DIRECTIONALITY OF DERIVATION OF THE CAUSATIVE ALTERNATION VERBS EVIDENCE FROM SLA RESEARCH

Enchao Shi
University of Arizona

1 Introduction

Recent research in lexical semantics has focussed on three questions (1) What constitutes the representation of a lexical entry in the lexicon (2) How are the morphologically related words (e g , *break*transitive vs *break*intransitive, *read* vs *readable*) related to one another in the lexicon? (3) How is the clausal interpretation derived? This paper is concerned with the first two, particularly the question concerning directionality of derivation of the paired causative verbs such as *shatter, crack, break*, etc Three proposals are first reviewed A standard view which claims that the intransitive *shatter*intr is the basic form from which the transitive *shatter*tran is derived, and an alternative view which conjectures that the direction of derivation is reversed Both proposals appeal to a unified account The third proposal explores a non-unified characterization, assuming that for some verbs the transitive variants are the basic uses, but for others the intransitive forms are the basic forms This review is followed by the report of a pilot study in which a group of non-native speakers (NNSs) of English were examined in terms of their knowledge of different variants of the causative alternation verbs An important assumption behind this study is that suppose frequency effect of input is minimal for these NNSs (i e , they were exposed to the intransitive and transitive forms to a similar extent), whichever forms these NNSs perform well with are the basic forms, and those with which these NNSs perform rather poorly are the derived forms This study aims to shed light on the on-going debate on whether the intransitive variant is derived from its transitive variant or the other way around Exploration of this question deserves attention as the literature shows that the standard view has dominated the current research in language acquisition studies For example, in studies on children's productive capability, researchers like Maratsos, et al (1987) and Gropen et al (reported in Pinker, 1989 54) all adopted the standard view and treated the intransitive forms as the basic uses and tested if children were willing to generate transitive uses in cases where the required semantic and morphophological conditions were met As is shown by our pilot study, such a treatment is open to question, in particular the results show that a non-unified account is more plausible This paper is divided into the following sections Section 2 reviews the standard view Section 3 gives an account of the alternative view, which is followed by the review of a non-unified account in section 4 Section 5 constitutes the report of the pilot study and a discussion of the questions at issue A conclusion is given in section 6

2 The standard view Intransitives as the base

The standard view traces back to Fillmore (1968) and continues to dominate the current research on the relation of the alternation verbs (e g , Williams, 1981, Pesetsky, 1995) To give a historical perspective, we start with Fillmore's proposal In his study of case grammar, Fillmore (1968 27) suggests that predicates are inserted into the well-formed frames like those in (1), which has been later developed into the subcategorization frames as in the Government and Binding theory (Chomsky, 1981) Fillmore (p 27) claims that the set of case frames in (1) gives rise to sentences in (2)

(1) a [_____ O]
    b [_____ O + A]
    c [_____ O + I]
    d [_____ O + I + A]

(2) a The door opened
    b John opened the door
    c The wind opened the door
    d John opened the door with a chisel

To avoid redundancy, Fillmore contends that (1) can be shrunk to (3), which is the form existing in the lexicon

(3) + [_____ O (I) (A)]

The parentheses in (3) are intended to indicate the optional nature of those elements Fillmore believes that causative alternation verbs like *open* are basically monadic, as only one NP with the objective case is obligatory Other related structures like (2b), (2c), and (2d), according to Fillmore, are derived through the addition of an NP with an agentive case, or an NP with an instrumental case Fillmore claims that a case frame like (3) captures the lexical relation between the variants of a verb like *open* To summarize, Fillmore contends that the basic structure for *open* is such that it requires an NP with the objective case, and this structure can be expanded when other NP(s) are added to (3) This characterization of the lexical relation of the variants of *open* represents the standard view Fillmore does not specify what motivates him to believe that the intransitive form is the source for further expansion, but Levin and Rappaport Hovav (1995 79) speculate that since the meaning of the transitive structure incorporates the meaning of the intransitive structure as in '*cause to V*-intransitive', the intransitive form ought to be the root and the transitive form, the derived

Williams (1981) proposes that the relation of the causative alternation verbs can be captured through a set of morphological rules Such rules are an operation of the addition of an affixation to a root, which derives a new word The application of the rule has a number of consequences First, it alters the adicity of the argument structure of the root Second, it changes the syntactic position of the argument subcategorized by the root word Williams (p 99), nonetheless, claims that no argument can be deleted or 'shortened' from the input argument in a derivation Morphological rules affect the external argument only as they may either internalize an external argument or externalize an internal argument of an input word These rules are formalized as follows E (X), I (X) Given only the I (X) rule is relevant to our discussion here, we focus on this rule only According to Williams (p 99), I (X) rule has two parts First, internalize or move the external argument of an input verb to the object position of the causative verb (the 'output word'), and then add a new external argument for the newly derived verb To illustrate, the causative $melt_{tran}$ is derived from its intransitive form $melt_{intr}$ as the result of the application of I (X)

(4) I (Th) $melt_{intr}$ (Th) $\rightarrow$ $melt_{tran}$ (A, Th)

(4) clearly illustrates Williams' idea of the direction of derivation of the two variants of the causative alternation predicates That is, there is only one possibility, with the transitive variants being derived from the intransitive variants Williams explicitly denies the possibility of a detransitivization process, as he claims that derivation from transitives to intransitives is 'sporadic', not all transitive verbs have corresponding intransitive variants, for example *put, attempt, build* can be used transitively only (p 104) Furthermore, Williams claims that from a logical perspective his proposal based on the subcategorization theory prevails over the detransitivization derivation as the latter would give rise to an illegal derivation Specifically, Williams claims that for a verb which takes two optional internal arguments like *promise*, four logical cases can be predicted based on the subcategorization theory as in (5), but not the one in (6)

(5) a X Y   one expansion   X Y
    b (X) Y   two expansion   X Y, Y
    c X (Y)   two expansions   X Y, X
    d (X) (Y)   four expansions X Y, X, Y, 0

(6)   X Y, X, 0

Williams contends that for (6) to be possible, element Y has to be present in the expansion set and thus the subcategorization theory successfully excludes it as a possible set In contrast, Williams shows that a detransitivization approach fails to exclude such an illegal result (i e , (6)), as seen in (7)

(7)   M $\longrightarrow$ M' $\longrightarrow$ M"
      X Y   X   0

Williams' argument based on logic exclusively is not tenable Without consideration of the lexical semantic and morphological properties characterized of the causative alternation verbs, Williams' account provides no account for the irregular patterns exhibited in the following paradigms

(8) a   The wind clear the sky
     b   The sky cleared
     c   The men cleared the table
     d   *The table cleared
(9) a   The baby burped
     b   The nurse burped the baby
     c   The doctor burped
     d   *The nurse burped the doctor   (Levin & Rappaport Hovav, 1994 46)

Furthermore, Williams' claim that a detransitivization derivation would give rise to an illegal derivation is a methodological artifact With a slight modification, the same derivation can be produced Moreover, Williams' account would be overinclusive, in that agentive verbs like *play, speak,* or *work* should thereby have transitive variants With no semantic considerations at all, Williams' logical account is also inadequate to account for the fact that verbs bearing similar meanings are not all eligible for various alternation constructions For instance, whereas verbs like *lean, beam,* and *shine* have both intransitive and transitive forms, verbs which denote similar meanings like *slouch, glitter,* and *sparkle* have intransitive forms only (Levin and Rappaport Hovav, 1994 42)

Pesetsky (1995), in analyzing causative psych verbs, presents an analysis consistent with the standard view Pesetsky basically argues that causative psych verbs, including those alternating psych verbs such as *worry, puzzle,* etc are made up of two components a root form (i e , SubjExp verbs, verbs which take an experiencer in the subject position), which is marked by the $\sqrt{}$ symbol and a phonologically null, bound morpheme, -CAUS, which is attached to the root, as seen in (10)

(10) [[$\sqrt{}$ SubjExp-predicate $_v$] 0_{CAUS}]

What (10) shows is that the SubjExp predicates are the base from which the causative psych predicates, which Pesetsky calls 'the ObjExp predicates', are derived by addition of a zero $_{CAUS}$ morpheme to the root In the paired sentences below, the a-sentences represent the root forms and the b-sentences, the derived forms

(11) a   John worried about the television set
      b   The television set worried John
      a   We puzzled over Sue's remarks
      b   Sue's remarks puzzled us   (Pesetsky, 1995 18)

To substantiate the existence of the zero $_{CAUS}$ morpheme, Pesetsky first refers to Myers' Generalization, which basically says 'zero-derived words do not permit the affixation of further derivational

397

morphemes' (Myers, 1984 66) Assuming Myers' Generalization is correct, the existence of the zero *CAUS* can be proved if the predicates with such zero morphemes disallow the addition of nominalizing suffixes This prediction is borne out by the data below

(12) a *The exam's continual agitation of Bill was silly
     b *Our constant annoyance of Mary got on our nerves   (Pesetsky, 1995 74)

The second piece of evidence Pesetsky provides to corroborate the existence of the proposed zero morpheme pertains to an asymmetry he observes as given below

(13) a The article in the *Times* made Bill angry at the government
     b *The article in the *Times* angered Bill at the government   (Pesetsky, 1995 60-61)

The ungrammaticality of (13b), according to Pesetsky, can be accounted for as follows Assuming that Cause and Causer elements are generated in a PP below the VP, the Cause element must move up to check the strong features borne by the *CAUS* under V Further, the Causer under the PP also needs to move to the Spec of VP to get NOM case However, with an additional PP as seen in (13b), the Cause is prevented from raising to V, as such a move violates Travis' (1984) *Head Movement Constraint*

  To summarize, the central idea of the standard view is that given an alternating predicate, if one variant is contained in another, then the former is the basic form and the latter is the derived form Furthemore, the standard view assumes that adding an additional argument is more desirable than deleting an existing argument
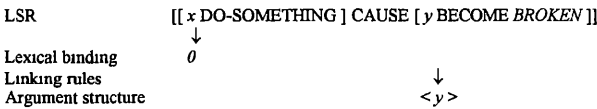

3 An alternative view Transitives as the base

  As has been seen in the previous section, an important underlying assumption, which motivates the standard view, is that if the semantics of a form is a subset of that of another form, then the former is the basic and unmarked form, which functions as an input form for the derivation of the transitive forms This assumption has led several researchers to the view that with the causative alternating verbs, the intrasitives are the basic forms whereas their causative variants are the derived uses, since the relation between the two forms can be characterized by such a subset-superset relation This assumption is actually reminiscent of an assumption commonly held in the aspectual study in linguistics, that is, complex events (e g , accomplishment) are derived from simple events (e g , activity) (See Dowty, 1979, Van Valin, 1990, Rappaport Hovav & Levin, 1998) Both assumptions seem to be based on a more underlying assumption that adding an argument or a subevent structure is more desirable than deleting one Below we will see that these assumptions have not gone without challenges We will focus on Levin and Rappaport Hovav's (1994, 1995) study on causative alternation verbs

  In their studies, Levin and Rappaport Hovav (1994, 1995) touch upon two issues What is the nature of lexical representation of causative alternation verbs and how can the relation between the two variants be characterized? Their major claim is that causative alternation verbs are 'semantically determined but syntactically represented' (Levin & Rappaport Hovav, 1995 21) Specifically, Levin and Rappaport Hovav claim that causative alternation verbs all share one semantic property, that is, they denote complex events involving a causing subevent and a central subevent, but under certain conditions the former subevent can be omitted Syntactically, the internal argument is base-generated in the direct object position and in the intransitive use, it is moved to the external position for case assignment Taking this assumption as the starting point, Levin and Rappaport Hovav make the following more specific claims

First, they claim that the causative alternating verbs like *break, shatter, crack*, are 'basically dyadic causative verbs' (p 81) The basic form for these verbs is that of the two-argument predicates, taking an internal argument and an external argument The inchoative (i e , intransitive) variants of these verbs are derived from the basic forms through what they call a 'detransitivization' process Further, Levin & Rappaport Hovav conjecture that given such an assumption, the two separate lexical representations for the causative alternation verbs, as suggested by other researchers (e g , Williams, 1981, Pesetsky, 1995), can be reduced to one single representation In other words, in the lexicon each causative alternation verb has only one entry which takes the form of the transitive variant This idea is illustrated in (14)

(14)   Representation of the transitive / intransitive forms of *break* (p, 108)

LSR	$[[\,x$ DO-SOMETHING $]$ CAUSE $[\,y$ BECOME *BROKEN* $]]$
	$\downarrow$
Lexical binding	0
Linking rules	$\downarrow$
Argument structure	$<y>$

According to Levin and Rappaport Hovav, (14) constitutes the lexical representation of predicates denoting externally caused eventualities (Levin & Rappaport Hovav, 1995 91) These eventualities contrast with internally caused eventualities in that they convey two subevents the causing subevent and the central subevent (Pustejovsky, 1992, Van Valin,1990), with the option that the causing subevent can be suppressed or unexpressed through a binding process as first proposed by Grimshaw (1990) When this occurs, the unexpressed subevent conveys either an agent, an instrument, a natural force, or a circumstance (p 92) As with the latter, there is only one subevent – the central subevent and no external causation is conveyed

To corroborate their claim, Levin and Rappaport Hovav provide such an argument, that is, 'the basic use of the verb will impose less stringent restrictions on its arguments, so that in those instances where there are different selectional restrictions on the transitive and intransitive uses, the use with the looser selectional restricitons, if there is one, will be basic' (p 86) This idea seems to be reminiscent of Jackendoff's (1975 644) *full-entry theory evaluation measure*, which says that 'of two lexicons describing the same data, that with a lower information content is more highly valued' Levin and Rappaport Hovav use (15) to justify their claim

(15) a   He broke his promise/the contract/the world record
       b   *His promise/the contract/The world record broke

Clearly, (15) shows that the intransitives impose more selectional restrictions than their causative counterparts This, according to Levin and Rappaport Hovav, provides evidence for their claim that derivation of the causative alternating verbs proceeds from the transitives to the intransitives As for under what condition a transitive variant can detransitivize, Levin and Rappaport Hovav suggest that language users seem to rely on their perception of the world, in particular their understanding of the condition under which an event may occur 'spontaneously without the volitional intervention of an agent' (p 102) Levin and Rappaport Hovav stress that when this condition is met, language users know that a given verb can detransitivize

To summarize, Levin and Rappaport Hovav propose an account contrasting the standard view, namely they argue that for causative alternation verbs the transitive variants are the basic forms from which their intransitive counterparts are derived through a detransitivation process, which Williams (1981) rejects outright In the next section, we review a still different account provided by Haspelmath

(1993), who basically claim that a unified account for the directionality of derivation of causative alternation verbs is not tenable

4   A non-unified account

Haspelmath (1993) challenges the unified account craved by both the proponents of the standard view and the alternative view, namely that whatever account one proposes regarding the directionality of derivation of the polysemouse causative verbs should be uniform Furthermore, Haspelmath also questions the morphological and semantic motivations underlying the previous accounts In its stead Haspelmath contends that a non-unified account would better account for the crosslinguistic data, particularly a cognitive account Haspelmath points out that the standard view as well as the alternative view, which he describes as instances of 'diagrammatic iconicity' (1993 87), fail to account for the following data, as they clearly show an irregular pattern of derivation

(16) Russian   *rasplavit'* 'melt' (transitive) → *rasplavit'-sja* 'melt' (intransitive)
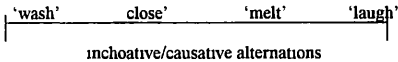(17) (Khalkha) Mongolian   *xajl-ax* 'melt' (intransitive) → *xajl-uul-ax* 'melt' (transitive)

Based on (16) and (17) and an extended crosslinguistic examination, Haspelmath claims that the world languages differ greatly in their ways of deriving one form from another Nonetheless, Haspelmath does not think that such a relation is random at all, rather he claims that the criterion may lie in the conceptual meaning as defined by Lakoff (1987) Haspelmath claims that the previous views fail to account for the data like those in (16)-(17) simply because they rely on the objective meaning With regard to the possibility of direction of derivation, Haspelmath claims that three major categories should be possible causative alternation (18a), anticausative alternation (18b), and non-directed alternation (18c) which is further divided into three categories equipollent, suppletive, and labile

(18) a French   *fondre* 'melt' (intr) → *faire fondre* 'melt' (tr)
        Georgian   *duy-s* 'cook' (intr) → *a-duy-ebs* 'cook' (tr)
     b Russian   *katat'* 'roll' (tr) → *katat'-sja* 'roll' (intr)
        Lezgian   *xkazun* 'raise' (tr) → *xkaz xun* 'rise' (intr)
     c Equipollent alternation
        Japanese   *atum-aru* 'gather' (intr)
                    atum-eru 'gather' (tr)
        Suppletive alternation
        Russian   *goret'* 'burn' (intr)
                    zec' 'burn' (tr)
        Labile alternation
        Modern Greek   *svino*   'go out'
                                  'extinguish'

The direction of derivation is generally determined in Haspelmath's framework by the presence or absence of a segmental string (e g , an affix, a particle, or an auxiliary verb) The one without such a string is the root form and the one with a string is the derived form Such a morphological approach is similar to Williams' Using such an approach, Haspelmath examined 21 languages and found tremendous crosslinguistic variations For example, while Russian, Rumanian, Greek, French, and German consistently show a pattern of anticausative alternation, Finnish, Turkish, Mongolian, and Hebrew show a reverse pattern – causative alternation Although such results provide an overall pattern, they are not particularly helpful in determining the direction of derivation Thus, using the same approach, Haspelmath looks at 31 predicates across the 21 languages more closely, this time more attention is paid to the conceptual meanings of the predicates Haspelmath found that verbs denoting

spontaneous occurrence of events (i e , spontaneous is defined as no need for an agentive instigator), including *freeze, dry, sink, going out,* and *melt,* show an overwhelming pattern of causative alternation across all 21 languages By contrast, verbs signifying events whose occurrence is incurred by outside force, including *split, break, close, open, gather,* and *connect,* show a pattern of anticausative alternation across all 21 languages Based on such results, Haspelmath formulates a conceptual scale of increasing likelihood of spontaneous occurrence, as given in (19)

(19) *Conceptual Scale of Increasing Likelihood of Spontaneous Occurrence*

```
  'wash'        close'         'melt'        'laugh'
|                                                   |
          inchoative/causative alternations
```

Verbs on the left end of the scale (e g , *wash, build, criticize*) can be used transitively only, as the events they describe cannot occur spontaneously Next, verbs like *close, open, break, drop,* although they can be perceived as describing events occurring spontaneously, denote events normally caused externally Thus, for these verbs, the transitive forms are the basic forms from which the intransitive variants are derived Next, verbs which may be subsumed under *melt,* including *freeze, cool, dry,* contrast the group on its left, in that they mainly signify spontaneous eventualities, although those events can be incurred or brought about by outside force Thus, for these verbs, the intransitive forms are basic, whereas their causative forms are derived Finally, on the far right end lie verbs like *laugh, talk,* which denote the prototypical instances of spontaneous events, therefore, they do not undergo an alternation of any kind at all

  To summarize, Haspelmath rejects the morphological and semantic accounts as proposed by Williams (1981), Fillmore (1968), Levin and Rappaport Hovav (1995), since they fail to account for the crosslinguistic data reliably Furthermore, Haspelmath has also denied the necessity for a unified characterization of the direction of the basic-derived relation of predicates like *break* Instead, Haspelmath presents a concept-based proposal as seen in (19) The key component of his proposal is the notion of spontaneity of events denoted by verbs Verbs may signify entirely spontaneous eventualities or non-spontaneous eventualities In neither case, an alternating construction is possible However, in between, there are verbs whose single forms denote both types of eventualities, with one being the base and the other, the derived For these verbs, the basic-derived relation is determined by the human perception That is, if one perceives that an event occurs spontaneously, then the intransitive form would be treated as the base, otherwise it would be regarded as derived Haspelmath's proposal echoes such a commonly held notion in cognitive grammar, that is, human language constructions mirror its experiences Givon (1991 106) explicitly makes a remark along this line, saying 'categories that are cognitively marked tend also to be structurally marked' Goldberg (1995 39) expresses a similar idea in her *Scene Encoding Hypothesis,* which states that language constructions are formed to encode basic human experience Other researchers, including Pinker (1989) and Hale and Kyser (1986) have also endorsed such a non-unified account as proposed by Haspelmath

5 A polite study

  Given the apparent divergence in various accounts for directionality of derivation of causative alternation verbs, the present study is reported to show which account would be more plausible based on empirical evidence elicited from second language (SL) learners of English An important assumption underlying this study is that the basic forms would be acquired prior to the derived forms Put it differently, whatever variants are learned earlier would be considered the basic forms, and those acquired later, the derived forms Furthermore, it was also assumed that if the data showed that SL

401

learners performed consistently better with the transitive variants, then this would be taken as evidence in support of the standard view, otherwise if the reverse was obtained, then we would take this as evidence supporting the alternative view. However, if the subjects' performance showed an inconsistent pattern (i e , for certain verbs they acquired the transitive variants prior to the intransitive variants, but for other verbs a reversed pattern is observed), then we would treat this as supportive evidence for Haspelmath's (1993) non-unified cognitive account

Subjects

Ten adult Mandarin-speaking learners of English participated in the study, who were currently enrolled at the University of Arizona At the time of the study, they had been in the United State for one year and 11 months on average They ranged in age from 19 years of age to 28 years of age They were first exposed to English in a formal EFL (English as a foreign language) setting at various ages, with the majority first starting studying English at around the age of 12 They took a TOEFL test before they were enrolled at the University of Arizona, and their mean score on the test was 602 4, with 7 out of 10 obtaining over 600 and the other 3, between 535 to 590 Thus, these subjects are the advanced ESL learners Another 10 native speakers of English, who were also currently enrolled at the University of Arizona, formed the control group

Tasks

Thirty high-frequency pairs of causative alternation verbs were tested, most of which were selected from samples given in Levin and Rappaport Hovav (1994) and Levin (1993) with 5 causative psych verbs selected from samples given in Pesetsky (1995) These verbs are listed in (20)

(20) *move, dry, melt, roll form, improve, broaden, thicken, deepen, capsize, reduce break, carry over, increase shut, transfer, sink, shrink, drop, grow ,clear, freeze, turn, burn, open, cheer, puzzle, worry, grieve, delight*

Twenty-one fillers were used as distracters

(21) *bring, cry, laugh, appear, denote, pour, obtain, send, become, torn, repair anger, cut, amuse smell load, cover, eat, sweat, blossom, pull*

A grammaticality judgment test was administered to both the experimental and the control groups, which was composed of a total of 80 test sentences [1] Subjects were asked to mark each sentence as grammatical, ungrammatical, or not sure by circling the appropriate letter and to underline the part of a sentence which they believed was ungrammatical Since we were only interested in the subjects' knowledge of the predicates, anything else marked by the subjects as ungrammatical or not sure was disregarded in the coding and calculating of the data The test sentences were arranged in a random [1]order and all subjects received the same order (22)-(23) contain two of the test sentences

(22) [A note you may see in the post office] The line forms on this side of the aisle   a GR   b UNGR   c NOT SURE

(23) The runner <u>sweated himself</u> so bad that he fainted   a GR   b UNGR   c NOT SURE

Based on the results obtained from the control group, 7 pairs of verbs, including *move, freeze, cheer, puzzle, delight, worry, grieve*, were excluded from further analysis as the test sentences involving these predicate turned out to be either ambiguous or pragmatically not felicitous For example, several native

---

[1] Special thanks to Adrian Wurr for checking the test sentences

speaker subjects marked sentence (24) as ungrammatical as they felt that the tense use was inappropriate So a total of 23 paired verbs was examined in the analysis

(24) Water froze in the winter   a GR b UNGR c NOT SURE

Results

Let's first look at the overall average scores obtained from the experimental and control groups They are given in Table 1

Table 1 *Overal average scores obtained by NSs and NNSs*

	Transitives	Intransitives
NS	217 (= 94%) (M = 21 7)	214 (= 93%) (M = 21 4)
NNS	209 (= 91%) (M = 20 9)	124 (= 54%) (M = 12 4)

Note   *Total score for each cell is 230 NS native speakers of English, NNS nonnative speakers of English*

Table 1 shows three interesting results The first is that NSs performed almost equally well on sentences involving transitive and intransitive variants, as their accuracy rate was 94% and 93%, respectively The second is that NSs and NNSs performed in a comparable manner on transitive variants, with NSs obtaining an accuracy rate of 94% and NNSs, an accuracy rate of 91% However, such comparability is absent from the two groups' performance on the intransitive variants, as the NSs obtained a 93% accuracy rate, whereas the NNSs, only a 54% accuracy rate An interim conclusion can be drawn at this point that the overall results appear to show that the standard view, which claims that the relation between transitive and intransitive variants of causative alternation predicates is best accounted for by assuming that the latter is the basic form from which the former is derived, is not plausible since the NNSs performed better with the transitive variants than the intransitive variants To the contrary, the alternative view is more plausible

However, with a closer look at the individual verbs, it appears that NSs' and NNSs' performance on both transitives and intransitives was much comparable with certain verbs, but not with others Roughly, the 23 predicates can be divided into two groups Group A and Group B Let's first look at Group A in some detail Table 2 shows a similar performance pattern between NSs and NNSs in judging sentences involving the two variants of verbs in this group

Table 2 *Total scores for individual paired verbs (Group A)*

	dry_tr		dry_mtr		melt		roll		thicken		shut		shrink		grow		turn		increase	
NS	9	10	10	10	8	9	10	7	10	9	10	9	10	10	9	10	10	9		
NNS	9	7	10	9	10	10	9	8	10	8	9	9	8	10	8	9	9	8		

Note   *Total score for each variant (cell) is 10 The scores on the left of the dotted line is the total scores obtained by NSs and NNSs, respectively*

Table 2 should be read like this For the transitive and intransitive variants of the verb *dry*, 9 out of ten native speaker subjects got the sentence involving the transitive use of the verb right, and so did the non-native speaker subjects As for the intransitive use, all native speaker subjects got the sentence right and

7 out of the 10 nonnative speaker subjects got the sentence right Overall, NSs and NNSs performed in a similar fashion with the predicates in Group A This becomes more obvious as seen in Table 3

Table 3 *Comparison of the average scores between NSs and NNSs on verbs in Group A*

	Transitives	Intransitives
NS	86 (= 96%) (M = 8 6)	83 (= 92%) (M = 8 3)
NNS	82 (= 91%) (M = 8 2)	78 (= 87%) (M = 7 8)

Note Total score for each variant (cell) is 90

Table 2 and 3 show a similar performance pattern between NSs and NNSs As for sentences involving transitive variants, NSs got 96% right, whereas NNSs, 91% correct As with sentences with intransitive variants, NSs obtained 92% correct and NNSs, 87% right The difference is minimal Furthermore, the intra-group difference is very small for the NS group, for the NNS group the difference is only about 5 percentage points This result seems to have revived the standard view, as it is possible that the NNSs acquired the intransitive variants first before they were able to master their transitive forms Furthermore, based on the criterion given by Haspelmath, verbs in this group should be subsumed under the category where the intransitives are the base However, such a conclusion is quickly weakened with a look at Group B, which shows that for NSs they performed consistently with both transitives and intransitives, but such a consistency was absent from NNSs' performance

Table 4 *Total scores for individual paired verbs (Group B)*

	open$_{tr}$ open$_{intr}$	form	improve	broaden	capsize	reduce	clear	sink	transfer	carry over	burn	break
NS	10 10	10 9	10 10	10 9	9 10	10 9	9 9	9 10	10 6	10 10	10 10	10 10
NNS	9 4	10 4	10 5	10 1	8 1	10 2	7 5	9 5	8 1	9 3	10 2	10 2

	deepen	drop
NS	7 10	7 9
NNS	8 5	9 6

Note Total score for each variant (cell) is 10

Table 5 *Comparison of the average scores between NSs and NNSs on verbs in Group B*

	Transitives	Intransitives
NS	131 (=94%) (M = 13 1)	131 (= 94%) (M = 11 2)
NNS	127 (= 91%) (M = 12 7)	46 (= 33%) (M = 4 6)

Note Total score for each variant (cell) is 140

Tables 4 and 5 exhibit the overall performance trend as seen in Table 1 with the NSs showing consistent judgments of the grammaticality of sentences involving transitives and intransitives, whereas the NNSs, judging the sentences with transitives overwhelmingly better than those with intransitives However, what has been concealed in Table 1 is that only certain causative alternation predicates seemed to be

troublesome for the NNSs, specifically the intransitive variants in Group B constitute the source of difficulty, as the NNSs showed an accuracy rate of only 33%, which means that on average each NNS got 9 4 test sentences wrong (out of 14) Furthermore, the intra-group difference for the NNSs is also striking, it was 81 points in total To summarize, with Group B, NSs and NNSs' performance on the transitive variants was comparable, but their performance on the intransitive variants diverged dramatically Such a result seems to point to the possibility that the transitive variants are the basic forms from which the intransitive variants are derived

Discussion

Assuming that the English causative alternation predicates under study here were exposed to the NNS subjects on a roughly equal basis and further assuming that Grimshaw's (1981 174) and Chomsky's (1995 32) claim that the notion of Canonical Structural Realization (CSR) is available to children as an initial learning mechanism for acquiring lexical items is correct, the results reported in the preceding section show that Haspelmath's non-unified account for the directionality of derivation of causative alternation verbs is on the right track Specifically, the NNS subjects demonstrated a non-unified learning pattern in acquiring the transitive and intransitive variants of this verb class, in particular they mastered the intransitive forms of such verbs including *dry, melt roll, shut, shrink, grow, turn increase,* and *thicken* (Group A) prior to their transitive variants This is compatible with Haspelmath's conjecture that the intransitive variants are the basic forms for these verbs But how are the transitive variants derived? Rappaport Hovav and Levin (1998) propose that the intransitive variants of Group A are initially represented in such a schema as in (25)

(25) $melt_{intr}$ [x *MELT*]

(25) is an event structure template, which denote a simple, end-state event Such an event, according to Rappaport Hovav and Levin (1998 111), can be freely augmented to a complex event structure, such as an accomplishment event, so long as the augmentation process satisfies two well-formedness conditions Subevent Identification Condition (SIC) and Argument Realization Condition (ARC) (pp 112-113) In this case, a simple event structure signifying a simple state event is expanded to a complex event structure conveying an accomplishment event as given in (26) by addition of a causing subevent to the existing central subevent This addition is allowed as in the resulting event structure (i e (26), each subevent is identified by a lexical head in the syntax (satisfying the SIC) and each structure participant (symbolized as variables x or y in (26)) is matched with an argument in the syntax (satisfying the ARC), as seen in (27)

(26) $melt_{tr}$ [[x DO-SOMETHING] CAUSE [y BECOME *MELT*]]
(27) Mary / the warm weather melt snow

Now let's turn our attention to predicates in Group B, including *open, form, reduce, clear, sink, break, burn, drop, improve, broaden, capsize, transfer,* and *carry over* How are the two variants of these verbs derived and represented in the lexicon? The result, as given in Table 4, suggests that the transitive variants are first formed as the basic uses, which then give rise to the intransitive variants as a result of the application of binding process (Levin & Rappaport Hovav, 1995 108) Specifically, adopting Haspelmath's (1993) account which emphasizes the notion of *spontaneity*, certain events, as denoted by such predicates as *break, open, form, reduce, transfer*, etc , cannot occur on their own or *spontaneously*, rather they are typically brought about by outside force Thus, the transitive forms of these verbs constitute the basic uses, and from a language acquisition perspective, these forms are also more accessible to children as well as adult language learners However, according to Levin and Rappaport Hovav (1995), in encoding these non-spontaneous events linguistically, we somehow decide

that such causing elements as an agent, a natural force, an instrument, or a circumstance can be omitted or unexpressed Such a decision is probably made based on our knowledge of the world (Levin & Rappaport Hovav, 1995 108) plus the inference rules at our disposition (Jackendoff, 1990) Rappaport Hovav and Levin (1998 115) spell out this process more specifically, utilizing Brisson's (1994) research on the recoverability condition They claim that a structural participant in the event structure can be unexpressed in the syntax 'if it is understood as "prototypical"' To summarize, the derivation of the two variants of verbs in Group B proceeds in such a sequence, starting with (28) which is the basic form, then proceeding to (29) where the binding process is applied, and finally to (30) where the intransitive forms are formed

(28) $form_{tr}$ [[x DO-SOMETHING] CAUSE [y BECOME *FORMED*]]
(29) $form_{tr}$ [[x DO-SOMETHING] CAUSE [y BECOME *BROKEN*]]
                    ↓
Lexical binding 0
Linking rules   ↓
Argument structure $<y>$
(30) $form_{intr}$ [y *FORM*]

So far an important question has been left out in the discussion as to what is the origin of the basic forms such as (25) and (28) Haspelmath provides a rather simplified answer, claiming that the formations of (25) and (28) are made possible through human cognition as a way to encode human experience More specifically, taking (25) as an example, Haspelmath conceives that as human beings observe such a scene (in the sense of Fillmore's (1977) where some substance changes state from solid to liquid, they encode this scene with the schema (25) Likewise, (28) is constructed in the similar fashion Such a line of thinking suggests that there is a direct relation between the real-world events and the linguistic encoding of those events Other researchers also advocate such an account As mentioned above, Givon (1991 106) and Goldberg (1995 39) are the advocates of such an idea However, this idea has been challenged in the literature For example, Jackendoff (1990 25-26) claims that given the fact that a single predicate like *go* may convey real-world events of different types, its characterization can be best captured in terms of semantic field features, as seen in (31)

(31) a   The bird went from the ground to the tree (semantic field of *spatial location and motion*)
      b   The inheritance went to Philip   (semantic field of *possession*)
      c   The light went from green to red   (semantic field of *ascription of properties*)

In other words, contrary to Haspelmath's conjecture, Jackendoff claims that the relation between predicates and the events they denote is indirect, in particular it is mediated by the semantic field features Other researchers also expressed the same idea that human languages do not encode human experiences directly, rather such an encoding is mediated by a system which is linguistic in nature For instance, following Jackendoff (1990), Culicover (1999) claims that such a relation is mediated by the lexical conceptual structure (LCS) Levin and Rappaport Hovav (1995) and Levin and Rappaport Hovav (1996) explicitly argue that predicates only incorporate those syntactically relevant semantic features derived from the real-world scenarios Talmy (1985), in his study of the conflation patterns of various languages, provides an often-quoted example in relation to the predicate *float* According to Talmy (p 64), the English verb *float* has two meanings referring to a 'buoyancy relation between an object and a medium' as in (32a) and to such a relation plus the idea of motion as in (32b)

(32) a   The boat floated under the bridge (Levin & Rappaport Hovav, 1996 504)
      b   The boat floated towards the bridge

However, as pointed out by Levin and Rappaport Hovav, 1996 504), the French equivalent of *float* has only one meaning, that of (32a), as in (33)

(33) Le bateau a flotte sous le pont

It is not far-reaching to assume that both English speakers and French speakers may witness the same scene of *floating* at one point in their real-world experiences, nonetheless as dictated by their different native languages, they know that for English the semantic feature of motion can be lexicalized into its predicate *float*, which make (32b) possible, but the same is not true of French and thus there is no equivalent to (32b) in French This provides strong evidence that human experience is not always mirrored directly in linguistic terms

Similarly, Pinker (1989) also echoes such an indirect connection between human experience and linguistic encoding from a language acquisition perspective He contends that in acquiring the container-oriented verbs like *fill*, a child may register such information from a real life situation about *fill*, including that *fill* is a two-argument predicate, taking an agent and a theme, it specifies a manner in which the agent causes the liquid to move, the shape of the container, and the end-state of the container (i e holism), etc , but soon the child may realize that only part of this information is syntactically relevant and thus expunge the information concerning the manner, the shape of the container, etc , but maintain the rest Pinker uses the production data collected by Bowerman (1982) to support his hypothesis These data show that the complete set of the syntactically relevant semantic features in association of verbs like *fill* do not come along as a whole, which would be predicted by Haspelmath's account, rather it takes children quite some time to pinpoint the exact components of the set This point is illustrated by the production errors collected by Bowerman from her children, as seen in (34)

(34) a Can I fill some salt into the bear? [fill a bear-shaped salt shaker with some salt]
      b And fill the little sugers up in the bowl how much you should [=fill the bowl with as much cereal as you should]

Once again, this shows that from a language acquisition standpoint, the relation between real-world events and linguistic encoding of those events is best assumed as indirect rather than direct

6 Conclusion

This study examined the question concerning directionality of derivation of transitive and intransitive variants of the causative alternation predicates Three different proposals were first reviewed The standard view, the alternative view, and a non-unified account This was followed by the report of an empirical study As the results show, Haspelmath's non-unified account appears to be on the right track Particularly, the NNS subjects demonstrated an acquisition pattern consistent with Haspelmath's predictions For example, with the predicates whose transitive variants are predicted as basic on Haspelmath's account, the NNS subjects performed overwhelmingly better on sentences involving the transitive variants than those involving the intransitive variants Furthermore, with the predicates whose intransitive variants are predicted as basic by Haspelmath, the same subjects performed in a comparable manner on both sentences involving transitive and intransitive variants This seems to show that it is possible that for this group of verbs, the intransitive variants are the root forms, from which their transitive counterparts are derived Finally, we briefly explored Haspelmath's assumption that linguistic expressions directly reflect real-world events and showed that such an assumption is not accurate, rather it is better to assume that such a relation is indirect

References

Bowerman, Melissa 1982 Evaluating competing linguistic models with language acquisition data Implications of developmental errors with causative verbs Quaderni di semantica, 3 5-65

Brisson, Christine 1994 The licensing of unexpressed objects in English verbs Papers from the 30th Regional Meeting of the Chicago Linguistic Society (CLS), Volume 1 The Main Session 99-102

Chomsky, Noam 1981 Lectures on government and binding Dordrecht Foris

Chomsky, Noam 1995 The Minimalist program Cambridge, Mass The MIT Press

Culicover, Peter W 1999 Syntactic Nuts Hard cases, syntactic theory and language acquisition Oxford, UK Oxford University Press

Dowty, David 1979 Word meaning and Montague grammar Dordrecht Reidel

Fillmore, Charles J 1968 The case for case Universals in linguistic theory, ed by Emmon Bach and Robert T Harms, 1-88 New York Holt, Rinehart and Winston

Fillmore, Charles J 1977 Topics in lexical semantics Current issues in linguistics theory, ed by R Cole, 76-138 Bloomington Indiana University Press

Givon, Talmy 1991 Isomorphism in the grammatical code Cognitive and biological considerations Studies in Language 15 85-114

Goldberg, Adele E 1995 A construction grammar approach to argument structure Chicago The University of Chicago Press

Grimshae, Jane 1981 Form, function, and the language acquisition device The logical problem of language acquisition, ed by C L Baker and John J McCarthy, 183-210 Cambridge, Mass The MIT Press

Grimshaw, Jane 1990 Argument structure Cambridge, Mass The MIT Press

Gropen, Jess, Setven, Pinker, & Thomas Roeper 1989 The role of directness of causation in children's productive lexical and periphrastic causatives Reported in Pinker (1989 54)

Hale, Ken and Jay Keyser 1986 Some transitivity alternations in English Lexicon Project Working Papers #7, MIT, Cambridge, MA

Haspelmath, Martin 1993 More on the typology of inchoative/causative verb alternations Causatives and transitivity, ed Bernard Comrie, 87-120 Amsterdam John Benjamins Publishing Company

Jackendoff, Ray 1975 Morphological and semantic regularities in the lexicon Lg 51(3) 639-71

Jackendoff, Ray 1990 Semantic structures Cambridge, Mass The MIT Press

Lakoff, George 1987 Women, fire, and dangerous things Chicago The university of Chicago Press

Levin, Beth 1993 English verb classes and alternation A preliminary investigation Chicago The University of Chicago Press

Levin, Beth and Malka Rappaport Hovav (1994) A preliminary analysis of causative verbs in English The acquisition of the lexicon, ed by Lila Gleitman and Barbara Landau, 35-77 Cambridge, Mass The MIT Press

Levin, Beth and Malka Rappaport Hovav 1995 Unaccusativity At the syntax-lexical semantics interface Cambridge, Mass The MIT Press

Levin, Beth and Malka Rappaport Hovav 1996 Lexical semantics and syntactic structure The handbook of contemporary semantic theory, ed by Shalom Lappin, 487-507 Oxford, UK Blackwell Publishers

Maratsos, Michael, Roxane Gudeman, Poldi Gerard-Ngo, and Ganie DeHart 1987 A study in novel word learning The productivity of the causative Mechanisms of language acquisition, ed by Brian MacWhinney, 89-113 Hillsdale, New Jersey Lawrence Erlbaum Associates, Publishers

Myers, Scott 1984 Zero-derivation and inflection MIT working papers in linguistics 7 Department of Linguistics and Philosophy, MIT, Cambridge, Mass

Pesetsky, David 1995 Zero syntax Experiencers and cascades Cambridge, Mass The MIT Press

Pinker, Steven 1989 Learnability and cognition The acquisition of argument structure Cambridge, Mass The MIT Press

Rappaport Hovav, Malka and Beth Levin 1998 Building verb meanings The projection of arguments Lexical and compositional factors, ed by Miriam Butt and Wilhelm Geuder, 135-164 Stanford, CA CSLI Publications

Pustejovsky, James 1992 The syntax of event structure Lexical & conceptual semantics, ed by Beth Levin and Steven Pinker, 47-82 Cambridge, Mass Blackwell Publishers

Talmy, Leonard 1985 Lexicalization patterns semantic structure in lexical forms Language typology and syntactic description, ed by T Shopen, 57-149 Cambridge, UK Cambridge University Press

Travis, L (1984) Parameters and effects of word order variation *Doctoral dissertation*, MIT, Cambridge, Mass

Van Valin, Robert D 1990 Semantic parameters of split intransitivity Lg 66 (2) 221-60

Williams, Edwin 1981 Argument structure and morphology The Linguistic Review 1 81-114