Argument Realization and Alternations:
A Theoretical Investigation on the Syntax-Lexical Semantics Interface

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Kazuya Kudo

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Abstract

In order to formalize certain relationships between syntax and the lexicon, the necessity is found for the existence of general linking rules to capture a systematic correspondence between the meaning and form of lexical items. In this dissertation, I develop a generative model of the lexicon in terms of qualia structure of predicates in order to investigate interface conditions between syntax and lexical semantics. In particular, I demonstrate that lexical constraints such as event-headedness not only provide a fundamental framework to understand how our lexical knowledge of predicates is organized in the lexicon, but also establish a mechanism of argument linking that determines the mapping patterns of semantic arguments from qualia structure to their appropriate syntactic positions. In doing so, I claim that any lexical theory that is notionally dependent on naive theta-role labels of arguments should be demolished, but the relativized hierarchy based on cognitive prominence of arguments needs to be taken into account for the study of argument realization. I also argue that in a generative model of the lexicon, instead of simple expansion or augmentation of lexical semantic representations, argument alternations should be captured by alternate modes of argument realization and generative devices to affect those patterns. The findings in this inquiry eminently illustrate that the lexical semantic knowledge of the speaker that is acquired based on his own linguistic experience must be richer and more complex than the syntactic knowledge that is considered to be innate in a language faculty, and that the correspondence between these two components, therefore, naturally has a form of an optimal "approximation" from the former to the latter.

要旨

統語部門と語彙部門との一定の関係を形式化する研究において、語彙項目の意味と形式の対応関係を記述する一般連結規則の存在が不可欠となっている。本論文は、統語論と語彙意味論との接点を考察するため、クオリア構造を用いて述語の生成的なレキシコンの原型を示すことを試みた。特に、事象の主辞性などの語彙的な制約が、我々の語彙的な知識が語彙部門でどのように組織化されているのかを理解するための基本的な枠組みを提供するだけでなく、述語が持つ意味項を適切な統語位置に写像するための連結の仕組みを確立するものであることを議論した。その過程で、項の単純な意味役割に依拠したいかなる言語理論も放棄されるべきであり、代わりに認知的な卓立性に基づく相対的な項の階層関係こそが、項の具現化に関する理論的考察に取り入れられるべきであることを示した。また、生成的なレキシコンの研究においては、項の具現化の交替は、語彙意味表示の単純な拡張あるいは増設によって捉えられるべきものではなく、語彙意味表示から統語構造への連結様式の変化によって捉えられるべきであり、そのような変化をもたらす生成的な方策こそが正しく記述されるべきであると主張した。本研究で得られる知見は、話者の経験によって後天的に獲得される語彙部門が、言語能力によって生得的に与えられる統語部門よりもより豊かで複雑であることを示唆しており、したがって、両者の対応関係は前者から後者への最適な接近として形式化されるものであることを端的に表している。

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Contents

Chapter 1: Introduction

This chapter aims to raise issues that will be dealt with in this thesis. In particular, I investigate one influential view as to the architecture of grammar in order to illuminate the discussion concerning the argument realization in syntax. The primary concern on this topic will be the status of the interface between syntax and semantics of particular lexical items. To this end, I introduce a generative approach to the semantic description of language which tries to capture the problem of lexical polysemy in terms of richer semantic blending and fewer redundancies.

1.1. Parallel Architecture of Grammar

It is no doubt that a central concern for any model of generative study is the relation among components of grammar. The most classical view in generative grammar partitioned grammatical knowledge into three basic components: the lexicon, phrase structure rules and transformational rules (Chomsky 1965). The focus of the study in those days was clearly on the mystery of phrase structure rules and the secrets of transformational rules, while the lexicon was though as being outside of those *syntactic* components (Chomsky 1970). Since then, accompanied by many fundamental debates (e.g., Chomsky 1972, 1975, 1981, 1993), the theoretical framework of generative grammar has been repeatedly reformed with new proposals and modifications. Yet, there seems to be still no consensus about the division of labor between processes in the lexicon and those in syntax. One of the reasons for this situation may be that most researchers devote their energies to consider primitives and constraints in syntax, but very few spend themselves in revealing how the lexical knowledge affects them. In fact, the trickiest question facing those who research at the interface between syntax and the lexicon is to answer where one component ends and another component begins (cf. Jackendoff 1997, Culicover and Jackendoff 2005). Although the entire discussion on this topic is far beyond the scope of this present thesis, it should be useful to present one promising view for the architecture of grammar, before we start our investigation into the interface between syntax and the lexicon.

The division of grammatical components is particularly important in the recent inquiry to understand the nature of language. In the generative research, for example, it is usually assumed that there are five basic components that organize what we naively call "grammar": the lexicon, syntax, phonology, morphology and semantics. Among those components, the lexicon is thought as an autonomous component that provides a complex of idiosyncratic sounds and meanings of lexical items. Items in the lexicon are assumed to *project* in syntax, building up a sentence in accordance with certain syntactic principles. Therefore, it must be the case that there is some interface between syntax and the lexicon in this model of the grammar. The sentence composed in syntax will then be *spelled-out* by a sequence of phonemes. In this view, there must also be an interface between syntax and phonology, since phonology is also a highly autonomous component in that it rarely affects the organization of other components.[1]

The place of morphology in a model of the grammar varies from researcher to researcher. Some argue that morphology is essentially a subcomponent of other modules, such as the lexicon (Lieber 1980, Selkirk 1982) and phonology (Sproat 1985), but others claim that it is an autonomous component to connect with other modules by means of richer interfaces (Beard 1988, Zwicky 1990). Anderson (1982) regards morphology as split between the lexicon (i.e., derivational morphology) and the phonology (i.e., inflectional morphology), with the syntax intervening between the two. Conversely, Di Sciullo and Williams (1987) draws a clear-cut distinction between syntax and morphology, claiming that these components are entirely separate domains of inquiry. For them, lexicalism is not merely a hypothesis about the way language might be organized, but it is the only logically possible way in which language *could* be organized.

Still other facilities of the brain are claimed to be crucial for various linguistic phenomena. For example, it has been argued that cognitive faculty is essential to the interpretation of spatial structure (Jackendoff 1983), which is now assumed to be a fundamental to conceptualization of the outer world. Cognition, in general, enables us to perceive an entity and an event in the world, which directly reflects in actual linguistic expressions (Langacker 1990). To put it strongly, any grammatical structure cannot be

understood or revealingly described independently of semantic considerations. Of course, it is not a specific process to language, but must be relevant to it by providing us with a symbolic relationship for conceptual configurations (see section 2.2.3).

To limit our interest on the interface between syntax and the lexicon, it has been traditionally assumed, under the name of "Lexicalist Hypothesis" (Chomsky 1970), that syntax and the lexicon are separate grammatical components, where the lexical information is *inserted* into the syntactic structure. In this view, any syntactic operation is impenetrable to internal information of the lexicon, and vice versa. Previous studies that reach a conclusion on this line are too numerous to mention, though there are some researchers who claim that the lexicon can be eliminated as a module with its own special primitives and modes of combination (Hale and Keyser 1993, Ramchand 2008). Despite those counterarguments, it has been often suggested that word formation in the syntax is different in many respects from that in the lexicon (cf. Shibatani and Kageyama 1988, Borer 1988). Furthermore, Jackendoff (1983, 1990b, 1997, 2002) consistently proposes that syntactic structure (i.e., syntax) and conceptual structure (i.e., semantics) are different levels in the grammar, since principles, representations, and well-formed conditions for these domains should be independent. According to him, "subject" and "object" are syntactic notions that are defined in the syntactic structure, while "Agent" and "Theme" are semantic notions, defined in the conceptual structure. These two notions are connected with each other by "correspondence rules", thanks to a natural homo-morphic relationship between the two representations. Perhaps, the spirit behind this idea is consistent with the recent conjecture in the Minimalist Program (Chomsky 1995).

Here, a question arises as to the nature of interface conditions. Specifically, more interesting and more important question (at least for me) than the organization of grammar is (i) how components of grammar are related to each other, and (ii) what constraints are imposed on those interface conditions. These particular questions have been overlooked and unanswered for a long time in the history of linguistics. The focus of this thesis will be exactly on this point, making a preliminary step to the study of the interface between syntax and the lexicon.

Jackendoff (1997) explicitly argues that syntactic structure and conceptual structure (of a sentence) are built up in a *parallel* manner. Thus, lexical items are combined in the syntax with their semantics being elaborated in accordance with the Fregean principle of compositionality. Following this idea, it is this system that I will refer to "correspondence" or "interface" in this thesis. In particular, I will assume that a syntactic unit becomes larger along with its semantic content, although principles and constraints for these two domains still differ. Then, the fundamental task for us to consider is how we formalize the correspondence between these two levels of representations. To be specific, the goal of this thesis can be to study a systematic connection between syntax and lexical semantics in terms of an extensive and comprehensive way of linking between the two. In doing so, I will accept a tacit assumption that semantic representations are much richer and more complex than syntactic representations (cf. Dowty 1991, Baker 1997). It is so presumably because semantic structure must be a direct reflection of our cognitive faculty that connects many abilities of human beings, whereas syntactic structure is assumed to be innate and specialized only in language. In other words, every recognition of an entity or an event, whether conscious or not, should be first interpreted in terms of conceptual notions, and then will be represented in a syntactic frame in order to be expressed verbally (Pinker 1989). Therefore, the correspondence between the two representations must look like an "approximation" of a semantic structure, which is *flexible* (i.e., less constrained), to a syntactic structure, which is *fixed* (i.e., highly constrained).

One more remark as for the domain of the study is necessary. In the generative research of the grammar, there is a well-motivated distinction between "competence" and "performance" (Chomsky 1965). Roughly speaking, competence is speaker-hearer's knowledge of their language, while performance is actual use of the language in concrete situations. Most generative studies have been done under the strict convention that a linguistic theory should face the competence of the grammar in an explicitly mentalistic framework. Those studies tend to avoid analyzing any pragmatic factors in a sentence, including memory limitations, attention and processing, since this attitude can be reasonable for those linguists who attempt to reveal a universal system of the

grammar independently of the physical world. However, it is fairly clear that our knowledge of language includes not only syntax but also other components. Furthermore, it now seems unquestionable that the encyclopedic knowledge of the speaker and particular pragmatic contexts may affect actual linguistic expressions and their semantic interpretation. Therefore, we still need to keep in mind, especially in the study of interface conditions, what factors, which are associated with performance, are involved in the determination of syntactic configurations of lexical items. This point will be crucial in chapter 4, in terms of the selection of appropriate mappings of grammatical arguments.

1.2. Verb Classes and Argument Alternations

At the interface between syntax and the lexicon, one of the most widely debated topics in modern linguistics is the relationship between verbs and their arguments. Many theories of generative grammar have been built on the assumption that the manner of syntactic realization of arguments is predictable from the meaning of their predicates. In fact, it is generally accepted that the morphosyntactic behavior (or "linking") of arguments is motivated by the meaning of verbs that fall into some sets of identifiable semantic classes (Levin 1993).

For example, the verbs *cut*, *break*, *touch* and *hit* are all transitive verbs, taking two arguments expressed as the subject and the object, as in (1.1).

(1.1) a. Margaret cut the bread.
b. Janet broke the vase.
c. Terry touched the cat.
d. Carla hit the door. (Levin 1993: 6)

However, they have little else in common in their syntactic behaviors. First, only *break* can be found in the inchoative construction (Fillmore 1967, Guerssel et al. 1985, Hale and Keyser 1986).

(1.2) a. * The bread cut.
b. The vase broke.
c. * The cat touched.
d. * The door hit. (Levin 1993: 9)

Second, *break* and *cut* appear in the middle construction, but *touch* and *hit* do not (Keyser and Roeper 1984, Hale and Keyser 1987, Zubizarreta 1987).

(1.3) a. The bread cuts easily.
b. Crystal vases break easily.
c. * Cats touch easily.
d. * Door frames hit easily. (Levin 1993: 6)

Third, *cut* and *hit*, but not *break* and *touch*, are found in the conative construction (Guerssel et al. 1985).

(1.4) a. Margaret cut at the bread.
b. * Janet broke at the vase.
c. * Terry touches at the cat.
d. Carla hit at the door. (Levin 1993: 6)

Finally, the body-part possessor ascension construction also distinguishes *break* from the other three.

(1.5) a. Margaret cut Bill on the arm. (cf. Margaret cut Bill's arm.)
b. * Janet broke Bill on the finger. (cf. Janet broke Bill's finger.)
c. Terry touched Bill on the shoulder. (cf. Terry touched Bill's shoulder.)
d. Carla hit Bill on the back. (cf. Carla hit Bill's back.)
(Levin 1993: 7)

Therefore, we obtain four different patterns of verbal behavior here. Each verb shows a distinct pattern of behavior with respect to these constructions.

The four patterns of behavior are linked to distinct semantic classes of these verbs. Importantly, other verbs corresponding to each class show the same pattern of behavior.

(1.6) a. Cut Verbs: cut, hack, saw, scratch, slash, ...
b. Break Verbs: break, crack, rip, shatter, snap, ...
c. Touch Verbs: pat, stroke, tickle, touch, ...
d. Hit Verbs: bash, hit, kick, pound, tap, whack, ... (Levin 1993: 7)

It has thus long been argued that verbs that have a similar meaning behave similarly in the syntax. In the recent lexical semantic research, the factor which decides the syntactic behavior of verb arguments is certified as verb meaning itself, and the way of syntactic realization of verb arguments must be felicitously predictable, in large part, from the lexical semantic representation of their verbs. In other words, members of each verb class share certain aspects of meaning as well as syntactic properties.

One important task for the interface conditions, therefore, is to reveal what factors that verbs have in common is relevant to their linguistic explanations. There must be some "primitive" semantic factors that affect those patterns of argument realization. Another important task is to clarify how those factors reflect actual linguistic expressions. In other words, a systematic way of reflecting the semantic differences among verbs in their syntactic differences needs to be explained. Previous studies, under any theory of the lexicon, have some difficulties when a single verb appears in some different syntactic frames (or "constructions"), because, for them, the different syntactic realization of verb arguments reflects in some ways different patterns of linking processes of the lexicon. The present thesis will attempt to discuss general ways of argument realization from a viewpoint of a particular lexical semantic theory called "Generative Lexicon" (Pustejovsky 1995), where argument realization is essentially treated as a problem of verbal polysemy.

The puzzle here is saddled with two major questions: (i) how arguments of

predicates are realized to their appropriate syntactic positions, and (ii) how the manner of argument realization is influenced when a predicate occurs in different syntactic frames. The first question can be restated as what types of lexical information in predicates are relevant for the mapping of their arguments, while the second question constitutes the so-called "linking problem", where some factors in the grammar make grammatical arguments of a predicate realize in different sentence patterns that are related semantically by paraphrases or subsumption.

The linking problem is grasped easily in a set of phenomena called "argument alternations". Levin (1993) lists cases of argument alternations in English almost exhaustively. Perhaps, the most previously-debated examples of argument alternations are causative transitive alternations, such as the causative/inchoative alternation in (1.7) and the induced action alternation in (1.8).

(1.7) *Causative/Inchoative Alternation*

a. Janet broke the cup.

b. The cup broke. (Levin 1993: 29)

(1.8) *Induced Action Alternation*

a. The horse jumped over the fence.

b. Sylvia jumped the horse over the fence. (Levin 1993: 31)

At first blush, these alternations share certain syntactic configurations. In fact, transitive variants of both alternations have a common semantic feature in that they express some kinds of causative events. However, their intransitive variants contrast strikingly. In intransitive variants of the causative/inchoative alternation, the subject is the entity that undergoes a change of state or location. On the other hand, the subject in intransitive variants of the induced action alternation is a causee that is induced to act by the causer. This semantic difference implies that the mechanisms for the two argument alternations sharply differ. I will discuss the mechanism of argument realization in the causative/inchoative alternation in section 3.2 and that in the induced action alternation in section 6.1.3.

The next large set of argument alternations is VP-internal argument alternations, where the syntactic realization of two internal arguments of three-place verbs alternates. The most typical examples of this type of alternations are the locative alternation in (1.9) and the dative alternation in (1.10).

(1.9) *Locative Alternation*

a. Jack sprayed paint on the wall.

b. Jack sprayed the wall with paint. (Levin 1993: 51)

(1.10) *Dative Alternation*

a. Bill sold a car to Tom.

b. Bill sold Tom a car. (Levin 1993: 46)

In these alternations, the possible expressions of two internal arguments are involved. Specifically, one of the internal arguments is expressed as the direct object of the verb, while the other as the object of an appropriate preposition or as the indirect object. The locative alternation and the dative alternation have been both extensively studied in the literature, but much of the previous discussions have only focused on the constraints on the alternations, including a characterization of verbs that take part in these alternations. Crucially, the exact semantic characterization pertaining to these alternations has been overlooked. In chapter 4, I will extensively study the mechanism of alternative modes of argument realization that aptly captures the semantics of these alternations.

Importantly, by means of our linking strategy that accounts for VP-internal argument alternations, the benefactive alternation in (1.11) can be treated as an extensive version of the dative alternation.

(1.11) *Benefactive Alternation*

a. Martha carved a toy for the baby.

b. Martha carved the baby a toy. (Levin 1993: 49)

The benefactive alternation is different from the dative alternation in that it involves the

benefactive preposition *for* rather than the goal preposition *to* in the prepositional variant in (1.11a). This difference essentially comes from the fact that while verbs that participate in the dative alternation are most typically exemplified by three-place verbs, verbs that appear in the benefactive alternation are two-place verbs with the beneficiary argument added as an adjunct phrase. Despite these differences, I will argue in section 4.3 that the mechanism of deriving double object variants of the benefactive alternation in (1.11b) is just the same as that of deriving double object variants of the dative alternation in (1.10b).[2]

Three are still other types of argument alternations in English. For example, some argument alternations in English make significant semantic changes between variants. In this sense, the middle alternation in (1.12) and the characteristic property of agent alternation in (1.13) constitute a natural class.

(1.12) *Middle Alternation*

a. The butcher cuts the meat.

b. The meat cuts easily. (Levin 1993: 26)

(1.13) *Characteristic Property of Agent Alternation*

a. That dog bites people.

b. That dog bites. (Levin 1993: 39)

These alternations are seemingly similar to the causative transitive alternations in (1.7) and (1.8), but are indeed different from them in that there is a significant semantic change through the alternations. Specifically, transitive variants of these alternations can be *eventive*, giving a picture of a specific event that is taken place at a given time and place, while their intransitive variants must be *stative*, describing a characteristic property of the subject. Following Carlson's (1977) term, the former clearly shows a property of "stage-level" predication, while the latter, a property of "individual-level" predication. The secret of eventuality alternation of this sort needs to be revealed along with the proper treatment of argument realization in these alternations. I will tackle this issue in section 6.1.1 in terms of a particular lexical rule on semantic arguments of

causative transitive verbs.

Adjunct arguments also participate in argument alternations, as exemplified by the instrument subject alternation in (1.14) and the raw material subject alternation in (1.15).

(1.14) *Instrument Subject Alternation*

a. David broke the window with the hammer.

b. The hammer broke the window. (Levin 1993: 80)

(1.15) *Raw Material Subject Alternation*

a. She baked wonderful bread from that whole wheat flour.

b. That whole wheat flour bakes wonderful bread. (Levin 1993: 82)

These oblique subject alternations are very pervasive in the context of argument alternations, yet receive surprisingly few comments in previous studies. In these alternations, entities such as instrument and material are realized as the subject with the absence of the agent argument. Interestingly, these subjects can be considered as a cause of the event in a broad sense. I will take up these alternations in section 6.1.2 with special reference to a lexical rule that induces demotion of agent arguments.

The next three oblique subject alternations are semantically more remarkable.

(1.16) *Characteristic Property of Instrument Alternation*

a. I cut the bread with this knife.

b. This knife doesn't cut. (Levin 1993: 39)

(1.17) *Location Subject Alternation*

a. We sleep five people in each room.

b. Each room sleeps five people. (Levin 1993: 82)

(1.18) *Sum of Money Subject Alternation*

a. I bought a ticket for $5.

b. $5 will buy a ticket. (Levin 1993: 83)

As well as the middle construction in (1.12b), (b)-sentences of these alternations are all instances of individual-level predication, where the sentence describes the capacity of the subject with respect to the action named by the verb. However, the subject is not a true argument of the verb but an adjunct in the original (a)-sentences. The exceptional mechanism for these argument alternations will be discussed in section 6.2.2 in terms of the lexical semantic representation of the subject NP.

The so-called possessor alternations also constitute a theoretically important set of argument alternations.

(1.19) *Body-Part Possessor Ascension Alternation*

a. Selina touched the horse's back.

b. Selina touched the horse on the back. (Levin 1993: 71)

(1.20) *Possessor-Attribute Factoring Alternation*

a. They praised the volunteer's dedication.

b. They praised the volunteers for their dedication. (Levin 1993: 73)

In these alternations, what is composed of a NP argument in (a)-sentences can be realized separately as a combination of a NP argument and a PP adjunct in (b)-sentences. Thus, the verbal valency seems to be changed through the alternations. This way of argument realization is, in fact, widely distributed among languages. Therefore, there must be some general mechanism in the interface condition that makes it possible to give rise to these argument alternations. I will propose a specific lexical rule in section 6.2.1 that not only explains these alternations but also applies to the general distribution of syntactic adjuncts.

The final group of argument alternations that will be discussed in this thesis involves an addition of semantic arguments that are not subcategorized by the verb.

(1.21) *Cognate Object Alternation*

a. Sarah smiled.

b. Sarah smiled a charming smile. (Levin 1993: 95)

(1.22) *X's Way Alternation*

a. They shopped around New York.

b. They shopped their way around New York. (Levin 1993: 99)

(1.23) *Resultative Alternation*

a. Pauline hammered the metal.

b. Pauline hammered the metal flat. (Levin 1993: 100)

In the (b)-sentences of (1.21) and (1.22), a certain fixed expression is allowed to appear as the direct object of the verb that is originally used as unergatives. In (1.23), the final state of the action can be added as a resultative AP. Verbs that appear in the "strong" resultative construction are also unergatives that do not lexically specify a result state of the action (Washio 1997).[3] These alternations will be discussed in section 6.2.3 from the viewpoint of compositionality of semantic components.

In this thesis, a unified strategy of argument linking from the lexicon to syntax will be presented to explain these alternations. Although the explanatory adequacy of my proposal is far from being sufficient, the primary purpose of this thesis is to reveal the patterns of argument realization in terms of proper lexical semantic representations in a rough-and-ready way, and to clarify practical mechanisms that affect the patterns of surface argument realization. For that purpose, we first need to begin by certifying the necessity of a generative model of the lexicon.

1.3. A Generative Model of the Lexicon

As reviewed in the previous sections, it is now standardly assumed by most linguistic frameworks that much of structural information of a sentence is best encoded from a lexicalized perspective. Hence, there must be a well-designed model of the lexicon that is bearable to argument alternations discussed above. The most conventional approaches to the lexicon design are to exhaust the list of lexical items to the extent that each item does not show semantic ambiguity any longer (Jackendoff 1975). This strategy, called "sense enumeration lexicon", appears, at first sight, to be successful in handling the sense differentiation of ambiguity. In fact, many syntactic

studies that do not feel involved in lexical models tacitly assume that there are as many lexical entries of a predicate as the syntactic structures that the item appears in. A seminal research by Jackendoff (1990b) is a typical example of this approach.

However, Pustejovsky (1995) argues that there are three basic characteristics of semantic description of language, and none of them could be adequately accounted for in the sense enumerative models of the lexicon.

(1.24) a. The creative use of words: Words assume new senses in novel contexts.
b. The permeability of word senses: Word senses are not atomic definition but overlap and make reference to other senses of the word.
c. The expression of multiple syntactic forms: A single word sense can have multiple syntactic realization. (Pustejovsky 1995: 39)

It is important that a theory of lexical meaning of words will affect the general structure of semantic theory in several ways, and it is necessary that our view of lexical semantics can actually force us to reevaluate the nature of semantic composition in language.

The first argument against the sense enumerative models of the lexicon concerns the creative use of words in (1.24a). It is certainly true that many words in a language have more than one lexical meaning to show what is called "lexical polysemy", but the ways in which words carry multiple meanings must vary from items to items. Weinreich (1964), for example, distinguishes semantic ambiguity of words into two types. The first type, which he calls "contrastive ambiguity", is seen where a lexical item accidentally carries two distinct and unrelated meanings of words.

(1.25) a. Mary walked along the <u>bank</u> of the river.
b. Harbor Bank is the richest <u>bank</u> in the city. (Pustejovsky 1995: 27)
(1.26) a. The judge asked the defendant to approach the <u>bar</u>.
b. The defendant was in the pub at the <u>bar</u>. (Pustejovsky 1995: 27)

In these examples, the pair of underlined words shows the so-called "homonymy". It is

therefore irrelevant for the purpose of construction of the lexicon and the synchronic study of word meanings whether these senses of words are historically related or mere accidents of orthographic and phonological blending. The disambiguation processes of this sort of items are in large part pragmatically constrained (cf. Hirst 1987).

The second type of semantic ambiguity, which Weinreich (1964) refers to as "complementary polysemies", involves lexical senses which are manifestations of the same basic meaning of the word as it occurs in different contexts.

(1.27) a. The bank raised its interest rates yesterday.
b. The store is next to the newly constructed bank. (Pustejovsky 1995: 28)

(1.28) a. John crawled through the window.
b. The window is closed. (Pustejovsky 1995: 28)

In (1.27) the word for *bank* can refer to both an institution and a building, and in (1.28) the word for *window* can refer to both an aperture and a physical object. This sort of category preserving ambiguities is especially called "logical polysemy", in order to distinguish them from category changing complementary polysemy, such as the case in which words like *hammer* can be used both as a noun (e.g. *John used the hammer to hit the window*) and as a verb (e.g. *John hammered the window*).

It is now obvious that sense enumerative models cannot assign a correct semantic interpretation to the second type of sense ambiguity, since, unlike contrastive ambiguity, complementary polysemy seems to entail a very different type of relation between word senses. For example, we can straightforwardly represent two contrastive senses of the word *bank* in (1.25), using its fundamental category type and a basic specification of a genus term, as in (1.29) and (1.30) below.

(1.29) $bank_1$
CATEGORY = count_noun
GENUS = shore

(1.30) $bank_2$

CATEGORY = count_noun

GENUS = financial_institute

However, it is absurdly incorrect to apply the same method to complementary polysemy, since two senses of *bank* in (1.27) is clearly a subtype of the main meaning of *bank* in (1.30).

The creativity of word sense can also be seen in the ambiguity of the adjective *good* in (1.31) and the verb *want* in (1.32).

(1.31) a. Mary finally bought a good umbrella.

b. After two weeks on the road, John was looking for a good meal.

c. John is a good teacher. (Pustejovsky 1995: 43)

(1.32) a. Mary wants another cigarette.

b. Bill wants a beer.

c. Mary wants a job. (Pustejovsky 1995: 45)

Each use of *good* in (1.31) refers to a different property of the complement noun, such as function (of the umbrella), taste (of the meal) and performance (of the teacher). Also, there are many ways to want something, including to want to smoke (a cigarette), to want to drink (a beer) and to want to have (a job). Obviously, these sense distinctions should be determined compositionally with their complements. Thus, enumeration is unable to exhaustively list the senses that these items will assume in new contexts. In short, the difficulty for sense enumerative models of the lexicon is that they cannot characterize all the possible meanings of lexical items in the lexicon.

A similar criticism to the sense enumeration lexicon will be made with respect to permeability of word senses, concerning (1.24b). The problem here is that there is too much overlap in the core semantics of the different readings of words, and it is not always obvious how to select the correct word sense in a given context. Consider, for example, the semantic difference of the verbs *bake* and *fry* in the following sentences

(Atkins et al. 1988).

(1.33) a. John baked the potatoes.
b. John baked a cake.

(1.34) a. Mary fried an omelet.
b. Mary fried an egg.

There is discrimination between change-of-state and creation senses of these verbs, yet there is no difference in the activity responsible for the result of the event. Therefore, it is difficult to define two senses of these verbs in terms of different lexical semantic representations while avoiding possible lexical redundancies.

The same situation holds for the complementary polysemy for the word *window* discussed above. Recall that the noun *window* in (1.28) shows an ambiguity denoting an aperture or a physical object. It is now clear that we cannot simply list these pairs of senses by distinct lexical items as below.

(1.35) $window_1$
CATEGORY = count_noun
GENUS = aperture

(1.36) $window_2$
CATEGORY = count_noun
GENUS = physical_object

The problem with this approach is that the logical relation that exists between the things in the world is not expressed, and that in certain circumstances a single lexical item is able to denote these senses at the same time.

(1.37) John crawled through the broken window. (Pustejovsky 1995: 48)

Window in (1.37) refers to an aperture with respect to the verb phrase *crawled through*,

while it refers to a physical object with respect to the adjective *broken*. These examples ably demonstrate that the enumeration-based organization of word senses is inadequate to capture both the partial overlap of the core meaning and the delicate nuance of the peripheral meaning of an item in the same instant (cf. Atkins 1991).

Turning to (1.24c) above, the representations allowed by the sense enumeration lexicon are inadequate to account for the description of natural language semantics. It is equally arbitrary to create separate word senses for a lexical item just because it can participate in distinct lexical realization. A striking example of this argument is provided by verbs like *forget* in (1.38).

(1.38) a. Madison Avenue is apt to forget that most folks aren't members of the leisure class. (factive)

b. But like many others who have made the same choice, he forget to factor one thing into his plans: Caliphobia. (non-factive)

c. As for California being a state being run by liberal environmental loonies, let's not forget where Ronald Reagan came from. (embedded question)

d. What about friends who forget the password or never got it? (concealed question)

e. He leaves, forgets his umbrella, and comes back to get it. (ellipsed non-factive) (Pustejovsky 1995: 51)

In these examples, the syntactic realization of the verb's complement determines how the proposition is interpreted semantically. For example, the tensed-S complement in (1.38a) exhibits a property called "factivity", while the non-tensed infinitival VP complement in (1.38b) expresses "non-factivity" (cf. Kiparsky and Kiparsky 1971). Sentence (1.38d) contains what is called "concealed question" complement, where the NP phrase can be paraphrased as a sentential question as in (1.38c) (cf. Grimshaw 1979). These different interpretations are usually encoded as separate senses of verbs with distinct lexical entries.

Under the sense enumeration lexicon, these distinctions would correspond to the

separate word senses for each syntactic type. Such a distinction, however, misses the important semantic relatedness between pairs of instances of *forget* in (1.38), such as the similarity between (1.38c) and (1.38d) in the question-like reading and between (1.38b) and (1.38e) in the non-factive reading. The proper treatment of these different complement types seems to be an approach that has one core definition of *forget* which could generate all the allowable readings above and all the possible complement syntax.

Another issue to be considered is the manner of realization of verb's arguments. As shown in section 1.2, arguments of a verb can be realized in several different ways in syntax. In the locative alternation, for example, two internal arguments of three-place verbs are alternately realized as the direct and oblique object of the verb. Previous researchers have tackled this linking problem mainly from two different perspectives. One end argues that the alternate modes of argument realization are induced by a lexical operation that changes a semantic structure of a verb (Rappaport and Levin 1988, Pinker 1989), while the other end argues that different syntactic frames in the alternation are derived from individual lexical semantic representations of a verb (Jackendoff 1990b, Maruta 1997). The focus of these studies resides basically in the polysemy of verb semantics, and two approaches by themselves do not conflict with each other. In fact, they share a common view that patterns of argument realization result from verb's lexical semantic representations. However, a problem lies in the verb semantics itself, since it has been revealed that locative alternation verbs do not show a shift in their logical meaning through the alternation (Beavers 2006). Hence, the alternation should be derived from alternate modes of argument encoding rather than the variance of verb's lexical semantic representations. In other words, it must be treated as a result of particular linking strategy related to the choice of verb's lexical semantic constituents that are to be mapped onto the syntax. One of the primary purposes of this thesis is, thus, to reveal those linking patterns in natural language that allow multiple syntactic realizations of arguments from the identical lexical semantic representation of a predicate.

1.4. Outline of the Thesis

The thesis is organized as follows.

Chapter 2 will draw a guideline for understanding the lexical semantic knowledge of predicates. Following Pustejovsky (1995), four essential levels of lexical semantic representations will be introduced: event structure, argument structure, qualia structure, and lexical inheritance structure. In particular, it will be shown that the lexical information that is relevant to argument realization in syntax is readily incorporated into a qualia structure of predicates with certain relational forces along with their arguments in four qualia roles.

In chapter 3, general linking rules that are responsible for the mapping of semantic arguments from qualia to syntax will be proposed. The linking strategy that I will develop refers particularly to a relationship between qualia roles of a predicate and a verbal head in the syntax. Importantly, it will be demonstrated that split intransitivity and causativity can be boiled down to the patterns of lexical semantic templates that an individual predicate has.

In chapter 4, VP-internal argument alternations including the locative alternation and the dative alternation will be intensively discussed, where the syntactic realization of two internal arguments of a verb alternates. It will be argued that these alternations are induced as a natural consequence of the linking strategy associated with the notion of event-headedness in the event structure. In doing so, particular pragmatic effects involved in these alternations will be clearly revealed. Also, I will claim that Japanese three-place verb constructions provide further evidence in favor of our linking strategy.

In chapter 5, a tentative theory that the event-headedness constitutes a parametric variation of the lexical knowledge of predicates will be advanced. Actually, it will be estimated that event-headedness provides a general framework of intralingual and cross-linguistic variations of argument alternations. If this idea is valid, grammatical variations of argument alternations receive a straightforward account in terms of the diversity of lexicalization patterns among languages. Consequences of this claim are unimaginably huge, but worth discussing seriously.

In chapter 6, generative devices for argument alternations will be discussed. The

general propaganda, in accordance with a generative model of the lexicon, is that argument alternations must be dealt with by certain lexical rules on arguments and by operations on qualia roles, without recourse to reorganization of lexical semantics of an item. Thereby, linking strategy proposed in chapter 3 will be maintained with reference to all alternations discussed in section 1.2, which is a welcome result to the generative linguistic inquiry that seeks the universality of language faculty.

Chapter 7 will summarize the result of the thesis and provide a general conclusion, with some remarks for a course of research in the future.

Chapter 2: The Lexical Knowledge of Predicates

In this chapter, following Pustejovsky (1995), I establish four levels of representations that organize the semantic information of lexical items: event structure (EVENTSTR), argument structure (ARGSTR), qualia structure (QUALIA), and lexical inheritance structure. These four levels, in agreement with a generative model of the lexicon, provide expressive, permeable, and creative nature of a language as a computational system. For predicates, they not only constitute an essential part of our lexical knowledge, but also provide a fundamental statement about the syntactic realization of their semantic arguments. The abstract design of a lexical representation that will be developed in this chapter largely depends on Pustejovsky's (1995) original notation of the Generative Lexicon, but its concrete contents will differ from his interpretation both qualitatively and quantitatively.

2.1. Event Structure

Since the event configuration is directly related to the interpretation of a predicate (Davidson 1967), one of the most important aspects of the lexical knowledge of a predicate is its event structure. By definition, predicates are elements that describe an event indicating activity, effect, property, state, and so on (Williams 1980, Rothstein 1983). Every predicate, therefore, illustrates one event concept that is organized in our mental lexicon with some grammatical principles. I will show in this section how the knowledge of event structure defines an event of a predicate in terms of traditional event decomposition approaches.

2.1.1. Subevent Analysis

Subevent analysis is an attempt to decompose one single entity of events into several smaller units called "subevents". Previous researchers have tried to decompose an event concept into primitive subevents in order to disclose the external configuration of the event structure. Before exploring the result of the research, let us review some influential studies in this field.

2.1.1.1. Vendler (1957) and Dowty (1979)

In English, the study of event decomposition most probably originates from Vendler's (1957) aspectual classification of events.[1] He proposes that events named by verbs (more precisely, verb phrases) can be classified into four different categories, given in (2.1), according to their restriction of time adverbials, tenses, and logical entailments.

(2.1) a. State: know, love, believe, belong, resemble
b. Activity: run, write, work, push a cart, drive a car
c. Accomplishment: paint a picture, draw a circle, run a mile, write a letter, push a cart to the supermarket
d. Achievement: recognize, reach, find, win a race, arrive

Vendler argues that these categories are practically divided in terms of their event interpretation, and the concept of time is particularly important to decide the individual verb use.

Formalizing Vendler's insight, Dowty (1979) provides eleven panoptical criteria of linguistic phenomena to distinguish Vendler's four classes of verbs. For example, (2.2) exhibits one of what is traditionally termed as "non-stative tests" (Lakoff 1965), which makes a distinction between *stative* and *non-stative* (or *eventive*) events.

(2.2) a. * John is knowing the answer. (state)
b. John is running. (activity)
c. John is painting a picture. (accomplishment)
d. John is arriving at the station. (achievement)

The result is that only verbs that denote non-stative events can occur in the progressive form. Among the non-stative events, activities and accomplishments are interpreted as describing "current state of affairs", while achievements have the sense of "immediate

future", since the latter lacks the "duration" of the event (cf. Kearns 2000).

The next well-known examples concern "boundedness" or "telicity" of events.[2]

(2.3) a. * John knew the answer for an hour. (state)
b. John ran for an hour. (activity)
c. ? John painted a picture for an hour. (accomplishment)
d. * John arrived at the station for an hour. (achievement)

(2.4) a. * John knew the answer in an hour. (state)
b. * John ran in an hour. (activity)
c. John painted a picture in an hour. (accomplishment)
d. John arrived at the station in an hour. (achievement)

The time adverbial *for an hour* requires the "duration" of an event, while *in an hour* requires the "bounds" of an event. As (2.3a) and (2.4a) illustrate, states like *know* are compatible with neither time adverbial, simply because they do not have any internal temporal structure.[3] Activities are only compatible with *for*-phrases, logically describing an event that can last forever. On the other hand, accomplishments and achievements are compatible with *in*-phrases, since these predicates denote an event that has a logical endpoint by which we know when the event being described will be finished. In usual contexts, accomplishments are also compatible with *for*-phrases, as the "?" mark in (2.3c) indicates, since they show a durative event expansion where a causing action by the agent may continue to the end of the event. According to Kearns (2000), the combination of accomplishments with *for*-phrases is felicitous when the "changes" of the event are focused, but inadequate when the "bounds" of the event are focused. In this respect, accomplishments in the progressive form are perfectly acceptable with a durative time adverbial, focusing on the activity by the agent.

(2.5) John was painting a picture for an hour.
(cf. *John was arriving at the station for an hour.)

The fact that this effect does not hold with achievements further supports the conclusion that only accomplishments can be used as both telic and atelic depending on the context.

What is particularly important in Dowty's conclusion is that accomplishments have both properties of activities and achievements in terms of their lexical aspect. In other words, Dowty provides a fundamental framework to see how events are organized structurally. To be more specific, states and activities in Vendler's classification are *simple* in the sense that they can be primitively defined by a single event concept, while accomplishments and achievements are *complex*, since they are defined by the combination of more than one subevent (cf. Parsons 1990). The mingled nature of accomplishments can be found in the ambiguity of adverbs in (2.6a) and (2.7a).

(2.6) a. John almost painted a picture.
b. John almost walked. (Dowty 1979: 58)

(2.7) a. The sheriff of Nottingham jailed Robin Hood for four years.
b. The sheriff of Nottingham rode a white horse for four years.
(Dowty 1979: 58)

Sentence (2.6a) with the accomplishment *paint a picture* has at least two readings: one is that John had the intension of painting a picture but he did not do it, and the other is that John did begin to paint a picture but he did not finish it. On the other hand, (2.6b) with the activity *walk* only entails that John did not walk. Sentence (2.7a) with the accomplishment *jail* is also two ways ambiguous, with *for four years* expressing either the period of sheriff's repeated actions of jailing Robin Hood or the period of the result state which the single act of jailing produced. Thus, achievements are also complex, since they must include a stative event as their endpoint (cf. Binnick 1969). Again, (2.7b) with the activity *ride a horse* has only the repetitive reading.

2.1.1.2. Jackendoff (1972, 1976, 1983, 1987, 1990b)

In Conceptual Semantics, Jackendoff (1976) first decomposes the meaning of verbs into some set of primitive predicates, such as CAUSE (x, y), GO (x, y, z), and BE

(x). These conceptual predicates by themselves designate a subevent that includes a proper relation and its necessary arguments (cf. Ostler 1979). On the basic conception in the "localist" approach (Gruber 1965), Jackendoff (1972, 1976, 1983, 1987, 1990b) consistently argues that events involving motion and location in space are central to the construal of all events, developing an idea that all verbs are intrinsically construable as "verbs of motion" or "verbs of location". More specifically, he proposes that all event concepts in human's mind, whatever semantic field (e.g., space, time, possession, identification and situation) they reside in, can be transposed by a spatial representation by means of what he calls "Conceptual Structure". For instance, Jackendoff (2002) sets up the following "functions" as members of primitive types in the sense of nonstandard version of type logic.

(2.8) *Types of Function-Argument Structure*

a. BE: <(x, y), State>
b. STAY: <(x, y), Event>
c. GO: <(Object, Path), Event>
d. EXT, ORIENT: <(Object, Path), State>
e. TO, FROM: <x, Path>
f. INCH: <State, Event>
g. PERF: <Event, State>
h. CAUSE, HELP, LET (three-argument version):
<(Object/Event, Object, Event), Event>
i. CAUSE, LET (two-argument version): <(Object/Event, Event), Event>

(Jackendoff 2002: 364)

By these patterns for abstract linguistic expressions, it becomes possible that predicates in (2.9) through (2.11) *intercommunicate* with different semantic fields in a parallel manner.

(2.9) *BE*

a. The messenger *is in* Istanbul. [Simple Location]

b. The money *is* Fred's. [Simple Possession]

c. The light *is* red. [Simple Property]

d. The meeting *is on* Monday. [Simple Schedule]

(2.10) *GO*

a. The messenger *went from* Paris *to* London. [Change of Location]

b. The inheritance finally *went to* Fred. [Change of Possession]

c. The light *went/changed from* green *to* red. [Change of Property]

d. The meeting was *changed from* Tuesday *to* Monday. [Change of Schedule]

(2.11) *CAUSE* and *STAY*

a. The gang *kept* the messenger *in* Istanbul. [Caused Location]

b. Fred *kept* the money. [Caused Possession]

c. The cop *kept* the light red. [Caused Property]

d. The chairman *kept* the meeting *on* Monday. [Caused Schedule]

(Jackendoff 2002: 356-357)

Importantly, such predicate decomposition can be taken to be a theory of the basic event types, since verbs individuate and name events. That is, it posits a limited inventory of linguistically relevant event types, and tells us what the possible internal configurations of event structures are. In Jackendoff's system, however, the inherent semantic roles of a predicate are simply treated as "slots" associated with variables and eventualities of that predicate. In fact, there seems to be no principled way in his Conceptual Structure to account for the aspectual property of events, without referring to the internal structures of primitive predicates (see Jackendoff (1991, 1996) for some discussions). Nevertheless, the idea that verb meanings can be decomposed into basic semantic components has been recently pursued in various linguistic fields, including Role and Reference Grammar (Van Valin and LaPolla 1997) and Cognitive Grammar (Croft 1991).

2.1.1.3. Kageyama (1996)

Dowty's (1979) subevent analysis and Jackendoff's (1990b) conceptual semantic research are fully integrated into Kageyama's (1996) study of lexical aspect. He argues that syntactic structure of a verb phrase is essentially associated with its lexical aspect, and introduces the following four lexical semantic templates called "Lexical Conceptual Structure (LCS)" that express structured patterns for human's cognition of events.

(2.12) *Lexical Conceptual Structure (LCS)*

a. State: [$_{\text{STATE}}$ y BE AT-z]

b. Activity: [$_{\text{EVENT}}$ x ACT (ON-y)]

c. Accomplishment: [$_{\text{EVENT}}$ x ACT (ON-y)] CONTROL [$_{\text{EVENT}}$ (y) BECOME [$_{\text{STATE}}$ y BE AT-z]]

d. Achievement: [$_{\text{EVENT}}$ (y) BECOME [$_{\text{STATE}}$ y BE AT-z]]

(Kageyama 1996: 84, 87)

The LCS temples in (2.12) reflect the part-whole relation of predicate types in good accordance with Vendler's four classifications of verbal aspect. In (2.12c), for example, accomplishment is defined by the combination of activity in (2.12a) and achievement in (2.12d).

As for argument realization, Kageyama assumes that these LCS templates work in cooperation with two linking rules, given in (2.13a) and (2.13b), which motivate the relationship between verb's conceptual structure and its argument structure.

(2.13) *Linking Rules*

a. External Argument Linking:

Link the subject of ACT to the external argument. If there is no ACT, no external argument is linked to the syntactic structure.

b. Internal Argument Linking:

Link the subject of BE to the internal argument. If there is no BE, link the object of ACT ON to the internal argument. If there is no ACT ON, no internal argument is linked to the syntactic structure.

(Kageyama 1996: 92)

Basically, these rules are laid down as an interpretation of Baker's (1988) UTAH (Uniformity of Theta Assignment Hypothesis) in terms of verbs' lexical semantic representations, capturing the so-called "Unaccusative Hypothesis" (Perlmutter 1978, Perlmutter and Postal 1984) in generative syntactic terms (cf. Burzio 1986). Specifically, unergative verbs like *work*, associated with the LCS in (2.12b), take only an external argument in the argument structure, while unaccusative verbs like *arrive*, associated with the LCS in (2.12d), take only an internal argument. Causative transitive verbs like *kill* have both an external argument and an internal argument, since they lexicalize the LCS in (2.12c), where the LCSs of unergatives and unaccusatives are embedded.

2.1.1.4. Pustejovsky (1991, 1995)

The subevent analysis by means of event decomposition is finally schematized in the work of Pustejovsky (1991, 1995).

Pustejovsky (1991) expresses the aspectual structure of events in terms of three types of event properties: state, process and transition.

(2.14) a. State (S): a single event, which is evaluated relative to no other event

ES: S

|

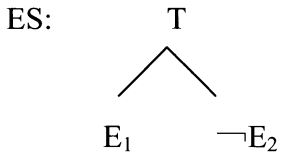
e

b. Process (P): a sequence of events identifying the same semantic expression

ES: P

$e_1 \ldots e_n$

c. Transition (T): an event identifying a semantic expression, which is evaluated relative to its opposition



Of these, a state and a process form a simple event structure, whereas a transition forms a complex event structure, where process and state are combined together. In particular, Pustejovsky gives the following structures for Vendler's four categories of verbal aspect. (In Pustejovsky's notation, "LCS'" indicates a semantic representation that is constituted of each subevent, while "LCS" indicates a semantic representation that is constituted of the whole event structure.)

(2.15) *State*

a. The door is closed.

b. ES:

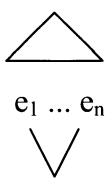
LCS': [closed (the-door)]

LCS: [closed (the-door)]

(2.16) *Activity*

a. Mary ran.

b. ES:



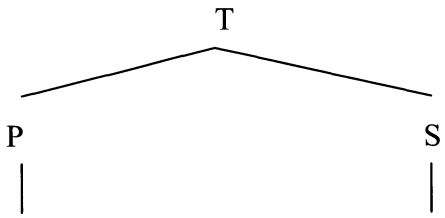
LCS': [run (Mary)]

LCS: [run (Mary)]

(2.17) *Accomplishment*

a. John closed the door.

b. ES:



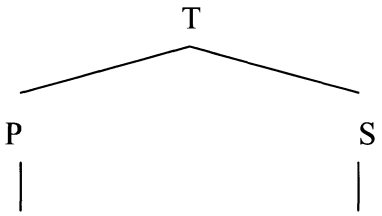
LCS': [act (John, the door) & ¬closed (the-door)] [closed (the-door)]

LCS: cause ([act (John, the-door)], become ([closed (the-door)]))

(2.18) *Achievement*

a. The door closed.

b. ES:



LCS': [¬closed (the-door)] [closed (the-door)]

LCS: become ([closed (the-door)])

Pustejovsky (1995) extends this analysis to the interpretation of event semantics, and presents a model of temporal relationship between an event and its proper subevents in terms of what he calls "extended event structure". For complex events, there are two subevents that must be interpreted as maintaining a particular temporal relationship. To account for their relationships, he regards an extended event structure as a "tuple" containing the following symbols.

(2.19) a. E: a set of events

b. ≼: a partial order

c. <: a strict partial order

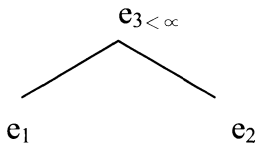
d. ○: overlap

e. ⊆: inclusion

f. * : head of an event (Pustejovsky 1995: 69)

In the extended event structure, complex events are understood as a combination of basic event structures with various temporal relationships defining subevents. Some of the model cases are illustrated as follows.

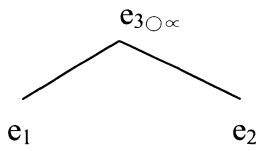
(2.20) *Exhaustive Ordered Relation*

a. 

b. $[_{e3}\ e_1 <_\propto e_2] =_{def} <_\propto (\{e_1, e_2\}, e_3)$

c. $\forall e_1, e_2, e_3\ [<_\propto (\{e_1, e_2\}, e_3) \longleftrightarrow e_1 \leqslant e_3 \wedge e_2 \leqslant e_3 \wedge e_1 < e_2 \wedge \forall e\ [e \leqslant e_3 \rightarrow e = e_1 \vee e = e_2]]$ (Pustejovsky 1995: 69)

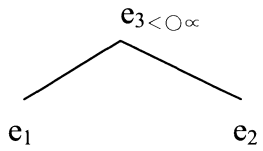
(2.21) *Exhaustive Overlap Relation*

a. 

b. $[_{e3}\ e_1\ {}_{\bigcirc\propto}\ e_2] =_{def}\ {}_{\bigcirc\propto}\ (\{e_1, e_2\}, e_3)$

c. $\forall e_1, e_2, e_3\ [{}_{\bigcirc\propto} (\{e_1, e_2\}, e_3) \longleftrightarrow e_1 \leqslant e_3 \wedge e_2 \leqslant e_3 \wedge e_1 \subseteq e_2 \wedge e_2 \subseteq e_1 \wedge \exists e\ [e \subseteq e_1 \wedge e \subseteq e_2 \wedge e = e_3] \wedge \forall e\ [e \leq e_3 \rightarrow e = e_1 \vee e = e_2]]$ (Pustejovsky 1995: 69-70)

(2.22) *Exhaustive Ordered Overlap Relation*

a. 

b. $[_{e3}\ e_1 <_{\bigcirc\propto} e_2] =_{def} <_{\bigcirc\propto} (\{e_1, e_2\}, e_3)$

c. $\forall e_1, e_2, e_3\ [<_{\bigcirc\propto} (\{e_1, e_2\}, e_3) \longleftrightarrow e_1 \leqslant e_3 \wedge e_2 \leqslant e_3 \wedge e_1 \bigcirc e_2 \wedge \text{init (e1)} < \text{init (e2)} \wedge \text{end (e1)} = \text{end (e2)} \wedge \forall e\ [e \leq e_3 \rightarrow e = e_1 \vee e = e_2]]$ (Pustejovsky 1995: 70-71)

Event structure (2.20) represents an exhaustive ordered relation, such as one presented

by the verb *build*, where e1 temporally precedes e2, each is a logical part of e3, and there is no other event that is part of e3. The definition and interpretation of the tree in (2.20a) are given in (2.20b) and in (2.20c), respectively. The relation (2.21) exhibits an exhaustive overlap relation, demonstrated by verbs like *accompany*, where an event is composed of two completely simultaneous subevents. The exhaustive ordered overlap relation in (2.22) defines an event containing two subevents, e1 and e2, where e1 starts before e2. According to Pustejovsky, this relation is proved by verbs like *walk*, which designates an event that the activity of foot movement partially overlaps but rightly initiates the movement of the body.

2.1.2. Event Structure Revisited

Although Pustejovsky's (1995) extended event structure takes full advantage of internal hierarchies of events and reaches highly schematized temporal relations among subevents, there seem to be certain inconveniences in his treatment of event decomposition. For one thing, accomplishments and achievements are not really differentiated in their event configurations, given that extended event structures are at best binary. In fact, Pustejovsky (1991) explicitly denies a generally accepted assumption that accomplishments include a participation of the agent (i.e., the subject of *act* in (2.17)), but achievements do not. This point is illustrated by the following pairs of examples, where verbs such as *arrive* and *win* can be used either volitionally or non-volitionally, regardless of their lexical aspect.

(2.23) a. Mary arrived at the party.
b. John won the race. (Pustejovsky 1991: 60)

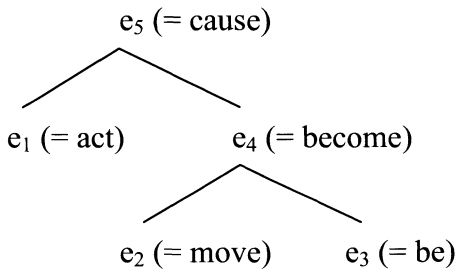
(2.24) a. The package arrived at the office.
b. Mary won the lottery. (Pustejovsky 1991: 60)

However, what distinguishes accomplishments from achievements must go far beyond agentivity of events. One familiar instance to indicate this point is "durativity", as has been discussed in section 2.1.1.1. In essence, accomplishments have the durative

nature, since they include an activity as their causing parts of the LCS in (2.17). If, as Pustejovsky suggests, achievements can be aspectually defined as a transition just in the same way as accomplishments, some explanation is necessary as for the event configuration in (2.18), where the preceding subevent is mysteriously represented as a process (P) while the succeeding subevent as a state (S), though both subevents are definitely of the same type, except that the former involves negation. Furthermore, it is well-known that agentivity of events largely depends on the animacy of the subject, not on the form of event structure (cf. Dowty 1991). In short, Pustejovsky's treatment of accomplishments and achievements cannot fully capture their aspectual properties that have been revealed in previous studies.

To avoid the confusion, I propose that a full-fledged event structure that a single predicate can lexicalize should be something like (2.25).

(2.25)



In this model, event structure needs to be extended to a form that can separate two basic transitions of events (i.e., causation and inchoation) and three basic event components (i.e., action, process and result), in order to distinguish types of aspectual properties of events. In conceptual terms, e1, e2 and e3 correspond to the functions of relations between events and arguments, including *act*, *move* (or *go*) and *be*, whereas e4 and e5 represent the functions of relations between events and events, such as *cause* and *become* (or *inch*). In (2.25), a subscript number is given to each event argument in order to indicate that each set of subevents brings about a temporal relationship in such a manner as extended event structure.

The event structure (2.25) is interpreted as the event structure of accomplishment verbs, such as *kill*. In fact, *kill* lexicalizes all three subevents indicated by e1, e2 and e3

in (2.25), each of which is roughly corresponding to a killing action by the agent, a dying process for the patient, and a state of the patient being dead. This treatment nicely accounts for the fact that English has three different predicates, *kill*, *die*, and *dead*, in accordance with the set of different subevents corresponding to e5, e4, and e3, respectively.[4] In this regard, Morgan (1969) suggests that (2.26) is at least three ways ambiguous to be paraphrased as (2.27a), (2.27b) and (2.27c).

(2.26) John almost killed Harry.

(2.27) a. What John almost did was kill Harry.

b. What John did was almost kill Harry.

c. What John did to Harry was almost kill Harry.

According to Dowty (1979), (2.27a) is appropriate for a situation in which John has the intention of killing Harry but at the last minute decides to do nothing at all, (2.27b) describes a situation in which John's act comes close to causing Harry's death but really affect him not at all, and (2.27c) expresses a situation in which John's action causes an effect in Harry which is near to death (cf. McCawley 1973). Tenny (2001) argues that other adverbs such as *again* produce a parallel effect. If Morgan's suggestion is on the right track, we can provide a natural explanation to this phenomenon by means of the event structure given in (2.25), though it is not quite obvious how these readings are calculated in logical semantics (cf. Zwicky and Sadock 1975).

As a logical possibility, each subevent in (2.25) can be lexicalized in a single lexical item. For example, unergative verbs like *play* have an *act* function in (2.28), motion verbs like *come* lexicalize a *move* function in (2.29), and stative verbs like *live* entail a *be* function in (2.30).

(2.28) a. John played (in the park).

b. ES: e_1 (= act)

(2.29) a. Christmas is coming nearer.

b. ES e_1 (= move)

(2.30) a. Mary lives in Tokyo.

b. ES: e_1 (= be)

These predicates have only one event argument for their sole primitive subevent. Thus, they are regarded as having a simple event structure.

Kearns (2000) notes that some stative predicates can be compatible with durative time adverbials when the context implies both a starting point and an endpoint of the event. With this in mind, consider the following examples:

(2.31) a. I lived in N.Y. for more than 10 years.

b. Mary was happy for only ten seconds.

c. I was sleepy for some times.

d. John belonged to the tennis club from 2005 to 2008.

Notice that these predicates are regarded as describing "stage-level states", quoted from Carlson's (1977) terminology, in contrast to "individual-level states", which resist any temporal modifications (e.g. **John was intelligent from 2005 to 2008*). Given that individual-level predicates display sharply different grammatical behaviors from stage-level predicates (Milsark 1977, Stump 1985, Diesing 1992), it might be necessary for them to be distinguished in terms of their event structure configurations. Following Parsons (1990), let us assume for the time being that individual-level predicates bind a state argument (s) instead of an event argument (e), as shown in (2.32b).

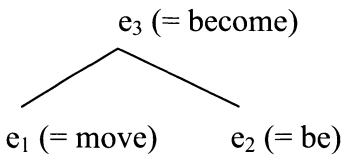
(2.32) a. Mary was intelligent (*for five years).

b. ES: s_1 (= be)

Returning to the structure (2.25), there are still other possibilities of natural event structure configurations. In fact, we can get (2.33) to (2.35) by getting rid of any one of the subevents from (2.25).

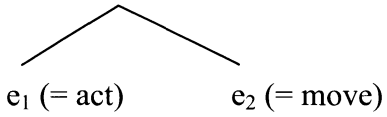
(2.33) a. The train arrived at the station.

b. ES:



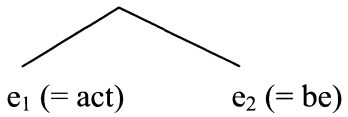
(2.34) a. John threw the ball at his dog.

b. ES:



(2.35) a. Mary is hanging from the horizontal bar.

b. ES:

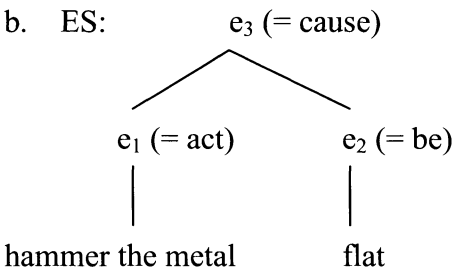


All these event structures are identical in terms of extended event structure, but different in relation to the accomplishment structure in (2.25). First, (2.33b) is an event structure of achievement verbs that do not lexicalize an activity of the agent. Second, (2.34b) represents an event structure where two overlapping subevents are involved without a clear endpoint. Importantly, event structures of some unergative verbs, such as *walk*, should be defined by (2.34b), since these events are characterized by the combination of an activity of the agent and a self-propelled movement of the theme (cf. Kageyama and Yumoto 1997), although they are still atelic in their aspectual consideration. Finally, the event structure in (2.35b) includes a causing activity and its result state, ignoring the process on the way to reach the final stasis. In this manner, the logical possibilities of the combinations of subevents are restricted in such a way not to deviate the event structure in (2.25).

Another important result of the schema in (2.25) is that it provides a formal system of "event type shifting" discussed in Pustejovsky (1991). That is, as far as the formula in (2.25) is met, we can expand the event structure of a predicate into more complex one. For example, the simple process of *hammer (the metal)* can be expanded into a transition by adding the resultative secondary predicate *flat*.

(2.36) a. Mary hammered the metal flat.

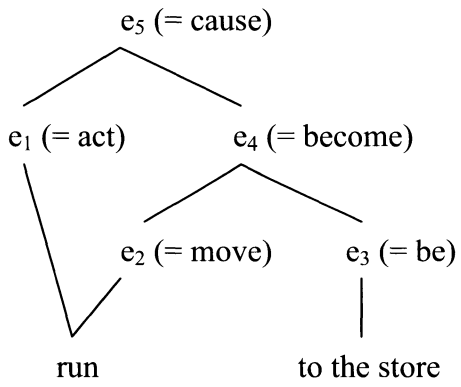
b. ES:



Also, the verb *run*, associated with the event structure in (2.34b) above, may be inflated with the goal phrase *to the store*, giving rise to the fully complex event structure *run to the store* in (2.37).

(2.37) a. John ran to the store.

b. ES:



In (2.37b), e1, e2, and e3, corresponding to the activity, movement, and state part of the event, prove as a whole an accomplishment status of event aspect. We cannot have any larger event structure, such as **Mary hammered the metal flat exhausted* and **John ran to the store home*. Thus, the limitation on the event structure gives a natural explanation to the event semantics of predicates, not only avoiding many invalid event structure configurations (cf. Levin and Rappaport Hovav 1995), but also providing a plausible interpretation to Goldberg's (1995) "Unique Path Constraint".

2.1.3. Event Headedness

In section 2.1.2, we have established well-formed configurations of event structure based on predicates' aspectual characteristics. Now, one might ask why achievements, associated with the event structure in (2.33b) above, only have a telic interpretation, despite the fact that they include a process subevent (i.e., *move*) that must exhibit a durative property. The involvement of a process subevent in the achievement event structure may be guaranteed by the fact that they can occur in the progressive aspect, as in (2.38), where some duration of an event plus a pragmatically implied endpoint is required (Leech 2004).

(2.38) a. The train is arriving at the station.
b. The ice is melting gradually.
c. They are finding the answer to the question.

Notice also that there are in fact some telic events that are compatible with durative time adverbials that take scope over the stative subevent (Pustejovsky 1991).

(2.39) a. John ran home for an hour.
b. My terminal died for two days.
c. Mary left town for two weeks. (Pustejovsky 1995: 74)

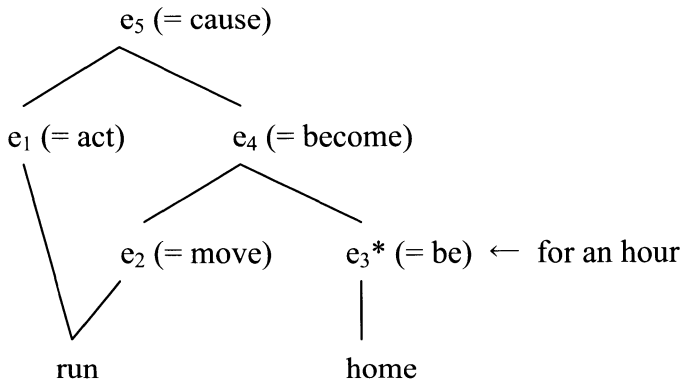
Obviously, these sentences do not denote atelic events, however. Rather, the *for*-phrases in (2.39) modify a stage-level state that lasts only for a given period of time. In (2.39a), for example, the *for*-phrase never takes scope over John's activity, but the final state of John's being at home. This is particularly contrastive to a normal situation in which *for*-phrases with an activity predicate modify the process subevent (e.g. *John ran for an hour*).

To capture this interpretation, Pustejovsky (1995) introduces the notion of "event headedness", which is originally motivated to account for Talmy's (1975, 1976) observation on cross-linguistic variations of motion expressions and semantic types of

causation. The intuition here is that the event information conveyed by a verb seems to be much richer than the simple sequence of events. By this notion, Pustejovsky claims that there must be a "foregrounding" or "backgrounding" operation in event structures that is coded in the event representations. Informally, event head, annotated as e*, is defined as the most prominent subevent in the event structure of a predicate, which contributes to the "focus" of the interpretation in a configurational manner. One instance to show how the event-headedness works linguistically is given by the aspectual interpretation of the sentence like (2.40).

(2.40) a. John ran home for an hour. (= (2.39a))

b. ES:

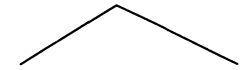


Assuming that the added goal phrase *home* in (2.40a), which specifies a result state of the action, is incorporated in the event structure in (2.40b) with a headed subevent, e3*, this final subevent will then be foregrounded semantically, and must be the locus of the modification by the time adverbial *for an hour*, giving rise to the interpretation that John spent an hour at home.[5]

On the basis of this concept, the reason why durative time adverbials are not compatible with achievement predicates appears to be that for these predicates, the event head is *lexically* specified to their result subevent, as illustrated in (2.41b).

(2.41) a. * The ice melted for an hour.

b. ES: e_3 (= become)



e_1 (= move) e_2* (= be) ← for an hour

As a lexically specified event head, the result state of achievements must be the target of modification by time adverbials. However, it results in an abnormal interpretation, since *for*-durative phrases imply that the state being modified will be finished in a given period of time. Furthermore, for some achievement events such as *The glass broke*, there seems to be no process for the change-of-state in the theme, since we cannot detect the ongoing process that the glass was halfway broken. If this reasoning is on the right track, the reason why durative time adverbials are not compatible with achievement predicates is just the same as the reason why they are not compatible with stative predicates. Again, event decomposition approach is quite successful to show this relation by revealing that achievements contain a state as their subpart.

Evidence from event modification is only one of several arguments in favor of making reference to a focusing mechanism in the event structure. Other significant aspects of event headedness will be discussed in later chapters in terms of argument realization. In particular, it will be shown in chapter 4 that event-headedness provides an efficient mechanism for proper treatment of VP-internal argument alternations, and in chapter 5 it will be argued that it also provides a fundamental framework to understand a parametric variation in the lexical knowledge of predicates. Constraints on event head assignment in English will be discussed in section 3.2.

2.2. Argument Structure

Another important aspect of the lexical knowledge of predicates is surely the information of their semantic arguments. This section will thus investigate an inner structure of events, namely the relationship between a predicate and its semantic arguments. As a result, the traditional argument structure in terms of naive theta-role labels will be greatly revised into one that organizes how participants of an event are arranged semantically. In effect, the argument structure in a generative model of the

lexicon will be based crucially on the findings in Cognitive Grammar (Langacker 1987).

2.2.1. Types of Arguments

Arguments of a predicate certainly have grammatically-relevant varieties in their types in the argument structure. In a generative model of the lexicon, for example, Pustejovsky (1995) adopts the following four types of semantic arguments (or "parameters") for lexical items.

(2.42) a. True Arguments: Syntactically realized parameters of the lexical item;
b. Default Arguments: Parameters which participate in the logical expressions in the qualia, but which are not necessarily expressed syntactically;
c. Shadow Arguments: Parameters which are semantically incorporated into the lexical item.
d. True Adjuncts: Parameters which modify the logical expression, but are part of the situational interpretation, and are not tied to any particular lexical item's semantic representation. (Pustejovsky 1995: 63-64)

True arguments in (2.42a) define those parameters that are necessarily expressed at a syntactic structure. The examples of them are given below.

(2.43) a. John arrived late. (Pustejovsky 1995: 63)
b. The scientist killed the rat.
c. Mary gave a letter to Bill.

No underlined constituents in (2.43) may be omitted in order to satisfy the "Theta-Criterion" (Chomsky 1981). This is the domain generally covered by the surface conditions on an argument structure in generative syntax, which require arguments to be expressed as syntactic constituents, and conversely, syntactic constituents to be bound properly to the argument structure.

Default arguments in (2.42b) are parameters that are necessary for the logical

well-formedness of sentences, but may be unexpressed in the syntax. These arguments usually express a certain kind of "material" and elements that are regarded as "medium".

(2.44) a. John carved the doll out of wood. (Pustejovsky 1995: 64)
b. Mary loaded the truck with books.

These arguments are optionally expressed due to the conditions at the level of lexical semantics. However, some default arguments have a property that can be expressed as true arguments in argument alternations (cf. Levin 1993).

(2.45) a. John carved the wood into a doll. (Pustejovsky 1995: 64)
b. Mary loaded the books onto the truck.

For this reason, Verspoor (1997) calls those arguments that have both properties of true arguments and default arguments, "pseudo-complements".

Shadow arguments in (2.42c) also refer to semantic content that is not necessarily expressed in the syntax. Generally, these arguments have an effect on making a detailed explanation of the action named by the verb.

(2.46) a. Mary buttered the toast with an expensive butter.
b. Harry kicked the wall with his gammy leg. (Pustejovsky 1995: 65)

In contrast to default arguments, however, shadow arguments are expressible only under the specific pragmatic conditions within sentences. In particular, they need to express contextually-necessary information by virtue of the redundancy restriction.

(2.47) a. * Mary buttered the toast with butter.
b. * Harry kicked the wall with his leg. (Pustejovsky 1995: 65)

Thus, the conditions under which these arguments can be expressed are specific in that they can be expressed only by operations of subtyping or discourse specification.

Finally, true adjuncts in (2.42d) are parameters that are not necessary at all to be expressed as syntactic constituents. Most typically, they are expressed as temporal or spatial modifications.

(2.48) a. John slept late on Tuesday.
b. Mary saw Bill in Boston. (Pustejovsky 1995: 66)

These adjuncts are, of course, completely optional, and only have a discourse function that specifies the settings or properties of a stage.

The logical distinction in types of arguments can be directly represented in the argument structure of predicates. For example, argument structures of the verbs *carve* and *butter* can be described as follows, where D-ARG indicates a default argument, and S-ARG indicates a shadow argument.

(2.49) carve

ARGSTR = ARG1 = x: animate_individual
ARG2 = y: artifact
D-ARG1 = z: material

(2.50) butter

ARGSTR = ARG1 = x: human
ARG2 = y: physical_object
S-ARG1 = z: *butter*

In terms of argument realization, true arguments provide a clue of the well-formedness conditions in that all true arguments must in some way be mapped onto the syntax, while other types of arguments need not unless some context-based specifications apply.

2.2.2. Selectional Restrictions

Another important role of argument structure is that it imposes the information about semantic restrictions on argument selection. For example, the goal phrase of the three-place verb *give* must be an animate individual, though the object of the preposition *to* usually does not require such restriction.

(2.51) I gave the package to {Maria/*London}.
(cf. I sent the package to {Maria/London}.)
(Rappaport Hovav and Levin 2008: 138)

In (2.51) the goal phrase *London* is not appropriate, unless it is interpreted, by means of a metonymic expansion, as denoting such animate individuals as some specific person in London. The easiest way to stipulate this restriction is to constrain the semantic property of each argument at the level of the lexicon.

(2.52) give
ARGSTR = ARG1 = x: animate_individual
ARG2 = y: physical_object
ARG3 = z: animate_individual

By the conditional clause in the argument structure of *give*, ARG1 (agent) and ARG3 (goal) are restricted semantically to those entities that are considered an animate individual, while ARG2 (theme) refers to a physical object that travels from the agent to the goal.

One more property that argument structure may have in role is that it gives a certain pragmatic hierarchy of arguments. For example, some verbs of giving in Japanese, such as *yaru* "give" and *morau* "receive", are quite sensitive to the person hierarchy (cf. Matsushita 1928, Sakuma 1936).

(2.53) *Japanese*

a. Boku-wa {kimi/Hanako}-ni hon-o yat-ta.
I-Top you/Hanako-Dat book-Acc give-Past
"I gave a book to {you/Hanako}."

b. Kimi-wa {*boku/Hanako}-ni hon-o yat-ta.
you-Top me/Hanako-Dat book-Acc gave-Past
"You gave a book to {me/Hanako}."

c. Taroo-wa {*boku/*kimi/Hanako}-ni hon-o yat-ta.
Taro-Top me/you/Hanako-Dat book-Acc gave-Past
"Taro gave a book to {me/you/Hanako}."

In (2.53), the speaker's viewpoint is limited to the agent, specifying participants in such a manner that the agent argument is to be greater than or equal to the goal argument according to the deictic hierarchy in Japanese, "addresser > addressee > third party" (cf. Teramura 1982). This result can be encoded in the argument structure of a verb as a "deictic viewpoint (DV)".

(2.54) *yaru* "give"

ARGSTR = ARG1 = x: animate_individual
ARG2 = y: physical_object
ARG3 = z: animate_individual
DV = x (addresser > addressee > third party)

Of course, this is merely a description of observed phenomena, but any theory of the argument structure must provide an explanation to these constraints properly, since the restriction of this sort appears to reside in the lexical properties of a specific item rather than some semantic or pragmatic conditions in a particular language. In fact, other verbs of giving in Japanese, such as *ataeru* "give", do not show this kind of restriction at all.

2.2.3. Prominence on Arguments

Now, we turn to the issue of internal structure of events. Argument structure in a generative model of the lexicon takes on a cognitive semantic aspect in that it defines the configurations of event participants that have their source in our subjective event construal. On the other hand, the traditional notion of thematic roles will be abandoned to be indefinable, and thus untenable.

2.2.3.1. General Problems of Thematic Roles

In traditional generative syntax, participants of an event have been expressed as arguments with particular thematic roles, such as Agent and Theme. These thematic arguments are determinably distributed in appropriate slots in the argument structure of a predicate, and then mapped to appropriate positions in the syntax by virtue of idealized rules of argument realization. Many researchers have pointed out that arguments of a predicate should be ordered by general grammatical principles, by which we can predict their syntactic behaviors. In a generative model of the lexicon, however, we need to sharply distinguish *thematic* roles of arguments from *semantic* roles of arguments. The former represents general syntactic terms associated with particular variables in an argument structure, but the latter is defined in terms of predicate-argument relation with reference to relational predicates in a qualia structure. (For notational discrimination, I will begin the former with a capital letter (e.g., Agent, Theme), and the latter with a small letter (e.g., agent, theme)).

Fillmore (1968) first proposed that the selection of subject is somewhat sensitive to the thematic roles of arguments.

(2.55) *Fillmore's (1968) Subject Selection Rule*

> If there is an A [=Agent], it becomes the subject; otherwise, if there is an I [=Instrument], it becomes the subject; otherwise, the subject is the O [= Objective]. (Fillmore 1968: 33)

Subsequently, Dik (1978) pointed out that there is a natural "thematic hierarchy" in a

language that determines the grammatical relation of the arguments at d-structure.

(2.56) *Dik's (1978) Continuity Hypothesis*

> For any language, if Subj or Obj function can be assigned to some semantic function S_j, then Subj or Obj can be assigned to any semantic function S_i, such that S_i precedes S_j in SFH [= Semantic Function Hierarchy] (for Obj assignment, $S_i \neq Ag$). (Dik 1978: 76)

These hierarchies have been assumed to be universally true, with the proviso that languages may vary in the "sensitivity" to the particular hierarchy.

More recent works share the assumption that argument structure itself is highly structured, independent of syntax. Williams (1981) distinguishes between *external* and *internal* arguments, which constitute a significant manifestation of our grammatical knowledge about arguments and their positions in syntax. Grimshaw (1990) also proposes a "prominence" of argument structure, by which a grammatical hierarchy of arguments shall be defined by means of two dimensions of semantic analyses: thematic and aspectual.

(2.57) *Grimshaw's (1990) hierarchy of argument structure*

a. (Agent (Experiencer (Goal / Source / Location (Theme))))
b. (Cause (other (...))) (Grimshaw 1990: 24)

In this view, the external argument is defined as the outermost (i.e., leftmost) argument in both dimensions in (2.58). Furthermore, nominalization of complex event nominals (e.g., *destruction*) and passivization (e.g., *written*) are explained by means of a lexical semantic operation that *suppresses* the external argument into an "argument adjunct" (i.e., "implicit argument" (Roeper 1987)).

In this way, many previous researches on the interface between syntax and the lexicon have provided important contributions to the theory of argument structure. A common assumption for almost all of them is that the core of a syntactic structure is

predictable from the semantic information in the argument structure of a predicate. However, all things considered, any theory based on naive theta-roles labels does not seem to be successful in capturing proper modes of argument realization. Most crucially, over forty years since Fillmore's (1968) conception, there is still no consensus about sorts and numbers of thematic roles. In fact, many different researchers have been proposing many different thematic hierarchies according to many different phenomena that they attempt to give an explanation in terms of many different thematic roles. Seminal studies have been done not only on argument realization (Fillmore 1968, Dik 1978, Givón 1984, Kiparsky 1985, Grimshaw 1990, Jackendoff 1990b), but also on passivization (Bresnan and Kanerva 1989), causativization (Carrier-Duncan 1985), and other morphological processes, such as compounding (Foley and Van Valin 1984), serial verbs (Baker 1989), and light verbs (Grimshaw and Mester 1988). Witness some of the thematic hierarchies that have been proposed in the literature (see Levin and Rappaport Hovav (2005) for more lists):

(2.58) a. Fillmore (1968):

Agent > Instrument > Objective

b. Dik (1978):

Agent > Goal > Recipient > Beneficiary > Instrument > Location > Temporal

c. Givón (1984):

Agent > Dative / Beneficiary > Patient > Location > Instrumental > Associative > Manner

d. Kiparsky (1985):

Agent > Source > Goal > Instrument > Theme / Patient > Locative

e. Carrier-Duncan (1985):

Agent > Theme > Goal / Source / Location

f. Baker (1989):

Agent > Instrument > Patient / Theme > Goal / Location

g. Bresnan and Kanerva (1989):

Agent > Beneficiary > Recipient / Experiencer > Instrument > Theme / Patient > Location

h. Grimshaw (1990):

Agent > Experiencer > Goal / Source / Location > Theme

i. Jackendoff (1990b):

Actor > Patient / Beneficiary > Theme > Source / Goal / Reference Object > Identificational Goal / Reference Object

j. Speas (1990):

Agent > Experiencer > Theme > Goal / Source / Location > Manner / Time

k. Van Valin (1990):

Agent > Effector > Experiencer > Location > Theme > Patient

l. Baker (1997):

Agent > Patient / Theme > Goal / Source / Location

Judging from these circumstances, it is natural for some researchers (e.g., Newmeyer 2002) to conclude that there is a reason for strong doubt that there exists a thematic hierarchy provided by UG, though other linguists (e.g., Bresnan and Kanerva 1992) still assume that there is a universal ranking of thematic roles once the supporting data is more carefully scrutinized. Setting aside the question whether it is possible to identify a thematic hierarchy that works properly for argument realization, any theory of the lexicon must seek for the true nature of semantic arguments without depending on naive theta role labels.

Since thematic roles have been schemed by the intuition of linguists who accepts the view that there should be classifiable distinctions in roles of participants of any cognizable events or situations, proper treatment of these roles must be behind the more careful considerations for the concern about how we recognize those distinctions by making full use of our cognitive faculty. Langacker (1987) argues that there is a basic assumption in Cognitive Grammar that the grammatical relation of arguments cannot be

understood independently of semantic considerations of events. From this point of view, argument realization itself is seen as a natural reflection of our systematic event construal (Croft 1991, Langacker 1991). The general agreement is that on the condition that a particular event participant is profiled relatively more prominent than the others, it will be realized at a higher grammatical status in a clause. The basic premise of this logic is that the surface structure of a construction should be viewed as an integral part of our grammatical knowledge in which semantics (i.e., meaning) and pragmatics (i.e., function) are closely coupled with syntax (i.e., structure) in a "symbolic relationship" (Langacker 1990). In what follows, grounded on the results of Cognitive Grammar, I will pursue two major motivations for the systematic arrangement of event participants.

2.2.3.2. Billiard-Ball Model

From the view of Cognitive Grammar (Langacker 1987), grammatical relation of arguments is a manifestation of the speaker's way of event construal, which is reducible to symbolic relationships between form and meaning. This offers a profound insight into a theory that syntactic properties of constructions are necessarily associated with its semantic considerations. The way in which some event is decomposed is closely related to how we understand participants of the event. One sentence, by definition, expresses one event concept. When the speaker communicates with others through linguistic expressions, he must focus his attention on a single segment of situations, which consist of a complexly intertwined event structure in actual world, and pick it out to be encoded as a linguistic unit. Leaving aside some irrelevant issues, such as memory limitation, constraints on information processing and a possible range of lexical entailment of a single verb, the problem now is to reveal the abstract mode of cognition, based on which the speaker selects an event concept, along with its event participants, out of essentially chained interactions of events in a conceptual network.

Event concept includes not only actions such as *walking* and *reading a book*, but also static situations such as *A tree stands on a hill* and *It's cold today*. An event in this conceptualized field forms a network with an interactive relation of each other. This interactive network often includes a unidirectional flow of energy which is transmitted

from one participant to another. If the speaker transforms this transitive chain of energy flow into linguistic expressions, he first limits the coverage of expression to certain facets of interactive network, giving rise to a particular "scope of predication". Then, the speaker profiles participants in the limited chain according to their occasional salience in the relevant event structure. The means of selecting participants in an action chain can be defined by a style of the speaker's independent process of event construal, and thus the event concept expressed in a certain grammatical form (e.g., prototypically, a finite transitive clause) is definitely based on the speaker's pattern of conceptualization for outward world.

Langacker's (1990) "billiard-ball model" gives us a simple schema to understand a representation of *dynamic* event concepts that include a transfer of some "energy" among participants. In this model, every entity in the outside world is likened to an object like billiard balls, which conveys force to others or changes its state by the force conveyed by others. The occurrence of an event is considered as a "chain" of these objects. Langacker's (1990) "action chain" and Croft's (1991) "causal chain" are one of the most useful manifestations of this model based crucially on the energy relationship among participants.

The mode of profiling of arguments is directly manifested in relation of cognitive salience (or "prominence") among participants. In the sentences in (2.59), for example, the participant realized as the subject receives the speaker's attention mostly.

(2.59) a. John broke the window with the hammer.
b. The hammer broke the window.
c. The window broke.

The relevant chain of each event can be represented by a billiard-ball model as in (2.60). (Boxed texts indicate event participants, double-line arrows indicate transfer of energy, single-line arrows indicate a change of state, and shades indicate the speaker's cognitive focus).

(2.60) a. [John] ⇒ [hammer] ⇒ [window] → [window']

b. [hammer] ⇒ [window] → [window']

c. [window] → [window']

The sentences in (2.59) can be used to describe the same situation, since all action chains in (2.60) share certain facets of the full event, which, as a particular scope of predicate selected by the verb *break*, consists of three event segments (i.e., subevents): John's action on the hammer (i.e., [John] ⇒ [hammer]), the hammer's movement to the window (i.e., [hammer] ⇒ [window]), and the window's change of its state (i.e., [window] → [window']). In (2.60a), the speaker profiles the entire chain of the events along with their associated participants. On the other hand, in (2.60b) the agent lies outside the scope of predication, and in (2.60c) only the change of state in the patient falls within the scope boundary of the predicate.

These relations can immediately be transformed into the discussion of argument structure. Obviously, what the notion of cognitive salience or prominence of participants indicates is that there are cognitively-motivated orders in argument encoding, where such naive thematic role labels are no more necessary. Consider, for example, the very intuitive argument alignment in (2.61), corresponding to the action chains in (2.60), where the variable *x*, *y* and *z* indicate *John*, *the hammer* and *the window*, respectively.

(2.61) a. $break_1$: (e, x, y, z)

b. $break_2$: (e, y, z)

c. $break_3$: (e, z)

Of course, in the framework of Generative Lexicon, these enumerative lexical semantic representations are not tenable. Rather, more fine-grained argument structures in which each argument structure is set up for a single subevent including one event argument must be in need. Adopting event decomposition approaches discussed in section 2.1, let us suppose that the event structure of the verb *break* can be decomposed into two subevents: one is its causing activity and the other is its resulting state. The well-formed

argument structures, therefore, will be as follows.

(2.62) a. a causing part of *break*: (e1, x, y)
b. a resulting part of *break*: (e2, z)

Clearly, the argument structure for a causing part of *break* in (2.62a) has something to do with the selection of its external arguments, whereas that of a result part of *break* in (2.62b) with the selection of its internal argument.

In an action chain, those participants as "energy source" are generally profiled with respect to those participants as "energy sink". In an unmarked expression, the most prominent participant within the selected scope of a predicate is the "initiator" of the event, which is expected to start transferring of energy in the causal chain. Although the prototypical action chain originates with a canonical agent and terminates with a canonical patient, the initiator may be non-volitional in certain circumstances (e.g., *the hammer* in (2.59b)). Hence, the notion subject or direct object cannot be equated with any single role archetype. Instead, Cognitive Grammar views subject as the most salient participant in the limited scope of predication. On the same principle, the second salient participant is selected as the direct object, and the third salient participant, as the oblique object. Thus, the grammatical relation of event participants is closely interconnected to the manner of event cognition in a conceptual field, but not their thematic roles.

Similar points are made convincingly by Croft's (1991) "causal order hypothesis", by which he argues that the grammatical relations hierarchy, "Subject < Object < Oblique", corresponds to the order of participation of arguments in the causal chain. Thus, the temporal order of event perception is directly reflected in arrangement of words in a sentence. To put it briefly, when the speaker conceptualizes a certain facet of events, he needs to access the event participants in such an order as corresponding to their cognitive salience, and the event concept that reflects the order of the speaker's access is the biggest determining factor of the grammatical relation of those event participants. Evidently, there is a general tendency in our inherent cognitive systems such that we attempt to grasp a variety of complicated situations in the most simply

methodized way possible.

2.2.3.3. Figure-Ground Segregation

The concepts which interface several events in an interactive network are not limited to just causal relations such as one represented by a billiard-ball model based on a sequence of energetic interactions of events.

Talmy (1978) argues that the notions that promote association of abstract ideas also include "resemblance" and "contiguity". At first blush, it seems unlikely that one participant in a static event is cognitively more profiled than the other, since these notions make a relation to objectively equivalent qualities between two participants in the event. For example, the propositions included in the following pairs of sentences appear to be ontologically equivalent.

(2.63) a. Mary resembles Susan.
b. Susan resembles Mary.

(2.64) a. Switzerland is bordered on the west by France.
b. France is bordered on the east by Switzerland.

In fact, it appears that the argument encoding in (2.63) is completely arbitrary, selecting either participant as a candidate of *x* and *y* in the argument structure in (2.65).

(2.65) resemble (s, x, y)

However, our cognitive systems inevitably treat these concepts differently even if they lack any cause-effect relationships. The determinant factors of profiling participants in such a case are *intrinsic* salience which individual participants possess by their nature. By examining the prominence relation found between two arguments in a static event, Talmy (2000) argues that a language must establish one concept as a reference point (called "Figure") for another concept (called "Ground"). This pair of concepts can be of two events or event participants relating to each other, not only in

causal situations but also in purely temporal or spatial configurations. The definitional and associated characteristics of Figure and Ground are given in (2.66).

(2.66) *Figure-Ground Segregation*

	Figure	Ground
Definitional characteristics	Has unknown spatial (or temporal) properties to be determined	Acts as a reference entity, having known properties that can characterize the Figure's unknowns
Associated characteristics	• more movable	• more permanently located
	• smaller	• larger
	• geometrically simpler (often pointlike) in its treatment	• geometrically more complex in its treatment
	• more recently on the scene/in awareness	• more familiar/expected
	• of greater concern/relevance	• of lesser concern/relevance
	• less immediately perceivable	• more immediately perceivable
	• more salient, once perceived	• more backgrounded, once Figure is perceived
	• more dependent	• more independent

(Talmy 2000: 315-6)

According to Talmy (2000), the items in the list give an intelligent explanation for the natural prominence scale of two participants that do not have any direct relation with the other. Consider, for example, the participants in the following pairs of sentences:

(2.67) a. The bike is near the house.

b. ? The house is near the bike. (Talmy 2000: 314)

(2.68) a. My sister resembles Madonna.

b. ? Madonna resembles my sister. (Talmy 2000: 318)

In (2.67), where the positional relationship between two spatially-aligned entities is described, *the bike* is naturally associated with Figure as a "smaller" and "more movable" entity than *the house*. In (2.68), where resemblance between two persons in their appearance is described, *Madonna*, the well-known singer, is naturally associated with Ground as a "more familiar/expected" topic for daily conversation. Arguments associated with Figure are preferably selected as the subject, while those associated with Ground function as a reference point to describe a character of the subject. In this wise, language inescapably imposes that one participant has to be profiled as relatively more salient than the other, even if the two participants have no causal relationship (and even when the speaker is not conscious about the Figure-Ground segregation).

The principle of Figure-Ground segregation also dictates that a Figure object must be realized in higher syntactic status than a Ground object in terms of their grammatical relations. For example, there is clearly a Figure-Ground reversal in the locative alternation.

(2.69) a. I slowly suffused perfume (F) through the room (G).

b. I slowly suffused the room (G) with perfume (F). (Talmy 2000: 335)

The theme argument, *perfume*, should be profiled basically more than the location argument, *the room*, as in (2.69a), since the theme is the precedent participant to the location in the canonical action chain. However, the selection of the arguments is reversed in (2.69b), where *the room* is construed as more salient participant than *perfume*. This special reversal of argument realization is relevant to the notion of "markedness" of the sentence, and produces an "affected" interpretation on the location argument in (2.69b) (Anderson 1971). The mechanism of the cognitive reversal of this sort will be discussed in chapter 4 in terms of the shifting of event head assignment.

Since Figure-Ground segregation is the experience of the speaker's subjective event construal, participants associated with multiple items in the list of (2.66) may

strengthen their properties incrementally. For example, if *my sister* in (2.68) (named *Mary* by way of convenience) comes to be a special topic in a discourse to gain additional features as Figure, such as "more recently on the scene", "of grater concern/relevance" and "more salient, once perceived", the observed peculiarity in (2.68b) becomes more highlighted.

(2.70) A: Mary is a beautiful woman, isn't she?
B:??Of course, I think Madonna resembles her.
(cf. Of course, I think she resembles Madonna.)

This contrast also indicates that the subject is a focus of our attention, usually a topic in the context. In this respect, the participants in the above examples hold subjectively produced asymmetries. The factor of these asymmetries is the virtual order of profiling process, which is similar to the way of accessing participants in the action chain. Although the style of profiling event participants is not determined solely and exclusively, it seems generally true that concrete entities tend to be more profiled than abstract concepts, and animate beings (especially, human beings) than inanimate beings, other things being equal.

2.3. Qualia Structure

In this section, I will outline the structured representation of semantic functions called "qualia structure", which gives the relational force of a lexical item and provides a fundamental framework of the Generative Lexicon. Briefly, qualia structure tells us how lexical items encode their semantic information compositionally. Importantly, event structure and argument structure discussed in the preceding sections will be readily incorporated into a single representation of the qualia structure.

2.3.1. Modes of Explanation

The meaning of a word varies among different languages and different people. Even such a simple English word as *book* has many different extensions according to

the speakers' viewpoints and background knowledge. In his book *physics*, Aristotle advanced the theory that there are four fundamental modes of explanation ("*aitiae*") that must be considered under every phenomenon in the world: material cause ("*hyle*"), formal cause ("*eidos*"), final cause ("*telos*"), and efficient cause ("*arche*"). And these four causes are mutually involved to constitute a concept called "quale", which is lexicalized distinctly in a word.

Following Moravcsik (1975), Pustejovsky (1995) brings the idea of Aristotle's modes of explanation to linguistics, arguing that the concept that a word carries can be defined in terms of four essential aspects of meanings which contribute to our ability to name an object or an event by means of certain predication relations. In his theory of Generative Lexicon, the meaning of a word is defined in terms of "qualia structure" as a set of properties or events associated with lexical items which best explain what the word means, along with a set of operative devices which supports a generative aspect of the lexicon. Specifically, a qualia structure has the following four essential generative factors, or *qualia*, in good accordance with Aristotle's four causes.

(2.71) a. Constitutive: the relation between an object and its constituent parts;
b. Formal: the basic category which distinguishes it within a larger domain;
c. Telic: its purpose and function;
d. Agentive: factors involved in its origin or "bringing it about".

(Pustejovsky 1995: 76)

In a qualia structure, each qualia value is understood as a set of expressions with well-defined types of variables or relational predicates that take variables as arguments. In this respect, the theory is designed to be compatible in a way with logical semantics and other fields such as computational linguistics.

In a generative model of the lexicon, all lexical items are analyzed as *relational* to a certain degree to other lexical items that carry similar semantic contents, although the manner in which the similarity is expressed functionally differs from category to category. For example, *novel* is similar to *dictionary* in its appearance (as *a book*) but

determinably different in its content (*novel* includes narrative; *dictionary* includes words), its function (*novel* is to be read; *dictionary* is to be consulted) and its origin (*novel* is written by a writer; *dictionary* is compiled by an editor). Qualia structures for these nominals specify these similarities and differences in the following manner.

(2.72) novel

QUALIA = CONST = y: narrative

FORMAL = x: book

TELIC = read (e, z, x)

AGENTIVE = write (e, w, x)

(2.73) dictionary

QUALIA = CONST = y: words

FORMAL = x: book

TELIC = consult (e, z, x)

AGENTIVE = compile (e, w, x)

This relational nature of lexical items is captured in terms of generative factors which can be viewed as a system of inference on the semantic content of these words (see section 2.4).

For relations, qualia act in their capacity similar to traditional thematic roles, where the individual qualia are possibly associated with entire event descriptions and not just individuals. However, considering the issue of "logical polysemy" discussed in section 1.3, where certain lexical items exhibit more than one meaning according to the context, a set of generative devises in the lexicon is required to capture the various different behaviors of a lexical item. In order to formalize these relationships, qualia structure should not be merely a simple listing of semantic roles and features, but must be able to provide a structural template over which some semantic transformations apply. This is a major shift in the lexical semantic paradigm, particularly when we consider the phenomena of argument realization and alternations, since it is necessary for any theory of the lexicon design to seek reasonable accounts for the many different distributions of

lexical items without increasing a burden of acquiring them.

Although Pustejovsky (1995) amply discuss the meaning of nominals in terms of his qualia structure, he does not make explicit how it extends to the meaning of predicates. However, from a lexical semantic point of view, where word meanings are fundamentally compositional, the meaning of predicates must also be defined in terms of their qualia structures. In what follows, based in large part on Pustejovsky's original observations on nominals, I will explore the qualia structure of predicates, with some necessary modifications added to his original interpretation.

2.3.2. Interpretation of Qualia Roles

The qualia structure of predicates consists of four fundamental aspects that have different semantic functions of the logical meaning. In this subsection, the interpretation of individual qualia roles will be discussed in order.

2.3.2.1. Formal Qualia

The formal qualia represent a taxonomic characterization of an object or an event, which distinguish the type of an object or an event from a larger set.

This relation is notionally equivalent to what is called the "is_a function" in traditional semantics (Cruse 1986). The typical example of this schema is given in (2.74).

(2.74) *A is a type of B*

a. An apple is a type of fruit.

b. A dog is a type of animal.

c. A rose is a type of flower.

By definition, the formal qualia of nominals indicate a preferably immediate hypernym of an object in this schema.

(2.75) apple

QUALIA = FORMAL = x: fruit

(2.76) dog

QUALIA = FORMAL = x: animal

This relation holds in predicates as well. For predicates, the taxonomic relation is accomplished among events (or states), since one of the crucial roles of predicates is to express an event (or a state) that is conceptualized by our cognizers. For example, the event denoted by the intransitive verb *walk* can be considered as being a subtype of the event denoted by the intransitive verb *move*, since the event *John walked* clearly entails the event *John moved*, but not vice versa (see section 2.4 below). Then, the formal quale of *walk* can be described as follows.

(2.77) walk

QUALIA = FORMAL = move (e, x, y)

In (2.77), *move* is a relational predicate, taking two semantic arguments corresponding to a theme (x) and a path (y) that is bound by an event argument (e). Notationally, *e* is a symbol of event arguments that indicates a subevent, while *x* and *y* are a symbol of variables that participates in that subevent. These arguments are ordered from left to right in terms of their relative prominence to the others (see section 2.2.3.2).

For adjectives, the formal qualia express a temporary or permanent state with the relational predicate *be* (Jackendoff 1990b, Kageyama 1996).

(2.78) happy

QUALIA = FORMAL = be (e, x, <u>happy</u>)

The underlined argument in (2.78) indicates a constant of the predicate which specifies the *x*'s actual state of being happy.

This relation can also be seen in verbs of change of state, such as *break* in (2.79).

(2.79) break

QUALIA = FORMAL = be (e, x, broken)

Verbs of change of state entail the result state of a theme, which must be lexicalized in their lexical semantic representations as a constant. They are to be distinguished from other verbs in the same domain (e.g., *bend*, *cook*) based on the final state they denote.

One of the major differences between the nominals and predicates is that the formal qualia of the former are defined as a set of variables, while that of the latter, as a set of predicates. Relational predicates in each quale contain a proper set of variables along with an event argument. In typical instances, events displayed in the formal qualia can be viewed in natural semantic terms as the "result" of the whole event.

2.3.2.2. Agentive Qualia

The agentive qualia indicate the manner in which an object is created or an event is taken place. How something is comes about is important for distinguishing objects and events in the world.

For nominals, the agentive qualia are represented by relational predicates that define a typical activity of producing the object. For example, *song* does not come into existence unless someone *composes* it, and *house* does not come into existence unless someone *builds* it. The information about its origin is directly reflected in the agentive qualia of these nominals.

(2.80) song

QUALIA = FORMAL = x: music

AGENTIVE = compose (e, w, x)

(2.81) house

QUALIA = FORMAL = x: building

AGENTIVE = build (e, w, x)

Here, the object being defined is typically bound to the second argument of the relation, with the first argument (w) indicating some agentive force to act on the object.

For predicates, the agentive qualia make reference to a relation that is necessary for the event to be taken place. Typically, intentional events such as *walking* and *playing* are brought about by a volitional action by the agent. However, even such accidental behaviors as *smiling* and *snoring* can be understood as involving some causing actions. Therefore, we assume that the agentive qualia of these predicates can be uniformly defined by the activity predicate *act*.

(2.82) walk
QUALIA = AGENTIVE = act (e, x)

(2.83) play
QUALIA = AGENTIVE = act (e, x)

(2.84) smile
QUALIA = AGENTIVE = act (e, x)

(2.85) snore
QUALIA = AGENTIVE = act (e, x)

Precisely, *act* indicates a relational predicate that expresses a continuous activity by an actor (cf. Pinker 1989). This predicate must be distinguished from the similar relational predicate *do* (Foley and Van Valin 1984), which only expresses a volitional activity by the agent. The main reason why we do not draw a distinction between volitional and non-volitional activities is that they do not have any difference in their lexical aspect (Dowty 1979). That is, there are some non-volitional events that express a continuous activity (e.g. *It rained for many days*), just as volitional events do. Thus, adopting *act*, instead of *do*, enables us to abstract a common semantic feature of these predicates in natural semantics.

For adjectives, there seems no agentive quale to be defined lexically, since they do not name any activity that brings about a particular state. However, when certain grammatical factors pragmatically coerce a volitional activity by the agent, the agentive

qualia may be evoked. In fact, we have the progressive form (e.g. *John is being happy*) and the imperative form (e.g. *Be quiet!*) in order to express an activity that causes the state named by the adjective.

It is important to note here that whereas the formal qualia of predicates express a resulting part of the event, the agentive qualia express a causing part of that event. This can be viewed as a way of understanding event decomposition in terms of a qualia structure. In this view, event functions in Conceptual Semantics, such as CAUSE and BECOME, need not be qualified any longer, since these relations are now recognizable as a derived semantic notion in the qualia structure by means of temporal contiguity and logical dependence between the two subevents (cf. Ono 2005).

2.3.2.3. Constitutive Qualia

The constitutive qualia represent a meronymic relation associated with an object or an event. For nominals, it refers to the parts or materials of an object in the inverted form of the "is_a_part_of" link.[6]

(2.86) *A contains B (= B is a part of A)*

a. A body contains an arm. (= An arm is a part of a body.)
b. An arm contains a hand. (= A hand is a part of an arm.)
c. A hand contains a finger. (= A finger is a part of a hand.)

Generally, the constitutive qualia of nominals are defined by the relationship with the formal qualia. For example, *hand* is logically a part of *arm*, which is of type *limb*. The qualia structure of *hand* will be something like (2.87).

(2.87) arm

QUALIA = FORMAL = x: limb
CONST = y: hand

For predicates, the constitutive qualia contain the background information that is

centralized to motivate the interpretation of events being described. These notions include properties (e.g., *manner*, *instrument*) and settings (e.g., *time*, *location*), which are necessary to specify events and situations properly. This type of information usually appears in the sentence as a true adjunct only by discourse conditions.

(2.88) a. Mary wrote a letter in a hurry. (manner)
b. John hit the fence with a stick. (instrument)
c. Susan slept late on Tuesday. (time)
d. Bill saw the boy in Boston. (location)

The domain in question can be viewed as partially parallel to "semantic fields" in Conceptual Semantics (Gruber 1965, Jackendoff 1976), "frames" in Frame Semantics (Fillmore 1982) and "mental spaces" in Cognitive Grammar (Fauconnier 1985).

Although the constitutive qualia of predicates are usually established contextually, there are some cases in which particular lexical items lexicalize the specific constitutive roles. For example, verbs of giving, such as *give* and *sell*, always evoke a semantic field that is linked with "possession" (Gruber 1965, Jackendoff 1990b). Moreover, verbs like *cut* necessarily denote an event in which a volitional agent uses a tool to cut an object (Guerssel et al. 1985).

(2.89) cut
QUALIA = CONST = i: cutlery
FORMAL = be (e2, y, cut)
AGENTIVE = act (e1, x, i)

In (2.89), the instrument argument (i) is involved in the agentive quale as the second argument, since it is understood as an object that receives the energy to work from the agent. Furthermore, the "direction" of a movement is an important factor to distinguish between *lift* and *lower*.

(2.90) lift

QUALIA = CONST = m: upward (→e2)

FORMAL = move (e2, y)

AGENTIVE = act (e1, x)

(2.91) lower

QUALIA = CONST = m: downward (→e2)

FORMAL = move (e2, y)

AGENTIVE = act (e1, x)

The arrows in the constitutive qualia indicate the place of the event argument that the manner adverbs modify. Verbs like *spill*, *inject* and *ladle* are distinct in the manner that the agent transfer the liquid (Pinker 1989). These differences should be connected to the agentive qualia of these verbs.

2.3.2.4. Telic Qualia

The telic qualia define what the purpose or function of a concept is.

For nominals, they define purpose that an agent has in performing an act and built-in function or aim which specifies certain activities. According to Pustejovsky (1995), there are two types of modes in telic qualia: direct telic and purpose telic. An example of direct telic can be observed by the noun *beer* in (2.92).

(2.92) beer

QUALIA = FORMAL = x: liquid

TELIC = drink (e, y, x)

In (2.92), the telic quale of *beer* directly incorporates a variable for the item as an object of the predicate *drink*.

On the other hand, an example of purpose telic is found with the noun *knife* in (2.93).

(2.93) knife

QUALIA = FORMAL = x: artifact

TELIC = cut (e, x, y)

Being a cutting tool, *knife* is usually interpreted as an instrument to be performed on the agent. This relation is described by a variable for the item incorporated as subject of the qualia predicate *cut*. The agentive nature of an instrument is showed in the following alternation associated with the instrument subject construction (cf. Levin 1993).

(2.94) a. The knife cut the bread.

b. John cut the bread with the knife. (Pustejovsky 1995: 100)

By virtue of the intrinsic complexity of qualia structures, there is no simple one-to-one mapping between theta-roles and qualia. This alternation will be discussed in section 6.1.2.

For predicates, the telic qualia specify a primary purpose of the event. For example, the most typical intension of *sending* an object to someone may be for him to receive it. Thus, the telic quale for the verb *send* can be defined by the possessional predicate *have*.

(2.95) send

QUALIA = FORMAL = move (e, y, z)

TELIC = have (e, z, y)

AGENTIVE act (e, x)

Importantly, however, values of telic qualia should be decided contextually. While the formal qualia indicate the logical entailment of the event, the telic qualia merely express an expected result of the event. In fact, the subevent being defined by the telic qualia can be easily canceled.

(2.96) a. John sent a letter to Bill, but it never arrived (so Bill didn't get it).

b * John sent a letter to Bill, but it never moved (so Bill didn't get it).

Thus, the telic qualia of predicates express a conversational implicature by the speaker. As indicated in (2.96b), on the other hand, the subevent defined by the formal qualia can never be canceled, since it denotes a logical entailment of the predicate.

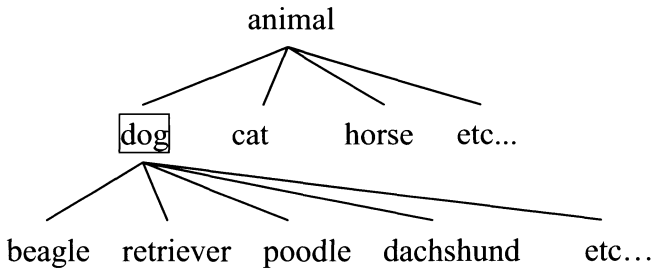
2.4. Lexical Inheritance Structure

Now that we obtain a general way of interpreting the meaning of predicates, one important question arises as to the structure of the lexicon. That is, we need to ask now how word meanings are related to each other. This particular inquiry has been a topic especially among those semantists who agree that lexical items hold a "paradigmatic" relation in the lexicon (e.g., Lyons 1977, Cruse 1986, Clark 1993).

Part of the answer to this question may be provided by the computational system called "lexical inheritance structure" (Pustejovsky 1995), which is identification of how a lexical structure is related to other structures in "type lattice", and its contribution to the global organization of a lexicon. Lexical inheritance structure, therefore, provides a network-like property of our lexical knowledge, avoiding many possible redundancies in access to the appropriate meaning of a lexical item.

To take a familiar example, the word *dog* must be related to its hypernym *animal*, and all possible hyponyms such as *beagle*, *retriever* and *poodle*, as in (2.97).

(2.97)



In logical semantics, a hyponym truth-conditionally entails its hypernyms (Kempson 1977). That is, if a proposition including a hyponym is true, then a proposition including

its hypernyms (and nothing else being changed) is also true. For example, if (2.98a) and (2.99a) are true, (2.98b) and (2.99b) are also true.

(2.98) a. Snoopy is a beagle.
b. Snoopy is a dog.

(2.99) a. There is a dog in the garden.
b. There is an animal in the garden.

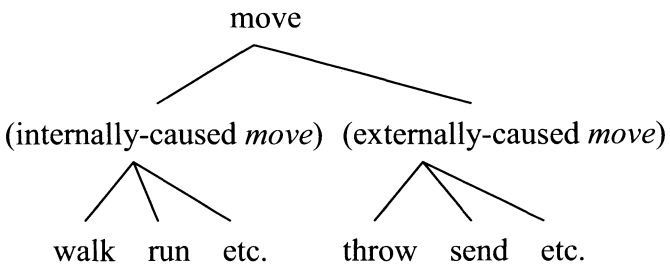
This relation can be captured by assuming that a hyponym inherits the formal quale of its hypernyms. In other words, the formal quale of a word can be defined by its hypernyms.

(2.100) beagle
QUALIA = FORMAL = x: dog

(2.101) dog
QUALIA = FORMAL = x: animal

This explanation can be extended to predicates as well. For example, the verbs *walk*, *run*, *throw* and *send* are all seen as a subtype of the verb *move* by the following lexical inheritance structure.

(2.102)



In the sense that *walk*, *run*, *throw* and *send* include an event that denotes a physical movement of the theme, all these verbs can be regarded as a natural semantic class of predicates. Now, the difference between *walk* and *throw* is that the former represents a

situation in which a movement is driven by the theme itself, but the latter describes a situation in which a movement is caused by the agent. This difference shall be described in the qualia structure of *walk* in (2.103) and that of *throw* in (2.104).

(2.103) walk

QUALIA = CONST = walking_manner (→e1)

FORMAL = move (e2, x, y)

AGENTIVE = act (e1, x)

(2.104) throw

QUALIA = FORMAL = move (e2, y, z)

AGENTIVE = act (e1, x)

In (2.103), the argument *x* plays a dual role, in that the entity that acts and the entity that moves are equal in its semantic value. In (2.104), on the other hand, the entity that carries out an activity and the entity that moves must be different, as indicated by different semantic values for variables.

This constitutes another reason why the agentive and formal qualia of predicates should be distinguished. As mentioned in section 2.3.2.1, the formal qualia express a logical entailment that can never be canceled in natural contexts, while the content of the agentive qualia may vary according to the context. In other words, there are many possible interpretations of the external argument of a predicate, though the result is always the same.

(2.105) a. John killed Mary deliberately. (agent)

b. John killed Mary unconsciously. (causer/actor)

c. The poison killed Mary. (instrument)

d. The typhoon killed Mary. (natural force)

e. The war killed Mary. (cause)

This division of qualia roles is a natural translation of the predicate decomposition

approaches advocated by many (e.g., Dowty 1979, Jackendoff 1990b, Levin and Rappaport Hovav 1995, Kageyama 1996, Pustejovsky 1995, Van Valin and LaPolla 1997).

In conclusion, it may be possible to give the definition of words that are so many as to be countless with surprisingly small sets of primitive predicates, such as those listed in (2.106), and individual semantic values of argument variables associated with those predicates.

(2.106) a. act (e, x) (x = entity)
b. be (e, x, y) (x = entity, y = location/state)
c. move (e, x, y) (x = entity, y = path/goal)
d. have (e, x, y) (x = entity, y = entity)

The word "primitive" should be understood as being significant to the extent which is grammatically-relevant (cf. Levin 1993). Event decomposition, therefore, is only effective when its outcome is empirically motivated by any linguistic data. Hence, the predicates in (2.106) can be regarded as semantically "primitive" to the extent that they cannot be decomposed any further into a semantically-narrow class of predicates in a linguistically relevant manner.

2.5. Summary

We can summarize the result of this chapter as follows. The lexical knowledge of predicates shall be defined as a structured *mete-entry* of the following four levels of representation.

(2.107) a. Event Structure: a configuration of substantial events of a lexical item that exhibits linguistically relevant event types;
b. Argument Structure: a specification of logical participants in the event denoted by a lexical item;

c. Qualia Structure: a property which gives the relational meaning of a lexical item by means of four essential aspects of word meaning, called *qualia*;
d. Lexical Inheritance Structure: a network-like knowledge which provides a way to avoid redundancies of a lexical item.

In particular, the qualia structure of predicates is defined as follows.

(2.108) *Qualia Structure of Predicates*

a. CONST: Setting (e.g. time, location), Property (e.g. manner, instrument);
b. FORMAL: Logical Entailment, Result;
c. TELIC: Purpose, Aim, Conversational Implicature;
d. AGENTIVE: Activity, Intermediary Instrument, Natural Force.

Among four qualia roles, formal and agentive roles are logically (or truth-conditionally) defined, while constitutive and telic roles may be the subject to discourse conditions. Importantly, these qualia roles are in fact structures which admit of transformational operations in order to capture polymorphic behaviors of word sense and various kinds of behaviors in argument realization and alternations. Indeed, it will be shown in the next chapter that what is directly relevant to syntactic distributions of arguments is their systematic alignment in the qualia structure.

To be more precise, let us review the full definition of the verb *walk* in (2.109):

(2.109) walk

EVENTSTR = E1 = e1: process

E2 = e2: process

RESTR = $<_{\bigcirc\infty}$

HEAD = e1

ARGSTR = ARG1 = x: animate_individual

D-ARG1 = y: path

QUALIA = CONST = walking_manner (→e1)

FORMAL = move (e2, x, y)

AGENTIVE = act (e1*, x)

By this representation, we understand the following interpretation for the verb *walk*. The causing force of *walk* is an action by the agent symbolized as *x* (agentive quale), while the result of the event involves a movement of the actor himself (formal quale). The activity of *walk* includes a walking manner (i.e., with one of the feet always being on the ground), which distinguishes *walk* from *run* (constitutive qualia). In this wise, event structure and argument structure can be fully incorporated into the qualia structure of *walk*.

One thing worth mentioning here is a notational discrimination adopted in this thesis. According to Fellbaum and Miller (1990), the verb *amble* has a "toroponymic" relation with the verb *walk*, since it includes specification of a special manner of walking. The verb *mumble* has the same relation with the verb *talk*. Accordingly, the formal qualia of these predicates appear to be (2.110) and (2.111), respectively, if followed by the strict definition of the formal qualia that says the formal qualia specify "preferably immediate hypernym" (cf. Fellbaum 1990, 1998).

(2.110) amble

QUALIA = FORMAL = walk (e, x)

(2.111) mumble

QUALIA = FORMAL = talk (e, x)

However, what is particularly important in the organization of qualia structure is that manners do not constitute a criterion that distinguishes a predicate "in a larger domain". Rather, manner components only distinguish a predicate "within the same domain".

Tenny (2000) argues that verbs denoting some change of state in the verb's direct object involve certain inner events, called "core events". Core events contain types of internal arguments associated with stativity or inchoativity to be projected into the syntax as a lexical category (i.e., VP). Employing the pure concept of Tenny's core events, the formal qualia of predicates should be only responsible to those subevents that involve internal arguments. In this view, *amble* is still the hyponym of *move*, just as *walk* is. In contrast, *mumble* cannot be treated as a hyponym of any predicate, since it contains no internal arguments associated with stativity or inchoativity. Thus, the qualia structures of these predicates must be as follows.

(2.112) amble

QUALIA = CONST = ambling_manner (→e1)
FORMAL = move (e2, x)
AGENTIVE = act (e1, x)

(2.113) mumble

QUALIA = CONST = mumbling_manner (→e1)
FORMAL = φ
AGENTIVE = act (e1, x)

In (2,112), *amble* has the same lexical semantic representation as *walk* except its manner specification, which corresponds exactly with the fact that these two verbs are only distinguishable in their manners of the action. In (2.113), *mumble* does not specify particular formal roles, since the verb does not entail any result of the action. The difference between (2.111) and (2.113) is not merely an instance of notational variations, but an important aspect of our lexical knowledge of the item. In fact, we can now correctly understand that the verb *mumble* lacks any internal argument, and behaves

similarly to the verb *talk*.

As in the case of *mumble* in (2.113), it is possible that not all lexical items carry a value for individual qualia roles. The absence of particular qualia roles constitutes a significant part of our lexical knowledge. For example, the absence of the agentive qualia of nominals indicates that the item is not an artifact (e.g., *television*, *chair*) but a natural kind (e.g., *stone*, *water*). By the same token, the absence of the agentive qualia of predicates distinguishes unaccusatives from unergatives.

(2.114) a. Tom cries. / Bill danced. / Catharine smiles.

b. The earthquake happens. / A man appeared. / The train arrived.

The situations described in (2.114b) may all have some clear causes in reality, but the logical reasons of the happening (of earthquake), the appearance (of a man), and the arrival (of the train) must be abstracted from the lexical meaning of the verb. In fact, unaccusatives do not have any external theta arguments syntactically, and exhibit the achievement property in their lexical aspect (see section 3.4 below).

Chapter 3: Mapping from Qualia to Syntax

In this chapter, I explore what the consequences of qualia-based semantic representation of predicates are for the mapping of their semantic arguments. In particular, I sketch briefly how arguments of a verb are properly mapped to syntax under discrete linking rules. Given that the event-headedness acts to foreground or "focus" a single quale of the verbal semantic representation, a general remark will be that the abstracted quale that results from headedness must be "saturated" by mapping its semantic arguments to the syntactic structure. Since our lexical semantic representations are substantially different from Pustejovsky's (1995) original proposal, our linking strategy will also be significantly different from his. Specifically, our linking rules essentially refer to the difference in types of qualia roles and their corresponding projections in syntax. Still, our strategy of argument linking is very general in that it would overgenerate inadequate syntactic representations unless certain grammatical constraints operate in the interface between syntax and the lexicon.

3.1. General Linking Rules

Perhaps, all the work that concerns the mapping from lexical semantics to syntax is meant to impose certain constraints on the actual mapping, and thus its formulation crucially depends on the semantic and syntactic representations being assumed. So far, it has been a shared view that there is a general relationship between the lexical semantic representation of a verb and its syntactic realization of arguments. This assumption is first expressed linguistically by Perlmutter (1978), and stated explicitly by Perlmutter and Postal (1984) as the Universal Alignment Hypothesis.

(3.1) *Universal Alignment Hypothesis*

There exist principles of UG which predict the initial relation borne by each nominal in a given clause from the meaning of the clause.

(Perlmutter and Postal 1984: 87)

As we have seen in section 1.2, there are actually semantically coherent classes of verbs whose members show similar syntactic behavior and semantically defined classes of arguments that pattern together in terms of argument realization. These studies suggest that there are predictable generality on the mapping that can be treated as "general rules" on linking.

In fact, many previous studies attempt to reveal a close relationship between thematic arguments and their syntactic structure. According to Williams (1981), arguments can be *syntactically* divided into two categories: external and internal arguments. The difference is most naturally observable in their morpho-syntactic behaviors, but it is also definable in terms of the qualia structure of a predicate. In our terms, external arguments, typified by Agent in thematic roles, can be defined as semantic arguments selected from the agentive qualia of a predicate, encompassing all types of immediate causes, such as volitional and non-volitional agents, natural forces, instruments, and experiencers. On the other hand, internal arguments, which are more readily associated with the result of an event, must be selected from the formal qualia that denote a change-of-state or a change-of-location in the theme.

To capture this highly configurational nature of argument realization, Baker (1988) examines a close relationship between thematic and structural hierarchies, which is summarized as the Uniformity of Theta Assignment Hypothesis (UTAH) given in (3.2).

(3.2) *Uniformity of Theta Assignment Hypothesis (UTAH)*

Identical thematic relationships between items are represented by identical structural relationships between those items at the level of d-structure.

(Baker 1988: 46)

The UTAH, as it is, allows a many-to-one mapping from semantics to syntax. That is, all members of a semantically equivalent class of verbs must map onto the same syntactic position, but there need not be a unique semantic class of arguments associated with a fixed syntactic position. For example, the syntactic notion of "subject" need not

be associated with a unified semantic characterization.

(3.3)	a.	John shot the bear.	(Agent)
	b.	She snores loudly.	(Actor)
	c.	The war killed Mary.	(Cause)
	d.	John received a package from Baraboo.	(Recipient)
	e.	Mary hates John.	(Experiencer)
	f.	A typhoon hit the city.	(Natural Force)
	g.	The noise frightened Mary.	(Stimulus)
	h.	The crane loaded the truck.	(Instrument)

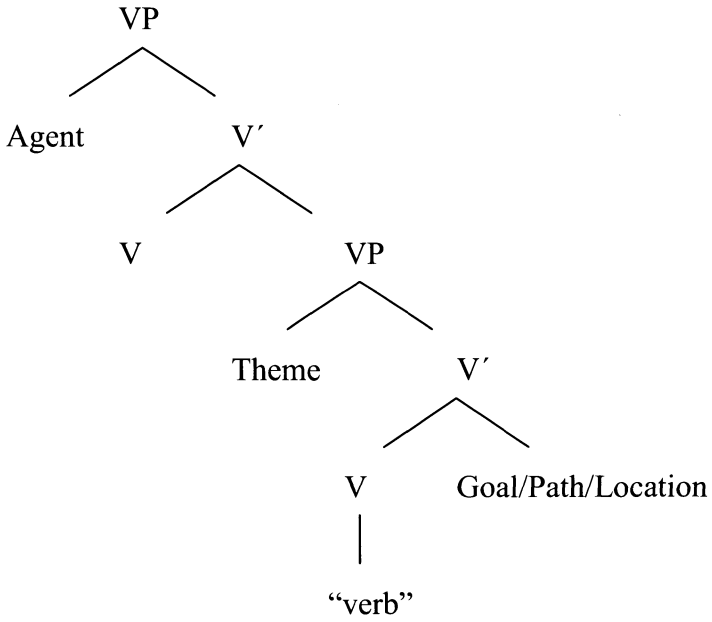
Conversely, arguments bearing the theme role can be realized as subject, object, and even oblique.

(3.4)	a.	*Water* splashed on my clothes.	(subject)
	b.	The children splashed *water* on my clothes.	(object)
	c.	The children splashed my clothes with *water*.	(oblique)

In this approach, therefore, all semantic distinctions need not be reflected in syntax, and certain essential semantic properties are preserved in the lexical semantic representation of a predicate.

In contrast, Baker (1997) maintains a strict one-to-one correspondence between thematic roles and syntactic positions by positing fairly coarse-grained thematic roles along with an abstract underlying syntactic representation. His main claim is that for the purpose of obtaining "deep" grammatical relations, only three broad thematic roles, namely Agent, Theme, and Goal/Path/Location, are necessary, and that there are some linking principles that map these three thematic roles onto three syntactically defined positions in the Larsonian VP-shell (i.e., two-layered VP structure). The syntactic configuration assumed by Baker (1997) can be described as follows.

(3.5)



Baker's (1997) conclusion is that the UTAH is only sensitive to a coarse grained version of theta theory, which distinguishes only three primary thematic roles. This shift is an ambitiously challenging enterprise to embody many many-to-one mapping approaches (e.g., Levin and Rappaport Hovav 1995, Kural 1996) into a strict one-to-one mapping approach, where generalized thematic roles are defined as a cluster or prototype concept, such as Van Valin's (1999) "macroroles", Dowty's (1991) "proto-roles" and Schlesinger's (1995) "A-case". The apparent beauty of Baker's approach is to keep the number of thematic roles small by adopting more abstracted notions of thematic roles, by which the size of the role inventory is significantly reduced.

As we have discussed in section 2.2.3.1, however, any theory dependent on naive theta role labels will be collapsed when the fine-grained distinction of thematic roles is required (see also section 3.3.1 below). For example, Kaga (2007) elaborates an Agent > Goal > Theme hierarchy, destructing previously assumed thematic hierarchy by Baker (1997). Naturally, there are considerate inconsistencies between the two studies in the definition of thematic roles. Furthermore, Baker's hierarchy has received significant doubts from typological perspectives. Many researchers have suggested that Japanese has a Goal > Theme hierarchy with regard to internal arguments (Hoji 1985, Yatsushiro 2003, Takano 2008). Even in English, some researchers have provided a Goal > Theme

hierarchy in terms of the double object construction (Aoun and Li 1986, Fujita 1996, Takano 1998). With these circumstances in mind, I propose general linking rules that are conceptually apart from thematic roles, but only refer to the prominence hierarchy among arguments. Actually, this is a necessary theoretical shift to maintain our conclusion drawn in section 2.2.3.

In order to present a prominence preservation approach, let us first introduce the mapping principle called "Uniformity of Prominence Assignment Hypothesis (UPAH)", which is essentially a relativized interpretation of Baker's UTAH.

(3.6) *Uniformity of Prominence Assignment Hypothesis (UPAH)*
Identical relative prominence hierarchy of semantic arguments is represented by identical structural hierarchy between those arguments at the level of base structure.

The UPAH is assumed to be operative in any mapping from lexical semantics to syntax. In effect, it gives the following schema for projecting semantic arguments from qualia to syntax.

(3.7) Q: P (e, x, y, z, ...) → ... [... x ... [.... y ... [... z ...]]] ...

In (3.7), P is a relational predicate in a qualia structure that contains a proper set of variables (x, y, z, ...) along with an event argument (e). The UPAH requires that all variables other than event arguments be projected in the syntax in the manner that a more prominent argument in the qualia structure will be located at a more outer (i.e., higher) position in the syntactic structure. In consequence, prominence between any two arguments will be reflected in their c-command relation at the configurational syntactic representation.[1]

Within the approach based on the UPAH, general linking rules that govern the mapping from qualia to syntax will be as follows.[2]

(3.8) a. Q_A: P (e, x) → [$_{vP}$ x [$_{v'}$ *v* VP]]

b. Q_F: P (e, x, y) → [$_{VP}$ x [$_{V'}$ V y]]

Obviously, the rule (3.8a) is responsible to the realization of external arguments, while the rule (3.8b) is to the realization of internal arguments. Thus, we interpret Williams' (1981) distinction between external and internal arguments by means of types of qualia roles that discharge semantic arguments. Furthermore, the rules in (3.8) require absolute mappings that explicitly specify the morphosyntactic realization of arguments bearing a particular semantic description.

To show how the rules in (3.8) works, let us consider a simple example with the lexical semantic representation of the verb *put* in (3.9).

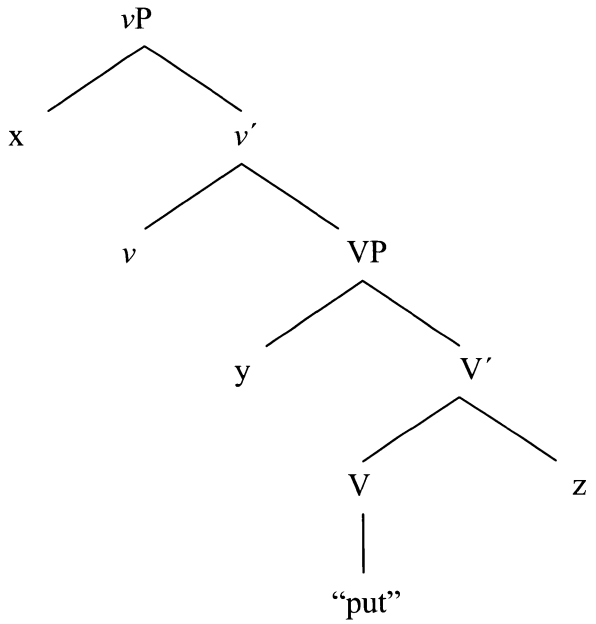
(3.9) put

QUALIA = FORMAL = be (e2, y, z)

AGENTIVE = act (e1, x)

The rule (3.8a) requires that the only (and thus the most prominent) argument in the agentive quale will be mapped onto the specifier of *v*P, while the rule (3.8b) requires that two semantic arguments in the formal quale will be mapped onto the specifier of VP and the complement of V, respectively, according to the relative prominence of the arguments. Thus, the appropriate syntactic configuration of *put* will be as follows.

(3.10)



Following the UPAH, the variable associated with a theme (y) is projected in the higher syntactic position than the variable associated with a location (z). I will assume in the rest of the thesis that this simple mechanism governs every aspect of argument realization and alternations. In effect, the linking rules in (3.8) are effective in all mappings from lexical semantics to syntax.

Again, this is a major step forward from Pustejovsky's (1995) original proposals for argument realization. One crucial difference is that in our model subject and object are derived syntactic notions, away from lexical semantics of predicates. In fact, our linking strategy only makes reference to the base position of semantic arguments at the underlying syntactic structure. This theoretical shift is particularly important to apply the above-mentioned linking algorithm to ergative and non-configurational languages (see section 3.3) and to argument alternations in English (see chapter 6).

3.2. Selectional Mapping by means of Event-headedness

As discussed in section 2.1.3, Pustejovsky (1995) argues that an event structure provides a configuration where events are not only ordered by temporal precedence, but also by relative prominence of arguments. The notion "event-headedness" gives a way of indicating a type of foregrounding and backgrounding of event arguments. For the

mechanism of argument realization, he suggests that only arguments associated with the headed event are obligatorily expressed at surface structure, while the headless event is *shadowed* along with their arguments, resulting in an interpretation with quantificational closure over these arguments.

Although the mapping strategy via event-headedness is conceptually explicit, there is no concrete proposal, to the best of my knowledge, as for the determinant factors of event-headedness other than in any wise arbitrary specifications for the phenomena. This is, of course, not an easy task and certain discrepancies might be expected, but, for the sake of argument, I would like to assume the following conditions on event head assignment in English.

(3.11) *Event Head Assignment (English)*

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

(i) it involves a constant; or

(ii) its manner/instrument/theme is lexically specified; or

(iii) it is semantically or pragmatically focused.

The conditions in (3.11) readily explain the contrast in several pairs of sentences associated with the transitivity alternation. For example, Rappaport Hovav and Levin (1998) argue that there is a distinction between *manner* and *result* verbs, where only the former can use intransitively without the direct object.

(3.12) a. Leslie swept. (cf. Leslie swept the floor).

b. * Kelly broke. (cf. Kelly broke the dishes.)

(Rappaport Hovav and Levin 1998: 102)

Generally, verbs of change of state (e.g., *break*, *melt*, *open*) lexically specify the result of the action. For the verb *break* in (3.12b), for example, the result state of the action must be specified by the constant *broken* as in (3.13).

(3.13) break

QUALIA = FORMAL = be (e2*, y, broken)

AGENTIVE = act (e1, x)

By the regulation (3.11 i), the subevent e2, which contains the constant *broken*, is assigned an event head, indicated by e2*. Then, *y*, the first argument variable in the formal quale, must be realized in syntax, according to the linking rule in (3.8b). The verb *sweep*, on the other hand, does not have such a constant in the formal quale, since the verb does not entail any result state of the action. Hence, the direct object of *sweep* can be omitted.

It is particularly important to note here that the mapping of the agentive quale of *break* is not obligatory, since e1 of the verb is not specified as a lexical head. In fact, the realization of the external argument of *break* is theoretically optional so that the well-known causative/inchoative alternation arrives.

(3.14) Causative/Inchoative Alternation

a. Janet broke the cup.

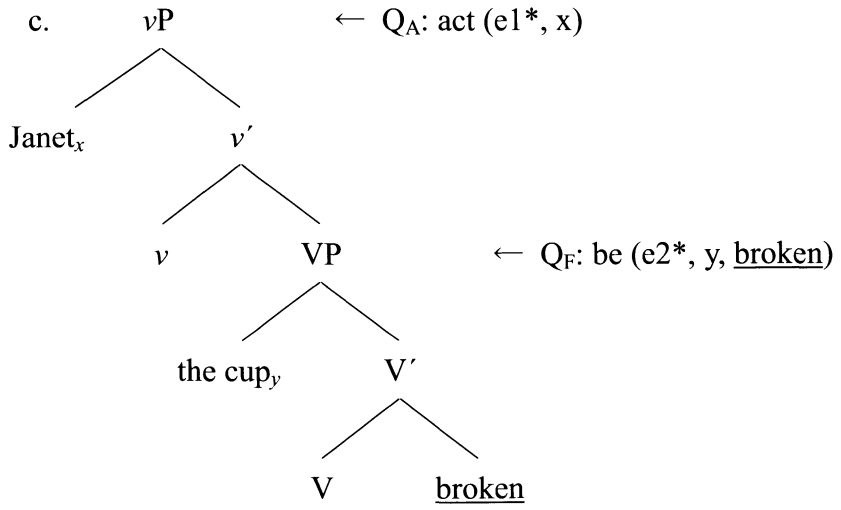
b. The cup broke. (Levin 1993: 29)

Obviously, the transitive form of *break* in (3.14a) comes out only when the agentive quale of the verb is mapped onto the syntax along with its external argument as in the following manner.

(3.15) a. Janet broke the cup. (= (3.14a))

b. Q_A: act (e1*, x) → [$_{vP}$ x [$_{v'}$ *v* VP]]

Q_F: be (e2*, y, broken) → [$_{VP}$ y [$_{V'}$ V broken]]

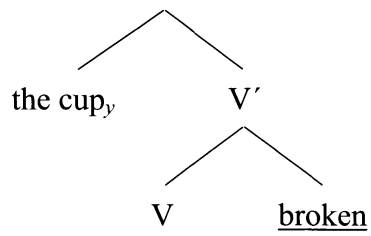


Otherwise, the intransitive form of *break* in (3.14b) comes out, with its agentive quale being *shadowed*, as shown in (3.16).

(3.16) a. The cup broke. (= (3.14b))

b. Q_A: act (e1, x) → *shadowed*

Q_F: be (e2*, y, broken) → [$_{VP}$ y [$_{V'}$ V broken]]



The structure (3.16c) represents the general syntactic configuration of unaccusative verbs (cf. Burzio 1986).

What gives an event head to the agentive quale of *break* in (3.15b) seems to be a pragmatic factor. In fact, many researchers have suggested that the syntactic realization of an external argument of change-of-state verbs will be obligatory when the active engagement of the agent is required in the context (Levin and Rappaport Hovav 1995, Kageyama 1996).

(3.17) a. He broke {his promise/the contract/the world record}.

b. * {His promise/The contract/The world record} broke.

(Levin and Rappaport Hovav 1995: 105)

The situations described in (3.17a) depend crucially on the existence of a volitional agent. In such situations, the agentive quale of *break* must be foregrounded, providing an event head by the regulation (3.11 iii), so that the external argument will obligatorily be mapped onto the syntax. This consideration immediately leads us to conclude that the transitive form of *break* in (3.14a) comes out only when the causing part of the verb is pragmatically focused.

There is another case in which the involvement of an agent is obligatory. One such example can be observed when verbs lexicalize an "intermediary instrument" (Wojcik 1976). Consider, for example, the lexical representation of the verb *cut* in (3.18):

(3.18) cut

QUALIA = CONST = i: cutlery

FORMAL = be (e2*, y, cut)

AGENTIVE = act (e1*, x, i)

The verb *cut* specifies an instrument argument (i) in the constitutive quale, since a cutting event must include the use of cutlery (Guerssel et al. 1985). This intermediary instrument is incorporated into the agentive quale as the second argument that receives an agentive force from the agent (x). Thus, the agentive quale of *cut* is lexically headed under the condition (3.11 ii). As a result, *cut* disallows the causative/inchoative alternation, as shown in (3.19).[3]

(3.19) a. Margaret cut the bread.

b. * The bread cut. (Levin 1993: 29)

The same point can be made for the verb *wash* (Haspelmath 1993). To wash something, it is necessary to use water or soap as a medium. Hence, just like *cut*, *wash* can be used only transitively. In contrast, the verb *clean*, which does not specify any means of cleaning, naturally shows the causative/inchoative alternation when the context permits.

In this way, event-headedness not only expresses a focus of interpretation, but also gives a clue to argument realization, which constitutes one of the constraints on the interface between syntax and lexical semantics. In chapter 4, I will argue that the proper treatment of event-headedness provides a fundamental to understanding VP-internal argument alternations. In chapter 5, it will be claimed that event-headedness advances a general framework for the typological variation in argument alternations, based on the view that the determinant factors of event-headedness might be different according to dialects and languages.

3.3. Approaches to Argument Realization

Since one central task for any linguistic theory is to solve the relation between meaning and form, there are many previous analyses which attempt to discover certain regularity in how arguments expressed in a surface syntactic frame. This particular issue has been called "linking problem", and has attracted much attention in the literature. In this section, I clarify a relation of our linking strategy discussed in the previous section with some influential alternatives which attempt to explain the grammatical relations in a sentence in terms of thematic or aspectual roles of arguments.

3.3.1. Absolute vs. Relativized UTAH

It is now well-motivated that there is an interface between language faculty and conceptual structure (Jackendoff 1983). Baker (1997) argues that in the non-linguistic stage of conceptualizing a particular event, we recognize an event with free use of our cognitive faculty which typically focuses on one participant as being particularly "relevant" than the other. Usually, a participant which is "salient" and "independent" is marked as Agent, and represented in the subject of the verb. On the other hand, a participant which is moved and dependent is marked as Theme, and projected at the

direct object position in the syntactic structure. The primitive semantic properties which characterize thematic relations of arguments are technically called "proto-Agent" and "proto-Patient" (Dowty 1991), and have been considered somewhat universally true.

There are in fact important linking regularities both within and across languages (Levin and Rappaport Hovav 2005). The simplest way to constrain these linking patterns may be to postulate that there is essentially no difference between the initial grammatical representation and the surface grammatical representation. This attitude can be seen in various mono-stratal theories of grammar, including Lexical-Functional Grammar (Bresnan and Kanerva 1989), Head-Driven Phrase Structure Grammar (Pollard and Sag 1987) and Role and Reference Grammar (Foley and Van Valin 1984). These approaches tend to burden the constraints of linking regularities on the lexicon or semantics rather than syntax. It then naturally follows that they tend to reach a sense enumerative model of the lexicon.

Another view of linking regularities allows nontrivial syntactic derivations internal to language faculty. This attitude attempts to constrain the interface between conceptual and syntactic representations in a particularly tight way, rather than placing a heavy task on either one of the components. The most widely-cited example of this type of approach is Baker's (1988) UTAH, discussed in section 3.1. Baker (1988) points out that, for all clauses and all languages, there is an obvious pattern in a choice of subject and object in terms of thematic roles they carry. In other words, subject and object are definable notions whose structural relationships are unitarily predictable in conceptual representation.

Baker (1997) cites some examples in favor of the view that there are certain regularities between participants of an event and surface grammatical forms. First, virtually every two-place verb in English expresses the agent of the event as its subject and the theme of the event as its object, but not vice versa.

(3.20) a. John {hit/built/found/pushed/bought/cleaned/broke/described} the table.

b. * The table {hit/built/found/pushed/bought/cleaned/broke/described} John.

(Baker 1997: 76)

Second, subject and object form a different structural unit with respect to the verb. In fact, the object and the verb constitute a unit, projected in syntax as a VP, but the subject and the verb do not (Roeper and Siegel 1978, Sproat 1985, Di Sciullo and Williams 1987 and Grimshaw 1990).

(3.21) a. John [$_{VP}$ hit the table] and Bill did [$_{VP}$ (so)], too.
b. * [$_{XP}$ John hit] the table and [$_{XP}$ (so)] did the chair. (Baker 1997: 76)

Third, the agent-subject has "prominence" over the patient-object in a variety of ways, involving anaphora, coreference, and quantification.

(3.22) a. Every man washed his car.
b. * His friend washed every man. (Baker 1997: 76)

These facts are sufficient to conclude a structural asymmetry between the subject and the object which is motivated by roughly defined thematic roles. That is, Agents are always underlying subjects, which is outside the VP in phrase structure and higher than the object, which is a complement of the verb.

It is worth noting that this seems also true in ergative languages (e.g., Dyirbal, Inuit) and non-configurational languages (e.g., Mohawk, Sesotho). In fact, Baker (1997) points out that there is no difference between ergative and accusative languages in their d-structure configurations (cf. Dixon 1994). The only difference between them lies in the fact that in the former an argument base-generated in the complement of the verb moves out of the lower VP, while in the latter an argument in the specifier of the higher VP (i.e., *v*P) undergoes movement in order to receive a Case (see Bok-Bennema (1991), Campana (1992), Murasugi (1992), Bittner (1994) and Bittner and Hale (1996) for discussion).

However, an immediate problem of this proposal, as suggested by many (e.g., Newmeyer 2002), is that it was presented without an explicit theory of thematic roles.

In fact, no pairs of scholars have reached a consensus about type, number, and hierarchy of thematic roles, as we have seen in section 2.2.3.1. In short, for advocates of thematic roles, there should be "optimum" interface between language and cognitive systems, which has never been fully explained.

Furthermore, some empirical problems in maintaining the UTAH universally weaken its explanatory power by relativizing a thematic hierarchy. For example, Speas (1990) points out that the expression of arguments is context-dependent. There are many cases that arguments other than Agent can appear in the subject position in English.

(3.23) a. John received a package from Baraboo. (Recipient)
b. The crane loaded the truck. (Instrument)
c. Mary hates John. (Experiencer)
d. A typhoon hit the city. (Natural Force)
e. The noise frightened Mary. (Stimulus)

Grimshaw (1990) argues that Experiencer subjects such as one in (3.23c) appear to have no syntactic difference from Agent subjects. This observation seems very natural, since the experiencer can be considered as an actor in his psychological stage, and thus can be treated as having an identical semantic value to the agent. Our theory predicts the same result by treating these subjects as the most prominent argument in the agentive qualia of a predicate, without depending on their actual thematic roles.[4]

Belletti and Rizzi (1988) also argue that the Experiencer argument of every psych verb must be base-generated in a higher syntactic position than the Theme argument. They suggest that for *fear*-type psych verbs, such as *like* in (3.24a), the experiencer is inserted into the normal subject position, while for *frighten*-type psych verbs, such as *worry* in (3.24b), it is generated at a lower position, leaving the subject position open for the theme argument to move into. This gives a clear syntactic solution to the fact that the backward binding is only possible for the latter.

(3.24) a. * Each other's friends like John and Mary.

b. Each other's friends worry John and Mary.

This treatment of Experiencer is clearly a counterexample to the UTAH, but is consistent with our linking strategy that only counts on the relative prominence of arguments. Indeed, *frighten*-type psych verbs denote an *externally*-caused change of state, where the experiencer subject can be seen as an agent, while *fear*-type psych verbs denote an *internally*-caused change of state, where the subject must be treated as a theme (cf. Pesetsky 1995).

More crucially, it is well-known that the semantic type of subject varies according to the choice of direct object.

(3.25) a. John threw {a baseball/his support behind a candidate/a party/a fit}.
b. Mary took {a book/a nap/a bus from New York/ an aspirin}.
c. Bill killed {a cockroach/a conversation/an evening watching TV/a bottle}.
(Marantz 1984: 49)

Of course, we can distinguish the literal use of the verbs in (3.25) from their metaphoric or idiomatic uses, but no clear definition of the subject theta roles can be made. One might even argues that idiomatic predicates may relate their idiosyncratic meanings to their lexical semantic representations, from which special linking rules should be applied to derive an appropriate syntactic structure. However, the crucial difficulty in such theory is that we would be totally at lost about how we discern an argument to be mapped into an idiomatic phrasal predicate which holds a word-like lexical property, and how we link only a part of that idiomatic predicate to the syntactic structure. In contrast, the relative prominence between arguments in those sentences is still very clear. In fact, all examples in (3.25) denote an event in which the subject has a relatively higher degree of prominence than the object. In this respect, all subjects in (3.25) are more or less the same, as desired in the present theory. Although we still need some further explanation on the non-compositionality of the idiomatic meaning of predicates, I believe that, as far as the linking problem is concerned, our theory based on the

"relativized UTAH" has many advantages over the "absolute UTAH" that depend on delicate notions of thematic roles.

In spite of these critical counterarguments, Baker (1997) still attempts to defend the absolutive version of UTAH, by collapsing thematic roles of arguments into some primitive macro-roles discussed by Dowty (1991). In fact, he claims that all subjects in (3.23), which are generally understood as different theta roles, can be treated uniformly as "Agent", in that they share certain macro-roles that are considered to be typical of an agent. However, his treatment again creates serious confusion in defining thematic roles in explicit ways, since he will be willing to collapse otherwise generally-acknowledged thematic role labels such as Agent and Theme. As a result, Baker is forced into leaving many syntactic problems unsolved, all of which never arise in the relativized UTAH.

One apparent problem that Baker argues against the relativized UTAH is that it says nothing if there is only one argument in the syntax. That is, if a verb takes only one argument, either Agent or Theme, the relativized UTAH is satisfied vacuously so that the argument can have its place at any A-position in the syntax. In contrast, the absolute UTAH can put desirable restrictions on the syntactic position of a sole argument by stating that all Agents are base-generated at the specifier of outer VP (i.e., *v*P), while all Themes at the complement of inner VP. Notice, however, that this problem does not arise in our "absolute" mapping approach (with the relativized UTAH), since the linking rules in (3.8) are quite sensitive to the distinction between outer and inner VPs. Specifically, the linking rules in (3.8) require that a subevent in the agentive qualia needs to be correlated with a *v*P, while that in the formal qualia with a VP. In other words, our approach induces the unergative/unaccusative distinction in terms of their qualia role types, just as the absolute UTAH does. Hence, we correctly predict that the sole (and thus, the most prominent) argument of the agentive qualia of a predicate is exclusively base-generated at the specifier of a *v*P, and the sole argument of the formal qualia of a predicate is base-generated at the specifier of a VP (though this is not an actual option, since a function in the formal qualia is necessarily a two-place predicate). If the Unaccusative Hypothesis (Perlmutter 1978) is universally true, as advocated by Rosen (1984) and Levin and Rappaport Hovav (1995), our linking strategy may be

detected in all languages universally. This specific point can be counted as a significant advantage of our analysis over both the absolute and relativized UTAH.

3.3.2. Aspectual Interface Hypothesis

The final remark on the realization of arguments goes to some aspectual notions of arguments. The idea that aspectual properties influence argument realization dates back at least to Hopper and Thompson (1980), who relate the notion of "transitivity" to several semantic properties of events. Since their influential study, some researchers have argued that there is actually a close connection between the grammatical relation of arguments and their aspectual performance in a clause (see, for example, Tenny (1987), van Voorst (1988), McClure (1994) and Borer (1998) as an example of this approach).

Among those researchers who advocate aspectual roles of arguments, it is generally agreed that the argument that "measures out" the event will be the direct object of the verb (Tenny 1994). This is well exemplified by the conative alternation such as below.

(3.26) a. John ate the apple in an hour.
b. * John ate at the apple in an hour.
(3.27) a. John ate the apple up.
b. * John ate at the apple up.

In (3.26) and (3.27), the internal argument measures the progress of the event when it is a direct object, but not when it is an oblique object. The only events that are measured out by the direct object can be compatible with the *in*-time adverbial and the particle *up*, both of which require the completion of an event. The same analysis has been made in other languages such as Dutch (van Hout 2000) and German (Kratzer 2004). In still other languages, such as Finnish and Estonian, the similar alternation is observed through changes in case marking instead of changes in grammatical relations (Kiparsky 1998, Ackerman and Moore 2001).

The similar effect can be observed in argument alternations such as the locative alternation.

(3.28) a. Jeremiah sprayed the paint on the wall.
b. Jeremiah sprayed the wall with the paint.
(3.29) a. Josiah cleared the dishes from the table.
b. Josiah cleared the table of the dishes.

In this alternation, the theme must be something like a material that can be consumed over time, and the location is something that can contain, or be free of, the material. According to Tenny (1994), both internal arguments of verbs like *spray* and *clear* are able to measure out the event, and that is why these verbs can appear in both variants of the locative alternation with a different choice of the direct object.

In addition, Borer (1998) claims that the well-established distinction between unergatives and unaccusatives can be boiled down to the difference of their aspectual notions.

(3.30) a. The lake froze {in/*for} an hour.
b. The candle melted {in/*for} an hour.
c. The barn collapsed {in/*for} an hour.
d. The concert ended {in/*for} an hour.
(3.31) a. Mary laughed {for/*in} an hour.
b. Josie danced {for/*in} an hour.
c. Martha sang {for/*in} an hour.
d. Mary sneezed {for/*in} an hour.

Indeed, it seems generally true that unaccusative verbs in (3.30) have a natural endpoint of the event, but unergative verbs in (3.31) do not.

These considerations lead Tenny (1992, 1994) to conclude that it is an internal temporal structure of events that creates a linking regularity between lexical semantics

and syntax. Her ideas converge into the Aspectual Interface Hypothesis (AIH) given in (3.32).

(3.32) *Aspectual Interface Hypothesis (AIH)*

The universal principles of mapping between thematic structure and syntactic argument structure are governed by aspectual properties. Constraints on the aspectual properties associated with direct internal arguments, indirect internal arguments, and external arguments in syntactic structure constrains [sic] the kinds of event participants that can occupy these positions. Only the aspectual part of thematic structure is visible to the universal linking principles.

(Tenny 1994: 2)

The AIH claims that it is the aspectual component of thematic roles that governs the linking of arguments to syntax. As is clear from the last line, the AIH can be a refinement of the UTAH. That is, the AIH defines what facets of thematic roles constitute a factor that determines the syntactic position of arguments.

However, this line of argumentation may be turned down by several immediate exceptions. For example, Jackendoff (1996) shows that there is a clear case in which even oblique PP complement can be a delimiter of the event, when it is quantified.

(3.33) a. Bill loaded the truck with dirt {in/(*)for} an hour.

b. Bill loaded the truck with three tons of dirt {in/*for} an hour.

(Jackendoff 1996: 347)

In (3.33b), the quantified material clearly acts as an incremental theme which measures out the whole event.[5] Therefore, the AIH does not hold, as it stands, in the locative alternation.

Furthermore, Levin and Rappaport Hovav (1995) demonstrate that there are some cases in which unaccusative verbs can be atelic.

(3.34) a. The ball rolled for two minutes.

b. The ball bounced for a full minutes.

c. The stew cooked for almost an hour.

(Levin and Rappaport Hovav 1995: 72)

Also, there are some cases in which unergative verbs, which are often atelic, can be interpreted as telic (McClure 1994).

(3.35) Mary won {*for/in} an hour.

More crucially, some unaccusative verbs can be either telic or atelic according to the context.

(3.36) a. The soup cooled {in/for} five minutes.

b. The train descended {in/for} five minutes.

Therefore, it must be concluded that there is no clear-cut relationship between the unergative/unaccusative distinction and their aspectual properties.

Instead, Levin and Rappaport Hovav (1995) demonstrate that the stative/eventive distinction is not relevant to the unergative/unaccusative distinction, but to the existence of agentivity of the event. For example, verbs of spatial configuration like *stand* are unergatives when they take animate subjects to have a "maintain position" meaning, as in (3.37a), but they are unaccusatives when they take inanimate subjects and have a "simple position" meaning, as in (3.37b).

(3.37) a. Yvonne stood alone (in the halfway) for six hour.

b. The statue stood *(in the corner).

(Levin and Rappaport Hovav 1995: 127)

Note that there is no difference between the two sentences in their sentential aspect: that

is, they are both atelic.

In fact, what is relevant to distinguish stative predicates seems to be whether there is a conceivable agent in the event. For example, the subject of *frighten*-type psych verbs may be construed as a causer, whereas the subject of *fear*-type psych verbs is clearly a theme (cf. Belletti and Rizzi 1988, Pesetsky 1995). This seems evident from the following examples.

(3.38) a. Mary fears {ghosts/big dogs}.
b. {Big dogs/*Ghosts} frighten Mary. (Pustejovsky 1991: 67)

(3.39) a. Mary feared another possible tornado.
b. * Another possible tornado frightened Mary. (Pesetsky 1995: 300)

Since the event depicted by *frighten* is *externally*-caused change of state in the experiencer object (Levin and Rappaport Hovav 1995), the subject, being a causer, needs to have its referent in the actual world. In contrast, the event depicted by *fear* is *internally*-caused change of state in the experiencer subject. Thus, any entity that comes into experiencer's mind can be the object of the verb.

The same difference has to do with the possibility of the middle formation. Many researchers have suggested that only verbs that denote external causation can appear in the middle construction (Keyser and Roeper 1984, Hale and Keyser 1987, Roberts 1987, Zubizarreta 1987). Thus, *frighten*-type psych verbs occur in the middle construction, while *fear*-type psych verbs do not.

(3.40) a. John frightens easily.
b. Little children amuse easily. (Levin 1993: 190)

(3.41) a. * Elephants fears easily.
b. * Paintings admire easily. (Levin 1993: 191)

These considerations naturally lead us to conclude that the linking of stative predicates is not accidental, and it cannot be determined in purely aspectual terms. In

our theory, on the other hand, the only difference between unergative and unaccusative verbs is whether or not the verb entails the agentive and formal qualia that are relevant to the mapping from lexical semantics to syntax. The next section will discuss the further details on this point.

3.4. Split Intransitivity and Causativity

The argument in the last subsection gives a conclusion that we cannot define unergatives and unaccusatives in terms of aspectual properties of predicates. It is also our conclusion that types of predicates cannot be classified in terms of thematic roles of arguments. Instead, our linking strategy will provide a unified way of understanding split intransitivity and causativity.

Now, we have two different types of semantic representation for predicates that have been called "unergative verbs". The first type is exemplified by verbs like *laugh* in (3.42), where no clear result of the action is entailed. We may call these predicates "true unergatives".

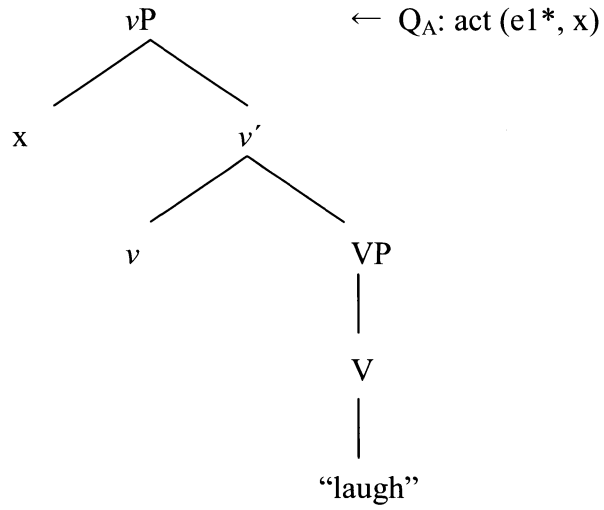
(3.42) laugh

QUALIA = CONST = laughing_manner (→e1)

AGENTIVE = act (e1*, x)

Following the linking rule in (3.8a), the syntactic realization of *laugh* will be as (3.43).

(3.43)



In (3.43), the lexical verb may not project at VP, since the verb does not have the formal quale to project any internal arguments (cf. Halle and Marantz 1993). Alternatively, it is also theoretically possible to assume that there is no VP, and the lexical verb is inserted directly into a *v* (cf. Hale and Keyser 1993).

The second type of unergative verbs is exemplified by verbs such as *walk* in (3.44), where a result subevent must take place as a result of the action named by the verb. Specifically, the action of walking must be followed by the movement of the agent. Therefore, these predicates specify both the agentive and formal qualia in their lexical semantic representations.

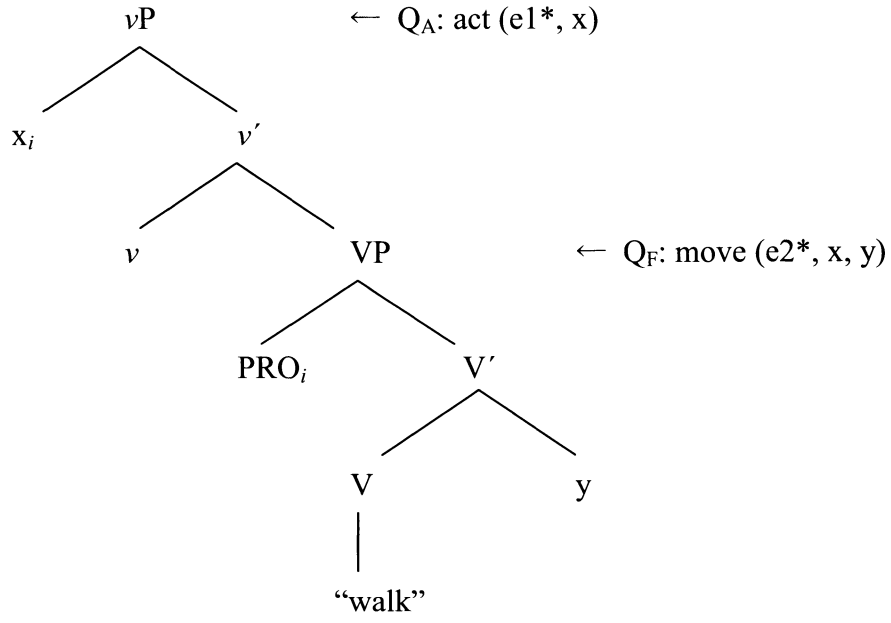
(3.44) walk

QUALIA = CONST = walking_manner (→e1)
FORMAL = move (e2, x, y)
AGENTIVE = act (e1*, x)

Actually, this representation must be seen as an instance of causative predicates, since there are an action part and a result part of the event. We may call this type of predicates "fake unergatives" or "hidden causatives". The reasons why the verb *walk* is usually treated as an instance of unergative verbs is that the formal quale of the verb may or may not be projected in the syntax, since it is not headed lexically. When the formal

quale of *walk* is not projected in the syntax, the same syntactic configuration as *laugh* in (3.43) comes out. Furthermore, even when it is headed (receiving some contextual requirement), there is no object appeared in the sentence, since the actor and the mover holds the same semantic value; hence, the former needs to bind the latter syntactically as in (3.45).

(3.45)



Actually, this is the syntactic structure for causative predicates. Of course, *walk* can be atelic, thanks to the durative predicate *act* in the agentive qualia. But it can also be telic when the formal quale is headed and a transitive event structure is activated (e.g. *John walked to the station in 10 minutes*). The obligatory goal phrase in a telic interpretation of *walk* confirms the validity of our solution.

Unaccusative verbs can also be divided into two types. One case is what we have already seen by the verb *break* in (3.16) above. The verb *break*, repeated here in (3.46), is lexically a causative, and has two options for syntactic realization of its arguments, according to whether the agentive quale of the verb is projected in the syntax or not.

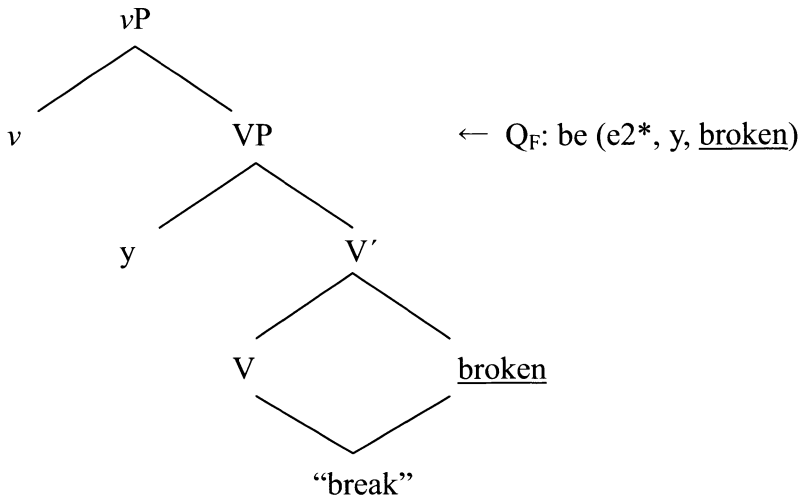
(3.46) break

QUALIA = FORMAL = be (e2*, y, broken)

AGENTIVE = act (e1, x)

When the agentive quale of *break* is not projected in the syntax, the inchoative structure as in (3.47) comes out.

(3.47)



In (3.47), the target of lexical insertion is the combination of V and its constant. The empty *v* may be projected above VP in accordance with the recent syntactic conjecture that all predicates have split verbal projections (cf. Chomsky 1995). Again, it is also theoretically possible that there is no *v* for unaccusative predicates.

The other case of unaccusative verbs is manifested by verbs of existence like *exist*. These verbs do not lexicalize any activity of the event, and thus have no agentive quale.

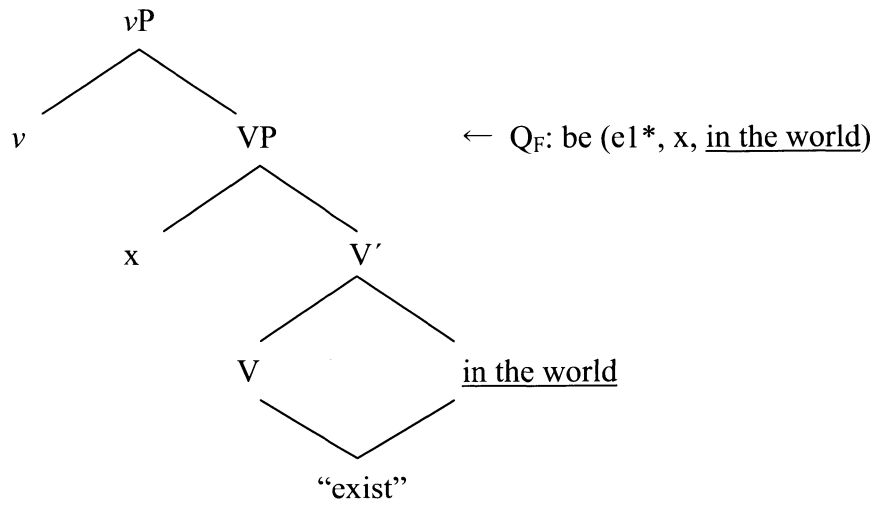
(3.48) exist

QUALIA = FORMAL = be (e1*, x, in the world)

Assume that verbs of existence contain the constant *in the world* as the second argument of the formal quale (cf. Kageyama 1996). Then, the formal quale of the verb must be headed to be projected in the syntax, giving rise to the following syntactic

configuration.

(3.49)



This is actually the same structure as one for the inchoative *break*. Truly, the difference between *break* and *exist* cannot be observable from the syntax. However, there is a clear difference between the two predicates in their lexical semantics. In fact, due to the existence of the agentive quale in the lexical semantic representation, only the former implies the existence of the agent even in the inchoative use. The latter, on the other hand, has no implied cause for the event, since it does not lexicalize the agentive quale. This is also evident from the fact that *exist*, unlike *break*, does not have the transitive causative use (e.g. **The famous mathematician existed a solution to the problem*). Thus, we may call verbs like *exist* "true unaccusatives".

To recapitulate: The traditional view of split intransitivity has been established by making reference to the syntactic difference of intransitive verbs. However, a closer look at the lexical semantics of those predicates reveals that there is an essential semantic distinction within unergatives and unaccusatives. In practice, some unergatives (e.g., *walk*) and some unaccusatives (e.g., inchoative *break*) have causative nature in their lexical semantic representations. Their apparent unergativity or unaccusativity is just a result of the linking patterns for those predicates. Our linking strategy can account for the difference not only *between* unergatives and unaccusatives but also *within* unergatives (true vs. fake) and unaccusatives (inchoative vs. true). These differences are

actually crucial for their sensitivity to certain lexical semantic operations, which will be discussed in chapter 6.

Chapter 4: VP-internal Argument Alternations

In this chapter, I detail how the strategy of argument realization by the effect of event-headedness works for several phenomena of VP-internal argument alternations. Of particular importance in this case study is that those alternations that do not exhibit any logical semantic change between variants should be dealt with without postulating any *ad hoc* lexical rules or enumerating homonymous lexical items, either of which necessarily differentiates logical semantics of alternating verbs. Instead, selectional mappings via event-headedness, discussed in section 3.2, can be viewed as a well-formedness condition on the interface between syntactic and semantic categories of those alternations. A major consequence of this approach is that any syntactic phrase cannot be interpreted outside of the semantic or pragmatic context within which it appears.

4.1. Event Head Shifting

Instances of argument alternations in English can be classified into several types in terms of their semantic nature through the alternation. As mentioned in section 1.2, some alternations such as the locative alternation show no logical semantic difference between variants, while others such as the middle alternation display a particular shift in eventuality. Given that the lexical semantic representation of a predicate provides a fundamental part for the interpretation of a clause, it is natural for a generative model of the lexicon to conclude that no lexical ambiguity is observed when no difference in the logical meaning between variants exists. In other words, argument alternations without any logical semantic shift through the alternation must be derived from the identical lexical semantic representation of a predicate.

In fact, the linking strategy developed in the last chapter predicts that argument alternations without a logical semantic change are exactly motivated by different modes of mapping from qualia to syntax. In particular, if a predicate has multiple semantic contents in the qualia structure, the approach indicates that licensed projections from a particular qualia role should also be multiple. Thus, in the presence of more than one

projectable qualia role, the mechanism of event-headedness acts as a filter to constrain the set of projectable qualia, so that only the headed event projects the configuration associated with its qualia value.

To demonstrate this principle, consider the lexical semantic representation of an abstract predicate α, where the internal arguments x and y are bound by two different relational predicates in the formal quale:

(4.1) α

QUALIA = FORMAL = P1 (e1, x, y)
P2 (e2, y, x)

According to the linking rule discussed in (3.8b), repeated here as (4.2), there are two possible mappings of those internal arguments, as shown in (4.3).

(4.2) Q_F: P (e, x, y) → [$_{VP}$ x [$_{V'}$ V y]]

(4.3) a. Q_F: P1 (e1, x, y) → [$_{VP}$ x [$_{V'}$ V y]]

b. Q_F: P2 (e2, y, x) → [$_{VP}$ y [$_{V'}$ V x]]

Now, the linking strategy in terms of event-headedness will provide a general way for the selection of set of projectable qualia. Specifically, event-headedness will determine that arguments associated with the headed subevent will be selected for the mapping to a syntactic structure, while the headless subevent will be *shadowed* to be syntactically inert. Then, we have at least two possible projections for the formal quale of α, indicated in (4.4) and (4.5), respectively.

(4.4) a. Q_F: P1 (e1*, x, y) → [$_{VP}$ x [$_{V'}$ V y]]

b. Q_F: P2 (e2, y, x) → *shadowed*

(4.5) a. Q_F: P1 (e1, x, y) → *shadowed*

b. Q_F: P2 (e2*, y, x) → [$_{VP}$ y [$_{V'}$ V x]]

I claim in the rest of this chapter that this is the only mechanism of many VP-internal argument alternations associated with internal arguments of a predicate.

Here, notice importantly that in our proposal for the event head assignment in English, repeated here as (4.6), the condition (4.6 iii) is different in its quality from the other two. That is, only the condition (4.6 iii) can refer to the pragmatic context of the utterance, while the other two are strictly lexical properties of an item.

(4.6) *Event Head Assignment (English)*

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

(i) it involves a constant; or

(ii) its manner/instrument/theme is lexically specified; or

(iii) it is semantically or pragmatically focused.

This indicates precisely that the choice of projectable qualia in VP-internal argument alternations may be determined pragmatically. In fact, we will see in the following sections that VP-internal argument alternations only exhibit a pragmatic effect through the alternation. In other words, there is no logical semantic difference in the alternations, since nothing other than the mapping patterns changes through the alternation. The only relevant factor of event-head shifting is a pragmatic focus given by (4.6 iii).

4.2. The Locative Alternation

Perhaps, the most demonstrative phenomenon for the mechanism of event head shifting is provided by the locative alternation in (4.7).

(4.7) *Locative Alternation*

a. Jack sprayed paint on the wall.

b. Jack sprayed the wall with paint. (Levin 1993: 51)

In this alternation, two internal arguments associated with a theme (or a "locatum" (Clark and Clark 1979)) and a location are realized as the direct object and the oblique

object of the verb. Thereby, the alternation constitutes a typical example of VP-internal argument alternations. Following Rappaport and Levin (1988), I will refer to the construction type in (4.7a) as "locative variant" and that in (4.7b) as "*with*-variant".

The locative alternation has attracted much attention in the literature, and many studies have been made on the mode of different realizations of two internal arguments of the verb. Although there are some proposals that attempt a syntactic account for this alternation (e.g., Larson 1990), it would be safe to conclude that the relatedness between the variants in the locative alternation should not be captured by any transformational rules, since the properties that motivate the alternation and selectional restrictions on verbs and arguments significantly diverges from other productive diathesis alternations, such as passivization (cf. Baker 1997). In general, a weakness of syntactic approaches to argument alternations is a lack of constraints on the changes that transformations could effect. In what follows, we focus our attention only on lexical semantic approaches to VP-internal argument alternations.

Previous lexical semantic approaches to the locative alternation can be broadly divided into two groups. One, which I call "lexical derivation approach", is the approach that derives lexical semantic representations of a predicate from its original meaning template by means of specific lexical rules. The other is the approach that lists lexical items that show idiosyncratic meanings and subcategorization properties as distinct entries. The latter is usually called "sense enumeration approach", which is critically discussed in section 1.3.

Conforming to the first type is the approach taken by Rappaport and Levin (1988). They propose a lexical semantic operation called "Lexical Subordination" to account for the patterns of argument realization between two variants of the locative alternation. Roughly speaking, Lexical Subordination is an operation to expand the lexical semantic representation of change-of-location verbs in (4.8a) into that of change-of-state verbs in (4.8b) by subordinating the original meaning of the verb.

(4.8) *Lexical Subordination*

a. [x cause [y to come to be at z]] →

b. [[x cause [z to come to be in STATE] BY MEANS OF [x cause [y to come to be at z]]] (Rappaport and Levin 1988: 26)

According to Rappaport and Levin (1988), the LCS in (4.8a) represents the meaning of the locative variants, while the LCS in (4.8b) of the *with*-variants. Since their linking rules require that the first argument of a change event (i.e., the subject of "to come to be") qualifies for the mapping to the direct internal argument of a verb, the theme (y) in (4.8a) and the location (z) in (4.8b) will be projected to the direct object position in the syntax.

An example of the second type of approaches is found with Jackendoff (1990) and Maruta (1997). They turn their attention to the synonymity of locative alternation verbs with other classes of verbs that do not participate in the alternation. For example, *load* in a locative-variant is similar both in its meaning and form to the verb *put* in (4.9b), while *load* in a *with*-variant to the verb *butter* in (4.10b).

(4.9) a. Bill loaded hay onto the truck.
b. Martha put the book onto the counter.
(4.10) a. Bill loaded the truck (with hay).
b. Harry buttered the bread (with cheap margarine).

These considerations immediately lead them to conclude that there are two different verbs that participate in the locative alternation. For them, it is purely accidental that the locative alternation verbs, such as *load*, have two different meanings represented in (4.11a) and (4.11b), which correspond to the two variant of the locative alternation.

(4.11) a. [CAUSE ([ ]$_i$, [GO ([ ]$_j$, [TO ([ ]$_k$)])])]
b. [CAUSE ([ ]$_i$, [INCH [BE ([CONSTANT], [ON [ ]$_j$])]])]
(Maruta 1997: 102-103)

In this view, the locative alternation merely involves two homophonous verbs that do

not related directly to each other.

However, neither approach is far from succeeding in accounting for the true nature of the locative alternation. First, there is no independently-motivated ground in the lexical derivation approach with respect to the applicability of lexical rules and the well-formedness conditions on derived lexical representations. Consider the following pairs of examples:

(4.12) a. Tamara poured water into the bowl.
b. * Tamara poured the bowl with water. (Levin 1993: 51)

(4.13) a. * June covered the blanket over the baby.
b. June covered the baby with the blanket. (Levin 1993: 51)

It is certainly true that not all locative verbs freely exhibit the locative alternation. According to Levin (1993), verbs of putting (e.g., *put*, *set*), verbs of pouring (e.g., *pour*, *drip*) and verbs of coiling (e.g., *coil*, *curl*) do not alternate, appearing only in the locative variant, as in (4.12). On the other hand, verbs of filling (e.g., *charge*, *fill*), verbs of covering (e.g., *coat*, *cover*), verbs of closing (e.g., *block*, *close*), verbs of surrounding (e.g., *edge*, *surround*), verbs of decorating (e.g., *adorn*, *decorate*) and verbs of contaminating (e.g., *contaminate*, *litter*) appear only in the *with*-variant, as shown in (4.13). From the context of lexical derivation approach, example (4.12) indicates that Lexical Subordination does not apply to verbs like *pour*, even though they are assumed to have the LCS equivalent to (4.8a). Pinker (1989) claims in this regard that rules like Lexical Subordination should not be considered to apply all change-of-location verbs, but to be sensitive to "narrow semantic classes" of locative verbs so that only locative alternation verbs (e.g., *spray*, *load*) can be an applicant of the rule. However, this is just an instance of stipulation, unless the conditions of narrow semantic classes of verbs are properly explained. Furthermore, a more fatal problem in this approach arises as for the examples in (4.13), where verbs like *cover* necessarily enter into the argument realization with their *derived* lexical semantic representation (i.e., (4.8b)), although they cannot discharge their arguments with their original lexical semantic representation (i.e.,

(4.8a)). One cannot simply put aside this problem by assuming that *cover*-type verbs only lexicalize a semantic component associated with change-of-state, since these verbs in fact entail a change-of-location, as we will discuss later. In short, lexical derivation approach could not help admitting that the practical consequences of lexical rules are highly unpredictable or totally accidental.

Secondly, Carlson and Tanenhaus (1988) verify, by psychological experiments, that no significant difference of verbs is detected through the locative alternation in their interpretability and the reaction time for interpretation. Their conclusion is that locative alternation verbs merely show a "thematic ambiguity" (i.e., same lexical meaning but different argument encoding) rather than a "sense ambiguity" (i.e., different lexical meanings). In this regard, sense enumeration approach, by itself, has a serious risk to increase the lexical burden, allowing morpho-phonologically identical predicates to lexicalize every single meaning that they indicates as distinct lexical entries. This treatment must be theoretically problematic, as we have discussed in section 1.3, and leaves many questions in terms of the acquisition of lexical items.

Thirdly and most crucially, there is no way in both lexical derivation approach and sense enumeration approach to capture the logical semantic relation between the two variants of the locative alternation. As clearly indicated by (4.14) and (4.15), locative alternation verbs like *load* always entail two result subevents, namely a movement of a theme and a change of state in a location, whichever variant they appear in.

(4.14) a. # John loaded the hay onto the wagon, but none of the hay moved.
b. # John loaded the hay onto the wagon, but the wagon was empty afterwards.
(Beavers 2006: 48)

(4.15) a. # John loaded the wagon with the hay, but none of the hay moved.
b. # John loaded the wagon with the hay, but the wagon was empty afterwards.
(Beavers 2006: 48)

This entailment relation does not come out from the sense enumeration approach where

two lexical verbs in the locative alternation do not share any overlapped lexical information. It is also difficult in the lexical derivation approach to explain this semantic relatedness, since the original lexical representation in (4.8a) does not constitute a proper subset of the derived lexical representation in (4.8b). This is, in fact, a general problem for all approaches that assume two or more distinct lexical semantic representations for the alternations that do not show any logical semantic difference.

With these problems in mind, we now show how the linking strategy by means of event-headedness captures the locative alternation correctly. We begin by describing the qualia structure of locative alternation verbs such as *spray* in (4.16).

(4.16) spray

QUALIA = CONST = y: spray

FORMAL = move (e2*, y, z)

be (e3*, z, sprayed)

AGENTIVE = act (e1, x)

In (4.16), two result subevents, one is associated with a movement of a theme and the other with a change of state in a location, are lexicalized in the formal quale, where the location argument (z) of the verb is bound lexically by both relational predicates, producing the logical entailment relation observed in (4.14) and (4.15) above.[1] Given that locative alternation verbs lexically specify the value of the theme argument, as indicated by the fact that they all have homophonous result nominals denoting a theme (cf. Clark and Clark 1979), e2 is lexically headed under the condition (4.6 ii).[2] Furthermore, e3 of *spray*, with the constant *sprayed*, must also be headed under the condition (4.6 i). Thus, according to our linking rule given in (4.2), there are two possibilities in the mapping from the formal quale of *spray* to the syntax.

What happens for this kind of multiply-headed verbs might, at first sight, be that we need to assume two VP layers (plus one *v*P layer) in order to project two VP structures in accordance with the linking rule in (4.2).

(4.17) a. move (e2*, y, z) → [$_{VP}$ y [$_{V'}$ V z]]

b. be (e3*, z, sprayed) → [$_{VP}$ z [$_{V'}$ V sprayed]]

Perhaps, the easiest way to achieve this syntactic configuration is to postulate that there are in fact three (or more) verbal layers in syntax, as advocated by Ramchand (2008). However, several reasons will decline this proposal and suggest the validity of two-layered verb phrases composed of one *v*P and one VP.

First, two-layered verb phrases give the most natural explanation to the limit on the number of true arguments in natural language. It seems generally true that there are up to three syntactic positions for grammatical arguments in a clause of every language, though actual events in the world often involve more than three participants. For example, Fillmore (1968) argues that a semantic frame of commercial transaction, at least, requires four event participants: a seller, a buyer, goods, and money. However, no single lexical item can express these four participants as true arguments. Then, the speaker is forced to select an appropriate predicate (e.g., *sell*, *buy*, *pay*) according to the context or his viewpoint about the situation.

Second, two-layered verb phrases directly explicate Williams' (1981) distinction between external and internal arguments. As we have seen in section 3.4, the so-called split intransitivity is reducible to their lexical semantic configurations, which reflect their morpho-syntactic behaviors. On the one hand, Burzio (1986) argues that only unaccusatives can form *there*-constructions, since they lack an external argument in the syntax. On the other hand, Levin and Rappaport Hovav (1995) show that only unergatives can take a non-subcategorized object in several constructions, such as resultative constructions (Simpson 1983), cognate object constructions (Massam 1990) and *way*-constructions (Marantz 1992), since they lack an internal argument associated with the direct object in syntax. Furthermore, several word formation processes, such as *-er* suffixation (Levin and Rappaport 1988, Rappaport and Levin 1992) and adjectival passive formation (Levin and Rappaport 1986), need the reference to the external/internal division of semantic arguments. These differences are naturally captured by the distinct syntactic positions of semantic arguments in the two-layered

verb phrases.

Finally, two-layered verb phrases automatically take account of relative hierarchy among semantic arguments by their syntactic positions at a base structure. Given that the UPAH (or UTAH) is linguistically true, the syntactic position of semantic arguments is a manifestation of their grammatical hierarchy (cf. Baker 1997). Three-layered verbs phrase, in contrast, must need the benefit of some syntactic devices, such as *movement* or *control* of arguments, in order to fill the unnecessarily increased syntactic slots in the verbal projections. From these inconveniences in positing a three-(or more)-layered verb phrase, two-layered VP structures such as one that Chomsky (1995) suggests will be assumed in this thesis.

Turning down the possibility of expanding verbal projections, what we need now is a method to select a proper subevent from the multiply-headed formal qualia of locative alternation verbs. Here, I claim that the condition (4.6 iii) is the one. That is, what distinguishes the argument realization in two variants of the locative alternation is a pragmatic focus provided by a specific context.

It is well-studied that there is a subtle nuance of the meaning in the two variants of the locative alternation. One of the most notable semantic differences is that participants realized as the direct object receive what has been traditionally called the "holistic effect" (Anderson 1971, 1977).

(4.18) a. # John loaded the hay onto the wagon, but left some hay to fill the truck.
b. John loaded the hay onto the wagon, but left some space for the grain.
(Beavers 2006: 48)

(4.19) a. John loaded the wagon with the hay, but left some hay to fill the truck.
b. # John loaded the wagon with the hay, but left some space for the grain.
(Beavers 2006: 48)

In (4.18a) and (4.19b), arguments that are realized as the direct object are interpreted as being "entirely affected" by the event named by the verb. This interpretation does not hold for the oblique object, as (4.18b) and (4.19a) shows. Notice in this regard, however,

that this interpretation is merely a pragmatic effect, as suggested by Jeffries and Willis (1984), who argue that the holistic effect is naturally cancelable according to the context and that some verbs (e.g., *drain*) lexically entail the holistic effect on the direct object regardless of the construction. The following examples, drawn from Beavers (2006), almost demonstrate the same point.

(4.20) a. [In a context in which only half of the hay must be moved]
John loaded the hay onto the wagon, and we can put the rest in the truck.

b. ? The painter sprayed the paint onto the wall, and used what was left to paint the ceiling. (Beavers 2006: 51-52)

(4.21) a. Kim loaded the car with the books, but did not fill the driver's seat.

b. Kim smeared her face with the mud, but carefully avoiding getting any into her eyes. (Beavers 2006: 52)

Thus, it is now well-motivated that the holistic interpretation is derived from neither semantic restriction of the construction nor any syntactic property of the direct object, but from the contextual information associated with pragmatic focus shared by the speaker and the hearer (Carter 1984). More specifically, the speaker put a focus on the subevent denoting a movement of a theme when he uses the locative variant, while the speaker pays more attention to the change of state in a location when he uses the *with*-variant (Pinker 1989). Our conclusion is that this pragmatic focus offers a key to understand which result subevent of locative alternation verbs is construed as being more salient than the other in order to be mapped onto the syntax.

Now, let us illustrate the realization of locative alternation verbs by using *spray* in (4.16). When e2 of *spray*, the movement subevent, is pragmatically focused, the realization pattern in (4.22) comes into effect, and the locative variant such as (4.7a) comes out. (A doubly-headed subevent is indicated by two stars superscripted on the event argument, e**. Here, just for argument's sake, the causative version of argument realization is shown, by putting an event head on e1 in the agentive quale, though the inchoative version of realization is also possible when contextual conditions are met.)

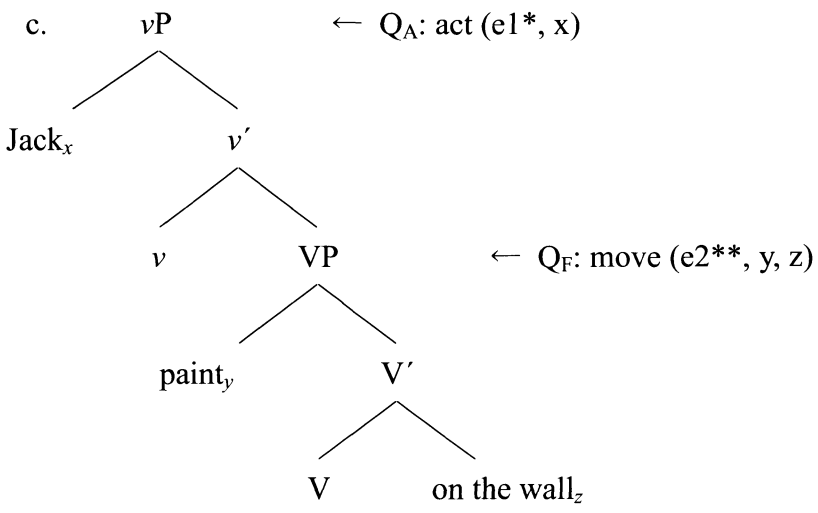
(4.22) a. Jack sprayed paint on the wall.

b. Q_A: act (e1*, x) → [$_{vP}$ x [$_{v'}$ *v* VP]]

Q_F: move (e2**, y, z) → [$_{VP}$ y [$_{V'}$ V z]]

Q_F: be (e3*, z, sprayed) → *shadowed*

c.



In the locative variant, e1 and e2 of locative alternation verbs will be projected on the syntactic structure, as in (4.22c), along with their semantic arguments, while e3 will be shadowed.

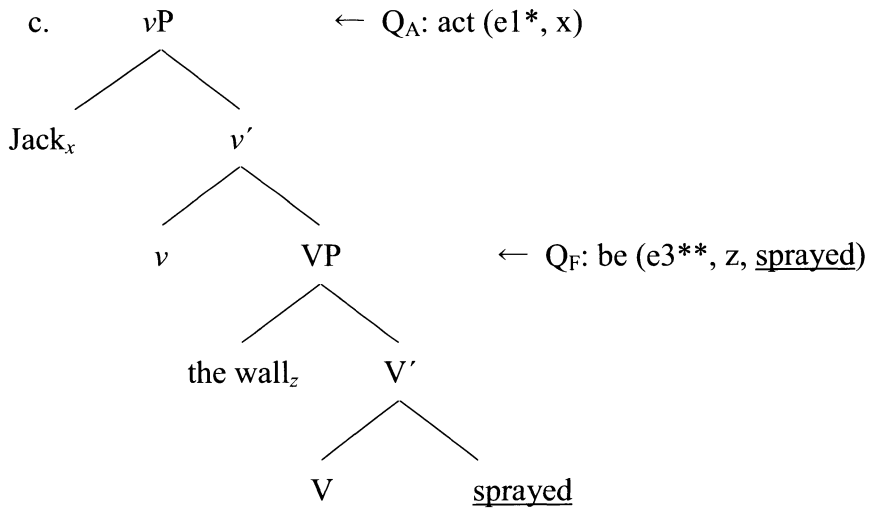
On the other hand, when e3 of *spray*, a change-of-state subevent, is contextually highlighted, it is selected as a mapping subevent, so that the realization pattern in (4.23) comes into effect.

(4.23) a. Jack sprayed the wall with paint.

b. Q_A: act (e1*, x) → [$_{vP}$ x [$_{v'}$ *v* VP]]

Q_F: move (e2*, y, z) → *shadowed*

Q_F: be (e3**, z, sprayed) → [$_{VP}$ z [$_{V'}$ V sprayed]]



The syntactic structure in (4.23c) emerges for the *with*-variant of locative alternation, though it does not contain the theme argument. In fact, the phonological output of the structure (4.23c) must be *Jack sprayed the wall*. This implies that the surface realization of a theme argument is not obligatory in the *with*-variant (Jackendoff 1990, Maruta 1997). Indeed, the theme argument in *with*-variants is a default argument that appears in the sentence only by discourse conditions (cf. Verspoor 1997).

(4.24) a. Jack sprayed the wall (with paint).

b. Jack sprayed the wall with {*spray/quick drying chemical spray}.

This seems a case for all locative alternation verbs, including verbs of smearing (e.g., *daub*, *smear*), verbs of spraying (e.g., *spray*, *sprinkle*), verbs of loading (e.g., *load*, *pile*) and verbs of cramming (e.g., *cram*, *stuff*). A similar account can be made for the unaccusative version of the locative alternation (Salkoff 1983) and the locative alternation with verbs of removal (Levin and Rappaport Hovav 1991).

The represented patterns of argument realization are supported by several empirical data. First of all, the holistic effect, observed in (4.18) and (4.19), qualifies as the direct evidence of a pragmatic focus on the subevent to be mapped in the syntax. Presumably, this interpretation is produced by the tendency of our general cognition to understand that those participants associated with the foregrounded subevent are more

affected than those participants associated with the backgrounded subevent, and that some physical property such as "wholeness" is the most appreciable scale for measuring affectedness on the direct object of the verb (cf. Dowty 1991).

Second, end-focus items, such as *up* and *over-*, can be attached only to verbs in the *with*-variant (Fraser 1971).

(4.25) a. * He loaded *up* the goods onto the wagon.
b. He loaded *up* the wagon with the goods. (Fraser 1971: 607)

(4.26) a. * Harry *overloaded* hay onto the wagon.
b. Harry *overloaded* the wagon with hay. (Fraser 1971: 607)

This fact receives a simple explanation under our linking strategy. As the name suggests, the end-focus particle *up* modifies a completion of the event (cf. Tenny 1994), and the prefix *over-* indicates a spacial excess of the location (Kageyama and Yumoto 1997). Since both of them refer crucially to the final subevent denoted by the verb, these items are only compatible with the *with*-variant, where the final subevent of the verbs is pragmatically focused.

Third, Levin and Rappaport Hovav (1991) point out that the direct object in the locative variant is preferred to be a physical object.

(4.27) a. * The judge cleared guilt from the accused.
b. The judge cleared the accused of guilt.
(Levin and Rappaport Hovav 1991: 143)

This constitutes further evidence of a pragmatic focus on the subevent mapped to the syntax. Our linking strategy predicts that in the locative variant, the movement subevent is pragmatically focused. However, it is strikingly peculiar for the cognitive faculty to detect an abstract concept by its physical movement in the world (e.g. **Guilt moves from the accused*).

The result is further confirmed by several syntactic considerations. Jackendoff

(1990a) provides much data that can be considered as syntactic phenomena to indicate the structural hierarchy observed by two internal arguments of locative alternation verbs. All of them suggest some asymmetry between a theme and a location in the locative alternation. Examples (4.28) to (4.32) suggest that in the locative variant the theme argument is located at the higher syntactic position than the location argument.

(4.28) *Quantifier Binding*

a. I loaded every book$_i$ into its$_i$ proper box.

b. * I loaded its$_i$ proper contents into every box$_i$. (Jackendoff 1990a: 432)

(4.29) *Weak Crossover*

a. Which books$_i$ did you load into their$_i$ proper boxes?

b. * Into which box$_i$ did you load its$_i$ proper contents? (Jackendoff 1990a: 432)

(4.30) *Superiority*

a. Which books did you load into which boxes?

b.?*Which boxes did you load which books into? (Jackendoff 1990a: 433)

(4.31) *each...the other*

a. I loaded each set of books into the other's box.

b. * I loaded the other's proper contents into each box. (Jackendoff 1990a: 433)

(4.32) *Negative Polarity Items*

a. I loaded none of books in any of the broken boxes.

b. * I loaded any of the books in none of the broken boxes.

(Jackendoff 1990a: 434)

In contrast, in the *with*-variant the location argument is considered to be located at the higher syntactic position than the theme argument.

(4.33) *Quantifier Binding*

a. I loaded every box$_i$ with its$_i$ proper contents.

b. * I loaded its$_i$ proper box with every book$_i$. (Jackendoff 1990a: 432)

(4.34) *Weak Crossover*

a. Which box$_i$ did you load with its$_i$ proper contents?

b. * Which books$_i$ did you load thier$_i$ proper boxes with?

(Jackendoff 1990a: 432)

(4.35) *Superiority*

a. Which boxes did you load with which books?

b.?*Which books did you load which boxes with? (Jackendoff 1990a: 433)

(4.36) *each...the other*

a. I loaded each box with the other's proper contents.

b. * I loaded the other's box with each set of books. (Jackendoff 1990a: 433-4)

(4.37) *Negative Polarity Items*

a. I loaded none of the broken boxes with any books.

b. * I loaded any of the broken boxes with none of the books.

(Jackendoff 1990a: 434)

Clearly, the results conform to our syntactic structures for the locative and *with-* variants, given in (4.22c) and (4.23c), respectively.

Furthermore, our strategy can be naturally extended to the explanation of non-alternating verbs in the locative alternation. Recall that verbs like *pour* only appear in the locative variant, as shown in (4.12). Consider the lexical semantic representation of *pour* in (4.38):

(4.38) pour

QUALIA = CONST = pouring_manner (→e2)

FORMAL = move (e2*, y, z)

AGENTIVE = act (e1, x)

Unlike locative alternation verbs, *pour* entails only one result subevent in the formal quale, namely a movement of the theme (cf. Pinker 1989). This entailment relation can be attested by the cancelability test as follows.

(4.39) a. # Tamara poured water into the tank, but none of the water actually moved.

b. Tamara poured water into the tank, but the tank was empty afterwards (because it has a hole).

Therefore, the reason why verbs like *pour* cannot appear in the *with*-variant is just that they do not entail a subevent of change-of-state in their lexical semantics.

The situation is slightly different for non-alternating verbs like *cover* in (4.13). We propose that the lexical semantic representation of *cover* is something like (4.40).

(4.40) cover

QUALIA = CONST = y: cover

FORMAL = move (e2*, y, z)

be (e3**, z, <u>covered</u>)

AGENTIVE = act (e1, x)

As well as locative alternation verbs, *cover* has two result subevents in the formal quale. Therefore, the verb itself entails both result subevents in the *with*-variant.

(4.41) a. # June covered the baby with the blanket, but the blanket didn't move at all.

b. # June covered the baby with the blanket, but the baby was not surrounded by the blanket.

It is also the same as locative alternation verbs that e2 of *cover*, with a specified theme, and e3, with the constant <u>*covered*</u>, are both lexically headed. So, the only difference between *cover* and locative alternation verbs lies in its lexical semantic process of foregrounding subevents. Notice that *cover* necessarily requires its semantic focus on the change-of-state subevent, in that the location needs to be interpreted as having a holistic effect lexically. Thus, we cannot say *June covered the baby with the blanket* without understanding that the whole body of the baby is surrounded by the blanket. In

other words, for verbs like *cover*, the semantic focus on the subevent associated with a change of state is not provided pragmatically, but provided lexically by the verb. Accordingly, e3 of *cover* must be selected, prior to e2, for the mapping to syntax, so that the only *with*-variant emanates exclusively. Among verbs that behave similarly to *cover*, the lexical semantic effect is produced by a physical holistic effect for verbs like *fill* and *surround*, whereas it is provided by a psychological judgment by the speaker for verbs like *decorate* and *litter*, such that the location increases or decreases its aesthetic value by the action.

A significant consequence of the selectional mapping approach is that there is no need to assume *ad hoc* lexical rules to capture argument alternations, nor to prepare two or more lexical entries for a lexical item that shows a complementary polysemy. Rather, if we adopt the notion of event-headedness into the strategy of argument realization, VP-internal argument alternations, which do not show any logical semantic change through the alternation, receive a straightforward explanation in terms of event-head shifting. In the next section, we further argue that the dative alternation in English will be explained by a similar mechanism, with some minor excursuses to be required on the original methodology.

4.3. Mapping from Telic and Qualia Expansion

In this section, I claim that the same analysis as the locative alternation goes for the dative alternation with only small modifications to it. Like the locative alternation, the dative alternation has two different syntactic frames for two internal arguments of three-place verbs.

(4.42) *Dative Alternation*

a. Bill sold a car to Tom.

b. Bill sold Tom a car. (Levin 1993: 46)

Typically, the dative alternation is observed with verbs that denote a change of possession in the theme, including verbs of giving (e.g., *give*, *sell*) and verbs of future

having (e.g., *offer*, *promise*). I will follow tradition and refer to the construction (4.42a) as "*to*-dative variant", whereas (4.42b) as "double object variant".

The dative alternation has also been extensively studied in the literature, and in fact there are both lexical derivation approach (e.g., Speas 1990) and sense enumeration approach (e.g., Pinker 1989) to the alternate mode of argument realization. In particular, it is often the case in the sense enumeration approach that the *to*-dative variant is simply given a semantic representation roughly along the line of 'x CAUSE y TO GO TO z', while the double object variant is intuitively associated with a semantic representation of 'x CAUSE z TO HAVE y' (cf. Green 1974, Oehrle 1976).

However, similar remarks as in the case of the locative alternation readily apply, since there is really no logical semantic change between two variants of the dative alternation (Rappaport Hovav and Levin 2008).[3]

(4.43) a. # My aunt gave some money to my brother for new skis, but he never got it.
b. # My aunt gave my brother some money for new skis, but he never got it.
(Rappaport Hovav and Levin 2008: 146)

(4.44) a. # My brother sold his car to Caroline, but she never owned it.
b. # My brother sold Caroline his car, but she never owned it.
(Rappaport Hovav and Levin 2008: 146)

(4.43) and (4.44) show that the verbs *give* and *sell* entail a change of possession in the theme, whichever variant of the dative alternation they appear in.

Now, let us suppose that the lexical semantic representation of the verb *give* is something like (4.45).

(4.45) give
QUALIA = CONST = possession
FORMAL = move (e2, y, z)
have (e3, z, y)
AGENTIVE = act (e1*, x)

In (4.45), two result subevents, *move* and *have* (or more primitively *be_with* (Kageyama 1996)), are entailed as the formal value of *give*, which must be construed as occurring in the semantic field of "possession".[4] Although these two result subevents are not headed lexically, without satisfying any condition given in (4.6) above, we simply assume that one of them must be projected at the syntax in order to "saturate" all true arguments of the verb. We also suppose that e1 of *give* must be headed lexically since the process of possessional change requires intentional involvement of the agent in ownership transactions. This is the reason why there is no inchoative version of the dative alternation in English.

By analogy with the locative alternation, suppose that either result subevent of *give* in (4.45) will be selected according to the pragmatic focus designed by the speaker, giving rise to the two different syntactic frames given below.

(4.46) a. *to*-dative variant: $[_{vP}$ x $[_{v'}$ *v* $[_{VP}$ y $[_{V'}$ V [to z]]]]]

b. double object variant: $[_{vP}$ x $[_{v'}$ *v* $[_{VP}$ z $[_{V'}$ V y]]]]

For verbs of giving, the choice of headed result subevents is rather subtle, because there is no conceivable difference between the process and the result of transactions in actual world. But if there is a spatiotemporal expansion in the transfer of the theme (e.g., when there is a temporal gap between the time of giving and the time of receiving), the pragmatic difference between the variants becomes remarkable. Consider, for example, the following pairs of sentences:

(4.47) a. John gave his money to the Institute.

b. John gave the Institute his money.

For most speakers of English, (4.47a) is preferable when the presentation of the money has not completed yet (e.g., in such a case that John gave his properties to the Institute by a testament), whereas (4.47b) is more suitable when the presentation has already

completed at the utterance time (cf. Erteschik-Shir 1979). There may also be some constraints from the discourse structure and information-packaging (Rappaport Hovav and Levin 2008). According to Davidse's (1996) corpus-based survey, thirty out of thirty-one examples (96.8%) of *promise* in the dative alternation are used in the double object variant.

Several grammatical phenomena support the syntactic asymmetry of two internal arguments at the underlying structure given in (4.46). Specifically, from the result of the following syntactic tests, the theme argument of *to*-dative variants can be considered to be base-generated higher than the goal argument (Larson 1988).

(4.48) *Anaphor Binding*

a. I showed Mary to herself.

b. * I showed herself to Mary. (Larson 1988: 338)

(4.49) *Quantifier Binding*

a. I sent every check$_i$ to its$_i$ owner.

b.??I sent his$_i$ paycheck to every worker$_i$. (Larson 1988: 338)

(4.50) *Weak Crossover*

a. Which check$_i$ did you send to its$_i$ owner?

b. * Which worker$_i$ did you send his$_i$ check to? (Larson 1988: 338)

(cf. * To whom did you send which check?)

(4.51) *Superiority*

a. Which check did you send to who?

b. * Whom did you send which check to? (Larson 1988: 338)

(4.52) *each ... the other*

a. I sent each boy to the other's parents.

b. * I sent the other's check to each boy. (Larson 1988: 338)

(4.53) *Negative Polarity Items*

a. I sent no presents to any of the children.

b. * I sent any of the packages to none of the children. (Larson 1988: 338)

In contrast, the goal argument must be base-generated higher than the theme argument in double object variants (Barss and Lasnik 1986).

(4.54) *Anaphor Binding*

a. I showed John himself (in the mirror).

b. * I showed himself John (in the mirror). (Barss and Lasnik 1986: 347)

(4.55) *Quantifier Binding*

a. I showed every friend$_i$ of mine his$_i$ photograph.

b. * I showed its$_i$ trainer every lion$_i$. (Barss and Lasnik 1986: 348)

(4.56) *Weak Crossover*

a. Which worker$_i$ did you deny his$_i$ paycheck?

b. * Which paycheck$_i$ did he deny its$_i$ owner? (Barss and Lasnik 1986: 348)

(4.57) *Superiority*

a. Who did you give which book?

b. * Which book did you give who? (Barss and Lasnik 1986: 349)

(4.58) *each...the other*

a. I gave each man the other's watch.

b. * I gave the other's trainer each lion. (Barss and Lasnik 1986: 349)

(4.59) *Negative Polarity Items*

a. I gave no one anything.

b. * I gave anyone nothing. (Barss and Lasnik 1986: 350)

These data sufficiently confirm the syntactic configurations of two variants of the dative alternation given in (4.46), which our linking strategy correctly predicts.

The study of idiomatic expressions suggests the same point. Given that idiomatic items are only composed of syntactic constituents (Katz and Postal 1964), it is predicted that dative alternation verbs take different syntactic units as idioms according to the constructions they appear in. As shown in (4.60) and (4.61), this prediction is naturally borne out.

(4.60) *Idioms from* to-*dative variants*

a. bring Y to light, carry Y to extremes, send Y to the showers, take Y into consideration, take Y to task, take Y to the cleaners, take Y to the hills, throw Y to the wolves

b. carry coals to Newcastle, tell it to the Marines

(4.61) *Idioms from double object variants*

a. give Z a hand, give Z a wide berth, give Z hell, give Z the air, give Z the boot, give Z the gun, give Z Z's cards, lend Z an ear, show Z the door

b. give the devil his due, give 'em hell, give oneself airs

A fixed part of the idioms in (4.60a) nicely corresponds to the V′ structure of *to*-dative variants in (4.46a), where only the theme argument (y) is excluded from the idiomatic expressions to form discontinuous idioms (cf. Kiparsky 1985, Larson 1988). As given in (4.60b), there are also a few idioms that are composed of the VP structure of (4.46a), where the order of the verb and its internal arguments are all fixed. On the other hand, idioms in (4.61a) corresponds to the V′ structure of double object variants in (4.46b), where the only goal argument (z) is outcast from discontinuous idioms. Of course, the VP idioms of double object variants, which include all participants other than the agent, are also possible, as in (4.61b). No other combinations of structural units are possible to form grammatical idiomatic expressions in English. We can correctly account for these results if we adopt the theory that a lexical verb is inserted in V and head-moves to *v* (Hale and Keyser 1993), or it is inserted after syntax making reference to the *v*-V amalgam (Halle and Marantz 1993).

Here, some modifications to our linking strategy are necessary with respect to dative alternation verbs that do not entail any change of possession. These include verbs of sending (e.g., *send*, *ship*), verbs of throwing (e.g., *pass*, *throw*), verbs of transfer of a message (e.g., *teach*, *tell*) and verbs of instrument of communication (e.g., *mail*, *fax*). These verbs simply describe the moment when a physical object is set in motion, and do not entail that the intended goal is attained. However, it is important to notice that there is still no difference in their logical entailment relationship between the variants.

(4.62) a. Lewis sent a bicycle to Sam, but it never arrived.

b. Lewis sent Sam a bicycle, but it never arrived.

(Rappaport Hovav and Levin 2008: 147)

(4.63) a. I threw the ball to Mary, but she was looking at the birds fly overhead and didn't even notice.

b. I threw Mary the ball, but she was looking at the birds fly overhead and didn't even notice. (Rappaport Hovav and Levin 2008: 147)

It then follows that "successful transfer", which has been considered to be the core semantics of the double object variant (Goldberg 1995), is not entailed by the lexical semantics of these verbs, but merely implied by the pragmatic context associated with the variant, as has been pointed out by many researchers occasionally (e.g., Oehrle 1977, Jackendoff 1990b, Baker 1997, Rappaport Hovav and Levin 2008).

With this in mind, consider the lexical semantic representation of *send* in (4.64):

(4.64) send

QUALIA = CONST = i: medium

FORMAL = move (e2, y, z)

TELIC = have (e3, z, y)

AGENTIVE = act (e1*, x, i)

The verb *send* necessarily denotes an activity of an agent (x) who utilizes some medium (i) (e.g., a postal arrangement) for sending a theme (y), and entails that the theme actually moves toward a goal (z). Unlike *give*, however, the possession subevent of *send* is implied in the telic quale, since it is not an entailment of the action but an intentional goal.[5]

Now, a special extension of our linking strategy is in order. In essence, we need a rule to project the semantic arguments in the telic quale of *send* into the syntax, in order to realize the double object variant of *send*. This mapping is schematized in (4.65).

(4.65) Q_T: P (e, x, y) → [$_{VP}$ x [$_{V'}$ V y]]

Given this rule, the dative alternation with verbs of sending is given a straightforward explanation. That is, the *to*-dative variant of *send*, as in (4.46a), appears when e2 in the formal quale is selected to be mapped onto the syntax, while the double object variant, as in (4.46b), is produced when e3 in the telic quale is selected to be mapped onto the syntax.

Again, the choice of the result subevents that will be mapped to the syntax seems to be pragmatically motivated. Hence, the well-known animacy restriction on the goal argument of *send* applies to the double object variant.

(4.66) a. Bill sent a package to {Tom/London}.
b. Bill sent {Tom/*London} a package. (Levin 1993: 46)

In our analysis, the animacy restriction is reducible to the fact that the subject of the relational predicate *have* must be a human being, which can be considered as an owner of the theme. In contrast, the object of the relational predicate *move* can be either animate or inanimate as long as it expresses a goal of the movement. We expect from these considerations that double object variants with verbs that do not entail a change of possession are only possible when the speaker has a clear intention in achieving the caused possession. This prediction seems to be borne out by the following examples.

(4.67) a. * Joe threw the right fielder the ball he had intended the first baseman to catch.
b. * Hal brought his mother a cake since he didn't eat it on the way home.
c. * Joe took Sam a package by leaving it in his trunk where Sam later found it.
(Goldberg 1995: 143)

The ungrammaticality of the sentences in (4.67) has been sometimes naively attributed

to the semantic contradiction on the presupposition that the double object variant describe a successful transfer, but this line of analysis is clearly incorrect, as we have already seen by the cancelability of the successful transfer meaning in (4.62) and (4.63) above. Rather, the unacceptability of these sentences must be imposed by the pragmatic discrepancy that the agent does not intend a successful transfer from the beginning of the action.

The last distinguishable group of verbs that appear in the double object variant includes verbs of creation (e.g., *bake*, *cook*), verbs of performance (e.g., *sing*, *write*) and verbs of obtainment (e.g., *buy*, *get*). In particular, these verbs can exhibit the so-called benefactive alternation, which is quite similar to the dative alternation.

(4.68) *Benefactive Alternation*

a. Martha carved a toy for the baby.

b. Martha carved the baby a toy. (Levin 1993: 49)

The benefactive alternation differs from the dative alternation in that it involves the benefactive preposition *for* rather than the goal preposition *to* in the dative variant. Thus, the construction in (4.68a) is sporadically called "*for*-dative variant". With our strategy of argument realization, however, there seems to be no need to concern the benefactive alternation individually. In fact, we can treat the benefactive alternation as a subsumed example of the dative alternation discussed so far.

To begin with, consider the lexical semantic representation of *carve* in (4.69):

(4.69) carve

QUALIA = CONST = i: instrument

FORMAL = be (e2*, y, carved)

AGENTIVE = act (e1*, x, i)

The lexical representation in (4.69) is structurally the same as change-of-state verbs, such as *cut*. In fact, some verbs of creation show a logical polysemy between a change

of state sense (e.g. *Martha carved the wood*) and a creation sense (e.g. *Martha carved a toy*), according to the semantic content of the direct object (Atkins et al. 1988). This semantic expansion is naturally captured by a lexical operation called "co-composition" (Pustejovsky 1995), which shifts an event type of the main verb through the unification of qualia structures between the verb and its direct object that carries information which acts on the governing verb. This is a particular way in a generative model of the lexicon to avoid relying on the enumeration of individual senses of verbs, and a good example to show how syntax and the lexicon build up in a parallel manner.

Leaving aside many irrelevant details, the result semantic representation of the VP *carve a toy* is given in (4.70), where the verb *carve* is co-composed with the object *a toy*.

(4.70) carve a toy

QUALIA = CONST = i: instrument
m: material
FORMAL = be (e2*, y: a toy, <u>in the world</u>)
AGENTIVE = act (e1**, x, i, m)

The VP *carve a toy* represents the semantic structure of a creation verb, being equipped with the shifted relational predicate *be* in the formal quale along with its constant *<u>in the world</u>*. This representation gives rise to the realization of a transitive clause, such as *John carved a toy*, either with or without the beneficiary in a *for*-phrase. Now let us consider how the double object variant of *carve* in the creation sense becomes possible from the representation in (4.70).

In dynamic approaches to the lexicon, it is often suggested that there is certain level of encyclopedic knowledge that is grammatically relevant to actual linguistic expressions (Kageyama 2005, Ono 2005). In this view, such information that depends on the speaker's comprehension of particular contexts should be described to some degree as the "on-line" meaning of a lexical item (Kageyama 2007). Adopting the gist of these ideas, let us assume that the qualia structure of a verb may undergo a semantic

expansion by adding some non-lexicalized pragmatic information to the telic qualia, as long as it is semantically compatible with the original qualia values of the verb. In this sense, the notion of "existence" is well matched with the notion of "possession", since the former can be considered as a prerequisite for the latter. Thus, it is possible that verbs that denote a creation in some sense imply a possession subevent as far as it conforms to the context.

Based on this semantic compatibility, let us suppose that the qualia structure of *carve a toy* can be extended to imply a caused possession of the theme, when the context requires that some beneficiary in the scene is expected to receive the object. Therefore, the following lexical semantic representation results.

(4.71) carve a toy (in the context requiring an expected recipient)

QUALIA = CONST = i: instrument
m: material
z: beneficiary
FORMAL = be (e2*, y: a toy, in the world)
TELIC = have (e3*, z, y)
AGENTIVE = act (e1**, x, i, m)

In (4.71), the beneficiary argument (z) is added in the constitutive quale of the predicate, fulfilling the contextual requirement. This is a natural semantic expansion especially when we realize that double object variants with verbs of creation, which are essentially two-place predicates, are only possible when there is a beneficiary in the context.

The argument realization of this lexical semantic representation is straightforward. Actually, the manner of argument realization in the benefactive alternation is the same as the locative and dative alternations. The fact that the realization of a *for*-phrase is optional in the *for*-dative variant receives a natural explanation in our linking strategy, since the beneficiary, as a default argument, only appears in the sentence under the discourse condition (see section 2.3.2.3).

As predicted, some pragmatic effects on the headed subevents are observable in

the benefactive alternation. For example, double object variants with verbs of creation require a strong agentive force that intends to achieve a successful transfer.

(4.72) a. Mary burned John a steak because she thought he liked it that way.
b. Mary burned John a steak because she realized he liked it that way.
c. Mary burned John a steak because she didn't realize he didn't like it that way.
d. * Mary burned John a steak because she didn't realize he liked it that way.
e. * Mary burned John a steak because she realized he didn't like it that way.

(Green 1974: 92)

Of course, this is not the case in *for*-dative variants, since the preposition *for* can denote not only an expected recipient but also a beneficiary (in a broad sense) who receives any possible benefit from the action.

To sum up, the argument realization in the dative alternation of *give*-type verbs is similar to what we observed in the locative alternation, while that of *send*-type verbs and *carve*-type verbs need some supplemental explanations. Crucial results are that a linking rule which allows the mapping of arguments from the telic qualia to syntax is added, and that the process of semantic extension in which some contextual information may be installed in the telic qualia of predicates is introduced. Supplemental pragmatic information can be responsible for the argument realization of double object variants in the benefactive alternation. In this regard, however, this semantic expansion must be relatively rare in world languages. Otherwise, many unconstrained overgenerations would occur. The proper restriction to constrain the undesirable mappings from the telic qualia is far beyond the scope of this thesis, but, by way of comparison, we will see in the next section what happens to Japanese three-place verb constructions, in which virtually no qualia expansion is observed.

4.4. Japanese Three-place Verb Constructions

Another piece of evidence in favor of the linking strategy via event-head shifting

comes from the argument realization of Japanese three-place verbs, which roughly correspond to locative and dative verbs in English. In fact, there is a phenomenon in Japanese that can be seen as exactly the same as the dative alternation in English.

In Japanese, there is seemingly no difference in the surface syntactic frames of all three-place verbs; *ageru* 'give', *oku* 'put', *hakobu* 'carry' and *okuru* 'send' uniformly take a nominative agent, a dative goal and an accusative theme, as shown in (4.73).[6]

(4.73) a. Taroo-ga Hanako-ni yubiwa-o age-ta.
Taro-Nom Hanako-Dat ring-Acc give-Past
"Taro gave a ring to Hanako."

b. Taroo-ga Hanako-no tukue-ni hanataba-o oi-ta.
Taro-Nom Hanako-Gen desk-Dat bouquet-Acc put-Past
"Taro put a bouquet on the Hanako's desk."

c. Taroo-ga Hanako-no ie-ni nimotu-o hakon-da.
Taro-Nom Hanako-Gen house-Dat package-Acc carry-Past
"Taro carried a package to Hanako's house."

d. Taroo-ga Hanako-ni tegami-o okut-ta.
Taro-Nom Hanako-Dat letter- Acc send-Past
"Taro sent a letter to Hanako."

What is worse, highly productive process of "scrambling" in Japanese makes it difficult to discern the structural hierarchy among these arguments. However, I will show that the four verbs in (4.73) constitute a different semantic class of verbs in Japanese, and there are in fact two distinct syntactic frames for Japanese three-place verbs that essentially correspond to two variants of the dative alternations in English. Importantly, our linking strategy provides a general framework by which the realization patterns of Japanese three-place verbs are more or less identical to those in English.

First, let us consider the lexical semantics of verbs of change of possession in Japanese. This class of verbs includes verbs of giving (e.g., *ageru* 'give', *uru* 'sell', *kasu* 'lend'), verbs of future having (e.g., *wariateru* 'assign', *yakusoku-suru* 'promise') and

verbs of transfer of message (e.g., *miseru* 'show', *osieru* 'teach', *syookai-suru* 'introduce'). The lexical semantic representation of *ageru* 'give' in (4.73a) is given in (4.74).

(4.74) *ageru* 'give'

QUALIA = CONST = possession

FORMAL = have (e2, y, z)

AGENTIVE = act (e1*, x)

Unlike *give* in English, the abstract movement process of the theme is not entailed in the semantic structure of *ageru* 'give'. In other words, *ageru* 'give' only denotes a caused possession, focusing on the possessional change of the theme. This is evident from the facts that these verbs do not take inanimate objects as their dative goal phrases, as in (4.75a), and that the dative object is not compatible with the postpositional particles *-e* 'for' and *-made* 'up to', as in (4.75b), which express a direction and a range of the theme's movement, respectively (Kishimoto 2001b).

(4.75) a. Taroo-ga {Hanako/*Hanako-no ie}-ni yubiwa-o age-ta.
Taro-Nom Hanako/Hanako-Gen house-Dat ring-Acc give-Past
"Taro gave a ring to {Hanako/*Hanako's house}."

b. Taroo-ga Hanako-{ni/??e/*made} yubiwa-o age-ta.
Taro-Nom Hanako-Dat/for/up to ring-Acc give-Past
"Taro gave a ring to Hanako."

Predictably, there is only one way of argument realization for verbs of change of possession in Japanese. Specifically, our linking strategy requires that the syntactic structure of *ageru* 'give' be something like (4.76), where the dative goal phrase (y) is structurally higher than the accusative theme phrase (z), reflecting the prominence hierarchy between these arguments in the formal quale.

(4.76) $[_{vP}$ x-Nom $[_{v'}$ $[_{VP}$ y-Dat $[_{V'}$ z-Acc V]] v]]

Some syntactic evidence supports the argument hierarchy in (4.76). For example, the possibility of bound variable interpretation of a pronoun in (4.77) indicates that the goal phrase of *ageru* 'give' is actually base-generated higher than the theme phrase at its base structure (Hoji 1985, Takano 2008).

(4.77) a. * Taroo-ga [[e_i sore$_j$-o hosigat-ta] tomodati]$_i$-ni
Taro-Nom it-Acc want-Past friend-Dat
[san-tyaku-izyoo-no huku]$_j$-o age-ta.
three-CL-more-Gen clothes-Acc give-Past
"Taro gave more than three clothes$_j$ to his friend who wanted it$_j$."

a′. Taroo-ga [san-tyaku-izyoo-no huku]$_j$-o [[e_i sore$_j$-o hosigat-ta] tomodati]$_i$-ni age-ta.

b. Taroo-ga [[soitu$_i$-ga e_j hosigat-ta] huku]$_j$-o
Taro-Nom fellow-Nom want-Past clothes-Acc
[san-nin-izyoo-no tomodati]$_i$-ni age-ta.
three-CL-more-Gen friend-Dat give-Past
"Taro gave more than three friends$_i$ the clothes which he$_i$ wanted."

b′. Taroo-ga [san-nin-izyoo-no tomodati]$_i$-ni [[soitu$_i$-ga e_j hosigat-ta] huku]$_j$-o age-ta.

According to Saito and Hoji (1983) and Hoji (1987), it is necessary for a pronoun to be properly bound by its antecedent *either* at the base structure or at the surface structure in order to provide a bound variable interpretation. In (4.77a), for example, it is impossible for the pronoun *sore* 'it', which is embedded in the goal phrase, to be bound by the antecedent in the theme phrase (i.e., *huku* 'clothes'). Therefore, the bound variable interpretation of *sore* 'it' does not obtain. The relevant interpretation becomes possible when the theme phrase overtly scrambled over the dative phrase, as in (4.77a′), making it possible that the former binds the latter at the surface structure. In (4.77b), on the

other hand, it is possible for the pronoun *soitu* 'fellow', which is embedded in the theme phrase, to be bound by the antecedent in the goal phrase (i.e., *tomodati* 'friend') which does not c-command the theme phrase at the surface structure, giving rise to a bound variable interpretation. Given that string vacuous scrambling is prohibited in Japanese (Saito 1985), the data suggests that the pronoun *soitu* 'fellow' must be bound by its antecedent *tomodati* 'friend' at the base structure given in (4.77b′), from which the goal phrase is scrambled over the theme phrase.

The same conclusion can be drawn from the scope interaction of two internal arguments of change-of-possession verbs (Hoji 1985).

(4.78) a. Taroo-ga daremo-ni ringo-ka banana-o age-ta. ($\forall > \vee$, $*\forall < \vee$)
Taro-Nom everyone-Dat apple-or banana-Acc give-Past
"Taro gave everyone an apple or a banana."

b. Taroo-ga ringo-ka banana-o daremo-ni age-ta. ($\vee > \forall$, $\vee < \forall$)

In (4.78a), with the goal-theme order, the goal phrase always takes a wider scope than the theme phrase. In contrast, either the theme phrase or the goal phrase can take a wider scope than the other with the theme-goal order in (4.78b). Given that the scope interpretation of two quantifiers is determined by their c-command relationship at the syntactic configuration (Kuroda 1970), the only possible interpretation of quantifier scope in (4.78a) indicates that the goal phrase is structurally higher than the theme phrase at every phase of syntactic derivation. Assuming that VP-internal scrambling in Japanese is a target of optional reconstruction at LF (cf. Mahajan 1990), the ambiguous scope interpretation in (4.78b), on the other hand, suggests that the structural relation of two internal arguments in (4.78b) has been inverted through the derivation. Although the contrast is rather subtle, if this analysis is on the right track, we can conclude that the goal phrase of verbs of change of possession is always base-generated at a higher position than the theme phrase at the base structure.

Next, let us consider verbs of change of location, such as *oku* 'put' in (4.73b). The lexical semantic representation of *oku* 'put' is given below.

(4.79) *oku* 'put'

QUALIA = FORMAL = be (e2, y, z)

AGENTIVE = act (e1, x)

Verbs of change of location only take an inanimate dative object, as shown in (4.80a), since the dative phrase, which is the object of the relational predicate *be* in the formal quale, must be interpreted as a location. Since the verbs do not entail a caused motion of the theme, the dative object of change-of-location verbs is not compatible with *-e* 'for' and *-made* 'up to', as shown in (4.80b).

(4.80) a. Taroo-ga {Hanako-no tukue/*Hanako}-ni hanataba-o oi-ta.
Taro-Nom Hanako-Gen desk/Hanako-Dat bouquet-Acc put-Past
"Taro put a bouquet on {Hanako's desk/*Hanako}."

b. Taroo-ga Hanako-no tukue-{ni/??e/*made} hanataba-o oi-ta.
Taro-Nom Hanako-Gen desk-Dat/for/up to bouquet-Acc put-Past
"Taro put a bouquet on Hanako's desk."

Verbs of change of location include verbs of putting (e.g., *oku* 'put', *naraberu* 'arrange'), verbs of loading (e.g., *noseru* 'load', *tumu* 'load') and verbs of painting (e.g., *nuru* 'apply', *haru* 'paste'). The important difference between verbs of change of possession and verbs of change of location is that they have the opposite prominence hierarchy with respect to their internal arguments, since the former specifies that a goal is the more prominent argument than a theme, while the latter specifies that a theme is the more prominent argument than a location.

Verbs of caused motion such as *hakobu* 'carry' in (4.73c) share the same prominence hierarchy with verbs of change of location. Consider, for example, the lexical semantic representation of *hakobu* 'carry' in (4.81), where the theme argument (y) is more prominent than the goal argument (z) in the formal quale:

(4.81) *hakobu* 'carry'

QUALIA = FORMAL = move (e2, y, z)

AGENTIVE = act (e1, x)

Verbs of caused motion entail a movement of the theme as its result subevent. Therefore, the goal phrase of caused motion verbs refers to something interpreted as a goal, as in (4.82a), and the dative object can be compatible with *-e* 'for' and *-made* 'up to', both of which are one of the several varieties of path expressions, as shown in (4.82b).

(4.82) a. Taroo-ga {Hanako-no ie/*Hanako}-ni nimotu-o hakon-da.
Taro-Nom Hanako-Gen house/Hanako-Dat package-Acc carry-Past
"Taro carried a package to {Hanako's house/*Hanako}."

b. Taroo-ga Hanako-no ie-{ni/e/made} nimotu-o hakon-da.
Taro-Nom Hanako-Gen house-Dat/for/up to package-Acc carry-Past
"Taro carried a package to Hanako's house."

This class of verbs includes verbs of pouring (e.g., *sosogu* 'pour', *tugu* 'pour'), verbs of carrying (e.g., *hakobu* 'carry', *modosu* 'return'), verbs of throwing (e.g., *nageru* 'throw', *suteru* 'throw away') and verbs of scattering (e.g., *maku* 'seed').

Now it is required by our linking strategy that the syntactic realization of verbs of change of location and verbs of caused motion must be something like (4.83), where the accusative object associated with a theme (y) is structurally higher than the dative object associated with a location or a goal (z).

(4.83) $[_{vP}$ x-Nom $[_{v'}$ $[_{VP}$ y-Acc $[_{V'}$ z-Dat V]] *v*]]

Therefore, it is expected that verbs of change of location and verbs of caused motion behave differently from verbs of change of possession in the syntax.

The syntactic structure in (4.83) can be confirmed by the same tests for (4.76). Consider, for example, the possibility of bound variable interpretation of two internal

arguments of the caused motion verb *modosu* 'return' in (4.84):

(4.84) a. Hanako-ga [[e_i sore$_j$-o mituke-ta] tana]$_i$-ni
Hanako-Nom it-Acc find-Past shelf-Dat
[san-satu-izyoo-no hon]$_j$-o modosi-ta.
three-CL-more-Gen book-Acc return-Past
"Hanako returned more than three books$_j$ to the shelf where she found it$_j$."

a′. Hanako-ga [san-satu-izyoo-no hon]$_j$-o [[e_i sore$_j$-o mituke-ta] tana]$_i$-ni modosi-ta.

b. * Hanako-ga [[soko$_i$-de e_j mituke-ta] hon]$_j$-o
Hanako-Nom there-DE find-Past book-Acc
[san-kasyo-izyoo-no tana]$_i$-ni modosi-ta.
three-CL-more-Gen shelves-Dat return-Past
"Hanako returned to more than three shelves$_i$ the book which she found there$_i$."

b′. Hanako-ga [san-kasyo-izyoo-no tana]$_i$-ni [[soko$_i$-de e_j mituke-ta] hon]$_j$-o modosi-ta.

Notice that the result is just the opposite of what we obtain with verbs of change of possession in (4.77). This time, it is possible in (4.84a) for the antecedent in the theme phrase (i.e., *hon* 'books') to bind the pronoun *sore* 'it', which is embedded in the dative goal phrase, giving raise to a bound variable interpretation, while it is impossible in (4.84b) for the antecedent in the goal phrase (i.e., *tana* 'shelves') to bind the pronoun *soko* 'there' embedded in the accusative theme phrase. (The same result is observable from sentences with verbs of change of location, which I will not display here.) This clearly indicates that the theme argument of verbs of caused motion (or verbs of change of location) is base-generated at a higher syntactic position than the goal (or location) argument.

For caution's sake, consider the scope interaction of two internal arguments of verbs of change of location like *oku* 'put'.

(4.85) a. Hanako-ga subete-no tukue-ni ringo-ka banana-o oi-ta.
Hanako-Nom every-Gen desk-Dat apple-or banana-Acc put-Past
(∀>∨, ∀<∨)
"Hanako put an apple or a banana on every desk."
b. Hanako-ga ringo-ka banana-o subete-no tukue-ni oi-ta. (∨>∀, *∨<∀)

In (4.85), the relation between word order of two internal arguments and their scope interaction is just the opposite of what we have seen in (4.78) with verbs of change of possession. Again, the judgment is very delicate, but if it is correct, the data suggest that the theme argument of verbs of change of location is base-generated structurally higher than the location argument.

There is still another class of three-place verbs in Japanese, which I call "verbs of change of possession via caused motion". This is a special class of verbs in Japanese, and, in fact, there seem to be only a few candidates for this class, including *okuru* 'send', *todokeru* 'bring', *watasu* 'hand over, *kubaru* 'distribute' and *kaesu* 'return'. As the name suggests, verbs in this class have both senses of caused motion and change of possession in the theme. Therefore, they can take either animate or inanimate objects as the dative goal phrase, and only when the dative object is inanimate, it is compatible with *-e* 'for' and *-made* 'up to'.

(4.86) a. Taroo-ga {Hanako/Hanako-no ie}-ni tegami-o okut-ta.
Taro-Nom Hanako/Hanako-Gen house}-Dat letter-Acc send-Past
"Taro sent a letter to {Hanako /Hanako's house}."
b. Taroo-ga Hanako-{ni/??e/*made} tegami-o okut-ta.
Taro-Nom Hanako-Dat/for/up to letter-Acc send-Past
"Taro sent a letter to Hanako."
c. Taroo-ga Hanako-no ie-{ni/e/made} tegami-o okut-ta.
Taro-Nom Hanako-Gen house-Dat/for/up to letter-Acc send-Past
"Taro sent a letter to Hanako's house."

Notice, however, that verbs of change of possession via caused motion do not entail a subevent associated with a change of possession. Hence, the caused possession sense can be easily canceled, as shown in (4.87).

(4.87) Taroo-wa Hanako-ni tegami-o okut-ta-ga, todoka-nakat-ta.
Taro-Top Hanako-Dat letter-Acc send-Past-but arrive-not-Past
"Taro sent a letter to Hanako, but it never arrived."

Thus, the lexical semantic representation of *okuru* 'send' will be as follows.

(4.88) *okuru* 'send'
QUALIA = FORMAL = move (e2, y, z)
TELIC = have (e, z, y)
AGENTIVE = act (e1*, x)

Indeed, this semantic structure is almost identical to the one for the English verb *send.* Accordingly, there are two possible syntactic realizations of internal arguments of the verb: one is (4.76) for verbs of change of possession, and the other is (4.83) for verbs of caused motion.

There are observable differences between two syntactic configurations of verbs of change of possession via caused motion. What distinguishes between the two ways of syntactic realization of these verbs is the animacy restriction on the goal argument. As discussed above, the goal argument in (4.76) must denote an animate being who can engage in the possession relationship. On the contrary, the goal argument in (4.83) should be preferred to refer to an inanimate being that is easily considered as a destination of the theme. Indeed, when the goal argument of *todokeru* 'bring' is animate, the syntactic configurations of verbs of change of possession emanates, as shown in (4.89).

(4.89) a. * Taroo-ga [[e_i sore$_j$-o kat-ta] kyaku]$_i$-ni
Taro-Nom it-Acc buy-Past customer-Dat
[san-dai-izyoo-no terebi]$_j$-o todoke-ta.
three-CL-more-Gen TV-Acc bring-Past
"Taro brought more than three TVs$_j$ to the customers who bought it$_j$."

a′. Taroo-ga [san-dai-izyoo-no terebi]$_j$-o [[e_i sore$_j$-o kat-ta] kyaku]$_i$-ni todoke-ta.

b. Taroo-ga [[soitu$_i$-ga e_j kat-ta] terebi]$_j$-o
Taro-Nom fellow-Nom want-Past TV-Acc
[san-nin-izyoo-no kyaku]$_i$-ni todoke-ta.
three-CL-more-Gen customer-Dat bring-Past
"Taro brought more than three customers$_i$ the TVs which he$_i$ bought."

b′. Taroo-ga [san-nin-izyoo-no kyaku]$_i$-ni [[soitu$_i$-ga e_j kat-ta] terebi]$_j$-o todoke-ta.

On the other hand, when the goal argument of *todokeru* 'bring' is inanimate, as in (4.90), the syntactic structure for verbs of caused motion comes out.

(4.90) a. Hanako-ga [[e_i sore$_j$-ga hituyoona] ie]$_i$-ni
Hanako-Nom it-Acc necessary house-Dat
[san-dai-izyoo-no terebi]$_j$-o todoke-ta.
three-CL-more-Gen TV-Acc bring-Past
"Hanako brought more than three TVs$_j$ to the house where it$_j$ is necessary."

a′. Hanako-ga [san-dai-izyoo-no terebi]$_j$-o [[e_i sore$_j$-ga hituyoona] ie]$_i$-ni todoke-ta.

b. * Hanako-ga [[soko$_i$-de e_j hituyoona] terebi]$_j$-o
Hanako-Nom there-DE necessary TV-Acc
[san-gen-izyoo-no ie]$_i$-ni todoke-ta.
three-CL-more-Gen house-Dat bring-Past
"Hanako brought to more than three houses$_i$ the TV which is necessary there$_i$."

b′. Hanako-ga [san-gen-izyoo-no ie]$_i$-ni [[soko$_i$-de e_j hituyoona] terebi]$_j$-o todoke-ta.

It is thus reasonable to conclude that verbs of change of possession via caused motion have the syntactic structure in (4.76) when the caused possession sense is focused along with an animate goal phrase to refer to a possessor, while they have the syntactic structure in (4.83) when the caused motion sense is focused along with an inanimate goal phrase that denotes a goal.

This is also the case for the quantifier scope of two internal arguments. The different scope interaction can be observed with verbs of change of possession via caused motion according to the animacy of the goal phrase (cf. Miyagawa and Tsujioka 2004).

(4.91) a. Taroo-ga dareka-ni dono-nimotu-mo okut-ta. ($\exists>\forall$, *$\exists<\forall$)
Taro-Nom someone-Dat every-package send-Past
"Taro sent every package to someone."

b. Taroo-ga dono-nimotu-mo dareka-ni okut-ta. ($\forall>\exists$, $\forall<\exists$)

(4.92) a. Taroo-ga dokoka-ni dono-nimotu-mo okut-ta. ($\exists>\forall$, $\exists<\forall$)
Taro-Nom some.place-Dat every-package send-Past
"Taro sent every package to some place."

b. Taroo-ga dono-nimotu-mo dokoka-ni okut-ta. ($\forall>\exists$, *$\forall<\exists$)

In (4.91), where the goal phrase is animate, the scope interaction is just the same as verbs of change of possession in (4.78), whereas in (4.92), where the goal phrase is

inanimate, it is just the same as verbs of caused motion (and therefore verbs of change of possession in (4.85)).

The final piece of evidence of our linking strategy comes from the syntactic status of the goal arguments of Japanese three-place verbs. To begin from the conclusion, the goal phrase of verbs of change of possession is a dative noun phrase (i.e., DP), while that of verbs of change of location or verbs of caused motion is a dative postpositional phrase (i.e., PP). There are well-studied differences between the two categories in their syntactic distributions. First, the dative noun phrase allows a quantifier floating, as in (4.93), but the dative postpositional phrase does not (Miyagawa 1989, Sadakane and Koizumi 1995).

(4.93) Taroo-wa tomodati-ni san-nin nooto-o kasi-ta.
Taro-Top friend-Dat three-CL note-Acc lend-Past
"Taro lent a note to three of his friends."

(4.94) * Taroo-wa torakku-ni san-dai nimotu-o hakon-da.
Taro-Top truck-Dat three-CL packeage-Acc carry-Past
"Taro carried a package to three trucks."

Second, the dative noun phrase can be the subject of passive sentences, as in (4.95), while the dative postpositional phrase cannot (Kishimoto 2001b).

(4.95) Hanako-wa Taroo-ni sono-zizitu-o sirasa-re-ta.
Hanako-Top Taro-by the-fact-Acc tell-Pass-Past
"Hanako was told the fact by Taro."

(4.96) # Hanako(-no gurasu)-wa Taroo-ni wain-o tuga-re-ta.
Hanako(-Gen glass)-Top Taro-by wine-Acc pour-Pass-Past
Lit. "Hanako's glass was poured wine into by Taro."

The sentence (4.96) can only be interpreted as an instance of "indirect passives", which express some annoying act for the subject.

Unsurprisingly, the goal phrase of verbs of change of possession via caused motion is ambiguous between a dative noun phrase and a dative postpositional phrase, depending on whether its referent is animate or inanimate. When it is animate, it can be a host of floating quantifiers, as in (4.97), and can be the subject of passive sentences, as in (4.98).

(4.97) Hokuto-wa sukina-onnanoko-ni huta-ri hanataba-o okut-ta.
Hokuto-Top favorite-girl-Dat two-CL bouquet-Acc send-Past
"Hokuto sent a bouquet to two of his favorite girls."
(Sadakane and Koizumi 1995: 20)

(4.98) Taroo-wa Hanako-ni tegami-o watasa-re-ta.
Taro-Top Hanako-by letter-Acc deliver--Pass-Past
"Taro was handed a letter by Hanako."

When the goal phrase is inanimate, on the other hand, it cannot be a target of quantifier floating, as in (4.99), and cannot be the subject of passive sentences, as in (4.100).

(4.99) * Hokuto-wa gaikoku-ni huta-tu hanataba-o okut-ta.
Hokuto-Top foreign.country-Dat two-CL bouquet-Acc send-past
"Hokuto sent a bouquet to two countries."
(Sadakane and Koizumi 1995: 20)

(4.100) # Sono-hasira-wa NTT-ni denwasen-o watasa-re-ta.
the-pile-Top NTT-by wire-Acc deliver-Pass-Past
Lit. "The pile was hanged wires across by NTT."

This result is just the same as what we obtained with respect to the syntactic hierarchy of two internal arguments of Japanese three-place verbs.

The difference in the syntactic status of the goal phrase is reducible to our linking strategy, by which specific result subevents are selected to be mapped onto the syntax. To be specific, when the possession subevent is selected, the goal argument must refer

to the subject of the relational predicate *have*, which needs to be a noun phrase syntactically. On the other hand, when the movement subevent is selected, the goal argument refers to the object of the relational predicate *move*, which is realized syntactically as a postpositional phrase. In English, the former corresponds to the form "y have z", while the latter to the form "y move to z". The syntactic status of semantic arguments is determined in this manner by virtue of the semantic property of each qualia predicate (cf. Jackendoff 1990b).

In this section, we have observed that there are two different syntactic structures for four different semantic classes of three-place verbs in Japanese. Our linking strategy deals with these differences in the parallel manner to what we have discussed relative to the English dative alternation. One of the significant outcomes is that verbs of change of possession via caused motion participate in the very similar phenomenon to the dative alternation in English. Importantly, the cross-linguistic differences of three-place verbs between English and Japanese are ascribed to their lexical semantic representations. This is a natural consequence, as long as it is natural to assume that what distinguishes languages in terms of argument realization is not the innate syntactic faculty nor the interface conditions between syntax and the lexicon, but the structured organization of the lexicon itself. In the next chapter, we will discuss more on this point.

Chapter 5: Event Headedness as a Parameter of Lexical Knowledge

In this chapter, I implement a tentative claim that the linking strategy by means of event-headedness provides a general framework for understanding empirical variations in argument alternations. Specifically, it will be positively argued that a surface diversity in the possibility of argument alternations can be explained in terms of different modes of event head assignment among speakers and among languages, instead of making reference to event structure ambiguity of alternation verbs. For illustration, four dimensions of linguistic phenomena in connection with the locative alternation will be discussed in order: speech errors, dialectal variations, intralingual variations and cross-linguistic variations. Hopefully, our discussion sheds fresh light on parametric approaches to the lexical knowledge of natural language.

5.1. Speech Errors by Children

In the field of language acquisition, it has been observed that children have a systematically different model of grammar than adults at a certain phase of their language acquisition (Pinker 1979, 1984, 1989). The acquisition of syntactic properties of verbs is one of the clearest cases in which the no-negative-evidence problem arises (Green 1974, Baker 1979). Children learn how a predicate encodes its grammatical arguments and how an alternative realization of the arguments is available from only the grammatical sentences that he or she has heard.

Bowerman (1982) reports that her two daughters persistently make errors in their spontaneous speech with particular verbs related to the locative alternation. Some of the data she collected are given in (5.1) and (5.2).

(5.1) a. Pour, pour, pour. Mommy, I ***poured*** you. [Mother: You poured me?] Yeah, with water. [= pour water on you] (E, 2;11)

b. I don't want it [= her toast] because I ***spilled*** it of orange juice. [= spilled orange juice on it] (E, 7;2)

c. I ***bumped*** this [= a toy] to me. [= I bumped myself with this] (C, 3;4)

d. Once the Partridge Family got ***stolen***. [Mother puzzled. The whole family?] No, all their stuff. (C, 6;5) (Bowerman 1982: 338)

(5.2) a. My other hand's not yukky. See? 'Cause I'm going to ***touch*** it on your pants. [= touch your pants with it] (E, 3;0)

b. Can I ***fill*** some salt into the bear? [= fill the bear (a bear-shaped salt shaker) with some salt] (E, 5;0)

c. I'm going to ***cover*** a screen over me. [= cover myself with a screen] (E, 4;5)

d. She's gonna ***pinch*** it on my foot. [= pinch my foot with it] (C, 4;9)

e. I didn't ***fill*** water up to drink it. I ***filled*** it up for the flower to drink it. [= filled the watering can up (with water)] (E, 4;1)

f. Terri said if this [= rhinestone on a shirt] were a diamond then people would be trying to ***rob*** the shirt. [= trying to rob me (of the shirt]] (E, 5;3) (Bowerman 1982: 338)

In (5.1) *pour*-type verbs, which only take a theme as the direct object in adult grammar, mistakenly appear in the *with*-variant, while in (5.2) *cover*-type verbs, which only take a location as the direct object in adult grammar, appear in the locative variant. The issue must be much broader than the simplest solution to label them as accidental errors in their verb use, since it has been found that errors with *cover*-type verbs in (5.2) are far more frequent than errors with *pour*-type verbs in (5.1).

The same result has been observed from psycholinguistic experiments to reveal the ability of children to understand and produce some locative verbs. For example, Gropen et al. (1991) argue that children tend to make errors with sentences containing *fill* rather than *pour*. Thirty out of forty-eight subject children, aged 2;6 to 5;11, describe locative events in pictures (e.g., of a woman filling a glass by pouring water) by using *fill* in the ungrammatical form (i.e., *fill water into the glass*), whereas only two children describe the same set of pictures by using *pour* in the ungrammatical form (i.e., *pour the glass with water*).

The susceptibility to syntactic errors can be measured by a semantic task as well.

Another experiment by Gropen et al. (1991) confirms that children tend to understand *fill* not as a *result* verb to make a container full but as a *manner* verb like *pour*. As might be expected, those children who misinterpreted verb meanings are more likely to make syntactic errors with these verbs. From these observations, we may assume that, at least for children, the event structure denoted by *fill* is regarded as entailing that of *pour* or its equivalent (except its manner component), but not vice versa.

Importantly, the tendency for children to produce errors of the type in (5.2) declines with their age. According to Gropen et al. (1991), the potential errors involving *fill* with the incorrect theme objects goes from 53% of children in the younger group (aged form 2;6 to 4;5) to 34% in the older group (aged from 4;6 to 6) with only 3% in adults. The data suggest that this type of speech errors becomes relatively less as children, who once confused the meaning of *fill* with *pour*, become to learn that pouring water is not the only way to make a glass full. Gentner (1982) also suggests that the younger children, but not the older children or adults, have difficulty in distinguishing appropriate instances of verb meaning.

Children are indeed slow in fixing the standard meanings of verbs. Gentner (1978) argues that some of the errors in acquiring verb meanings fall into a systematic pattern. In particular, children have more difficulty acquiring the meaning components relevant to "change of state" than those relevant to "movement" or "change of location". To apply this upshot to locative verbs, when a child acquires the event structure associated with a change of state in a location (i.e., *be*), he or she would have already acquired the event structure associated with a movement of a theme (i.e., *move*). In other words, the movement part of the verb meaning must be lexicalized in locative verbs earlier than the change-of-state part. Then, it naturally follows that those children whose vocabulary has not been stable yet tend to use *cover*-type verbs mistakenly in the locative variant of the locative alternation. Actually, our linking strategy automatically provides an accurate account for these findings by assuming that the event head parameter associated with a change of state of *cover*-type verbs has not been specified in child grammar, so that the two result subevents entailed by those verbs can be both a target of argument realization, giving rise to the ungrammatical argument alternation.

Thus, a valid reasoning behind these phenomena seems to be as follows. At the first phase, children acquire a movement component for verbs like *cover* that expresses a locative event, as in (5.3).

(5.3) cover (stage 1)

QUALIA = CONST = y: cover

FORMAL = move (e2*, y, z)

AGENTIVE = act (e1, x)

The qualia structure in (5.3) is similar to that for verb like *pour* in adult grammar. We are claiming that this representation is shared by all locative verbs, including *spray* and *pour*, at a very early stage of child grammar. Then, the semantic component associated with a change of state in a location will be conflated.

(5.4) cover (stage 2)

QUALIA = CONST = y: cover

FORMAL = move (e2*, y, z)

be (e3*, z, covered)

AGENTIVE = act (e1, x)

In this stage, *cover*-type verbs make no difference from locative alternation verbs, such as *spray* and *load*. It is thus quite natural that errors in *cover*-type verbs in (5.2) are of frequent occurrence in this phase. Finally, event head according to the lexical semantic focus of the verb will be added to the representation.

(5.5) cover (stage 3)

QUALIA = CONST = y: cover

FORMAL = move (e2*, y, z)

be (e3**, z, covered)

AGENTIVE = act (e1, x)

In this stage, *cover*-type verbs can no longer appear in the locative variant, since e3 is exhaustively selected to the mapping to the syntax, as we have demonstrated in section 4.2. From this point of view, event-headedness, which provides the information of foregrounding and backgrounding on particular subevents, may be considered as a sort of "lexical parameters" entrenched with our linguistic experience.

As a natural process of acquiring verb meanings, children seem to have struggled for acquiring the correct parameters about event heads for a particular language. In English, many younger children apparently do not acquire event heads of *cover*-type verbs correctly. Thus, significant proportion of native speakers of English misinterprets the meaning of *fill* as if it entails relevant manner of motion verbs, such as *pour*. As the meaning of *fill* and *pour* is getting established, however, they learn that there are many other means than *pouring* to achieve the event of *filling*. Then, children no longer use *fill* to describe a situation in which a liquid is just pouring into a container. In short, the different behavior of *cover*- and *pour*-type verbs in the locative alternation is lexical compartmentalization of these verb meanings. Specifically, *fill* in the locative variant will be lexically blocked out if the relevant manner of motion verbs (e.g., *drip*, *dribble*, *pour*) specifies the movement of a theme, which finally results in a state change in a location to be full. The exact manner of lexical acquisition awaits further research, but the empirical data with respect to speech errors by children is just expected to bear out the lexicalization pattern of locative verbs and our linking strategy.

5.2. Dialectal Variations

Another piece of evidence in favor of the claim that event-headedness constitutes a parameter of our lexical knowledge comes from dialectal variations in the possibility of argument alternations.

In the context of the locative alternation, Kishimoto (2001a) reports an interesting fact that *cover*-type errors in the form of (5.2) are regarded as fully acceptable in some dialects of British English. Therefore, those speakers have the following patterns with regard to the locative alternation.

(5.6) *British English (some dialects)*

a. John sprayed paint on the wall.

b. John sprayed the wall with paint.

c. John poured water into the glass.

d. * John poured the glass with water.

e. John filled water into the glass.

f. John filled the glass with water.

As to the verbs *spray* and *pour*, the speakers in question display the same judgment as average English speakers. However, they sharply contrast to other speakers in that they treat verbs like *fill* as locative alternation verbs. Notice crucially that for those speakers who accept (5.6e), (5.6d) is still totally unacceptable.

A natural account for this fact arrives soon in our linking strategy. Indeed, the paradigm in (5.6) can be explained in just the same way as speech errors by children discussed in the last section. In fact, the only difference between those speakers who accept (5.6e) and those who do not is the dialectal mode of event head assignment on the subevent associated with a change of state in a location. With this in mind, consider the lexical semantic representation of *fill* in (5.7), which is designed for those speakers who accept (5.6e):

(5.7) fill (for some British English speakers)

QUALIA = CONST = y: fill

FORMAL = move (e2*, y, z)

be (e3*, z, filled)

AGENTIVE = act (e1, x)

In this representation, e2 and e3 hold relatively the same prominence relation, so that the representation is quite similar to typical locative alternation verbs. I am not sure for the time being what factor of event-head assignment lacks for the speakers in question,

but one clear argumentation is that different lexical semantic representations are not necessary in accordance with the alternating and non-alternating versions of *fill*, which leads undesirable redundancies in the lexicon. Our linking strategy, endowed with a generative model of the lexicon, gives an explanation to these dialectal variations of argument alternations without recourse to the difference in the event structure of the verb, but to the accessibility to the patterns of argument realization. By this approach, we can still maintain that errors in *pour*-type verbs, as in (5.6d), are never acceptable in all dialects in English, since *pour*-type verbs do not entail a change-of-state subevent, which is necessary for the realization of the *with*-variant.

5.3. The *Clear* Alternation

The view that event-headedness constitutes a parameter of the lexical knowledge can be extended to the *clear* alternation in English.

(5.8) Clear *Alternation*

a. Henry cleared dishes from the table.

b. Henry cleared the table of dishes. (Levin 1993: 52)

In this alternation, verbs that denote a removal of a theme participate in the semantically inverse type of the locative alternation. In (5.8b), the "ablative" preposition *of* (Hook 1983) is used instead of the preposition *with* in the *with*-variant of the *spray/load* type locative alternation. The class members of the *clear* alternation are relatively small. Levin and Rappaport Hovav (1991) only cite three verbs, namely *clear*, *clean* and *empty*, associated with this alternation, while Fraser (1971) and Hook (1983) readily extend the coverage of alternation verbs to include *drain* and *strip* as a class member.

Apparently, argument realization for the verb *clear* receives the same explanation as the *spray/load* type locative alternation, discussed in section 4.2. Now, let us suppose that the lexical semantic representation of *clear* is something like (5.9):

(5.9) clear

QUALIA = CONST = z: clear

FORMAL = remove (e2***, y, z)

be (e3***, z, clear)

AGENTIVE = act (e1, x)

The verb *clear* entails two result subevents just like *spray/load* type locative alternation verbs. In effect, the following sentences are both somewhat contradictory.

(5.10) a. # Bill cleared the dishes from the table, but no dishes on the table moved.

b. # Bill cleared the table of the dishes, but no dishes on the table moved.

(5.11) a. # Bill cleared the dishes from the table, but the table was messy afterwards.

b. # Bill cleared the table of the dishes, but the table was messy afterwards.

Notice that *clear* specifies a source argument (z) by its deverbal noun form. Therefore, e2 and e3 of the verb are both supposed to be lexically headed. Also, since *clear* is a deadjectival verb, containing the constant denoting the final state of the action, e3 must be headed further.

One more thing to be noted as to verbs in the *clear* alternation is that they must specify a specific result of the action denoted by the verb. In fact, all verbs in the *clear* alternation seem to require a physical holistic effect (e.g., *clear*, *drain*, *empty*) or a psychological judgment on the final state of the location (e.g., *clean*). This is somewhat evident from the following examples.

(5.12) a. # Bill cleared the dishes from the table, but there were some dishes left on the table.

b. # Bill cleared the table of the dishes, but there were some dishes left on the table.

Thus, the situation of *clear* is exactly the same as the one for *cover*-type locative verbs,

which do not participate in the locative alternation.

Recall that the lexical semantic conditions for verbs to enter into the locative alternation are that the verb entails two result subevents, and that both of the result subevents have relatively equal prominence in the context. Therefore, under strict application of our linking strategy via event-headedness, *clear*-type verbs, by nature, ought to behave similarly to *cover*-type verbs in terms of the locative alternation. However, the fact that they enter into the *clear* alternation in (5.8) suggests that e2 and e3 of the *clear*-type verbs have relatively equal prominence to be headed, as in (5.9). One possible factor to put an extra event head on e2 of *clear*-type verbs is the negational nature of the relational predicate *remove*. Actually, *remove* can be decomposed into *move_from* or *not_be_at*, both of which are not a natural way of conceptualization of the outer world in terms of a billiard-ball model discussed in section 2.2.3.2. In any case, let us simply assume for the time being that e2 of *clear* receives some special semantic focus to obtain the relatively equal prominence to e3. Of course, this is just a stipulation, depending on the parameterization of lexical knowledge, but if it receives some further support to prove itself, our linking strategy can extend to the *clear*-type locative alternation. The fact that only a small number of verbs in English participate in the *clear* alternation definitely tells its peculiar nature.

Despite the uniqueness of the *clear*-type locative alternation, the main point of our linking strategy holds perfect for other verbs of removal that do not participate in the *clear* alternation. There are in fact two patterns of non-alternating verbs in the *clear* alternation.

(5.13) a. The thief stole the painting from the museum.
b. * The thief stole the museum of the painting. (Levin 1993: 52)

(5.14) a. * The doctor cured pneumonia from Pat.
b. The doctor cured Pat of pneumonia. (Levin 1993: 52)

According to Levin (1993), verbs of stealing (e.g., *steal*, *snatch*), verbs of removing (e.g., *remove*, *delete*) and verbs of vanishing (e.g., *evacuate*, *expel*) can appear only in

the locative variant of the *clear* alternation. On the other hand, verbs of cheating (e.g., *cheat*, *rid*), verbs of depriving (e.g., *deprive*, *rob*) and verbs of curing (e.g., *cure*, *free*, *ease*) can occur only in the *of*-variant.[1]

The unavailability of *steal* in the *of*-variant receives a straightforward explanation in our linking strategy. Consider the lexical semantic representation of *steal* in (5.15):

(5.15) steal

QUALIA = CONST = stealing_manner (→e1)
FORMAL = remove (e2, y, z)
AGENTIVE = act (e1*, x)

The verb *steal* lexicalizes no change of state subevent. The absence of a change-of-state subevent in *steal* can be confirmed by the following cancelability test.

(5.16) a. # The thief stole the painting from the museum, but it didn't move at all.
b. The thief stole the painting from the museum, but the museum was not damaged at all (because the painting was of no value).

Thus, it is quite natural that *steal* cannot occur in the *of*-variant, just as *pour*-type verbs cannot appear in the *with*-variant.

The reason why verbs of depriving cannot appear in the locative variant is also very simple. Consider, for example, the lexical semantic representation of *rob* in (5.17):

(5.17) rob

QUALIA = FORMAL = remove (e2, y, z)
be (e3*, z, <u>robbed</u>)
AGENTIVE = act (e1, x)

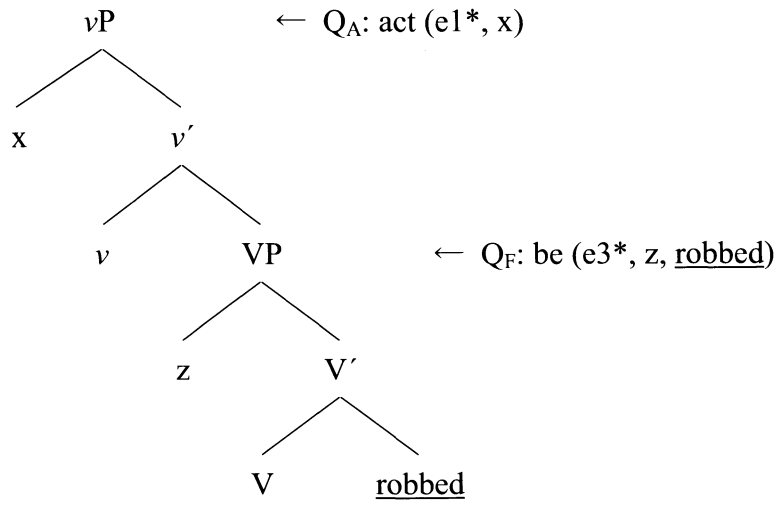
The verb *rob* entails two result subevents, namely a movement subevent and a change-of-state subevent. This can be indicated by the cancelability test as below.

(5.18) a. # They robbed the bank of its money, but the money didn't move at all.

b. # They robbed the bank of its money, but the bank lost no money afterward.

As for the event-headedness, the verb *rob* does not have a deverbal noun associated with a theme or a location. Accordingly, e2 is not headed lexically. E3, on the other hand, must be headed, since it contains a constant that denotes a result state of the action. Therefore, *rob* can only appear in the *of*-variant, with e3 exhaustively selected to be mapped onto the syntax. The result syntactic structure for *rob* will thus be as (5.19).

(5.19)



The structure (5.19) has the same syntactic configurations as the *with*-variant of the *spray/load*-type locative alternation. In fact, just like *with*-phrases in the *with*-variant, *of*-phrases in the *of*-variant are optional when a stolen item is not contextually necessary to be expressed.

(5.20) a. Two men robbed Fred (of his watch) at his Hyde Park home.

b. The bank was robbed (of its money) yesterday.

In this way, our linking strategy to the *spray/load*-type locative alternation can naturally be extended to the *clear*-type locative alternation.

To conclude, *clear*-type locative alternation verbs have its peculiar source in the lexicalization patterns in English. If the approach taken in this section is on the right track, it follows that *cover*-type verbs and *clear*-type verbs share their event structure configurations, but they crucially differ in the manner of event head assignment, and thus the distribution in the locative alternation. A number of arguments discussed above almost inevitably lead us to presuppose that they are only different in the event head assignment on the movement subevent. This can be counted as an instance in which the manner of event head assignment constitutes a lexical parameter even within the same language.

5.4. Lexicalization Patterns in Japanese

The lexicalization patterns of Japanese verbs provide further evidence in favor of the claim that event-headedness constitutes a parameter of our lexical knowledge.

Somewhat comparable with the English locative alternation is the distribution of Japanese locative verbs *sosogu* 'pour' in (5.21) and *mitasu* 'fill' in (5.22).

(5.21) a. Taroo-wa koppu-ni mizu-o sosoi-da.
Taro-Top glass-Dat water-Acc pour-Past
"Taro poured water into the glass."

b. * Taroo-wa koppu-o mizu-de sosoi-da.
Taro-Top glass-Acc water-with pour-Past
Lit. "Taro poured the glass with water."

(5.22) a. Taroo-wa koppu-ni mizu-o mitasi-ta.
Taro-Top glass-Dat water-Acc fill-Past
Lit. "Taro filled water into the glass."

b. Taroo-wa koppu-o mizu-de mitasi-ta.
Taro-Top glass-Acc water-with fill-Past
"Taro filled the glass with water."

Example (5.21) shows that, just like its English counterpart *pour*, the Japanese verb

sosogu 'pour' can appear in the locative variant, but not in the *with*-variant. On the other hand, example (5.22) indicates that the Japanese verb *mitasu* 'fill' appears in the both variants in the locative alternation, which is clearly a distinct behavior from its English counterpart *fill*.

Just like *pour* in English, *sosogu* 'pour' defines a manner of continuous liquid flow, without entailing any about a result state of the container.

(5.23) a. # Taroo-wa koppu-ni mizu-o sosoi-da-ga, mizu-wa nagare-nakat-ta.
Taro-Top glass-Dat water-Acc pour-Past-but water-Top flow-not-Past
"Taro poured water into the glass, but the water didn't flow."

b. Taroo-wa koppu-ni mizu-o sosoi-da-ga, (ana-ga aite-ite)
Taro-Top glass-Dat water-Acc pour-Past-but hole-Nom open-Perf
koppu-wa kara-no-mama dat-ta.
glass-Top empty-remain Cop-Past
"Taro poured water into the glass, but the glass remained empty (because it has a hole)."

Thus, the lexical semantic representation of *sosogu* 'pour' can be considered to be exactly the same as that of *pour* in English.

(5.24) sosogu 'pour'

QUALIA = CONST = pouring_manner (→e2)
FORMAL = move (e2*, y, z)
AGENTIVE = act (e1, x)

Then, it is quite natural that *sosogu* 'pour' (and other verbs of the same semantic class) cannot appear in the *with*-variant in (5.21b).

In contrast, the Japanese verb *mitasu* 'fill' specifies a result state of the container without specifying any specific kind of motion of the theme. At the same time, however, *mitasu* 'fill' actually entails a movement subevent, whichever variant in the locative

alternation they appear in.

(5.25) a. # Taroo-wa koppu-ni mizu-o mitasi-ta-ga, mizu-wa nagare-nakat-ta.
Taro-Top glass-Dat water-Acc fill-Past-but water-Top flow-not-Past
Lit. "Taro filled water into the glass, but the water didn't flow."

b. # Taroo-wa koppu-ni mizu-o mitasi-ta-ga, koppu-wa kara-no-mama dat-ta.
Taro-Top glass-Dat water-Acc fill-Past glass-Top empty-remain Cop-Past
Lit. "Taro filled water into the glass, but the glass remained empty."

(5.26) a. # Taroo-wa koppu-o mizu-de mitasi-ta-ga, mizu-wa nagare-nakat-ta.
Taro-Top glass-Acc water-with fill-Past-but water-Top flow-not-Past
"Taro filled the glass with water, but the water didn't flow."

b. # Taroo-wa koppu-o mizu-de mitasi-ta-ga, koppu-wa kara-no-mama dat-ta.
Taro-Top glass-Acc water-with fill-Past-but glass-Top empty-remain Cop-Past
"Taro filled the glass with water, but the glass remained empty."

Thus, the lexical semantic representation of *mitasu* 'fill' should be as (5.27) below.

(5.27) mitasu 'fill'

QUALIA = FORMAL = move (e2*, y, z)
be (e3*, z, <u>filled</u>)
AGENTIVE = act (e1*, x)

Just like *fill* in English, *mitasu* 'fill' is supposed to lexicalize two result subevents in the formal qualia, which bear the relatively equal prominence relation in order to participate

in the locative alternation. I am now not in a position to reveal the exact nature of event-head assignment in Japanese, but the representation like (5.27) is essential for the behavior of *mitasu* 'fill' in the locative alternation. Indeed, all Japanese verbs that enter into the locative alternation semantically correspond to English *cover*-type verbs (e.g., *oou* "cover", *kazaru* "decorate").[2] The situation is quite similar to the one for those English speakers who accept *cover*-type verbs in the *with*-variant, which is discussed in section 5.2.

The reasonable conclusion from these facts about Japanese seems to be that the mode of event decomposition between English and Japanese are not much different, but they differ crucially in language-specific manners of event-head assignment (cf. Fukui, Miyagawa and Tenny 1985). In other words, if, as a quite natural assumption, Japanese verbs share many lexical semantic properties with their English counterparts, the interface theory inevitably requires that *mitasu* 'fill' and *fill* be identical in their event structure configurations, even though they are different in the possibility of the locative alternation. In particular, we need at least to assume that the event-headedness between two result subevents entailed by the verb *mitasu* 'fill' should be relatively equal, so that the verb participates in the locative alternation shown in (5.22).

Another language-particular difference between English and Japanese in terms of event-headedness comes from the fact that Japanese has many morphological markers to indicate an event head on a particular subevent.

Kageyama (1996) argues that some affixes in Japanese have a property to derive causative transitive verbs from their intransitive counterparts.[3]

(5.28) a. *-e-*: tat-u 'go up' → tat-e-ru 'build', susum-u 'proceed' → susum-e-ru 'advance', narab-u 'stand in a line' → narab-e-ru 'arrange', totono-u 'be settled' → totono-e-ru 'settle'

b. -as-: nar-u 'sound' → nar-as-u 'ring', tob-u 'fly_{intr}' → tob-as-u 'fly_{tr}', zure-ru 'slip' → zurasu 'slide, her-u '$\text{decrease}_{\text{intr}}$' her-as-u '$\text{decrease}_{\text{tr}}$', kawak-u '$\text{dry}_{\text{intr}}$' → kawak-as-u '$\text{dry}_{\text{tr}}$', ugok-u '$\text{move}_{\text{intr}}$' → ugok-as-u '$\text{move}_{\text{tr}}$'

c. -os-: oki-ru 'occur' → ok-os-u 'give rise to'

In our analysis, these transitivization affixes can be viewed as an event-head assigner on the subevent in the agentive quale. For example, the intransitive verb *tokeru* 'melt$_{intr}$' can be transformed into the transitive verb *tokasu* 'melt$_{tr}$' by adding the transitivization affix *-as-* on the verbal stem.

(5.29) a. Koori-ga toke-ta.
ice-Nom melt$_{intr}$-Past
"The ice melted."

b. Taroo-ga koori-o tok-asi-ta.
Taro-Nom ice-Acc melt$_{intr}$-TR-Past
"Taro melted the ice."

Thus, the lexical semantic representations of a causative/inchoative pair of verbs, such as *tokeru* 'melt$_{intr}$' and *tokasu* 'melt$_{tr}$', can be drawn as follows.

(5.30) tokeru 'melt$_{intr}$'
QUALIA = FORMAL = be (e2*, y, melted)
AGENTIVE = act (e1, x)

(5.31) tokasu 'melt$_{tr}$'
QUALIA = FORMAL = be (e2*, y, melted)
AGENTIVE = act (e1*, x)

Clearly, the presence or absence of an event head on the agentive qualia of these verbs reflects their syntactic structure. Also, the Japanese transitive locative alternation verb *mitasu* 'fill$_{tr}$' is derived from its intransitive form *mitiru* 'fill$_{intr}$' by the affixation of the transitivization affix *-as-*, with its lexical semantic property to enter into the locative alternation maintained.

In contrast to English, there are also cases in Japanese in which an event head on

the agentive quale is eliminated by morphological affixation. In fact, such affixes as *-e-* and *-ar-* induce intransitivization of transitive causative verbs (Kageyama 1996).

(5.32) a. -e-: kir-u 'cut' → kir-e-ru 'be cut', nuk-u 'pull out' → nuk-e-ru 'come out', or-u 'bend$_{tr}$' → or-e-ru 'bend$_{intr}$', war-u 'break$_{tr}$' → war-e-ru 'break$_{intr}$', yabur-u 'tear' → yabur-e-ru 'be torn'

b. -ar-: atume-ru 'collect → atum-ar-u 'gather', ue-ru 'plant' → uw-ar-u 'be planted', maze-ru 'mix' → maz-ar-u 'be mixed', tume-ru 'stuff' → tum-ar-u 'be choked'

Now, let us assume that these affixes have an effect to remove an event head from the agentive quale of a predicate. For example, the Japanese transitive verb *waru* 'break$_{tr}$' will be intransitivized by the affixation of *-e-* on its verbal stem, as shown in (5.33).

(5.33) a. Hanako-ga mado-o wat-ta.
Hanako-Nom window-Acc break$_{tr}$-Past
"Hanako broke the window."

b. Mado-ga war-e-ta.
window-Nom break$_{tr}$-INTR-Past
"The window broke."

Thus, the lexical semantic representations of the pair of verbs *waru* 'break$_{tr}$' and *wareru* 'break$_{intr}$' can be described as follows.

(5.34) waru 'break$_{tr}$'
QUALIA = FORMAL = be (e2*, y, broken)
AGENTIVE = act (e1*, x)

(5.35) wareru 'break$_{intr}$'
QUALIA = FORMAL = be (e2*, y, broken)
AGENTIVE = act (e1, x)

It is worth noting that there seem to be yet other effects of verbal affixation in Japanese. For example, when the verbal affix *-os-* attaches to true unaccusatives, such as *okoru* 'occur', a headed agentive quale will be conflated to derive causative transitive predicates, such as *okosu* 'cause'. Then, the transitivity alternation is observed between these two verbs.

(5.36) a. Ziko-ga okot-ta.
accident-Nom occur-past
"The accident happened."
b. Taroo-ga ziko-o ok-osi-ta.
Taro-Nom accident-Acc occur-CAUSE-Past
"Taro caused an accident."

The lexical semantic representations of these predicates can be described as follows.

(5.37) okoru 'occur'
QUALIA = FORMAL = be (e1*, x, in the world)

(5.38) okosu 'cause'
QUALIA = FORMAL = be (e2*, y, in the world)
AGENTIVE = act (e1*, x)

As mentioned in section 3.4, true unergatives such as *okoru* 'occur' do not lexicalize an agentive quale, as in (5.37), but the verbal affix *-os-* provides a headed agentive quale on the verb semantics, as in (5.38).

In this wise, Japanese verbal affixes affect the agentive qualia of predicates in some ways. I do not aware so far of any instance in which they affect on the formal qualia of predicates. Instead, I may claim that in Japanese, the conflation of the formal qualia of predicates is induced by the lexical process of "compounding". For example, true unergatives, such as *naku* 'cry', can be interpreted as having a result of the action

by undergoing compounding with predicates, such as *harasu* 'cause to swell', that specifies the formal quale lexically.

(5.39) a. Taroo-ga nai-ta.
Taro-Nom cry-Past
"Taro hit Hnako."

b. Taroo-ga me-o harasi-ta.
Taro-Nom eye-Acc cause.to.swell-Past
"Taro had his eyes swollen."

c. Taroo-ga me-o naki-harasi-ta.
Taro-Nom eye-Acc cry-cause.to.swell-Past
"Taro had his eyes swollen from crying."

The lexical semantic representations of *naku* 'cry' and *harasu* 'cause to swell' are given in (5.40) and (5.41), respectively.

(5.40) naku 'cry'
QUALIA = CONST = crying_manner (→e1)
AGENTIVE = act (e1*, x)

(5.41) harasu ''cause.to.swell'
QUALIA = FORMAL = be (e2*, y, swollen)
AGENTIVE = act (e1*, x)

Here, these two representations can be conflated by morphological compounding to derive the compound verb *naki-harasu* 'cry-cause.to.swell' in (5.42).

(5.42) naki-harasu 'cry-cause.to.swell'
QUALIA = CONST = crying_manner (→e1)
FORMAL = be (e2*, y, swollen)
AGENTIVE = act (e1*, x)

This is another example of "co-composition" (Pustejovsky 1995) via the unification of agentive qualia of predicates to extend their lexical semantics generatively (see section 6.2.3).

In English, these morphological effects cannot be observed, simply because there are no verbal affixes in English. Therefore, it is natural that Japanese develops its own way of event head assignment by utilizing its morphology. Japanese locative alternation verbs discussed above are one of the good examples to indicate this point. Also, it seems valid to infer that event head assignment in Japanese has something to do with its morphological processes, such as affixation and compounding. Although Japanese morphological system is far too complex to discuss exhaustively in this thesis, it would be safe to conclude that the results of this section may be incorporated into our linking theory in terms of event-headedness.

Chapter 6: Generative Devices for Argument Alternations

The argument in chapter 4 clearly indicates that lexical semantic representations of predicates do not alter when no logical semantic difference is observed through the alternation. In this chapter, I demonstrate how far this statement can be maintained with respect to other argument alternations in English. Specifically, I will argue that many argument alternations in English are to be induced by two types of generative devices in the lexicon. One of the devices is "lexical rules" that are applied to semantic arguments of predicates, while the other is "lexical operations" that are applied directly to qualia structure of predicates. In the end, it will be concluded that various argument alternations in English can be captured in our linking strategy along with the change of semantic values of arguments and the shift of patterns in argument realization, without recourse to individualized lexical semantic representations to syntactic constructions.

6.1. Lexical Rules

In this section, four lexical rules that are applied to semantic arguments of predicates will be discussed. All of the rules must provide their own grounds in our cognitive faculty, so that the motivation of the rules is fairly universal, although the effect may vary from language to language. I will show how those rules affect the semantic value of arguments, in order to show how various argument alternations in English are brought about.

6.1.1. Argument Abstraction

The first lexical semantic rule on arguments is the "abstraction" of arguments. This rule is operative to trigger the argument alternations where the valency of causative transitive verbs appears to decrease with a particular semantic shift to be observed. For example, let us consider the middle alternation in (6.1):

(6.1) *Middle Alternation*

a. The butcher cuts the meat.

b. The meat cuts easily. (Levin 1993: 26)

In contrast to the active transitive sentence in (6.1a), the sentence pattern in (6.1b) is called "middle", since the sentence is "active" in its morphology of the verb, but "passive" in its meaning. In the middle variant, the logical object of the verb is surfaced as the grammatical subject, although there is no passive or other morphological marking on the verb that indicates the externalization of the internal argument. It appears, therefore, that *the meat* in (6.1b) is in fact realized as the subject position at a base structure (Diesing 1992), but I will claim that both variants in the middle alternation share the same underlying syntactic configuration, except the semantic value of the agent argument.

It has been argued that middle sentences denote a different semantic concept from their corresponding active sentences in terms of "genericity" (Keyser and Roeper 1984, Fagan 1992). In fact, the understood agent in (6.1b) can be interpreted only generically. Therefore, middle sentences are advisedly used to describe a general property of the subject rather than a specific event. Because of this semantic property, middle sentences are not compatible with punctual time adverbs, progressive aspect, and perception verbs.

(6.2) a. ? Yesterday, the mayor bribed easily, according to the newspaper.
b. * Bureaucrats are bribing easily.
c. * I saw bureaucrats bribe easily. (Keyser and Roeper 1984: 384-386)

These characteristics have been ascribed to the property of the middle variant as an individual-level stative predication, which depicts a generic property of the subject independent of a particular duration of time (Matsumoto and Fujita 1995, Kageyama 2006, Kudo 2008).

The characteristic description in middle sentences is motivated by the speaker's subjective event construal that reflects in actual linguistic expressions in principled ways (Langacker 1991). Specifically, the motivation of middle formation must be a

description of the inherent property or "function" of a theme argument, regardless of the ability and volition of a possible agent. Hence, the derivation of the middle variant shall be induced by a lexical rule that defocuses an agent argument to be understood as an implicit one, so that the *potentiality* of a change of state/location in the theme argument is highlighted. Following Fagan (1988), I suggest that this defocusing of agent argument can be achieved by changing a specific agent into some arbitrary referent that can be paraphrased by such a generic noun phrase as *people, in general* (cf. Fellbaum 1985).

In order to accomplish this defocusing of arguments, let us assume that the lexical semantic rule "argument abstraction" is applied at the lexical semantic representation of a predicate as in the following manner.

(6.3) *Argument Abstraction*

$Q: P(e, x) \Rightarrow Q: P(e, x_{arb})$

The term *arb* in (6.3) designates a set of features, such as [+human, +generic, ±plural], which identifies semantic properties generally referred to as "arbitrary interpretation" (Rizzi 1986). Syntactically, abstracted arguments are realized as an implicit argument called "arbitrary pro" (henceforth, pro_{arb}), which is an empty counterpart of arbitrary semantic arguments.

Now, witness the effect of argument abstraction in terms of the middle alternation. First, consider the lexical semantic representation of *cut* in (6.4):

(6.4) cut

QUALIA = CONST = i: cutlery

FORMAL = be (e2*, y, cut)

AGENTIVE = act (e1*, x, i)

The verb *cut* holds the semantic representation that is typical of verbs of change of state. By the application of argument abstraction, the agent argument of *cut* is abstracted away, as shown in (6.5a). Since our linking strategy requires that arguments of *cut* be mapped

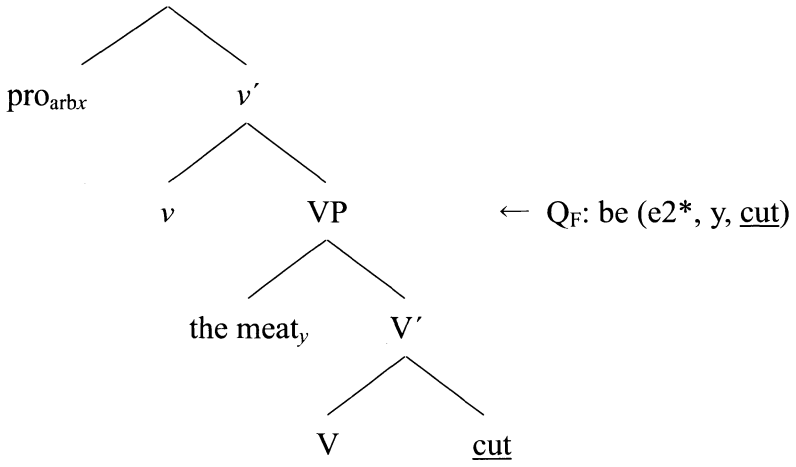
to its appropriate syntactic position, as in (6.5b), the underlying syntactic configuration in (6.5c) is provided.

(6.5) a. Q_A: act (e1*, x, i) $\Rightarrow$ Q_A: act (e1*, x_{arb}, i)

b. Q_A: act (e1*, x_{arb}, i) $\rightarrow$ [$_{vP}$ x_{arb} [$_{v'}$ *v* VP]]

Q_F: be (e2*, y, cut) $\rightarrow$ [$_{VP}$ y [$_{V'}$ V cut]]

c. *v*P $\leftarrow$ Q_A: act (e1*, x_{arb}, i)



From (6.5c), *the meat* will be moved out of VP in order to satisfy the requirement that the subject position in English be filled by an overt element.[1] Since *pro*$_{arb}$ is incapable of being the grammatical subject, it may stay at the specifier of *v*P, while *the meat* will move up to the subject position instead. Thus, the peculiarity of surface syntactic form of middle sentences results.

As for the realization of *pro*$_{arb}$, Stroik (1992) provides a strong piece of evidence that an implicit agent of the middle variant should be present syntactically.

(6.6) a. Books about {oneself/*herself} never read poorly.

b. Books about {*oneself/herself} read quickly for Mary. (Stroik 1992: 136)

The proper license of the reflexive pronoun *oneself* in (6.6a) suggests that there is some null argument in the clause that serves as a possible antecedent of the pronoun. The null argument in question must be an implicit agent created by argument demotion, because

the reflexive pronoun needs to be co-indexed with the overt *for*-phrase argument, *Mary*, in (6.6b), which is logically linked to the implicit agent.[2]

This analysis of middle formation immediately predicts that verbs that participate in the middle alternation must be causative transitives; otherwise, no overt argument will be mapped onto the syntax. In fact, middle formation is best considered to be a lexical derivation, since all verbs in the middle variant have their transitive uses even though they may lack their intransitive uses, and there is no verb that appears only in the middle variant. With this in mind, consider the following paradigm:

(6.7) a. Crystal breaks easily. (Levin 1993: 241)
b. Copper rods bend easily. (Levin 1993: 242)
c. Idaho Potatoes bake beautifully. (Levin 1993: 244)
d. Cotton clothes dry easily. (Levin 1993: 245)

(6.8) a. * French fabrics adores easily.
b. * The answer knows easily. (Levin 1993: 26)

(6.9) a. * This metal won't pound.
b. This metal won't pound flat. (Levin 1993: 26)

Middle sentences are typically formed with verbs of change of state, as shown in (6.7). In contrast, stative verbs in (6.8) are incompatible with the middle formation, since they do not have an agentive argument to be abstracted. Verbs of simple action in (6.9) are also not compatible with the middle variant, unless some result state is indicated by a resultative predicate (Rapoport 1993). Our approach to the middle alternation can treat this condition appropriately by necessarily stating that middle formation is restricted to those verbs that have both agentive and formal roles in their qualia structure.

In passing, it is worth mentioning that argument abstraction has a secondary effect. Recall that middle verbs are individual-level predicates, and thus must be stative, even though the corresponding active verbs can be eventive. This means that the eventuality of the original active sentence will be lost in the course of middle formation. I suggest that this semantic shift is induced by the suppression of event arguments through the

alternation. Given that event arguments, by definition, specify a concrete expression of an event (Davidson 1967), it seems perfectly reasonable to postulate that if participants or particular settings (e.g., time, place) of an event are abstracted away, the concreteness of the event itself will be *blurred* in parallel. Accordingly, if event arguments of a predicate become somewhat deficit as a result of argument abstraction, the derived sentence must be understood as an instance of individual-level predication (Kageyama 2006, Kudo 2008).[3]

The same explanation as the middle alternation can naturally be extended to the characteristic property of agent alternation given in (6.10).

(6.10) *Characteristic Property of Agent Alternation*

a. That dog bites people.

b. That dog bites. (Levin 1993: 39)

In this alternation, the affected theme argument of the verb, which has been considered not omissible, is missing. Sentence (6.10b) shares the same semantic property as middle sentences in that it describes a general property of the subject rather than a specific event. In this respect, (6.10b) should be distinguished from the sentence derived by "indefinite object deletion" (e.g. *Mary already ate (a lunch)*), since it is clear that the latter describes an actual event happening at a given time and place.

In the characteristic property of agent alternation, what is abstracted away is an internal argument of causative transitive verbs, namely the theme argument. Consider the lexical semantic representation of *bite* in (6.11), which is another example of verbs of change of state:

(6.11) bite

QUALIA = FORMAL = be (e2*, y, <u>bitten</u>)

AGENTIVE = act (e1*, x)

Based on the analogy of the middle formation, the process of abstracting the theme

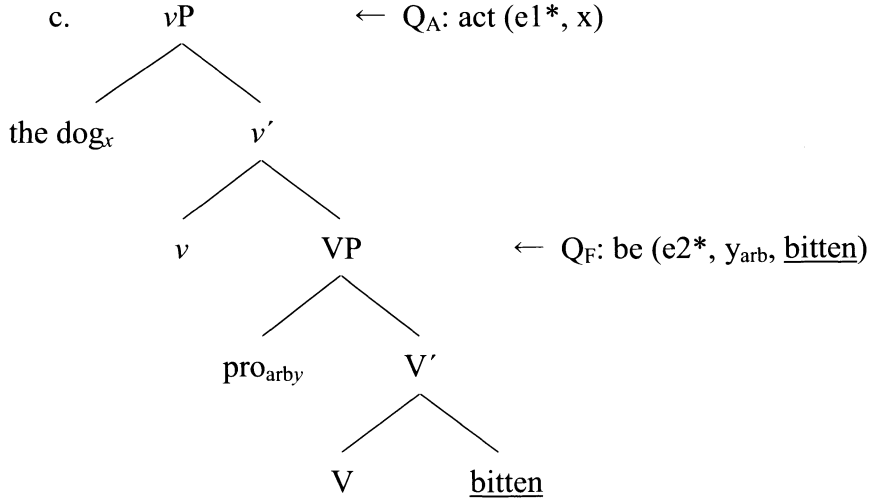
argument of *bite* can be described as follows.

(6.12) a. Q_F: be (e2*, y, bitten) ⇒ Q_F: be (e2*, y_{arb}, bitten)

b. Q_A: act (e1*, x) → [$_{vP}$ x [$_{v'}$ *v* VP]]

Q_F: be (e2*, y_{arb}, bitten) → [$_{VP}$ y_{arb} [$_{V'}$ V bitten]]

c.



Applied at the level of lexical semantic representation, the rule of argument abstraction changes a specific theme argument into some arbitrary referent, as in (6.12a). By our linking strategy given in (6.12b), the syntactic structure (6.12c) should come out. From (6.12c), *the dog* moves out of *v*P in order to occupy the subject position of the sentence. Then, the grammatical relation of the sentence does not differ from its active transitive counterpart, except that the theme argument is realized as pro_{arb}.

Naturally, the same restriction as middle formation is observed in this alternation. First, there is a complex event constraint on the alternation verbs.

(6.13) a. Tigers only kill at night. (Goldberg 2001: 506)

b. John is always ready to please. (Rizzi 1986: 501)

(6.14) a. * Wolves only attack at night.

b. * Fans are always ready to enjoy.

(6.15) a. * A new broom sweeps.

b. A new broom sweeps clean.

As the contrast between (6.13) and (6.14) shows, the characteristic-property-of-agent variants are only formed from causative transitive verbs that canonically take an affected theme argument as their logical object. Again, verbs of simple action cannot take part in the alternation, as shown in (6.15), unless the result state of the action is specified by a resultative phrase.

Second, the characteristic-property-of-agent variant constitutes another semantic class of individual-level predication. Therefore, the sentences are not compatible with punctual time adverbs, progressive aspect, and perception verbs.

(6.16) a. * The tiger killed at that moment.
b. * The tiger is killing (now).
c. * I saw the tiger kill there. (Kageyama 2006: 104)

These results must indicate that middle and characteristic-property-of-agent variants go through the same process of formation, and thus can be dealt with by the same lexical rule given in (6.3).

6.1.2. Argument Demotion

The second lexical semantic rule on arguments is the "demotion" of arguments. Argument demotion has been occasionally argued in Relational Grammar (Perlmutter and Postal 1984), but the rule I propose here is more abstract in the sense that demotion may be applied on every type of argument variables in qualia structure. Suppose that the rule "argument demotion" in (6.17) demotes the most prominent semantic argument in a subevent, so that the second most prominent argument is realized in the syntax.

(6.17) *Argument Demotion*

Q: P (e, x, y) $\Rightarrow$ Q: P (e, x^, y)

The symbol ^ represents a syntactically inert argument that is notionally similar to

"chômeur" in Relational Grammar (Perlmutter and Postal 1977).

Consider now how the argument demotion works for argument alternations. Here, we take up the instrument subject alternation in (6.18) as an example, which involves the instrument subject variant in (6.18b).

(6.18) *Instrument Subject Alternation*

a. David broke the window with the hammer.

b. The hammer broke the window. (Levin 1993: 80)

In (6.18b), the oblique argument, which is semantically characterized as instrument, can be realized as the subject of a sentence. This alternation has been considered to involve the agent demotion, since the oblique subject is only possible when the agent argument is absent (e.g. **The hammer broke the window by David*).

Let us assume that the lexical semantic representation of *break* associated with the context in (6.18) is something like (6.19).

(6.19) break

QUALIA = CONST = i: instrument

FORMAL = be (e2*, y, broken)

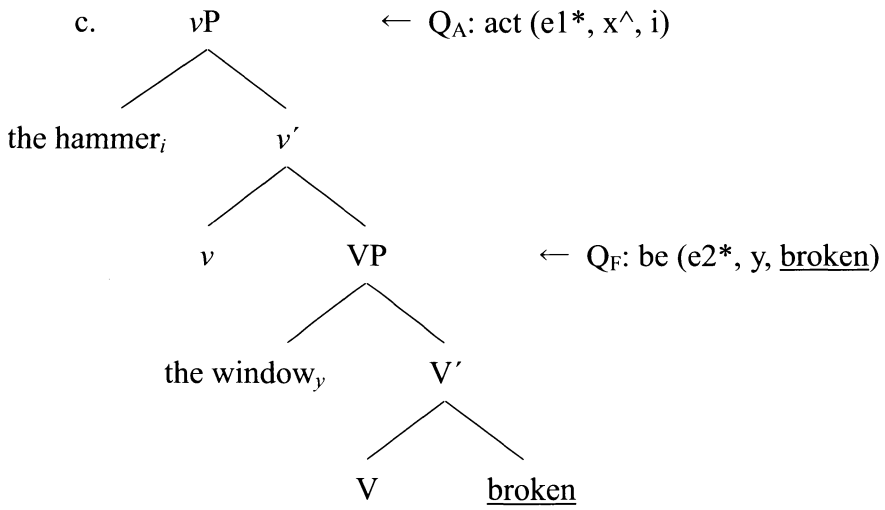
AGENTIVE = act (e1*, x, i)

Note especially that an instrument argument (i) is contextually added in the constitutive quale of the predicate, so that the instrument phrase *with the hammer* can be realized as a true adjunct in (6.18a). This instrument argument is incorporated into the agentive quale of the verb, providing an event head on the causing subevent. Then, the lexical rule of argument demotion is applied as follows.

(6.20) a. Q_A: act (e1*, x, i) $\Rightarrow$ Q_A: act (e1*, x^, i)

b. Q_A: act (e1*, x^, i) $\rightarrow$ [$_{vP}$ i [$_{v'}$ *v* VP]]

Q_F: be (e2*, y, broken) $\rightarrow$ [$_{VP}$ y [$_{V'}$ V broken]]



By the application of argument demotion in (6.20a), the agent argument (x) of the verb is suppressed to be syntactically inert (x^). Accordingly, the instrument argument (i) in the agentive quale is selected to be mapped to the syntax, as shown in (6.20b), so that the instrument subject variant in the form of (6.20c) comes out. Clearly, one of the necessary conditions on the application of argument demotion is that the instrument argument is incorporated into the agentive quale of the predicate. This is only possible when the instrument argument is interpreted as an object that the agent argument works on directly.

Evidence of our treatment of the instrument subject alternation comes from the semantics of instruments. Various studies on the notion of instrument have made a sharp distinction between "intermediary instruments" and "facilitating instruments" (Wojcik 1976, Marantz 1984). According to Levin and Rappaport (1988) and Rappaport and Levin (1992), verbs like *open* and *sand* only take intermediary instruments, whereas verbs like *eat* and *see* only take facilitating instruments. Interestingly, only verbs that take intermediary instruments allow the instrumental subjects.

(6.21) a. Doug opened the can with the new gadget.

b. The new gadget opened the can. (Levin and Rappaport 1988: 1071)

(6.22) a. Julia sanded the floors with the old machine.

b. The old machine sanded the floors. (Levin and Rappaport 1988: 1072)

(6.23) a. Bill ate the meat with a fork.

b. * The fork ate the meat. (Levin and Rappaport 1988: 1072)

(6.24) a. Mira saw the crack with the magnifying glass.

b. * The magnifying glass saw the crack. (Levin and Rappaport 1988: 1072)

Notice that some verbs can appear with either intermediary or facilitating instruments, but, as expected, only the intermediary instruments can be expressed as subject.

(6.25) a. Bill loaded the truck with a crane.

b. The crane loaded the truck. (Levin and Rappaport 1988: 1072)

(6.26) a. Bill loaded the truck with a pitchfork.

b. * The pitchfork loaded the truck. (Levin and Rappaport 1988: 1072)

Thus, whether instrument arguments can be expressed as subject or not relates crucially to the semantic type of instruments.

An argument in favor of our approach is found in relation to the derivation of *-er* nominals. Levin and Rappaport (1988) and Rappaport and Levin (1992) argue that no instrumental *-er* nominal is derived from verbs that only take facilitating instruments.

(6.27) a. cutter, dryer, heater, opener, peeler, printer, slicer, stapler

b. eater, jumper, runner, seer, swimmer, walker, writer

The *-er* nominals in (6.27a) have an instrumental interpretation, in addition to a normal agentive interpretation. The *-er* nominals in (6.27b), on the other hand, can only have an agentive interpretation, lacking an instrumental interpretation. The existence of an instrumental interpretation of *-er* nominals in (6.27a) indicates that those instrument arguments must be regarded as external arguments of a verb that is able to perform the action autonomously. In other words, those arguments are necessarily associated with the agentive qualia of predicates, and thus must be projected in the syntax when the agent argument is demoted.

The mechanism of argument demotion is not restricted to the instrument subject alternation, but also goes for the other oblique subject alternations, such as the natural force subject alternation in (6.28), the abstract cause subject alternation in (6.29) and the raw material subject alternation in (6.30).

(6.28) *Natural Force Subject Alternation*

a. I dried the clothes into the sun.

b. The sun dried the clothes. (Levin 1993: 80)

(6.29) *Abstract Cause Subject Alternation*

a. He established his innocence with the letter.

b. The letter established his innocence. (Levin 1993: 81)

(6.30) *Raw Material Subject Alternation*

a. She baked wonderful bread from that whole wheat flour.

b. That whole wheat flour bakes wonderful bread. (Levin 1993: 82)

The oblique subjects found in (6.28b) and (6.29b) can be naturally understood as other instances of instruments, since we can say *I used the sun to dry the clothes* and *He used the letter to establish his innocent* as well as *David used the hammer to break the widow*.

In (6.30b), what is realized as the subject is a material for the theme to come into existence. Recall that verbs of creation involve a material argument in their qualia structure. Just like instrument arguments, material arguments shall be registered in the constitutive quale of a predicate, and incorporated into the agentive quale as the object that an agent acts upon directly.

(6.31) bake bread

QUALIA = CONST = m: material

FORMAL = be (e2*, y: bread, in the world)

AGENTIVE = act (e1*, x, m)

Therefore, when the agent argument (x) is demoted, the material argument (m) will necessarily be mapped onto the syntax, so that the material subject construction in (6.30b) successfully comes out. When the instrument argument (i) is also incorporated into the agentive quale of the predicate, argument demotion must be doubly applied in order to suppress both agent and instrument arguments at the same time.

6.1.3. Argument Substitution

The third lexical semantic rule that has an effect on arguments is the rule of "argument substitution", which alters the semantic value of argument variables as schematized in (6.32).

(6.32) *Argument Substitution*

Q: P (e, x, y) ⇒ Q: P (e, z, y)

This operation is effective only when the identical argument variables are distributed across multiple qualia roles in a predicate. Thus, a good candidate for this rule is verbs of self-propelled motion, such as *walk* and *run*, discussed in section 3.4.

Consider the lexical semantic representation of *walk* in (6.33), where the semantic value of an agent (i.e., the subject of *act*) and a theme (i.e., the subject of *move*) is identical:

(6.33) walk

QUALIA = CONST = walking_manner (→e1)

FORMAL = move (e2, x, y)

AGENTIVE = act (e1*, x)

The realization of the formal quale of *walk* depends on the semantic focus in the context, though the result is often syntactically vacuous. Sentence (6.34a) has the formal quale being mapped onto the syntax, as indicated by the overt path phrase *through the door*, whereas only the agentive quale is realized in (6.34b).

(6.34) a. John walked through the door.

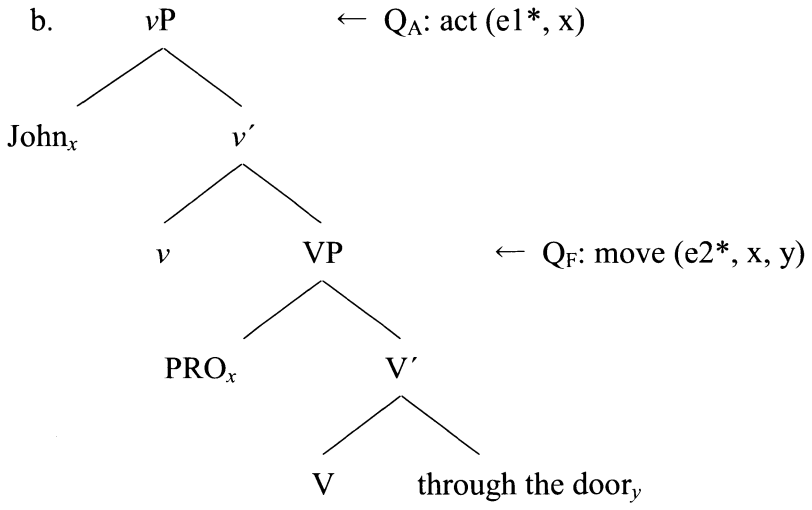
b. John is walking (in place).

Given that one of the identical variables that results in a syntactically lower position will be controlled by the other, the realization of the sentence (6.34a) is described as follows.

(6.35) a. Q_A: act (e1*, x) → [$_{vP}$ x [$_{v'}$ *v* VP]]

Q_F: move (e2*, x, y) → [$_{VP}$ x [$_{V'}$ V y]]

b.



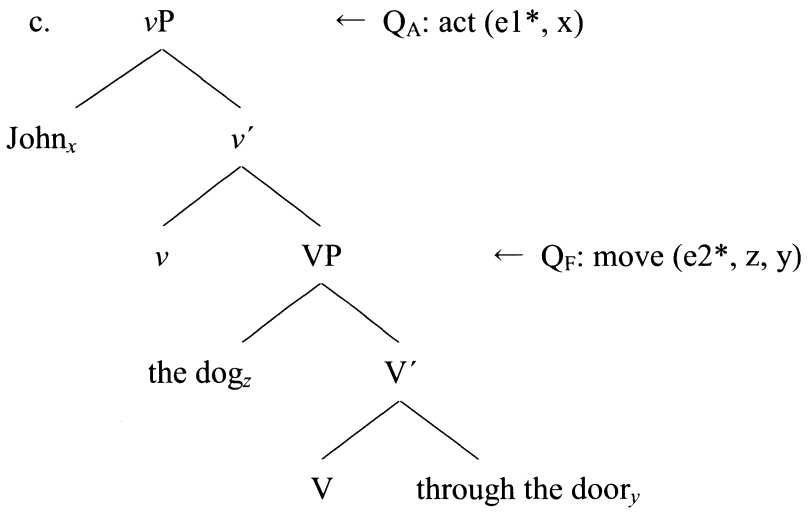
In (6.35b), the agent argument (*John*) in the specifier of *v*P controls the theme argument (PRO) realized at the specifier of VP via c-command relation.

This much being said, let us now consider how argument substitution affects the argument realization of *walk*. Since the fundamental effect of the rule is to give a variable another value, if it applies to the theme argument of *walk*, PRO in (6.35b) can have concrete referent in linguistic expressions. Then, witness the following derivation:

(6.36) a. Q_F: move (e2*, x, y) ⇒ Q_F: move (e2*, z, y)

b. Q_A: act (e1*, x) → [$_{vP}$ x [$_{v'}$ *v* VP]]

Q_F: move (e2*, z, y) → [$_{VP}$ z [$_{V'}$ V y]]



As described in (6.36a), the rule of argument substitution changes the referent of the theme argument (x) into a different value (z). The substitute argument will be realized as the direct object of the verb, giving rise to the sentence like *John walked the dog through the door* in (6.36c). Here, *the dog* must be interpreted as an entity that is forced to move by the order from the agent.

Notice that the effect of argument substitution should not be equated with the causative/inchoative alternation of ergative verbs. The process of argument substitution is only possible for "fake unergatives" (e.g., *walk*, *jump*, *run*, *march*, *fly*), where two identical valuables distributed across different qualia roles to make a causative event interpretation.

(6.37) a. John walked the dog through the door.

b. The trainer jumped the horse over the fence. (Liefrink 1973: 139)

c. The psychologist ran the rats through the maze.
(Brousseau and Ritter 1991: 54)

d. The general marched the soldier to the tent.
(Levin and Rappaport Hovav 1995: 111)

e. A helicopter flew them home. (Kageyama 2006: 54)

On the other hand, "pure unergatives" (e.g., *study*, *play*, *talk*, *laugh*, *cough*), which do

not entail any result subevent in the formal quale, cannot be a target of argument substitution.

(6.38) a. * The teacher studied his students very hard. (Kageyama 2000: 46)
b. * Mother played the kids in the park.
c. * Susan talked John before a huge audience.
d. * The clown laughed the children. (Kageyama 2000: 46)
e. * The doctor coughed the patient.

These empirical data constitute further evidence for the modes of split intransitivity, discussed in section 3.4, and our linking strategy.

One of the influential supports for the derivation in (6.36) comes from the fact that directional path phrases, which are purely optional in their intransitive use of fake unergatives, become obligatory in their transitive causative use.

(6.39) a. The general marched the soldiers ??(to the tents).
b. The rider jumped the horse ?(over the fence).
c. We ran the mouse *(through the maze).
(Levin and Rappaport Hovav 1995: 111)

Notice that even if these path phrases need not be expressed in certain circumstances, they are always understood in the transitive causative use of these verbs. Since our linking strategy predicts that the transitive causative use of fake unergatives is only possible when the formal quale of the verb takes part in the argument realization, it is entailed that the path argument (i.e., *y* in (6.36)) must be realized as a PP in the syntax along with the substituted theme argument.

As a logical possibility, it is also possible to apply argument substitution to the agent argument of self-propelled motion verbs. I suggest that this is what happens in the induced action alternation in (6.40).

(6.40) *Induced Action Alternation*

a. The horse jumped over the fence.

b. Sylvia jumped the horse over the fence. (Levin 1993: 31)

In this alternation, the agent argument of the verb is substituted for a different value, but the theme argument remains the same. This alternation is also primarily found with verbs of self-propelled motion, which have the identical arguments in their qualia structure.

In the induced action variant in (6.40b), the agent argument is understood as an entity that assists the movement of the theme argument. Therefore, the sentence is only well-formed in the situation where the theme argument has some difficulty to fulfill the activity by itself. This property has been pointed out by several researchers, as in (6.41).

(6.41) a. John flew {the falcon/*the sparks}. (Cruse 1972: 521)

b. The trainer jumped {the horse/*the athlete} over the fence.
(Liefrink 1973: 139)

c. The nurse burped {the baby/?the patient/*the doctor}. (Smith 1978: 107)

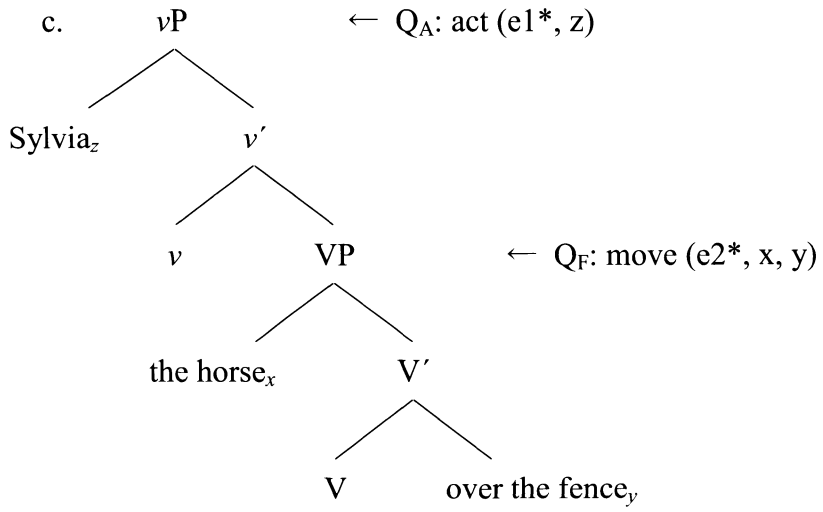
While substituting the theme argument has a sense of coerced causation, this alternation implies that the substitute agent helps or supports the action or movement of a theme. The difference unambiguously resides in the original qualia value of identical arguments, though I suspect that there seems no way to discern them without a context.

The argument realization of the induced action alternation is also straightforward. In fact, it is just the same as what we saw in (6.36), except that in the induced action alternation the agent argument in the agentive quale is substituted.

(6.42) a. Q_A: act (e1*, x) $\Rightarrow$ Q_A: act (e1*, z)

b. Q_A: act (e1*, z) $\rightarrow$ [$_{vP}$ z [$_{v'}$ *v* VP]]

Q_F: move (e2*, x, y) $\rightarrow$ [$_{VP}$ x [$_{V'}$ V y]]



In (6.42a), the agent argument (x) is substituted for some other referent (z) that can help the action denoted by the verb. As in (6.42c), the substitute argument is realized at the specifier of *v*P in the syntax.

The substitute argument appears to inherit some semantic property of the original argument. Thus, natural forces and instruments can never be the subject of the induced action variant.

(6.43) a. * The floods marched the army further north. (Cruse 1972: 521)

b. * {The lightning/The whip} jumped the horse over the fence.

(Levin and Rappaport Hovav 1995: 112)

Under our analysis, this phenomenon can be accounted for by the general semantic constraint that these inanimate subjects cannot be interpreted as an appropriate agent of marching (**The flood marched north*) and jumping (**The whip jumped over the fence*) in the normal context. This constitutes further evidence for the claim that argument alternations induced by argument substitution are essentially different from the causative/inchoative alternation. The transitive subjects of the former correspond to the intransitive subjects, but those of the latter to the intransitive objects.

Kageyama (2000) argues that the same mechanism can go for certain types of lexical causativization in Japanese. According to him, some transitive causative verbs in

Japanese, such as *tateru* 'make something stand up' and *naraberu* 'stand something in a row', are formed by the suffixation of *-e-* which induces the argument substitution at the level of lexical semantic structure of their corresponding intransitive verbs, such as *tatu* 'stand up' and *narabu* 'stand in a row'.

(6.44) a. Taroo-ga guraundo-ni tat-ta.
Taro-Nom ground-Dat stand-Past
"Taro stood on the ground."

b. Taroo-ga guraundo-ni hata-o tat-e-ta.
Taro-Nom ground-Dat flag-Acc stand-E-Past
"Taro put up a flag on the ground."

If this observation is valid, it may lead us to postulate that the rule of argument substitution, grounded on our cognitive faculty, is universally applicable to a certain extent, although its morpho-syntactic effect may vary from language to language (cf. Kageyama and Yumoto 1997).

6.1.4. Argument Binding

The forth, and the last, lexical semantic rule on arguments is the "binding" of arguments. Following Kageyama (1996), who advocates that the same phenomenon as binding arguments in syntax is also operative in the lexical semantic representation, I propose that the lexicon has the rule of "argument binding" in (6.45), which applies to the qualia structure of predicates.

(6.45) *Argument Binding*

Q: P (e, x, y) ⇒ Q: P (e, x=z, y)

By argument binding, the argument *x* is bound by and co-indexed with the argument *z* (x=z). Because of the nature of binding, the binding argument must be somewhere in the same lexical representation, namely the qualia structure. The lexical rule that I propose

in (6.45) is notionally the same as Kageyama's "anti-causativization", but its outcome in the syntax will be incontrovertibly different.

Kageyama (1996) argues that the rule like argument binding is responsible to the causative/inchoative alternation given in (6.46).

(6.46) *Causative/Inchoative Alternation*

a. Janet broke the cup.

b. The cup broke. (Levin 1993: 29)

Kageyama's claim is that arguments that are bound in the lexicon will be "suppressed" in the sense that they become syntactically inert. Consequently, if the rule of argument binding applies to the external argument of a causative predicate, the bound external argument will be suppressed lexically, so that the only internal argument can be realized in the syntax, giving rise to the inchoative variant of the alternation.

Crucially, however, there seems to be no convincing reason in Kageyama's (1996) linking strategy why the bound argument does not have any syntactic realization. In fact, unlike passives, the inchoative variant of the causative/inchoative alternation does not have a PRO in the syntax.

(6.47) a. * The door opened by John.

b. The door was opened by John. (Kageyama 1996: 143)

(6.48) a. * The buildings burned to correct insurance.

b. The buildings were burned to correct insurance.

(Keyser and Roeper 1984: 407)

In order to capture the case, Kageyama's approach is forced to assume that suppression by argument binding is different in its quality from that in the case of passivization. In effect, he needs to presuppose different levels of representations, LCS and argument structure, for two distinct levels at which argument suppression is applied. In section 3.2, we have already established the mechanism of the causative/inchoative alternation in

terms of selectional mapping via event-headedness. In our approach, therefore, there is no need to depend on different mechanisms for capturing the argument realization of causative/inchoative pairs of sentences.

In view of the circumstance, I rather suggest that the rule of argument binding is responsible to the phenomena that include "reflexivization" in the syntax. For example, when the agent argument of a causative verb binds its theme argument, normal reflexive sentences are produced.

(6.49) a. John cut himself.
b. They killed themselves.
c. Mary washed herself.
d. I dressed myself.

In (6.49), the agent argument of the verb binds semantically the theme argument, so that the latter will be realized in syntax as a reflexive pronoun.

It is also possible that the theme argument of a causative verb binds semantically its agent argument. This seems what is happening in the so-called reflexive diathesis alternations, including the virtual reflexive alternation in (6.50).

(6.50) *Virtual Reflective Alternation*
a. The butcher cuts the meat.
b. This meat cuts itself. (Levin 1993: 84)

Recall the lexical semantic representation of *cut* in (6.51).

(6.51) cut
QUALIA = CONST = i: cutlery
FORMAL = be (e2*, y, cut)
AGENTIVE = act (e1*, x, i)

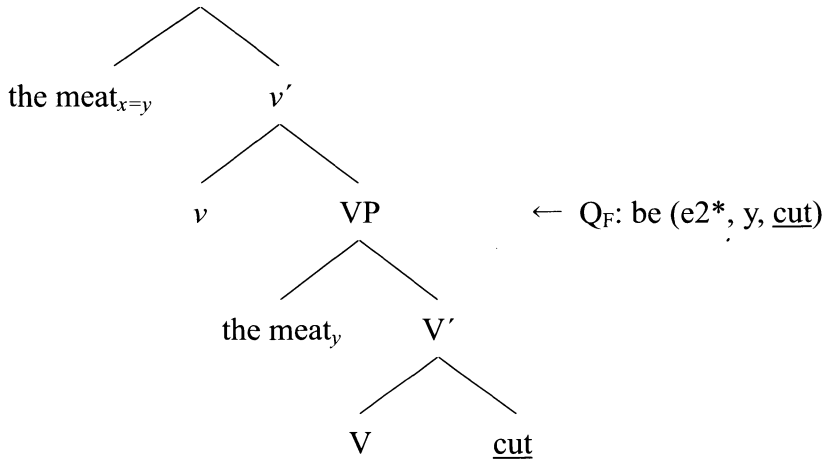
The rule of argument binding binds the agent argument (x) in the agentive quale with the theme argument (y) in the formal quale, where the former causes a change of state in the latter, so that it gives rise to a peculiar interpretation as if a theme brings about its change of state by itself. The argument realization of the virtual reflexive variant in (6.50b) will be as follows.

(6.52) a. Q_A: act (e1*, x, i) $\Rightarrow$ Q_A: act (e1*, x=y, i)

b. Q_A: act (e1*, x=y, i) $\rightarrow$ [$_{vP}$ x=y [$_{v'}$ *v* VP]]

Q_F: be (e2*, y, cut) $\rightarrow$ [$_{VP}$ y [$_{V'}$ V cut]]

c. *v*P $\leftarrow$ Q_A: act (e1*, x=y, i)



By virtue of argument binding in (6.52a), two arguments with the identical semantic value are mapped to the syntax, as in (6.52b). Of the two instances of *the meat* in (6.52c), the lower occurrence will be spelled-out as the reflexive pronoun (i.e., *itself*) according to the syntactic constraints on argument binding.

An immediate consequence of this analysis is that verbs with a simple event structure cannot participate in the virtual reflexive alternation.

(6.53) a. * John danced himself.

b. * The ambassador arrived himself.

c. * The washing machine was sold itself. (Fellbaum 1989: 126)

Predictably, the result syntactic structure of argument binding needs a complex verb phrase as in (6.52c). Therefore, true unergatives, true unaccusatives and passives are all excluded from the alternation.

In our approach, it can also be correctly predicted that argument binding does not apply to verbs that strongly imply the existence of an agent.

(6.54) a. * Soft wood saws itself.
b. * These rolls slice themselves.
c. * Smooth surfaces paint over themselves. (Fellbaum 1989: 128)

Since verbs in (6.54) semantically require the active involvement of an agent, in the sense that a theme cannot be understood as an entity that performs the action by itself, the agent arguments of these verbs may resist to be bound by other arguments at the level of lexical semantics.

Furthermore, the rule of argument binding gives a simple account for the fact that intermediary instruments can never be the subject of virtual reflexive variants.

(6.55) * This pipe smokes itself. (Fellbaum 1989: 129)
(cf. This pipe smokes easily.)

Since intermediary instruments appear in the agentive quale, they cannot bind the agent argument in the qualia structure, though they can be the subject of middle sentences when the agent argument is demoted via argument demotion and the theme argument is abstracted away via argument abstraction.

The virtual reflexive alternation seems to have other special properties that may not receive an instant solution in our approach (see Fellbaum 1989). It is also supremely difficult to limit the set of verbs that participate in this alternation (cf. Levin 1993). In short, the rule of argument binding is merely a necessary condition for the formation of the virtual reflexive variant in (6.50b). In particular, we do not have any satisfactory explanation to the restrictions on the applicability of argument binding. The exact nature

of this alternation awaits further research.

6.2. Operations on Qualia

Another aspect of the claim that argument alternations without a logical semantic shift do not involve an extension of the semantic structure of predicates resides in the variety of argument linking itself. In this section, three lexical operations that affect on the qualia structure of predicates are introduced, all of which should be counted as a generative device that provides a fundamental pattern of argument realization.

6.2.1. Constitutive Specification

In section 2.3.2.3, we saw that arguments in the constitutive qualia of predicates can be realized in the syntax as true adjuncts. The typical case of such arguments is time and location associated with the action denoted by the verb.

(6.56) a. John slept late on Tuesday.
b. Mary saw Bill in Boston. (Pustejovsky 1995: 66)

In (6.56), arguments that provide a property of the event are realized in the sentence in order to specify the situation being described. We call this linking pattern "constitutive specification", since the information expressed as true adjuncts needs to be specified in the constitutive quale of a predicate.

Arguments in the constitutive quale of the direct object can be realized in syntax in almost the same manner. This operation gives a straightforward explanation to the body-part possessor ascension alternation, given below.[4]

(6.57) *Body-Part Possessor Ascension Alternation*
a. Selina touched the horse's back.
b. Selina touched the horse on the back. (Levin 1993: 71)

Consider the lexical semantic representation of *touch* in (6.58):

(6.58) touch

QUALIA = FORMAL = be (e2*, y, touched)

AGENTIVE = act (e1, x)

It is now obvious that if the value of the theme argument (y) of *touch* is determined by the NP *the horse's back*, the normal transitive sentence as in (6.57a) comes out. When, on the other hand, the value of the theme argument is assigned by the NP *the horse*, the VP *touch the horse* in (6.59) will be composed.

(6.59) touch the horse

QUALIA = CONST = y: the horse

[QUALIA = CONST = mane, hoof, neck, back, etc.]

FORMAL = be (e2*, y: the horse, touched)

AGENTIVE = act (e1, x)

Here, the theme argument in the constitutive quale (i.e., *the horse*) has its own qualia structure including its constitutive quale. Suppose that constitutive specification applies to this semantic structure of the VP. Then, the embedded constitutive quale of *the horse* can be a target of the operation now. Thus, various specification of the body-part of *the horse* can be possible.

(6.60) Selina touched the horse on the {mane/hoof/neck/back/foot/nose/head}.

This analysis correctly predicts that the specified body part of the horse should have an appropriate semantic relation with the object. In effect, an adjunct PP must be a part of the object, but not vice versa.

(6.61) # Selina touched the {mane/hoof/neck/back/foot/nose/head} on the horse.

Sentence (6.61) does not have the same meaning as (6.60): it only has a strange reading that the event of touching the horse is performed upon the horse's body.

Our analysis also predicts that a PP specified by the constitutive specification is syntactically optional.

(6.62) a. Selina touched the horse (on the back).
b. The horse kicked Penny (in the shin).
c. Alison poked Daisy (in the ribs).

The optionality of an adjunct PP essentially results from the semantic shallowness of adjunct phrases, in the sense that the core meaning of the sentence never changes with or without them. In fact, if a verb denotes some change of state in the object NP, constitutive specification may not be applied.

(6.63) a. * The horse broke Penny in the shin. (cf. The horse broke Penny's shin.)
b. * The glass cut Rachel in the toe. (cf. The glass cut Rachel's toe.)
(Levin 1993: 72)

The entailment in the sentence *The horse broke Penny* is crucially different from that in the sentence *The horse broke Penny's shin*. Therefore, constitutive specification cannot be applied to give rise to the alternation in (6.63).

The same mechanism can be readily extended to the possessor-attribute factoring alternation in (6.64), which involves two possible expressions of a possessor and a possessed property.

(6.64) *Possessor-Attribute Factoring Alternation*
a. They praised the volunteer's dedication.
b. They praised the volunteers for their dedication. (Levin 1993: 73)

The possessor attribute factoring alternation involves the different preposition from the

body-part possessor ascension alternation in (6.57). However, these alternations can be treated equally, since attribute is just another instance of properties associated with the possessor, which can be a target of constitutive specification.

6.2.2. Telic Role Realization

In section 6.1.1, we discussed argument alternations that involve the description of characteristic property of the subject. A similar semantic characterization is pertinent to the characteristic-property-of-instrument sentences given in (6.65).

(6.65) a. This pen doesn't write.
b. These shears clip well.
c. This machine records well.
d. This oven cooks well. (Levin 1993: 39)

Now, consider the argument realization in the characteristic-property-of-instrument alternation in (6.66), which involves the characteristic-property-of-instrument variant in (6.66c).

(6.66) *Characteristic Property of Instrument Alternation*
a. I cut the bread with this knife.
b. The knife cut the bread.
c. This knife doesn't cut. (Levin 1993: 39)

Clearly, (6.66b) is a simple instance of argument demotion discussed in section 6.1.2. Also, sentence (6.66c) appears at first sight to constitute another instance of argument abstraction discussed in section 6.1.1. In fact, we might give a correct description of the argument realization in (6.66c) by means of abstracting the theme argument from (6.66b), since characteristic-property-of-instrument variant, as well as the middle and characteristic-property-of-agent variants, is actually an instance of individual-level predication, as shown in (6.67).

(6.67) a. * This knife didn't cut at that time.

b. * This knife is not cutting.

c. * I saw this knife didn't cut.

However, this seems not the case, because in some instances of characteristic property of instrument variants the direct object may not be omitted, which sharply contrasts with other characterizing sentences that involve pro_{arb} in the syntax.

(6.68) a. This key won't open *(the lock).

b. This hammer won't break *(the window). (Levin 1993: 39)

Therefore, I suggest that the characteristic property of instrument variant is derived by referring to the performatory property of the subject instrument, rather than by some lexical rules on arguments.

In order to arrive at a feasible assumption, let us consider the lexical semantic representation of *knife* in (6.69):

(6.69) knife

QUALIA = CONST = edge, blade, etc.

FORMAL = x: instrument

TELIC = cut (e, x, y)

AGENTIVE = produce (e, z, x)

As an intermediary instrument, *knife* has its chief use in cutting the object. Accordingly, the telic quale of the item can predicate a cutting event, with the item itself involved as the most prominent argument. Suppose that the operation called "telic role realization" makes reference to the information in the telic qualia directly, and realizes its argument variables in the surface form as in the following manner.

(6.70) *Telic Role Realization*

Q_T: P (e, x, y) $\Rightarrow$ [$_{vP}$ x [$_{v'}$ *v* [$_{VP}$ V y]] (*x* is an intermediary instrument)

By this operation, we achieve the semantic nature of the sentence as well as its syntactic structure. Since telic roles of a noun, by definition, define a built-in function of the item, the sentence derived by telic role realization must be a property description of the subject.

As an immediate consequence of this operation, characterizing sentences cannot be formed when the situation being predicated is not considered to be an expedient use of the item.

(6.71) a. This knife won't cut (a rope).

b. ? This knife won't cut open (a letter).

c. ??This knife won't kill (people).

d. ?*This knife won't break (the window).

e. * This knife won't break open (the lock).

As shown in (6.71), there are gradations in the acceptability of characteristic property of instrument sentences. It naturally follows that telic quale of an item can be equipped with somewhat flexible information according to the context.

Our analysis on the characteristic property of instrument alternation seems to be crucial to other argument alternations where certain oblique phrases appear as the subject of characterizing sentences.

(6.72) *Location Subject Alternation*

a. We sleep five people in each room.

b. Each room sleeps five people. (Levin 1993: 82)

(6.73) *Sum of Money Subject Alternation*

a. I bought a ticket for $5.

b. $5 will buy a ticket. (Levin 1993: 83)

Each room in (6.72b), which may contextually be referred to as a guest room, should be considered as a space whose main purpose is for a person to sleep in. Also, *$5* in (6.73b) can be considered as an intermediary instrument to buy goods. Telic role realization is applicable, therefore, when these items are predicated of by relational predicates in the telic qualia. As a result, the sentences in (6.72b) and (6.73b) must be interpreted as an example of individual-level predication.

6.2.3. Agentive Role Unification

"Co-composition" is a lexical semantic operation that shifts a verb meaning from one to another (Pustejovsky 1995). This operation is only possible under the unification of qualia values in predicates and their arguments. In section 4.3, we discussed the argument realization in the benefactive alternation in terms of the unification of the agentive qualia of a verb and its object. There are other instances in which some qualia unification is necessary to understand their argument realization.

One example of such cases is provided by the cognate object alternation given in (6.74).

(6.74) *Cognate Object Alternation*

a. Sarah smiled.

b. Sarah smiled a charming smile. (Levin 1993: 95)

In this alternation, basically intransitive verbs, such as verbs of nonverbal expression (e.g., *cry*, *laugh*, *smile*, *sneeze*) and verbs of manner of speaking (e.g., *mumble*, *scream*, *whisper*, *yell*), take a "cognate object" (i.e., zero-derived object) as their direct object. Verbs that participate in this alternation are typically true unergatives which have a gap of the object position in the syntax.[5]

The first thing to notice on this alternation is that cognate objects in themselves are semantically equal to "resultant objects" that comes into existence as a result of the action denoted by the verb (Quirk et al. 1985). In fact, cognate objects denote a created

object named by the zero-derived verb. This fact can be apparent by the agentive quale of the object NP.

(6.75) smile (noun)

QUALIA = CONST = mouth, teeth, etc.

FORMAL = x: expression

AGENTIVE = smile (e, y)

The agentive quale of the noun *smile* should be its zero-derived verb *smile* in (6.76).

(6.76) smile (verb)

QUALIA = CONST = smiling_manner (→e1)

AGENTIVE = act (e1*, x)

The manner specification by the constitutive quale of *smile* provides an interpretation that the verb in (6.76) and its cognate object in (6.75) share the same agentive qualia. Under this condition, the agentive role unification can be applied to derive the VP *smile a smile* in (6.77).

(6.77) smile a smile

QUALIA = CONST = smiling_manner (→e1)

FORMAL = be (e2*, y: a smile, in the world)

AGENTIVE = act (e1*, x)

The overall semantic structure in (6.77) represents the one for verbs of creation, in general.

On the ground that cognate objects are in fact resultant objects, they resist free pronominalization, since the same object cannot be created twice.

(6.78) a. *John baked a cake and then I baked it.

b. *John smiled a smile then Mary smiled it. (Massam 1990: 181)

In this view of cognate objects, it is also explained why it is necessary that the agent of cognate objects must be coreferential with the agent of the matrix verb.

(6.79) Gabriel sneezed {a/his/*her} hefty sneeze. (Massam 1990: 173)

Since cognate objects are created by the action of the agent, possessive pronouns that do not agree with the agent in gender and number are semantically excluded.

The claim that cognate objects are actually a grammatical object of a verb can be confirmed by the fact that adverbial phrases cannot intervene between a verb and its cognate object, as shown in (6.80).

(6.80) a. Let Ben run (*quickly) a little run.
b. Ben sneezed (*that way) a glorious sneeze. (Massam 1990: 166)

According to Stowell (1981), verbs and their grammatical objects must be adjacent in order to assign a structural Case. Then, no adverbial phrase can be intervened between. The data in (6.80) demonstrate the same point.

Moreover, verbs and their cognate objects can undergo some VP operations, such as *though*-movement in (6.81) and VP-preposing in (6.82).

(6.81) Smile a happy smile though Chris did, everyone could see that her happiness was forced. (Macfarland 1995: 103)

(6.82) I wanted Chris to smile a happy smile that day, and smile a happy smile she did that way. (Macfarland 1995: 104)

According to Reinhart (1983), these operations can only be applied to a structural unit corresponding to a VP in the syntax. Thus, it is strongly suggested from the above data that verbs and their cognate objects syntactically form a VP.

Our analysis of the cognate object alternation nicely accounts for the fact that cognate object variants can be formed with unergative verbs, but not with unaccusative verbs (Levin and Rappaport Hovav 1995).

(6.83) a. Harry lived an uneventful life.
b. Bill sighed a weary sigh. (Jones 1988: 89)
c. Rosamond cried a good long cry, then she felt better.
d. Reverend Tully prays a solemn prayer. (Massam 1990: 164)
e. Louisa slept a restful sleep.
f. Malinda smiled her most enigmatic smile.
(Levin and Rappaport Hovav 1995: 40)

(6.84) a. * The glass broke a crooked break.
b. * The actress fainted a feigned faint. (Levin and Rappaport Hovav 1995: 40)
c. * She arrived a glamorous arrival.
d. * The apple fell a smooth fall. (Levin and Rappaport Hovav 1995: 148)
e. * Karen appeared a striking appearance at the department party.
f. * Phyllis existed a peaceful existence.
(Levin and Rappaport Hovav 1995: 150)
g. * The statue stood a heroic stance in the middle of the common.
h * The city sprawled an extensive sprawl around the bay.
(Levin and Rappaport Hovav 1995: 152)

Since unaccusatives do not have any information in the agentive qualia, they cannot be a possible candidate for agentive role unification.[6]

Notice further that cognate objects are restricted to the zero-derived form of unergative verbs (Baron 1971).

(6.85) a. * He died a suicide.
b.?*He smiled a silly grin. (Massam 1990: 165)
c. * Mary laughed a sad smile.

d. * The dog howled fierce barks.

e. * Ellen sneezed a dry cough. (Takami and Kuno 2002: 144)

f. * Tom slept a sound slumber.

As shown in (6.85), NPs that are not morphologically related to cognate objects cannot be a grammatical object of the cognate object variant, even though they are semantically similar to cognate objects. This is a natural consequence of our analysis, since agentive role unification is only possible when the information in a particular qualia role is practically identical.[7]

Finally, a semantic function of the cognate object alternation is worth mentioning here. Notice that the original verb *smile* in (6.76) and the derived VP *smile a smile* in (6.77) have the same logical meaning. Accordingly, there must be some pragmatic restrictions on the unification of agentive qualia: otherwise, the result of the operation is semantically vacuous. In this respect, it is well-known that cognate objects need some adjectival modification (Quirk et al. 1985, Dixon 1991). Cognate objects without a modifying phrase are clearly ungrammatical.

(6.86) a. * Willy sneezed a sneeze.

b. * Neil laughed a laugh.

c. * The actress smiled a smile. (Rice 1988: 209)

This fact may receive a simple explanation. Functionally, verbs in the cognate object variant denote an action, while cognate objects specify an actual manner of the action. Thus, if there is no modification on cognate objects, they have no use to be produced.

This observation immediately leads us to speculate that the motivation for the cognate object alternation is a modification of the action named by the verb. Actually, cognate objects appear to have the same semantic function as manner adverbs.

(6.87) a. Bill laughed a hearty smile. (= Bill laughed heartily.)

b. Tom slept a sound sleep. (= Tom slept soundly.)

Concomitantly, modality adverbs which express a psychological attitude of the speaker cannot modify the event in the cognate object variant.

(6.88) * Hans smiled an evident smile. (Massam 1990:174)

It is particularly important to note here that there seems a language-particular constraint on the cognate object formation. In practice, there is a restriction in English on the number of manner adverbs in a clause, as shown in (6.89a). Therefore, it follows that the English language needs to make use of agentive role unification to form the cognate object variant, in order to enrich the modification structure in the NP, as in (6.89b).

(6.89) a. * She smiled warmly happily. (Omuro 1991: 68)
b. She smiled a warm, happy smile.

I suggest that this is the motivation of the cognate object formation in English.

As compared to English, consider the situation in Japanese. As shown in (6.90a), where two manner adverbs can modify the action denoted by the verb at the same time, Japanese does not have such a restriction on manner adverbs as English. As expected, Japanese does not have a cognate object sentence such as (6.90b).

(6.90) a. Taroo-wa atatakaku siawasesooni hohoen-da.
Taro-Top warmly happily smile-Past
Lit. "Taro smiled warmly happily."
b. * Taroo-wa atatakai siawasesoona hohoemi-o hohoen-da.
Taro-Top walm happy smile-Acc smile-Past
"Taro smiled a warm, happy smile."

If the argumentation above is on the right track, it is concluded that English develops a

grammatical method of agentive qualia unification by composing a cognate object of the verb in order to cover the richer modification on the action that cannot be expressed by manner adverbs. This reasoning explains why a cognate object, which is semantically vacuous as it is, needs some modification phrases obligatorily.

It seems that the analysis of the same sort can be extended to other alternations, including the X's way alternation in (6.91) and the resultative alternation in (6.92).

(6.91) *X's Way Alternation*

a. They shopped around New York.

b. They shopped their way around New York. (Levin 1993: 99)

(6.92) *Resultative Alternation*

a. Pauline hammered the metal.

b. Pauline hammered the metal flat. (Levin 1993: 100)

In (6.91b), the verb *shop*, the NP *their way* and the PP *around New York* all share the agentive property that requires the movement of a theme, so that they can be a target of semantic composition by means of qualia unification. A partial lexical representation of the non-subcategorized object is given in (6.93).

(6.93) way

QUALIA = FORMAL = x: distance

AGENTIVE = move (e1, x)

Also, the adjectival phrase *flat* in (6.92b) needs some causing event in order to achieve the result state of something being flat.

(6.94) flat

QUALIA = FORMAL = be (e1, y, flat)

AGENTIVE = P_{act} (e, x)

Since these phrases are semantically compatible with the main predicates, they can be composed in the qualia structure of predicates by such an operation as agentive role unification.

Chapter 7: Conclusion

This thesis has been an attempt to provide an adequate mechanism of argument linking from the lexicon to syntax under the theory of Generative Lexicon. The chief motivation for adopting a generative model of the lexicon is conceptual, but it actually enables us to describe much empirical phenomena concerning argument realization and alternations.

In chapter 3, we observed a new set of theory for argument realization that does not depend on any thematic role specifications but only refers to the relative prominence of semantic arguments with respect to a relational predicate in the qualia structure. The theory we have developed is *abstract* in the sense that it does not include a primitive set of thematic arguments, but turns to natural semantic classes of event participants. The theory is *systematic* as well in that general linking rules are strictly constrained to allude to appropriate syntactic positions of each argument by virtue of the difference in types of qualia roles. As we have seen in section 3.4, not all lexical items carry a value for each qualia role. This is the particular way for us to treat syntactic differences among those predicates.

If this argument is correct, linking can be viewed as an "approximation" of a lexical semantic representation to a syntactic representation. The semantic structure is an acquired conceptual complex based on our cognitive faculty (Jackendoff 1990b), while the syntactic structure is an innate language faculty which is highly constrained by itself (Chomsky 1986). Jackendoff (2002) argues that semantics is a compositional system independent of and far richer than syntactic structure. Formal semantics (Chierchia and McConnell-Ginet 1990, Cann 1993) and Cognitive Grammar (Lakoff 1987, Langacker 1987) are both established as theories of meaning as a rich combinational system. Instead of relations of domination and linear order found in syntax, semantic structure has such relations as logical connectives, functions that take arguments, quantifiers that bind variables, and relation of assertion to presupposition. Thus, semantics has an inventory of basic units and of means to combine them that is distinct from syntax. There must be, therefore, interface rules that connect semantic and syntactic components in parallel architecture of grammar.

The linking strategy discussed in chapter 4 is just one example in those lines of arguments. It would mean that semantic representation of predicates in terms of qualia structure is by far fine-grained than syntactic structure of a verb phrase. In particular, recent syntactic researches under Chomsky's (1995) Minimalist Program attempt to capture every single phenomenon in the syntax in terms of strictly restricted sets of generative apparatus, such as Merge and Move, and motivations called "features". On the other hand, semantic investigation, especially one by means of the qualia structure, has been given much richer descriptive powers out of recognition that we must take in consideration certain pragmatic factors and world knowledge in order to understand actual linguistic utterances in the context. In this study, therefore, the lexicon is viewed as one of grammatical modules, which equips its own conditions and rules apart from syntax.

All the proposals I have made throughout the thesis should be regarded as being extremely tentative, for our present knowledge of the lexicon is ridiculously small. Thus, the thesis must be titled a preliminary study in the sense that future research is necessary to reveal many unanswered questions. In particular, the adequateness of lexical semantic representation and syntactic representation is a primary concern for the research of interface conditions. In addition, our research has left many aspects of cross-linguistic variations of lexical knowledge, though only the tidbit is given in chapter 5. Finally, the exact nature of generative devices discussed in chapter 6 needs to be linguistically motivated to be established. Nevertheless, the thrust of the present work is to amply demonstrate that the Generative Lexicon is a reasonable way to pursue these problems. I believe that findings in this thesis give rise to new approaches of investigation in the field of lexical semantics. I also hope that discussions in this thesis lay a foundation for substantial researches into the interface between syntax and the lexicon.

Notes

(Chapter 1)

1. An apparent example, in which phonology might affect the organization of other components, is that phonological difference of verbs is relevant to the possibility of the dative alternation. The general observation (with some exceptions) is that only verbs with initial-stressed stems of two syllables or fewer may occur in the double object construction (Green 1974). Thus, verbs like *give* and *send* permit the double object construction, but such near synonyms as *donate* and *transfer* do not.

   (i) a. We {gave/donated} $10 to UNICEF.
   b. We {gave/*donated} UNICEF $10.

   (ii) a. We {sent/transferred} some stock to Bill.
   b. We {sent/*transferred} Bill some stock.

2. Yet other alternations seem to be dealt with by a similar explanation to the locative and dative alternations. These include the fulfilling alternation in (i) and the image impression alternation in (ii).

   (i) Fulfilling Alternation
   a. The judge presented a prize to the winner.
   b. The judge presented the winner with a prize. (Levin 1993: 65)

   (ii) Image Impression Alternation
   a. The jeweler inscribed the name on the ring.
   b. The jeweler inscribed the ring with the name. (Levin 1993: 66)

   In fact, the fulfilling alternation and the image impression alternation show many surface similarities to the dative alternation and the locative alternation, respectively. Some verbs that participate in the fulfilling alternation also participate in the dative alternation. I surmise that the same account for the dative and locative alternations is effective to these alternations as well, though we will not go over the details in this thesis.

3. There is a well-known distinction between "strong" and "weak" resultatives (Washio 1997). Strong resultatives have verbs that do not entail a result state of the action, and a resultative phrase describes the state achieved by the referent of the NP

predicated of as a result of the action named by the verb.

(i) a. They ran their Nikes threadbare.

b. The knocked the man senseless.

On the other hand, weak resultatives have verbs that entail a result state of the action, and a resultative phrase only specify the state entailed by the verb.

(ii) a. The meat froze solid.

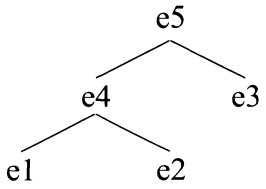
b. She washed the dishes clean.

Languages vary according to the standards that both, either or neither of them they have. For example, English and German has both, Japanese and Italian have only weak resultatives, and French has neither. No language has only strong resultatives.

(Chapter 2)

1. In Japanese, a similar analysis had been done by Kindaichi (1950). For the development of the study of verbal aspect in Japanese, see Okuda (1977), Moriyama (1988), Kudo (1995) and Kinsui (2000), among others.
2. Some researchers (e.g., Depraetere 1995) claim that "(un)boundedness" and "(a)telicity" should be scrupulously discriminated. However, I regard these two notions equally as a measure to determine whether or not an event or a situation being described has an inherent or intended endpoint (cf. Declerck 1979). In effect, the distinction matters little to our discussion of argument realization.
3. Stative predicates can be compatible with an *in*-phrase when it occurs in the future tense (e.g. *Jones will know him in five years.* (Kearns 2000: 206)). However, the *in*-phrase in such a sentence only denotes the time to be taken to become the state described by the predicate, but not the time to be taken to finish it. Actually, this holds true with every type of predicates that Vender classifies, so we will leave this interpretation out of consideration.
4. Pustejovsky (2001) shares the same critical mind to the previous analysis of the event structure, but reaches the different configuration of events from the one we propose in (2.25). His event structure for accomplishment verbs, such as *build*, *destroy* and *clean*, can be schematized in our notation as follows.

(i)



However, this event configuration is untenable, simply because there seems to be no linguistic phenomena that require an event structure in which action and process need to be combined to leave result out. In contrast, there are many examples that require an event structure in which process and result should be combined, as in the case of unaccusative verbs to express an inchoative event.

5. Note in this regard, however, that there seem to be some variations in the possibility of event-head assignment according to the semantics of goal phrases.

(i) a. John ran into the store for an hour.

b. # John ran to the store for an hour.

Just as the resultative adverbial *home* does in (2.39a), the PP *into the store* in (i a) has an effect of bringing an event head to the final state of the event, providing the interpretation that John was at the store for the given period of time. In contrast, the PP *to the store* in (i b) does not exhibit the same effect, and the only possible interpretation of the *for*-phrase in (i b) is the certain period of time when John was repeatedly going back and forth to the store by running, though this interpretation is pragmatically anomalous.

6. Pustejovsky (1995) argues that the constitutive qualia also include the information that refers to what something is constituted of the object (i.e., regular "is_a_part_of" link). We leave this issue open, since we do not recognize any linguistic phenomena in argument realization and alternations that are relevant to this relation.

(Chapter 3)

1. Such a syntactic hierarchy has been captured in the literature in terms of grammatical relation as in (i) or morphological case as in (ii).

(i) subject > object > indirect object > oblique

(ii) nominative > accusative > dative > oblique cases

However, since the UPAH is only relevant to the underlying syntactic structure and says nothing else to the surface morphosyntactic realization of arguments, these syntactic notions cannot be useful for our linking strategy. Furthermore, most researchers who advocate some syntactic hierarchy that corresponds to the prominence of arguments presuppose the existence of a thematic hierarchy (Belletti and Rizzi 1988, Jackendoff 1990b), and thus depend on thematic role labels on arguments.

2. Here, I adopt the split VP structure, following Chomsky (1995), in which the whole verbal projection is constituted of *v*P and VP. However, our theory of argument realization connotes that whether or not *v*P projects an external argument is determined lexically rather than syntactically. Specifically, any predicates including the agentive qualia (more precisely, headed agentive qualia) will project a *v*P that has an external argument in its specifier position.
3. Notice that only the most prominent argument in the agentive quale of *cut* will be mapped onto the specifier of *v*P, given that there is only one syntactic slot for external arguments in the *v*P. One might ask how the instrument argument of *cut* will be "saturated" syntactically, since saturation might be necessary to constraint the number of grammatical arguments of a predicate (Grimshaw 1990). Here, I suggest that there is a null realization of instrument argument, and that an accurate logico-semantic representation of the sentence with *cut* is something like "I cut the bread (with the knife.)". In fact, the instrument argument can only appear in the sentence as an adjunct. The correlation between an agent and an instrument will be demonstrated in the Instrument subject construction, where an instrument instead of an agent appears in the subject position (see section 4.1.2).
4. Note in this regard, however, that the instrument subject in (3.23b) needs some explanation, since the most prominent argument in the event must be the agent that uses an instrument. See section 6.1.2 for the discussion on this point.
5. There is a discrepancy in judgments on the atelic interpretation in (3.33a). The standard view is that the sentence cannot be atelic, but Jackendoff claims that it can be, as demonstrated by the following example.

(i) ? Bill loaded the truck with dart for an hour, but there was still room for it.

(Jackendoff 1996: 346)

In section 4.2, we will argue that locative alternation verbs actually do not entail a completion of the event, supporting Jackendoff's side.

(Chapter 4)

1. Strictly speaking, the conceptual structure of z in the two qualia roles must be different. Specifically, the second argument of *move* must be a path containing an entity as its embedded value (i.e., $[_{path}$ AT $[_{entity}$ z]]), while the first argument of *be* is an entity itself (i.e., $[_{entity}$ z]). For simplicity sake, I do not distinguish these two values by different variables indices.
2. There are only a few locative alternation verbs (e.g., *brush*) that denote an instrument rather than a theme in their derived nominal forms. Of course, the result lexical semantic schema for those verbs is just the same as normal locative alternation verbs.
3. For verbs of future having, caused possession of a theme will be achieved in the future, and thus successful transfer is not entailed at the utterance time.

    (i) a. The boss {offered/promised} a rise to us, but we haven't got it yet.

    b. The boss {offered/promised} us a rise, but we haven't got it yet.

    However, it seems that the subject at least needs to intend it to happen in reality.

    (ii) a. # The boss {offered/promised} a rise to us, though he least expected it to happen.

    b. # The boss {offered/promised} us a rise, though he least expected it to happen.

    Then, we can presume that these verbs have roots that involve a "sublexical" modality component which restricts the possible worlds in which successful transfer holds (cf. Koenig and Davis 2001).
4. Rappaport Hovav and Levin (2008) argues that verbs of giving do not lexicalize a semantic component associated with a caused motion, since they do not occur with the adverbs *all the way* and *halfway* which specify the extent of the path.

(i) a. * Susan gave the ball {all the way/halfway} to Bill.

b. I sent the package {all the way/halfway} around the world to the Antarctic. (Rappaport Hovav and Levin 2008: 138)

However, the incompatibility of verbs of giving with these adverbial phrases may have another explanation. One possibility might be that these adverbs require conceivable physical extension of the path phrase, as they actually seem to do. Then, it is natural for the path adverbs to be incompatible with verbs of giving, because verbs of giving all have a specification of their semantic field as "possession", which is clearly not physically observable.

5. *Send* and *throw* differ in their tolerance of path expressions (Rappaport Hovav and Levin 2008).

(i) a. * Fred sent the box {behind the factory/under the awning/towards Carson}.

b. Fred threw the ball {behind the tree/under the porch/towards third base}. (Rappaport Hovav and Levin 2008: 136)

This can be attributed to the difference in the property of their *move* function. We leave this issue open.

6. There are still other semantic classes of three-place verbs in Japanese. One of the classes includes verbs of fulfilling, such as *mitasu* 'fill', which corresponds to *cover*-type verbs in English. We will discuss the argument realization of these verbs in section 5.4 in connection with a cross-linguistic variation of lexicalization patterns between English and Japanese.

(Chapter 5)

1. There seems to be a dialectal variation as to the acceptability of *cure*-type verbs in the locative variant. In fact, some English speakers readily accept the sentence pattern in (5.14a). The situation is just the same as *cover*-type verbs in the locative variant, discussed in section 5.2. This constitutes, therefore, another instance of the evidence in favor of the claim in this chapter.
2. Japanese does not have a removal type of the locative alternation in a strict sense,

since it lacks an ablative postposition corresponding to English *of*. However, some verbs like *katazukeru* 'clear' can take both a theme and a location as the direct object, which implies that Japanese actually has a similar phenomenon to the *clear* alternation in English.

3. The morphology of verbal affixes in Japanese does not always correspond to their semantics, due to many unknown characteristics of morphology in modern Japanese. See Kageyama (1996, 2000) and Matsumoto (2000) for some discussion.

(Chapter 6)

1. In (6.5c), we discard Diesing's (1992) analysis that the subject of all individual-level predicates is base-generated in the sentence subject position directly. See Matsumoto and Fujita (1995) for the alternative syntactic derivation of the middle construction along the line discussed here. Notice, however, if we adopt Diesing's idea, while abandoning our linking strategy, we have an immediate answer to the question why expletives are not inserted in the subject position of middle sentences instead of moving the theme argument thereto. We leave this issue open for future research.
2. Interestingly, when the semantic content of implicit agent is overtly indicated by the *for*-phrase adjunct, the generic interpretation of middle sentence may be cancelled. This effect can be due to the "reinterpretation" of the agent argument at LF. Therefore, the generic agent may be co-indexed with the specific agent indicated by the *for*-phrase, as shown by (6.6b), and thereby be overwritten at LF. This fact constitutes another evidence to support the claim that the implicit agent of middle sentences is syntactically present.
3. In this respect, one might claim that event argument suppression may take place in syntax. In fact, some researchers (e.g., Keyser and Roeper 1984, Roberts 1987, Stroik 1992) propose a purely syntactic solution to the middle alternation. However, as far as English is concerned, there seems to be no chance of defending this approach, since any syntactic operation (e.g., passivization) may not induce such a systematic suppression of event arguments as middle formation. After all, the

lexically established properties of middle sentences can never be derived without such a lexical operation as argument abstraction discussed here.

4. Japanese has a similar alternation.

(i) a. Taroo-wa Hanako-no-te-ni kisu-o si-ta.
Taro-Top Hanako-Gen-hand-Dat kiss-Acc do-Past
"Taro kissed Hanako's hand."

b.(?)Taroo-wa Hanako-ni te-ni kisu-o si-ta.
Taro-Top Hanako-Dat hand-Dat kiss-Acc do-Past
"Taro kissed Hanako on her hand."

I believe that the same analysis as English is applicable to this alternation.

5. The so-called "reaction object" variant, as in (i), may be considered as a subset of the cognate object variant.

(i) a. Pauline smiled her thanks.
b. Sandra beamed a cheerful welcome.
c. She mumbled her adoration. (Levin 1993: 98)

First, reaction object variant can be paraphrased by the corresponding cognate object variant (e.g. *Pauline smiled a smile of her thanks*). Second, verbs that take part in the reaction object construction is almost the same as verbs that take part in the cognate object construction (cf. Levin 1993).

6. An apparent counterexample to this restriction is the verb *die*.

(i) John died a gruesome death. (Jones 1988: 89)

The verb *die* is usually considered as an unaccusative verb, but it readily appears in the cognate object variant. I do not have a clear explanation for this fact. See Levin and Rappaport Hovav (1995) and Takami and Kuno (2002) for some discussion on this issue.

7. In this sense, the cognate object construction is sharply distinguished from the sentence in which regular transitive verbs happen to have the cognate object. Those verbs impose no morphological restriction on the form of the object NP.

(i) a. Sam danced {a jig/a piece from Swan Lake/something involving lots of pirouettes}.

b. Bill dreamed {a most peculiar thing/that he was a crocodile}.

(Jones 1988: 89)

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