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WORD FORMATION OF JAPANESE V-V COMPOUNDS

A DISSERTATION

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OF KOBE SHOIN GRADUATE SCHOOL OF LETTERS

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

Adviser: GUNJI Takao

By

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Dissertation Committee

Chairperson: GUNJI Takao

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Acknowledgments

It was about four years ago that I began to study Japanese V-V compounds. Before that, my interest had been in complex predicates in English and I had intended to study relating phenomena for my Ph.D. dissertation. What urged me to change my mind to tackle V-V compounds was prof. Gunji's suggestion, when I was a research student at Kobe Shoin. Since then he has constantly been supportive. Especially for the past three years in a row, he has given me insightful suggestions and advice as my supervisor and the chair of the reading committee. I can never thank him enough.

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Contents

Chapter 1   Introduction

1.1   Background

The process of 'compounding,' in which two words combine to form one word, seems to be one of the most productive and pervasive ways of word formation in Japanese.

(1) a.   V-V compounds

hasiri-sar(u) (run-leave), *moti-sar(u)* (have-leave), *ori-mage(ru)* (fold-bend), *tataki-tubus(u)* (hit-crush), *humi-tubus(u)* (step.on-crush), *aruki-tukare(ru)* (walk-get.tired), *nomi-tukare(ru)* (drink-get.tired), *katari-akas(u)* (talk-spend.night), *nagare-tuk(u)* (flow-arrive), *kogi-tuk(u)* (row-arrive), *kogi-susum(u)* (row-proceed), *ki-kuzure(ru)* (wear-get.disordered), *ni-kuzure(ru)* (simmer-crumble)

走り去る，持ち去る，折り曲げる，叩き潰す，踏み潰す，歩き疲れる，飲み疲れる，語り明かす，流れ着く，漕ぎ着く，漕ぎ進む，着崩れる，煮崩れる

b.   N-N compounds

hude-bako (pencil-case), *biiru-bin* (beer-bottle), *wain-gurasu* (wine-glass), *e-hagaki* (picture-post.card), *ude-dokei* (wrist-watch), *take-zutu* (bamboo-pipe), *hana-bi* (flower-fire), *hon-dana* (book-self), *karaa-terebi* (color-TV), *usi-goya* (cattle-pen)

筆箱，ビール瓶，ワイングラス，絵葉書，腕時計，竹筒，花火，本棚，カラーテレビ，牛小屋

c.   V-N compounds

keetai-denwa (carry-phone), *benkyoo-beya* (study-room), *seizoo-gaisya* (production-company), *sanka-ninzuu* (participate-number.of.people), *yaki-soba* (fry-noodle), *yude-tamago* (boil-egg), *kiri-e* (cut-picture), *warai-ziwa* (smile-wrinkle), *nuri-e* (paint-picture), *sasi-kizu* (stick-wound)

携帯電話，勉強部屋，製造会社，参加人数，焼きそば，ゆで卵，切り絵，笑い皺，塗り絵，刺し傷

d.   N-V compounds

katei-hoomon (home-visit), *iken-syuuyaku* (remark-collect), *kidoo-syuusei* (orbit-correct), *haka-mairi* (tomb-visit), *sumi-yaki* (charcoal-burn), *mise-zimai* (shop-close), *mono-dukuri* (things-make), *ki-dukare* (mind-get.tired)

家庭訪問，意見集約，軌道修正，墓参り，炭焼き，店じまい，ものづくり，気疲れ

e.   A-A compounds

ao-ziroi (blue-white), *hoso-nagai* (thin-long), *asa-guroi* (shallow-black), *usu-gurai* (thin-dark), *ama-karai* (sweet-hot), *ama-zuppai* (sweet-sour), *atu-kurusii* (hot-annoying)

青白い，細長い，浅黒い，薄暗い，甘辛い，暑苦しい

f.   N-A compounds

tikara-duyoi (power-strong), *hara-guroi* (belly-black), *igi-bukai* (meaning-deep), *siryo-bukai* (consideration-deep), *nasake-bukai* (mercy-deep), *ki-yowa(na)* (mind-weak)

力強い，腹黒い，意義深い，思慮深い，情け深い，気弱（な）

Among these compounds, we focus on V-V compounds, which offer a theoretically intriguing perspective on the interface of semantics, syntax, morphology, and pragmatics, and which have been given relatively frequent and accurate theoretical analysis in the field of lexical semantics, syntax, and other related areas (Kageyama (1993), Matsumoto (1998), Fujita and Matsumoto (2005), Yumoto (2005), Fukushima (2005), among others). Specifically the present dissertation aims to analyze the word-formation process of Japanese lexical V-V compounding (Kageyama 1993).

In spite of the high productivity exemplified above, however, in V-V compounds, not every random combination of two verbs is accepted even if the semantic interpretation seems to be possible.

(2)   **hai-sar(u)* (crawl-leave), **tukami-sar(u)* (hold-leave), **tataki-tubure(ru)* (hit-get.crushed), **humi-tubure(ru)* (step.on-get.crushed), **siri-tukare(ru)* (know-get.tired), **tataki-akas(u)* (hit-spend.night), *warai-tuk(u)* (laugh-arrive), **ki-yase(ru)* (wear-get.slim), **naki-susum(u)*

(cry-proceed)

這い去る，?*歩き去る，*つかみ去る，*叩き潰れる，*踏み潰れる，*知り疲れる，*叩き明かす，*笑い着く，*着痩せる，*泣き進む

For example, **hawi-sar(u)* (crawl-leave) and *?*aruki-sar(u)* (walk-leave) are not accepted while *hasiri-sar(u)* is good, in which the same verb *sar(u)* occurs as V2 and the V1 *haw(u)* and *aruk(u)* seem to be classified into the same type as *hasir(u)* (run) (manner-of-motion verb). In addition, the intransitive lexical V-V compounds (LVCs) **tataki-tubure(ru)* (hit-get.crashed) and **humi-tubure(ru)* (step.on-get.crashed) are impossible, whereas their counterpart transitive LVCs *humi-tubus(u)* and *tataki-tubus(u)* are typical examples of LVCs. One of our aims is to provide a more accurate explanation which can describe and predict possible combination of two verbs than previous studies.

Compared with syntactic V-V compounds (SVCs) (the differences between LVC and SVC is reviewed briefly in the next section), in which the former verb (V1) is, roughly speaking, syntactically embedded as a complement of the latter verb (V2), LVCs show relatively complicated behavior in the possibility of V1-V2 combination, as we have just seen, as well as in argument inheritance, and semantic construal.

As to argument inheritance, in some cases, LVCs inherit the arguments of both verbs; in other cases only those of V2; while in yet other cases only those of V1 are inherited. Concrete examples are presented in the next chapter. Can it be possible to give a reasonable and convincing explanation of this variation? The rule which seems to play a crucial role is the *Righthand Head Rule* (RHR) (Williams 1981), which defines the right-hand member as the head in morphologically complex structure. Although most of the previous studies adopt RHR[1] as a primitive rule and RHR holds in many LVCs, the facts of argument inheritance mentioned above cast doubt on such a view. That is, the question is whether RHR must be primitively applied to all LVCs. In order to give a precise explanation on the difference in argument inheritance among LVCs, it would be optimal to have some other rules which can capture the difference. Assuming that syntactic features of LVCs reflect the semantics of the two verbs to be compounded, we argue that lexical semantic properties of the verbs

---

[1] One exception is Matsumoto (1998), who argues there are some LVCs where V1 should be regarded as semantic head.

compositionally determine the headedness of the formed LVCs. In other words, we attempt to pursue the possibility of the view that lexical semantic properties determine syntactic property as far as possible, without depending on primitive morpho-syntactic rules.

In addition to argument inheritance, LVCs seem to show variety in their semantic interpretations: V1 is interpreted as a cause (*hasiri-tukare(ru)* (run-get.tired)), means (*tataki-otos(u)* (hit-drop)), or an accompanying situation (*asobi-kurasu* (play-lead.a.life)) of V2; sometimes V1 appears to be just mixed up with V2 (*naki-sakeb(u)* (weep-cry)), as has been analyzed. Here a question arises, however: why do LVCs have such variety in their interpretation? Where do such interpretations come from?

Giving reasonable answers to these question not only enables us to get a more precise and accurate sketch of Japanese LVCs, but also contribute to theoretical simplification. Moreover, our theoretical system, I believe, can be applied to the analysis of languages other than Japanese and make crosslinguistic studies of V-V compounds and semantics of lexical complex predicates, which is to be carried out in the future.

1.2   Syntactic V-V compounds and lexical V-V compounds

The target of this thesis is what is called lexical V-V compounds (LVCs), which are distinguished from syntactic V-V compounds (SVCs). There have been descriptive studies on V-V compounds, such as Teramura (1984), Ishii (1983), Shirota (1998), Himeno (1999), etc. But, as far as I know, it was Kageyama (1993) that theoretically analyzed V-V compounds from the perspective of Generative Grammar, and defined the distinction of these two kinds of V-V compounds for the first time.

The distinction between SVCs and LVCs comes from the fact of whether the two verbs in the compound can behave as syntactically independent elements. According to Kageyama, this is attested mainly by the following tests.

(3)   Anaphoric Restriction

   a. Ken-ga   ki-o   **kiri**-hazime-ta-node Naomi-mo **soo**-si-hazime-ta (SVC)
       Ken-NOM tree-ACC cut-begin-PAST-so   Naomi-too so-do-begin-PAST
       Ken began to cut down the tree, and Naomi began to do so.
       健が木を切り始めたので，奈緒美もそうし始めた。

  b. *Ken-ga   ki-o   **kiri**-taosi-ta-node Naomi-mo **soo**-si-taosi-ta   (LVC)

   Ken-NOM tree-ACC cut-begin-PAST-so Naomi-too so-do-begin-PAST
   Ken cut down the tree, so Naomi fell so.

  *健が木を切り倒したので，奈緒美もそうし倒した

(4)   Honorification

  a.   sensei-wa   tegami-o   o-**kaki**-ni-nari-**hazime**-ta   (SVC)

   teacher-NOM letter-ACC HON-write-DAT-HON-begin-PAST
   Our teacher began to write a letter.

   先生が手紙をお書きになり始めた。

  b. *sensei-wa   tegami-o   o-**uke**-ni-nari-**tot**-ta

   teacher-NOM letter-ACC HON-receive-DAT-HON-take-PAST
   The teacher received a letter.

  *先生が手紙をお受けになり取った。

   cf. sensei-ga   tegami-o   o-**uke-tori**-ni-nat-ta   (LVC)

    teacher-NOM letter-ACC HON-receive-take-DAT-HON-PAST
    The teacher received a letter.

    先生が手紙をお受け取りになった。

(5)   Passivization of V1

  a.   ki-ga   **kir**-are-**hazime**-ta   (SVC)

   tree-NOM cut-PASS-begin-PAST
   The tree began to be cut.

   木が切られ始めた。

  b. *ki-ga   **kir**-are-**taosi**-ta   (LVC)

   tree-NOM cut-PASS-fell-PAST
   The tree was cut down.

   *木が切られ倒した。

(6)   Paraphrase of V1 by a light verb expression

a. **setudan**-si-**hajimeru**

cut-do-begin

begin to cut

切断し始める

cf. kiri-hajimeru (begin to cut)

　　cut-begin
　　切り始める (SVC)

b. ***settyaku**-si-**tukeru**

glue-do-attach

glue

*接着しつける

cf. hari-tukeru (post)

　　post-attach
　　貼り付ける (LVC)

Our target is LVCs, which can be defined by these tests. Of course, as Yumoto (2005) and Ogawa and Niinuma (2010) point out, the nature of these test also should be examined. In fact Ogawa and Niinuma (2010) argue that not all seemingly LVCs show the same behavior with respect to these tests, so it may be possible to analyze some of LVCs as SVCs in fact. However, in most of the V-V compounds which can also be analyzed syntactically, the second verb (V2) has more or less lost its original meaning and functions as some kind of aspect marker. Although I analyze a few of such examples, our main interest goes to LVCs in which both V1 and V2 retain their original meaning more or less, and the meaning of which is compositionally calculated: we focus on V-V compounds which pass most of the tests above. What we want to see is the world within LVCs, rather than differences between LVCs and SVCs.

1.3   The purpose of the dissertation

The purpose of this dissertaion is to give a theoretical explanation which has predictability and falsifiability, rather than to sketch the distribution of LVCs. Specifically, we are going

to tackle the following issues.

(7) a. **What combinations are possible between V1 and V2?**

   Why are *tataki-tubus(u)* (hit-crash) and *moti-sar(u)* (have-leave) well-formed, while
   **tataki-tubure(ru)* and **warai-sar(u)* (laugh-leave) are not acceptable?

   b. **What is the theoretical process (or processes) in which two verbs are
       conflated?**

   c. **What decides the inheritance of arguments of V1 and V2?**

   Why cannot we say **Ken-wa sono-heya-o turesat-ta* (Ken left the room (accompa-
   nying someone) while *Ken-wa sono-ba-o hasiri-sat-ta* (Ken left the place running)
   is possible, although in both cases V2's argument is realized?

   d. **Is V2 really the "head" of LVC as many previous studies assume?**

Throughout this dissetation we will consider related linguistic phenomena in order to give
convincing answers to these questions.

1.4   Fundamental theoretical devices

This subsection introduces two main basic theoretical devices we adopt in order to analyze
LVCs: Lexical Conceptual Structure (LCS) (Jackendoff (1990), Levin and Rappaport Hovav
(1995), Kageyama (1996), etc.) and Qualia Structure (Pustejovsky 1995).

1.4.1   Lexical Conceptual Structure

LCS has its origin in Generative Semantics (Lakoff (1965), McCawley (1968), Gruber (1965,
1967), and many others) which did not distinguish syntax and lexical meaning. It is a repre-
sentation system of the conceptual meaning of words, not connotative meaning (Kageyama
1996), based mainly on the aspectual behavior of verbs (Vendler (1967), Dowty (1972, 1979),
etc.), and it is not a syntactic representation, which is a difference from Generative Seman-
tics. However, it is not the case that LCS has nothing to do with syntax. Rather, it is closely
related to syntax. The theoretical assumption which makes LCS a useful and meaningful

device is that syntax more or less reflects lexical information and that lexical semantic properties play an important role in phenomena such as passivization, lexical causation, locative alternation, dative alternation, transitive-inchoative alternation, etc.

It is no wonder, therefore, to assume that meaning of verbs plays a crucial role in LVCs as well. In fact, our study is regarded as a pursuit to develop this viewpoint as far as possible: we attempt to explain the behavior of LVCs and the possibility of verb combination from the meaning of verbs as much as possible.

LCS consists of semantic predicates (regarded as functions) like ACT, CAUSE, BE, BECOME, MOVE, etc., their arguments (variables), and constants. Here we have some examples of LCSs.

(8)   a. *hohoem(u)* (smile):   ACT (x)
          b. *tatak(u)* (hit):   ACT ON (x, y)
          c. *tukare(ru)* (get.tired): BECOME $(y,\ TIRED)$
          d. *oti(ru)* (fall):   MOVE DOWN TO $(y, [_{place}z])$
          e. *kowas(u)* (break):   CAUSE $([\text{ACT ON } (x, y)], [\text{BECOME } (y,\ BROKEN)])$

Of course, the classification of verbs in (8) is not assigned just by intuition: each verb is classified by tests which clarify its aspectual property. Though we introduce such tests when necessary in the following chapters, we refer the reader to Dowty (1979), Jackendoff (1990), Levin and Rappaport Hovav (1995), or Kageyama (1996) in order to get more detailed explanations of the way of classification.

As for the relation between LCS and syntax, previous literature has usually assumed that arguments in LCS are mapped first to Arguemt Structure (AS), by linking rules (Grimshaw (1990), Levin and Rappaport Hovav (1995), Kageyama (1996), etc.), and then they are mapped from AS to syntax. This is shown in (9).

(9)   **Syntax**
$$\Uparrow$$
Argument Structure
$$\Uparrow \leftarrow \text{Linking Rules}$$
Lexical Conceptual Structure
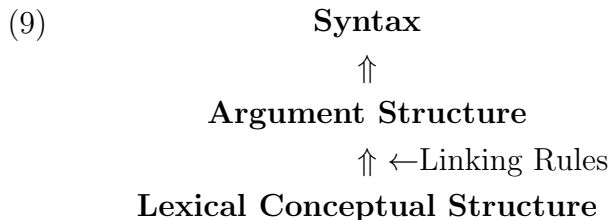
Although we generally adopt the system presented in (9), we will make a slight modification to linking rules, because we use another semantic representational system, Qualia Structure,

which represents not only the propositional meaning of verbs represented in the form of LCS, but also information which does not usually fall under propositional meaning. Such non-propositional information is still "lexical," however; it is neither pragmatic nor what is called "world knowledge." As we replace LCS in (9) by Qualia Structure, we have to define linking rules from Qualia Structure to AS. This is presented in Chapter 3.

In the next subsections, we give a brief introduction to the lexical semantic representation by Pustejovsky (1995) which includes Qualia Structure, and Kageyma's (2005) Qualia Structure, a modified version of Pustejovsky (1995). Both of these are fundamental theoretical devices on which our analysis is based.

1.4.2 Qualia Structure

Pustejovsky (1995) proposes the following system of (lexical) semantic representation[2] (The descriptions in QUALIA STRUCTURE are quoted from Pustejovsky (1995: 76)).

(10)
$$
\begin{bmatrix}
\textit{EVENSTR}: \text{internal event structure of predicates} \\
\textit{ARGSTR}: \text{argument structure} \\
\textit{QUALIA STRUCTURE} \\
\begin{bmatrix}
\text{FORMAL:} & \text{that which distinguishes it within a larger domain} \\
\text{CONST:} & \text{the relation between an object and its constituent parts} \\
\text{TELIC:} & \text{its purpose and function} \\
\text{AGENTIVE:} & \text{factors involved in its origin or "bringing it about"}
\end{bmatrix}
\end{bmatrix}
$$

Let us consider a concrete example. The following is the lexical semantic representation of *drive*.

---

[2] He uses this semantic representation not only for single words but also for predicates consisting of more than one word.

(11)

$$\begin{bmatrix} \textbf{drive} \\ \textit{EVENSTR} \\ \begin{bmatrix} \text{E}_1 : \text{e}_1 = \text{process} \\ \text{E}_2 : \text{e}_2 = \text{process} \\ \text{RESTR} = < \circ_\alpha \end{bmatrix} \\ \textit{ARGSTR} \\ \begin{bmatrix} \text{ARG1:} \ x = \text{human} \\ \text{ARG2:} \ y = \text{behicle} \end{bmatrix} \\ \textit{QUALIA STRUCTURE}: \\ \begin{bmatrix} \text{FORMAL:} \quad \text{move (e}_2, y) \\ \text{AGENTIVE: drive\_act (e}_1, x, y) \end{bmatrix} \end{bmatrix}$$

(Pustejovsky 1995: 114)

Since LCS represents the content of the propositional meaning of the verb, LCS seems to be able to replace the Event Structure (*EVNSTR*) in (10); LCS depicts the content of the event to be represented in the Event Structure. In fact, Kageyama (2005) proposes a Qualia Structure in which LCS is built in for verbs. Example (12) shows his Qualia Structure and definitions of each quale.

(12)

$$\begin{bmatrix} \textit{QUALIA STRUCTURE} \\ \begin{bmatrix} \text{FORMAL:} & \text{eventuality type of the verb} \\ & \text{(activity, state, process , transition)} \\ \text{CONST:} & \text{LCS of the verb} \\ \text{TELIC:} & \text{purpose, goal, or function of the verb} \\ \text{AGENTIVE:} & \text{presupposition, background information, or scenery} \end{bmatrix} \end{bmatrix}$$

(Kageyama 2005: 83)

We will modify this Qualia Structure in Chapter 3

1.5   Organization

In this chapter we have identified our goal, seen some background information, and introduced fundamental theoretical devices. From now on, we will advance our argument as follows.

Chapter 2   critically reviews previous theoretical studies, revolving around theoretical issues, and clarifies what must be resolved.

Chapter 3   introduces our original theoretical device to represent the lexical semantic meaning of verbs, which is a modified version of the Qualia Structure by Pustejovsky (1995) and Kageyama (2005).

Chapter 4   is the main body of this dissertation. We will tackle the issues mentioned in (7) above utilizing the Qualia Strucure introduced in chapter 3.

Chapter 5   presents a brief summary of this dissertation and the theoretical implications of our analysis, as well as some remaining problems.

Chapter 2   The locus of issues

Previous theory-oriented studies on the word formation of lexical V-V compounds (LVCs) analyze them as a process of synthesizing the argument structures or the lexical conceptual structures (LCSs) of two verbs to be compounded. That is, they deal with the issue on only a single syntactic or semantic level. However, on our investigation it seems that such an approach cannot give a natural explanation to the fact that some LVCs show different behavior as to negation, adverb modification, or argument inheritance. Moreover, they will overgenerate totally unacceptable examples.

2.1   Transitivity Harmony Principle (Kageyama 1993) and Subject Coincidence Principle (Yumoto (1996, 2005), Matsumoto (1998))

Kageyama (1993) proposes the *transitivity harmony principle*, which argues that transitive verbs and unergative verbs cannot be compounded with unaccusative verbs; unaccusative verbs can be compounded only with unaccusative verbs. Classifying verbs into three categories, transitives, unergatives, and unaccusatives, we have nine logically-possible combinations to form LVCs.

(13)   **V1: transitive**

     a.   **transitive + transitive:** *kai-toru* (buy-take) *nugui-toru* (wipe-take), *i-nuku* (shoot-through), *keri-taosu* (kick-fell), *tataki-otosu* (hit-drop), *osi-tubusu* (push-crash), *huki-kesu* (blow-extinguish), *hiki-tomeru* (pull-stop), *nugi-tirasu* (take.off-scatter) 買い取る，拭き取る，射抜く，蹴り倒す，叩き落とす，押し潰す，吹き消す，引き止める，脱ぎ散らす

     b.   **transitive + unergative:** *mati-kamaeru* (wait-gird), *sagasi-mawaru* (search-about), *kai-mawaru* (buy-about), *nageki-kurasu* (grieve-lead.a.life), *nagame-kurasu*

(gaze-lead.a.life)

待ち構える，探し回る，買い回る，嘆き暮らす，眺め暮らす

c. **transitive + unaccusative:** **kiri-otiru* (cut-fall), **arai-otiru* (wash-fall), **nugui-otiru* [1] (wipe-fall)

*切り落ちる，*洗い落ちる，*ぬぐい落ちる

(14)   **V1: unergative**

a. **unergative + transitive:** *naki-harasu* (weep-one's.eye.out), *hohoemi-kaesu* (smile-return), *husi-ogamu* (glance.down-worship), *warai-tobasu* (laugh-away), *nori-kaeru* (ride-change), *sumi-kaeru* (live-change)

泣き腫らす，微笑み返す，伏し拝む，笑い飛ばす，乗り換える，住み替える

b. **unergative + unergative:** *kake-oriru* (run-down), *abare-mawaru* (get.violent-about), *aruki-mawaru* (walk-about), *naki-kurasu* (weep-live.a.life), *asobi-kurasu* (play-live.a.life)

飛び降りる，駆け降りる，暴れ回る，歩き回る，泣き暮らす，遊び暮らす，

c. **unergative + unaccusative:** **naki-hareru* (weep-get.swollen), **hasiri-korobu* (run-fall.down), *(sukii-de) *suberi-otiru* (ski-down), **hasiri-otiru* (run-fall), **tobi-otiru* (jump-fall)

*泣き腫れる，*走り転ぶ，(スキーで)*滑り落ちる，*走り落ちる，*跳び落ちる

(15)   **V1: unaccusative**

a. **unaccusative + transitive:** **ure-tobasu* (sell-away), **yure-okosu* (shake-wake), **akire-kaesu* (get.shocked-return), **kuzure-otosu* (collapse-drop), **yure-otosu* (shake-drop), **kobore-otosu* (spill-drop)

*売れ飛ばす，*揺れ起こす，*あきれ返す，*崩れ落とす，*揺れ落とす，*こぼれ落とす

---

[1] Although Kageyama (1993) and Yumoto (2005) regard *arai-otiru* (wipe-fall) and **nugui-otiru* (wipe-fall) as unacceptable, as we see below, they seem to be acceptable; at least more acceptable than *kiri-otiru* (cut-fall). Several native speakers of Japanese around me gave a similar judgment as mine.

b. **unaccusative + unergative:** **korobi-oriru* (fall.down-get.off), **kuzure-oriru* (*collapse-descend), **ahure-oriru* (spill-descend), **oti-mawaru* (fall-about), **tumaduki-mawaru* (stumble-about), *taore-kurasu* (fall.down-live.a.life), **itami-kurasu* (hurt-live.a.life)
転び降りる，*崩れ降りる，*溢れ降りる，*落ち回る，*つまずき回る，*倒れ暮らす，*痛み暮らす

c. **unaccusative + unaccusative:** *kobore-otiru* (spill-fall), *kuzure-otiru* (collapse-fall), *hage-otiru* (get.rubbed.away-fall), *yake-otiru* (burn-fall), *suberi-otiru* (slide-fall), *koroge-otiru* (roll-fall)
こぼれ落ちる，崩れ落ちる，剥げ落ちる，焼け落ちる，滑り落ちる，転げ落ちる

Matsumoto (1998) exemplifies quite a few counterexamples to the *transitivity harmony principle*, however.

(16) a. *aruki-tukareru* (walk-tired), *asobi-tukareru* (play-tired), *oyogi-tukareru* (swim-tired), *tati-tukareru* (stand-tired), *suwari-tukareru* (sit-tired), *syaberi-tukareru* (talk-tired), *naki-kutabireru* (cry-get.exhausted), *hasiri-kutabireru* (run-get.exhausted), *naki-nureru* (cry-wet), *naki-sizumu* (cry-sink)
歩き疲れる，遊び疲れる，泳ぎ疲れる，立ち疲れる，座り疲れる，しゃべり疲れる，泣き疲れる，泣きくたびれる，走りくたびれる，泣きぬれる，泣き沈む

b. *yomi-tukareru* (read-tired), *mati-kutabireru* (wait-get.exhausted), *nomi-tubureru* (drink-get.flat), *kui-tubureru* (eat-get.flat), *kiki-horeru* (hear-love), *mi-horeru* (see-love)
読み疲れる，待ちくたびれる，飲みつぶれる，食いつぶれる，聞きほれる，見ほれる

(Matsumoto 1998: 49)

In (16a) unergative V1s are compounded with unaccusative V2s, and in (16b) transitive V1s with unaccusative V2s, against the *transitivity harmony principle.*

Yumoto (2005) also points out similar examples.

(17)   *nomi-tubureru* (drink-get.plastered), *ki-bukureru* (wear-swell), *kui-daoreru* (eat-fall.down),
       kiki-horeru (hear-love), *mati-kutabireru* (wait-get.exhausted)
       飲み潰れる，着膨れる，食い倒れる，聞きほれる，待ちくたびれる

                                                                                  (Yumoto 2005)

In sum although the *Transitivity Harmony Principle* captures the possible combination of verbs in many LVCs, there exist quite a few counterexamples, which should not be overlooked.

Yumoto (1996, 2005) and Matsumoto (1998) propose the *Subject Coincidence Principle*, which can be regarded as a relaxation of *transitivity harmony principle*. This principle allows two verbs to form a compound as long as their subjects are coindexed in reference even if they are different in transitivity. As a result, the examples in (16) and (17) are qualified as legitimate LVCs: in *nomi-tukareru* (drink-tired), which means a person drinks and gets tired, the subjects are identical though the V1 is transitive and the V2 is unaccusative.

In fact, however, there still exist some counterexamples in which V1's object and V2's subject are identified in construal and the two verbs have different transitivity.

(18)   *itame-kogeru* (fry-burn), *ki-kuzureru* (wear-lose.figure), *ni-kuzureru* (simmer-crumble),
       ni-tokeru (simmer-melt), *arai-otiru* (wash-fall), *huki-otiru* (wipe-fall), *(kami-ga) kiri-sorou* ((hair) cut-uniform.in.length), *(keeki-ga) kiri-wakareru* ((cake), cut-separated)
       炒め焦げる，着崩れる，煮崩れる，煮溶ける，洗い落ちる，拭き落ちる，切り揃う，切り分かれる

Kageyama (1993) and Yumoto (2005) judge *arai-otiru* and *huki-otiru* as unacceptable, but quite a few examples can be found.

(19) a. Oyu-de   shibot-ta   hukin-de   **huki-oti**-nikui yogore-wa, juusoo-o
         hot water-WITH squeeze-PAST duster-WITH wipe-away-hard stain-TOP bicarbonate-ACC
         tuke-te   huru-haburasi-de   kosut-ta   ato-wa   mizu-buki, kara-buki simasu.
         add-AND old-toothbrush-WITH brush-PAST after-TOP water-wiping dry-wiping do
         'Brush at stains with an old toothbrush with bicarbonate which is hard to wipe off
         with a hot squeezed duster, and then give it a wipe with a dry duster after wiping
         with a wet one.'
         お湯で絞った布巾で 拭き落ち にくい汚れは重曹をつけて古歯ブラシで擦ったあと
         は、水拭きから拭きします。

b. Iti-nen-mae-no   ketyappu-no simi-ga   ***arai-oti***-ta to   yuu hito-mo   iru.

one-year-ago-GEN ketchup-GEN stain-NOM wash-fall   COMP say people-also there are

'Some people say that stains of ketchup one year ago was washed off.'

一年前のケチャップのシミが 洗い落ちたという人もいる。

c. hootyoo-o ireru to   sakut-to   kiri-wakare-masu! ... betu-uri-no   hootyoo-o

knife-ACC cut.in and smoothly-COMP cut-separated-HON   optinally-sold-GEN knife-ACC

ireru   to   sakut-to   kokimiyoi-oto-to tomoni kiri-wakare-masu!

cut-in and smoothly-COMP fine-sound-with with   cut-separated-HON

'Cut with a knife, and it is smoothly cut separated... Cut with an optionally-sold

knife it is smoothly cut separated with a fine sound.'

包丁を入れるとサクッと 切り分かれます！ ... 別売りの包丁を入れると、サクッと

小気味好い音とともに 切り分かれます。

(*Google*)

In addition, the Japanese native speakers I asked judged the LVCs in (18) as acceptable; at least no one judged them as ungrammatical.

These counterexamples have often been considered just exceptions, but they should not be treated just as such since the number of them cannot be overlooked, and more importantly, some of them are quite productive like V-*tukareru* or V-*otiru*. Of course it is theoretically desirable to give a natural explanation which comprise these 'exceptions' as well as such major examples as (13) to (15).

2.2   Ways of synthesizing two verbs

Previous studies conflate two verbs' LCSs on the basis of the functional relations like *dvandva, accompanying situation, means*, and so on [2].

(20) a. **Dvandva**:

LCS1 AND LCS2 (t1=t2)

koi-sitau (love-like)

恋い慕う

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[2]The descriptions including *tn* represent time relation. For example, $t1 \geq t2$ means the event described by V1 must antecede or co-occur with that of V2 in time.

b. **Accompanying Situation**:

LCS2 WHILE LCS1 (t1=t2)

katari-akasu (talk-go.through.night)

語り明かす

c. **Means, Manner**:

LCS2 BY LCS1 (t1≥t2)

kiri-taosu (cut-fell)

切り落とす

(Kageyama 1993)

(21) a. **Dvandva**:

$\big[$ [LCS1] AND [LCS 2] $\big]$ (t1=t2)

naki-sakebu (weep-cry), *koi-sitau* (love-like)

泣き叫ぶ，恋い慕う

b. **Accompanying Situation, Manner**:

$\begin{bmatrix} \text{[LCS2]} \\ \text{WHILE [LCS1]} \end{bmatrix}$ (t1=t2)

moti-yoru (have-approach), *asobi-kurasu* (play-live.a.life), *hai-yoru* (crawl-approach)

持ち寄る、遊び暮らす，這い寄る

c. **Means**:

$\begin{bmatrix} \text{[LCS2]} \\ \text{BY [LCS1]} \end{bmatrix}$ (t1≥t2)

kiri-taosu (cut-fell), *kati-toru* (win-get)

切り倒す，勝ち取る

d. **Cause and Result**:

$\begin{bmatrix} \text{[LCS2]} \\ \text{FROM [LCS1]} \end{bmatrix}$ (t1≥t2)

asobi-kutabireru (play-get.exhausted), *obore-sinu* (drown-die)

遊び疲れる，溺れ死ぬ

e. **Complement**:

$$\left[\; \text{LCS2}\ldots[\text{LCS1}]\ldots \;\right]$$

kaki-otosu (write-miss), *hibiki-wataru* (echo-spread)

書き落とす，響き渡る

(Yumoto 2005)

Such approaches, however, have the following problems.

(22) a. They do not give clear criteria to classify LVCs into such LCS patterns beyond intuitive observation and judgment; it is not clear in what case an LVC is classified as, for example, a manner compound or a cause-and-result compound. In addition, semantic predicates like *WHILE, BY, FROM* need independent definitions.

b. In the explanation of LVCs like *odori-tukareru* (dance-get.tired) or *ni-kuzureru* (boil.in.soup-crumble), in which neither V1 nor V2 has *CAUSE*, the approaches like the above have the following three logically possible options:

1) to introduce *BY*, forming the LCS V2 *BY* V1,

2) to assume the semantic predicate *CAUSE* in either Verbs, or

3) to introduce *CAUSE* from somewhere, probably on the basis of pragmatic inference.

But all of these are problematic as to where *CAUSE* comes from.

It seems to be much more substantive and convincing if meaning like 'manner,' 'cause and result,' 'accompanying situation,' etc. is interpreted secondarily, not assuming such paraphrase-like LCS patterns as in (20) or (21). In addition, from the viewpoint of theoretical simplicity, fewer semantic predicates are more desirable; if there is a way that does not need semantic predicates in (22a), which requires an independent definition, we should take that way. Yumoto (2005) regards such semantic predicates as necessary functions not only in describing compound verbs, quoting examples from Jackendoff (1990).

(23) a. John turned yellow from eating carrots.

b. John got the award because he did something clever.

   c.   John died of excludiosis.

(24) $\left[\begin{array}{l} \text{GO}_{ident} \text{ ([JOHN], [TO [YELLOW]])} \\ \text{[FROM [EAT ([JOHN], [CARROTS])]]} \end{array}\right]$

(Jackendoff 1990: 96)

(24) represents the semantic structure of (23a), but (23a) is completely grammatical without *from eating carrots*. *From eating carrots* is an adjunct in syntax, and *turn* cannot be thought as having a causing event in its lexical meaning (a similar reasoning is possible for (23b) and (23c)). In addition, there seems to be no simple verb that includes a causing event as its lexical meaning besides Sino-Japanese verbs ("kango-doosi" in Japanese) like *byoosi-suru* (die of diseases). Considering the fact that no native Japanese verbs ("wago-doosi"), which are candidates for LVCs, contain *FROM* in their LCSs, it should be avoided to introduce it into LCSs of LVC's as well. This is even more compelling when we assume that LVCs basically have similar semantic structure to simple verbs, as Yumoto argues.

   Next, let us consider (22b). As we saw above, Kageyama (1993) and Yumoto (2005) adopt the option 1 in (22b), which has the above problem. On the other hand, Asao (2007) takes the second option.

(25) a.   *nomu* (drink): x_i DRINK y

   b.   *tubureru* (get.plastered): ([z_i ACT] CAUSE) [BECOME [w_i BE DRUNKEN]]

   c.   *nomi-tubureru*: [x DRINK y] CAUSE [BECOME [x BE DRUNKEN]]
        飲み潰れる

(Asao 2007)

Since *tubureru* is unaccusative, however, it is difficult to assume that it has *CAUSE*. Asao does not give any reasons why *tubureru* has *CAUSE*, and he says nothing about the meaning of the parenthesis containing [z_i ACT] CAUSE, either. It might be possible to assume such description as to *tubureru* on the ground that it has the transitive couterpart *tubusu*. However, in addition to the fact that there are no counterpart verb **nomi-tubusu*, his approach has

also difficulty dealing with *nomi-tukareru* (drink-get.tired), the V2 of which has no transitive counterpart: it is too arbitrary to propose that *tukareru* has CAUSE in its LCS [3].

Fukushima (2005) chooses the third option.

(26)   Cause compounds: $\lambda Q \lambda P.$ (CAUSE' $(P(x_1 \ldots x_m), Q(x_1 \ldots x_n)))$
       odori-tukareru (dance-get.tired)
       踊り疲れる

He formalizes his 'cause compounds' as in (26), but does not give any explanation as to when the CAUSE function should be introduced; it seems that the only argument for positing CAUSE is that we need to introduce it into the semantic structure somewhere just because we can infer causal relation between the two verbs when we interpret the meaning of such LVCs.

We might assume that *CAUSE* could be introduced via inference from our "world knowledge," but this approach immediately suffers from the problem of overgeneration. For example, it is perfectly normal that a child grows when it eats and we can infer a causal relation between *eating* and *growing.* Nontheless *taberu* (eat) and *sodatu* (grow) cannot be compounded into **tabe-sodatu.* On the other hand, *tabe-tukareru* (eat-get.tired) is completely acceptable. In order to explain this difference in acceptability between **tabe-sodatu* and *tabe-tukareru*, it seems necessary to distinguish lexicon form world knowledge and give a precise description of the lexical meaning of verbs. Such approaches appear to be more promising for accurate prediction.

2.3   Argument inheritance and head

The problem of argument inheritance, that is, how the arguments of base verbs are inherited to the formed LVCs, has been a major issue partly because the phenomenon is complicated. It would be simple if *Righthand Head Rule* (RHR) (Williams 1981) held in every case.

(27)   In morphology we define the head of a morphologically complex word to be the right-hand member of that word.

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[3]Besides the problem given above, the analysis in (25) has at least two additional problems. First, in the LCS of *tubureru* the resultative state is specified by the constant *DRUNKEN*. This means, however, that there is a special *tubureru* in the lexicon other than ordinary *tubureru*, which means something gets crushed. Second, no LCS is presented for *nomu*; *DRINK* in (25c) seems just a paraphrase of *nomu*.

<div align="right">(Williams 1981)</div>

According to RHR, V2 is head in V-V compounds. Taking into consideration Lieber's (1983) *Feature Percolation* in addition, which argues that features of head are percolated up to compounds, all the arguments of V2 should be inherited. As many previous studies argues, RHR holds in many examples of LVCs. Of course, it is not clear which verb functions as head when all the arguments of V1 and V2 are identified with each other as in *tataki-kowasu* (hit-break), *ori-mageru* (fold-bend), *yuzuri-watasu* (give-hand) or *obore-sinu* (drown-die). In such compounds, we can say either RHR holds or not.

One of the cases where RHR appears to come into effect is when V2 is unaccusative and V1 is different in transitivity like *nomi-tukareru* (drink-get.tired) or *ki-kuzureru* (wear-lose.figure). In *nomi-tukareru*, subjects of V1 and V2 are identified with each other, but V1's object remains unidentified. Considering RHR and *Feature Percolation*, we can predict that unidentified V1's argument will not be inherited. As is predicted, in fact, V1's object cannot be realized in *nomi-tukareru*.

(28) a. Ken-wa   *nomi-tukare*-ta

     Ken-TOP drink-get.tired-PAST
     Ken got tired from drinking.

     健は飲み疲れた。

   b. *Ken-wa   biiru-o   *nomi-tukare*-ta

     Ken-TOP beer-ACC drink-bet.tired-PAST
     Ken got tired from drinking beer.

     *健はビールを飲み疲れた[4]。

In *ki-kuzureru*, *kimono*, which is an object for V1 and a subject for V2, can be realized only with nominative case marker (*kimono-ga*).

(29) a. Naomi-wa   kimono-ga   *ki-kuzure*-ta

     Naomi-TOP kimono-NOM wear-loose.shape-PAST
     Naomi's kimono got loose while wearing.

     奈緒美は着物が着崩れた。

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[4]This sentence is good when we make a brief pause between *nomi* and *tukareru*. In this case, however, the two verbs are independent of each other, which means that they are no longer interpreted as a compound at all.

b. *Naomi-wa   kimono-o   *ki-kuzure*-ta

Naomi-TOP kimono-ACC wear-loose.figure-PAST
Naomi's kimono came undone while wearing.

*奈緒美は着物を着崩れた

That is, *kimono* is realized as V2's subject, not V1's object. In these cases RHR appears to work. Yumoto (2005) presents similar examples.

(30) a. *zaisan-o   *tukai-tubureru*

property-ACC spend-get.crushed
go bankrupt from spending one's property

*財産を使いつぶれる

b. *taigan-ni   booto-o   *kogi-tuku*

the.other.side.of.the.river-LOC boat-ACC row-reach
reach the other side of the river rowing

*対岸にボートを漕ぎ着く

c. *ronbun-o   *kaki-tukareru*

paper-ACC write-get.tired
get tired from writing papers

*論文を書き疲れる

d. *sitagi-o   *ki-bukureru*

underwear-ACC wear-swell
get swelled with a lot of underwear on

*下着を着膨れる

e. *syootyuu-o   *nomi-tubureru*

Japanese.vodka-ACC drink-get.plastered
get absolutely plastered by drinking

*焼酎を飲みつぶれる

f. *kawa-o   *nagare-tuku*

river-ACC flow-reach
reach flowing in the river

　　　*川を流れ着く

<div align="right">(Yumoto 2005: 136)</div>

In fact, however, the situation is not so simple. There are cases where RHR does not seem to hold. In some LVCs, elements which V2 can originally subcategorize for cannot be realized at all.

(31) a.　Ken-wa　sono-heya-o　*sat*-ta

　　　　　Ken-TOP the-room-ACC have-leave-PAST
　　　　　Ken left the room.

　　　　　健はその部屋を去った。

　　b. *Ken-wa　sono-heya-o　*moti-sat*-ta

　　　　　Ken-TOP the-room-ACC leave-PAST
　　　　　Ken left the room (with something).

　　　　　*健はその部屋を持ち去った。

　　c.　Ken-wa　hon-o　*moti-sat*-ta

　　　　　Ken-TOP book-ACC have-leave-PAST
　　　　　Ken take a book away.

　　　　　健は本を持ち去った。

　　d. *Ken-wa　sono-heya-o　hon-o　*moti-sat*-ta

　　　　　Ken-TOP the-room-ACC book-ACC have-leave-PAST
　　　　　Ken left the room with a book.

　　　　　*健はその部屋を本を持ち去った。

The verb *saru* (leave) can subcategorize an accusative argument as (31a) shows. However, this property is lost in the LVC *moti-saru* and the accusative argument cannot be realized at all as in (31b): it can only be interpreted as the object of V1 *motu*, resulting in the strange interpretation that Ken left with the room (in his hand), which is parallel to (31c). The realization of both arguments of V1 and V2 is not allowed either, as in (31d). In order to improve acceptability, the place argument of *saru* must be an oblique: the sentence in (32) is completely acceptable.

(32) Ken-wa   sono-heya-**kara** hon-o   *moti-sat*-ta

Ken-TOP the-room-from   book-ACC have-leave-PAST
Ken left the room with a book.

健はその部屋から本を持ち去った。

The reason for the unacceptability of (31d) appears to be the "double-o constraint" in phonology. However, it is not the case since the relativized phrase which has only one accusative object is not accepted, either.

(33) a.   Ken-ga   hon-o   *moti-sat*-ta   heya

Ken-NOM book-ACC have-leave-PAST room
the room which Ken take a book away

健が本を持ち去った部屋

b. *Ken-ga   sono-heya-o   *moti-sat*-ta   hon

Ken-NOM the-room-ACC have-leave-PAST book
the book which Ken take away from the room

*健が部屋を持ち去った本

(31a) can be derived from either (31d) or (32). If it is derived from (31d), we can say the acceptability of (31a) got improved by avoiding double *-o*. If it is derived from (32), its acceptability is naturally predicted. However, (33b) can be derived only from (31d), and it shows that acceptability is not improved even if double *-o* is avoided. Therefore, (33) reveals that *heya*, the argument of V2 *saru*, which should be the head, cannot be inherited at all, while V1's argument *hon* must be inherited.

Here is another example, which is slightly different from (31).

(34) a.   Ken-wa   kokudoo-nigoosen-o *hasit*-ta

Ken-TOP Route 2-ACC   run-PAST
Ken ran Route 2.

健は国道2号線を走った。

b.   Ken-wa   sono-ba-o   *sat*-ta

Ken-TOP the-place-ACC leave-PAST
Ken left the place.

健はその場を去った。

c.   Ken-wa   kokudoo-nigoosen-o *hasiri-sat*-ta

     Ken-TOP Route 2-ACC   run-leave-PAST
     Ken left running Route 2.

     健は国道２号線を走り去った。

d.   Ken-wa   sono-ba-o   *hasiri-sat*-ta

     Ken-TOP the-place-ACC run-leave-PAST
     Ken left the place running.

     健はその場を走り去った。

e.   *Ken-wa   sono-ba-o   kokudoo-nigoosen-o *hasiri-sat*-ta

     Ken-TOP the-place-ACC Route 2-ACC   run-leave-PAST
     Ken left the place running.

     *健はその場を，国道２号線を走り去った。

f.   *Ken-wa   kokudoo-nigoosen-o sono-ba-o   *hasiri-sat*-ta

     Ken-TOP Route 2-ACC   the-place-ACC run-leave-PAST
     Ken left the place running.

     *健は国道２号線を，その場を走り去った。

As in *moti-saru*, not both of V1 and V2's arguments can be realized as (34e) and (34f) show. In addition, the place argument of V2 *saru* must be an oblique with *-kara* for (34e) and (34f) to be acceptable.

(35) a.   Ken-wa   sono-ba-kara   kokudoo-nigoosen-o *hasiri-sat*-ta

       Ken-TOP the-place-from Route 2-ACC   run-leave-PAST
       Ken left the place running.

       健はその場から，国道２号線を走り去った。

   b. ?Ken-wa   kokudoo-nigoosen-o sono-ba-kara   *hasiri-sat*-ta

       Ken-TOP Route 2-ACC   the-place-from run-leave-PAST
       Ken left the place running.

       ?健は国道２号線を，その場から走り去った。

Yet, as in (34c) and (34d), *hasiri-saru* is different from *moti-saru* in that it can realize either V1's path argument (*kokudoo-nigoosen*) or V2's place argument (*sono-ba*). Here again,

V1's argument, though not being identified with V2's, can be realized as in *moti-saru*, and in that case V2's argument cannot be realized at all.

Yumoto (2005) proposes the following LCS for *ture-saru* (accompany-leave), which is classified as an "accompanying situation LVC."

(36)   *ture-saru*: $\left[\begin{array}{l} [[x_i] \text{ CONTROL } [[y_i] \text{ GO FROM } [z]] \\ \text{WHILE } [[x_i] \text{ CONTROL } [[\underline{y}] \text{ BE WITH } [z_i]]] \end{array} \right]$

(Yumoto 2005: 148)

In (36), V1 *ture(ru)* is introduced as a semantic adjunct. Therefore, we cannot but say that, as Yumoto herself says, the underlined $\underline{y}$ must be realized even if it is semantically adjunct. The reason she gives is that y remains unidentified with the arguments of V2 and it can only be realized as an object. As a result, z must be realized with the oblique *kara* (from), not with the accusative case marker *-o* .

(37)   Ken-wa   sono-ko-o   sono-heya-{kara/*o}   *ture-sat*-ta
        Ken-TOP the-child-ACC the-room-{from/-ACC} accompany-leave-PAST
        Ken went away from the room accompanying the child.
        健はその子を { その部屋から/*を } 連れ去った。

However, this explanation of hers is problematic at least in two points. First, as we saw in (22a), it is not clear why *ture-saru* must be classified as an 'accompanying-situation LVC,' and the semantic predicate *WHILE* needs independent definition.

Second, her explanation does not give an answer to the difference between *ture-saru* and *hasiri-saru*. As seen in (37), while *ture-saru* can inherit only V1's argument, as in *moti-saru*, *hasiri-saru* can inherit either argument of V1 or V2. Following (36), we would obtain an LCS like (38) for *hasiri-saru*.

(38)   *hasiri-saru*: $\left[\begin{array}{l} [[x_i] \text{ CONTROL } [[y_i] \text{ GO FROM } [z]] \\ \text{WHILE } [[x_i] \text{ CONTROL } [[y_i] \text{ MOVE } [_{path} z]]] \end{array} \right]$

In (38), V2's z and V1's z remain unidentified, so it is predicted that at least V2's z must be realized because V2 is the head. In fact, however, as (34c) and (34d) show, V1's z is equally realizable even if V2's z is not realized. Therefore the reason is not clear in (38) why

only the argument of the nonhead verb *hasir(u)* can be inherited alone over the argument of the head verb. This behavior of *hasiri-saru* seems to shed doubt on treatments which always regard V2 as head.

To sum up, problems of previous studies on argument inheritance seem to lie in their ways of conflating two verb's LCSs and their way of argument which premises RHR and *Feature Percolation*.

By the way, RHR was originally proposed to capture the fact that in many cases suffixes determine the grammatical category of words they attach to, and RHR says virtually nothing about the case in which two words of the same category are compounded. In the case of suffix attachment, we can regard suffixes as functions and words it attaches to as arguments. Therefore it is natural that suffix behaves as head. However, in the case of LVC, in the previous studies we have investigated, it seems that "complement LVCs" appears to be analyzed on function-argument relation, but the other patterns are not clear on this point until the way two verbs are semantically unified is clarified; we turn back again to the problem of the formal definition of semantic predicates. While most of the LCSs in (21) represents V2 as head, at least "dvandva LVCs" does not seem to be analyzed as V2-head LVCs. In addition, in the remaining ones, the situation is not so different: it still remains obscure which verb is semantically head until concrete formal mechanism and semantic relation in conflating two verbs are disclosed.

Lieber (1983) also regards V-V and P-V compounds as exceptional, since both stems are argument-taking and actual existence of English V-V compounds such as *freeze-dry, drip-kick*, or *stir-fry* cannot be predicted by her theory.

Of course, it is plausible to regard V2 as morphological head, because only V2 inflects as to tense, aspect, or transitive-inchoative alternation. However, it is just a matter of form; reflecting semantic complexity of verbs, it seems the case that semantic head and morphological head do not accord and semantic headedness in LVCs plays a crucial role in inheritance or realization of arguments.

Considering what we have observed so far, it seems plausible not to regard V2 as head at all time. In the following chapters, I will not rely on RHR and syntactic or morphological *Feature Percolation* to determine the head of LVCs. Specifically, I will argue that headedness of LVCs

is compositionally determined by lexical semantic property of verbs to be compounded.

Chapter 3 Lexical Semantic Representation

3.1 Preliminary analysis

As a preliminary analysis, we observe aspectual behavior of transitive verbs and classify them
into the following three categories.

(39) a. **Causative verbs**

kowas(u) (break), *tubus(u)* (crush), *taos(u)* (fell), *or(u)* (break.apart), *kobos(u)*
(spill), *nuk(u)* (pull.out) *tutum(u)* (wrap), *ok(u)* (put), *ki(ru)* (wear)
壊す，潰す，倒す，折る，こぼす，抜く，包む，置く，着る

b. **Semi-causative verbs**

Seemingly causative verbs which behaves differently from those in (39a):
ni(ru) (simmer), *yak(u)* (burn), *itame(ru)* (stir-fry), *mus(u)* (steam) *araw(u)* (wash),
migak(u) (polish), *huk(u)* (wipe)
煮る，焼く，炒める，蒸す，洗う，磨く，拭く

c. **ACT-ON verbs**

Most ACT-ON verbs, which do not have resultative states at all:
nade(ru) (stroke), *tatak(u)* (hit), *kosur(u)* (rub), *kak(u)* (scratch), *name(ru)* (lick),
kam(u) (chew)
撫でる，たたく，こする，掻く，舐める，噛む

This classification is motivated by the following behavior of verbs in each category. First, as
(40a) shows, verbs in (39a) require telic interpretation, which is attested by *n-hun/byoo-de*
(in *n* minutes/seconds). On the other hand, those in (39c) do not accept telic interpretation
as shown in (40c).

(40) a.   Ken-wa   sono-hako-o 10-byoo-de   tubusi-ta

      Ken-TOP the-box-ACC 10-second-in crush-PAST
      Ken crushed the box in 10 seconds.

      健はその箱を 10 秒で潰した。

  b.   ?Ken-wa   sono-sakana-o 10-pun-de   ni-ta

      Ken-TOP the-fish-ACC   10-minute-in simmer-PAST
      Ken simmered the fish in 10 minutes.

      ?健はその魚を 10 分で煮た。

  c.   *Ken-wa   sono-neko-o 10-pun-de   nade-ta

      Ken-TOP the-cat-ACC 10-minute-in stroke-PAST
      Ken stroked the cat in 10 minutes.

      *健はその猫を 10 分で撫でた。

Verbs in (39b) show the behavior to be categorized as either (39b) or (39c): they accept telic interpretation, although the acceptability is slightly lower than those in (39a).

As for atelic interpretation, verbs in (39b) and (39c) both accept it, while verbs in (39a) do not.

(41) a.   *Ken-wa   sono-hako-o 10-byoo-kan   tubusi-ta

      Ken-TOP the-box-ACC 10-second-for crush-PAST
      Ken crushed the box for 10 seconds.

      健はその箱を 10 秒間潰した。

  b.   Ken-wa   sono-sakana-o 10-pun-kan   ni-ta

      Ken-TOP the-fish-ACC   10-minute-for simmer-PAST
      Ken simmered the fish in 10 minutes.

      健はその魚を 10 分間煮た。

  c.   Ken-wa   sono-neko-o 10-pun-kan   nade-ta

      Ken-TOP the-cat-ACC 10-minute-for stroke-PAST
      Ken stroked the cat in 10 minutes.

      健はその猫を 10 分間撫でた。

The difference is clearer in the irrialis mood.

(42) a.　Ken-wa　sono-hako-o　10-byoo-de　tubusu-daroo

　　　　Ken-TOP the-box-ACC 10-second-in crush-will

　　　　Ken will crush the box in 10 seconds.

　　　　健はその箱を 10 秒で潰すだろう。

　　b.?*Ken-wa　sono-sakana-o 10-pun-de　　niru-daroo

　　　　Ken-TOP the-fish-ACC　10-minute-in simmer-will

　　　　Ken will simmer the fish in 10 minutes.

　　　?*健はその魚を 10 分で煮るだろう。

　　c. *Ken-wa　sono-neko-o　10-pun-de　　naderu-daroo

　　　　Ken-TOP the-cat-ACC 10-minute-in stroke-will

　　　　Ken will stroke the cat in 10 minutes.

　　　*健はその猫を 10 分で撫でるだろう。

(43) a. *Ken-wa　sono-hako-o　10-byoo-kan　tubusu-daroo

　　　　Ken-TOP the-box-ACC 10-second-for crush-will

　　　　Ken will crush the box for 10 seconds.

　　　*健はその箱を 10 秒間潰すだろう。

　　b.　Ken-wa　sono-sakana-o 10-pun-de　　niru-daroo

　　　　Ken-TOP the-fish-ACC　10-minute-in simmer-will

　　　　Ken will simmer the fish in 10 minutes.

　　　健はその魚を 10 分間煮るだろう。

　　c.　Ken-wa　sono-neko-o　10-pun-kan　　naderu-daroo

　　　　Ken-TOP the-cat-ACC 10-minute-for stroke-will

　　　　Ken will stroke the cat for 10 minutes.

　　　健はその猫を 10 分間撫でるだろう。

Compared with (40b), the acceptability of (42b) is lower, while the other sentences in (40) and (42) are the same in acceptability as those in (40) and (41), past-tensed sentences. On the other hand, the acceptability of atelic interpretation is invariable between past-tensed sentences and irrialis ones.

To sum up, causative verbs allow only telic interpretation and ACT-ON verbs only atelic interpretation, while semi-causative verbs accept both telic and atelic interpretation although the telic interpretation is lower in acceptability than causative verbs. Considering this theoretically, if LCSs of semi-causative verbs were the same as those of causative verbs, that is, if semi-causative verbs had resultative states in their LCSs as causative verbs, such difference would not be observed: it seems that resultative states are not specified in their LCSs in semi-causative verbs, while they are specified in causative verbs, because causative verbs show no difference in acceptability depending on tense and mood.

Next, let us observe resultative sentences. While verbs in (39a) and (39b) are compatible with resultative phrases, those in (40c) are not.

(44) a.   Ken-wa   sono-hako-o petyanko-ni   tubusi-ta
          Ken-TOP the-box-ACC totally.flat-to crush-PAST
          Ken crushed the box totally flat.
          健はその箱をぺちゃんこに潰した。

     b.   Ken-wa   yasai-o   kutakuta-ni ni-ta
          Ken-TOP vegetable-ACC too.soft-to   simmer-PAST
          Ken simmered the vegetable too soft.
          健は野菜をくたくたに煮た。

     c. *Ken-wa   sono-neko-o subesube-ni nade-ta
          Ken-TOP the-cat-ACC smooth-to   stroke-PAST
          Ken stroked the cat smooth.
          *健はその猫をすべすべに撫でた。

Finally as (45a) and (45b) show, verbs in (39a) and (39b) occur with *-tearu*, which also refers to resultative states, while those in (39c) do not.

(45) a.   sono-hako-wa tubusi-tearu
          the-box-TOP   flat-has.been
          The box has been crushed.
          その箱は潰してある。

    b. sono-sakana-wa ni-tearu

       the-fish-TOP   simmer-has.been
       The fish has been simmered.

       その魚は煮てある。

    c. *sono-neko-wa nade-tearu

       the-fish-TOP stroke-has.been
       The cat has been stroked.

       *その猫は撫でてある。

Summing up, we obtain the following table.[1]

	examples	*n-time-de*	*n-time-kan*	resultatives	*-tearu*
Causative verbs	*kowas(u)* (break)	ok	*	ok	ok
Semi-causative verbs	*ni(ru)* (simmer)	?or?*	ok	ok	ok
ACT-ON verbs	*nade(ru)* (stroke)	*	ok	*	*

Table 1: Verbs and Telicity

Semi-causative verbs show, as it were, hybrid-like behavior: on one hand they occur with atelic expression *n-time-kan* like ACT-ON verbs, and on the other hand, they allow telic interpretation like causative verbs, though showing slightly lower acceptability. Next section shows that our system of Lexical Semantic Representation convincingly and clearly formalizes this difference between these three types of verbs.

3.2 Lexical Semantic Representation

We propose the following Lexical Semantic Representation (LSR), modifying Kegeyama's (2005), which improved Pustejovsky's (1995) Qualia Structure.

(46)
$$
\begin{bmatrix}
\textit{QUALIA STRUCTURE} \\
\begin{bmatrix}
\textit{Truth-conditional Section (TS)} \\
\text{FORMAL:}\quad \text{eventuality type of the verb (state, process, transition)} \\
\text{CONST:}\quad \text{LCS of the verb}
\end{bmatrix} \\
\begin{bmatrix}
\textit{Non-truth-conditional Section (NTS)} \\
\text{TELIC:}\qquad \text{resultative state the verb potentially has} \\
\text{TRIGGER:}\quad \text{external factors of the verb}
\end{bmatrix}
\end{bmatrix}
$$

---

[1]The classification in (39) does not take into consideration whether those transitive verbs have corresponding intransitive counterparts or not. More precise classification will be presented in Section 4.3.8.

One different point from Kageyama and Pustejovsky is that we divide the four quales in Qualia Structure into the two semantic sections: Truth-Conditional Section (TS) and Non-truth-conditional Section (NTS). The former subsumes Formal Quale (FORMAL) and Constitutive Quale (CONST), and the latter,Telic Quale (TELIC) and Trigger Quale (TRIG-GER).[2] The content of TELIC and TRIGGER is also different (probably stricter than Kageyama and Pustejovsky), which is defined in (46).

Another difference is that we define the relation between semantics and syntax, and between TS and NTS.

(47) a.   Variables in TS are linked to Argument Structure (AS) by linking rules（Grimshaw (1990), Jackendoff (1990), Levin and Rappaport Hovav (1995), Kageyama (1996), etc.).

      b.   Variables in NTS are not linked to Argument Structure.

      c.   At least one variable in NTS must be somehow associated with corresponding one in TS.

(47a) has been generally supposed in previous studies discussing the relation between lexical semantics and syntax. (47b) means variables which are not included in the proposition of a verb are not related to syntax; it is variables in TS that have relation to syntax. Of course it is possible that NTS variables which are associated to TS are finally linked to syntax by way of TS.

(47c) stipulates the relation between NTS and TS. No verb seems to exist which lexically specifies an external factor consisting of no shared elements with its CONST value (LCS). If such a verb existed, the LSR for it would be like (48).

---

[2]We use the term "Trigger" instead of Putejovsky's original "Agentive" in order to avoid confusion with the general term "Agent."

(48)
$$
\begin{bmatrix}
\textit{*komarer(u)} \text{ (novel verb)} \\
\begin{bmatrix}
\textit{QUALIA STRUCTURE} \\
\begin{bmatrix}
\textit{TS} \\
\text{FORMAL: transition} \\
\text{CONST: BECOME } (y, \textit{BROKEN})
\end{bmatrix} \\
\begin{bmatrix}
\textit{NTS} \\
\text{TRIGGER: \quad ACT ON } (x, z)
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

(48) means that "y breaks but the external factor of breaking must be an event in which someone (x) does something not on y but on something else (z)." Such situations can exist in real life, but there seems to be no verb which necessarily must be used in such situations. That is, no verb lexically presupposes the existence of a set of participants none of which is shared with participants in its LCS. (47c) excludes such verbs as those like (48). Therefore it is not something special. TRIGGER values in fact come into effect for verbs which have a certain specification on TRIGGER value like *tukare(ru)*, as we will see soon.

Our LSR formalizes the observation in the previous section on the three types of transitive verbs. Let us see the formalization explaining the content of each quale.

(49) **Causative Verb**
$$
\begin{bmatrix}
\textit{kowas(u)} \text{ (break) 壊す} \\
\begin{bmatrix}
\textit{QUALIA STRUCTURE} \\
\begin{bmatrix}
\textit{TS} \\
\text{FORMAL: transition} \\
\text{CONST: \quad CAUSE ([ACT ON } (x, y)], [\text{BECOME } (y, \textit{BROKEN})])
\end{bmatrix} \\
\begin{bmatrix}
\textit{NTS} \\
\text{TELIC: \quad } \phi
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

(50) **Semi-causative verbs**
$$
\begin{bmatrix}
\textit{ni(ru)} \text{ (simmer) 煮る} \\
\begin{bmatrix}
\textit{QUALIA STRUCTURE} \\
\begin{bmatrix}
\textit{TS} \\
\text{FORMAL: \quad process} \\
\text{CONST: \quad ACT ON } (x, y)
\end{bmatrix} \\
\begin{bmatrix}
\textit{NTS} \\
\text{TELIC: \quad BE } (y, \textit{COOKED})
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

(51) **ACT-ON verbs**

$$
\begin{bmatrix}
nade(ru)\ \text{(stroke)}\ 撫でる \\
\begin{bmatrix}
QUALIA\ STRUCTURE \\
\begin{bmatrix}
TS \\
\text{FORMAL:}\quad \text{process} \\
\text{CONST:}\qquad \text{ACT ON }(x,\,y)
\end{bmatrix} \\
\begin{bmatrix}
NTS \\
\text{TELIC: } -
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

FORMAL in TS encodes event type of verbs, and CONST has their LCS as its value. This is not different from Kageyama (2005). What makes our LSR different is the content of TELIC and AGENTIVE, and in addition, we propose tests for licensing their values.[3]

There are three possible values as to TELIC: 1) some concrete value is specified, 2) there is no value to be specified since a certain resultative state is specified at the level of TS (we encode it as "ϕ"), and 3) there can be no resultative state (represented as "$-$"). The test by which to determine TELIC values has to do with the one based on event boundedness, which we saw in the previous section (presented here again as (52)).

(52) a. Ken-wa   sono-hako-o {10-byoo-de/*10-byoo-kan} tubusi-ta
         Ken-TOP the-box-ACC 10-second-{in/for}   crush-PAST
         Ken crushed the box for 10 seconds.
         健はその箱を {10 秒で/*10 秒間 } 潰した。

   b. Ken-wa   sono-sakana-o {?10-pun-de/10-pun-kan} ni-ta
       Ken-TOP the-fish-ACC   10-minutes-{in/for}   simmer-PAST
       Ken simmered the fish in 10 minutes.
       健はその魚を {?10 分で/10 分間 } 煮た。

   c. Ken-wa   sono-neko-o {*10-pun-de/10-pun-kan} nade-ta
       Ken-TOP the-cat-ACC 10-minutes-{in/for}   stroke-PAST
       Ken stroked the cat in 10 minutes.
       健はその猫を {*10 分で/10 分間 } 撫でた。

---

[3]Neither Pustejovsky (1995) nor Kageyama (2005) presents criteria to attest values of TELIC and AGEN-TIVE.

Tubus(u) (crush) allows *10-byoo-de* (in ten seconds) to cooccur, since it has the semantic predicate *BECOME* in its CONST in TS. Its FORMAL value is specified as *transition*, which means *tubus(u)* includes change of state.[4] TELIC value is specified as ϕ because resultative state is already specified in TS and therefore no further resultative state can be added.[5]

As we saw in the previous section, *ni(ru)* (simmer) shows different behavior from either *tubus(u)* or *nade(ru)*. Equally to *nade(ru)*, CONST value of *ni(ru)* is specified as ACT ON, which is the same as *nade(ru)*, because both verbs allow *10-pun-kan* (for ten minutes) to cooccur. However, *ni(ru)* is different from *nade(ru)* in that it allows the cooccurrence of *10-pun-de* (in ten minutes), though the acceptability being slightly lower than *10-pun-kan*. This behavior of *niru* indicates that it potentially has a resultative state in its meaning, which is naturally represented as its TELIC value in our LSR.

As the LSR of *nade(ru)* involves no element that allows cooccurrence of *10-pun-de*, **10-pun-de-naderu* is not accepted. On the other hand, *niru* has as its TELIC value "edible state" (*COOKED*). Since it is just a state, *niru* does not clearly mean transition. It does not have the semantic predicate BECOME, either. However, by reading its TELIC value and CONST value, we can obtain the meaning "*x* acts on *y* and *y* can be at an edible state." This makes it possible to infer some relation, possibly a causal relation, between these two events. That is why cooccurrence of *10-pun-de* is not totally unacceptable.

Niru has the semantic predicate ACT ON at the level of TS. Telicity expressions like *10-pun-de* or *10-pun-kan* primarily refers to that semantic level, TS, and when the values of TS do not accord with them, they next refer to NTS and make a coerced interpretation. This seems to be the reason the acceptability of *?10-punde-niru* is slightly lower than that of *10-pun-de-tubusu*: the latter can be licensed just by referring to the TS value of *tuku*, while the former is forced to refer all the way to the NTS value of *ni(ru)*, which lies at the "deeper" sematic level.[6]

---

[4]Specifically we assume three necessary values for FORMAL: state, process, and transition; we do not distinguish transitivity of verbs and represent as *transition* regardless of transitivity as long as the verb means change of state or location. Of course possibility remains that we need more detailed distinction, but as for phenomena discussed in the present paper, there seems to be no necessity of further distinction.

[5]AGENTIVE is omitted because of its unnecessity for discussion here. Henceforth we will not represent the quales in qualia structure which are not necessary for discussion.

[6]Analyzing English verb *wash* and *sweep*, Kageyama (2005) argues that these verbs have a resultative state in their LCS but their FORMAL value is *process* because they allow either of *in ten minutes* or *for ten minutes*. His analysis seems valid if there is no difference in acceptability between them: *wash* and *sweep*

By the way, for some Japanese native speakers, those who can accept the sentence with *10-pun-de* in (52b) without any difficulty, it might not be clear why the resultative state is registered in NTS, not in TS; the reslutative state could be included as a part of its CONST value. However, the resultative state cannot be propositional meaning of *niru*, I believe, because *niru* shows difference in cancellation of resultative state from verbs which are usually classified as change-of-state causative verbs like *tubus(u)* (crush) or *kowas(u)* (break).

(53) a. *sono-hako-o tubusi-ta-kedo tubur-ena-katta

      the-box-ACC crush-PAST-but crush-NEG-PAST
      I crushed the box, but it did not crush.

    *その箱を潰したけど潰れなかった。

   b. *sono-pasokon-o kowasi-ta-kedo koware-nak-atta

      the-PC-ACC   break-PAST-but crush-NEG-PAST
      I broke the PC, but it did not broke.

    *そのパソコンを壊したけど壊れなかった。

(54) a. sono-sakana-o ni-ta-kedo   nie-na-katta

      the-fish-ACC   crush-PAST-but simmer-NEG-PAST
      I simmered the fish, but it did not become edible.

    その魚を煮たけど煮えなかった。

Since *tubus(u)* and *kowas(u)* logically entail resultative states in their propositional meaning, the resultative states cannot be canceled. On the other hand *niru* accepts cancellation. This behavioral difference to negation can be explained in our LSR with no difficulty: it is attributed to the difference in semantic status of their resultative states. *Tubus(u)* and *kowas(u)* have their resultative states at the level of TS, while *niru* has its resultative state at the level of NTS, which does not conflict with cancellation by *nie-nak-kat-ta*.[7]

---

are, in our term, "truth-conditionally hybrid." In Japanese, on the other hand, the difference in acceptability surely exists between {*10-pun-kan niru/haku*} and {*?10-pun-de niru/haku*} as we have seen. In order to make the latter expression completely acceptable, we need to add some telicity markers like *-tesimau* as in *10-pun-de* {*ni/hai*}*-tesimat-ta*. Our LSR can formalize such differences between English and Japanese.

   [7]Kageyama (1996) attributes this difference to his semantic predicate CONTROL, which means, in his words, direct responsibility of Agent to the secondary event. If cognitive focus is put on Agent, the verb

Next，we give the definition of TRIGGER. TRIGGER value is licensed by whether external factors are necessary or not for the verb, which can be tested by the cooccurrence of *mizukara* or *hitorideni,* both of which are roughly translated into *by oneself* in English. *Mizukara* usually occurs with a human subject, and *hitorideni,* with a non-human subject, though the latter can be sometimes used with human subjects when the verb means no intentionality. The cooccurence of these two phrases indicates that the subject itself can be the factor; the subject plays a role of "internal factor" for the verb. In that case, TRIGGER value is minus (−).

(55) a.   Ken-wa   mizukara zimen-ni   taore-ta [TRIGGER: −]
          Ken-TOP by-himself ground-LOC fall-PAST
          Ken fell on the ground.
          健は自ら地面に倒れた。

   b. *Ken-wa   mizukara   tukare-ta   [TRIGGER: +]
          Ken-TOP by-himself get.tired-PAST
          Ken got tired by himself.
          *健は自ら疲れた。

(56) a.   sono-ha-wa   hitorideni oti-ta   [TRIGGER: −]
          the-leaf-TOP by.itself   fall-PAST
          The leaf fell by itself.
          その葉はひとりでに落ちた。

   b. *sono-nizakana-wa   hitorideni kuzure-ta   [TRIGGER: +]
          the-simmered.fish-TOP by.itself   crumble-PAST
          The simmered fish crumbled by itself.
          *その煮魚はひとりでに崩れた。

---

allows cancellation as in *denki-o tuketa-kedo tuka-nakat-ta* (I turned on the light but it was not on.); if cognitive focus is put on the relutative event, the verb cannot be canceled by negation as in (53). However, his explation gives no answer to the reason why *tubusu* and *kowasu* never allow focus to be put on Agent, while *niru* does.

  c. *Ken-wa   gakkoo-ni   hitorideni tui-ta   [TRIGGER: +]

     Ken-TOP school-LOC by.himself arrive-PAST

     Ken arrived at school by himnself.

  *健は学校にひとりでに着いた。[8]

(55b) is unacceptable while (55a) has no problem, because the subject of *taoreru* more or less can control the falling action while that of *tukareru* cannot control the change of state: in order for a person or an animal to get tired, he/she/it needs to do something like running, swimming, talking, etc. Similarly, in order for someone or something to arrive somewhere, he/she/it has to move before. TRIGGER values (+ or −) represents such difference between *taoreru* on one hand and *kuzureru* and *tuku* on the other.

(57)
$$
\begin{bmatrix}
tuk(u) \text{ (arrive) 着く} \\
\begin{bmatrix}
QUALIA\ STRUCTURE \\
\begin{bmatrix}
TS \\
\text{FORMAL:} \quad \text{transition} \\
\text{CONST:} \quad \text{BECOME [BE AT } (y, z)]
\end{bmatrix} \\
\begin{bmatrix}
NTS \\
\text{TELIC:} \quad \phi \\
\text{TRIGGER:} \quad \dots \text{MOVE } (y, [_{path}\ w])
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

    So far we have defined our LSR, and now we are ready to make a detailed analysis.[9] The next chapter presents our analysis of LVC formation.

---

[8]*Basu-ni notte itara gakkoo-ni hitorideni tuita* (I arrived at school of myself while I was on the bus.) is more acceptable. This seems to be because *basu-ni notte itara* evokes motion, which is the latent cause of arrival.

[9]Our AGENTIVE and TELIC quales put a stricter semantic restriction on verbs than those of Kageyama (2005). We consider our LSR, which has such a strict restriction, helps a lot explain the semantic restriction in combining two verbs to form LVCs. Of couese the effectiveness of our LSR in other phenomena is to be empirically proved. An example is Bando (2011): an analysis of backward binding in psych verbs.

Chapter 4 Two ways of formation

We argue that there are two different ways to form LVCs: one is the process in which the LCSs of two verbs are combined only at the level of TS, and the other is the process in which V1's LCS is introduced at the level of V2's NTS. Section 4.1 analyzes the former type, and section 4.2, the latter type. Section 4.3 presents advantages of our analysis.

4.1 LCS blending

The process of LVC formation in which only TS works is similar to Complex Predicate Rule (Jackendoff 1974), LCS synthesizing in Kageyama (1999), or "superimposition" of LCSs by Asao (2007). Specifically we argue that the CONST values of V1 and V2 (the LCSs of the two verbs) are "blended" on the basis of at least one semantic predicate they have in common, forming a more or less "brand-new" LCS.

4.1.1 Basic operation

Our "LCS blending" in TS means the following operation.

(58)   **Blending of same type LCSs**

    a. ACT (ON) $(x, (y))$ + ACT (ON) $(x, (y))$ → ACT (ON) $(x, (y))$

       naki-sakebu (weep-cry), *koi-sitau* (love-like), *nageki-kanasimu* (moan-feel.sad)

       泣き叫ぶ，恋い慕う，嘆き悲しむ

    b. BECOME $(y, \ldots)$ + BECOME $(y, \ldots)$ → BECOME $(y, \ldots)$

       odoroki-akireru (get.surprised-get.shocked), *ore-magaru* (fold-bend)

       驚きあきれる，折れ曲がる

    c. MOVE $(x...)$ + MOVE $(x...)$ → MOVE $(x, \ldots)$

       yure-otiru (swing-fall), *tare-sagaru* (droop-hang), *mai-agaru*[1] (dance-rise)

---

[1]That *mau* (dance) has semantic predicate MOVE is verified from the fact that it can occur with directional phrases like *sayuu-ni* (right and left) as in *kamihubuku-ga sayuu-ni mai, (butai-sita-ni oti-ta)* (Confetti danced right and left (down to below the stage).

揺れ落ちる，垂れ下がる，舞い上がる

d. CAUSE ([ACT ON (x, y)], [BECOME $(y, \ldots)$]) +
CAUSE ([ACT ON (x, y)], [BECOME $(y, \ldots)$])
$\rightarrow$ CAUSE ([ACT ON (x, y)], [BECOME $(y, \ldots)$])
ori-mageru (fold-bend), *ooi-kakusu* (cover-hide), *yaburi-suteru* (tear-throw.away),
tigiri-toru (pick.off-take)
折り曲げる，覆い隠す，破り捨てる，ちぎり取る

e. CAUSE ([ACT (x)], [MOVE $(x \ldots)$]) + CAUSE ([ACT (x)], [MOVE $(x, ...)$])
$\rightarrow$ CAUSE ([ACT (x)], [MOVE $(x \ldots)$])
hasiri-mawaru (run-turn), *ugoki-mawaru* (move-turn), *nige-mawaru* (flee-turn),
koroge-mawaru (roll-turn), *hai-yoru* (crawl-approach), *ayumi-yoru* (walk-approach),
suberi-oriru (ski-descend)
走り回る，動き回る，逃げ回る，転げ回る，這い寄る，歩み寄る，滑り降りる

(59)   **Blending of different type LCSs**

a. ACT ON (x, y) + CAUSE ([ACT ON (x, y)], [BECOME $(y, \ldots)$])
$\rightarrow$ CAUSE ([ACT ON (x, y)], [BECOME $(y, \ldots)$])
tataki-kowasu (hit-break), *osi-akeru* (push-open), *hiki-taosu* (pull-down), *keri-akeru*
(kick-open)
叩き壊す，押し開ける，引き倒す，蹴り開ける

b. ACT ON (x, y) + CAUSE ([ACT ON (x, y)], [MOVE $(y \ldots)$])
$\rightarrow$ CAUSE ([ACT ON (x, y)], [MOVE $(y \ldots)$])
tataki-otosu (hit-fell), *osi-ageru* (push-raise), *uti-ageru* (hit-raise)
叩き落とす，押し上げる，打ち上げる

c. ACT (x) + CAUSE ([ACT (x)], [MOVE $(x \ldots)$])
$\rightarrow$ CAUSE ([ACT (x)], [MOVE $(x, \ldots)$])
warai-korogeru (laugh-roll.oneself), *hane-mawaru* (jump-about), *abare-mawaru* (rage-
about), *ii-yoru*[2] (say-approach)

---

[2] *Iu* (say), a transitive verb, seems to be intransitivized as Yumoto (2005) argues.

笑い転げる，跳ね回る，暴れ回る，言い寄る

As an example let us see the formation of *ori-mageru* (fold-bend) in (58d).

(60) a. oru: CAUSE ([*x* ACT ON *y*], [BECOME (*y, FOLDED*)])

b. mageru: CAUSE ([*x* ACT ON *y*], [BECOME (*y, BENT*)])

c. ori-mageru: CAUSE ([*x* ACT ON *y*], [BECOME (*y, FOLDED* ∧ *BENT*)])

As (60) illustrates, the same semantic predicates of V1 and V2 are blended, resulting in one semantic predicate. What should be emphasized is that this process in principle makes LCSs little different from those of simple verbs. This not only makes description of LVCs simpler, but it helps a lot discuss causative-inchoative alternation of LVCs as we will see later.

Regarding semantic matching of two verbs, the process of LCS blending predicts that two verbs which do not have a same semantic predicate cannot be blended.[3]

4.1.2 'Identification' of arguments and the principle of blending

THE PRINCIPLE OF LCS BLENDING

In LCS blending, common semantic predicates of two verbs blend, resulting in one semantic predicate. Accordingly, arguments of the common semantic predicate are unified into one, rather than to say that two verbs' arguments are "identified" with each other. As a result, we can get similar construal as "identification.[4]"

In (58), as the same type LCSs are blended, their corresponding arguments are unified into one accordingly. In this case two verbs have identical semantic predicates, so all the arguments are unified with no problem. The situation is not so different in (59), where part of LCSs of two verbs is different. In this case, the arguments of the same semantic predicates are unified as in (58), and accordingly, the other arguments are identified on the basis of the reference of the unified arguments. Let us consider *tataki-kowasu* (hit-break) as an example.

---

[3]Further examples and verbs which have partly different semantic predicates from each other is discussed in section 4.1.3.

[4]We exemplify crucial differences between our "blending" and previous studies' "identification" in section 4.3

(61) a.   *tataku*: ACT ON (x, y) 叩く

b.   *kowasu*: CAUSE ([ACT ON (x, y)], [BECOME (y, *BROKEN*)])   壊す

c.   *tataki-kowasu*: CAUSE ([ACT ON (x, y)], [BECOME (y, *BROKEN*)])
        叩き壊す

First, each argument of the common semantic predicate ACT ON is unified into one. Accordingly, y in BECOME (y, *BROKEN*) is identified as the same argument as y in ACT ON (x, y), because this identification is already lexically specified in V2 *kowasu*.

What has been argued so far predicts, as said above, that two verbs of totally different semantic predicates cannot form an LVC. However, the converse is not always true: not all pairs of verbs that have a same semantic predicate can be compounded.

(62) *korogasi-otiru (roll-fall), *nage-agaru (throw-ascend), *tigiri-yabureru (tear-get.torn)
        *転がし落ちる, *投げ上がる, *ちぎり破れる

V1 and V2 in (62) have a common semantic predicate.

(63)   *korogasi-otiru 転がし落ちる

a.   *korogasu*: CAUSE ([ACT ON (x, y)], [**MOVE** (y)])

b.   *otiru*: **MOVE** DOWN (y)

(64)   *nage-agaru 投げ上がる

a.   *nageru*: CAUSE ([ACT ON (x, y)], [**MOVE** TOWARD (y, z)])

b.   *agaru*: **MOVE** UP (y)

(65)   *tigiri-yabureru ちぎり破れる

a.   *tigiru*: CAUSE ([ACT ON (x, y)], [**BECOME** (y,*TORN*)]

b.   *yabureru*: **BECOME** (y,*TORN*)

These pairs have the same semantic predicates marked with bold letters. Nevertheless, they cannot be compounded at all as (62) shows. Reflecting on this fact, we propose the following principle on LCS blending.

(66) **Principle of LCS Blending (PLB) :** two verbs cannot be LCS-blended when their semantic predicates of starting point of the events are not shared with each other.

Since (66) logically implies that two verbs to be compounded must share at least one semantic predicate, it predicts that not only compounds like in (62) but also ones like **tataki-tubureru* (hit-break) or *koware-otiru* (break-fall) are impossible.

(67) a. *tataku* (hit): ACT ON (x, y)

   tubureru (get.crushed): BECOME (y, *CRUSHED*)

   b. *ka-ga   tataki-tubure-ta

   mosquito-NOM hit-get.crashed-PAST
   The mosquito was crushed by hitting.
   *蚊が叩き潰れた。

(68) a. *kowareru* (break): BECOME (y, *BROKEN*)

   otiru (fall): MOVE DOWN (y)

   b. *razikon-heri-ga   (hikootyuu)   koware-oti-ta

   radio-controled-helicopter-NOM (while.flying) break-fall-PAST
   The radio-controled model helicopter broke and fell (while flying).
   *ラジコンヘリが,（飛行中）壊れ落ちた。

As shown in (67), *tataku* (hit) and *tubureru* (get.crashed) cannot be compounded because they share no semantic predicate.

   (66) also predicts two unaccusative verbs which fulfill *Transitivity Harmony Principle* (Kageyama 1993) cannot form an LVC, as in (68), unless they have at least one common semantic predicate. Therefore, even though a radio-controled helicopter's breaking down while flying can cause it to fall in the real world, the LVC **koware-otiru* is predicted to be unacceptable.

From the viewpoint of our LCS blending, not only is there no need to make specific rules as to argument identification, but also we can reduce *Transitivity Harmony Principle*, a morpho-syntactic principle, Unique Path Constraint (Goldberg 1995), and Temporal Iconicity Condition[5] (Li 1993) to PLB. This makes description of LVCs theoretically much simpler.

Seemingly exceptional cases

PLB appears too strict because some seemingly exceptional cases can be found. However, it seems that the spirit of PLB remains effective even in such seemingly exceptions.

One of such "exceptions" is the following.

(69)   gake-ga   (tanizoko-ni)   **kuzure-oti**-ta.
cliff-NOM valley.bottom-LOC collapse-fall-PAST
The cliff collapsed down to the bottom of the valley.
崖が（谷底に）崩れ落ちた。

In this case, however, V1 *kuzure(ru)* is possibly reanalyzed as a motion verb, rather than change-of-state which it originally means. A supporting evidence is that when *gake* (cliff) occurs as subject, directional adverbials can cooccur. On the other hand, when the subject is *tumiki* (blocks), the sentence is hardly acceptable.

(70) a. ?gake-ga   (tanizoko-e-to)   **kuzure**-ta.
cliff-NOM valley.bottom-to-COMP collapse-PAST
The cliff collapsed to the bottom of the valley.
?崖が谷底へと崩れた。

---

[5]In the case of *yake-sinu* (burn-die), both of the base verbs have the semantic predicate BECOME. Since PLB says nothing about time order, it predicts that either of the verbs can occur as V1, resulting in **sini-yakeru*, as opposed to *yake-sinu*. This suggests that our principle cannot completely take place of TIC. However, a possibility remains to explain the time order constraint. Subject of *yake(ru)* can be interpreted as an incremental theme (Dowty 1991), or sentences which include *yake(ru)* can be interpreted incrementally: *sono-kami-ga sukosi yake-ta* (The paper burned a little.) can be interpreted that some part of the paper burned, or the the burning event was not completed. On the other hand, *sin(u)* never allows such interpretation unless plural subject occurs: **sono-ippikino-inu-ga sukosi sinda* (The dog died a little.) is totally unacceptable. This difference between the two verbs may suggest the degree of achievement, rather than time, plays a crucial role. In other words the verb which profiles higher degree of achievement or accomplishment must be V2. In order to describe it formally, however, we need a more precise device in addition to ordinarily used LCS and Qualia Structure. We put aside the issue for future research.

b.?*tumiki-no-yama-ga   yuka-e-to   **kuzure**-ta.

blocks-GEN-pile-NOM floor-to-COMP collapse-PAST
A pile of Blocks collapsed onto the floor.

?*積み木の山が床へと崩れた。

There exist some other seemingly exeptions.

(71) a.   tamago-o booru-ni   wari-otosu

egg-ACC   bowl-LOC break-drop
break an egg into the bowl

卵をボールに割り落とす

b.   kakunenryoo-ga   tanku-kara toke-deru

nuclear.fuel-NOM tank-from   melt-out
Nuclear fuel melt out from the tank.

核燃料がタンクから溶け出る

As for (71a), *wari-otosu* does not seem to allow subjects other than *tamago* (egg).

(72) a.?*tyokoreeto-o   booru-ni   wari-otosu

chocolate-ACC bowl-LOC break-drop
break chocolate into the bowl

?*チョコレートをボールに割り落とす

b. *garasu-o   yuka-ni   wari-otosu

glass-ACC yuka-LOC break-drop
break glass into the bowl

*ガラスを床に割り落とす

As soon as we break the shell of an egg, its content falls. That is, in this case, we can recognize motion of content of an egg from *tamago-o waru* (break an egg).

Let us turn to *toke-deru* (melt out of somewhere). The explanation is similar. When something melts, it becomes liquid, and liquid is very easy to move or flow. Here again our lexical or world knowledge on the subject salvages acceptability.

Since PLB is a general rule, it is defeasible: verb combinations which appear to violate it are not totally impossible as long as interpretation which matches it is possible.[6]

4.1.3   Compositional headedness

We have proposed the process of LCS blending at the level of TS: the CONST values of two verbs are blended on the basis of common semantic predicates. In this section we apply to it the notion of "event headedness." As far as I know, the notion itself was first introduced by Pustejovsky (1995). However, he does not give clear criteria to decide which subevent of a verb is licensed as head. We adopt the notion of event headedness by Kudo (2010), which makes clearer definition of event head, and we argue that event headedness of LVCs is compositionally determined by the headedness of base verbs. This notion of event headedness helps avoid problems of applying RHR to LVCs, which we discussed in chapter 2.

Kudo's definition of event headedness is the following.

(73)   ***Event-Head Assignment***

A subevent of a predicate must be headed, indicated by e*, if and only if

a.   it involves a constant; or

b.   its manner/instrument/theme is lexically specified. [7]

(Kudo 2010: 84)

---

[6]The issue of in what case coerced interpretation like what we discuss here is possible still remains. In order to give a convincing answer, it seems that difference and relation between motion and change of state must be researched conceptually, theoretically, and pragmatically. But presently it is beyond our analysis.

[7]In addition to (73a, b), Kudo presents another criterion as (c): *or it is semantically or pragmatically focused.* This condition comes into effect, for instance, in causative-inchoative alternation of verbs like *break*. Explaining it briefly under our flamework, *break* has an LCS like CAUSE ([ACT ON (x, y)], [BECOME $(y, BROKEN)$]*) in lexicon. If this is straightly mapped to syntax, it is realized as an intransitive verb: in principle only elements included in the head event are mapped to syntax. On the other hand, if the Agent x is pragmatically focused, the primary event ACT ON (x, y) also functions as head: the LCS is "doubly headed." In this case, the verb is realized as a transitive verb. By the way, our framework supposes corresponding transitive and intransitive verbs are both registered in the lexicon and they are related to each other by lexical rules. Therefore, what comes in effect in our argument in fact is (73a, b), and we would analyze transitive *break* as a singly headed verb: the secondary event is the only head. There seems to be another way. That is, the head preliminarily specified in the lexicon and that assigned by (c) are different from each other in nature. However, since such an issue does not directly affect our argument, we do not go further here.

Let us see analyses in previous studies at first. For example Yumoto (2005) gives the following analysis of *naki-sakebu* (weep-cry).

(74)   naki-sakebu: [x_i CONTROL [y_i CRY]] AND [x_i CONTROL [y_i SHOUT]]
       → [x_i CONTROL [y_i CRY AND SHOUT]] （Yumoto 2005: 113）

The following is our analysis, in which the CONST values of the two verbs are blended.

(75)
$$\left[\begin{array}{l} naku \text{ (weep) } 泣く \\ \left[\begin{array}{l} QUALIA\ STRUCTURE \\ \left[\begin{array}{l} TS \\ \text{CONST: } [\text{ACT}_{\underline{voice},tears,...}\ (x)]^* \end{array} \right] \end{array} \right] \end{array} \right]$$

(76)
$$\left[\begin{array}{l} sakebu \text{ (cry) } 叫ぶ \\ \left[\begin{array}{l} QUALIA\ STRUCTURE \\ \left[\begin{array}{l} TS \\ \text{CONST: } [\text{ACT}_{\underline{voice},...}\ (x)]^* \end{array} \right] \end{array} \right] \end{array} \right]$$

(77)
$$\left[\begin{array}{l} naki\text{-}sakebu \text{ (weep-cry) } 泣き叫ぶ \\ \left[\begin{array}{l} QUALIA\ STRUCTURE \\ \left[\begin{array}{l} TS \\ \text{CONST: } [\text{ACT}_{\underline{voice},(tears,...)}\ (x)]^{**} \end{array} \right] \end{array} \right] \end{array} \right]$$

The CONST value in (75) means that the verb *naku* (weep) has the semantic predicate ACT, which is accompanied by its own manner like letting out one's voice, tears, etc. It has a simple event structure, and manners are specified there, so of course this single event is the head, which is marked with "*." As to *sakebu* (cry), we could give similar exposition. *Naku* and *sakebu* have the same semantic predicate ACT at the starting point of their events, which makes it possible for them to form an LVC. However, in forming an LVC in fact, their manner, which is the motivation of headedness of both verbs, must not conflict with each other. In this case both verbs have the manner of letting voice (underlined part), which plays a crucial role in blending. Meanwhile, manners other than that are outfocused. This is confirmed by the following behavior.

(78) a.   Naomi-ga   {oogoe-de/samezame}   nai-ta
          Naomi-NOM {loudly/quietly.and.with.tears} weep-PAST
          Naomi wept {quietly/letting off a lot of tears}.
          奈緒美が { 大声で/さめざめ } 泣いた。

b.   Naomi-ga   {oogoe-de/*samezame}   saken-da

Naomi-NOM {loudly/quietly.and.with.tears} cry-PAST

奈緒美が { 大声で/*さめざめ } 叫んだ。

(79)   Naomi-ga   {oogoe-de/*samezame/*oogoe-de-samezame}   naki-saken-da

Naomi-NOM {loudly/quietly.and.with.tears/loudly, quietly.and.with.tears} weep-cry-PAST

Naomi wept and cry loudly and quietly, letting off a lot of tears.

奈緒美が { 大声で/*さめざめ /*大声でさめざめ } 泣き叫んだ。

The adverbial phrase *oogoe-de* (loudly) can modify the whole compound *naki-sakebu. Samezame* (quietly with a lot of tears) refers to the whole behavior of weeping; modifying *naki-sakebu*, it must refer to manners other than voicing, like letting off tears. However, the manner in charge of letting off tears are already outfocused, so *samezame* can no longer modify *naki-sakebu*. In addition, *naku* and *sakebu* in *naki-sakebu* cannot be independently modified by *oogoe-de* and *samezame* respectively, as (79) shows.

This behavior of *naki-sakebu* proves that it has the manner of letting one's voice, which V1 and V2 have in common, and this manner motivates the headedness of the compound *naki-sakebu*. Accordingly the other manners each verb independently has are outfocused in the semantic structure.

Next we consider LVCs made by two causative verbs: first, *nage-suteru* (throw-throw.away) and then *yaburi-suteru* (tear-throw.away). These compounds are formed by the same process as *naki-sakebu*, which is a big difference from previous studies.

Here are Lexical Semantic Representations (LSRs, cf. Section 3.2) of *nageru* and *suteru*.

(80) $\begin{bmatrix} nageru \text{ (throw) 投げる} \\ \begin{bmatrix} QUALIA\ STRUCTURE \\ \begin{bmatrix} TS \\ \text{CONST: CAUSE ([ACT ON } (x, y)]^*, \text{[MOVE TOWARD } (y, z)]) \end{bmatrix} \end{bmatrix} \end{bmatrix}$

(81) $\begin{bmatrix} suteru \text{ (throw away) 捨てる} \\ \begin{bmatrix} QUALIA\ STRUCTURE \\ \begin{bmatrix} TS \\ \text{CONST: CAUSE ([ACT ON } (x, y)], \text{[BECOME [BE AT } (y, z)]]) \end{bmatrix} \end{bmatrix} \end{bmatrix}$

According to (73), in *nageru* the primary event (ACT ON (x, y)) is specified as head, since manners like swinging one's arm is specified there; otherwise the event could not be called "nageru." On the other hand, *suteru* has no head because it does not fulfill the conditions in (73): no way or manner is specified and there is no constant in (81). You can throw away (*suter(u)*) something by any method or manner as long as you make it away from yourself to somewhere.

As was done in forming *naki-sakebu* (weep-cry), the LSR of *nage-suteru* is obtained by blending the CONST values of V1 and V2.[8]

(82)
$$
\left[
\begin{array}{l}
\textit{nage-suteru} \text{ (throw-throw.away) 投げ捨てる} \\
\left[
\begin{array}{l}
\textit{QUALIA STRUCTURE} \\
\left[
\begin{array}{l}
\textit{TS} \\
\text{CONST: CAUSE ([ACT ON } (x, y)]^*, \\
\qquad\quad \text{[[MOVE TOWARD } (y, z)](*) \wedge \text{[BECOME [BE AT } (y, z)]])
\end{array}
\right]
\end{array}
\right]
\end{array}
\right]
$$

The notation (*) indicates relative headedness is assigned on the event of V1 *nageru*: the origin of headedness of *nage-suteru* is the manner of V1 *nageru*, so in the secondary event (the second argument of CAUSE, represented as the second line in CONST quale in (82)), the subevent which comes from *nageru* is correspodingly and relatively regarded as head.

Our argument so far indicates that V1 *nageru* is head in the compound *nage-sureru*. This notion of headedness gives a natural explanation of the following facts.

First, *nage-suteru* allows adverbial modification which V1 *nageru* accepts.

(83) a. Ken-wa   marume-ta tooan-o   **ookiku ude-o hut-te**

Ken-TOP ball.up-PRF answer.sheet-ACC greatly arm-ACC swing-CONJ
nage-sute-ta

throw-throw.away-PAST
Ken throw away the balled up answer sheet with a big swing.

健は，丸めた答案を，大きく腕を振って投げ捨てた。

b. Ken-wa   marume-ta tooan-o   **sugoi hayasa-de**

Ken-TOP ball.up-PRF answer.sheet-ACC great speed-with

---

[8]A remaining problem in (82) is how the two z's in *nageru* and *suteru* are identified with each other. We suppose that they usually receive identified construal by our "world knowledge." This assumption is supported by (84c): the target point of *nageru* and the place where the object is *thrown away (suteru)* can be different as a result. That is, it is possible for the two elements not to be identified in reality.

nage-sute-ta

throw-throw.away-PAST

Ken throw away the balled up answer sheet with a great speed.

健は，丸めた答案を，すごい速さで投げ捨てた。

In addition，*nage-suteru* accepts cancellation which V2 *suteru* does not when used alone.

(84) a. *Ken-wa   marume-ta tooan-o   gomibako-ni   sute-ta   ga

Ken-TOP ball.up-PRF answer.sheet-ACC rubbish.bin-LOC throw.away-PAST but

gomibako-ni-wa   hair-ana-katta

rubbish.bin-LOC-TOP enter-NEG-PAST

Ken threw away the balled-up answer sheet in the rubbish bin, but it did not get
in.

*健は丸めた答案をゴミ箱に捨てたが，ゴミ箱には入らなかった。

b. Ken-wa   marume-ta tooan-o   gomibako-ni   nage-ta   ga

Ken-TOP ball.up-PRF answer.sheet-ACC rubbish.bin-LOC throw-PAST but

gomibako-ni-wa   hair-ana-katta

rubbish.bin-LOC-TOP enter-NEG-PAST

Ken threw the balled-up answer sheet at the rubbish bin, but it did not get in.

健は丸めた答案をゴミ箱に投げたが，ゴミ箱には入らなかった。

c. ?Ken-wa   marume-ta tooan-o   gomibako-ni   nage-sute-ta

Ken-TOP ball.up-PRF answer.sheet-ACC rubbish.bin-LOC throw-throw.away-PAST

ga gomibako-ni-wa   hair-ana-katta

but rubbish.bin-LOC-TOP enter-NEG-PAST

Ken threw away the balled-up answer sheet at the rubbish bin, but it did not get
in.

?健は丸めた答案をゴミ箱に投げ捨てたが，ゴミ箱には入らなかった。

Since *gomibako-ni suteru* (throw away in the rubbish bin) semantically imply that its object
gets in the rubbish bin, *gomibako-ni-wa haira-nakat-ta* (it did not get in) cannot follow it,
as shown in (84a). Meanwhile, *gomibako-ni nageru* (throw at the rubbish bin) does not have
such implication, so cancellation is possible as in (84b). In the case of *nage-suteru*, although
suteru's BECOME BE AT (y, z) exists in its LSR, it is *nageru*'s MOVE TOWARD (y, z)

that is relatively specified as head. Therefore, although *nage-suteru* allows cancellation as *nageru*, the acceptability may be slightly lower than when *nageru* is used alone.

The fact in (84) is difficult to give a natural explanation for theories which predetermine V2 to be the head of LVCs. It seems more plausible to think that the head of LVCs is compositionally determined depending on the headedness of the two verbs to be compounded.

Our mechanism of compositional headedness gives a similar explanation to the behavior of another LVC *yaburi-suteru*, V1 of which is different from *nage-suteru*. First, let us compose LSR of *yaburi-suteru* as in the case of *nage-suteru*.

(85)
$$
\begin{bmatrix}
yaburu \text{ (tear) 破る} \\
\begin{bmatrix}
QUALIA\ STRUCTURE \\
\begin{bmatrix}
TS \\
\text{CONST: CAUSE ([ACT ON } (x,\ y)]\text{*, [BECOME } (y,\ TORN)]\text{*)}
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

Yaburu has its own specific resultative state, which is represented as the constant *TORN*. In addition, An agent and the manner of tearing is essential in order to bring about such a specific resultative state. This is the motivation of the headedness specified on the primary event in (85). As a result, *yaburu* is "doubly headed," which is different from *nageru*.[9] The CONST value of (85) is blended with that of (81) as in the case of *nage-suteru*, generating the following LSR.

(86)
$$
\begin{bmatrix}
yaburi\text{-}suteru \text{ (throw-throw.away) 破り捨てる} \\
\begin{bmatrix}
QUALIA\ STRUCTURE \\
\begin{bmatrix}
TS \\
\text{CONST: CAUSE ([ACT ON } (x,\ y)]\text{*,} \\
\qquad\qquad \text{[BECOME } [[TORN\ (y)]\text{*} \wedge \text{[BE AT } (y,\ z)]]])
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

Yaburi-suteru is doubly headed as the CONST value in (86) shows, and both heads come from V1 *yaburu*. Therefore, adverbial phrases which refer to the headed events are predicted

---

[9]Head specification on the primary event in *yaburu* might appear to be arbitrary because the counterpart intransitive form *yabureru* (break) exists like the pair of *kowasu/kowareru*, and *kowasu*, which is transitive, does not seem to be assigned head to its primary event. However, the intransitive verb *kowareru* allows *hitoride-ni* (by itself) to cooccur as in *kuruma-ga hitoride-ni koware-ta* (The car broke by itself), while *yabureru* does not (**kami-ga hitoride-ni yabure-ta*). This fact seems to imply that the existence of an agent remains in *yabureru* (Kageyama's (1996) "de-causativization"), while it does not remain in *kowareru* (Kageyama's (1996) "anti-causativization"). Therefore, the head specification of *yaburu* does not seem arbitrary.

to occur with *yaburi-suteru,* while ones which refer to the unheaded event should be difficult to occur. This prediction is born out by the following behavior of *yaburi-suteru.*

(87) a. Ken-wa   tooan-o   biribiri-ni yaburi-sute-ta
     Ken-TOP answer.sheet-ACC pieces-to   tear-throw.away-PAST
     Ken tore and threw away the answer sheet to pieces.
     健は答案をびりびりに破り捨てた。

    b. Ken-wa   tooan-o   biribiri-to   yaburi-sute-ta
     Ken-TOP answer.sheet-ACC tearing.sound-COMP tear-throw.away-PAST
     Ken tore and threw away the answer sheet with tearing sound.
     健は答案をびりびりと破り捨てた。

    c.?*Ken-wa   tooan-o   gomibako-ni   yaburi-sute-ta
     Ken-TOP answer.sheet-ACC rubbish.bin-LOC tear-throw.away-PAST
     Ken tore and threw away the answer into the rubbish bin.
     ?*健は答案をゴミ箱に破り捨てた。

Compared with (87a) and (87b), (87c) is much less acceptable. *Biribiri-to* in (87a) and *biribiri-ni* in (87b) modify the headed events: manner of acting on paper and resultative state respectively. On the other hand, in (87c), the element in the unfocused subevent (z) is realized. In this case, slightly different from *nage-suteru*, the headedness in the secondary event is primitively assigned in *yaburu*. This seems to be the reason (87c) is lower in acceptability than (82c).[10]

4.1.4   Interpretation of LCS

Our mechanism of LCS blending does not use semantic predicates like WHILE, BY, or FROM: what we use is only "∧." Though this is desirable from the viewpoint of theoretical simplicity, it might be thought that our description could not represent detailed differences in interpretation. This is surely the case in lexical semantic level. However, this is not our disadvantage.

---

[10]*suteru* in such cases as *koibito-o (*kokyoo-ni) suteru* (throw away one's lover in his/her hometown), in which locative phrases cannot occur, might be analyzed as having a more or less different LCS. However, as this issue do not seem to have direct effect on our argument, we go no further here.

As we argued in Chapter 2, previous studies do not give any independent evidence of their classification of their way two verb's LCSs are combined with each other other than intuitive observation. What we must solve is, "why is a certain LVC interpreted as such?" That is, we must detect the very origin of the difference in interpretation. If we say, for example, *tataki-tubus(u)* (hit-break) is a "means LVC" and should be analyzed as "LCS2 by LCS1" because V1 is thought to be a means of V2," its logic is cyclic.

Our approach, I believe, provides a way to get out of this logical cyclicity, though I am not sure if it gives fully satisfying explanation. We assume that concrete interpretation is obtained by construing the LVC's LCS formed through a single process of LCS blending partly by the aid of our knowledge about the real world. Let us see some examples.

(88) a. *naki-sakeb(u)* (weep-cry):

  $\text{ACT}_{\underline{voice},(tears,...)}$ (x) ** 泣き叫ぶ

  b. *tataki-kowas(u)* (hit-break):

  CAUSE ([ACT ON (x, y)]*, [BECOME $(y, \ldots)$]]) 叩き壊す

  c. *nage-sute(ru)* (throw-throw.away):

  CAUSE ([ACT ON (x, y)]*

  [[MOVE TOWARD (y, z)]$(*)$ $\wedge$ [BECOME [BE AT (y, z)]]]) 投げ捨てる

  d. *moti-sar(u)*[11] (have-leave):

  CAUSE $(x, [[\text{BE WITH } (y, x)] \wedge [\text{MOVE AWAY FROM } (x, z)]]])$ 持ち去る

Reading the LCS (88a) results in the interpretation that x does something that can be called either *nak(u)* or *sakeb(u)*. In (88b), as V1 is blended with the first argument of CAUSE, it is interpreted as what causes the second argument of CAUSE: that is, V1 is interpreted as a cause of V2. Interpreting (88c), we obtain the meaning that x's throwing of y causes y to move toward z "AND" it comes to be at z. In order to get a meaningful interpretation between y's movement toward z and y's coming to exist at z in our real world, probably we should interpret "$\wedge$" as time relation: x's throwing of y causes y to move toward x, and after the motion, finally y is at z. The situation is a little different in (88d). We get

---

[11]*moti-saru* is analyzed in detail in section 4.3.1.

interpretation that x causes x to have y "AND" to move away from z. In order to get a meaningful interpretation of "∧" in our real world, maybe the former event (x have y) should be interpreted as a accompanying event of the latter (x move away from z).

Of course, detailed processes of the interpretations argued so far are still to be discussed, and it is beyond our reach for now. However, our approach can avoid such logical cyclicity as pointed out above.

In the present section, we have seen the mechanism of LCS blending in TS and some of its advantages. Further examples are to be presented in section 4.3. Before that, in the next section, we will see the other process of forming LVCs in which NTS plays a crucial role.

4.2   Unification of V2's AGENTIVE and V1's CONST

Examples of LVCs formed by NTS taking part are the following.

(89) a. *aruki-tukareru* (walk-get.tired), *nomi-tukareru* (drink-get.tired), *asobi-kutabireru* (play-get.exhausted), *tadori-tuku* (track.back-arrive), *ne-bokeru* (sleep-get.senile)[12]
歩き疲れる，飲み疲れる，遊びくたびれる，辿り着く，寝ぼける

b. *itame-kogeru* (fry-burn), *ki-kuzureru* (wear-loosen), *ni-kuzureru* (simmer-crumble), *ni-tokeru* (simmer-melt), *(keeki-ga) kiri-wakareru* ((cake) cut-separate), *(yogore-ga) arai-otiru* ((stein) wash-fall), *huki-otiru* (wipe-fall), *(kami-ga) kiri-sorou* ((hair) cut-get.in.order)
炒め焦げる，着崩れる，煮崩れる，煮溶ける，(ケーキが) 切り分かれる，(汚れが) 洗い落ちる，拭き落ちる，(髪が) 切り揃う

c. *ii-otosu* (say-fell), *ii-morasu* (say-leak), *tabe-nokosu* (eat-leave), *ii-nokosu* (say-leave)[13]
言い落とす，聞き落とす，言い漏らす，聞き漏らす，食べ残す，言い残す

Subjects of V1 and V2 are identical in (89a) while not in (89b). Examples in (89c) are to be analyzed in section 4.3.7. In previous studies, V1 of these LVCs are analyzed to be the cause

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[12]*Ne-sizumaru* (sleep-become.quiet) is formed by LCS blending at TS. The reasons and detailed process is presented in section 4.3.4.

[13]*Ii-nokosu* means failing to say something that is to be said. The other *ii-nokosu*, meaning leaving words by saying them, is formed by LCS blending described in the previous section.

of V2. However, such analyses suffer from the following problem, as pointed out in (22b) in Chapter 2.

(90)   **Question:** Why are these LVCs interpreted like [V1 CAUSE of V2] although neither of the verbs includes CAUSE in their LCS?

In attempting to solve this problem within approaches of previous studies which treat both V1 and V2 at the same semantic level, they have the following three options, as presented in (22b), all of which cannot give convincing answers to (90), as we have confirmed.

(91) a.   To introduce *BY*, forming the LCS V2 *BY* V1.

b.   To assume the semantic predicate *CAUSE* in either Verbs.

c.   To introduce *CAUSE* from somewhere, probably on the basis of pragmatic inference.

In (91) the closest approach to ours is (91c), but our system is not based on pragmatics but on lexical semantic structure, which can not only give a natural motivation for the causal interpretation, but also predict productivity of such LVCs as in (89). Putting it briefly, we can find the source of causal interpretation in V2's TRIGGER value.

4.2.1 *Aruki-tukareru* type

This section analyzes LVCs like those in (89a). As an example let us analyze *aruki-tukareru* (walk-get.tired). The following is LSR of V2 *tukareru*.

(92)
$$
\begin{bmatrix}
\textit{tukareru} \text{ (get.tired) 疲れる} \\
\begin{bmatrix}
\textit{QUALIA STRUCTURE} \\
\begin{bmatrix}
\textit{TS} \\
\text{FORMAL: transition} \\
\text{CONST: } \boxed{1} \text{ [BECOME } (x,\ \textit{TIRED})]^*
\end{bmatrix} \\
\begin{bmatrix}
\textit{NTS} \\
\text{TRIGGER: ACT} \ldots (x,\ \ldots)
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

(93) a. *Ken-wa   mizukara tukare-ta

     Ken-TOP by.himself get.tired-PAST
     Ken got tired by himself.

  *健は自ら疲れた。

  b. Ken-wa   mizukara okuzyoo-kara oti-ta

     Ken-TOP by.himself rooftop-from fall-PAST
     Ken fell from the rooftop by himself.

    健は自ら (屋上から) 落ちた。

The existence of some value in TRIGGER quale of (92) is attested by the unacceptability of
(93a): in order for a person to get tired some external factor is necessary. On the other hand,
when the subject is an intentional being, *otiru* (fall) can occur with *mizukara* as shown in
(93b)[14].

    The content of the TRIGGER value (ACT... $(x, \ldots)$) is attested by the following be-
havior of *tukareru*.

(94) a. *kare-no koto-o   siri-sugi-te   moo   siri   tukare-ta

     he-GEN thing-ACC know-too.much-and already know get.tired-PAST
     I have known him too much and I have got tired.

  *彼のことを知りすぎて，もう知り疲れた。

  b. *watasi-wa koobe-ni   nagaku sun-de   moo   sumi-tukare-ta

     I-TOP   Kobe-LOC long   live-and already get.tired-PAST
     I have lived in Kobe too long and I have got tired.[15]

   ?*私は神戸に長く住んで，もう住み疲れた。

  c. *watasi-wa takusan oyoi-de   mukoogisi-ni   nankaimo tui-ta   ga, moo

     I-TOP   a.lot   swim-and the.other.side-LOC many.times arrive-PAST and already

---

[14]In section 4.1.2, we analyzed *otiru* as having just MOVE...$(x\ldots)$. However, verbs like *otiru* (fall),
hazureru (come.off), and *agaru* (rise) allows *wazato* (intentionally) to cooccur. In that case their LCSs seem
to be reflexive structure like CAUSE $(x, [\text{MOVE}\ldots(x, \ldots)])$.

[15]In contrast, *sumi-akita* (live-get.tired.of) is accepted with no problem in this sentence. *Sumi-akita* should
be classified as a syntactic compound, which is out of scope of our analysis. This is because it allows syntactic
operations on V1 alone such as passivization (*okorare-akiru*), honorification (?*o-okori-ni nari akiru*), or light-
verbalization (tookoo-si-akita).

tuki-tukarete ita

reach-tired　be

Since I had swum a lot and had reached the other side many times, I was already tired out.

*私はたくさん泳いで向こう岸に何回も着いたが，もう着き疲れていた。

d. *saka-o　　nobor-oo-to　　suru tabini　　nankaimo　taore-te kotogat-te, watasi-wa

slope-ACC go.up-try-COMP do　every.time many.times fall-and roll-and　　I-TOP
korogari-tukare-ta

roll-get.tired-PAST

Every time I tried to walk up the slope, I fell and rolled many times, and I got tired.

*坂を登ろうとするたびに何度も倒れて転がって，私は転がり疲れた。

The vebs in (94) do not have ACT in their LCS and they cannot be compounded with *tukareru*. This fact seems to indicate that the external cause of *tukareru* must have the semantic predicate ACT.

Let us see LSR of *aruku* (walk), then.

(95)
$$\begin{bmatrix} aruku \text{ (walk) 歩く} \\ \begin{bmatrix} QUALIA\ STRUCTURE \\ \begin{bmatrix} TS \\ \text{FORMAL: act} \\ \text{CONST: } \boxed{2}\,[\text{CAUSE }([x\ \text{ACT}]^*, [\text{MOVE }(x, [_{path}\ z])])] \end{bmatrix} \\ \begin{bmatrix} NTS \\ \text{TELIC: } - \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

The CONST value of *aruku* contains the semantic predicate ACT, which is compatible with the semantic restriction of the TRIGGER value of *tukareru*. This enables the two verbs to combine to form the LVC *aruki-tukareru*.[16]

---

[16]TELIC value (−) is attested by **Ken-wa 10 byoo-de arui-ta* (Ken walked in ten seconds), which has no perfect reading. Head is specified on the primary event, which contains manner of moving legs and arms. Incidentally this movement accordingly accompanies as the manner of MOVE as well. Therefore it might be possible to think that the secondary event also has head. However, such discussion has no effect on the argument here.

(96) a.
$$
\left[
\begin{array}{l}
\textit{aruki-tukareru} \text{ (walk-get.tired) 歩き疲れる} \\
\left[
\begin{array}{l}
\textit{QUALIA STRUCTURE} \\
\left[
\begin{array}{l}
\textit{TS} \\
\text{FORMAL: transition} \\
\text{CONST: } \boxed{1} \text{ [BECOME } (x, \textit{TIRED})]^{*}
\end{array}
\right] \\
\left[
\begin{array}{l}
\textit{NTS} \\
\text{TRIGGER: } \boxed{2} \text{ (walk)}
\end{array}
\right]
\end{array}
\right]
\end{array}
\right]
$$

b.?*Ken-wa   sono-miti-o   aruki-tukare-ta

     Ken-TOP the-way-ACC walk-get.tired-PAST
     Ken walked and got tired from walking the way.

    ?*健はその道を歩き疲れた。

That is, *tukareru*'s TRIGGER value, which is specified only as ACT… $(x, \ldots)$, is unified with *aruku*'s CONST value. By this unification *tukareru*'s TRIGGER value is fully specified. This mechanism of unification predicts that *tukareru* does not combine with verbs which do not have ACT as their CONST value. Therefore, inexistence of **siri-tukareru* or **sumi-tukareru* is explained even though in real situations we can often get tired by knowing some disgusting things about a person or by living in an area too long.

(96a) explains the reason for (96b): why *aruki-tukareu* cannot realize the accusative path element while V1 can realize when alone like in *sono-miti-o aruku*. In (96a), V1 *aruku* is introduced in NTS, from which no element is linked to Argument Structure. Therefore, z surely exists in semantics, but it cannot be linked to Argument Structure. This is the reason (96b) is not accepted.

4.2.2   *Ni-kuzureru* type

LVCs in (89b), in which V1's object and V2's subject is identified in construal, is formed similarly to *aruki-tukareru*. We analyze *ni-kuzureru* (simmer-crumble) here as an example. The following is LSR of V2 *kuzureru*.

(97) a.
$$
\left[
\begin{array}{l}
\textit{(sakana-ga) kuzureru} \; ((\text{fish}) \; \text{crumble}) \; (\text{魚が}) \; \text{崩れる} \\
\left[
\begin{array}{l}
\textit{QUALIA STRUCTURE} \\
\left[
\begin{array}{l}
\textit{TS} \\
\text{FORMAL: transition} \\
\text{CONST: } \boxed{1} \; [\text{BECOME } (y, \; CRUMBLED)]^* \\
\end{array}
\right] \\
\left[
\begin{array}{l}
\textit{NTS} \\
\text{TRIGGER: } \dots \text{ACT ON } (x, \; y) \dots \\
\end{array}
\right]
\end{array}
\right]
\end{array}
\right]
$$

b. *sono-sakana-wa hitorideni kuzure-ta

the-fish-TOP   by.itself   crumble-PAST
The fish crumbled by itself.

*その魚はひとりでに崩れた。

The existence of some specific value in TRIGGER quale, which represents external factors of the verb, is attested by the unacceptability of (97b). Because fish cannot crumble by itself, in order for it to crumble, at least something or someone must ACT ON it.[17]

Niru has the following LSR, which is already presented in Chapter 3.

(98)
$$
\left[
\begin{array}{l}
\textit{niru} \; (\text{simmer}) \; \text{煮る} \\
\left[
\begin{array}{l}
\textit{QUALIA STRUCTURE} \\
\left[
\begin{array}{l}
\textit{TS} \\
\text{FORMAL: process} \\
\text{CONST: } \boxed{2} \; [\text{ACT ON } (x, \; y)] \\
\end{array}
\right] \\
\left[
\begin{array}{l}
\textit{NTS} \\
\text{TELIC: BE } (y, \; COOKED) \\
\end{array}
\right]
\end{array}
\right]
\end{array}
\right]
$$

As in the case of *aruki-tukareru*, the TRIGGER value of *kuzureru* and the CONST value of *niru* is compatible, so they can be unified, forming *ni-kuzureru*.[18]

---

[17]Compared to *sakana* (fish), *imo* (potato) seems to be easier to occur with *hitorideni* (p.c. Takane Ito). That may be the case, but in the case of *imo*, probably cooking scene is unconsciously (or consciously) premised; otherwise even for *imo* it is hardly possible to allow *hitorideni*.

[18]That is, in our analysis *ni-kuzureru* is not derived from its corresponding transitive form ?*ni-kuzusu*, but it is independently formed by the direct compounding of *niru* and *kuzureru*, which is against Kageyama (1993), Matsumoto (1998), or Yumoto (2005). Discussion on transitive-inchoative alternation in LVCs is in section 4.3.8.

(99)
$$
\left[
\begin{array}{l}
\textit{(sakana-ga) ni-kuzureru} \ ((\text{fish}) \ \text{simmer-crumble}) \ (\text{魚が}) \ \text{煮崩れる} \\
\left[
\begin{array}{l}
\textit{QUALIA STRUCTURE} \\
\left[
\begin{array}{l}
\textit{TS} \\
\text{FORMAL: transition} \\
\text{CONST: } \boxed{1} \ [BECOME \ (y, \ CRUMBLED)]^* \\
\end{array}
\right] \\
\left[
\begin{array}{l}
\textit{NTS} \\
\text{TRIGGER: } \boxed{2} \ (\textit{niru}) \\
\end{array}
\right]
\end{array}
\right]
\end{array}
\right]
$$

Our system of LSR provides a more convincing answer to the question in (90).

(100) **Answer:** The construal similar to [V1 CAUSE V2] has its root in the TRIGGER quale of V2: V2's TRIGGER value and V1's CONST value (LCS) are unified, and as a result, V1 is interpreted as an "external factor" of V1.

That is, causal-like interpretation in LVCs is obtained through the unification of V1 and V2's LSRs, each of which is independently motivated. In addition, our system can do without directly introducing the semantic predicate CAUSE into LVC's LCS, which is a big difference form previous studies. Moreover, our system can explain the factor of argument inheritance as we have just seen: in the type of LVCs discussed in this section (henceforth, we call them "TRIGGER LVCs") V1's arguments cannot be inherited because V1 is introduced in the level of NTS, which is not linked to Argument Structure.

Another important point in our analysis is that TRIGGER LVCs are free from Subject Identification Principle (Yumoto (1996, 2005), Matsumoto (1998)). Yet, the identification of arguments itself is not free at all: it is lexically specified by V2. As analyzed above, *tukareru* lexically identifies its own subject and TRIGGERing verb's subject; *kuzureru* lexically identifies its own subject and TRIGGERing verb's (V1's) object.[19]

Moreover, on the basis of what we have argued so far, our analysis theoretically and semantically differentiates the semantic predicate CAUSE and the causal interpretation obtained through TRIGGER quale. This is strongly supported by the evidence presented in

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[19] *Naki-kuzureru* (weep-crumble) appears to be an exception to (97a), in which the subject of the two verbs are identified. In this case, however, it is perhaps lexically fixed since V2 *kuzureru* cannot be used alone as in **Naomi-ga kuzure-ta*. Otherwise, it may not be "external factors" that cause the event of *kuzureru*; rather, the cause is in herself: something that Naomi does. If so, *kuzurerru* would have an LCS like CAUSE ([ACT (x)], [BECOME $(x, FLAT)$]*). Then, *naki-kuzureru* is formed by LCS blending in TS, in which *naku* ([ACT (x)]*) is blended with the primary event of *kuzureru* (ACT (x)), forming CAUSE ([ACT (x)]*, [BECOME $(x, FLAT)$]*). This analysis seems plausible because *naki-kuzureru* shows similar behavior to other LVCs formed by LCS blending, as we will see in the next section.

the next section.

4.3   Advantages

4.3.1   Argument inheritance

LCS BLENDING

Differences between our LCS blending, which is equipped with the system of compositional headedness, and previous analyses which preliminarily assume V2 to be head are found in cases where arguments of V2 cannot be realized in LVCs. Our system provides reasonable explanation to this phenomenon by compositional headedness in LCS blending and general linking rules in (47a) in Chapter 3.

First, we observe and analyze differences between *moti-sar(u)* (have-leave) and *moti-aruk(u)* (have-walk) on one hand, and *hasiri-sar(u)* (run-leave) on the other. Let us reconfirm what we observed before in Chapter 2. As we have seen, neither *moti-sar(u)* nor *moti-aruk(u)* can realize accusative nominals of V2. On the contrary, *hasiri-sar(u)* can inherit either V1 or V2's argument. First we analyze the former LVCs: *moti-sar(u)* and *moti-aruk(u)*.

(101) a. *Ken-wa   gakkoo-o   sono-hon-o   moti-sat-ta

    Ken-TOP school-ACC the-book-ACC have-leave-PAST
    Ken left school with the book.

    *健は，学校を，その本を持ち去った。

 b. Ken-wa   gakkoo-o   sat-ta

    Ken-TOP school-ACC leave-PAST
    Ken left his school with the book.

    健は学校を去った。

(102) a.?*Ken-wa   kokudoo-ni-goosen-o sono-hon-o   moti-arui-ta

    Ken-TOP Route-2-number-ACC the-book-ACC have-walk-PAST
    Ken Walked along Route 2 with the book.[20]

    ?*健は，国道２号線を，その本を持ち歩いた。

---

[20]If we use *matizyuu-o* (whole of the town) instead of *kokudoo-ni-goosen-o*, the sentence is more acceptable. In this case, however, *matizyuu-o* functions as an adverbial which means the area walking action covers. This analysis is supported by the fact that *-o* in *matizyuu-o* can be omitted: *Ken-wa matizyuu sono-hon-o motiaruita* is completely acceptable, while *-o* in *kokudoo-ni-goosen-o* cannot be omitted.

b.   Ken-wa   kokudoo-ni-goosen-o   arui-ta

Ken-TOP Route-2-number-ACC walk-PAST
Ken walked along Route 2.

健は国道２号線を歩いた。

As we argued in Chapter 2, using relativization in order to avoid phonological double-*o*, *gakkoo-o* and *kokudoo-ni-goosen-o* cannot be realized as an argument of *moti-saru* and *moti-aruku* respectively. Of course, realization of two accusative nominals is possible when V1 and V2 are used as individual verbs.

(103) a.   Ken-wa   gakkoo-o   sono-hon-o   mot-te   sat-ta

Ken-TOP school-ACC the-bookACC have-and leftPAST
Ken left the school with the book.

健は，学校を，その本を持って去った。

b.   Ken-wa   kokudoo-ni-goosen-o   sono-hon-o   mot-te   arui-ta

Ken-TOP Route-2-number-ACC the-book-ACC have-and walk-PAST
Ken walked Route 2 with the book.

健は，国道２号線を，その本を持って歩いた。

This phenomenon is problematic for theories which always regard V2 as head. On the other hand, our analysis gives a reasonable explanation. *Moti-saru* (have-leave), for example, is formed by LCS blending, as indicated in (104).

(104) a.   *mot(u)* (have)： CAUSE $(x,$ [BE WITH $(y, x)]$) 持つ

b.   *sar(u)* (leave)： CAUSE $(x,$ [MOVE AWAY FROM $(x, z)]$ 去る

c.   *moti-sar(u)* (have-leave)：
CAUSE $(x,$ [[BE WITH $(y, x)] \wedge$ [MOVE AWAY FROM $(x, z)]]$) 持ち去る

This blending takes place at CONST quale, resulting in the following LSR.

(105)

$$\begin{bmatrix} \textit{moti-sar(u)} \text{ (have-leave) } 持ち去る \\ \begin{bmatrix} \textit{ARGUMENT STRUCTURE} \\ \text{ARG1: } x \\ \text{ARG2: } y \end{bmatrix} \\ \begin{bmatrix} \textit{QUALIA STRUCTURE} \\ \begin{bmatrix} \textit{TS} \\ \text{FORMAL: transition} \\ \text{CONST: CAUSE } (x, [[\text{BE WITH } (y, x)] \wedge [\text{MOVE AWAY FROM } (x, z)]]) \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

According to (73), neither V1 *mot(u)* nor V2 *sar(u)* has head specification in their LCSs, because no specific manner of action is specified and there is no constant which indicates a certain state or place. Therefore x, y, and z are all qualified as candidates to be linked to Argument Structure (AS). Of the three variables, y and z are candidates for internal argument, but Japanese has *double o constraint*, which prohibits more than one arguments with accusative case from occurring at the same time (Harada (1973, 1975), Kuroda (1978, 1992), Saito (1985), etc.). Considering this constraint from the viewpoint of the linking rules in (47a), in the LCS in (104), y is more likely to be linked to AS than z because y is more affected than z: y undergoes change of state by getting held, while the place z does not undergo any change (referring to Levin and Rappaport Hovav (1995)). That is, although LCS of *moti-sar(u)* contains place argument of V2 *saru*, differently from the case in which *sar(u)* is used alone, it is not linked to AS.[21] This is the reason why the place argument of

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[21] As ungrammaticality of **Ken-ga Naomi-o sono-heya-o sar-ase-ta* (Ken made Naomi leave the room.) shows, *sar(u)* is strongly affected by *double-o constraint*. If this constraint is one on structural case as Mihara and Hiraiwa (2006) argues, the accusative argument of *sar(u)* also should bear structural case as in *hamabe-o* in his example *??Taro-wa Hanako-o hamabe-o aruk-ase-ta* (Taro made Hanako walk (along) the shore).

Incidentally, *-o* arguments which do not bear structural case is not affected by *double-o constraint*, as in *Syoonen-wa ame-no naka-o saka-o nobori-kiri...* (The boy walked up the slope to the top in the rain...) (Shibatani 1978).

Causative construction offers another piece of evidence that place argument is not an argument of *moti-sar(u)*. When *sar(u)* is used alone, either causee or place argument functions as an antecedent of relativization.

(106) a. Ken-ga sono-heya-o sar-ase-ta onna (the woman Ken made leave the room)
 健がその部屋を去らせた女

 b. Ken-ga sono-onna-o sar-ase-ta heya (the room which Ken made the woman leave)
 健がその女を去らせた部屋

However, in *motisar(u)*, place argument cannot be antecedent, while causee can.

(107) a. Ken-ga sono-hon-o moti-sar-ase-ta onna
 (the woman Ken made leave with a book)
 健がその本を持ち去らせた女

V2 *saru*, which is head in previous studies, cannot be realized.

To sum up, when two events are equal in headedness and more than one variable are competitive for the status of direct internal argument in AS, only one of them is linked according to linking rules. Therefore, it is predicted that even if it cannot be realized as direct internal argument, a 'loser' can be realized in other ways. In fact, the place argument of *sar(u)* can be realized as an oblique *sono-heya-kara*.

(108)   Ken-wa   sono-hon-o   sono-heya-**kara** moti-sat-ta
        Ken-TOP the-book-ACC the-room-from   have-leave-PAST

By the way, differently from examples so far, *mot(u)* and *sar(u)* do not have ACT in their LCSs. This is followed by the impossibility of adverbials which modify ACT, differently from *tukam(u)* or *nigir(u)*, both of which roughly correspond to *hold* in English.

(109) a.?*Ken-wa   sono-hon-o   **kenmeini** mot-ta
        Ken-TOP the-book-ACC hard   have-PAST
        Ken had the book hard.
       ?*健はその本を懸命に持った。

    b. *Ken-wa   sono-hon-o   **gyutto** mot-ta
        Ken-TOP the-book-ACC tightly   have-PAST
       ?*健はその本をぎゅっと持った。

(110)?*Ken-wa   sono-heya-o   **kenmeini** sat-ta
        Ken-TOP the-room-ACC hard   leave-PAST
        Ken left the room hard.
       ?*健はその部屋を懸命に去った。

(111) a.   Ken-wa   sono-sakana-o **kenmeini** {tukan-da/nigit-ta}
          Ken-TOP the-fish-ACC   hard   hold-PAST
          健はその魚を懸命に { 掴んだ/握った }。

    b. *Ken-ga (sono-onna-ni) hon-o moti-sar-ase-ta heya
        (the room Ken made the woman leave with a book)
        *健がその女に本を持ち去らせた部屋

This phenomenon also supports our argument that place argument is no longer functions as an argument of *moti-sar(u)*.

    b.   Ken-wa   sono-boo-o   **gyutto** {tukan-da/nigit-ta}

       Ken-TOP the-bar-ACC tightly hold-PAST

       Ken held the bar tightly.

       健はその棒をぎゅっと { 掴んだ/握った }。

On the contrary, *kowas(u)*, the detailed manners of which are not specified, allows *kenmeini* (hard) and *hagesiku* (violently)[22].

(112)   Ken-wa   sono-kuruma-o **{kenmeini/hagesiku}** kowasi-ta

        Ken-TOP the-car-ACC   hard/violently   break-PAST

        Ken broke the car {hard/violently}.

        健はその車を { 懸命に/激しく } 壊した。

    Let us move on to the analysis of *hasiri-saru* (run-leave). (113) represents the LCS blending of *hasir(u)* (run) and *sar(u)* (leave), forming *hasiri-saru*, the LSR of which is presented in (114).

(113) a.   *hasir(u)*: CAUSE ([(ACT) (x)], [MOVE (x, $_{path}$ y)]) 走る

     b.   *sar(u)*: CAUSE (x, [MOVE AWAY FROM (x, z)]) 去る

     c.   *hasiri-sar(u)*:

       CAUSE (x, [[MOVE (x, $_{path}$ y)] $\land$ [MOVE AWAY FROM (x, z)]]) 走り去る

(114)
$$\begin{bmatrix} \textit{hasiri-sar(u)} \text{ (run-leave) 走り去る} \\ \begin{bmatrix} \textit{ARGUMENT STRUCTURE} \\ \text{ARG1: } x \\ \text{ARG2: } y \oplus z \end{bmatrix} \\ \begin{bmatrix} \textit{QUALIA STRUCTURE} \\ \begin{bmatrix} \textit{TS} \\ \text{FORMAL: transition} \\ \text{CONST: CAUSE (} x, \text{[[MOVE (} x, {}_{path} y\text{)]} \land \text{[MOVE AWAY FROM (} x, z\text{)]])} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

---

[22]*Moti-ageru* (have-raise) is problematic for our analysis. *Age(ru)* do not seem to have ACT either, because it is difficult to say *?*Ken-wa kenmeini sono-hako-o ageta*. However, the compound *moti-ageru* totally accept *kenmeini* as in *Ken-wa kenmeini sono-hako-o moti-age-ta*. We put aside this issue of how this phenomenon go with our LCS blending for future research for now.

  By the way, adverbial modification itself seems problematic for previous studies which combine two verb's LCS like LCS2 BY LCS1. We will deal with this problem in section 4.3.3.

The notation "$y \oplus z$" in ARG2 means either y or z, but only one of them, can be linked to AS as direct internal argument, the reason for which is argued below. "(ACT) (x)" in (113a) means that manners like moving one's arms and legs can be deleted from the LCS of *hasir(u)*. This is motivated by the fact that *hasiru* need not necessarily accompany such manners as in *kuruma-ga hasiru* (A car runs) or *hikari-ga hasiru* (Light travels). This is also attested by other manner of motion verbs like *haw(u)* (crawl), which necessarily accompany specific manners. They cannot be combined with *sar(u)*. (*Aruk(u)* is between *hasiru* and *haw(u)* in acceptability).

(115) a. Ken-wa   sono-ba-kara   hasiri-sat-ta
           Ken-TOP the-place-from run-leave-PAST
           Ken run away from the place.
           健はその場から走り去った。

       b. ?Ken-wa   sono-ba-kara   aruki-sat-ta
           Ken-TOP the-place-from walk-leave-PAST
           ?健はその場から歩き去った。

       c. *Ken-wa   sono-ba-kara   hawi-sat-ta
           Ken-TOP the-place-from crawl-leave-PAST
           *健はその場から這い去った。

In *hasir(u)*, the semantic predicate ACT can be deleted. As a result, the semantic predicate at the starting point of *hasiru* and *saru* is CAUSE, which enable for the two verb's LCSs to be blended with each other because the semantic predicate of the starting point of their events can be shared.

Incidentally, the principle of LCS blending, PLB, predicts that verbs which have only ACT cannot be compounded with *sar(u)* because they do not have predicates to be shared.

(116) *warai-sar(u)* (laugh-leave), *syaberi-sar(u)*, (talk-leave), *sikame-sar(u)*, (frown-leave), *hohoemi-sar(u)*, (smile-leave), *naki-sar(u)*, (weep-leave), *sakebi-sar(u)*, (cry-leave)
       *笑い去る，*しゃべり去る，*しかめ去る，*微笑み去る，*泣き去る，*叫び去る

In real life situations, it happens very often that a person leaves smiling, laughing, weeping, etc.. However, in fact, compounds like (116) are never possible. If we analyze *hasiri-sar(u)* as [V2] WHILE [V1], it would be difficult to give a clearcut explanation to the absence of such compounds as in (116). It might be possible to say that *saru* is unaccusative, and therefore it is impossible for them to combine with unergative verbs like *waraw(u)*. However, such an explanation cannot explain why *hasir(u)*, an unergative verb, can be compounded with unaccusative *sar(u)*.

So far, we have analyzed the formation process of *hasiri-sar(u)* and have argued that the process we propose predicts possible combination of verbs with *-saru*. From now on, we consider argument inheritance in *hasiri-saru*. *Hasiri-sar(u)* realizes either V1's argument or V2's argument, which is different from *moti-sar(u)*: *motisar(u)*, as we saw, can realize only V1's argument with accusative case.

(117) a.   sono-kuruma-wa kokudoo-ni-goosen-o hasiri-sat-ta

the-car-TOP   Route-2-number-ACC run-leave-PAST
The car ran away along Route 2.

その車は国道２号線を走り去った。

 b.   sono-kuruma-wa sono-ba-o   hasiri-sat-ta

the-car-TOP   the-place-ACC run-leave-PAST
The car ran away from the place.

その車はその場を走り去った。

 c.   *sono-kuruma-wa kokudoo-ni-goosen-o sono-ba-o   hasiri-sat-ta

the-car-TOP   Route-2-number-ACC the-place-ACC run-leave-PAST
The car ran away from the place along Route 2.

*その車は，国道２号線を，その場を走り去った。

 d.   *sono-kuruma-wa sono-ba-o   kokudoo-ni-goosen-o hasiri-sat-ta

the-car-TOP   the-place-ACC Route-2-number-ACC run-leave-PAST
The car ran away from the place along Route 2.

*その車は，その場を，国道２号線を走り去った。

As we have seen above, in *moti-sar(u)*, V1's argument (theme) is predominant candidate over V2's place argument to be linked to AS as direct internal argument, because V1's

argument undergoes change of state while V2's remains unaffected (we present LSRs of *moti-sar(u)* and *hasiri-sar(u)* here again for comparison).

(118)
$$
\begin{bmatrix}
\textit{moti-sar(u)} \text{ (have-leave) 持ち去る} \\[4pt]
\begin{bmatrix}
\textit{ARGUMENT STRUCTURE} \\
\text{ARG1: } x \\
\text{ARG2: } y
\end{bmatrix} \\[10pt]
\begin{bmatrix}
\textit{QUALIA STRUCTURE} \\
\begin{bmatrix}
\textit{TS} \\
\text{FORMAL: transition} \\
\text{CONST: CAUSE } (x, [[\text{BE WITH } (y, x)] \wedge [\text{MOVE AWAY FROM } (x, z)]])
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

(119)
$$
\begin{bmatrix}
\textit{hasiri-sar(u)} \text{ (run-leave) 走り去る} \\[4pt]
\begin{bmatrix}
\textit{ARGUMENT STRUCTURE} \\
\text{ARG1: } x \\
\text{ARG2: } y \oplus z
\end{bmatrix} \\[10pt]
\begin{bmatrix}
\textit{QUALIA STRUCTURE} \\
\begin{bmatrix}
\textit{TS} \\
\text{FORMAL: transition} \\
\text{CONST: CAUSE } (\ x, [[\text{MOVE } (x, [_{path}\ y])] \wedge [\text{MOVE AWAY FROM } (x, z)]])
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

Our argument so far predicts if the status of two verbs' variables is equal in linking to AS, either of them can be linked. *Hasiri-sar(u)* is such an example: neither V1's path y nor V2's place z undergoes change of state; they are not affected by subject's running. As a result, either y or z can be linked to AS. But AS has only one place for direct internal argument. Therefore it is impossible to realize both y and z as direct internal arguments at the same time.[23]

So far, we have argued that LCS blending explains the difference in argument inheritance between *moti-sar(u)* and *hasiri-sar(u)*, as well as it predicts possible verbs combined with *sar(u)*.

Katari-akas(u) (talk-go.through.night) and *nomi-akas(u)* (drink-go.through.night) can be analyzed similarly. Supposing that *akas(u)* means abstract motion as Nishiyama and Ogawa (2010) argue, it has the following LCS.

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[23]Also in this case, *-o* nominal is possible if it is adverbial like *ame-no-naka-o* (in the rain): *?Ken-wa ame-no-naka-o sono-ba-o hasiri-sat-ta* (Ken ran away from the place in the rain.) and *?Ken-wa ame-no-naka-o kokudoo-ni-goosen-o hasiri-satta* are both acceptable.

(120) *akas(u)*: CAUSE ([ACT (x)], [MOVE $(x, [_{path} \ z_{night}])$]]) 明かす

The existence of ACT is attested by the following behavior of *akas(u)*.

(121) karera-wa waiwai(-to)   sono-yoru-o   akasi-ta

they-TOP noisily.and.lively-COMP the-night-ACC go.through.night-PAST
They went thought the night noisily.

彼らはわいわい（と）その夜を明かした。

The adverb *waiwai(-to)* usually modifies ACT as in *waiwai(-to) syaberu* (talk noisily and lively), which supports the existence of ACT in *akas(u)* as well. Another piece of evidence is (122).

(122) a.?*Ken-wa   sono-yoru-o   akasi-ta

they-TOP the-night-ACC go.through.night-PAST
Ken went thought the night.

?*健はその夜を明かした。

   b. Ken-wa   dokusyo-o-si-te   sono-yoru-o   akasi-ta

Ken-TOP reading.books-ACC-do-CONJ the-night-ACC go.through.night-PAST
Ken went through the night reading.

健は読書をしてその夜を明かした。

(122a) indicates that *akas(u)* requires some activity. *Dokusyu-o-si-te* is regarded as what specifies the content of the activity.

   Katar(u) has the following LCS.

(123) *kataru*: CAUSE ([ACT (x)]*, [BE IN $(y, WORLD)$]]) 語る

The headedness on the primary event is motivated by chatting manners. *WORLD* looks like a constant, but in fact it does not mean any specific places: it means just something comes to be exist. Therefore, the secondary event (BE IN *WORLD*(y)) is not specified headedness. By blending (120) and (123), we obtain the following LSR.

(124) $\Big[$ *katari-akas(u)* (talk-go.through.night) 語り明かす

$\qquad \Big[$ *ARGUMENT STRUCTURE* $\Big]$
$\qquad$ ARG1: x
$\qquad$ ARG2: y ($\oplus$ z)

$\qquad \Big[$ *QUALIA STRUCTURE*

$\qquad\qquad \Big[$ *TS*
$\qquad\qquad$ FORMAL: transition
$\qquad\qquad$ CONST: CAUSE ([ACT (x)]*,
$\qquad\qquad\qquad$ [[MOVE $(x, [[_{path}\ z_{night}]])] \wedge$ [BE IN $(y,\ WORLD)](*)]) $\Big]\ \Big]\ \Big]$

In this LCS neither y nor z undergoes any change of state, as in *hasiri-saru* above, so without considering headedness, like *hasiri-saru*, y and z would be equal as candidates to be linked to AS. However, since the headedness on the primary event (ACT (x)) originates in V1 *katar(u)*, relative headedness is assigned to the event of *katar(u)* (BE IN $(y,\ WORLD)$), as in the case of *nage-suter(u)* (throw-throw.away). This CONST value of *katari-akas(u)* predicts that y is more likely to be linked to AS than z, although it is not not totally impossible for z to be linked because the headedness is no more than relative one (this is represented by the parenthesis in AS). This prediction seems to accord with the fact: (125b) seems to me slightly less acceptable than (125a).

(125) a.   karera-wa omoide-o   katari-akasi-ta

$\qquad$ they-TOP memories-ACC talk-go.through.night-PAST
$\qquad$ They went through the night talking.

$\qquad$ 彼らは、思い出を語り明かした。

$\quad$ b. ?karera-wa sono-yoru-o   katari-akasi-ta

$\qquad$ they-TOP the-night-ACC talk-go.through.night-PAST
$\qquad$ They went through the night talking.

$\qquad$?彼らは、その夜を語り明かした。

Omoide-o seems to be the more felicitous candidate to be linked to AS as direct internal argument of *katari-akas(u)*. This is reinforced by the following behavior.

(126) a.   karera-wa sono-yoru omoide-o   katari-akasi-ta

$\qquad$ they-TOP the-night memories-ACC talk-go.through.night-PAST

During the night they talked alot about their memories.

彼らは、その夜、思い出を語り明かした。

b. ?karera-wa sono-mondai-nituite sono-yoru-o katari-akasi-ta

they-TOP the-problem-about the-night-ACC talk-go.through.night-PAST
During the night they talked alot about their memories.

?彼らは、その問題について、その夜を語り明かした。

As (126a) shows, *sono-yoru* can be adverbial when *omoide* is an object, whereas *sono-mondai* is less likely to be adverbial when *sono-yoru* is argument-like, as shown in (126b). In fact, *sono-yoru-o* seems to be adverbial rather than an argument, as (127) indicates.

(127) a.?*karera-wa sono-yoru-o omoide-o katari-akasi-ta

they-TOP the-night-ACC memories-ACC talk-go.through.night-PAST
They went through the night talking about their memories.

?*彼らは、その夜を、思い出を語り明かした。

b. karera-wa sono-yoru-o aw-e-nakat-ta 20-nen-kan-no-aida-ni

they-TOP the-night-ACC see-can-not-PAST 20-years-for-during-LOC
tumori-ni-tumot-ta omoide-o katari-akasi-ta

pile-and-pile-PAST memories-ACC talk-go.through.night-PAST
They went through the night talking about their memories accumulated

during the 20 years when they had not been abole to see each other.

?彼らは、その夜を、会えなかった 20 年間の間に積もり積もった思い出を

語り明かした。

That is, double-o constraint in *katari-akas(u)* is *surface double-o constraint* (Poser 2002). From its behavior so far, we can conclude that the object of V1 *omoide-o* is direct argument of *katari-akas(u)*, while there are no strong evidence to support the claim that the object of V2 *sono-yoru-o* is direct argument. Our system of LCS blending and compositional headedness can describe the subtle difference in acceptability between the sentences in (125). Moreover, this is much more important, it can predict that V1 is semantically head and V1's arguments are inherited to the LVC *katari-akas(u)*.

Another example supporting our mechanism of LCS blending is found in argument inheritance of *ooi-kakus(u)* (cover-hide).

(128) a. kaizoku-wa sono-heya-ni   takara-o   kakusi-ta

pirates-TOP the-room-LOC treasure-ACC hide-PAST
The pirates hid treasures in the room.

海賊はその部屋に宝を隠した。

b. kaizoku-wa takara-o   ooi-kakusi-ta

pirates-TOP treasure-ACC cover-hide-PAST
The pirates hid the treasures by covering them.

海賊は宝を覆い隠した。

c. *kaizoku-wa sono-heya-ni   takara-o   ooi-kakusi-ta

pirates-TOP the-room-LOC treasure-ACC cover-hide-PAST
The pirates hid the treasures in the room by covering them.

*海賊はその部屋に宝を覆い隠した

When used alone, V2 *kakus(u)* (hide) can subcategorize for theme and place, as (128a) shows. However, *ooi-kakus(u)* (cover-hide) cannot subcategorize for place, which is shown in (128c). If we analyzed *ooi-kakus(u)* following Yumoto (2005), an LCS like $_{LCS}[kakus(u)]$ BY $_{LCS}[oow(u)]$ would be formed for *ooi-kakus(u)*, resulting in (129).

(129)   *ooi-kakusu*: CAUSE (x, [BECOME BE AT (y, [$_{place}$ z])])
                        BY [CAUSE (x, [BECOME BE AT (y, *UNDER COVER*)])] 覆い隠す

Yumoto states that, in compounding two transitive verbs, their internal arguments and external arguments are identified with each other. Therefore the place argument z should be remain unidentified. Thus, she would predict (128c) to be acceptable, contrary to the fact.

On the other hand, LCS blending forms *ooi-kakusu* by the following process.

(130)   a. *oow(u)*:   CAUSE ([ACT ON$_{cover}$ (x, y)]*,
                            [BECOME BE AT (y, $_{place}$*UNDER COVER*)]*) 覆う
          b. *kakus(u)*:   CAUSE ([ACT ON (x, y)],
                            [BECOME BE AT (y, [$_{secretplace}$ z]]) 隠す
          c. *ooi-kakusu*: CAUSE ([ACT ON$_{cover}$ (x, y)]*,
                            [BECOME BE AT (y, $_{secretplace}$*UNDER COVER*)]*) 覆い隠す

(130a) roughly means that x put y under a cover by using it. The subscript *cover* indicates that the usage of cover is specified, so headedness is assinged to the primary event (ACT

ON $(x,\ y)$). The secondary event also bears headedness because it include the constant *UNDER COVER*. Blending (130a) and (130b) results in (130c). In (130c), the constant of V1 *UNDER COVER* is subsituted for V2's variable z. Therefore z can no longer be realized as other values, resulting in the unacceptability of (128c).

(130c) shows that the V1 *oow(u)* is the head, which is supported by the following fact.

(131) a. Ken-wa   takara-o   suppori   oot-ta

     Ken-TOP treasures-ACC completely cover-PAST
     Ken completely covered the treasures.

     健は宝をすっぽり覆った。

   b.?*Ken-wa   takara-o   suppori   kakusi-ta

     Ken-TOP treasures-ACC completely hide-PAST
     Ken completely hid the treasures.

    ?*健は宝をすっぽり隠した。

   c. Ken-wa   takara-o   suppori   ooi-kakusi-ta

     Ken-TOP treasures-ACC completely cover-hide-PAST
     Ken completely hide the treasures by covering them.

     健は宝をすっぽり覆い隠した。

The adverbial *suppori* can modify *oow(u)*, but cannot modify *kakus(u)*, as shown in (131b). Therefore in (131c) *suppori* modifies the V1 *oow(u)*. Considering this adverbial modification, it seems unlikely that *oow(u)* is introduced just as a semantic modifier in the semantic structure of *ooi-kakus(u)*. (130c) explains this modification with no difficulty.

Summing up, our mechanism of LCS blending can explain not only restrictions on the combination of two verbs in some examples, but also it gives a reasonable explanation to argument inheritance, which is problematic for theories that assume V2 to be head.

Next, let us see some examples in which RHR appears to hold. Our system can cope with such examples as well.

(132)   *sime-koros(u)* (put.a.noose-kill), *huri-maze(ru)* (shake-mix), *haki-kiyome(ru)* (sweep-purge)

     絞め殺す，振り混ぜる，掃き清める

In these LVCs, V2's internal argument is inherited, while V1's is not, as shown in (133) and (134).

(133) a. Ken-wa   niwatori-o   sime-korosi-ta

Ken-TOP chicken-ACC put.a.noose-kill-PAST
Ken put a noose around the chicken's neck and killed it.

健は鶏を絞め殺した。

b. Ken-wa   (bin-no)   nakami-o   huri-maze-ta

Ken-TOP (bottle-GEN) content-ACC shake-mix-PAST
Ken shook the content of the bottle and mixed it.

健は (ビンの) 中身を振り混ぜた。

c. Ken-wa   butai-o   haki-kiyome-ta

Ken-TOP stage-ACC sweep-purge-PAST
Ken swept the stage to purge it.

健は舞台を掃き清めた。

(134) a. *Ken-wa   niwatori-no kubi-o   sime-korosi-ta

Ken-TOP chicken-GEN neck-ACC put.a.noose-kill-PAST
Ken put a noose around the chicken's neck and killed it.

健は鶏の首を絞め殺した。

b.?*Ken-wa   bin-o   huri-maze-ta

Ken-TOP bottle-ACC shake-mix-PAST
Ken shook the bottle and mixed the content.

?*健はビンを振り混ぜた。

c. Ken-wa   (butai-no)   gomi-o   haki-kiyome-ta

Ken-TOP (stage-GEN) dust-ACC sweep-purge-PAST
Ken swept the stage to purge it.

*健は（舞台の）ゴミを掃き清めた。

In LCS blending, *sime-koros(u)* is formed by the process in (135), for example.

(135) a. *sime(ru)*: [ACT ON (x, y)]* 絞める

b.   *koros(u)*: CAUSE ([ACT ON (x, z)], [BECOME $(z, DEAD)$]*) 殺す

c.   *sime-koros(u)*: CAUSE ([ACT ON $(x, y (= \text{PART OF } z))$]*,

[BECOME $(z, DEAD)$]*)

Since both verbs have the common semantic predicate ACT ON at their event-starting point, PLB allows them to combine with each other. This is similar to the case of *tataki-kowas(u)*, for example.

(136) a.   *tatak(u)*: [ACT ON (x, y)]* 叩く

b.   *kowas(u)*: CAUSE ([ACT ON (x, y)], [BECOME $(y, BROKEN)$]*) 壊す

c.   *tataki-kowas(u)*: CAUSE ([ACT ON (x, y)]*, [BECOME $(y, BROKEN)$]*)

Comparing (135) and (136), however, there is a difference: in (136), y in the primary event (y in [ACT ON (x, y)]*) is identical with y in the resultative event (y in [BECOME $(y, BROKEN)$]*), while in (135), they are not totally identical. Here arises a question: which is linked to AS, y or z in (135c)? In order to answer this question, let us consider simple verbs at first.

Generally, in simple verbs having causal semantic structure like *kowas(u)*, the theme argument of the primary event must be identical with the theme argument in the secondary event, as in (136b). If they can be totally different, verbs having LCS like the following would exist.

(137)   CAUSE ([ACT ON (x, y)], [BECOME $(z, BROKEN)$]*)

The LCS in (137) means that x ACT ON y and as a result, z, which is has no relation to y, become broken. Semantic linking between arguments is not assured and causal relation cannot be read in (137) without some special inference or situations. In fact, there seems to be no verb which corresponds to (137). However, this identification in *kowas(u)* does not mean the two ys are totally identical in reality: we can say x *broke* y even if x acts on the very small part of y, as long as y's function was lost by what x did. That is, The LCS in (137) is possible if part-whole relation is established between y and z. This situation seems similar among other causative verbs.

Considering this fact in simple verbs and assuming that LVCs have more or less similar LCSs to those of simple verbs, though LCSs like (137) are not eligible in LVCs either, it is allowed if part-whole relation is assured between y and z. The LVCs in (132) seems to be such examples. As described in (135c), in order for *sime-koros(u)* to be true, the neck which is put a noose on must be part of the subject of dying; otherwise *sime-koros(u)* would be false. Therefore, in *sime-koros(u)*, such semantic relation must be established between y and z, which is specified in (135) by the predicate PART OF: the conflation of two verbs are possible because part-whole relation is established between V1's object and V2's object.

As for argument inheritance, *sime-koros(u)* parallels to *kowas(u)*. As pointed above, even if someone acts on very small part of something, like a tiny part of a computer, the part itself is not realized in expression at all; what is realized is only a *computer* as in *Ken-wa pasokon-o kowasi-ta* (Ken broke the computer). Then, treating *kowas(u)* and *sime-koros(u)* in parallel, it is not "part" (neck) but "whole" (chicken) that is realized as a syntactic argument in a sentence.

In this way LCS blending can deal with LVCs parrallel to simple verbs, which is desirable for theoretical simplification. By the way, our mechanism of LCS blending at first see starting point of the event of the two verbs to be conflated, and if the semantic predicate can be shared, it allows the two verbs to combine with each other in principle. This seems to imply that the subjects of the semantic predicate to be shared must be identical because it is the subject that is responsible for the launch of what is described by the semantic predicate. Thus, LCS blending seems to motivates *Subject Identification Principle* (Yumoto (1996, 2005), Matsumoto (1998)).

TRIGGER LVCs

In addition to LCS blending, in section 4.2, we proposed another process of forming LVCs in which V1's CONST value in TS is unified with V2's TRIGGER value in NTS. As to argument inheritance, as we have argued, V1's arguments are not inherited to the formed LVCs because V1 is introduced at the level of NTS, the arguments in which are not linked to AS. Here we have another example.

(138) a. **LCS Blending in TS**

Ken-wa   booto-o   kogi-susun-da

Ken-TOP boat-ACC row-proceed-PAST
Ken proceeded rowing the boat.

健はボートを漕ぎ進んだ。

b. **Unification in NTS**

*Ken-wa   taigan-ni   booto-o   kogi-susun-da

Ken-TOP the.other.side-to boat-ACC row-proceed-PAST
Ken proceeded rowing the boat.

Ken reached the other side rowing the boat.

*健は対岸にボートを漕ぎ着いた。

In LCS blending, argument inheritance is decided by headedness of LVCs which is compositionally specified. LCS of *kog(u)* is in (139a), and LCS of *Susum(u)* with agentive subject is in (139b). Blending these LCSs forms (139c).

(139) a.   *kog(u)*: CAUSE ([ACT ON (x, y)]*, [MOVE $(x, [_{path}\ z])$]]) 漕ぐ

b.   *susum(u)*: CAUSE ([ACT (x)], [MOVE $(x, [_{path}\ z])$]] 進む

c.   *kogi-susum(u)*: CAUSE ([ACT ON (x, y)]*, [MOVE $(x, [_{path}\ z])$]]) 漕ぎ進む

On the other hand, *kogi-tuku* (row-reach) is formed by unification in NTS: V1's LCS is introduced as TRIGGER value of *tuk(u)* (reach), which is illustrated in (140).

(140)
$$
\begin{bmatrix}
\textit{kogi-tuk(u)} \text{ (row-reach) 漕ぎ着く} \\
\begin{bmatrix}
\textit{ARGUMENT STRUCTURE} \\
\text{ARG1: } y \\
\text{ARG2: } w
\end{bmatrix} \\
\begin{bmatrix}
\textit{QUALIA STRUCTURE} \\
\begin{bmatrix}
\textit{TS} \\
\text{FORMAL: transition} \\
\text{CONST: BECOME BE AT } (y, w)
\end{bmatrix} \\
\begin{bmatrix}
\textit{NTS} \\
\text{TRIGGER: CAUSE ([ACT ON } (x, y)]^*, \\
\qquad\qquad\qquad [\text{MOVE } (x, [_{path}\ z])]) \ (kog(u)) \text{ 漕ぐ}
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

Since *kogu* is in NTS, its arguments are not inherited to the LVC *kogi-tuk(u)*.

By the way, *kogi-susum(u)* can realize subject other than an intentional being like *Ken*: *booto-ga kogi-susumu* is also possible. In this case, the LCS of *susum(u)* should be like the following.

(141)   *susum(u)*: MOVE $(x, [_{path}\ z])$ 進む

Since the semantic predicate of *susum(u)* in (141) cannot be shared with *kogu*, *(booto-ga) kogi-susumm(u)* cannot be formed at TS. In NTS, however, *kogu* can be introduced because it has the semantic predicate MOVE, which is required as TRIGGER value by *tuk(u)*. As a result, unification is possible and *kogi-susumu* is formed.

(142)
$$
\begin{bmatrix}
\textit{(booto-ga) kogi-susum(u)} \text{ ((boat) row-proceed) （ボートが）漕ぎ進む} \\
\begin{bmatrix}
\textit{ARGUMENT STRUCTURE} \\
\text{ARG1: } y
\end{bmatrix} \\
\begin{bmatrix}
\textit{QUALIA STRUCTURE} \\
\begin{bmatrix}
\textit{TS} \\
\text{FORMAL: transition} \\
\text{CONST: MOVE } (y, [_{path}\ z])
\end{bmatrix} \\
\begin{bmatrix}
\textit{NTS} \\
\text{TRIGGER: [CAUSE ([ACT ON } (x,y)]^*, [\text{MOVE } (x, [_{path}\ z])]) \text{ } (kog(u))
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

Interestingly, different from *(Ken-ga booto-o) kogi-susumu*, *(booto-ga) kogi-susumu* does not inherit V1's arguments.

Other examples are presented in (143), in which V1's arguments are not inherited.

(143) a. *****beddo-ni** {ne-bokeru/   ne-midareru   }

   bed-LOC   sleep-get.senile/ sleep-get.disordered
   get disordered while speeling

   *ベッドに { 寝ぼける/寝乱れる }

   b. *****biiru-o**   nomi-tukareru

   beer-ACC drink-get.tired
   get tired from drinking beer

   *ビールを飲み疲れる

c. *tyoozyoo-ni **roopu-o** tadoti-tuku

   summit-LOC rope-ACC follown-reach
   reach the summit following the rope

   *頂上にロープをたどり着く

d. ***huton-o** tataki-kutabireru

   futon-ACC beat-get.exhausted
   get exhausted from beating futon.

   *布団を叩きくたびれる

V2s in (143) cannot occur with *hitorideni* (by itself), the test presented in Chapter 3, by which the possibility for V1 to be introduced in NTS is attested.

4.3.2   Argument creation

There are some LVCs arguments of which are not selected by either neither V1 or V2.

(144)   *omoi-tuk(u)* (think-reach), *omoi-das(u)* (think-out), *tati-age(ru)* (stand-raise), *huki-tuke(ru)* (blow-attach), *sire-watar(u)* (get.known-spread)
   思いつく，思い出す，立ち上げる，知れ渡る

For example, in *omoi-tuk(u)*, neither *omow(u)* nor *tuk(u)* select the object *yoi-kangae* (good idea); it it not until V1 and V2 is combined and form the LVC that *yoi-kangae* can be selected as an argument.

(145) a.   Ken-wa   yoi-kangae-o omoi-tui-ta

      Ken-TOP good-idea   think-reach-PAST
      A good idea occurred to Ken.

      健は良い考えを思いついた。

   b. *Ken-wa   yoi-kangae-o   omot-ta

      Ken-TOP good-idea-ACC think-PAST
      Ken thought of a good idea.

      *健は良い考えを思った。

    c. *Ken-wa   yoi-kangae-ni tui-ta

       Ken-TOP good-idea-to reach-PAST
       Ken reached a good idea.

      *健は良い考えについた。

Here are other examples.

(146) a.   Ken-wa   hahaoya-o   omoi-dasi-ta

        Ken-TOP mother-ACC think-out-PAST
        Ken recalled his mother.

       健は母親を思い出した。

    b. ?Ken-wa   hahaoya-o   omot-ta

       Ken-TOP mother-ACC think-PAST
       Ken thought of his mother.

      ?健は母親を思った。

    c. *Ken-wa   hahaoya-o   dasi-ta

       Ken-TOP mother-ACC out-PAST
       Ken got his mother out.

      *健は母親を出した。

(147) a.   karera-wa iinkai-o   tati-age-ta

        they-TOP committee-ACC stand-raise-PAST
        They established a committee.

       彼らは委員会を立ち上げた。

    b. *karera-wa iinkai-o   tate-ta

       they-TOP committee-ACC set.up-PAST
       They uprear a committee.

      *彼らは委員会を立てた。

    c. *iinkai-ga   tat-ta

       committee-NOM stand-PAST
       A committee rose.

      *委員会が立った。

d. *karera-wa iinkai-o   age-ta

they-TOP committee-ACC raise-PAST
They raised a committee.

*彼らは委員会を上げた。

These LVCs cast doubt on the way which synthesizes the LCSs of two verbs like [LCS2] by [LCS1] and assumes "argument identification." In such mechanisms, each corresponding argument to be identified independently exists in each verb's LCS. Therefore there is no room for arguments which are not selected either by V1 or V2 to be newly selected. On the other hand, in our system, two LCSs are blended on the basis of common semantic predicates and accordingly each argument become one. In a sense, brand-new semantic predicates is established and the new semantic predicates select arguments. Therefore there appears to be possibility for arguments selected neither by V1 nor V2 to be newly selected.

4.3.3   Adverbial modification

As has been often pointed out, our mechanism can predict the possibility of adverbial modification. In the case of LCS blending, adverbs which modifies only V1 is possible in principle because both V1 and V2 are in the same semantic level, TS. On the other hand, V1s introduced in NTS do not join the propositional meaning of the formed LVC. Therefore adverbials modifying only V1 cannot occur.

(148) a. **LCS Blending in TS**

Ken-wa   (booto-o)   giigii   kogi-susun-da

Ken-TOP (boat-ACC) shrieking.sound row-proceed-PAST
Ken proceeded rowing the boat with shrieking sound.

健は（ボートを）ぎいぎい漕ぎ進んだ。

b. **Unification in NTS**

*Ken-wa   giigii   kogi-tui-ta

Ken-TOP shrieking.sound row-reach-PAST
Ken proceeded rowing the boat.

Ken reached the other side rowing.

*健は対岸にぎいぎい漕ぎ着いた。

(149) a. **LCS Blending in TS**

Ken-wa   sakana-o gutugutu   ni-kuzusi-ta

Ken-TOP fish-ACC boiling.sound simmer-crumble-PAST
Ken simmered the fish crumbled.

健は魚をぐつぐつ煮崩した。

b. **Unification in NTS**

*sakana-ga gutugutu   ni-kuzure-ta

fish-NOM   boiling.sound simmer-crumble-PAST
*魚がぐつぐつ煮崩れた。

Here are some similar examples.

(150)   **LCS Blending in TS:**

a. **sayuu-ni**   yure-otiru

right.and.left-to swing-fall
fall swinging right and left

左右に揺れ落ちる

b. **hirahira**   mai-agaru

flutteringly ascend
ascend flutteringly

ひらひら舞い上がる

c. **suppori**   ooi-kakusu

completely cover-hide
completely cover (something)

すっぽり覆い隠す

d. **biribiri**   yaburi-suteru

tearing.sound tear-throw.away
throw away (something) with tearing sound

びりびり破り捨てる

e. **butibuti** tigiri-toru

picking-off.sound rip-take.away
rip off (things) with pinking-off sounds
ぶちぶちちぎり取る

f. **batabata** hasiri-mawaru

hastily run-go.round
run around hastily
ばたばた走り回る

g. **gosogoso** hai-yoru

funbling.manner crawl-approach
approach (something) crawling in fumbling manner
ごそごそ這い寄る

h. **banban-to** tataki-kowasu

bang.bang-COMP beat-break
break with banging sounds
バンバンと叩き壊す

i. **basit-to** tataki-otosu

thwacking.sound-COMP hit-fell
hit (something) down
バシッと叩き落す

j. **gui-to** hiki-taosu

jerking.manner-COMP pull-fell
pull (something) down with a jerk
ぐいと引き倒す

k. **ban-to** keri-akeru

bang-COMP kick-open
kick (something) open with a banging sound
バンと蹴り開ける

l. **kaan-to**   uti-ageru

crack-COMP hit-raise

hit (something) up with a cracking sound

カーンと打ち上げる

m. **geragera** warai-korogeru

loudly   laugh-roll.about

roll about laughing loudly

げらげら笑い転げる

n. **pyonpyon**   hane-mawaru

hopping.manner jump-about

jump around

ぴょんぴょん跳ね回る

o. **hisohiso**   ii-yoru

whispering.manner say-approach

approach (someone) whispering

ひそひそ言い寄る

(151)   **Unification in NTS :**

a. ***waiwai** asobi-kutabireru

lively   play-get.exhausted

get exhausted from playing lively

*わいわい遊び疲れる

b.?***sintyooni**   tadori-tuku

deliberately follow-reach

deliberately reach following (some routes)

?*慎重にたどり着く

c. ***wanwan** naki-harasu

noisily   cry-have.swollen

weep (one's eye) out noisily

*わんわん泣き腫らす

d.?***yasasiku** daki-tuku

    gently   hug-stick.to

    go to hug (someone) gently[24]

 ?*やさしく抱きつく

e. ***gussuri** ne-bokeru

    sound   sleep-get.senile

    get senile after being sound asleep

 *ぐっすり寝ぼける

f. ***guigui** nomi-tuakreru

    a.lot   drink-get.tired

    get tired by drinking a lot

 *ぐいぐい飲み疲れる

g. ***gangan** itame-kogeru

    wildly   fry-burn

    (some food) burns from being fried violently

 *ガンガン炒め焦げる

h. ***yuttari** ki-kuzureru

    loosely   wear-get.disordered

    (clothes) gets disordered while wearing loosely

 *ゆったり着崩れる

i. ***zyabuzyabu**   arai-otiru

    washing.sound wash-fall

    (stein is) washed away with washing sounds

 *（じゃぶじゃぶ）洗い落ちる

---

[24]Since *tuk(u)* cannot be used alone like *Ken-wa Naomi-ni tui-ta* (Ken stuck to Naomi.), we cannot apply *hitorideni* test. However, considering that *daki-tuk(u)* shows similar behavior in argument inheritance and adverbial modification, it seems plausible to classify *daki-tuk(u)* as a TRIGGER LVC.

j. ***gosigosi**   huki-otiru

    scrubbing.manner wipe-fall

    (stein is) wiped away with a scrubbing manner

  *ごしごし拭き落ちる

k. (kami-ga) ***tyokityoki**   kiri-sorou

    (hair-NOM) snipping.sound cut-get.in.order

    (hair) gets in order by cutting

    （髪が）*ちょきちょき切り揃う

One interesting example is *naki-haras(u)* (weep one's eyes out). *Haras(u)* is morpho-syntactically transitive because it subcategorizes an accusative object. However, at the level of semantic structure, it seems to have the semantic predicate AFFECTED (Imaizumi & Gunji 2002), like *das(u)* in *netu-o das(u)* (have a fever).

(152) $\begin{bmatrix} haras(u) \text{ (have.some.body.part.swollen) 腫らす} \\ \begin{bmatrix} ARGUMENT\ STRUCTURE \\ \text{ARG1: } x \\ \text{ARG2: } x' \end{bmatrix} \\ \begin{bmatrix} QUALIA\ STRUCTURE \\ \begin{bmatrix} TS \\ \text{FORMAL: transition} \\ \text{CONST: AFFECTED } (x, [\text{BECOME } (x', SWOLLEN)]^*) \end{bmatrix} \\ \begin{bmatrix} NTS \\ \text{TRIGGER: EVENT } (x) \end{bmatrix} \end{bmatrix} \end{bmatrix}$

The notation x' means PART OF relation: x' is part of x. TRIGGER value is attested by the fact that *mizukara* (by oneself) cannot cooccur.

(153) *Ken-wa   mizukara asi-o   harasi-ta

    Ken-TOP by.himself foot-ACC have.(body.part).swollen

    Ken had his foot swollen by himself.

  *健は自ら足を腫らした。

The existence of trigger value is also attested by comparing *haras(u)* with *harer(u).*

(154) a.   sonnani me-o   harasi-te   doo-sita-no

            so   eye-ACC have.(body.part).swollen-CONJ what-do-Q
            You have had your eyes swollen. What happened to you?

            そんなに目を腫らしてどうしたの？

     b.?*sonnani me-ga   hare-te   doo-sita-no

            so   eye-ACC have.swollen-CONJ what-do-Q
            Your eyes are swollen. What happened to you?

         ?*そんなに目が腫れてどうしたの？

In the case of *haras(u)*, it is natural to ask about causing events, while it is not natural to ask the cause of *harer(u)*. This fact also suggests that some external factor (TRIGGER value) exists in *harasu*, although it does not seem to be fully specified: what is specified is only that x is involved in a certain event, which is represented in TRIGGER quale in (152).

     In order to form an LVC with *haras(u)*, *nak(u)* cannot but be introduced in NTS of *haras(u)* because the two verbs have no common semantic predicate, which makes it impossible to be blended with each other in TS. LSR of *naki-haras(u)* is in (155).

(155)
$$
\begin{bmatrix}
\textit{naki-haras(u)} \text{ (weep-have.some.body.part.swollen) 泣き腫らす} \\
\begin{bmatrix}
\textit{ARGUMENT STRUCTURE} \\
\text{ARG1: } x \\
\text{ARG2: } x'
\end{bmatrix} \\
\begin{bmatrix}
\textit{QUALIA STRUCTURE} \\
\begin{bmatrix}
\textit{TS} \\
\text{FORMAL: transition} \\
\text{CONST: AFFECTED } (x, [\text{BECOME } (x', \textit{SWOLLEN})]^*)
\end{bmatrix} \\
\begin{bmatrix}
\textit{NTS} \\
\text{TRIGGER: } [\text{ACT } (x)]^* \text{ (}\textit{nak(u)}\text{ (weep))}
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

In (155), V1 *nak(u)* is in NTS, so adverbials modifying it (*wanwan*) cannot refer to that semantic level because they usually modifies truth-conditional semantic content of verbs.

     Similar explanation applies to *hasiri-tukare(ru)*.

(156) a.   Ken-wa   dandan   hasiri-tukare-ta

            Ken-TOP gradually run-get.tired-PAST
            Ken gradually got tired.

            健はだんだん走り疲れた。

b. *Ken-wa   issyookenmei hasiri-tukare-ta

Ken-TOP hard   run-get.tired-PAST
Ken got tired hard.

*健は一生懸命走り疲れた。

(157) $\begin{bmatrix} \textit{hasiri-tukare(ru)} \text{ (run-get.tired) 走り疲れる} \\ \begin{bmatrix} \textit{QUALIA STRUCTURE} \\ \begin{bmatrix} \textit{TS} \\ \text{FORMAL: transition} \\ \text{CONST: [BECOME } (x, \textit{TIRED})]^* \end{bmatrix} \\ \begin{bmatrix} \textit{NTS} \\ \text{TRIGGER: CAUSE ([ACT } (x)]^*, [\text{MOVE } (x, [_{path} z])]) \text{ (run)} \end{bmatrix} \end{bmatrix} \end{bmatrix}$

Even if one is tired from running very hard, (156b) is not acceptable at all. This is because
hasir(u) (run) is introduced into NTS as (157) illustrates, and the V2 *tukare(ru)* does not
have any semantic predicate to be modified by *issyookenmei* (hard). Of course, (156a) has no
problem since *dandan* (gradually) modifies the semantic predicate BECOME of *tukare(ru)*,
which is in TS.

4.3.4   Scope of negation

TRIGGER LVCs behave differently from LCS blending LVCs in negation: *-nai* does not
negate V1's meaning in TRIGGER LVCs, while it does in LCS-blending ones.

(158) a. **LCS blending (TS):**

Ken-wa   Naomi-o   daki-age-nak-atta   （NOT＞V1）

Ken-TOP Naomi-ACC hug-raise-NEG-PAST
Ken did not lift Naomi in his arms.

健は奈緒美を抱き上げなかった。

b. **TRIGGER LVCs (NTS):**

sono-sakana-wa ni-kuzure-nak-atta   （NOT＜V1）

the-fish-TOP   simmer-crumble-NEG-PAST
The fish did not crumble in simmering.

その魚は煮崩れなかった。

Generally the sentence (158a) is interpreted that Ken did not hug Naomi. In contrast, (158b) is interpreted that someone simmer the fish but it did not crumbled. That is, V1 is negated in (158a), while V1 of (158b) remained intact. This is reinforced by the following conversation.

(159) a.   A: Ken-wa   Naomi-o   daki-age-nak-atta-n-da

              Ken-TOP Naomi-ACC hug-raise-NEG-PAST-C-COP
              "Ken didn't hold up Naomi in his arms."

              「健は奈緒美を抱き上げなかったんだ。」

      B: zyaa daka-nak-atta-n-da-yo-ne?

              then hug-NEG-PAST-COP-C-Q
              "Then, he didn't hug her, did he?"

              「じゃあ、抱かなかったんだよね？」

  b.   A: sono-sakana-wa ni-kuzure-naka-atta-n-da

              the-fish-TOP   simmer-crumble-NEG-PAST-C-COP
              "The fish didn't crumble by simmering."

              「その魚は煮崩れなかったんだ。」

      B: ♯zyaa ni-nak-atta-n-da-yo-ne?

              then   simmer-NEG-PAST-COP-C-Q
              "Then, (someone didn't) simmer it, did he?"

              「♯じゃあ、煮なかったんだよね？」

In (159a) what B is saying is natural as reconfirmation of whether Ken hug Naomi or not. In (159), on the other hand, B's reconfirmation sounds strange ('♯' means awkwardness in discourse). This seems to be because *ni(ru)* (simmer) behaves as presupposition (Katttunen 1971) in the LVC *ni-kuzure(ru)* (simmer-crumble): V1 *ni(ru)* is the presupposition of V2 *kuzure(ru)*. This presupposition seems to bring about the cause-like interpretation. In fact, also by intuition, *ni-kuzure(ru)* means that something happens to crumble while or after simmering; strong causal relation is not felt in comparison with *tataki-kowas(u)* (hit-break), *kiri-taos(u)* (cut-fell), or *huki-tor(u)* (wipe-take.away).

    Our claim that V1 behaves as a presupposition of V2 in *ni-kuzure(ru)* is testified by the following parallel behavior between *ni-kuzureru* and the factive verb *sir(u)* (know), referring to Karttunen (1973).

(160) a.   Ken-wa   Naomi-ga   kami-o   kit-ta   koto-o sira-nak-atta.

Ken-TOP Naomi-NOM hair-TOP cut-AST C-ACC know-NEG-PAST
datte   motomoto   kir-anak-atta-kara.

in.fact from.the.beginning cut-CONJ-NEG-PAST-because
Ken did not know that Naomi cut her hair. In fact, she had not.

健は奈緒美が髪を切ったことを知らなかった。だってもともと切らなかったから。

b.   sono-sakana-wa ni-kuzure-naka-atta.

the-fish-TOP   simmer-crumble-NEG-PAST
datte   motomoto   ni-nak-atta-kara.

in.fact from.the.beginning cut-CONJ-NEG-PAST-because
The fish didn't crumble by simmering. In fact it had not been simmerred.

その魚は煮崩れなかった。だってもともと煮なかったから。

Presuppositions are deniable only when they are embedded in negation (Gunji (1982), Potts (2003)) as shown in (160a). However, the interpretation of (160a) is a kind of meta-negation, what Gunji (1982) calls "abortion:" the presupposition is discarded before it is born.

(161)   Jack doesn't regret being bald. For he isn't bald.

(Gunji 1981: 51)

The interpretation of (160b) parallels that of (160a) and (161). On the contrary, the interpretation of (162) is different.

(162)   Ken-wa   Naomi-o   daki-age-nak-atta

Ken-TOP Naomi-ACC hug-raise-NEG-PAST
datte   motomoto   dak-anak-atta-kara.

in.fact from.the.beginning hug-CONJ-NEG-PAST-because
Ken didn't hold up Naomi in his arms. In fact he didn't hug her.

健は奈緒美を抱き上げなかった。だってもともと抱かなかったから。

(162) is not interpreted as abortion; it appears to be somewhat redundant. This can be explained by assuming that the V1 *dak(u)* (hug) has already been negated at truth-conditional semantic level (Pott's (2003) "at issue" level) in the first sentence, so repeating it in the second sentence make us feel some redundancy.

Summing up, we can give a similar explanation to these facts as to negation as in the case of adverbial modification in the previous subsection. Usually negation negates the semantic elements in TS (at issue), but since V1 is in NTS in TRIGGER LVCs, it do not directly negate V1, while it does in LCS-blending LVCs.[25]

Here are other examples of LCS-blending LVCs and TRIGGER LVCs which shows the same behavior as *daki-age(ru)* and *ni-kuzure(ru)* respectively.

(163) a. **LCS blending (TS):**
{*yure-oti* (swing-fall) / *mai-agara* (dance-rise) / *ooi-kakusa* (cover-hide) / *yaburi-sute* (tear-throw.away) / *tigiri-tora* (pick.off-take) / *hasiri-mawara* (run-around) / *hai-yora* (crawl-approach) / *tataki-kowasa* (hit-break) / *tataki-otosa* (hit-drop) / *hiki-taosa* (pull-fell) / *keri-ake* (kick-open) / *uti-age* (hit-raise) / {*warai-koroge* (laugh-roll) / *hane-mawara* (jump-around) / *ii-yora* (say-approach)}
nak-atta (NEG-PAST)
{ 揺れ落ち / 舞い上がら / 覆い隠さ / 破り捨て / ちぎり取ら / 走り回ら / 這い寄ら / 叩き壊さ / 叩き落とさ / 引き倒さ / 蹴り開け / 打ち上げ / 笑い転げ / 跳ね回ら /言い寄ら } なかった

b. **TRIGGER LVCs (NTS):**
{*asobi-kutabire* (play-get.exhausted) / *tadori-tuka* (follow-reach) /*naki-harasa* (weep-have.body.part.swollen) / *ne-boke* (sleep-get.senile) /*nomi-tukare* (drink-get.tired) /*itame-koge* (fry-burn) /*ki-kuzure* (wear-get.disordered) /*arai-oti* (wash-fall) /*huki-oti* (wipe-fall) /*(kami-ga) kiri-sorowa* ((hair) cut-get.in.order)}
nak-atta (NEG-PAST)
{ 遊びくたびれ / たどり着か / 泣き腫らさ / 寝ぼけ / 飲み疲れ / 炒め焦げ / 着崩れ / 洗い落ち / 拭き落ち / (髪が) 切り揃わ } なかった

One interesting contrast is found in the difference between *ne-bokeru* (sleep-get.senile) and *ne-sizumaru* (sleep-get.silent). The former is a TRIGGER LVC as presented in (163b), and the latter, an LCS-blending LVC. At first let us present evidence to analyze *ne-sizumar(u)* as an LCS-blending LVC.

Ner(u) and *sizumar(u)* can be analyzed to have the following LCSs.

(164) a. *ner(u):* CAUSE (x, [BECOME (x, *ASLEEP*)]*) 寝る

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[25]Here again *daki-tuk(u)* seems problematic for our analysis because usually, in *daki-tuk-anak-at-ta*, negation reach V1. However, we cannot use V2 alone: **Ken-wa Naomi-ni tukan-ak-at-ta*. Considering this fact, negation may exceptionally reach V1. Similar explanation is possible for *kami-tuk(u)* (chew-stick.to) and *kaziri-tuk(u)* (bite-stick.to).

     b.   *sizumar(u):* CAUSE (x, [BECOME (x, *QUIET*)]*) 静まる

This is supported by the following behavior.

(165) a.   Ne-nasai! (to children who are chatting in bed)

         sleep-IMP
         Sleep!
         寝なさい！

     b.   Sizumar-e!   (to noisy students)

         become.quiet-IMP
         Be quiet!
         静まれ！

(166) a.   Seito-tati-wa   ne-yoo-to   si-nak-atta

         student-PL-TOP sleep-try-COMP do-NEG-PAST
         The students would not sleep.
         生徒たちは寝ようとしなかった。

     b.   Seito-tati-wa   sizumar-oo-to   si-nak-atta

         student-PL-TOP become.quiet-try-COMP do-NEG-PAST
         The students would not be quiet.
         生徒たちは静まろうとしなかった。

That is, they allow intentional reading, and in this case their LCSs have reflexive semantic structure as (164) shows. As the two verbs share the semantic predicate of event-starting point, they can be LCS blended, resulting in the following LCS.

(167)   *ne-sizumar(u):* CAUSE (x, [BECOME (x, *ASLEEP* $\wedge$ *QUIET*)]**)

    Then let us compare *ne-sizumar(u)* with *ne-boker(u)* in negation.

(168) a.   Seito-tati-wa   ne-sizumar-anak-atta   (NOT $>$ V1)

         student-PL-TOP sleep-become.quiet-NEG-PAST
         The students did not sleep and become quiet.
         生徒たちは寝静まらなかった。

b. Seito-tati-wa   ne-boke-anak-atta   (NOT $<$ V1)

student-PL-TOP sleep-get.senile-NEG-PAST
The students did not get senile after sleeping.

Our analysis is also reinforced by adverbial modification, which is presented in the previous subsection.

(169) a. Seito-tati-wa   {gussuri/sinto} ne-sizumat-te-i-ta

student-PL-TOP soundly/quietly sleep-become.quiet-CONJ-BE-PAST
The students were sleeping {soundly/quietly}
生徒たちは { ぐっすり/しんと } 寝静まっていた。

b. Seito-tati-wa   {*gussuri/sugoku} ne-boke-te-i-ta

student-PL-TOP soundly/greatly   sleep-get.senile-CONJ-BE-PAST
The students was senile a lot after sleeping soundly.
生徒たちは {*ぐっすり/すごく } 寝ぼけていた。

Gussuri modifies V1 *ner(u)*, while *sinto* and *sugoku* modify *sizumar(u)* and *boke(ru)* respectively. As (169) shows, *ne-sizumar(u)* allows either of V1-modifying and V2-modifying adverbs. In constrast, *ne-boke(ru)* do not allow *gussuri*, which modifies V1 *ner(u)*.

4.3.5 Prediction of productivity

LCS-BLENDING LVCS

In LVC formation at the level of TS, LVCs are formed by LCS blending. As we have argued, PLB predicts that two verbs which do not share any semantic predicates in their LCSs are not compounded. In addition, for two verbs to be conflated whose heads are specified on the same position in their LCSs, the motivation of the headedness such as manners or means, or at least part of them, must be compatible with each other. Typical examples are ones called "dvandva" LVCs in previous studies like *naki-sakebu* (weep-cry) or *koi-sitau* (love-like). The combination of such two verbs is predicted to less productive than the combination of two verbs either of which does not have a headed subevent or whose positions of headed events are not identical with each other. In many cases, verbs which have headed subevents

are compounded with headless verbs, resulting in the specification of the headedness of the formed compounds.

For example, as analyzed before, *suteru* has headless LCS. Therefore our prediction is that it is quite likely to be blended with other verbs as long as the blending follows PLB. In fact, verbs which specify manners or means of throwing away are easy to be compounded with *suter(u)*.

(170)   *nage-suteru* (throw-throw.away), *uti-suteru* (hit-throw.away), *hoori-suteru* (toss-throw.away), *kanaguri-suteru* (rip.off-throw.away), *haki-suteru* (sweep-throw.away), *haki-sureru* (vomit-throw.away), *oki-suteru* (put-throw.away), *ii-suteru* (say-throw.away), *tukai-suteru* (use-throw.away), *itoi-suteru* (hate-throw.away)

投げ捨てる，打ち捨てる，放り捨てる，かなぐり捨てる，掃き捨てる，吐き捨てる，置き捨てる，言い捨てる，使い捨てる，厭い捨てる

Summing up what has been argued so far, the following generalization is obtained as to LCS blending LVCs.

(171)   **Prediction on productivity of LCS-blending LVCs**

a.   Two verbs which share the semantic predicate of event-starting point are more likely to be compounded.

b.   Two verbs which do not share the semantic predicate of event-starting point are not compounded in principle. As a result, there exist relatively few examples of such LVCs.

c.   Vebs of headedless LCS are highly productive in LVC formation.

d.   Two verbs which have head at the same position in their LCSs cannot be compounded unless they share some manners or means, which motivate the headedness in their LCSs. Therefore, such combination of verbs show relatively lower productivity than headless verbs in the formation of LVCs.

In order to prove the adequacy of (171), empirical data must be piled up. However, we are proposing a stricter restriction than theories which use semantic predicates like BY or

WHILE, or which introduce CAUSE pragmatically or on the basis of "world knowledge." On this point our prediction appears to be more precise and more likely to prevent overgeneration.

TRIGGER LVCs

As we pointed out in chapter 2, there are a certain number of counterexamples to *Transitivity Harmony Principle* (Kageyama 1993) and *Subject Identification Principle* (Yumoto (1996, 2005), Matsumoto (1998)). We have analyzed such "exceptions" as TRIGGER LVCs. As such exceptional treatment by previous studies indicates, TRIGGER LVCs do not seem as productive as LCS blending LVCs. This is because the selectional restriction to V1 is specified in V2's TRIGGER quale, as we have argued. Needless to say, whether a certain value is specified or not in V2's TRIGGER quale primarily decides its productivity of LVCs. In addition to V2's TRIGGER value, taking V1's TELIC value into consideration, we can predict the productivity of TRIGGER LVCs.

First, we observe LVCs in which the subjects of V1 and V2 are identified in construal. In this case, unification is possible as long as some value is specified in V2's TRIGGER quale (we notate it as '+' below) and V1's meaning is compatible with it. Here are some examples.

(172) a. *hasiri-tukarer(u)* (run-get.tired), *nage-tukarer(u)* (throw-get.tired), *kogi-tuk(u)* (row-reach), *tadori-tuk(u)* (follow-reach), *ne-boke(ru)* (sleep-get.senile), *nomi-tubure(ru)* (drink-get.plastered)

　　　　走り疲れる，投げ疲れる，漕ぎ着く，たどり着く，寝ぼける，飲み潰れる

　　　b. **nomi-hutor(u)* (drink-gain.weight), **tabe-sodat(u)* (eat-grow.up), **oyobi-yase(ru)* (swim-lose.weight)

　　　　*飲み太る，*食べ育つ，*泳ぎ痩せる

As we observed in section 4.2.1, V2s in (172a) cannot occur with *hitorideni/mizukara* (by oneself), which means that TRIGGER value is '+,' while V2s in (172b) can, which means that TRIGGER value is '−.'

On the other hand, in order for two verbs whose subjects are not identified in construal to be combined, in addition to the '+' specification of V2's TELIC value, V1's TELIC value must be '+' or 'ϕ,' which means the verb contains some resultative state in TS or NTS.

(173) a. *ki-kuzure(ru)* (wear-get.disordered), *ni-kuzure(ru)* (simmer-crumble), *arai-oti(ru)* (wash-fall), *huki-oti(ru)* (wipe-fall), *(kami-ga) kiri-sorow(u)* ((hair) cut-get.in.order)
着崩れる，煮崩れる，洗い落ちる，拭き落ちる，(髪が) 切り揃う

   b. *(ine-ga) *huki-taore(ru)* ((rice plant) blow-fall, *(manekin-ga) *keri-taore(ru)* ((mannequin) kick-fall), *(doa-ga) *osi-yabure(ru)* ((door) push-get.tore), *(mokeihikooki-ga) *tataki-tubure(ru)* ((model plane) hit-crush)
（稲が）*吹き倒れる，*マネキンが蹴り倒れる，*ドアが押し破れる，*模型飛行機が叩き潰れる

While the TELIC value of V1s in (172a) is '+' or 'ϕ,' that of V1s in (173b) is '−,' which is attested by the following sentences as we first saw in Chapter 3. .

(174) a. Ken-wa   ni-hun-de   sono-suutu-o ki-ta   (TELIC: ϕ)
Ken-TOP 2-minutes-in the-suit-ACC wear-PAST
Ken put on the suit in 2 minutes.
健は2分でそのスーツを着た。

   b. ?Ken-wa   sono-sakana-o go-hun-de   ni-ta   (TELIC: +)
Ken-TOP the-fish-ACC   5-minutes-in simmer-PAST
Ken simmered the fish in 5 minutes.
?健はその魚を5分で煮た。

(175) a. *kaze-ga   go-hun-de   hui-ta   (TELIC: −)
wind-NOM 5-minutes-in blow-PAST
Wind blew in 5 minutes.
*風が5分で吹いた。

   b. *Ken-wa   ni-hun-de   sono-manekin-o   ket-ta   (TELIC: −)
Ken-TOP 2-minutes-in the-mannequin-ACC kick-PAST
Ken kicked the mennequin in 2 minutes.
*健はそのマネキンを2分で蹴った。

As (173b) indicates, if subjects are not identified in construal, LVCs whose V1's TELIC value is '−' are not acceptable.

What we have argued suggests that the productivity of TRIGGER LVCs greatly depends on V1's TELIC value and V2's TRIGGER value, both of which are not included in truth-conditional meaning of verbs (TS); they are at non-truth-conditional semantic level (NTS).

Summing up, we obtain the following table which shows all the logically possible combination of verbs as to TELIC and TRIGGER values, and whether subjects are identified or not.

(176)　**Prediction of productivity among TRIGGER LVCs**

	V1's TELIC	V2'S TRIGGER	subjects	examples
A)	$+, \phi$	$+$	identified	*ki-bukure(ru)*(wear-swell) 着膨れる
B)	$-$	$+$	identified	*aruki-tukare(ru)* (walk-get.tired) 歩き疲れる
C)	$+, \phi$	$-$	identified	**ki-yase(ru)* (wear-lose.weight) *着痩せる **ki-butor(u)* (wear-gain.weight) *着太る
D)	$-$	$-$	identified	**tobi-oti(ru)* (jump-fall) *跳び落ちる
E)	$+, \phi$	$+$	unidentified	*ni-kuzure(ru)* (simmer-crumble) 煮崩れる *arai-oti(ru)* (wash-fall) 洗い落ちる
F)	$-$	$+$	unidentified	*tataki-tubure(ru)* (hit-crush) *叩き潰れる, ?**yude-kuzure(ru)* (boil-crumble) ?*茹で崩れる
G)	$+, \phi$	$-$	unidentified	*(mikan-ga)* **tigiri-oti(ru)* ((orange) pick.off-fall) （ミカンが）*ちぎり落ちる
H)	$-$	$-$	unidentified	*(hae-ga)* **tataki-oti(ru)* ((fly) hit-fall) （ハエが）*叩き落ちる

As we have just argued, in the cases where subjects are identified, the only requirement is that V2's TRIGGER value is '+,' and V1's TELIC value is not restricted. Contrastively, in the case where subjects are not identified, V1's TELIC value must be '+' or ϕ in addition to the specification of V2's TRIGGER value as '+.' Therefore the fact that subject-identified LVC is more productive than subject-unidentified LVC is naturally motivated.

It is an intriguing phenomenon that *ki-bukure(ru)* (wear-swell) is eligible while **ki-yase(ru)* (wear-lose.weight) and **ki-butor(u)* (wear-gain.weight) are not acceptable, although all of these examples have corresponding light-verb expressions: *ki-bukure-suru*, *ki-yase-suru*, and *ki-butori-suru*. Our LSR gives an answer to this difference: this is because the TRIGGER value of *yase(ru)* and *hutor(u)* is '−' since *Ken-wa hitorideni {yase-ta/hutot-ta}* (Ken {lose/gain} weight by himself) is acceptable, while TRIGGER value of *hukure(ru)* is '−,'

since **Ken-wa hitorideni hukure-ta* (Ken swelled by himself) is unacceptable,

When subjects are not identified, V2's TRIGGER value must be '+,' and V1's TELIC value must be + or ϕ. Thus, acceptability is lower when V1's TELIC value is '−.' This is the reason ?**yude-kuzure(ru)* is less acceptable than *ni-kuzure(ru)*, though *yude(ru)* has similar meaning to *ni(ru)*: unlike *ni(ru)*, *yude(ru)* hardly allows telic interpretation as shown in (177).[26]

(177) a. ?Ken-wa   namaniku-o   10-pun-de   ni-ta
             Ken-TOP the-raw.meat-ACC 10-minutes-in simmer-PAST
             Ken simmered raw meat in 10 minutes.

         ?健は生肉を 10 分で煮た。

       b.?*Ken-wa   namaniku-o   10-pun-de   yude-ta
             Ken-TOP the-raw.meat-ACC 10-minutes-in simmer-PAST
             Ken boiled raw meat in 10 minutes.

         ?*健は生肉を 10 分で茹でた。

By the way, provided that LCS blending in TS takes place on the basis of sharing a semantic predicate of event-starting point as we have argued, *Subject Identification* (in LCS) is naturally followed. In addition, supposing that the primary way of LVC formation is LCS blending, subject-identified LVCs should be typical, and accordingly they should have relatively high productivity. On the other hand, subject-unidentified LVCs suffer from further constraints and their productivity is relatively low.

As has been discussed so far, our system provides a description and prediction on the productivity of TRIGGER LVCs, all of which violate *Transitivity Harmony Principle* (Kageyama 1993), and some of which violate *Subject Identification Principle* (Yumoto (1996, 2005), Matsumoto (1998)). In order to examine the adequacy of our prediction, some statistical study may be necessary. I put it aside for future research for now, but what is important is that prediction of productivity of TRIGGER LVCs is possible, and our analysis provides a new falsifiability, which has not been possible in previous studies.

[26]For some native speakers of Japanese (177b) seems as acceptable as (177a). Such speakers' LSR of *yuder(u)* is almost the same as that of *ni(ru)*: TELIC value is 'ϕ.' Therefore our prediction is that such speakers will accept the LVC *yude-kuzure(ru)*. In fact, some Japanese native speakers I asked who accept (177b) also judged *yude-kuzure(ru)* as acceptable, and those who has difficulty accepting (177b) judged that *yude-kuzure(ru)* is difficult to accept.

4.3.6   Rendaku

Our LCS blending forms what previous studies calls "dvandva LVCs" and others by the same process in principle, not using semantic predicates like BY, WHILE and so on. This is supported by their bahavior in the phenomenon of so-called "rendaku," a kind of phonological assimilation.[27]   Let us see some simple examples.   When two nouns are compounded, in principle the first consonant of the second word is vocalized.

(178) a.   *sibu* + ***k**aki* → *sibu-**g**aki* (sour-pesimmon) しぶがき（渋柿）

    b.   *kara* + ***s**isi* → *kara**z**isi* (Chinese-lion) からじし (唐獅子)

    c.   *danbooru* + ***h**ako* → *danbooru**b**ako* (cardboard box) ダンボールばこ (箱)

    d.   *benkyoo* + ***h**eya* → *benkyoo**b**eya* (study room) べんきょうべや (勉強部屋)

    e.   *yu* + ***t**ouhu* → *yu**d**ouhu* (hot.water-tofu) ゆどうふ (湯豆腐)

However, in some cases rendaku does not happen.   One of such exceptions is "dvandva" coumpounds.

(179) a.   *siro* + ***k**uro* → *siro**k**uro* (black and white) しろくろ (白黒)

    b.   *kusa* + ***k**i* → *kusa**k**i* (grass and tree) くさき (草木)

    c.   *aka* + ***s**iro* → *aka**s**iro* (red and white) あかしろ (赤白)

    d.   *kou* + ***h**aku* → *kou**h**aku* (red and white) こうはく (紅白)

    e.   *turu* + ***k**ame* → *turu**k**ame* (crane and tortoise) つるかめ (鶴亀)

    f.   *ue* + ***s**ita* → *ue**s**ita* (up and down) うえした (上下)

By the way, LCS blending treats two verbs to be compounded equally: it does not assume V2 to be head, and it does not regard V1 as a semantic modifier, either.   That is, all LCS-blending LVCs are dvandva compounds in a sence.   Therefore it is predicted that LCS

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[27]This subsection is largely indebted to Prof. Matsui's advice.

blending LVCs will show the same behavior in rendaku as those in (179). That is, they will be free from rendaku.

Although rendaku does not occur in LVCs themselves except for ones derived from nominals like *ki-bukurer(u)* (wear-swell), it occurs in their nominalized counterparts. Let us see examples analyzed as dvandva in previous studies at first.

(180)   *nageki-**k**anasimi* (mourn-feeling.sad), *koi-**s**itai* (love-liking)

         なげきかなしみ (嘆き悲しみ)，こいしたい (恋い慕い)

As (180) shows, rendaku does not occur in counterpart nominals of "dvandva" LVCs. Interestingly, other LVCs show the same behavior.

(181)   *nage-sute* (throw-trhowing.away), *uti-kowasi* (hit-breaking), *kami-tuki* (chew-sticking),
         moti-sari (have-leaving), *ture-sari* (accompany-leaving)

         なげすて (投げ捨て)，うちこわし (打ち壊し)，かみつき (噛み付き)，もちさり (持ち
         去り)，つれさり (連れ去り)

This behavior suggests that the counterpart LVCs of those in (181) is formed in the same process as "dvandva" LVCs, which are the counterparts of those in (180).

Further evidence comes from TRIGGER LVCs. In TRIGGER LVCs, different from LCS blending LVCs, rendaku occurs.

(182)   *nomi-dukare* (drink-getting.tired), *hasiri-dukare* (run-getting.tired), *warai-zini* (laugh-
         dying), ?*tadori-duki* (follow-reaching)

         のみづかれ (飲み疲れ)，はしりづかれ (走り疲れ)，わらいじに (笑い死に)，?たどりづ
         き (たどり着き)

According to our mechanism, in TRIGGER LVCs V1 is not introduced into the same semantic level where V2 lies. That is, they are formed by totally different way from those in (180) and (181). Therefore it is no wonder that rendaku occurs in their counterpart nominals.

To sum up, as the table in (183) shows, our distinction of LCS blending LVCs and TRIGGER LVCs are parallel as to the occurence of rendaku in counterpart nominals. Rendaku does not happen in counterpart nominals of LCS-blending LVCs because the way of formation

is the same as that of dvandva N-N compounds. In contrast, rendaku happens in counterpart nominals of TRIGGER LVCs because V1 does not have the same semantic status as V2.

(183)   **Rendaku in Nominals**

	LCS blending	dvandva N-N	TRIGGER LVC	general N-N
example	*nage-sute*	*siro-kuro*	*nomi-dukare*	sibu-gaki
Rendaku	no	no	yes	yes
	なげすて	しろくろ	のみづかれ	しぶがき

Previous studies would have difficulty giving a reasonable explanation to this phenomenon because they differentiate their "dvandva" LVCs and other LVCs, and they do not discriminate our TRIGGER LVCs and LCS blending LVCs.

4.3.7   "Lexical complement" LVCs

This section analyzes LVCs presented in (89c), which Yumoto (2005) analyses as "lexical complement structure" (presented here again as (184)).

(184)   *ii-otosu* (say-fell), *ii-morasu* (say-leak), *tabe-nokosu* (eat-leave), *ii-nokosu* (say-leave)[28]
        言い落とす，聞き落とす，言い漏らす，聞き漏らす，食べ残す，言い残す

Here is her analysis.

(185)   V+*otos(u)* : [x FAIL-IN [LCS1]]　(Yumoto 2005: 320)

In this analysis, V1's LCS is plugged into V2's LCS as its value. There are problems, however. What is crucial is that the new semantic predicate FAIL-IN is created and its formal definition is not clear. If this semantic predicate just means *fail* in English or *-sisokonaw(u)* in Japanese, it is not more than a paraphrase and it is not a substantial analysis. Another problem is that, as (186) shows, V1's arguments cannot be realized though usually they should be realized in the complement of V2, which Yumoto attributes to the nature of "lexical" complement.

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[28]Matsumoto (1998) analyzes LVCs like those in (184) as LVCs in which V1 means V2's "background information," referring to Lakoff (1987), Tsohatzidis (1995), Goldberg (1998) and Fillmore (1971, 1982). We share the viewpoint with him. Our analysis may be regarded as a formalization of his insight.

(186) *Ken-wa   Naomi-ni sono-kotoba-o ii-otosi-ta

       Ken-TOP Naomi-to the-words-ACC say-drop-PAST
       Ken fail to say the words to Naomi.

       健は奈緒美にその言葉を言い落とした。

Moreover, (185) would predict that basically any intentional verb can occur as LCS1, but it
is strictly restricted in fact, as (187) shows.

(187) a. *sono-sake-o   nomi-otosu

           the-sake-ACC drink-drop
           fail to drink that sake

           *その酒を飲み落とす

      b. *kuruma-o iti-dai   kowasi-otosu

           car-ACC   one-CLASS break-drop
           fail to break a car

           *車を一台壊し落とす,

      c. *ie-o   tate-otosu

           house-ACC build-drop
           fail to build a house

           *家を建て落とす

      d. *mokei-o   tukuri-otosu

           model-ACC make-drop
           fail to make a model

           *模型を作り落とす

In our system, *otos(u)* has the following LSR.

$$(188) \quad \begin{bmatrix} otos(u) \text{ (fail) } 落とす \\ \begin{bmatrix} ARGUMENT\ STRUCTURE \\ \text{ARG 1: } x = \text{human} \\ \text{ARG 2: } y = \text{information} \end{bmatrix} \\ \begin{bmatrix} QUALIA\ STRUCTURE \\ \begin{bmatrix} TS \\ \text{CONST: NOT V1} \\ NTS \\ \text{TRIGGER: INTEND } (x, \text{V1}) \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

(188) describes that x (human) in fact does not do anything to some information (y), intending to do it. That x (human) does not do anything is in TS as CONST value, and the intention of carrying it out is in NTS as TRIGGER value.[29]

According to (188), argument inheritance of *V-otosu* can be be given the same explanation as other TRIGGER LVCs like *aruki-tukare(ru)* (walk-get.tired) or *ni-kuzure(ru)* (simmer-crumble): V1 is introduced in NTS and no argument in NTS is linked to AS. Moreover, (188) clearly specify selectional restriction of *otos(u)* as semantic restriction in AS.

4.3.8 Transitive-inchoative alternation in LVCs

Transitive-inchoative alternation in V-V compounds is mentioned in Kageyama (1993)，Matsumoto (1998)，and Yumoto (2005), and there are descriptive studies such as Suga (1983) or Nishio (1988), but they do not clarify theoretical mechanisms of alternation and the difference in possibility of alternation among V-V compounds.[30]

The mechanism of LCS blending gives a more straightforward explanation on transitive-inchoative alternation in LVCs than previous studies. Let us see data at first. Here are some examples which show alternation and which do not. (The right of the slash is transitive, and the left is intransitive. Only transitive forms are translated into English.)

(189) a.   *ire-kae(ru)/ire-kawar(u)* (put.in-change), *ori-kasane(ru)/ori-kasanar(u)* (fold-stack),

      tuki-sas(u)/tukisasar(u) (prong-sting), *tumi-kasane(ru)/tumi-kasanar(u)* (pile-pile),

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[29]This more or less grammaticalized *otos(u)*, which has restricted meaning and has strict selectional restriction as (187), is probably derived from the usual *otosu* which means dropping something. Though this meaning derivation is also an interesting issue, we do not go further because it does not have direct relation to our discussion on LVC.

[30]Chen (2010), Hidaka (2010)，and Ogawa and Niinuma (2010) are recent analyses.

nezi-mage(ru)/nezi-magar(u) (twist-bend), *hari-tuke(ru)* (plaster-attach), *hane-kaes(u)/hane-kaer(u)* (bound-return),

入れ替える/入れ替わる，折り重ねる/折り重なる，折り曲げる/?折り曲がる，突き刺す/突き刺さる，積み重ねる/積み重なる，ねじ曲げる/ねじ曲がる，貼り付ける/貼り付く，跳ね返す/跳ね返る

b. *(booru-o) uti-age(ru)/(booru-ga) ?*uti-agar(u)* (hit-raise (ball)), *uti-otos(u)/*uti-oti(ru)* (hit-fell), *osi-ake(ru)/*osiak(u)* (push-open), *kaki-nuk(u)/*kaki-nuke(ru)* (write-pull.off), *kiri-taos(u)/*kiri-taore(ru)* (cut-fell), *tataki-kowas(u)/*tataki-koware(ru)* (hit-break), *nezi-ake(ru)/*nezi-ak(u)* (twist-open), *hori-sage(ru)/*hori-sagar(u)* (dig-drop), *yobi-okos(u)/*yobi-oki(ru)* (call-wake)

打ち上げる/?*打ち上がる（ボール），打ち落とす/*打ち落ちる，押し開ける/*押し開く，押し上げる/?*押し上がる，書き抜く/*書き抜ける，切り倒す/*切り倒れる，叩き壊す/?*叩き壊れる，ねじ開ける/*ねじ開く，掘り下げる/*堀り下がる，呼び起こす/*呼び起きる

LCS blending can predict that LVC in which V1 has only ACT ON in its LCS cannot alternate. Let us see the difference between *ori-mage(ru)* and *tataki-tubus(u)* for instance: the former alternates, while the latter does not.

(190) a. *or(u)* (fold): CAUSE ([ACT ON (x, y)], [BECOME BE $(y, FOLDED)$]) 折る

b. *mage(ru)* (bend): CAUSE ([ACT ON (x, y)], [BECOME BE $(y, BENT)$]) 曲げる

c. *ori-mage(ru)* (fold-bend):
CAUSE ([ACT ON (x, y)], [BECOME BE $(y, [FOLDED_{V1} \wedge BENT])$])
折り曲げる

(191) a. *tatak(u)* (hit): ACT ON (x, y) 叩く

b. *tubus(u)* (crush): CAUSE ([ACT ON (x, y)], [BECOME BE $(y, FLAT)$]) 潰す

c. *tataki-tubus(u)* (fold-bend):
CAUSE ([ACT ON $(x, y)]_{V1}$, [BECOME BE $(y, FLAT)$]) 叩き潰す

In *ori-mage(ru)*, V1 and V2 share the semantic predicate CAUSE. Therefore the semantic link of arguments between the primary event (the first argument of CAUSE) and the secondary event (the second argument of CAUSE) is the same as that of alternating simple verbs like *mager(u)*.

(192)   *mage(ru)* (bend): CAUSE ([ACT ON (x, y)], [BECOME BE $(y, BENT)$]) 曲げる

For a simple transitive verb to be intransitivized, the semantic link of its arguments between the primary event and the secondary event must be assured. In (192) the semantic link between the two *y*s are assured. In order to establish the same semantic link between arguments in LVC, both V1 and V2 must have CAUSE; otherwise, like (191), this link is not established enough because V1 does not participate in the secondary event.

Although alternation in LVCs requires further discussion, at this point, we can at least preliminary conclude that LVCs formed by two causative verbs are more likely to alternate than others. This way of explanation is difficult for Kageyama (1993) since he mainly uses AS to describe LVCs and he cannot thrust into deep semantic level. It would also be difficult for Matsumoto (1996, 1998) and Yumoto (2005), who analyze V1 as a subordinating semantic element, because it would be V2, the head, that is responsible for alternation.

Let us consider a little further in detail. There is still difference in whether the verb alternates or not among LVCs consisting of two verbs both of which have CAUSE in their LCSs. Some examples are in (193).

(193) a.   *ire-kae(ru)/ire-kawar(u)* (put.in-change), *ori-kasane(ru)/ori-kasanar(u)* (fold-stack), *tumi-kasane(ru)/tumi-kasanar(u)* (pile-stack), *hari-tuke(ru)/hari-tuk(u)* (plaster-attach)
入れ替える/入れ替わる，折り重ねる/折り重なる，折り曲げる/?折り曲がる，積み重ねる/積み重なる, 貼り付ける/貼り付く

   b.   *kaki-nuk(u)/*kaki-nuke(ru)* (write-pull.off), *kiri-taos(u)/*kiri-taore(ru)* (cut-fell), *nage-age(ru)/*nage-agar(u)* (throw-raise), *humi-tubus(u)/*humi-tubure(ru)* (step.on-crush), *hagi-tor(u)/*hagi-tore(ru)* (strip-take), *tigiri-tor(u)/?*tigiri-torer(u)* (rip-take)

書き抜く/*書き抜ける，切り倒す/*切り倒れる，投げ上げる/*投げ上がる，踏み潰
す/*踏み潰れる，剥ぎ取る/*剥ぎ取れる，ちぎり取る/?*ちぎり取れる

I would like to prove that our mechanism of compositional headedness helps explain the difference in the possibility of alternation presented in (193). In addition, we argue that, in our framework, transitive-inchoative alternation in LVCs can be explained parallel to that of simple verbs.

Though it is idealistic that we can describe both transitivization and intransitivization, it is beyond our scope for now. We will focus on the latter process, sharing the viewpoint with Kageyama (1993), Inoue (1976), Nishio (1954), Okutsu (1967) and others.

As preliminary consideration, we examine simple verbs at first. We categorize simple causative verbs into the following four categories, (194) to (197), depending on the head positions in their LCSs.

(194)   Causative verbs A

    a. *nage(ru)*: CAUSE ([$\underline{\text{ACT ON}}_{swingarm,etc}$ (x,y)]*, [MOVE TOWARD (y,z)]])
      投げる

    b. *hum(u)*: CAUSE ([$\underline{\text{ACT ON}}_{foot}$ (x,y)]*, [BECOME BE UNDER $(y, x's\ FOOT)$](*))
      踏む

(195)   Causative verbs B

    a. *kowas(u)*: CAUSE ([ACT ON (x,y)], [BECOME $(y,\ BROKEN)$]]*) 壊す

    b. *tubus(u)*: CAUSE ([ACT ON (x,y)], [BECOME $(y,\ FLAT)$]]*) 潰す

(196)   Causative verbs C

    a. *yabur(u)*: CAUSE ([ACT ON$_{tearingmanner}$ (x,y)]*, [BECOME $(y,\ TORN)$]]*) 破る

    b. *hasam(u)*: CAUSE ([ACT ON$_{twothings}$ (x,y)]*,
                   [BECOME BE BETWEEN $(y,\ TWO\ THINGS)$]]*) 挟む

(197) Causative verbs D

    a. *suter(u)*: CAUSE ([ACT ON (x, y)], [BECOME BE AT (y, z)]) 捨てる

    b. *age(ru)*: CAUSE ([ACT ON (x, y)], [MOVE UP TO (y, z)]) 上げる

Our mechanism of event headedness seems to explain the reason why causative verbs A are not intransitivized while causative verbs B are: (194) and (195) seem to indicates the generalization in (198).

(198) **Principle of Intransitivization (PI):** A causative verb is not intransitivized if its head is specified on the preliminary event; if head is specified only on the secondary event, the causative verb can be intransitivized.[31]

Intransitiviation in causative verbs C and causative verbs D seems to depend on each verbs. In order to give a full explanation, probably we must analyze the content of "head" more in detail. However, our analysis above seems to be enough in order to capture some common behavior between simple verbs and LVCs.

    To sum up, we reach the following result in (199).

(199) **Event head and intransitivization in simple verbs**

LCS	examples	intransitivization
A) CAUSE ([[ ]*, [ ]])	*nage(ru)* (throw)	no
B) CAUSE ([[ ], [ ]*])	*kowas(u)* (break)	ok
C) CAUSE ([[ ]*, [ ]*])	*yabur(u)* (tear) *oow(u)*	depends
D) CAUSE ([[ ], [ ]])	*suter(u)* (throw away), *age(ru)* (raise)	depends

Now we are ready to analyze LVCs. As we have four types of causative verbs, there are sixteen logically-possible combinations, all of which are presented in the following table, although there are some combinations whose real examples are hard to be found.[32]

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[31]Levin and Rappaport Hovav (1995) suggest similar idea as for simple verbs, though they do not use the notion of event headedness.

[32]We should examine this gap closely and consider the reasons, but I put it aside for future research.

(200) **Compositional event head and intransitivization in LVCs**

V1	V2	LVC	type	examples	intransitivization
A) [[ ]* [ ]]	A)[[ ]* [ ]]	[[ ]**[ ]]	A	*hoori-nage(ru)* 放り投げる	—
A) [[ ]*[ ]]	B) [[ ] [ ]*]	[[ ]*[ ]*]	C	*humi-katam(eru)* 踏み固める *nigiri-tubus(u)* 握り潰す	depends?
A) [[ ]*[ ]]	C) [[ ]* [ ]*]	[[ ]**[ ]*]	A	*?humi-tigir(u)* ?踏みちぎる	no?
A) [[ ]*[ ]]	D) [[ ] [ ]]	[[ ]*[ ]]	A	*nage-age(ru)* 投げ上げる *daki-age(ru)* 抱き上げる	no
B) [[ ] [ ]*]	A)[[ ]* [ ]]	[[ ]*[ ]*]	C	**ake-nage(ru)* *開け投げる	—
B) [[ ] [ ]*]	B)[[ ] [ ]*]	[[ ][ ]**]	B	*ori-mage(ru)* 折り曲げる *tumi-kasane(ru)* 積み重ねる	ok
B) [[ ] [ ]*]	C)[[ ]* [ ]*]	[[ ]*[ ]**]	B'	**kowasi-yabur(u)* *壊し破る **tubusi-tigir(u)* *潰しちぎる	X
B) [[ ] [ ]*]	D)[[ ] [ ]]	[[ ] [ ]*]	A	**kowasi-otos(u)* *壊し落とす	X
C) [[ ]* [ ]*]	A)[[ ]* [ ]]	[[ ]**[ ]*]	A	**yaburi-nage(ru)* *破り投げる	—
C) [[ ]* [ ]*]	B)[[ ] [ ]*]	[[ ]*[ ]**]	B'	*hasami-tubus(u)* 挟み潰す *yaburi-ake(ru)* 破り開ける	no?
C) [[ ]* [ ]*]	C)[[ ]* [ ]*]	[[ ]**[ ]**]	C	*tigiri-yabur(u)* ちぎり破る *hasami-tigir(u)* 挟みちぎる	??
C) [[ ]* [ ]*]	D)[[ ] [ ]]	[[ ]*[ ]*]	C	*tigiri-tor(u)* ちぎり取る *hagi-tor(u)* 剥ぎ取る	depends?
D) [[ ] [ ]]	A)[[ ]* [ ]]	[[ ]*[ ]]	A	*sute-nage(ru)* *捨て投げる	—
D) [[ ] [ ]]	B)[[ ] [ ]*]	[[ ][ ]*]	B	*?otosi-kowas(u)* ?落とし壊す	ok?
D) [[ ] [ ]]	C)[[ ]* [ ]*]	[[ ]*[ ]*]	C	**tori-tigir(u)* *取りちぎる	X
D) [[ ] [ ]]	D)[[ ] [ ]]	[[ ][ ]]	D	*tori-das(u)* 取り出す *tori-age(ru)* 取り上げる *ire-kae(ru)* 入れ替える	depends

"−":   Not intrantitivised because V2 is not intransitivised when alone.

"X":   There seem to be no LVCs of this type.

" B' ":   B' looks similar to B, in that the power of headedness of the secondary event is stronger than the primary event because the secondary event is doubly headed while the primary event is singly headed. However, it is different from B in that the primary event is assigned headedness, while that of B has no head.

Although we cannot make a definitive statement, from (200), it seems to be possible to give the following generalization.

(201)   **Principle of Intransitivization in LVCs (PIL):** A causative LVC is not intransitivized if its head is specified on the preliminary event and no head is specified on the secondary event; if head is specified only on the secondary event, the causative verb can be intransitivized.

In order to determine the validity of PIL, we should examine much more data, but at least at this point, it does not seem to be wrong to say the possibility of intransitivization of LVCs can be analyzed in parallel with simple verbs if we adopt LCS blending and compositional headedness.

Chapter 5   Summary, theoretical implication, and remaining problems

5.1   Summary

What we have argued in the present dissertation is summarized in the following claim.

(202)   Word formation of LVC is explicable by two processes: LCS blending in TS and the unification of V1's CONST value (LCS) and V2's TRIGGER value in NTS.

Our analysis has following advantages.

(203) a.   By dividing Qualia Structure into two semantic levels, TS and NTS, we can treat the phenomena in section 4.3 with no difficulty. In addition, we can analyze LVCs using more general semantic predicates; we need no semantic predicates such as FAIL-IN, WHILE, or FROM which require independent formal definitions. Moreover, we can analyze broader range of data more precisely than previous studies.

   b.   By utilizing the mechanism of LCS blending equipped with a compositional head-specifying device, it is no longer necessary to predetermine that V2 is head. As a result flexible explanation is possible as to argument inheritance on the basis of semantic synthesizing of two verbs' LCSs.

   c.   We can attribute *Transitivity Harmony Principle*, *Subject Identification Principle* in LCS, *Temporal Iconicity Condition*, and *Unique Path Constraint* to Principle of LCS blending (PLB), which brings theoretical simplification.

   d.   Cause-like construal in TRIGGER LVCs is attributted to V2's TRIGGER value; it is unnecessary to introduce CAUSE directly into LCS and we can describe them

with a ready-made system. Accordingly overgeneration is avoided and possible
verb combinations are predictable.

e. By taking advantage of NTS, which simple verbs generally have as well, and by
defining the relation between TS, NTS, and AS, we reduce Unaccusativity Priority
Principle (Yumoto 2005), a mopho-syntactic constraint, to semantic strucure, which
reihforces Yumoto's argument that LVCs are formed at semantic level.

5.2   Righthand Head Rule in LVCs

We have proposed two kinds of LVCs: LCS blending LVCs and TRIGGER LVCs. The
former is formed by blending LCSs of V1 and V2, which treats two verbs to be compounded
semantically equally in status: V1 is not semantically subordinated to V2.

The latter is formed by unifying V1's LCS, which is in TS, and V2's TRIGGER value
in NTS. In other words, V1's truth-conditional meaning is semantically demoted into non-
truth-conditional meaning in the formed LVC, which makes it impossible for V1's arguments
to be linked to the Argument Structure (AS). Therefore, *Righthand Head Rule* (RHR) applies
to TRIGGER LVCs both in semantics and in syntax.

On the other hand, in LCS blending LVCs, their semantic headedness is compositionally
decided and the compositional headedness determines the linking of semantic arguments to
AS. This means that RHR does not hold in LCS blending LVCs. This way of thinking gives
us an answer to the question of why RHR appears to hold in some LVCs while it does not
seem to apply to others.

One of the theoretical motivations of applying RHR to LVCs in previous studies seems
to lie in the fact that V1's arguments are not inherited when V2 is unaccusative like in
nomi-tukare(ru) (drink-get.tired) or *ni-kuzure(ru)*, which are classified as TRIGGER LVCs
in our analysis. In order to explain the fact that V1's arguments, not V2's, are inherited
in *ture-sar(u)* (accompany-leave) and *ture-aruk(u)* (accompany-walk), Yumoto (2005) argues
that V1's arguments, even if V1 is a modifier in the LVC's LCS, can be inherited when they
are not identified with V2's arguments. However, in addition to the problem of the linking to
AS from a semantic adjunct, this argument does not give any answer to why V1's arguemt
is not iherited as well in *nomi-tukare(ru)* and *ni-kuzure(ru)*. She attributes this phenomenon

to *Unaccusativity Priority Principle* (UPP), a morpho-syntactic principle.

In our mechanism, on the other hand, uninheritance of V1's arguments in TRIGGER LVC is explained by the semantic level where V1 is introduced, and the inheritance of V1's argument in *ture-aruk(u)* and *ture-sar(u)* is detemined by composisional headedness in LCS blending LVCs.

To sum up, there is no necessity of assuming morpho-syntactic RHR. We can flexibly deal with both cases on the basis of semantic structure: cases in which RHR holds and cases in which it does not holds. This implies that RHR and UPP are by-products in LVCs; they are secondarily derived from semantic structure. As a result, our argument shores up Yumoto's proposal that LVCs are formed by somehow synthesizing the semantic structures of V1 and V2.

5.3   Lexical or syntactic

We have argued that LVCs are formed on the basis of semantic structures of base verbs. This does not mean, however, that we are irreconcilable to syntactic analyses like Fujita and Matsumoto (2005) or Nishiyama and Ogawa (2010), which is equipped with relatively rich syntactic devices to describe verb meaning. The substantial value of theories must be empirically determined according to how well they can describe and predict linguistic phenomena like argument inheritance or the possibility of verb combination and the corresponding productivity.

On argument inheritance, our analysis offers a semantic base for syntactic analyses. If meaning of verbs has nothing to do with syntactic analysis of LVCs, the verb classification by Nishiyama and Ogawa (2010) itself would be arbitrary. The issue of which class (Root, Aux, Asp, or Voice in their term) a verb belongs to depends on the verb's semantics including aspectual properties, which is also describable in our semantic structures.

We seem to have an advantage in predicting the possibility of verb combination, the productivity of LVCs, and argument inheritance. Our LSR is equipped with the semantic description level NTS. This semantic level represents the information of TELIC and TRIGGER, and it also represents semantic headedness of verbs, all of which are not usually thought to be reflected in syntactic structure. We have shown such information plays a crucial role.

Therefore our system seems to make more fine-grained descriptions and predictions possible.

5.4   The status of TRIGGER LVCs

Summing up our argument very briefly, there exists two types of LVCs: LCS blending LVCs and TRIGGER LVCs. The former is formed in truth-conditional level as previous studies argues, though our concrete way of formation being different, and in the formation of the latter, non-truth-conditional semantic level joins as well. This non-truth-conditional level should belong to neither pragmatics nor "world knowledge." It belongs to lexical semantic level of verbs. By dealing with LVCs in lexical semantic level, we can achieve successful description and prediction including exceptional data for previous studies, avoiding the problem of overgenaration.

According to our analysis, the conclusion on the locus of LVC formation is that they are formed to the extent of non-truth-conditional lexical semantic level: TELIC and TRIGGER. As we can infer from the fact that previous studies focus on our LCS blending LVCs and they treat TRIGGER LVCs as almost exceptional ones, the typical level of LVC formation seems to be TS. If the formation is impossible in TS, NTS plays a crucial role. However, strict restrictions accompanies in the formation of TRIGGER LVCs because the information of selectional restriction is lexically specified in the TRIGGER quale of V2, which motivates relatively low productivity, while there is no need of subject identification nor semantic predicate sharing.

5.5   Remaining problems

5.5.1   Difficulty in analyzing

We have argued that our system of LVC formation can cope with wide variety of LVCs including exceptions for previous studies. However, there still remains LVCs which our system has difficulty giving a convincing analysis. In this subsection I introduce such examples and present a forecast at the present point.

The first examples are *saki-midare(ru)* (bloom-get.disordered) and *kaki-nagur(u)* (write-beat), which Matsumoto (1998) analyses as LVCs whose semantic head is V1. First, let us see the formation process of *saki-midare(ru)*

(204) a. *sak(u)*: [BECOME (*y, BLOOMED*)]* 咲く

b. *midare(ru)*: [BECOME (*y, DISORDERLY*)]* 乱れる

c. *saki-midare(ru)*: [BECOME (*y,* [*BLOOMED* ∧ *DISORDERLY*])]** 咲き乱れる

This is the same process in which other LCS-blending LVCs are formed, and there seems to be no problem. However, observing its behavior in negation, a problem arises.

(205) sakura-no-hana-ga   saki-midare-nak-atta
cherry-GEN-blossom-NOM bloom-get.disorderly-NEG-PAST
Cherry blossoms were not full bloomed.
桜の花が咲き乱れなかった。

The sentence in (205) is ambiguous between the following two interpretations.

(206) a. ?Cherry blossoms did not bloom.

b. Cherry blossoms opened up, but were not full bloomed.

It seems to me that the primary interpretation is (206b), which indicate that *saki-midare(ru)* is a TRIGGER LVC in our argument. However, the interpretation of (206a) is not impossible, either. One possible way of coping with this ambiguity might be attributable to the ambiguity of *sak(u)*. Flowers and blossoms seem to have the power of blooming in themselves. This can be attested by the following sentences.[1]

(207) a. sakura-no-hana-wa   hitorideni saku
cherry-GEN-blossom-TOP by.itself   bloom
Cherry blossoms come out by itself.
桜の花はひとりでに咲く。

---

[1]Some kinds of flowers are difficult to bloom by themselves. For example, in case of big chrysanthemums grown for ornamental purpose, it seems difficult to say ?**tairin-no kiku-no hana-ga hitoride-ni sai-ta* (A big chrysanthemum bloomed by itself). In addition it is also difficult to say *tairin-no kiku-ga niwazyuu-ni saki-midare-ta* (Big chrysanthemums bloomed all over the garden). This seems to imply that in order for flowers to *saki-midarer(u)*, they must bloom without people's care. In order to formalize this difference, we must describe the meaning difference of flowers, and establish a system that can compositionally calculate the meaning of sentences. However, since it is beyond our analysis for now, we tentatively analyze this phenomenon as ambiguity of *sak(u)*.

b.　sakura-no-hana-ga　　　zibun-kara saku

cherry-GEN-blossom-NOM self-from　bloom
Cherry blossoms come out by their own power.

桜の花は自分から咲く。

If *sakura-no-hana* (cherry blossoms) has its own power of blooming, it is possible for *sak(u)* to have the following LCS.[2]

(209)　*sak(u)*: CAUSE (*x*, [BECOME (*y*, *BLOOMED*)]*) 咲く

The LCS in (209) cannot blend with (204b) due to PLB: they do not share a semantic predicate at the event-starting point. The remaining way to form the LVC *saki-midare(ru)* is to make it as a TRIGGER LVC. This seems possible because the verb *midare(ru)* does not accept *hitorideni* as shown in (210).

(210) *mankaino　　　sakura-no-hana-ga　　　hitorideni midare-ta

full.bloomed cherry-GEN-blossom-NOM by.itself　bloom-PAST
Cherry blossoms got disordered by itself.

*桜の花がひとりでに乱れた。

cf. ?mankaino　　　sakura-no-hana-ga　　　kyoohuu-de　　midare-ta

full.bloomed cherry-GEN-blossom-NOM strong.wind-by bloom-PAST
Cherry blossoms got disordered by strong wind.

?満開の桜の花が強風で乱れた。

---

[2]It is not clear whether the semantic predicate ACT exists or not. As we can say the following sentences, it does not seem implausible to assume ACT in the LCS of *sak(u)*.

(208)　a.　sakura-no-hana-ga　　　genkini　sai-ta
　　　　　cherry-GEN-blossom-NOM cheerfully bloom-PAST
　　　　　The cherry blossoms bloomed cheerfully.
　　　　　桜の花が元気に咲いた。

　　　b.　?sakura-no-hana-ga　　　issyoukenmei sai-ta
　　　　　cherry-GEN-blossom-NOM hard　　　bloom-PAST
　　　　　The cherry blossomed bloomed very hard.
　　　　　?桜の花が一生懸命咲いた。

However, in (208a), *genkini* can modify the state after blooming as well as the process or action. (208b) is probably personification, but considering the fact that some verbs never accept personification like **gake-ga issyookenmei kuzureta* (The cliff collapsed very hard), it may not so strange to assume ACT in the cases of personification.

Therefore, we obtain the following LSR of *midare(ru).*

(211)
$$
\begin{bmatrix}
\textit{midare(ru)} \text{ (get.disorderly) } 乱れる \\
\begin{bmatrix}
\textit{QUALIA STRUCTURE} \\
\begin{bmatrix}
\textit{TS} \\
\text{FORMAL: transition} \\
\text{CONST: BECOME BE } (y, \textit{DISORDERLY})
\end{bmatrix} \\
\begin{bmatrix}
\textit{NTS} \\
\text{TRIGGER: + (EVENT } (y))
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

The '+' TRIGGER value is attested by (210), but what specific value is registered is not so clear. Therefore, we just tentatively assume that y must be involved in some event. If unification in TS is possible, we can get the following LSR of *saki-midare(ru).*

(212)
$$
\begin{bmatrix}
\textit{saki-midare(ru)} \text{ (bloom-get.disorderly) } 咲き乱れる \\
\begin{bmatrix}
\textit{QUALIA STRUCTURE} \\
\begin{bmatrix}
\textit{TS} \\
\text{FORMAL: transition} \\
\text{CONST: BECOME BE } (y, \textit{DISORDERLY})
\end{bmatrix} \\
\begin{bmatrix}
\textit{NTS} \\
\text{TRIGGER: CAUSE } (x, \text{[BECOME } (y, \textit{BLOOMED})]^*) \text{ 咲く}
\end{bmatrix}
\end{bmatrix}
\end{bmatrix}
$$

This LSR predicts the interpretation in (206b) because V1 is in NTS and it cannot join truth-conditional meaning of *saki-midare(ru).*

If this analysis is on the right track, it is predicted that LVCs consisting of two unaccusative verbs can be formed as either of our two kinds of LVC: LCS blending LVCs or TRIGGER LVCs. There seem to have been few studies which focus on LVCs consisting of two unaccusative verbs and analyze them closely. I put aside this issue for future research.

Next, let us move to *kaki-nagur(u). Kaki-nagur(u)* is formed by LCS blending because *kak(u)* and *nagur(u)* share the semantic predicate of event-starting point. The formation process of *kaki-nagur(u)* is presented in (213).

(213) a. *kak(u)*: CAUSE ([ACT (x)]*, [BECOME BE IN （z, *WORLD*)]) 書く

b. *nagur(u)*: [ACT ON (x, y)]* 殴る

c.   *kaki-nagur(u)*: CAUSE ([ACT (ON) $(x, (y))$]**, [BECOME BE IN $(z, WORLD)$)])
書き殴る

Kaki-nagur(u) is another counterexample to RHR because V2's argument cannot be realized. Since we do not really hit what we have wrote, we cannot but think that y in (213b) is deleted for some reason, or it cannot be linked to AS at all. But the latter idea seems implausible because y cannot be realized by any way; even as an adjunct. Then, probably y is completely deteted from the LCS and only the manner of *nagur(u)* (hit) remains. However, the reason why such deletion is possible is not clear.

Other LVCs which we have not analyzed are ones like *sikari-tuke(ru)* or *sizumari-kaer(u)*, in which V2 has lost its original meaning and functions a sort of aspect marker. It might be possibel to analyze them as syntactic compounds as Nishiyama and Ogawa (2010) and Ogawa and Niinuma (2010) argue. How much our analysis and theirs are compatible is not clear, however. This issue is also to be discussed in the future.

5.5.2   Relation to resultatives

In this subsection, comparing with English, we briefly think about the relation between Japanese resultative LVCs like *tataki-tubus(u)*, English resultative construction, and Japanese resultative construction, all of which are classified into so-called complex predicate.

First, we observe differences between English and Japanese resultative constructions. Considering what Kageyama (2005) argues in our framework, English allows resultatives which refer to not only propositional and non-propositional lexical meaning of verbs, but also pragmatic meaning or "world knowlege," like *The prince kissed the princess awake.* On the other hand, Japanese resultatives cannot refer to such pragmatic meaning or world knowledge.

(214)   **Propositional Resultative: Lexical**

a.   Ken broke the pot to pieces.

b.   Ken-wa   tubo-o   konagona-ni kowasi-ta
Ken-TOP pot-ACC pieces-to   break-PAST
Ken broke the pot to pieces.
健は壷を粉々に壊した。

(215)   **Non-propositional Resultative: Lexical**

    a.   Ken wiped the floor shiny clean.

    b. ?Ken-wa   yuka-o   pikapika-ni   hui-ta

        Ken–TOP floor-ACC shiny.clean-to wipe-PAST

        Ken wiped the floor shiny clean.

    ?健は床をピカピカに拭いた。

(216)   **Pragmatic Resultative: Non-lexical**

    a.   She scrubbed her foot smooth.

    b. *kanozyo-wa asi-o   subesube-ni kosut-ta

        she-TOP   feet-ACC smooth-to   scrub-PAST

        She scrubbed her feet smooth.

    *彼女は足をすべすべにこすった。

As (216) shows, English resultatives, following Kageyama's explanation, can refer to not only non-truth conditional lexical meaning as shown in (215a), but also inferential meaning.[3] Contrastively, Japanese resultatives can express only within the lexical meaning of verbs (as far as non-truth-conditional meaning, though acceptability seems to be slightly lower as shown in (215b)).

Japanese resultative LVCs which are classified as LCS-blending LVCs depict within the truth-conditional meaning of verbs by definition. They cannot be formed unless V2 has both ACT and CAUSE in their LCSs; if not, it violates PLB because the semantic predicate at the event-starting point cannot be shared. Let us see examples.

(217)   *osi-ake(ru)*

    a.   *os(u)*: ACT ON (x, y)

    b.   *ake(ru)*: CAUSE ([ACT ON (x, y)], [BECOME $(y, OPEN)$])

---

[3]In his term "TELIC" meaning: he uses the term TELIC to mean "the purpose of the verb," which is different from our definition. Our definition is stricter than his.

(218)   *osi-ak(u)

    a.   os(u): ACT ON (x, y)

    b.   ak(u): BECOME $(y, OPEN)$

Os(u) and ak(u) share no semantic predicate, so of course the semantic predicates of event starting point cannot be shared. Thereore, their LCSs cannot be blended to form an LCS blending LVC. The last resort is to form a TRIGGER LVC, but it also fails because the TELIC value of V1 os(u) is '$-$' and their subjects are not identified. As a result *osi-ak(u) is not qualified as an LVC.

    Mots(u) and atatame(ru) have the same semantic predicate CAUSE, but they cannot be compounded because their semantic predicates of event-starting point cannot be shared.

(219)   *moti-atatame(ru)

    a.   mot(u): CAUSE $(x, [$BE WITH $(y, x)])$

    b.   atatame(ru): CAUSE $([$ACT ON $(x, y)], [$BECOME $(y, OPEN)])$

That is, "LCS blending resultative LVCs" are possible only in the following combination.

(220) a.   V1: ACT ON (x, y)

    b.   V2: CAUSE($[$ACT ON$(x, y)], [$BECOME $(y, CONSTANT)])$

    The situation is different in TRIGGER LVCs. As we have argued, a TRIGGER LVC is possible if V2's TRIGGER value is compatible with V1's CONST value (LCS) when their subjects are identified (ex. nomi-tukare(ru) (drink-get.tired), ki-bukure(ru) (wear-swell)), and when their subjects are not identified, V1's TELIC value must be $+$ or ϕ in addition (ex. ki-kuzure(ru) or arai-oti(ru)). In other words, in TRIGGER LVCs, V2's NTS, though showing relatively strict selectional restrictions, fills the missing link of causative-like relation between the two verbs to be combined.

    To sum up, we obtain the following table.

(221) **The coverage of resultative expression**

	Truth-conditional Meaning (lexical)	Non-truth-conditional Meaning (lexical)	Pragmatic/World Knowledge Meaning (non-lexical)
E. Resultative	**ok** (*break – to pieces*) (*wash – clean*)	**ok** (*wipe – shiny clean*)	**ok?** (*?bark – awake*) (*push – open*)
J. Resultative	**ok** (*konagona-ni kudak(u)*) (*akaku-nur(u)*)	**ok?** (*?pikapika-ni huk(u)*) (*yawarakaku ni(ru)*)	**no** (**konagona-ni tatak(u)*) (**yawarakaku tatak(u)*)
J. LCS.B.LVC	**ok** (*osi-ake(ru)*) (*ori-mage(ru)*)	– – –	**no** (**hoe-okos(u)*) –
J.TRIG. LVC	– –	**ok** (restricted) (*arai-oti(ru)*)	**no** (**osi-ak(u)*)

Comparing resultatives between English and Japanese, as we saw above, English resultatives can depict non-truth-conditional lexical meaning with no difficulty, while Japanese resultatives have a little difficulty depicting such meaning, although not impossible. In addition, it is impossible for Japanese resultatives to depict non-lexical meaning, while English can, although depending on cases.

Japanese resulative LVCs show almost the same tendency to resultatives: they can depict non-truth-conditional lexical meaning, though there are restrictions, and they cannot depict non-lexical meaning. However, there seems to be an important difference between Japanese resulatives and resultative LVCs as (222) shows.

(222) a. ?Ken-wa yuka-o pikapika-ni hui-ta
　　　　 Ken-TOP floor-TOP shiny.clean-to wipe-PAST
　　　　 Ken wiped the floor shiny clean.
　　　　?健は床をピカピカに拭いた。

　　 b. *yuka-ga huki-hikat-ta
　　　　 floor-NOM wipe-shine-PAST
　　　　 The floor shone by wiping.
　　　　*床が拭き光った。

The resultative sentence in (222a) is acceptable, while the corresponding LVC **huki-hikar(u)* in (222b) is not accepatable at all. This indicates that there are stricter restrictions in LVCs than in resultatives sentences. In addition, in our mechanism, (222b) should be accepted as a TRIGGER LVC because V1's TELIC value and V2's TRIGGER value are both '+,' which is attested by the following sentences.

(223) a. ?Ken-wa   sono-yuka-o   10-pun-de   hui-ta   [TELIC: +]

   Ken-TOP the-floor-TOP ten-minute-in wipe-PAST
   Ken wiped the floor in ten minutes.

  ?健はその床を10分で拭いた。

  b. *yuka-ga   hitorideni hikat-ta   [TRIGGER: +]

   floor-NOM by.self   shine-PAST
   The floor shone by itself.

  *床がひとりでに光った。

Even if V1 is changed to *migak(u)*, which is more likely to imply some resultative state, the acceptability is not improved.

(224) a. ?Ken-wa   yuka-o   pikapika-ni   migai-ta

   Ken-TOP floor-TOP shiny.clean-to wipe-PAST
   Ken polished the floor shiny clean.

  健は床をピカピカに磨いた。

  b.?*yuka-ga   migaki-hikat-ta

   floor-NOM wipe-shine-PAST
   The floor shone by wiping.

  ?*床が磨き光った。

I do not have any reasonable idea to explain this difference between the sentences in (222), and unacceptability in (222b) and (224b). Perhaps a more precise definition should be necessary: even if the verb cannot occur with *hitorideni* or *mizukara*, it might not be enough. Comparing with V2s in acceptable examples like *ni-kuzure(ru)* or *huki-oti(ru)*, *yuka* (floor) does not have any piece of nature to shine by itself. Contrastively, even if they do not crumble and move

away totally by themselves, *sakana* (fish) can crumble and *yogore* (stein) can be moved away if given some action initiating their change of state. TRIGGER LVCs might be affected such a delicate difference, which is also for future research.

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