The Roles of Internal and External Factors and the Mechanism of Analogical Leveling: Variationist- and Probabilistic OT approach to Ongoing Language Change in Japanese Voice System

by

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Abstract

This thesis presents an exhaustive research about ongoing language variation and change in the Japanese voice system. Through the analysis I identify the roles of internal and external factors in human linguistic competence that govern the language variation and change, and I construct a model of grammar that inherently includes the language variation and change. This work aims at the formal theoretical analysis primarily built upon the empirical evidence: a huge amount of spontaneous speech data.

Until now, a number of researches on language variation and change have been done from various perspectives: The sociolinguistic research, specifically from the perspective of the variationist approach (Labov 1963 et seq., Weinreich et al. 1968), has revealed much about language variation and change, particularly with respect to phonological aspects, focusing on various internal and external factors that govern the phenomena by the quantitative method. However, the formalization of the mechanism of language variation and change is insufficient; the generative grammatical approach (Chomsky 1957) can give a formal account of the phenomena based on the grammatical theory. However, this approach has focused on the language competence as the research subject, and the language use has been overlooked. Thus, the approaches have not cooperated and have not shared their insights.

In the grammatical category voice in Japanese, language variation and change which reorganize the conjugation paradigm are currently underway. The process includes three variations: *sa*-Insertion, *ra*-Deletion and *re*-Insertion. The variation and change in voice are related to the functional demand and to morphophonology.

Based on these facts, I conducted the research from the perspectives of a variationist approach (Labov 1963 et seq.; Weinreich et al. 1968), and also Optimality Theory (henceforth OT; Prince and Smolensky 1993/2004), specifically the

Probabilistic OT (e.g. Boersma 1998; Boersma and Hayes 2001; Goldwater and Johnson 2003; Jäger 2004; Jäger and Rosenbach 2006), sharing the insights of both paradigms. I employ two large-scale Japanese corpora: the on-line full text databse of the minutes of the Diet and the Corpus of Spontaneous Japanese, complementally taking advantage of the strong points of each corpus for the exhaustive research about language variation and change. The exhaustive research on the corpora brought forth the data which amounts to a total of over 20,000 tokens of the variations.

Specifically, I conduct the quantitative analysis employing the spontaneous speech data and examine the roles of internal- and external factors that govern the language variation and change. The data are subject to the factor-by-factor analysis followed by the multivariate analysis. Subsequently, I conduct the grammatical analysis in terms of the Optimality Theory. I set several OT constraints, reinterpreting the results of the quantitative analysis. The Probabilistic OT analysis includes the prediction of the change and the verification of the analysis. Considering all the results together, I discuss the locus of variation in human language competence. In doing so, I uncover some detailed insights about the roles of internal and external factors and this in turn leads to the construction of a model of grammar that accommodates the inherent variability.

In addition to the identification of the roles of factors and the construction of the model, I propose that the three variations are not discrete phenomena but a uniform and exhaustive one which is driven by the common demand for the optimization of the conjugation paradigm as well as the reduction of the functional load of each form in the Japanese voice system; the discrepancy in the manner of the change is derived according to the particular meanings or functions of each variation. I also show that the language variation and change in question can be explained by the interaction of a small set of constraints.

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List of Abbreviations

ACC: Accusative	AUX: Auxiliary	CAUS: Causative
COND: Conditional	DES: Desiderative	GEN: Genitive
LOC: Locative	NEG: Negative	NOM:Nominative
NONP: Nonpast	PAST:Past	POL: Polite
POT: Potential	QPART: Question Particle	TE: *te*-form of the verb

Chapter 1. Introduction

This thesis aims to identify the roles of language internal and external factors (henceforth internal factors and external factors, respectively) in human linguistic competence that governs language variation and change, and to construct a model of linguistic competence that inherently includes language variation and change. The present thesis aims at constructing a bridge between empirical work based on a huge amount of data on the one hand, and a formal account, including the modeling of the phenomena in question as well as of the language change as a whole, in terms of grammatical theory, on the other.

The variation is defined as "alternative ways of saying the same thing" (Labov 1972), namely in variation multiple linguistic elements representing the same meaning coexist at a particular time period, and the speaker selects one of the elements according to the settings, for instance. The variation is observed in every linguistic category from the phonological level to the discourse level. Take phonological variation in English called t/d deletion (Labov 1969; Bayley 1995, among others) as an example; when we pronounce, for example, the verb *cost*, the final *t* is optionally deleted. At this point, there exist two alternatives with the same semantic content: *cost* and *cos_*. One of these two forms is selected at a particular speech event. The dialectal difference is also categorized as the (regional) variation and youth language is also an example of (social) variation.

The change is the process where a particular linguistic element used at a particular time period is replaced by other elements with the passage of time. Similar to the variation, the change is also observed in every linguistic category. Take one of the syntactic changes in English: the rise of periphrastic *do* (Ellegård 1953; Lightfoot 1979; Kroch 1989, among others) as an example. In Middle English, questions were formed by inverting the tensed verb with the subject and negative sentences by placing the negative marker *not* immediately after the tensed verb, roughly as in *Have we not...* . In the beginning of 14th century, the change has begun: the periphrasitc *do* appears as a dummy auxiliary with no inversion of the tensed verb roughly as in *We do not have…* . Before the 14th century, the periphrastic *do* did not exist. In the 14th century it appeared and has diffused gradiently; finally it replaced the traditional pattern. The change does not occur abruptly, but it proceeds gradually. Hence in the intermediate stage of language change, we observe the variation, where traditional variants and innovative variants coexist. In language variation and change in Japanese, voice is also undergoing the change, and it takes the form of variation at present.

These are governed by various internal factors, which include some linguistic factors, such as the animacy of the subject, the grammatical case of each argument and the preceding/following context of the forms in question (phonemes or length of the verbs), and external factors, which include some social factors such as age, gender, socioeconomic status and style.

As is usual with any such variation and change phenomena, these have also been referred to as examples of *kotoba-no-midare* “language disturbance” by language purists and school teachers. However, the importance of the phenomena in question has long been acknowledged among the researchers working within and outside the linguistics both for its theoretical implications and for practical applications such as the language education, the language policy, and the natural language processing, heretofore, a number of researches on language variation and change have been done from various perspectives.

Japanese traditional grammar and dialectology have a long history of the research on language variation and change (Yanagida 1930; NIJL 1959), including the research on Ainu (Hattori 1964), particularly focusing on the dialectal differences, and have achieved important results based on the in-depth survey through the extensive fieldworks. However, the research within this framework remains just some discrete descriptions of the phenomena and lacks the principled explanation. These descriptions are far from the explanation of the mechanism of language variation and change on the whole. Furthermore, these approaches mainly adopt the individually collected data by means of the questionnaire, except for the above-mentioned extensive surveys (Yanagida 1930; NIJL 1959; Hattori 1964). These are also insufficient with respect to their scale, compared to the large-scale corpora which have been enhanced in recent years.

The sociolinguistic research, specifically from the perspective of variationist approach (Labov 1963 et seq.; Weinreich et al. 1968), has revealed much about language variation and change, particularly with respect to phonological aspects, focusing on various internal and external factors that govern the phenomena by the quantitative method. After the 1980s, this methodology has also been applied to the phenomena in Japanese (Nishimura 1985; Shibamoto 1985; Hibiya 1988). However, from the scientific point of view, the formalization of the mechanism of language variation and change (how and why language variation and change occurs) is missing. These issues remain to be answered to the best of my knowledge.

Traditional generative grammatical theory (e.g. Chomsky 1957) has assumed the “ideal speaker,” who does not show any disfluent phenomena and whose utterances do not include any gradience or variations, and conducted the analysis based on the utterances of that speaker. Thus, the spontaneous speech and the language use have been overlooked. The actual usage, however, includes a number of disfluency and variation phenomena. Therefore, such a traditional theory cannot capture the actual usage all the more for the language variation and change phenomena. The variationist approach assumes that the locus of variation exists internal to the linguistic competence (inherent variability, Weinerich et al. 1968); on the other hand, the generative grammatical approach assumes that the locus of variation exists external to the specific domain of linguistic competence, namely, the locus is the issue of performance, and so language variation and change have been outside of the scope of research.

Over the last couple of decades, one approach within the framework of generative grammar has focused on language change (Lightfoot 1979, 1991; Roberts 1993; Kroch 1989, 2001; Roberts and Roussou 2003, among others). This approach gives a formal account to the syntactic change: the grammatical change is attributed to the parameter resetting (change in the universal binary choices). However, language variation and change is intrinsically gradient. The parameter resetting account would have to claim that the change occurs in an all or nothing manner. The generative grammatical approach is still insufficient for the study of language variation and change in the sense that it cannot accommodate the gradience which is the essence of language variation and change.

As described above, although the research on language variation and change has been done from various perspectives and frameworks, the methodologies and the criteria of the analysis vary greatly from one approach to another approach, and also some problems remain even within individual approaches. These facts, when we consider the alternative, show that a major breakthrough will be achieved by unifying the advantages each approach has and compensating for the shortcomings. Therefore, the integrated and comprehensive research bridging between empirical work and the formal grammatical theory is necessary in order to reveal the mechanism of language variation and change as well as the human linguistic competence.

As to the data issues, even the formal theory should be on ample empirical ground: a huge amount of spontaneous speech data. Before the innovation of large-scale corpora, a huge amount of spontaneous speech data has not been available; instead, individually collected data, by means of a questionnaire, for example, has been employed. Although this kind of data is helpful in the sense that we can freely design each item of the questionnaire for our own purpose, the size of the data collected is small, compared to the large-scale corpora; for example, it does not enable the research on the chronological change over 50 years. In addition, the self-report system is often faced with the underreporting/overreporting by data subjects in response to ideologies of various kinds (cf. Milroy 1987). Moreover, the generative tradition defines the linguistic competence too narrowly. Although it is not necessarily the case that the speaker's intuition traditionally employed as the data in the generative tradition is totally unreliable, looking through the spontaneous speech data, we can observe a more detailed and wider range of phenomena than the intuition predicts. It is impossible to cover the linguistic phenomena and linguistic competence by mere intuition (cf. Bresnan 2006, 2007). The spontaneous speech data is a prerequisite for the study of language variation and change, since the investigation of the factors of various kinds (In what context do what kind of factors have an influence on the phenomenon?) is necessary in order to describe the details of and reveal the mechanism of variation and change. For these reasons, I employ two large-scale Japanese corpora: the "*On-line full-text database of the minutes of the Diet*" (henceforth Diet database) and the "*Corpus of Spontaneous Japanese*" (henceforth CSJ), complementally taking advantage of the strong points of each corpus for the exhaustive research about language variation and change.

Thus far, the variationist approach (sociolinguistics) and the generative grammatical approach (biolinguistics, internalist approach) have not cooperated or shared their insights (Cornips and Corrigan 2005). However, a number of methodological innovations have achieved a breakthrough: the improvement of the research environment including the innovation of large-scale corpora (cf. Maekawa 2002; Bresnan, Cueni, Nikitina, and Baayen 2007), the advancement and the accumulation of the study of language variation and change, and the development of the grammatical theory including the Optimality Theory which accommodates the gradience and enables the explanation of language variation and change (cf. Bresnan, Deo, and Sharma 2007). Thus, the time is ripe for a bridge between the variationist and generative grammatical approaches.

Both paradigms can benefit from each other by sharing insights: The insights from grammatical theory provide the variationist approach with the beneficial information, specifically in defining the range of language variation and change, on the one hand, as Sells et al. (1996) claim:

> Variation theory needs grammatical theory because a satisfactory grammatical characterization of a variable is a pre-requisite to decisions about what to count and how to count it, and it is an essential element in the larger question about where variation is located in speaker's grammars.
>
> (Sells et al. 1996: 173)

On the other hand, grammatical theory can also benefit from the variationist approach: Quantitative results provide not only the detailed description, but also provide the empirical evidence for language variation and change that exhibits orderly heterogeneity. These should be the strong support to the formal analysis. Chomsky (1999) demonstrates that the time may well be ripe for a more integrated approach.

> Internalist biolinguistic inquiry does not, of course, question the legitimacy of other approaches to language, any more than internalist inquiry into bee communication invalidates the study of how the relevant internal organization of bees enters into their social structure. The investigations do not conflict; they are mutually supportive. In the case of humans, though not other organisms, the issues are subject to controversy, often impassioned, and needless. (Chomsky 1999: 34)

Over the past decade, the grammatical theory has turned its attention to spontaneous speech, variation and frequency in various linguistic phenomena, specifically in phonology (e.g. Anttila 1997 et seq.; Boersma and Hayes 2001, among others, and *Workshop on Variation, Gradience and Frequency in Phonology, 6-8 July, 2007, at Stanford University*)

With the above background, the present thesis reports the research conducted from both quantitative (statistical) and qualitative (grammatical theoretic) perspectives. I assume that language variation and change are driven by various factors but constrained by the nature of possible grammars. The grammatical theory should be grounded in the firm empirical evidence, particularly when it comes to the issues of language variation and change. I, therefore, propose a model of the grammar that accommodates the inherent variability based on the huge amount of spontaneous speech data, and I situate the roles of internal and external factors that govern language variation and change in question in human linguistic competence through the exhaustive examination of the data. Specifically, I identify the locus of variation. This includes the following questions: What is the source of the variation? Where is the system that generates the variation located, internal to the grammar (competing (multiple) grammar (Kroch 1989) or inherent variability) or external to the grammar (as an optional rule or as a general cognitive capacity)?

As to the issues of internal and external factors, it has been assumed that internal factors constrain the phenomena categorically and the internal factors are associated with the grammaticality (hard constraint), while on the other hand external factors constrain the phenomena gradiently and the external factors are associated with the acceptability (soft constraint) (Keller 2000, among others). The present research anatomizes the roles of factors beyond the dichotomy of factors, such as the soft/hard distinction. Specifically, I verify one of the significant claims in variationist approach that in language variation and change the following tendencies concerning the interaction of factors are observed: internal factors are mutually independent, in other words there exists no significant interaction within internal factors; internal factors and external factors are also mutually independent; while external factors are interrelated (Labov 1982).

In order to achieve the aforementioned goals, I conduct the exhaustive research on language variation and change in terms of variationist approach. Specifically, I conducted the quantitative analysis employing the spontaneous speech data and examine the roles of internal and external factors that govern language variation and change. The data are subject to the factor-by-factor analysis followed by the multivariate analysis. Subsequently, I conduct the grammatical analysis in terms of the Optimality Theory. I set several OT constraints, reinterpreting the results of the quantitative analysis; specifically, I formalize the mechanism of analogical leveling

(Paul 1890/1970; Kurylowicz 1940; Manczak 1980; Kiparsky 1978; Bybee 1985) which reduces the number of allomorphs that a form has and makes the paradigms more uniform; In analogical leveling, forms which formerly underwent alternations no longer do so after the change. Furthermore, I give a formal account to the mechanism of language variation and change in terms of Probabilistic OT. The Probabilistic OT analysis includes the prediction of the change and the verification of the analysis. Considering all the results together, I discuss the locus of variation in human linguistic competence. In doing so, I uncover some detailed insights about the roles of internal and external factors and this in turn leads to the construction of the model of grammar that accommodates the inherent variability.

The case studies on language variation and change in contemporary Japanese voice system form the empirical basis of this thesis: *sa*-Insertion, *ra*-Deletion and *re*-Insertion. The exhaustive examination of the corpora brought forth the data which amounts to a total of over 20,000 tokens of the variations.

On the assumption that the phenomena in question are grammatical changes, it follows that every member of the category, voice, is affected uniformly by the common ground: the optimization of the conjugation paradigm by analogical leveling and the reduction of the functional load of each form.[1] However, external pressures as a trigger of the change could themselves be functionally motivated: each factor is associated with the particular meanings or functions of each variation, and it affects differently according to the properties of each phenomenon[2] and controls the detail of the change. This is reflected, for example, in the timing of the change: although the

[1] Throughout this thesis, I use the term "functional load" to refer to the amount of function/meaning which a certain morpheme carries, unlike the term traditionally used in phonology (cf. Mathesius 1929, among others). The importance of a certain phonemic opposition in making distinctions in a language is not at issue.

[2] For example, *ra*-deletion is an instance of change from below, *sa*-Insertion change from above, and *re*-Insertion change from below, in the sense of Labov (1990).

absolute order of the change of each phenomena is fixed by the core grammar: *ra*-deletion comes first followed by *sa*-Insertion, *re*-Insertion in turn follows the change of *sa*-Insertion,[3] the factors outside the core grammar make slight changes according to the particular meanings or functions of each variation. The present analysis partly supports the view that internal factors constrain the phenomena categorically, while on the other hand external factors constrain the phenomena gradiently. To put this into the present context, we can argue that internal factors sketch the outline of variation and change and external factors determine the details with reference to the particular properties of each phenomenon.[4]

In addition to the identification of the roles of factors and the construction of the model, I propose that three varations are not discrete phenomena but are a uniform and exhaustive one that is driven by the common demands for the optimization of the conjugation paradigm as well as the reduction of the functional load of each form in the Japanese voice system (analogical leveling); the discrepancy in the manner of the change is derived according to the particular meanings or functions of each variation. I also show that the language variation and change in question can be explained by the interaction of a small set of constraints.

This thesis is organized as follows: In Part I, Chapter 2 comprises the methodological preliminaries: I firstly present and identify the theoretical issues, and then I introduce the phenomena in question as well as the previous studies on these phenomena. Chapter 3 describes the data and the characteristics of the corpora which I employed in the present research. In Part II, Chapter 4 presents the statistical analyses of *sa*-Insertion, specifically from the perspective of Variation Theory; Chapter 5 covers *ra*-deletion and Chapter 6 covers *re*-Insertion; and Chapter 7 summarizes the statistical

[3] I examine the order of the change by means of T-order (Anttila and Andrus 2006) in Chapter 9.
[4] I locate this insight in the architecture of the OT grammar.

analysis and discusses the theoretical implications of the results. In Part III, I present the Optimality-Theoretic analysis in Chapter 8. Based on the results of the standard OT analysis, I conduct the Probabilistic OT analysis in Chapter 9. Finally, Chapter 10 concludes the entire discussion. At the same time, I construct a general model of language variation and change, and discuss the characterization of the roles of Internal and External factors in the organization of human linguistic competence.

PART I

Chapter 2. Methodological preliminaries

This chapter presents some methodological preliminaries in conducting the analysis. In Section 2.1, I introduce the two approaches to language variation and change; variationist approach and Optimality-Theoretic approach, which I follow throughout this thesis. In Section 2.2, I in turn identify and describe three variations.

2.1 Approaches to language variation and change

Language variation and change, hitherto, have been studied from a number of perspectives. This section introduces two approaches, among others, to language variation and change. Firstly, I present the variationist approach, and secondly the Optimality-Theoretic approach.

2.1.1 Variationist approach

The variationist approach (Labov 1963 et seq.; Weinerich et al. 1968) aims to present a model of language which could accommodate the paradoxes of language change: Formal approaches to language have been attempting to identify the structure of languages a fixed set of rules or principles, but at the same time language that always changes, hence such structure has to be fluid. As mentioned above, in variationist approach, variations are defined as "alternative ways of saying the same thing" (Labov 1972), such as *cost* vs. *cos_*.

The essence of variationist approach depends on three aspects of language that are often overlooked in other linguistic fields (Tagliamonte 2006): Firstly, orderly heterogeneity (Weinreich et al. 1968: 187-8): Language is not homogeneous, but heterogeneous. The heterogeneity is ordered by various language internal and external factors, rather than unconstrained. The human linguistic competence includes the ability of controlling such heterogeneity. Secondly, language change: The language change proceeds in neither a uniform nor an abrupt manner. In the intermediate stage of language change, we observe the variation, where traditional variants and innovative variants coexist, since the change proceeds gradiently. That is, the change always involves the variation, but the variation does not necessarily involve the change. In such a case, the variation is called a stable variable (e.g. *t/d* deletion). Linguistic and social factors are closely interrelated in the development of language change. Thirdly, pervasive social meaning: Language conveys not only the meaning of its words, but also abundant non-linguistic information. The choices speakers make among alternative linguistic means to convey the same meaning (proposition) often includes important extralinguistic information associated with, for example, age, gender, and socioeconomic class.

Specifically, the variationist approach sets the following five research questions (problems) raised in Weinreich et al. (1968: 183-7).

1. What are the general constraints on change, if any, that determine possible and impossible changes and directions of change? (Constraints problem)
2. By what route does language change? (Transition problem)
3. How is a given language change embedded in the surrounding system of linguistic and social relations? (Embedding problem)
4. How do members of a speech community evaluate a given change, and what is the effect of this evaluation on the change? (Evaluation problem)

5. Why did a given linguistic change occur at the particular time and place that it did? (Actuation problem) (Joseph 2008)

The variationist approach aims to answer these questions by means of the quantitative method, based on the observation that speakers make choices when they use language and that these choices are discrete alternatives with the same referential value or grammatical function. Furthermore, these choices vary in a systematic way and as such they can be quantitatively modeled (Labov 1969, among many others). In the quantitative analysis, the data are firstly subjected to the factor-by-factor analysis, in order to examine the significance of each factor and its contribution to the distribution of a particular variation. Then, the data can also be subjected to a regression analysis. In this analysis, the observed values are log-transformed before the regression is performed. Such a regression will find the factor values for each of the factors that results in the best fit between the observed data and the values predicted by the regression model. The advantage of the quantitative approach lies in its ability to model the simultaneous, multi-dimensional factors impacting on a speaker's choice, to identify even subtle grammatical tendencies and regularities in the data, and to assess their relative strength and significance (Tagliamonte 2006).

2.1.2 Optimality-Theoretic approach

In this section, I outline the Optimality Theory and Optimality-Theoretic approach to variation and change. Firstly I introduce the basic concepts of Optimality Theory; secondly, the Partial ordering model; thirdly, the Stochastic OT; and finally the Maximum Entropy OT.

2.1.2.1 Basic concepts of Optimality Theory

Optimality Theory (Prince and Smolensky 1993; hereafter, OT) is the grammatical theory which aims at the explanation of the universality and the diversity of human languages. OT supposes that the grammar of human language consists of a set of universal constraints: markedness constraints, which demand the unmarked (canonical) forms or structures of human languages in general, and faithfulness constraints, which require the conformity of output with input. These constraints are inherently in conflict; markedness constraints and faithfulness constraints, for instance, make some demands in exactly the opposite direction, and each constraint is violable and totally ranked. The architecture of OT grammar is graphically represented as in (1).

(1) Input → $\boxed{\text{Gen}}$ → Candidates → $\boxed{\text{Eval}}$ → Output (optimal candidate)

For a given input, Gen (generator) generates a class of candidates and the candidates are in turn evaluated following the constraint ranking by Eval (evaluator). A form which best satisfies the constraints in their ranking on which other candidates conflict is selected as an optimal output. Although the constraints are universal, the ranking is specific to each language. The languages differ due to the difference of the ranking (cf. Kager 1999).

I exemplify how OT grammar works. In OT the violation profile (schema of every violation incurred by each candidate) and the evaluation are illustrated in the forms of Tableau, as in (2) and (3). As to the notational convention, candidates are listed in the left most column; if a candidate is optimal, in other words it incurs least violations (of higher ranked constraints), the candidate is marked by the index '☞' on the left. Constraints are listed in the top row; the constraint ranking is assigned from left (highest) to right (lowest). the asterisks represents the violation that each candidate incurs for a particular constraint, and the number of asterisks corresponds to the number of violations. If the violation is fatal, that is indicated by an exclamation mark. With these in mind, I present the evaluation process below.

(2)	C_1	C_2	C_3
A	*!		*
B		**!	
☞ C		*	
D		*	*!

Let us look at the tableau from left to right. In (2) we have four candidates and three constraints ranked as $C_1 > C_2 > C_3$. Firstly, only candidate A violates the highest ranked constraint C_1 and it is excluded. Secondly, candidate B violates C_2 twice and it is excluded, since other surviving candidates C and D incur only one violation of C_2, respectively. The competition of C and D is passed on to the final constraint. Finally, candidate D violates C_3, while candidate C incurs no violation of C_3, hence candidate C is selected as the optimal output with least violations. Given that this is the grammar for a particular language, we can derive the typological difference by assuming the different rankings in other languages.

(3)		C_2	C_1	C_3
☞	A		*	*
	B	**!		
	C	*!		
	D	*!		*!

In (3), we have the same set of candidates and constraints, only the ranking is different: $C_2 > C_1 > C_3$, this yields the different optimal output A. On the assumption that the constraints are universal, the difference of the rankings is the very locus of the diversity of human language.

This is the general architecture of standard OT. In standard OT, the ranking of constraints is totally ordered at least within a particular language; it follows that a single optimal output is generated for each input and no variation arises. In what follows, I present how language variation and change are treated within other elaborated versions of OT.

2.1.2.2 Partial ordering model

The partial ordering model (Anttila 1997 et seq.; Anttila and Cho 1998) proposes that the constraints are partially ordered rather than totally ordered, as in standard OT, and that the variation arises from different rankings within the grammar. Unlike the multiple grammars model (Kroch 1989; Kiparsky 1993; Yang 2000; Anttila 2002b, among others), where an individual speaker has a set of competing invariant grammars, the partial ordering model assumes a single grammar that inherently includes variation. I schematize this with the example above. Let us assume that the total ranking in example (2) represents a grammar in a particular language *L*; the grammar with constraints ranked as $C_1 >> C_2 >> C_3$, where C_1 is the highest, generates invariably the optimal output C and the grammar in *L* includes no variation. On the other hand, assuming the grammar in which C1 and C2 are unranked as in C_1, $C_2 >> C_3$, in other words only the relationship between C_1 and C_3 and C_2 and C_3 is fixed as in $C_1 >> C_3$, $C_2 >> C_3$, there arise two possibilities (rankings) with three constraints: $C_1 >> C_2 >> C_3$ and $C_2 >> C_1 >> C_3$. To take (2) and (3) as examples, if the constraint is ranked as $C_1 >> C_2 >> C_3$ as in (2), the optimal output will be A; on the other hand, if the constraint is ranked as $C_2 >> C_1 >> C_3$ as in (3), the optimal output will be C. Thus, the grammar in partial ordering model permits several rankings and variable outputs. This is the locus of variation within a single grammar (including intra-speaker variation).

Furthermore, this model also predicts the abstract frequency with which different variants will be observed. The abstract frequency of each candidate is calculated according to the number of times of 'win' (being selected as optimal candidate) divided by the number of rankings. Assuming the above example with the grammar permitting two rankings, we find that the candidate C wins under the ranking $C_1 >> C_2 >> C_3$, and A wins under the ranking $C_1 >> C_3 >> C_2$. The candidates A and C win once, respectively, and the number of rankings is 2, it follows that the probability of the occurrence is 50 percent for each candidate. However, the prediction of partial ordering model is far from fine-grained compared with the probabilistic model which I mention below, since it cannot calculate, for example, the fine probabilities with a small set of constraints. For example, in order to obtain the distribution where the probability of output A is 99% and that of B is 1%, we need the grammar with at least 100 rankings where A wins in 99 rankings and B wins in one ranking (Boersma and Hayes 2001; Coetzee and Pater 2008). This scenario is quite unlikely. In what follows, I introduce two versions of Probabilistic OT.

2.1.2.3 Stochastic OT

Stochastic OT (Boersma 1998; Boersma and Hayes 2001) differs from the standard OT with respect to the notion of ranking. In this model, the strength of each constraint is associated with numerical values (*ranking values*) along a continuous scale of real numbers, rather than the categorical ranking as in Figure 1, and each constraint takes the ranges of values characterized by a Gaussian distribution. The evaluation of Stochastic OT takes the forms of *stochastic evaluation*: at every speaking event, the random value, *evaluation noise*, is added to the ranking value and the final value of the constraint is determined. This value is called a *selection point*. The selection point of each constraint varies from evaluation to evaluation, and this is the locus of variation.

Figure 1. Categorical ranking with ranges (Bresnan, Deo, and Sharma 2007: 333)

Stochastic OT accommodates both categorical and gradient cases. Briefly speaking, if the ranking values of constraints are distant and the ranges of each constraint never overlap as in Figure 1, there will be no variation. On the other hand, if the ranking values of constraints are close enough and the bell curves overlap as in Figure 2, there will be variation, since so-called ranking reversal of the constraints (e.g. $C_1 \gg C_2 \rightarrow C_2 \gg C_1$) may occur within the overlapping area (from 84 to 89 roughly).[5]

[5] In Stochastic OT the language change is modeled as movement in ranking values of each constraint (Clark 2004).

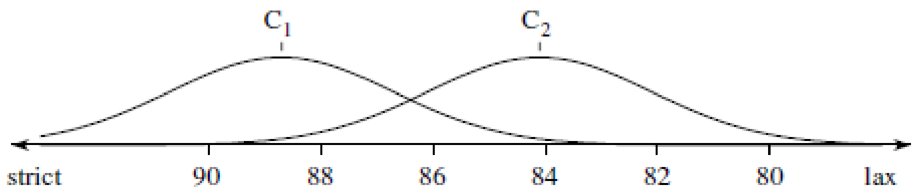

Figure 2. Overlapping ranking distributions (Bresnan, Deo, and Sharma 2007: 333)

Stochastic OT is accompanied by the learning theory: Gradual Learning Algorithm (henceforth GLA). GLA calculates and identifies the ranking values of each constraint based on the OT grammar which specifies input and output pairs, constraints, violation profiles, and the learning data which consists of the frequency distribution of each variant. GLA in turn generates the distribution of variants based on the ranking values. While learning, GLA continues to promote and demote the ranking values of each constraint by a small step in order to come up with the grammar which can generate the frequency distribution consistent with the learning data.

Although Stochastic OT can calculate the fine probabilities with a small set of constraints, and it enables the fine-grained prediction of language variation and change, this model cannot accommodate a certain kind of data, as described below; this is because the relationship among constraints characterized by selection points is interpreted as a categorical ranking after the evaluation; hence the lower ranked constraints do not play any role.

2.1.2.4 Maximum Entropy OT

Maximum Entropy OT (Goldwater and Johnson 2003, Jäger 2004, Jäger and Rosenbach 2006; henceforth MaxEnt OT) is the log-linear model that calculates a probability distribution over the candidate set, where the strength of each constraint is represented as the parameter *weight*. The probability of a candidate is proportional to the exponential of its Harmony score. The model searches for the least biased distribution that has the highest entropy. MaxEnt OT is accompanied by the learning algorithm, Stochastic Gradient Ascent (SGA) that is frequently used in machine learning. Similar to GLA, SGA estimates the weights of each constraint based on the OT grammar which specifies input and output pairs, constraints and violation profiles, and the learning data which consists of the frequency distribution of each variant, and SGA in turn generates the distribution of variants based on the model.

One advantage of MaxEnt OT, among others, is that it can handle two kinds of cumulativity: ganging-up cumulativity and counting cumulativity, which Stochastic OT cannot deal with.

The example (4) illustrates the ganging-up cumulativity.

(4)	C_1	C_2	C_3
A1	*		
B1		*	

	C_1	C_2	C_3
A2	*		
B2		*	*

The candidates A1 and A2 violate the highest ranked constraint C_1, hence the candidates B1 and B2 win, respectively. According to the basic assumption of OT, once a competition is decided, lower-ranked constraints (C_2 and C_3) play no role, and how high the winner wins is not taken into account. Given the ganging-up cumulativity, however, the dominated constraints have an impact on the probability of a candidate (Jäger and Rosenbach 2003). The non-optimal candidate B2 is worse than B1, in that the former violates C_2 and C_3, while the latter violates only C_2. It follows that the probability of B2 is less than that of B1. Incidentally, in the tableau on the right hand side the violation of lower-ranked C_2 coupled with the violation of C_3 for the candidate B2 may override the violation of highest-ranked C_1 for the candidate A2. Thus, it is sometimes the case that B2 wins.

Next, I present an example of counting cumulativity with (5).

(5)	C_1
A1	*
B1	

	C_1
A2	***
B2	

In (5), the winners are B1 and B2, respectively. Assuming the counting cumulativity, we find that the number of constraint violations has an impact on the probability of a candidate. The non-optimal candidate A2 is worse than A1, in that the former incurs three violations of C_1, while the latter violates only once. Thus, the probability of A2 is less than that of A1.

I analyze the empirical data and examine the hypothesis in terms of Probabilistic OT. In the remainder of this chapter, I describe three variations that are subjected to the following analysis.

2.2 Variations in Japanese Voice

In this section, I introduce the properties of each variation which I focus on throughout this research with reference to the previous studies. In addition, I define the envelope of variation, namely, I classify what is identified as each variant and what is not. Firstly, I introduce *sa*-Insertion, secondly *ra*-Deletion, and finally *re*-Insertion.

2.2.1 *sa*-Insertion

Sa-Insertion is a variation phenomenon in Japanese causatives. Japanese causatives are formed by attaching causative suffixes to verb stems. The standard causative, which is the traditional variant, comprises the verb stem and the causative suffix *(s)ase*;[6] in contrast, *sa*-Insertion, which is the innovative variant, comprises the verb stem and the causative suffixes *as* and *ase*. I present below some examples of *sa*-Insertion and standard causatives observed in the Diet database.

standard causative

(6) hikooki-o mata tsukur-<u>ase</u>-ru.

airplane-ACC again make-CAUS-NONP

'We let (the company) make airplanes again.' (Yoshio Namiki, Jun. 11 1952)

(7) iroirona enzetsu-o yar-<u>ase</u>-te-itadaita.

various speech-ACC do-CAUS-TE-AUX.POL.PAST

'I made various speeches.' (polite) (Keigo Ouchi, Jun. 7 1994)

(8) gakkoo-ni ik-<u>ase</u>-nai.

school-LOC go-CAUS-NEG.NONP

'We allow (students) not to go to school.' (Hiroko Mizushima, Feb. 27 2004)

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[6] The Japanese causative suffix shows morphophonemic alternation, according to the types of verb stem: consonant verb takes *ase*, as in *yar-ase*, while vowel verb takes *sase*, as in *tabe-sase* 'let someone eat'. I will mention the two types of Japanese verb (consonant verb/vowel verb) below.

sa-Insertion

(9) tyoosa hookokusyo-o yom-as-ase-te-itadakimasita.

investigation report-ACC read-CAUS-CAUS-TE-AUX.POL.PAST

'I read the investigation report.' (polite) (Seiichi Mizuno, Sep. 27 1995)

(10) sitsumon-o owar-as-ase-te-itadakimasu.

question-ACC finish-CAUS-CAUS-TE-AUX.POL.NONP

'Let me finish my question.' (Tatsuya Ito, Apr. 11 1997)

(11) kono koosyoo-o torihakob-as-ase-tai.

this negotiation-ACC advance-CAUS-CAUS-DES.NONP

'I want to let (someone) advance this negotiation.' (Sanzo Hosaka, Apr. 10 1998)

As exemplified above, each standard causative is formed by attaching *ase* to verb stems, while in *sa*-Insertion *as* and *ase* attach to verb stems, instead of *ase* alone. Thus, *sa*-Insertion results in an extraphonological sequence *sa* in causative phrases, as opposed to the standard causatives.[7]

Among the previous studies, Kikuchi (1997) claims that the grammaticalization process (Meillet 1912; Hopper and Traugott 1993, among others) turned the phrase *-as-ase-te-itadak-* into an independent word, and that *-as-ase-te-itadak-* lost its original meaning and has acquired a new meaning and function.

[7] *Sa*-Insertion was given its name based on a phonological aspect of Japanese. Japanese has an open-syllable sound pattern and in principle it does not allow codas. Thus, the sequence *yar-as-ase* is pronounced with CV structure as in *ya.ra.sa.se*. This results in the auditory perception of an extra *sa* rather than *as*. However, the morphosyntactic investigation revealed that *sa*-Insertion contains an extra causative suffix *as* (Okada 2003, Sano 2006), and the difference between standard causative and *sa*-Insertion cannot simply be attributed to the phonological aspect.

Chen (2002) analyzed the utterances of all the members of the Diet of Japan (by means of the same corpus as that used in the present research) from 1947 to 1957 and from 1996 to 2001 and concluded that *sa*-Insertion 1) is first observed in 1947 and 2) occurs in almost all the consonant verbs regardless of stem length.

Inoue (2003) points out that *sa*-Insertion is restricted to consonant verbs, and that it does not occur in vowel verbs. Japanese verbs are classified into two types, according to the stem-ending: one type is a consonant verb which ends in a consonant (e.g. *yar*-'do,' *hair*- 'enter'), and the other type is a vowel verb which ends in a vowel (e.g. *mi*- 'see', *tabe*- 'eat') (Bloch 1946).

Table 1. Distribution of causatives by verb type

verb type	stem	standard causative	*sa*-Insertion
consonant verb	*yar-*	*yar-ase-*	*yar-as-ase-*
	hair-	*hair-ase-*	*hair-as-ase-*
vowel verb	*tabe-*	*tabe-sase-*	**tabe-sas-ase-*
	mi-	*mi-sase-*	**mi-sas-ase-*

As Table 1 shows, the standard causative can occur with either consonant or vowel verbs, while *sa*-Insertion cannot occur with vowel verbs. Thus, **mi-sas-ase-* or **tabe-sas-ase-*, for instance, are impossible.

Based on this observation, Inoue claims further that the change of *sa*-Insertion would lead to the simplification of the conjugation of verbs in Japanese by analogical leveling (cf. Kiparsky 1978; Bybee 1985, among others).

Table 2. Distribution of causative suffix by paradigm

paradigm	verb type	causative suffix
traditional	vowel verb	*sase* (standard causative)
	consonant verb	*ase* (standard causative)
innovative	vowel verb	*sase* (standard causative)
	consonant verb	*sase* (*sa*-Insertion)

As illustrated in Table 2, the traditional paradigm, which consists of only the standard causative, shows a morphophonemic alternation of the causative suffix between two allomorphs *ase* and *sase* according to the verb types to which it attaches. On the other hand, in the innovative paradigm, which consists of *sa*-Insertion and the standard causative, the causative suffix in vowel verbs has changed from *ase* to *sase*. There is no such alternation in this paradigm, and the causative suffix uniformly takes the form *sase*, regardless of the type of the verb stem. Consequently, the difference in conjugation paradigm disappears.[8]

Okada (2003) points out that 1) the benefactive pattern (*-as-ase-te-itadak-* pattern) is especially frequent in *sa*-Insertion (comprising nearly half of the dataset); 2) *sa*-Insertion is a double causative;[9] 3) *sa*-Insertion serves to reinforce politeness (the intensifier of the level of politeness), and the newly inserted causative suffix carries this function.[10] 4) The reanalysis of particular transitive verbs that are phonologically similar to the causative forms caused the change of *sa*-Insertion.

[8] This analysis, however, is problematic because it is primarily based on the *Kana* spelling of Japanese. Although the name *sa*-Insertion is based on the *Kana* spelling, *Kana* is inappropriate for detailed analysis of *sa*-Insertion, and morphophonemic analysis needs to be done.

[9] As to the cross-linguistic difference, Korean allows the double causative and the meaning of the double causative is literal double causative in contrast to Japanese (Ishihara and Horie 2003; Ishihara et al. 2004).

[10] This seems to be associated with the fact that the causative suffix originally carried the intensifier function of the honorific/humble meaning in addition to the causative function in old Japanese (cf. Sato 1977: 317-319, and references cited therein).

Okada (2004) claims that 1) the intransitive and transitive distinction of verbs is irrelevant to the distribution of *sa*-Insertion; 2) the frequency of *sa*-Insertion in verbs ending in -*s* is low.

Based on Okada's claim that *sa*-Insertion is a double causative, Sano (2006) proves that *sa*-Insertion is the productively formed causative which consists of two causative suffixes. Traditionally, the double causative is not allowed in Japanese and the occurrence of two causative suffixes leads to unacceptability. Instead, one of the causative suffixes is suppressed in double causative construction and a single causative surfaces (Shibatani 1973; Martin 1975; Kuroda 1993). As a result, double causative and single causative surface as identical form: single causative. In *sa*-Insertion, however, two causative suffixes remain intact. Here exists the variation: If two suffixes remain intact, then double causative (*sa*-insertion) arises; on the other hand, if one of the causative suffixes is suppressed, then the single causative (the standard causative) arises.

Although *sa*-Insertion has, thus far, been analyzed based on natural linguistic data and some properties of *sa*-Insertion have been revealed, some crucial methodological problems exist: The previous studies are insufficient in terms of a principled account of the variation and the mechanism of the change, and also the possible dialectal differences have been mostly ignored (lack of dialectal control).

Based on this background, Sano (2005, 2008b, 2009b) conducted the quantitative analysis of *sa*-Insertion in Tokyo Japanese, specifically focusing on its chronological change and the effects of internal factors, such as the preceding context and the following context, via the Diet database. Using CSJ, Sano (2008a) demonstrated the significance of the effects of external factors and the interaction among internal factors and external factors in the change of *sa*-Insertion. Sano (2007) formalized the change of *sa*-Insertion from the prespective of Optimality Theory. Taking the analysis of Sano (2007) one step further, Sano (2009a) conducts the Probabilistic OT analysis of *sa*-Insertion and models its chronological change.

2.2.2 *ra*-deletion

Ra-Deletion is a variation phenomenon in Japanese potentials. Japanese potentials are formed by attaching potential suffixes to verb stems as causatives. The standard potential, which is the traditional variant, comprises the verb stem and the potential suffix *e* or *rare*;[11] in contrast, *ra*-Deletion, which is the innovative variant, comprises the verb stem and the reduced form of the potential suffix *re*. I present some examples of *ra*-Deletion and standard potentials observed in the Diet database.

standard potential

(12) sekitan-no haikyuu-o uke-rare-nai

coal-GEN ration-ACC receive-POT-NEG

'(I) cannot have a ration of coal.' (Yoshio Sakurauchi, Aug. 29 1947)

(13) sitsumon-o tuduke-rare-mase-n

interpellation-ACC continue-POT-POL-NEG

'(I) cannot continue the interpellation.' (Keiichi Ishii, Oct. 26 1995)

[11] The Japanese potential suffix also shows morphophonemic alternation, according to the types of verb stem: consonant verb takes *e*, as in *yar-e* 'can do', while vowel verb takes *rare*, as in *tabe-rare* 'can eat.'

(14) syoohisya-ga ansinsite gyuuniku-o tabe-rare

customer-NOM with ease beef-ACC eat-POT

'Customers can eat the beef with ease, and…' (Sota Iwamoto, Mar. 28 2002)

ra-Deletion

(15) nam-pun-de ko-re-masu-ka?

how many-minute-in come-POT-POL-Qpart

'In how many minutes, can (you) come?' (Akira Kuroyanagi, Mar. 28 1980)

(16) onaji mono-sika mi-re-nai

same thing-only see-POT-NEG

'(I) can see only the same thing.' (Syozo Azuma, May 29 2002)

(17) ne-re-ru yoona zyootai

sleep-POT-NONP like condition

'Condition where (I) can sleep.' (Akira Koike, Mar. 15 2007)

As exemplified above, each standard potential is formed by attaching *rare* to verb stems, while in *ra*-Deletion *re* attaches to verb stems, instead of *rare*. This is the crucial difference between the two variants. In addition, *ra*-Deletion is restricted to vowel verbs, in other words, consonant verbs never get *ra*-Deleted as in Table 3 and 4.

Table 3. Distribution of potential forms by verb types

verb type	stem	standard potential	*ra*-Deletion
consonant verb	*yar-*	*yar-e-*	— (*yar-e-*)
	hair-	*hair-e-*	— (*hair-e-*)
vowel verb	*tabe-*	*tabe-rare-*	*tabe-re-*
	mi-	*mi-rare-*	*mi-re-*

Table 4. Distribution of potential suffix by paradigm

paradigm	verb type	potential suffix	
traditional	vowel verb	*rare*	(standard potential)
	consonant verb	*e*	(standard potential)
innovative	vowel verb	*re*	(*ra*-Deletion)
	consonant verb	*e*	(standard potential)

There are a number of exhaustive researches on *ra*-Deletion from various linguistic perspectives (Nakamura 1953; Kanda 1964; Tsuchiya 1971; Okazaki 1980; Nakata 1982; Yamamoto 1984; Kato 1988; Shibuya 1990; Inoue 1998 and others). Among the previous studies, Matsuda (1993) conducted the sociolinguistic analysis based on his data ranging over 200 hours, focusing on 80 subjects from Tokyo of each generation, and based on his analysis concerning several significant factors contributing to the distribution of *ra*-Deletion. He claims that *ra*-Deletion: 1) is restricted to the short stem verbs, and does not occur in long stem verbs (restricted to verbs within 3 morae in length); 2) is more compatible with verbs that end in *i* than verbs that end in *e*; 3) is more compatible with the negative context than the affirmative context (following context of the potential suffix); 4) does not occur in compound verbs, auxiliary verbs, and causative verbs; 5) is more frequent in main clauses than in subordinate clauses (5 internal factors); 6) is preferred by younger speakers (age); 7) is preferred by female speakers (gender) (2 external factors).

Inoue and Yarimizu (2002) report that *ra*-Deletion is first observed in the early 20th century. Geographically, the change begins in Chubu area, Chugoku area, and Shikoku area and the change is advanced in these areas. Hokkaido area is remarkable in that the change has progressed rapidly, in spite of its remoteness to these areas (see Appendix II).

Kinsui (2003) claims that *ra*-Deletion is first observed around 1920 (end of Taishoo era) in Tokyo area, and he also challenges the issue of the verb-length by framing the following hypothesis: *ra*-deletions with short verbs are acquired as lexical items, since the phrases with short verbs are difficult for speakers to decompose into verb stems and suffixes, and such phrases are not subject to the grammatical process. On the other hand, *ra*-Deletion with Long verbs is subject to the morphological word formation. If a speaker has already passed the critical period of language acquisition and does not have the grammar which includes the morphology of *ra*-Deletion, the speaker cannot generate *ra*-Deletion with long verbs. That is, short verbs are acquired irrespective of speaker's grammar; long verbs, on the other hand, are restricted to a particular speaker, in other words, *ra*-Deletions with short verbs are easy to spread, while those with long verbs are not. This is reflected in the distribution of *ra*-Deletion by length of the verb stem. The change of *ra*-Deletion proceeds from the lexical phenomenon, which is random and selective, to the grammatical phenomenon, which is exhaustive and uniform, as observed in many languages.

Fukushima (2004) conducted the analysis from the functional point of view and points out the role of *ra*-Deletion in the paradigm. Traditionally, the morpheme *rare* for vowel verbs carries four meanings; passive, honorific, potential and spontaneous. If the meaning potential is carried by the innovative morpheme *re* with *ra*-Deletion, then the functional load of *rare* will decrease (it carries three meanings), and the difference between the potential and other three meanings will get clarified. This is schematized as follows.

Table 5. The meanings passive, honorific, potential and spontaneous and their forms

paradigm	meaning	Form	
traditional	passive, honorific, potential, spontaneous	*rare*	(standard potential)
innovative	potential	*re*	(*ra*-Deletion)
	passive, honorific, spontaneous	*rare*	(standard potential)

In addition, he points out the analogical leveling in *ra*-Deletion: The correspondence between consonant verbs and vowel verbs of conjugation pattern in potential form is restructured with reference to the conjugation pattern in other forms such as causative forms. This is schematized as follows.

Table 6. The correspondence between consonant verbs and vowel verbs

form	consonant verb	vowel verb
causative	*yar-ase-*	*tabe-sase-*
potential	*yar-e-*	*tabe-rare-*
	yar-e-	*tabe-re-* (*ra*-Deletion)

As shown in Table 6, in causative form the discrepancy between the suffixes of consonant verb and vowel verb is the existence of *s*. On the other hand, in potential form the discrepancy is the existence of *rar*. If *ra* of the potential suffix for vowel verbs is deleted, the correspondence between consonant verbs and vowel verbs in potential form will be similar to that of causative form. As a result, the conjugation pattern of vowel verbs in potential form has changed (*rare* → *re*) in terms of *ra*-Deletion.

Ito and Mester (2004) give a formal account of *ra*-Deletion in terms of Optimality Theory. More about this is discussed later in in Chapter 8.

Matsuda (2008) conducted the analysis of *ra*-Deletion and the verification of the claims of previous studies, specifically with respect to five significant claims (Matsuda 1993, and others), employing the Diet database. The results by and large support the claims of previous studies and importantly, his results reveal the crucial difficulty of the Diet database in analyzing a particular linguistic phenomenon. I give the details about this point in Section 3.1.1.

In these studies, however, the issue of the mechanism of the change has not been enough discussed from the theoretical point of view. As to the quantitative analysis, there are no studies that shed light on such issues as the chronological change of the distribution of *ra*-Deletion in terms of the large-scale corpora.

2.2.3 *re*-Insertion

The change of *ra*-Deletion is followed by the change of *re*-Insertion (Shioda 2000; Inoue and Yarimizu 2002 among others). *Re*-Insertion is a variation phenomenon in Japanese potentials preceded by the change of *ra*-Deletion. *Re*-Insertion, which is the innovative variant, comprises the verb stem and potential suffixes *e/re/rare and re*. On the other hand, the traditional counterpart (henceforth, TC) of *re*-Insertion comprises the verb stem and the potential suffix *e*, *re*, or *rare*. There is no categorial restriction on the occurrence of *re*-Insertion: any verbs (any potential forms) can get *re*-Inserted. Therefore, I define the TC of *re*-Insertion as either the potential form of consonant verbs such as *ik-e-ru* 'can go,' the potential form of vowel verbs such as *mi-rare-ru* 'can see' or *ra*-Deletion such as *mi-re-ru* 'can see.' Some examples of *re*-Insertion and its TC observed in CSJ are shown below.

traditional counterpart

(18) kaigairyokoo-mo ik-e-ru

international travel-also go-POT-NONP

'(We) can go also for the international travel.' (A07F0908)[12]

(19) kanzyoo-no seiki-no zyootai-o arawas-e-masu

affection-GEN occurrence-GEN state-ACC show-POT-POL

'(I) can show the state of the occurrence of affection.' (A02F0800)

(20) meikakuna kotae-ga das-e-nai

definitive answer-NOM give-POT-NEG

'(I) cannot give a definitive answer.' (S00M0061)

[12] The alphanumeric character annotated to the end of each example (S03M0570) is the 'speech ID' which is used as the index of each speech. In each speech ID, the leading characters 'A' indicates that a speech in question is classified into the academic presentation speech (APS), 'S' the simulated public speaking (SPS), 'R' readings, 'D' dialogs, and 'M' others, respectively. The alphabet in the middle, 'M' indicates that the speaker of a particular speech is male, and 'F' female, respectively. Thus, for example, 'A01M0001' represents the APS by male speaker, and 'S02F0002' represents the SPS by female speaker. I follow this convention also in the Appendix.

re-Insertion

(21) soko-de sum-e-re-tara

there-LOC live-POT-POT-COND

'If (I) can live there.' (S03M0570)

(22) subete jibun-de kime-re re-ru

everything oneself-by decide-POT-POT-NONP

'(I) can decide everything by myself.' (S08M1255)

(23) yuuzai-ni motteik-e-re-ru-yooni

guilt-LOC bring-POT-POT-NONP-in order to

'In order to be able to incriminate (suspect).' (S04M1512)

In the examples above, each TC of *re*-Insertion is formed by attaching *e* to verb stems, while in *re*-Insertion *e/re* and *re* attach to verb stems, instead of *e* alone. Thus, *re*-Insertion contains an extra *re* in causative phrases, as opposed to the TC.

Inoue and Yarimizu (2002) report that *re*-Insertion: 1) is first reported in the literature published in 1996; 2) is prevalent in Chubu area, Chugoku area, and Shikoku area as well as Hokkaido area where *ra*-Deletion has already spread (see Appendix II); 3) is the double potential; 4) is more frequent in 'state potentials' such as *Kyoo gakkoo-ni ik-e-re-ru* 'Today (I) can go to the school.' than in 'ability potentials' such as *Kare-wa eigo-o kak-e-re-ru* 'He has an ability to write English.'

Shioda (2000) points out that the spread of *ra*-Deletion actuated the change of *re*-Insertion: For consonant verbs, the potential suffix traditionally takes the form *e* as in *ik-e-ru* or *yom-e-ru*; however, the spread of *ra*-Deletion initiated the generalization of the suffix *re* of *ra*-Deletion for vowel verbs such as *mi-re-ru* or *tabe-re-ru* to every verb, including consonant verbs, by analogical leveling. This process yields *re*-Insertion such as *ik-e-re-ru* or *yom-e-re-ru*. Again, the analogical leveling plays a role in the emergence of *re*-Insertion.

Shin (2004) conducted the quantitative analysis by means of the Internet and questionnaires and claims that *re*-Insertion is more frequent in short stem verbs than in long stem verbs, and it is less frequent in verbs (potential forms) that end in *re* such as *tore-ru* 'come off' or *mi-re-ru* 'can see.'

However, these studies are insufficient with respect to the method and the analysis. The claim that *re*-Insertion contributes to the restructuring of the conjugation paradigm as *sa*-Insertion and *ra*-Deletion has not been fully discussed. In these studies, however, the issue of the mechanism of the change has not been enough discussed from the theoretical point of view. As to the quantitative analysis, there are no studies that shed light on such issues as the chronological change of the distribution of *ra*-Deletion in terms of the large-scale corpora.

In summary, each previous study is discrete with respect to the method of the analysis even within a particular phenomenon, and each work has its own problems. Moreover, there has been no integrated quantitative analysis with consistent methods across three variables, and also the formal account of the mechanism of language variation and change in terms of grammatical theory is overlooked. The incomplete development of large-scale corpora that enable the integrated analysis as well as the lack of unified approach of sociolinguistics and grammatical theory may have brought on this situation. Although each variation and change shows particular properties, common properties or driving force can also be observed in every variation such as the analogical leveling. This implies that these are not distinct changes, but rather an overall change in voice system, related to the restructuring of conjugation paradigm. The next chapter presents the data related issues.

Chapter 3. Data

In the present analysis, I employ two large-scale corpora complementarily: The Diet database and CSJ. In Section 3.1, I explain the properties of these two corpora. In Section 3.2, I discuss the advantages of the complementary use of two corpora. Section 3.3 describes the criteria for the data extraction for each variant. Section 3.4 describes the factors I focus on throughout the statistical analysis. Finally, Section 5 describes the collected data subject to the present analysis.

3.1 Corpora

3.1.1 The Diet database

The Diet database is the free on-line database in which the computerized equivalent of the minutes of the Diet[13] is recorded. In 2001, the bureaus of both houses of the Diet and the National Diet Library compiled and released this database. The Diet database is primarily characterized by its scale[14]: it includes all utterances of the members in all sessions and committees from the first Diet held in May, 1947 to the present, which amounts to a total of 3.5 billion characters. (It continues to be updated.) The Diet database has no equals even among any domestic and international corpora including the one for linguistic purposes with respect to its large-scale. The large scale of the Diet database enables analysis of the chronological change of the phenomena over 60 years.[15] Additionally each speaker, each member of the Diet, is from a particular region of Japan. This property allows the analysis examining the dialectal differences.

The Diet database includes the components of a search system. In the Diet

[13] The Diet is the Japanese congress. The Diet of Japan is comprised of the plenary sessions and the committees. The committees are further divided into permanent committees of each Ministry and select committees. Each member of the Diet belongs to either the House of Councilors or the House of Representatives (Oyama, 2003).

[14] As of March 2008, the size of the utterances included in the Diet database amounts to about two gigabytes in electronic text format.

[15] Matsuda (2004) describes the potential of the Diet database for Linguistics use.

database, therefore, we can directly search target strings by selecting the Diet number or the date of session/committee in the pull-down menu (this is obligatory) and adding search strings without employing the specific computer programs such as editors.[16] The target can be specified by adding further information such as the name of a speaker or the session/committee. The target strings are displayed with detailed information per session/committee and we can directly download the information into our computer (About the details and the usage of the database, see Matsuda 2004a).

However, it is originally designed for political purposes and not for linguistic purposes. Therefore, the audio data, various kinds of tags such as the one that indicates the part of speech, and the attributes of the speaker are not annotated. Thus, the phonetic (acoustic) analysis is impossible, and the data extraction from the Diet database involves an immense amount of time and effort, compared to other annotated corpora.[17] Finally, I mention the weakness of the database for linguistic analysis that result from the properties of the Diet. Firstly, the style in the Diet tends to be formal and the utterances in informal settings such as the daily conversation are unlikely.[18] Secondly, the majority of the members of the Diet are males, and the number of female members is small. Thus, the Diet database is not appropriate for the analysis examining the roles of style or gender. Most importantly, the Diet database applies the "correction policy" to the transcription, namely the disfluent phenomena such as slip of the tongue and the inappropriate expressions such as jeers are deleted in transcribing the original text. Unfortunately, some examples of non-standard forms such as innovative forms

[16] It is possible to download the utterances and process by means of the editor.

[17] We can identify the attributes of the speaker with reference to the biographic encyclopedia of the members (e.g. Nichigai Associates 2003). We can also facilitate the data mining by means of the computer programs which identify the part of speech of words or morphemes through morphological analysis. After that we apply the Global Regular Expression Print (GREP) employing the computer languages such as Java or Perl.

[18] To the best of my knowledge, there has been no research that show the significance of stylistic effect in the Diet.

are also subject to the correction policy (Matsuda et al. 2008). Therefore, the analysis of a particular phenomenon is impossible.

3.1.2 CSJ

CSJ is a large scale spontaneous speech corpus of common Japanese with rich annotation (Maekawa 2004). It was compiled under the project "Spontaneous Speech: Corpus and Processing Technology (1999–2003)" by The National Institute for Japanese Language, The National Institute of Communications and Technology and Tokyo Institute of Technology, and it was released in 2004.

CSJ consists of 662 hours of speech including 7.5 million words, collected from 3,302 speeches of 1,417 speakers. Most of the speeches consist of spontaneous monologues. These monologues are classified into two types; "Academic Presentation Speech (APS)" and "Simulated Public Speaking (SPS)." APS are live recording of academic presentations in various academic societies. SPS, on the other hand, are general speech or comment by a layperson on everyday topics like "Joyful memory of my life," "The town I live in," "Commentary on recent news" and so on. Most speeches in APS and SPS are 10–15 minutes long. In general, APS can be characterized by stiff, formal speaking style, whereas SPS by casual and informal style. Each speech in APS and SPS actually has a different style or degree of spontaneity on account of each speaker's attitude.

One of the features of CSJ is its rich annotation. Every speech is transcribed in two formats: orthographic transcription and phonetic transcription. The former is a transcription written down by ordinary writing style of Japanese text including the disfluency phenomena such as fillers or word fragments, and the latter is a transcription written down by Japanese syllables faithfully. Part-of-speech information is annotated to the orthographic transcription. Various phonetic events like lengthening vowels or non-verbal events like laughing are transcribed in the phonetic transcription. We can retrieve a particular word accurately from orthographic transcription, and examine how the word is actually pronounced by phonetic transcription. CSJ is also accompanied by the audio data. A part of CSJ, called the Core[19], which consists of almost 500,000 words, contains much more detailed annotation; manually annotated part of speech information, clause boundary labels, discourse boundary labels and so on. The boundaries of a "clause unit," which is a syntactic unit originally designed for CSJ, are also annotated. Another important information given to the corpus is called "impressionistic rating data" which is based on the psychological study. One of the recording staff members subjectively evaluated the concerned speech during the recording. Spontaneity, speed, articulatory clarity, style and so on are graded according to five ranks, and the results were recorded to each speech (Maekawa 2004, Maruyama and Sano 2006). We can use such impressionistic rating data as criteria to estimate the characteristics of each speech. Thus, the fine-grained annotation of the CSJ enables the analysis concerning the external factors.

3.2 The advantages of the complementary use of two corpora

Here I mention the advantages of employing two corpora complementarily. As described above, both corpora have a number of strengths along with the limitations. The large-scale of the Diet database enables the long-term analysis of a certain phenomenon. In addition, we can relatively easily observe even the infrequent linguistic phenomena in the Diet database, which we seldom encounter in spontaneous

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[19] In the morphological information in Core, the results of the machine-aided morphological analysis are revised manually, and this procedure yields the precision of 99.9 percent. On the other hand, the precision is 97~98 percent in Non-Core, since the manual revision is seldom applied.

speech. This property is significant especially for the analysis of the phenomena which are in the beginning of the language change; if we cannot collect enough data, it is impossible not only to ensure the accuracy, but also to conduct the analysis. The real-time study is also possible in the Diet database without an immense amount of time and effort by focusing on some members with long run of tenure (e.g. 30 year tenure). On the other hand, the style of the Diet is formal in general, in other words the Diet database does not include the utterances in informal settings to be compared to the one in formal settings. Moreover, the male members are predominant in the Diet, while the number of female members is small. This means the lack of the utterances by female speakers. Thus, the organization of the Diet precludes the analysis of style or gender: It is impossible to ensure enough data to derive the stylistic and gender differences. The correction policy sometimes becomes a serious obstacle in conducting the analysis.

The fine-grained annotation of CSJ facilitates and enriches the analysis: The detailed transcription and various labels such as the part of speech information coupled with the GREP by means of the computer languages reduce the cost on data mining. The phonetic (acoustic) analysis is also relatively easy. The distinction between APS and SPS, the information such as impressionistic rating data enable the exhaustive analysis of external factors such as style and gender. CSJ is designed considering the balance of the distribution of male and female, although males are predominant in APS. In addition, the analysis about dialectal differences and SEC (socio-economic class) is also possible with reference to the detailed information about the speaker attributes. Unlike the Diet database, CSJ includes no correction policy. On the other hand, the size of the corpus is relatively small for the present exhaustive research even if it is counted as a large-scale corpus. CSJ does not include the long-term follow-up recording of each speaker. Therefore, CSJ is not appropriate for the long-term analysis and the real-time analysis of the phenomena. I summarize the features of Diet database and CSJ below.

Table 7. Features of Diet database and CSJ

feature	Diet database	CSJ
scale	large	small
real-time study	+	−
style	formal	balanced
gender	male	balanced (SPS)
correction policy	+	−
audio data	−	+
dialectal difference	controllable	controllable
data mining	search system	GREP using transcriptions and labels
annotation	−	rich
external factors	−	+
speaker attributes	−	+

This shows that the analysis employing only one of the corpora is insufficient for the exhaustive research. This in turn means that the problem can be solved by integrating the strengths and compensating for the limitations of each corpus ("division of roles" of each corpus). For example, I conduct the long-term analysis by means of the Diet database and examine the stylistic and gender differences by means of CSJ. Thus, by employing two large-scale corpora complementarily I can cover a broad range of research areas and items that govern language variation and change.

I mention the possibility of the Diet database for linguistic research. The Diet database provides a huge amount of synchronic as well as diachronic data which is impossible to obtain through the individual work. This is the greatest benefit of applying the Diet database to the usage-based analysis. In the present analysis, for example, the causative constructions, which include *sa*-Insertion, are infrequent in spontaneous speech, and *sa*-Insertion tends to be used in formal settings, as mentioned above. It is difficult to collect enough tokens of *sa*-Insertions exclusively by means of the individual fieldwork and interviews after arranging the formal settings. If the phenomenon in question is in the beginning of the language change where every (innovative) phenomenon is infrequent, the collection is much more difficult. Therefore, the Diet database is uncommon as well as useful, in the sense that it includes a huge number of formal spontaneous speeches in the Japanese Diet. In addition, given that the Diet database includes all the utterances of the members over 60 years, it is fair to say that the application of the Diet database is prerequisite, in order to control the dialectal differences, and to reveal the mechanism of language variation and change in detail.

Finally, I mention the possibility of CSJ for linguistic research. As mentioned above, CSJ includes various kinds of information for linguistic research such as the speaker attributes, the style, and so forth. Before the amplification of large-scale corpora in recent years, we have traditionally acquired this kind of information through the interviews or fieldwork using a huge amount of time and effort. The rich annotation of CSJ not only reduces this kind of burden on the survey considerably, but also it provides the new way to do the detailed linguistic research by examining the roles of external factors as in the present analysis, which has long been quite difficult. Thus, it is certain that CSJ opens up new opportunities for linguistic research.

By keeping all these strengths and limitations in mind, we can conduct the more advanced linguistic research.

3.3 The criteria for the data extraction

This section introduces the criteria in extracting the data. For the preciseness of the research as well as for the follow-up studies, setting the criteria: e.g. to define the expression which is regarded as *sa*-Insertion/standard causative (envelope of variation), to define the ranges of the focus of the analysis and extracting the data following them is necessary. Firstly, I present the criteria for *sa*-Insertion, secondly for *ra*-Deletion, and finally for *re*-Insertion.

3.3.1 *sa*-Insertion

I arrange seven criteria for the data extraction of *sa*-Insertion as follows:

1. Limiting the target to consonant verbs (Excluding vowel verbs)
2. Excluding nouns (the phrase idiomatically used as one unit)
3. Excluding the sequence noun + main verb *sase* (limiting the target to the sequence verb + causative suffix)
4. Excluding phrases which contain the potential suffix
5. Limiting the target to productive causatives (excluding lexical causatives).
6. Excluding transitive verbs (limiting the target to causatives)
7. Distinguishing *sa*-Insertion and standard causatives precisely

In the following, I will describe each criterion one by one in detail.

1. Limiting the target to consonant verbs (Excluding vowel verbs)

As mentioned above, *sa*-Insertion is formed by attaching causative suffixes *as*-*ase* to consonant verbs. Therefore, vowel verbs, including those with the upper/lower unigrade conjugation pattern[20] along with *ka* irregular verbs, other than consonant verbs, cannot get *sa*-Inserted. Thus, vowel verbs do not satisfy the requirement to be included in the data of *sa*-Insertion. The phrases that include vowel verbs are excluded; only the phrases that contain consonant verbs are included.

2. Excluding nouns (the phrase idiomatically used as one unit)

Among phrases that contain a causative suffix, there are idiomatic expressions functioning as one unit such as *omatase* 'to make someone wait (honorific),' *okikase* 'to let[21] someone hear (honorific),' *iyagarase* 'offence,' *mekubase* 'wink,' *yarase* 'made-up.' Although these words contain a verb stem and a causative suffix, they function as one unit; these words are grammatically categorized as nouns (so-called verbal nouns). Therefore, they do not undergo any morphological word formation. I limit the target only to the elements that may undergo productive causative formation. Therefore, nouns are excluded. I distinguish these nouns from the target elements by adding *su-ru* or *o-su-ru* to the end of them. If these are nouns, the resulted combinations can become a verb or verb phrase, while the target element cannot, for example, *omatase-su-ru* or *omatase-o-su-ru* are correct, but **kaw-ase-su-ru* or **kaw-ase-o-su-ru* are not. Thus, I include in the data only the elements that become

[20] The verbs with upper/lower bigrade conjugation pattern and *sa* irregular verbs are restricted to the old Japanese.
[21] In this chapter, I will use *let* as meaning simply 'cause' and I will make no distinction between *let* and *make*; namely, coerciveness is irrelevant here.

ungrammatical in this test.

3. Excluding the sequence noun + main verb *sase* (limiting the target to the sequence verb + causative suffix)

Some phrases contain the sequence noun + main verb *sase* 'let someone do something,' such as *haiken-sase* 'let someone see (honorific),' *oukagai-sase*, 'let someone visit (honorific), *rakutan-sase* 'discourage,' *happyoo-sase* 'let someone announce,' *youi-sase* 'let someone prepare.' Although in these phrases the main verb *sase* is phonologically equivalent to the causative suffix *sase*, it is grammatically different from the causative suffix which I focus on in the present analysis: it is the lexical causative counterpart of the verb *sur-u*, 'do'; it is an independent verb (it does not need the host to attach, unlike suffixes, e.g. *watasi-ga kare-ni sore-o sase-ru*, 'I let him do it') and can function as the verbal noun conbined with the preceding nouns as the examples above. Therefore, the sequence noun + main verb *sase* is excluded from the data.

4. Excluding phrases which contain the potential suffix

Some phrases that include the potential suffix such as *haras-e-ru* 'can clear,' *arawas-e-ru* 'can express'are phonologically similar to the phrases that include the causative suffix such as *yar-ase-ru* 'let someone do something,' *hair-ase-ru* 'let someone enter' and can be misinterpreted. The incorrect analysis causes the misinterpretation: in the above examples, the morphological boundary between the verb stem and the suffix is incorrectly analyzed, and part of the verb stem is incorporated into the suffix, such as *har-ase-ru* 'let someone clear' or *araw-ase-ru* 'let someone express.' However, in cases of misinterpretation, the verb stem *har* and *araw* do not exist at least in the present-day Japanese (they do exist but as different verbs having the same phonological matrix.). The reanalysis of the potential suffix as the causative suffix is impossible. Thus, the potential suffix is correctly distinguished from the causative suffix, and the former is excluded from the data. However, the exceptional cases exist; verbs such as *tob* 'fly' can be either causativized as in *tob-ase-ru* or potentialized as in *tobas-e-ru* because both the intransitive counterpart *tob* and the transitive counterpart *tobas* are possible. In this case, I distinguish the potential suffix from the causative suffix with reference to the context.

5. Limiting the target to productive causatives (excluding lexical causatives)

The causative in Japanese is classified into two types: productive causative and lexical causative (transitive verb). The productive causatives are such phrases as *kak-ase* 'let someone write,' and are productively formed causatives. The lexical causatives are such words as *kakas* 'let someone write.'[22] The latter is considered to be one unit and it does not undergo any morphological causative formation (Shibatani 1973; Kuroda 1993; Miyagawa 1999, among others). I focus only on the productively formed causatives, since *sa*-Insertion is the productive causative which consists of two causative suffixes (Sano 2006). Therefore, lexical causatives are out of the target regardless of whether they are allomorphs of *ase* or whether the verb functions as a transitive counterpart of a particular verb. This criterion applies only to the last causative suffix of the phrase. *Sa*-Insertion can contain the lexical causative such as *kak-as-ase*. However, the lexical causative is contained in the middle of the phrase, and it is exempt from the criterion. In addition, this criterion applies only to the standard

[22] Strictly speaking, it is not necessarily the case that the productive causatives are *ase* and the lexical causatives are *as*. For example, *as* may functions as the allomorph of *ase*. The issue of the productive causative and the lexical causative is controversial. The interested reader may refer to Shibatani (1973), Kuroda (1993) and Miyagawa (1999) among others.

causative but not to *sa*-Insertion, since the last suffix of the phrase in *sa*-Insertion is always the productive causative and only the last suffix of the standard causative can be the lexical causative.

6. Excluding transitive verbs (limiting the target to causatives)

Some transitive verbs have the same morphological shape as causatives. For example, *aw-ase-ru* 'let someone meet or put something together,' *sir-ase-ru* 'inform,' *kik-ase-ru* 'let someone hear or let something work,' *iw-ase-ru* 'let someone say,' *tor-ase-ru* 'let someone take' have the same morphological shape as causatives and function as if they were causatives, namely it demands from the causee some sort of behavior. The issue of the distinction of transitive verbs and causatives is out of the focus of the present research. Therefore, I conducted the distinction with reference to the Japanese dictionary *Koojien* 5th edition (1998). If the elements in question appear as a dictionary entry, I regard them as transitive verbs and exclude from the data. If they did not, I regard them as causatives and included them in the data. The reason for adopting this method is as follows: generally the dictionary entry consists of words and not morphologically formed phrases; therefore, the phrases that are identified as the transitive verbs can appear in the dictionary as entries; however, morphologically formed causatives cannot. Thus, the transitive verbs that appear as dictionary entries are excluded from the target. Incidentally, whether the phrases are transitive verbs or not cannot be inferred by the types of the verb: for example, *aw-* 'meet' has *aw-ase-ru* as its transitive counterpart, but whether its *sa*-Inserted counterpart *aw-as-ase-ru*, if any, is a transitive verb or not cannot be determined by the existence of a transitive counterpart.

7. Distinguishing *sa*-Insertion and standard causatives precisely

Some phrases can be analyzed as both *sa*-Insertion and standard causatives such as *tadasase* 'let someone correct' and *tobasase* 'let someone fly.' These phrases can be analyzed as both *tad-as-ase* (*sa*-Insertion) and *tadas-ase* (standard causative), *tob-as-ase* (*sa*-Insertion) and *tobas-ase* (standard causative)[23]. I set up the following criteria for the distinction.

I The phrase does not have an intransitive counterpart. (That is, it cannot be divided any more into morphemes like *tad-as*.)

II The phrase takes an obvious object.

If the phrase in question satisfies these criteria, the included verb is transitive and the phrase consists of a transitive verb and a causative suffix *(s)ase-*. Thus, it is regarded as a standard causative like *tadas-ase* or *tobas-ase*. If the phrase does not satisfy any one of the above criteria, I regard it as *sa*-Insertion. For example, I analyze *watashi-ga kitinto eri-o* <u>*tadasase*</u>*-ru* 'I let someone shape up properly' (Kosuke Hori, 1934, Representatives, 2/22/2000, administration committee) [24] as follows.

I	It does not have an intransitive counterpart.	**tad-u*
II	It takes an obvious object.	*eri* 'collar'

Firstly, the intransitive counterpart does not exist and the verb cannot be divided into finer morphemes, because it is the smallest morpheme. Secondly, it takes an object.

[23] As to the Japanese morphophonemics, see Kuroda (1965a), chapter 7 and McCawley (1968) among others.

[24] In the following, the detailed data of the utterances are stated as follows. (speaker's name, birth year, house, date of utterance, name of Diet section).

Thus, the phrase is analyzed as transitive verb + causative suffix *ase*. Therefore, I identify the status of the transitive verb *tadas*, and the phrase is regarded as the standard causative.

Although most of the verbs of this kind satisfy the above criteria or do not satisfy the criteria categorically, and are classified into *sa*-Insertion or transitive verbs, exceptionally, *tobasase* sometimes satisfies the above criteria and sometimes does not. The former is identified as the standard causative, and the latter is *sa*-Insertion. I describe the latter case. Take *saigo-ni* <u>*tobasase*</u>*-te itadakitai-* (I will skip to the end. (honorific)) (Syozo Azuma, 1951, Representatives, 4/21/1993, foreign affairs committee) as an example. This is analyzed as follows.

I	It has an intransitive counterpart.	*tob-u*
II	It does not take an obvious object.	–

Therefore, I identify the status of the intransitive verb *tob-u*, since it does not take an obvious object. The lack of an obvious object does not satisfy the status of transitive verb. If it takes an obvious object, I identify it as the transitive verb regardless of the existence of the intransitive counterpart. Thus, the phrase is analyzed as intransitive verb + causative suffixes *as* and *ase*, and the phrase is identified as *sa*-Insertion.

3.3.2 *ra*-Deletion

In this section, I describe the criteria for extracting *ra*-Deletion. Before turning to the detailed description of the criteria, I introduce the target of the analysis of *ra*-Deletion.

As mentioned above, the Diet database applies the correction policy to the transcription. Unfortunately, *ra*-Deletion has also long been subject to the correction policy and most of the examples of *ra*-Deletion have been corrected to their traditional equivalent (the standard potential). It was not until around 2000 that *ra*-Deletion is accepted as one of the linguistic expressions in Japanese in the Diet database and becomes exempt from the correction policy (Matsuda et al. 2008). Therefore, the rigorous and precise analysis of *ra*-Deletion is impossible at least with respect to the chronological change of the distribution of *ra*-Deletion, due to this fact. This in turn shows that it becomes all but meaningless to invest a great deal of time and effort to collecting the data from the questionable source. Instead, it is far more adequate to conduct the follow-up study and the verification of the analysis of the previous studies with adding some new criteria, data, and items of analysis. Therefore, I do not begin the present analysis anew and do not deal with every occurrence of *ra*-Deletion in the analysis with the Diet database, but focus on the occurrences of *ra*-Deletion with specific verbs (This restriction also applies to the extraction of the standard potential), according to the list of verbs in Matsuda (2008).[25] The verbs listed in Matsuda (2008: 114) are shown below.

[25] Kenjiro Matsuda provided me with the raw data of the analysis in Matsuda (2008).

Table 8. The list of verbs in Matsuda (2008)

azuke-ru	'deposit'	*kotae-ru*	'answer'	*osie-ru*	'teach'
atae-ru	'give'	*ku-ru*	'come'	*sake-ru*	'avoid'
de-ru	'come out'	*mi-ru*	'see'	*sinji-ru*	'believe'
hajime-ru	'begin'	*nage-ru*	'throw'	*sute-ru*	'throw away'
iki-ru	'live'	*ne-ru*	'sleep'	*tabe-ru*	'eat'
kake-ru	'put on,' 'impose'	*nige-ru*	'flee'	*tae-ru*	'endure'
kari-ru	'borrow'	*nose-ru*	'list'	*tsuduke-ru*	'continue'
ki-ru	'wear'	*oboe-ru*	'memorize'	*uke-ru*	'receive'
kime-ru	'decide'	*oki-ru*	'arise'	*ume-ru*	'fill'
koe-ru	'cross over'	*ori-ru*	'get off'	*yame-ru*	'quit'

I also focus on these 30 verbs in the analysis of *ra*-Deletion with the Diet database, adding some verbs and phrases that potentially become *ra*-Deleted: two verbs; *ire-ru* 'insert,' *hanare-ru* 'get away' and three phrases[26]; noun + main verb *sase* (verbal noun) + potential suffix, as in *benkyoo-<u>sase-rare</u>* 'be caused to study,' transitive verb + potential suffix, as in *aw<u>ase-rare</u>* 'be caused to meet' and verb + causative suffix + potential suffix, as in *uke-<u>sase-rare</u>* 'be caused to receive.' The potential suffix can attach to the causative suffix, the transitive verb or the main verb *sase* and forms the strings *ase-rare*. These examples are frequent in spontaneous speech, therefore, they should be included in the analysis. Thus, I focus on 32 verbs and three phrases in the analysis of *ra*-Deletion with the Diet database.

The analysis of *ra*-Deletion is primarily dedicated to the verification of the

[26] Although I searched for the examples of some other verbs, I observed no tokens of those verbs.

result of the previous studies, since *ra*-Deletion has been explored from sociolinguistic, functional and OT perspectives, and the research on *ra*-Deletion is well advanced, compared to the other two variations. In addition to the verification, I further advance the analysis of *ra*-Deletion, specifically with respect to the underresearched aspects, by adding the new research items and elaborating the entire analysis, based on the results of the previous studies.

On the other hand, in CSJ I do not set any restriction on the sampling and I focus on every occurrence of *ra*-Deletion, since CSJ does not cause any problems related to the transcription policy unlike the Diet database and also no exhaustive analysis of *ra*-Deletion employing CSJ does exists yet.

I arrange four criteria for the data extraction of *ra*-Deletion as follows:

1. Limiting the target to vowel verbs (Excluding consonant verbs)
2. Excluding the inflectional form ‘conditional’ of verbs
3. Excluding the verbs ending in *re*
4. Limiting the target to potential meaning (Excluding passive, honorific and spontaneous)

I will describe each criterion one by one.

1. Limiting the target to vowel verbs (Excluding consonant verbs)

In contrast to *sa*-Insertion, *ra*-Deletion occurs only in vowel verbs, in other words, consonant verbs cannot get *ra*-Deleted. Thus, consonant verbs do not satisfy the requirement to be included in the data of *ra*-Deletion. The phrases that include consonant verbs such as *hasir-e-ru* ‘can run’ *kak-e-ru* ‘can write’ or *tob-e-ru* ‘can fly’ are excluded; only the phrases that contain vowel verbs are included in the data.

2. Excluding the inflectional form ‘conditional’ of verbs

Vowel verbs can take an inflectional form exactly the same as *ra*-Deletion phonologically: for example, *mi-re* ‘see,’ *tabe-re* ‘eat,’ *kangae-re* ‘think.’ In order to distinguish the conditional forms from *ra*-Deletion, I refer to the following properties of conditional forms: These conditional forms of vowel verbs generally occur with *ba* ending (conjunctive particle) and constitute the conditionals, as in *mi-reba*, *tabe-reba*, *kangae-reba*. If the phrase in question ends in the sequence *reba*, these are identified as conditional forms of verbs, and not as *ra*-Deletion. Thus, by paying attention to the ending of verb phrases, I exclude the conditional forms correctly.

3. Excluding the verbs ending in *re*

Some vowel verbs ending in *re* such as *kire-ru* ‘go off’, *tore-ru* ‘come off’ and *yabure-ru* ‘tear’ are phonologically similar to *ra*-Deletion such as *mi-re-ru* ‘can see,’ *tabe-re-ru* ‘can eat’ and *ko-re-ru* ‘can come,’ and can be misinterpreted as examples of *ra*-Deletion. This type of verb is frequent in unaccusative verbs. The incorrect analysis of the morphological boundary again causes the misinterpretation: these verbs are reanalyzed as *ki-re-ru*, *to-re-ru* and *yabu-re-ru*; the part of verb stem is reanalyzed as the potential suffix. However, there are no verbs in the present-day Japanese such as *ki*, *u* or *yabu* (they do exist but as different verbs having the same phonological matrix.). The reanalysis of the verb stem as the potential suffix is impossible. Thus, the potential suffix is correctly distinguished from the causative suffix, and the former is excluded from the data.

4. Limiting the target to potential meaning (Excluding passive, honorific and spontaneous)

As mentioned above, the suffix *e* or *rare* (allomorphs) carries four meanings: passive, honorific, potential, and spontaneous. The meaning of *ra*-Deletion, however, is restricted to potential, in other words, *ra*-Deletion is the innovative counterpart of potential and not of the passive, honorific or spontaneous, even if the form of the morpheme is exactly the same. I focus exclusively on the suffix with potential meaning in extracting the data. However, the distinction of the meanings of *e* or *rare* is difficult: there is no systematic criterion, according to which we can identify the meanings of each instance in a clear-cut manner, even in the Japanese traditional grammar. Actually, there is no research on this kind of issue. Therefore, I identify the meaning of each instance with reference to the context and exclude the meanings other than potential. This criterion only applies to the extraction of standard potentials, since the meaning of *ra*-Deletion is exclusively potential.

3.3.3 *re*-Insertion

Finally, I present the criteria for extracting *re*-Insertion. I introduce the target of the analysis of *re*-Insertion.

The TC of *re*-Insertion includes the potential form of consonant verbs, the potential form of vowel verbs (standard potential) and *ra*-Deletion. In CSJ, the total token of these three variants amounts to over 20,000 as opposed to 20 tokens of *re*-Insertion as shown in Section 3.5.2, and this yields the rate of *re*-Insertion less than 0.01 percent. Then, the detailed alteration of the distribution of *re*-Insertion and its TC according to the factors will be obscured and the rigorous and precise analysis is impossible. Therefore, I do not focus on every verb and I limit the target to the verbs which occurs in *re*-Insertion, in other words, if a verb is not observed in *re*-Insertion, I do not include the TC with that verb in the data. It follows that each *re*-Insertion necessarily has its TC and the type frequency of verbs in *re*-Insertion is consistent with that of TC.

I describe five criteria for the extraction of *re*-Insertion below:

1. Excluding the sequence ‘consonant verbs + conditional form of the potential suffix’
2. Limiting the target to the double potential
3. Excluding *ra*-Deletion with the verb stem ending in *e*
4. Excluding *ra*-Deletion with the conjunctive particle *reba*
5. Excluding phrases which contain the causative suffix

As mentioned above, the TC of *re*-Insertion includes the standard potential and *ra*-Deletion. Therefore, the four criteria for *ra*-Deletion also apply to the extraction of the standard potential and *ra*-Deletion as the traditional variants of *re*-Insertion.

1. Excluding the sequence ‘consonant verbs + conditional form of the potential suffix’

Some consonant verbs with conditional form of the potential suffix such as *ik-e-reba* ‘if someone can go’ are phonologically similar to *re*-Insertion such as *ik-e-re-ru*, and the former can be misinterpreted as the latter. Here again the incorrect analysis of the morphological boundary causes the misinterpretation. The part of the conditional particle *re* is reanalyzed as the potential suffix and the double potential results as in *ik-e-re-ba*. As the criterion #2 for *ra*-Deletion, in order to distinguish the conditional forms from *re*-Insertion, I refer to the following properties of conditional forms: These conditional forms generally occur with *ba* ending as in *mi-reba*, *tabe-reba*, *kangae-reba*. If the phrase in question ends in the sequence *reba*, these are identified as conditional forms, and not as *re*-Insertion. Thus, by paying attention to the ending of verb phrases, I can exclude the sequence ‘consonant verbs + conditional form of the potential suffix’ correctly.

2. Limiting the target to the double potential

Some transitive verbs or *ra*-Deletion is phonologically similar to *re*-Insertion. However, *re*-Insertion is defined as the double potential, and the single potential or other forms are excluded from the data. Here I propose a rule for the distinction: 1) deleting the second potential suffix *re*, if the (single) potential form results, the phrase in question is the double potential, on the other hand, if the other forms result (e.g. transitive verbs), the phrase is not the double potential; 2) adding *ra* in front of the potential suffix *re*, if the resulting phrase is odd, the phrase in question is the double potential, while if the phrase is grammatical, it is *ra*-Deletion. Taking *yom-e-re-ru* ‘can read,’ and *age-re-ru* ‘can lift’ as an example, these are illustrated as follows.

(24)	**original form**	**deletion of *re***	**resulting form**	
double potential	*yom-e-re-ru*	→	*yom-e-ru*	(single potential)
ra-Deletion	*age-re-ru*	→	*age-ru*	(transitive verb)

(25)	**original form**	**addition of *ra***	**resulting form**
double potential	*yom-e-re-ru*	→	**yom-e-rare-ru*
ra-Deletion	*age-re-ru*	→	OK*age-rare-ru*(standard potential)

In (24), the deletion of *re* yields the single potential (*yom-e-ru*) and the transitive verb (*age-ru*), and the former is identified as *re*-Insertion according to the rule. In (25), the addition of *ra* yields the ungrammatical phrase and the standard potential, and the former is identified as *re*-Insertion. The phrase is identified as *re*-Insertion by the satisfaction of these two requirements.

3. Excluding *ra*-Deletion with the verb stem ending in *e*

Some *ra*-Deletion includes the verb stem ending in *e* such as *age-re-ru* 'can lift,' *uke-re-ru* 'can receive,' *mise-re-ru* 'can show.' *Ra*-Deletion with these verbs is phonologically similar to *re*-Insertion such as *ik-e-re-ru* 'can go,' *kak-e-re-ru* 'can write,' *yom-e-re-ru* 'can read,' and may be misinterpreted as *re*-Insertion. In such a case, the part of the verb stem is reanalyzed as the potential suffix and the following phrases result: *ag-e-re-ru, uk-e-re-ru*, *mis-e-re-ru*. The sequence *e-re* is exactly the same as the double potential. In this case, however, some of the verb stem does not exist in the present-day Japanese such as **ag* and **mis*, and the meanings of some pair of verbs become different: The meaning of *uke* is 'receive,' while that of *uk* is 'float.' The misinterpretation causes the problem. Thus, *ra*-Deletion with the verb stem ending in *e* is correctly distinguished from the *re*-Insertion, and the former is excluded from the data.

4. Excluding *ra*-Deletion with the conjunctive particle *reba*

Some *ra*-Deletion with the conjunctive particle *reba* such as *kae-re-reba* 'If someone can change something,' *kanji-re-reba* 'If someone can feel,' *toji-re-reba* 'If someone can close' is phonologically similar to *re*-Insertion, and may be misinterpreted as *re*-Insertion. In such a case, the part of *reba* is reanalyzed as the potential suffix and the following phrases result: *kae-re-re-ba, kanji-re-re-ba*, *toji-re-re-ba*. The sequence *re-re* is exactly the same as the double potential. However, the conjunctive particle cannot be separated and the reanalysis is impossible. Thus, *ra*-Deletion with the conjunctive particle *reba* is correctly distinguished from the *re*-Insertion, and the former is excluded from the data.

5. Excluding phrases which contain the causative suffix

This criterion is the mirror image of the criterion #4 for *sa*-Insertion. Some phrases that include the causative suffix such as *har-ase-ru* 'let someone paste' or *araw-ase-ru* 'let someone wash' can be misinterpreted as *haras-e-ru* 'can clear' or *arawas-e-ru* 'can express.' The incorrect analysis again causes the misinterpretation: in the above examples, the morphological boundary between the verb stem and the suffix is incorrectly analyzed, and part of the causative suffix is incorporated into the verb stem. However, in the cases of misinterpretation, the meanings of each pair of verbs are different: The meaning of *har* is 'paste,' while that of *haras* is 'clear,' similarly the meaning of *araw* is 'wash' while that of *arawas* is 'express.' If we misinterpret the morphological boundary, the meanings of each verb become different. Thus, the phrases with the causative suffix are correctly distinguished from that with the potential suffix with reference to the meanings of each verb, and the former is excluded from the data. In addition, I refer to the context in the exceptional case (e.g. *tob*).

This section presented the criteria for each variable. Some of the criteria are applied across variations and others are variation-particular. I conduct the data-extraction following these criteria. In the next section, I touch upon the factors.

3.4 Factors

Before moving on to the analysis, I need to select the items which I will use as an index of the language internal and external factors among all the information annotated to CSJ. In doing so, the selection of factors needs to be linguistically well-motivated, as it should be based on some solid linguistic ground; in other words, if I cannot develop a plausible argument in favor of the selection of a certain factor, the selection is invalid. At the same time, the selection referring to the results and the claims of previous studies is favorable both for the verification of the previous studies and for the development of the study of language variation and change as a whole. This section introduces the factors I will examine in the statistical analysis.

3.4.1 Diet database

As mentioned above, some information has not been annotated to the Diet database which can be interpreted as external factors, unlike CSJ. The internal factors, however, can be identified even if we refer only to the transcription of the utterances, and the large-scale of the Diet database provides a huge amount of data; this in turn enables the fine-grained analysis of the phenomena. Therefore, I mainly focus on the internal factors in the analysis by the Diet database. As to the external factors, we can identify, for example, the birth-year of each member with reference to the biographic encyclopedia of the members, I take the potential stylistic difference in the Diet database (e.g. Representatives/Councilors and plenary session/committee) into consideration. Thus, I selected the following factors (four external factors and nine internal factors) for the statistical analysis: “birth-year,” “year of Diet,” style (“type of the House” and “type of the Diet meeting”) (external factors); preceding context (“self-controllability,” “verb-length,” “conjugation type of the verb (*i*-stem/*e*-stem),” "verb type (vowel verb/consonant verb)," and "morphological structure of the preceding stem (monomorphemic/complex)), "idiom/noun or not," "following context," "negative/affirmative," and "embeddedness" (internal factors). I examine the effects of these factors according to each phenomenon.

3.4.2 CSJ

Among the information annotated to CSJ, some items can be regarded as factors governing language variation and change, and some items cannot. As mentioned above, the selection of factors should be linguistically well-motivated. For example, the selection of the factors that may be associated with the formality based on the observation that *sa*-Insertion tends to be used in formal settings is quite adequate. On the other hand, "the degree of articulatory clarity," "the existence/nonexistence of difficult technical terms," "degree of the use of dialects," and "the type of recording equipment" are unlikely to have an influence on the distribution of *sa*-Insertion and other variables. Therefore, I selected the factors whose effects on the distribution of each variable are linguistically well-grounded among the types of information annotated to CSJ (the speaker attributes data and the impressionistic rating data). The selected factors are then subject to a pilot study. As a result, I selected the following factors (nine external factors and nine internal factors) for the statistical analysis: "speech type (APS/SPS)," "gender," "birth-year," "geographical difference,"[27] "education," "spontaneity," "speech style," "speech skill," and "speech experience" (external factors), and preceding context ("self-controllability," "verb length," "conjugation type of the verb (*i*-stem/*e*-stem)," "verb type (vowel verb/consonant verb)," and "morphological structure of the preceding stem

[27] I format the geographical difference for the subsequent analysis, since it is unapplicable to the statistical analysis in its original form (see section 4.2.3.4).

(monomorphemic/complex)), “idiom/noun or not,” “following context,” “negative/affirmative,” and “embeddedness” (internal factors).

3.5 The collected data for the analysis

In this section, I present the result of the data extraction.

3.5.1 Diet database

In the analysis using the Diet database, I focus on the Tokyo dialect among other dialects of Japan. At the same time, I primarily focus on the chronological aspects of language variation and change in question. Based on the list of the members of the Diet by Nambu (2005), I sampled 81 members among 190 members of the Diet who come from Tokyo (dialectal control). The scope of the present research includes all of their utterances from the entire time period. I selected one member for each year of their birth, in order to examine the chronological change of the distribution of each variant. Thus, the analysis focuses on the utterances of 81 members from Tokyo.[28] The focus of the analysis is consistent across all variations.

The present research targets the utterances from May 20 1947 to February 29 2008 (from the first Diet to 169th Diet). This range of the time-period I focus on is again consistent for every variation. An exhaustive examination of the Diet database brought forth: 1) a total of 352 causative forms with *sa*-Insertion, as opposed to a total of 4,907 standard causative forms; thus, the rate of *sa*-Insertion (*sa*-Insertion/(*sa*-Insertion + standard causatives) *100) amounts to 6.69 percent; 2) a total of 95 potential forms with *ra*-Deletion, as opposed to a total of 1,599 standard

[28] Sano (2008a, 2008b) describes the criterion concerning the status of *sa*-Insertion and standard causatives in the data extraction. According to the criterion of Sano (2008a), I excluded the examples which are not qualified as *sa*-Insertion or standard causatives from the extracted data.

potential forms; thus, the rate of *ra*-Deletion (*ra*-Deletion/(*ra*-Deletion + standard potentials) *100) amounts to 5.61 percent; 3) no example of *re*-Insertion, as shown in Table 9 below.

Table 9. Distribution of three variations in the Diet database

variant	#	variant	#	variant	#
sa-insertion	352	*ra*-Deletion	95	*re*-Insertion	none
standard causative	4,907	standard potential	1,599	potential	—
rate of *sa*-insertion(%)	6.69	rate of *ra*-Deletion(%)	5.61	rate of *re*-Insertion(%)	—

Comparing the rate of *ra*-Deletion with that of *sa*-Insertion, the rate of *ra*-Deletion is relatively high (the rate of *ra*-Deletion is close to that of *sa*-Insertion), despite the fact that some examples of *ra*-Deletion have been deleted by the correction policy. This shows that the change of *ra*-Deletion has been advanced to a significant degree, compared to other variants. I observed no examples of *re*-Insertion. This may again be due to the corretion policy. Therefore, I exclude *re*-Insertion from the analysis by the Diet database, and I do not extract the examples of the standard counterpart of *re*-Insertion from the Diet database.

3.5.2 CSJ

In the analysis employing CSJ, I focus on every spontaneous speech included in CSJ (3402 speeches) including the Core and Noncore, Monologues: APS (A) and SPS (S), Readings (R), Dialogues (D), and others (M)). An exhaustive examination of CSJ brought forth: 1) a total of 42 causative forms with *sa*-Insertion, as opposed to a total of 1,498 standard causative forms; thus, the rate of *sa*-Insertion (*sa*-Insertion/(*sa*-Insertion + standard causatives) *100) amounts to 2.73 percent; 2) a total of 543 potential forms with *ra*-Deletion, as opposed to a total of 7,615 standard potential forms; thus, the rate of *ra*-Deletion (*ra*-Deletion/(*ra*-Deletion + standard potentials) *100) amounts to 6.66 percent; 3) a total of 20 potential forms with *ra*-Deletion, as opposed to a total of 3,657 standard potential forms; thus, the rate of *ra*-Deletion (*ra*-Deletion /(*ra*-Deletion + standard potentials) *100) amounts to 0.54 percent, as shown in Table 10 below.

Table 10. Distribution of three variations in CSJ

variant	#	variant	#	variant	#
sa-insertion	42	*ra*-Deletion	543	*re*-Insertion	20
standard causative	1,498	standard potential	7,615	potential	3,657
rate of *sa*-insertion(%)	2.73	rate of *ra*-Deletion(%)	6.66	rate of *re*-Insertion(%)	0.54

Among three variables, *ra*-Deletion is enormous in token frequency and the rate of *ra*-Deletion is also relatively high. This again shows that the change of *ra*-Deletion is well under way. On the other hand, the token frequency of *re*-Insertion is remarkably small and the rate of *re*-Insertion is quite low. The token frequency and the rate of *sa*-Insertion are in between. On the assumption that the change spreads gradually and the rates of each innovative forms reflect the degree of progression (the higher the rate of an innovative form, the more advanced the change), the order of the change of each variation is as follows: *ra*-Deletion => *sa*-insertion => *re*-Insertion. This is consistent with the claim of previous studies: *ra*-Deletion was first observed at the end of the 19th century, *sa*-Insertion in 1947, and *re*-Insertion at the end of the 20th century.

This chapter introduced the issues of the data: The properties of two corpora, the advantages of the complementary use of two corpora, the criteria in the data extraction, and the data which is subjected to the analysis that follows. In the next chapter, I conduct the statistical analysis based on the data collected.

PART II

In Part II, Chapter 4 presents the statistical analyses of *sa*-Insertion, specifically from the perspective of Variation Theory; Chapter 5 covers *ra*-deletion and Chapter 6 covers *re*-Insertion; and Chapter 7 summarizes the statistical analysis and the theoretical implications of the results. The data obtained from the Diet database and CSJ are subjected to the factor-by-factor analysis, followed by the multivariate analysis. In addition to the extensive examination of internal and external factors, I discuss some theoretical implications, such as grammaticalization, acquisition, change from below/above, order of the change, gender, categorical/gradient distinction, internal/external distinction, change of factors (Dynamic Interaction Hypothesis), and frequency effect, in light of the findings in previous works.

Chapter 4. Statistical analysis of *sa*-Insertion

In this chapter, I conduct a statistical analysis of *sa*-Insertion. The data are subject to the factor-by-factor analysis by comparing the distributions of *sa*-Insertion and of the standard causative, followed by the multivariate analysis examining the weight of each constraint as well as the interaction of the factors. Firstly, I present the analysis employing the Diet database, and secondly I conduct the analysis based on CSJ.

4.1 The Diet database

In this section, I conduct analysis of *sa*-Insertion in the Diet database, according to each factor. An exhaustive examination of the Diet database brought forth a total of 352 causative forms with *sa*-Insertion, as opposed to a total of 4,907 standard causative forms; thus, the rate of *sa*-Insertion (*sa*-Insertion/(*sa*-Insertion + standard causatives) *100) amounts to 6.69 percent, as shown in Table 11 below.

Table 11. Distribution of causatives (Diet database)

	#
sa-Insertion	352
standard causatives	4,907
rate (%)	6.69

In Section 4.1.1, I examine the chronological change of the distribution of *sa*-Insertion. Section 4.1.2 examines the effect of stylistic difference in the Diet. Section 4.1.3 examines whether *sa*-Insertion occurs in idioms and nouns.

In Section 4.1.4, I examine the effect of following context on the distribution of *sa*-Insertion. Section 4.1.5 examines the effect of preceding context on the distribution of *sa*-Insertion. In Section 4.1.6, I discuss the lexical diffusion (cf. Chen and Wang 1975) and frequency effect. In Section 4.1.7, I discuss the cause of the change. Section 4.1.8 conducts the multivariate analysis. Finally, Section 4.1.9 summarizes the discussion.

4.1.1 Chronological change

In this section, I conduct analysis of the chronological change of the distribution of *sa*-Insertion. Analysis of the chronological change of *sa*-Insertion is necessary in order to identify the status of *sa*-Insertion as an instance of language change. If *sa*-Insertion is an instance of language change, the distribution of *sa*-Insertion should show a correlation with the birth-year of the member. To verify this, I first examined the relationship between the distribution of *sa*-Insertion and the birth-year of the member, where *sa*-Insertions and standard causatives are sorted according to the birth-year of the members (grouped every ten years). I then considered the relationship between the year-period and the occurrence of *sa*-Insertion, where *sa*-Insertions and standard causatives are displayed, grouped for every five years. The distribution of *sa*-Insertion by birth-year is shown in Figure 3, and the distribution of *sa*-Insertion by five-year period is shown in Figure 4.

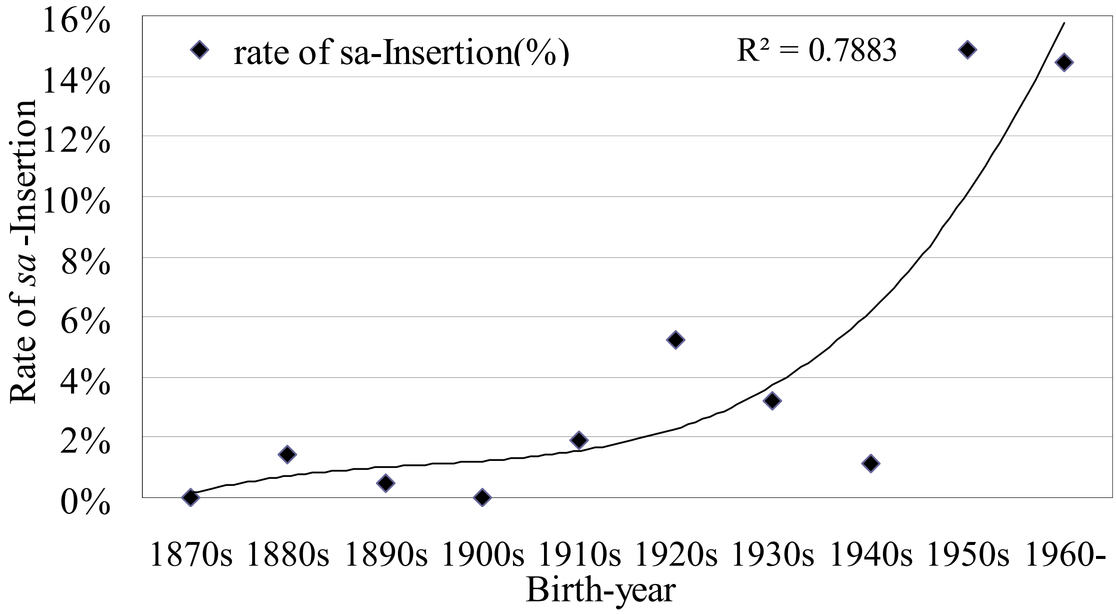

Figure 3. Distribution of *sa*-Insertion by birth year (Diet database)

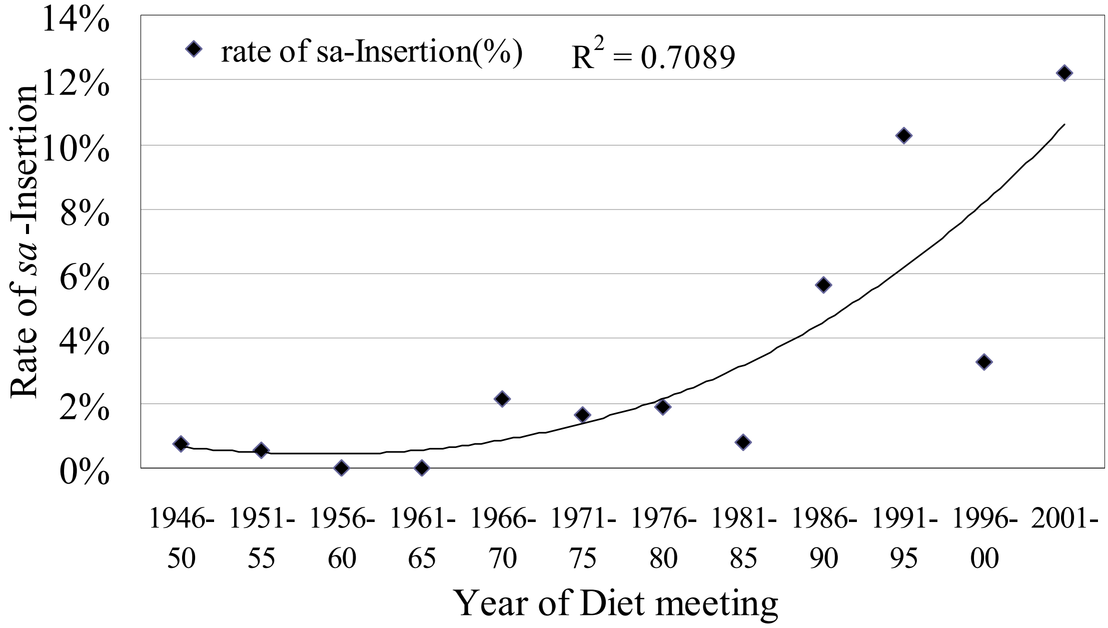

Figure 4. Distribution of *sa*-Insertion by five-year period

Figure 3 demonstrates that the more recent the birth-year of the member is, the higher the rate of *sa*-Insertion. This tendency is remarkable in the birth-years after the 1950s. A significant correlation can be found between the distribution of *sa*-Insertion and birth-years (X^2 =319.9, d.f.=9, p<0.001 (p<0.001)[29]). This shows that *sa*-Insertion is an instance of language change. In Figure 4, the dots which stand for the rate of *sa*-Insertion for each year of the Diet and the approximated curve are plotted. As in Figure 3, the rate of *sa*-Insertion is shown to be gradually rising from year to year. In the present data, *sa*-Insertion is first observed in 1949. This result is consistent with the claim of Chen, and from the first appearance, some *sa*-Insertion is observed (gradually

[29] In what follows, each distribution is subject to the chi-square test for independence to examine the null hypothesis that the distribution (frequency) of variants is not affected by each factor (independent). If the result is significant, the null hypothesis is rejected and it follows that the distribution in question is affected by the factor. 'X^2 =' represents the chi-square statistic and 'd.f.=' represents the degrees of freedom. If the result is significant, I show the p-value as 'p<'. If the result is not significant, 'n.s.' is indicated. The chi-square test, however, can be inaccurate, where the table includes the cell(s) with quite low frequency. In such cases, I show the result of the Fisher's exact test as '(p<),' in addition to the result of the chi-square test.

increasing) until the 1980s. Around 1990, *sa*-Insertion suddenly exploded. This shows that *sa*-Insertion is in the beginning of a language change, and although some fluctuations are observed, the shape of the current curve corresponds to the early stage of an S-curve (Bailey 1973; Chambers and Trudgill 1980, among others). Thus, it can be predicted that the change of *sa*-Insertion will proceed in an S-curve fashion.

At this point, I discuss the steep declines of the rate of *sa*-Insertion in 1940s in Figure 3, and in 1996-2000 in Figure 4. Yasuda (2006) describes the Japanese-language education in Japan around the 1940s. According to Yasuda (2006), pupils were inculcated the firm awareness to the “correct Japanese language” as well as the language itself, including the honorifics, through the rigorous language policy. The members whose birth-year is around 1940s were exactly the pupils subject to this policy. Also, most of the causatives including *sa*-Insertion observed in 1996-2000 were uttered by these members. These facts imply that the members whose birth-year is around the 1940s have a firm awareness regarding Japanese, and they are reluctant to use the innovative forms that are regarded as an instance of language disturbance such as *sa*-Insertion. This is reflected in the steep decline of the rate of *sa*-Insertion in the relevant points.

Note that *sa*-Insertion is first observed in 1949 in the present data. This year almost coincides with the birth year of the members who show the most rapid increase (after the 1950s). This fact implies the following scenario: The precursory *sa*-Insertion which appeared around the 1950s is transmitted to subsequent generations as primary linguistic data and is reproduced by members born after the 1950s. The members born around 1950 are the first generation that could have been exposed to *sa*-Insertion during the period of acquisition, while most of the members born before the 1950s had already passed the critical period when they were first exposed to *sa*-Insertion. It follows that the members whose birth year is after 1950 have a grammar with *sa*-Insertion, and the diffusion is accelerated by these members. This leads to the significant increase of *sa*-Insertion in the members born after 1950.

4.1.2 Style

In this section, I examine the effect of stylistic difference. Firstly, I discuss the type of the Diet meeting: plenary sessions/committees, and secondly the type of the House: Representatives/Councilors.

4.1.2.1 Type of the Diet meeting

Although the Diet is stylistically formal in general, it is not necessarily the case that there is no stylistic difference in the Diet. Among the potential stylistic differences, each of the Diet meeting is classified into either the plenary sessions or the committees. This constitutes one of the major stylistic differences in the Diet. If there exists enough stylistic difference between the plenary sessions and the committees, the type of the Diet meeting has an influence on the distribution of *sa*-Insertion. I examine the effect by comparing the distribution of *sa*-Insertion and standard causatives. The result is shown in Table 12.

Table 12. Distribution of causatives by type of the Diet meeting

Diet	*sa*-Insertion	standard causative	rate of *sa*-Insertion(%)
plenary session	8	195	3.94
committee	344	4,712	6.80
total	352	4,907	6.69

$X^2 = 2.56$, d.f.=1, n.s.

As Table 12 shows, the frequency of *sa*-Insertion is quite low in plenary sessions, and the rate of *sa*-Insertion is higher in the committees than in the plenary sessions. Although *sa*-Insertion seems to be more compatible with the plenary session, the result of the chi-square test shows that the distinction between plenary session and committee does not contribute to the choice of the variants. Therefore, I do not identify the type of the Diet meeting as an independent significant factor.

4.1.2.2 Type of the House

The members of the Diet belong to either the House of the Representatives (henceforth Representatives) or the House of the Councilors (henceforth Councilors). The type of the House is another major stylistic difference in the Diet. I hypotheisze that the difference of the Houses has an influence on the distribution of *sa*-Insertion. I examine the effect by comparing the distribution of *sa*-Insertion and standard causatives. The result is shown in Table 13.

Table 13. Distribution of causatives by type of the House

House	*sa*-Insertion	standard causative	rate of *sa*-Insertion(%)
Representatives	126	2,956	4.09
Councilors	226	1,953	10.37
total	352	4,907	6.69

$X^2 = 80.73$, d.f.=1, $p<0.001$

As shown in Table 13, the frequency and the rate of *sa*-Insertion are significantly higher in Councilors than in Representatives.

At this point, I discuss the relationship between the properties of each House and one of the properties of *sa*-Insertion. The members of both Houses are elected by the direct election and the organization of the members by party is not neccesarily different (the electoral system of Councilors is similar to the proportional representation and the single-seat electoral district system of Representatives), compared to the Diet or Congress in other countries. However, some property specific to Councilors also exists: Firstly, the candidates in Councilors are all over 30 years old, while those in Representatives are over 25 years old. Secondly, Councilors was originally the House of Aristocracy (Kazokuin) and it functions as the 'House of the discipline.' Thirdly, the deliberation of the bill proceeds from Representatives to Councilors. These facts show that the authority of the Councilors is rather strong (Oyama 2003). The facts may well affect the consciousness of the members. As a result, they regard the Councilors as more formal than the Representatives. If this assumption is correct, it follows that *sa*-Insertion is more compatible with the formal settings, namely Councilors. The empirical finding supports the assumption: It is empirically known that *sa*-Insertion is more compatible with the formal settings. Thus, *sa*-Insertion is more compatible with Councilors which is identified as the stylistically formal settings.

4.1.3 Idioms and nouns

In this section, I examine whether *sa*-Insertion occurs in idioms and nouns. Idioms appear to be resistant to the language change. I assume that *sa*-Insertion does not occur in idioms.

Although several idioms are observed, in which standard causatives are included, such as *me-o hikar-ase-ru* ‘overlook’ (Takeru Inukai, 1896, Representatives, 2/10/1953, select committee) *kuti-o suber-ase-ta* ‘leaked’ (Syozo Hasegawa, 1914, Representatives, 10/22/1980, education committee), *warudie-o hatarak-ase-ta* ‘contrived’ (Hisayasu Nagata, 1969, Representatives, 4/5/2001, plenary session), *geta-o hak-ase-ta* ‘exaggerated’ (Akira Koike, 1960, Councilors, 10/9/1998, select committee), no idioms which include *sa*-Insertion are observed.

Among the characteristics of an idiom (Clark and Clark 1979; Pawley 1986; Nunberg, Sag, and Wasow 1994, among others; cf. idiomaticization, lexicalization: Brinton and Traugott 2005), grammatical deficiency and lack of substitutability appear to be linked to its resistance to language change: an idiom does not permit the syntactic variability characteristic of free combinations, such as passive (**the breeze was shot*), negation ($^{?}$*didn’t shoot the breeze*), internal modification (**shoot a strong breeze*, **shoot breezes*, *shoot some breeze*), or topicalization (**the breeze he shot*); synonymous lexical items cannot be substituted (**shoot the wind*, **fire at the breeze*) nor can items be reversed or deleted. An idiom functions as a complete autonomous unit in its own right and it is stored in the lexicon as one "idiom." Thus, the idiom cannot be decomposed into individual lexical items, and the constituents of the idiom lack their original meaning or grammatical function, as far as it keeps an idiomatic status. Since idioms are indecomposable and since the constituents of idioms lack their original meaning or grammatical function, each constituent is invisible to the grammatical operation. For example, in *shoot the breeze* the verb *shoot* cannot be passivized, since it lacks the status as a verb. To put this insight into the context of language change, one can argue that each constituent of idioms is invisible to language change. For example, in *me-o hikar-ase-ru* the causative suffix *ase* cannot undergo *sa*-Insertion as in **me-o hikar-as-ase-ru*, which affects every causative suffix, since it lacks the status as a causative suffix. The same holds true for potential suffix: potential suffixes in idioms do not undergo *ra*-Deletion or *re*-Insertion. The result supports the idiom's resistance to language change.

Next, I turn to the issue of nouns. Some nouns that include the causative suffix are idiomatically used as one unit, such as *omat<u>ase</u>* 'to let someone wait (honorific),' *okik<u>ase</u>* 'to let someone hear (honorific),' *iyagar<u>ase</u>* 'offence,' *mekubase* 'wink,' *yar<u>ase</u>* 'made-up.' Similar to the idioms, nouns are also resistant to the change, since these constitute the atoms of linguistic elements: nouns are established as a unit. In the present data, no nouns that include *sa*-Insertion are observed. The same argument as in the idioms also applies to this case. Furthermore, it is unlikely that the innovative forms occur in the existing idioms and nouns, even if the change becomes sufficiently advanced, since idioms and nouns function as complete autonomous units and each constituent is invisible to language change. I argue that newly-created idioms and nouns can include the innovative forms in the future. Thus, I verified that *sa*-Insertion does not occur in idioms and nouns.

4.1.4 Following context

In this section, I examine the effect of following context on the distribution of *sa*-Insertion.

4.1.4.1 Grammaticalization

Firstly, I examine the grammaticalization hypothesis. If Kikuchi's grammaticalization hypothesis and Okada's claims are on the right track, *sa*-Insertion is more compatible with the *-as-ase-te-itadak-* pattern to other patterns. To verify this hypothesis, I examine the distribution of *sa*-Insertion and the standard causative by following context. The result is shown below.

Table 14. Distribution of causatives by following context (Diet database)

context	*sa*-Insertion	standard causative	rate of *sa*-Insertion(%)
-te-itadak-	341	2,127	13.82
others	11	2,780	0.39

$X^2 = 378$, d.f.=1, $p<0.001$

As Table 14 shows, the frequency of *sa*-Insertion in the *-as-ase-te-itadak-* pattern is 341, among a total of 352 occurrences of *sa*-Insertion, and compared to other patterns, the rate of *sa*-Insertion in the *-as-ase-te-itadak-* pattern shows an extremely high percentage: 13.82 percent. That is, most of the *sa*-Insertions occur with the *-as-ase-te-itadak-* pattern.

As mentioned above, Kikuchi claims that *sa*-Insertion has become an independent word and Okada claims that the benefactive pattern is especially numerous. Likewise, the results of the present research show that the *-as-ase-te-itadak-* pattern is predominant. The following context of *sa*-Insertion, however, is not limited to the *-as-ase-te-itadak-* pattern. (Other patterns are also observed.) This implies that the grammaticalization process remains to be completed and is currently underway.

To capture the grammaticalization process, I examine the chronological change of the *-as-ase-te-itadak-* pattern in *sa*-Insertion.

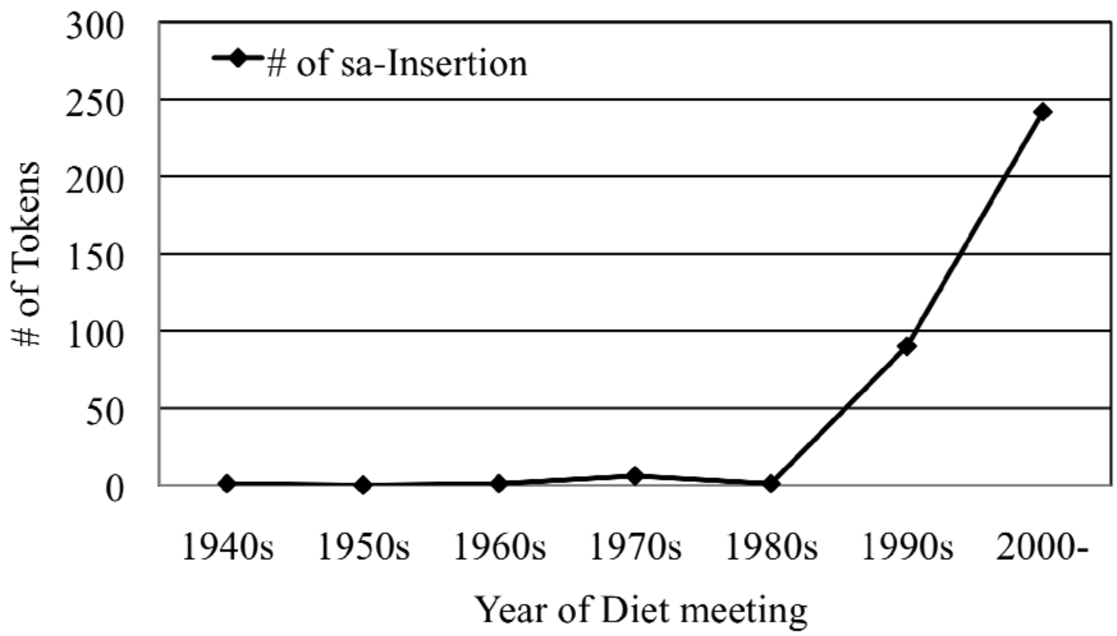

Figure 5. Chronological change of the *-as-ase-te-itadak-* pattern in *sa*-Insertion

As Figure 5 shows, few examples of *-as-ase-te-itadak-* pattern in *sa*-Insertion are observed until the 1980s. After the 1980s, its occurrence explodes: 90 examples are observed in the 1990s and 242 examples are observed after 2000.[30] This shows that

[30] I mention the spread of *-(s)ase-te-itadak-* pattern. There have been two ways to form the honorifics in Japanese: *o ~ suru* pattern and *-(s)ase-te-itadak-* pattern. Both patterns create the honoric forms by attaching to verbs or verbal nouns. Although *o ~ suru* pattern is restricted to particular verbs and verbal nouns and the honorification is impossible in certain contexts, the

the grammaticalization process follows the same trajectory as the change of *sa*-Insertion. The grammaticalization is currently underway, accompanied by the change of *sa*-Insertion and *sa*-Insertion is contributing to the grammaticalization of the independent word *-as-ase-te-itadak-*.

At this point, I mention the grammaticalization of *sa*-Insertion. The phrase *-as-ase-te-itadak-* originally had the literal meaning 'to get a benefit/permission to do,' but then lost its original meaning and became an independent word with a new grammatical function that adds politeness; the meaning has become semantically unpredictable. That is, *-as-ase-te-itadak-* has changed from a causative phrase to a politeness word. In fact, the meaning of *-as-ase-te-itadak-* is predominantly 'polite' and not 'cause,' at least in the present data. Thus, *-as-ase-te-itadak-* has arguably undergone grammaticalization.

As mentioned above, it is empirically known that *sa*-Insertion is more compatible with the formal settings. This fact seems to be associated with the grammaticalization process: It is assumed that the *-as-ase-te-itadak-* pattern, which is an inherently polite expression, is used in formal settings. *Sa*-Insertion, which is

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-(s)ase-te-itadak- pattern attaches to any verbs and verbal nouns as in (i). Thus, the universality of the *-(s)ase-te-itadak-* pattern leads to its spread and *-(s)ase-te-itadak-* pattern has been replacing the *o ~ suru* pattern (Inoue 2003).

(i)	o ~ suru	*o-nagame-su-ru	(look-Honorific)
		*o-tyoosa-su-ru	(survey-Honorific)
	-(s)ase-te-itadak	nagame-sase-te-itadak	(look-Cause-Honorific)
		tyoosa-sase-te-itadak	(survey-Cause-Honorific)

Furthermore, the universality of *-(s)ase-te-itadak-* pattern entails another cause of its spread. In Japanese, there have been some lexical honorifics exempt from the morphological honorific formation as in (ii).

(ii)	conclusive form	lexical honorific form	*-(s)ase-te-itadak-* form
	i-u	moosiager-u	iw-(as)-ase-te-itadak
	ik-u	mair-u	ik-(as)-ase-te-itadak

Although the lexical honorifics are morphologically unpredictable and these are memorized by rote, *-(s)ase-te-itadak-* pattern yields the honorifics by morphological formation. The *-(s)ase-te-itadak-* pattern reduces the burden of the leraning: Every verb is morphologically honorified, instead of memorizing the lexical honorific forms.

accompanied by the *-as-ase-te-itadak-* pattern, is also used in formal settings.

4.1.4.2 Affirmative/negative distinction

Here, I examine the effect of the affirmative/negative distinction. It has been traditionally hypothesized that negative contexts tend to show the conservative behavior in language change compared to the affirmative contexts (Givón 1979; Matsuda 1993, among others). Following this hypothesis, I expect that the rate of *sa*-Insertion is lower in negative contexts than in affirmative ones. I show the distribution of causatives classified according to the affirmative/negative distinction below.

Table 15. Distribution of causatives by affirmative/negative context (Diet database)

context	*sa*-Insertion	standard causative	rate of *sa*-Insertion(%)
affirmative	351	4,667	6.99
negative	1	240	0.41
total	352	4,907	6.69

$X^2 =$ 15.94, d.f.=1, $p<0.001$ ($p<0.001$)

As Table 15 illustrates, the distribution of *sa*-Insertion is close to a categorical one: I observed only one token of *sa*-Insertion in negative context, and the rate of *sa*-Insertion shows an extremely low percentage compared to the rate in affirmative context. Thus, the change of *sa*-Insertion is far from advanced in negative context. The result supports the above hypothesis.

4.1.5 Preceding context

In this section, I examine the relationship between the preceding context of *sa*-Insertion and the distribution of *sa*-Insertion; Section 4.1.5.1 discusses the self-controllability restriction; Section 4.1.5.2 discusses the transitivity; Section 4.1.5.3, OCP[31] (μ); Section 4.1.5.4, the effect of verb types; and finally I examine the effect of verb length in Section 4.1.5.5. In the first three contexts, the distribution of *sa*-Insertion is categorically rather than quantitatively restricted.

4.1.5.1 Self-controllability restriction

Japanese verbs are classified into self-controllable and non-self-controllable verbs (cf. Harada 1973, Tonoike; 1978). Self-controllable verbs describe proactive behavior. In a sentence with a self-controllable verb, a speaker (agent) performs the behavior described by the verb of his/her own volition, as in *yar-u* 'do,' *hasir-u* 'run,' and *ukaga-u* 'ask (honorific).' In contrast, non-self-controllable verbs describe spontaneous events. In a sentence with a non-self-controllable verb, the speaker (agent) cannot perform the behavior of his/her own volition (e.g. *I am going to suffer.), as in *kurusim-u* 'suffer,' *komar-u* 'be puzzled,' and *kanasim-u* 'grieve.' In the present data, *sa*-Insertion is restricted to self-controllable verbs and no *sa*-Insertion occurs with non-self-controllable verbs. Examples such as **kurusim-as-ase-*, **komar-as-ase-*, **kanasim-as-ase-* are not observed.

These results can be explained by the following incompatibility of non-self-controllable verbs with the *-te-itadak-* component of the *-as-ase-te-itadak-* pattern: as we saw above, most *sa*-Insertions occur with the *-as-ase-te-itadak-* pattern. In a sentence with *-te-itadak-*, a person who performs a behavior is obligatorily the

[31] Obligatory Contour Principle (OCP), which bars consecutive identical features, was originally proposed by Leben (1973).

speaker (agent). Self-controllable verbs, in which the speaker (agent) can perform the behavior voluntarily, are compatible with *-te-itadak-*. For example, in a sentence with a self-controllable verb such as *sore-o yar-as-ase-te-itadakimasu* 'Allow (me) to do it,' the person who performs 'do' is the speaker (agent). However, non-self-controllable verbs, in which the speaker (agent) cannot perform a behavior voluntarily, are incompatible with *-te-itadak-*. Although the person who performs the 'suffering' is the speaker (agent) in a sentence such as **kurusim-as-ase-te-itadakimasu* 'Allow me to suffer,' '*kurusim*' cannot be performed voluntarily. Thus, the combination of non-self-controllable verbs and *-te-itadak-* is impossible. The fact that *sa*-Insertion is restricted to self-controllable verbs is associated with the grammaticalization process.

4.1.5.2 Transitivity

Among the verbs in Japanese, some have only intransitive form, some have only transitive form, and others have both intransitive and transitive forms. At this point, the intransitive/transitive distinction refers to the type of verbs in the framework of Shibatani (1973), which is different from the ordinary definition[32] such as 'verbs that take object(s) as the argument(s).' The transitive verbs here are such that the action or process that they denote is performed by a person other than the subject. For example, although *tomar-u* 'stop' and *ki-ru* 'wear' are transitive verbs in an ordinary definition, these are regarded as intransitive verbs, not transitive verbs, as shown in Table 16, cited from Shibatani (1973: 348) with a slight modification.

[32] Okada (2003)'s intransitive/transitive distinction is based on the ordinary sense, thus it differs from the definition of the present analysis.

Table 16. Examples of intransitive/transitive verbs

action/process (intransitive)		action & process (transitive)	
agar-u	‘rise’	*age-ru*	‘raise’
ki-ru	‘wear’	*kise-ru*	‘dress’
tomar-u	‘stop’	*tome-ru*	‘stop’
sin-u	‘die’	*koros*	‘kill’
nak-u	‘cry’	*nak-as*	‘cause to cry’
odorok-u	‘be surprised’	*odorok-as*	‘surprise’
tob-u	‘fly’	*tob-as*	‘fly’
kawak-u	‘dry’	*kawak-as*	‘dry’

The verbs *tomar-u* and *ki-ru* are classified into the intransitive (action or process verbs), because the action or process is performed by the subject, namely the verb contains either action (stop) or process (wear), but not both. On the other hand, in a sentence which includes *okos-u* ‘wake,’ the person who gets up is not the subject, but other persons (object); the subject wakes that person and the person gets up. These verbs of this kind are regarded as transitive verbs, since they contain both action and process. Thus, I identify verbs that denote either action or process as intransitive verbs, and verbs that denote both action and process as transitive one. In the present data, every transitive (action and process) verb does not get *sa*-Inserted; *sa*-Insertion is restricted to the intransitive (action or process) verbs. The verbs are classified into three types with respect to the transitivity: 1) the one that has only intransitive form; 2) the one that has only transitive form; 3) the one that has both intransitive and transitive forms.

The verbs of the first type such as *ik-u* ‘go,’ and *hasir-u* ‘run’ have no transitive counterpart, instead adding the causative suffix *(s)as* yields the transitive counterpart such as *ik-as* 'let someone go' and *hasir-as* 'let someone run.' Firstly, the transitive counterpart of the first type as in *ik-as* and *hasir-as* does not get *sa*-Inserted and does not yield the phrases as in **ik-as-as-ase-*, **hasir-as-as-ase-*; The causative suffixes attach to the intransitive counterpart *ik-u* and *hasir-u* yielding the phrases as in *ik-as-ase-* and *hasir-as-ase-*. Secondly, the verbs of the second type such as *tadas-u* 'correct' and *hatas-u* 'accomplish' comprise exclusively the transitive counterpart and does not include the intransitive counterpart like **tad-u* and **hat-u*. The transitive counterparts *tadas-u* and *hatas-u* cannot be *sa*-Inserted and do not yield the phrases as in **tadas-as-ase-* and **hatas-as-ase-*. Hence these verbs do not occur in *sa*-Insertion. Finally, the verbs of the third type such as *utsur-u* 'move' and *sin-u* 'die' have the intransitive and transitive pairs as in *utsur-u* 'move' and *utsus-u* 'transfer,' *sin-u* 'die' and *koros-u* 'kill.' The intransitive counterpart of the third type can be *sa*-Inserted and yields the phrases as in *utsur-as-ase-* and *sin-as-ase-*, but for the transitive counterpart the process is impossible as in **utsus-as-ase-* and **koros-as-ase-*. These are summarized in Table 17.

Table 17. Distribution of *sa*-Insertion by types of verbs

	intransitive (action/process)	transitive (action & process)
First type	+ *sa*-Insertion	– *sa*-Insertion
Second type	—	– *sa*-Insertion
Third type	+ *sa*-Insertion	– *sa*-Insertion

As Table 17 shows, *sa*-Insertion is restricted to intransitive verbs and transitive verbs. These results can be explained by the following incompatibility of transitive verbs with the *-te-itadak-* component of the *-as-ase-te-itadak-* pattern: as mentioned above, most *sa*-Insertions occur with the *-as-ase-te-itadak-* pattern. In a sentence with *-te-itadak-*, a person who performs a behavior is obligatorily the speaker (agent). The person, other than the subject (agent), cannot participate in the action that the verb denotes. *Sa*-Insertion can denote either action or process, but not both of them, due to the connection with *-as-ase-te-itadak-* pattern. On the other hand, the transitive verbs obligatorily denote both action and process. The property of transitive verbs (action and process) is incompatible with the property of *sa*-Insertion (action or process) with *-as-ase-te-itadak-* pattern. It follows that the transitive verbs cannot occur in *sa*-Insertion. The phonological restriction also applies. The transitive verbs in consonant verbs all end in *-s* like *utsus-* or *tadas-*. If these verb are *sa*-inserted, the phrases that include the matrix *sasa* are created as in **utsus-as-ase-* or **tadas-as-ase-*. It follows that the *sa*-inserted transitive verbs necessarily violate the OCP (μ) and are barred. In any case, the transitive (action and process) verbs never occur in *sa*-Insertion.

4.1.5.3 OCP (μ)

If consonant verbs ending in *-s*, such as *das-u* 'give,' *tadas-u* 'correct,' and *tobas-u* 'fly' were to undergo *sa*-Insertion, the sequence *sasa* would be created, as in **das-as-ase-*, **tadas-as-ase-*, and **tobas-as-ase-*. Okada (2004) claims that the frequency of *sa*-Insertion in verbs ending in *-s* is low.

Although the consonant verbs ending in *-s* amount to a total of 759 in token frequency, no *sa*-Insertion with this kind of verbs is observed in the present data. In other words, *sa*-Insertion which contains the sequence *sasa* cannot occur. Based on this observation, I introduce the constraint OCP (μ) (Sano 2007).

(26) OCP (μ)[33]

No morae with identical CV sequences are adjacent.

The OCP (μ) bars the adjacent morae with identical CV sequences, such as /**sa.sa*/.[34] In this case, the sequence *sasa* in the matrix of the verb stem and the causative suffix is subject to this constraint. Due to the OCP (μ), *sa*-Insertion which contains the sequence *sasa*, as in **das-as-ase*-, **tadas-as-ase*-, and **tobas-as-ase*-, is prohibited.

4.1.5.4 Effect of verb types

As mentioned above, Japanese verbs are classified into two types: consonant verbs (e.g. *yar*-, *hair*-) and vowel verbs (*mi*-, *tabe*-). In the present data, *sa*-Insertion is restricted to consonant verbs and cannot occur with vowel verbs, as Inoue (2003) claims. This derives from the phonological property of *sa*-Insertion with vowel verbs: any *sa*-Insertions with vowel verbs obligatorily contain the sequence *sasa*, as in **tabe-sas-ase* or **mi-sas-ase*. Thus, *sa*-Insertion with vowel verbs is excluded again by the OCP (μ), as in the examples above. The incompatibility of *sa*-Insertion with vowel

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[33] At this point, I mention the motivation for introducing OCP (μ) and OCP morph (40) as subcategorial constraints, independent of the original OCP. The crucial point is the difference in unit of application. As defined in (30), OCP requires that no identical features are adjacent. According to this definition, any linguistic features adjacent to each other are subject to OCP. On the other hand, the units in mora level are the sole subject of OCP (μ) and an individual segment or tone is outside the scope of OCP (μ). Unlike these two constraints, which apply to the units in phonological level, OCP (morph) applies to the units in morphological level.

The distinction in unit of application plays an important role in accounting for the following data. Firstly, to take the phonological matrix **sasa* as an example, two *s's*, are separated by the intervening *a*; likewise, two *a*'s are separated by the intervening *s*. In other words, no segments that share the same features are adjacent in this matrix. Therefore, OCP cannot block **sasa*. On the other hand, OCP (μ) correctly blocks **sasa*, since two *sa*'s in mora level are adjacent. Thus, we can capture the deviance of the phonological matrix **sasa* only by introducing OCP (μ). Secondly, if we regard *yar-as-ase* (*sa*-Insertion) as a phonological matrix, we can say that no units that share the same features are adjacent in this matrix, and they do not violate either OCP or OCP (μ). On the other hand, *yar-as-ase* as a morphological matrix is blocked by OCP (morph), since two causative suffixes (*as* and *ase*) are adjacent. Thus, in order to capture the deviance of *yar-as-ase*, we have to appeal to OCP (morph).

[34] OCP (μ) is too powerful, given that there are some nouns containing *sasa* in Japanese, e.g. *sasa* 'bamboo grass' and *Sasaki* (proper noun). This constraint has to be refined in terms of the level (range) of application. I discuss this issue in Section 5.2.1.2

verbs has a general phonological ground (it is not a specific property of vowel verbs). The claim of Inoue (2003) is explained by OCP (μ), without appeal to any additional machinery.

4.1.5.5 Effect of verb-length

In language change (morphosyntactic change), it is assumed that the change diffuses from shorter verbs to longer verbs (e.g. *ra*-deletion, Matsuda 1993). If this assumption is also true for the case of *sa*-Insertion, *sa*-Insertion is more compatible with the shorter verbs than the longer verbs, with a higher rate in shorter verbs than in longer verbs in the beginning of language change, as opposed to Chen's claim that *sa*-Insertion occurs in almost all the consonant verbs regardless of stem length. To verify the hypothesis, I examined the distribution of *sa*-Insertion and the standard causative by verb-length measured by mora. The results are shown below.

Table 18. Distribution of causatives by verb-length measured by mora (Diet database)

Token	*sa*-Insertion	standard causatives	rate of *sa*-Insertion(%)
2 morae	91	1,484	5.78
3 morae	184	2,222	7.65
4 morae	72	990	6.78
5 morae	3	139	2.11
6 morae	2	72	2.70
total	352	4,907	6.69
Type	***sa*-Insertion**	**standard causatives**	**rate of *sa*-Insertion(%)**
2 morae	14	61	18.67
3 morae	17	155	9.88
4 morae	16	111	12.60
5 morae	3	55	5.17
6 morae	1	9	10.00
total	51	391	11.54

Token: X^2 =12.29, d.f.=4, $p<0.01$ ($p<0.01$)   Type: X^2 = 6.66, d.f.=4, n.s. (n.s.)

As Table 18 shows, the Token frequency of *sa*-Insertion in 2, 3 and 4 morae verbs is 91, 184 and 72, respectively. On the other hand, the Token frequency of *sa*-Insertion in 5 and 6 morae verbs is only 3 and 2, respectively. Likewise, the rate of *sa*-Insertion in 2, 3 and 4 morae verbs is over 6 percent, while in 5 and 6 morae verbs, the rate is less than 3 percent.

These results show that the distribution of *sa*-Insertion is affected by verb-length, as opposed to the claim of Chen. Specifically, *sa*-Insertion frequently occurs in 2, 3 and 4 morae verbs compared to the standard causative, while in 5 and 6 morae verbs, it seldom occurs. This tendency is also observed in Type frequency. *Sa*-Insertion is more compatible with the short verb stems. In the beginning of language change, *sa*-Insertion seldom occurs in verbs of more than 5 morae in length and the assumption that the change diffuses from shorter verb to longer verb is true for the case of *sa*-Insertion.

As mentioned above, Kinsui (2003) challenges the issue of verb-length. Kinsui's argument is as follows: *ra*-deletion with short verbs is acquired as a lexical item, while *ra*-Deletion with long verbs are acquired as a module of the grammar. If a speaker has already passed the critical period of language acquisition and do not have the grammar which includes the morphology of *ra*-Deletion, the speaker cannot generate *ra*-Deletion with long verbs. This hypothesis is likely to apply to *sa*-Insertion. Here I examine the distribution of *sa*-Insertion by birth-year and verb-length by means of the cross-tabulation. If Kinsui's hypothesis is on the right track, then *sa*-Insertion with long verbs is restricted to the younger generation, since the speakers of the older generation have already passed the critical period and they do not have the relevant grammar, although *sa*-Insertion with short verbs is observed in relatively wider range. The result is shown below.

Table 19. Distribution of *sa*-Insertion by birth-year and verb-length measured by mora

verb-length / birth-year	2 morae	3 morae	4 morae	5 morae	6 morae
1870s	0	0	0	0	0
1880s	2	0	0	0	0
1890s	0	0	1	0	0
1900s	0	0	0	0	0
1910s	1	0	3	1	0
1920s	7	13	3	1	0
1930s	13	3	10	0	2
1940s	3	6	1	0	0
1950s	43	50	5	0	0
1960-	22	112	49	1	0

As Table 19 shows, *sa*-Insertion in 2, 3 and 4 morae verbs are observed in wider range of generation. However, *sa*-Insertion in 5 and 6 morae verbs is also observed in older generations: 1910s-1930s, contrary to the assumption. Thus, the issue of verb-length cannot necessarily be attributed to the difference between the lexicon and the grammar, as Kinsui argues.

4.1.6 Lexical diffusion and frequency effect

The lexical diffusion theory (cf. Chen and Wang 1975, among others) argues that the change proceeds not uniformly among all lexical items, but begins with a subset of the lexicon and gradually diffuses to other lexical items. In other words, the frequency of the innovative forms is high with particular lexical items, and low with other lexical items in the beginning of the change. In the present data, I observed lexical diffusion of *sa*-Insertion. The change of *sa*-Insertion does not diffuse uniformly among all verbs, but begins with particular verbs and spreads to other verbs. I present the representative verbs with *sa*-Insertion and their frequency: *utsur-u* 'move on' (87); *ukaga-u* 'hear' (polite) (47); *hair-u* 'enter,' *owar-u* 'finish' (31); *yar-u* 'do' (22); *yom-u* 'read' (22); *okona-u* 'conduct' (10); *kak-u* 'write,' *tor-u* 'take' (8); *kik-u* 'hear,' *modor-u* 'return' (7); *i-u* 'say,' *ik-u* 'go,' *kubar-u* 'distribute,' *tsuka-u* 'use,' *tob-u* 'fly' (5); *susum-u* 'advance' (4). The results support the claim of the lexical diffusion theory.

The lexical diffusion of *sa*-Insertion is associated with the frequency effect. In the history of language change, it is hypothesized that the change is subject to the frequency of the forms in question, and the frequently used words are typically resistant to the language change because of their saliency (Bybee 1985, among others). If we put this into the present context, it follows that the frequency of *sa*-Insertion is high with the frequently used verbs, and low with less frequent verbs. I examined the correlation between the frequency of the representative verbs in the Diet database with *sa*-Insertion and the frequency of these verbs in NIJL (2005). NIJL (2005) describes the results of the survey of vocabulary in 70 magazines published in 1994, and presents the detailed information of lexical items including their frequency. I use the frequency of each verb in NIJL (2005) as an index of the absolute frequency of each verb. If the effect of frequency plays a role, the inverse correlation should appear: the frequency of *sa*-Insertion is high with frequent verbs, and low with less frequent verbs. I show the result in Table 20.

Table 20. Frequency of representative verbs in the Diet database with *sa*-Insertion and in NIJL (2005)[35]

verbs	frequency in the Diet database with *sa*-Insertion	frequency in NIJL (2005)
utsur-u	87	36
ukaga-u	47	40
hair-u	31	486
owar-u	31	128
yar-u	22	665
yom-u	22	246
okona-u	10	383
kak-u	8	314
tor-u	8	675
kik-u	7	449
modor-u	7	96
i-u	5	5,854
ik-u	5	1,429
kubar-u	5	15
tsuka-u	5	841
tob-u	5	94
susum-u	4	109

Correlation coefficient: -0.239

As Table 20 shows, the frequency of *sa*-Insertion is high: 87 and 47, respectively with

[35] The verb with the highest frequency is *sur-u* 'do' (15,959).

less frequent verbs *utsur-u* (36) and *ukaga-u* (40), on the other hand the frequency of *sa*-Insertion is low: 5 with frequent verbs such as *i-u* (5,854) and *kik-u* (1,429). The correlation coefficient between frequency in the Diet database with *sa*-Insertion and frequency in NIJL (2005) is -0.239. Although the inverse correlation is observed, the value is not so high. This is because the effect of various kinds such as verb types, verb-length, and stem final phonemes also plays a role, and the effect is competing with that of frequency, as a result the effect of frequency is balanced out. Thus, the result partly supports the frequency hypothesis at this stage of the change.

4.1.7 The origin of the change of *sa*-Insertion

In this section, I discuss the potential driving force of the change of *sa*-Insertion. Okada (2003) argues that the reanalysis caused the emergence of *sa*-Insertion. Some transitive verbs are phonologically similar to the causative forms such as *tob<u>as</u>-u* 'fly' and *ugok<u>as</u>-u* 'move.' The similarity causes the reanalysis: the verb stem is decomposed into the stem and the causative suffix, as in *tob-as-u* and *ugok-as-u*. The transitive verbs are reanalyzed as causative forms. Furthermore the transitive verbs are causativized as in *tobas-ase* and *ugokas-ase*. Similarly, the reanalyzed transitive verbs are further causativized, and are subject to the reanalysis as double (multiple) causatives as in *tob-a<u>s-a</u>se* and *ugok-a<u>s-a</u>se*. Thus, the renewal of the causative morpheme *-sa-* occurs and the double (multiple) causatives emerged in Japanese.

However, this argument includes two problems. Firstly, transitive verbs and causative forms are functionally different. The relationship between transitive verbs and causative forms is still controversial: it remains to be settled which forms are to be classified into transitive verbs and which into causative forms. The argument based on the mere similarity of the phonological shape without the consideration of the function is inadequate. Secondly, the number of transitive verbs that are phonologically similar to the causative forms is small. It is unlikely that the transitive verbs of low frequency would lead to global renewal of causative forms.

Contrary to the claim of Okada (2003), I argue that the analogy from the causative form of *su-ru* 'do' is the origin of the change. The main verb *su-ru* attaches to any verbal nouns (cf. Martin 1975) and yields the verb phrases such as *kenkyuu su-ru* 'do study,' *happyoo su-ru* 'make a presentation' or *seikoo su-ru* 'make a success.' When *su-ru* is causativized, it obligatorily takes the form *sase*, and it also attaches to any verbal nouns. The causative verb *sase*- of *su-ru* in (27a) is phonologically similar the causative suffix of consonant verbs in (27c).

(27)	a. *kenkyuu* <u>*sase*</u> 'let someone study'	verbal noun + *sase*
	b. *yar*-<u>*ase*</u> 'let someone do'	vowel verbs
	c. *mi*-<u>*sase*</u> 'let someone look'	consonant verbs

The causative suffix of the vowel verb is exactly the same as the main verb *sase*. The main verb *sase* also attaches to any verbal nouns as *su-ru*. The causative suffix -*ase* of consonant verb in (27b) is different. The causative suffix of the consonant verb *ase* is adjusted to the form *sase*. Thus, the change of *sa*-Insertion has begun. This is the analogical leveling in Inoue (2003). Kato and Kato (1983) claim that *sa*-Insertion is observed in child language. Children use the causative suffix *sase*- in both vowel verbs and consonant verbs, that is, they overgeneralize the causative suffix *sase*- of vowel verbs to consonant verbs. This implies the possibility of analogical leveling in conjugation paradigm.

4.1.8 Multivariate analysis

In this section, I examine the degree of the contribution of each factor to the distribution of *sa*-Insertion and the interaction among internal and external factors by means of the multivariate analysis, based on the results of the factor-by-factor analysis in previous sections. In previous sections, I demonstrated that the internal and external factors have an influence on the distribution of *sa*-Insertion by means of factor-by-factor analysis.

In language change, each factor affects the distribution of particular variables interacting with each other in an intricate way, instead of playing a role independently, in other words, the interactions of each factor govern the distribution of the variables. For example, it may be the case that the effect of speech style is just the projection of the effect of speech style as a subcategory, even if the results of the factor-by-factor analysis show that the speech type has an influence on the distribution of *sa*-Insertion. In addition, it is not the case that every factor is playing a role in a uniform manner. Alternatively, it is likely that among the significant factors, there is a ranking in their contribution: For example, the speech type has the largest impact and the speech style has the second largest impact on the distribution of *sa*-Insertion. Therefore, it is necessary to conduct the detailed analysis considering the interactions among each factors, in order to reveal the mechanism of variation and change.

Specifically, I conduct the binominal logistic regression analysis; the dependent variable is the choice of *sa*-Insertion/standard causative, and the independent variable (the predictor) includes three internal factors: verb-length, following context, and affirmative/negative distinction; and three external factors:

birth-year, type of the Diet meeting, and type of the House.[36] I employed the statistical software SPSS. Among the result of the analysis, the coefficients of each independent variable correspond to the degree of contribution (weight) of each factor to the distribution of the variation.

If, however, there is a strong correlation among independent variables (multicollinearity), the results of the regression analysis will be inaccurate; specifically, the estimator of partial regression coefficients will be unstable. To avoid the problem, we have to figure out the correlation among variables, and include the interaction terms in the analysis. I firstly examine the correlation among variables. I show the results of the analysis below, firstly the correlation matrix.

Table 21. Correlation matrix among dependent variable and independent variables (*sa*-Insertion, Diet database)

	Constant	House	birth-year	Diet	verb-length	following	Aff/Neg
Constant	1.000	.-769	-1.000	.005	.104	.022	-.013
House	-.769	1.000	.768	-.017	-.128	.060	.012
birth-year	-1.000	.768	1.000	-.007	-.115	-.045	.006
Diet	.005	-.017	-.007	1.000	-.024	.071	.010
verb-length	.104	-.128	-.115	-.024	1.000	-.006	.003
following	.022	.060	-.045	.071	-.006	1.000	.294
Aff/Neg	-.013	.012	.006	.010	.003	.294	1.000

Firstly, I discuss the interaction among factors, based on the result shown in Table 21.

[36] The factors with categorical effects such as idioms and nouns, self-controllability, and OCP (μ) cannot be included in the regression analysis.

In language variation and change, the following tendency with respect to the interaction of factors is observed: internal factors are mutually independent, in other words, there exists no significant interaction within internal factors; internal factors and external factors are also mutually independent; while external factors are interrelated (Labov 1982). If this claim is on the right track, it follows that the internal factors such as verb-length, following context, and affirmative/negative distinction are mutually independent, internal factors and external factors (type of the House, type of the Diet meeting, and birth-year) are also mutually independent, and only the external factors are interrelated also in the present analysis. Looking into the results in Table 21, we observe that verb-length, following context, and affirmative/negative distinction are independent,[37] and that these factors do not show any significant correlation with type of the House, type of the Diet meeting, and birth-year, respectively. Each internal factor independently affects the distribution of *sa*-Insertion. Thus, the independence of each internal factor is borne out. On the other hand, type of the House and birth-year show high correlation coefficient. The results support the above claim.

The correlation between type of the House and birth-year is attributed to the fact that the candidates in Councilors are all over 30 years old, while those in Representatives are over 25 years old. The average age of the members in Councilors is higher than than that of those in Representatives. This is reflected in the correlation between these two factors.

Next, I discuss the degree of contribution of each factor to the distribution of *sa*-Insertion. I show the result of logistic regression below.

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[37] Following context and affirmative/negative distinction shows a certain degree of correlation. This is because both of these refer to the same context: the following context of causative suffixes. Specifically, the negative context is a subset of the "others" in following context, and the affirmative context covers the context of the *te-itadak-* pattern. Thus, the contexts of these two factors partly overlap.

Table 22. Result of the logistic regression (*sa*-Insertion, Diet database)[38]

variables in the equation

	β	SE	Wald	d.f.	P-value	Exp(β)
House	89.893	18.212	24.363	1	.000	1.10E+039
birth-year	.054	.007	57.835	1	.000	1.056
Diet	.501	.431	1.354	1	.245	1.651
verb-length	-.110	.078	1.990	1	.158	.896
following context	3.345	.328	104.039	1	.000	28.365
Aff/Neg	.121	1.053	.013	1	.909	1.128
House by birth-year	-.046	.009	24.803	1	.000	.955
Constant	-110.729	13.954	62.967	1	.000	.000

-2 Log likelihood = 1984.957, Cox & Snell R^2 = .108, Nagelkerke R^2 = .277[39]

[38] I introduce the statistical terminology in Table 22. "β" indicates the regression coefficient which represents the coefficients of each independent variable in the regression equation. If the value is positive, the variable positively contributes to the choice of *sa*-Insertion (increase the frequency of *sa*-Insertion), on the other hand, if the value is negative, the variable negatively contributes to the choice of *sa*-Insertion (decrease the frequency of *sa*-Insertion). If the (absolute) value of coefficient is higher, the contribution of the variable is greater. "SE" refers to the standard error which is the standard deviation in the estimated value (not in the observed data). If standard error takes higher value, the deviation is greater. "Wald" indicates the Wald statistic, which is the test statistic used for the determination of the significance of regression coefficient in Wald test. Based on the Wald statistic, the significance probability (P-value) is calculated. If the Wald statistic is higher, the resulting P-value will be lower. For example, the significant probability of House (.000) is calculated based on its Wald statistic (24.363). The significance probability (P-value) is shown in the 6th column. If the significance probability of a variable is less than .05, I regard the variable as significant. For example, the significance probability of House is .000, thus House is significant; on the other hand, the significance probability of verb-length is .158, thus verb-length is not significant. "Exp(β)" represents the odds ratio. For example, Exp(β) of the following context is 28.365. This shows that the probability of the choice of *sa*-Insertion is 28.365 times higher with *te-itadak-* pattern than with "others," everything else being equal. If this value is closer to 1, the contribution of the variable is smaller. The variable such as "House by birth-year" is the interaction term which combines the variables showing the interaction. With the interaction term, we reflect the interaction of variables into the model.

[39] -2 Log likelihood, Cox & Snell R-Square and Nagelkerke R-Square indicate the *fit* of the constructed model (Goodness of Fit Index). -2 Log likelihood represents a degree with which the constructed model cannot account for the data. The smaller the value, the better the model explains the data. If we reduce the number of independent variables, the unexplained parts of the data will increase and the value of -2 Log likelihood will be higher. Cox & Snell R-Square is an attempt to imitate the interpretation of multiple R-Square based on the likelihood. Nagelkerke R-Square is a further modification of the Cox & Snell coefficient to assure that it can vary from 0 to 1. Nagelkerke R-Square will normally be higher than the Cox and Snell measure. As for Cox & Snell R-Square and Nagelkerke R-Square, the larger the value, the better the model explains the data.

As Table 22 shows, type of the House, birth-year, following context, and type of the House by birth-year are significant, according to the P-values. Although verb-length is not significant with five percent level, the tendency for the significance is observed. This shows that these factors contribute to the distribution of *sa*-Insertion. On the other hand, type of the Diet meeting and affirmative/negative distinction are not significant, namely these factors do not contribute to the distribution of *sa*-Insertion. As to the interaction between factors, type of the House and birth-year are both significant as an independent factor. The interaction term type of the House by birth-year is also significant. This shows that these factors do not play a role independently, but contribute to the distribution of *sa*-Insertion interacting with each other.

Looking into the coefficients of each significant factor ("β" in Table 22), we observe that among the significant factors (type of the House, birth-year, following context, and type of the House by birth-year), type of the House is the most influential factor, and other factors are ranked as follows according to their contribution: following context, birth-year, and type of the House by birth-year. In other words, the factors affect the distribution of *sa*-Insertion in the order of: type of the House, following context, birth-year, and type of the House by birth-year.

As to the interaction of type of the House and birth-year, the coefficients of birth-year and the interaction term type of the House by birth-year are not so high. On the other hand, type of the House as an independent factor shows the extremely high coefficient. This implies that the effect of birth-year is projected on type of the House, and the complex of these two factors eventually affects the distribution of *sa*-Insertion in the form of the supercategory type of the House, although birth-year plays a role in itself. Among the external factors associated with the potential stylistic difference in the Diet, type of the House is confirmed to contribute to the distribution of *sa*-Insertion although type of the Diet meeting is not a significant factor. Thus, I obtained the detailed insights about the effects of internal and external factors as well as their interaction that are unavailable by the factor-by-factor analysis. Based on these observations, I model the relationship among each factor as follows.

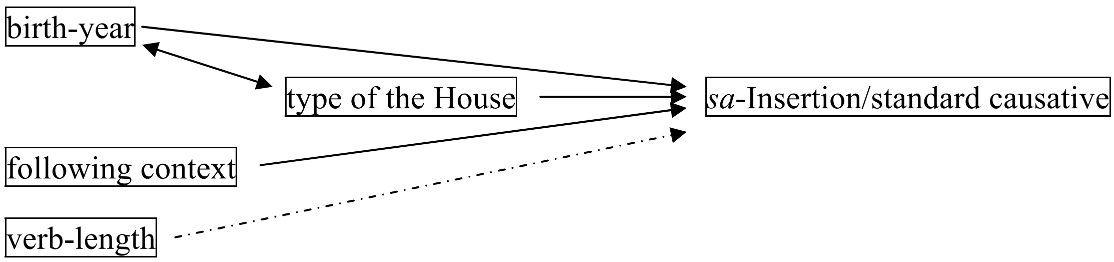

Figure 6. Model of the relationships among birth-year, type of the House, following context, and verb-length

4.1.9 Summary

In this section, I conducted statistical analysis of *sa*-Insertion via the Diet database. As a result, some unexplored properties of *sa*-Insertion were revealed, and claims of previous studies were verified in an objective and empirical manner. Specifically, the results show that *sa*-Insertion: 1) is increasing more and more in recent years; 2) is more compatible with the stylistically formal settings (Councilors and committees); 3) does not occur in idioms and nouns; 4) is more compatible with the affirmative context ; 5) is in the course of grammaticalizing and creating the independent word, -*as-ase-te-itadak*-; 6) is restricted to self-controllable verbs; 7) is restricted to the intransitive (action or process) verbs; 8) does not contain the sequence *sasa* (OCP (μ)); 9) is restricted to consonant verbs (OCP (μ)); 10) seldom occurs in verbs more than 5 morae in length; 11) is subject to the lexical diffusion and frequency effect that are the long standing issues in the study of language variation and change. Furthermore, I argued that the analogical leveling is the driving force of the change of *sa*-Insertion. Most importantly, the internal factors predominantly play a role in a categorical manner (the observations #3, 6, 7, 8, 9), on the other hand, every external factor contributes to the distribution gradiently (#1 and 2).

The multivariate analysis reveals the degree of the contribution of each factor to the distribution of *sa*-Insertion and the interaction among internal and external factors. Firstly, as to the interaction among factors, verb-length, following context, and affirmative/negative distinction are independent, and these factors do not show any significant correlation with type of the House, type of the Diet meeting, and birth-year, respectively. The results, coupled with the categorical/gradient distinction, imply that the internal and external factors occupy distinct rooms in human linguistic competence. Secondly, as to the degree of the contribution of each factor, factors affect the distribution of *sa*-Insertion in the order of: type of the House, following context, birth-year, and type of the House by birth-year. As opposed to the claim that internal factors constrain the phenomena categorically and the internal factors are associated with the grammaticality (hard constraint), on the other hand external factors constrain the phenomena gradiently and the external factors are associated with the acceptability (soft constraint) (Keller 2000, among others), it is not necessarily the case that the internal factors are categorical. Furthermore, the strength of internal factors does not necessarily override that of external factors; some external factor shows extremely significant contribution.

The results partly support Kikuchi's claim that *sa*-Insertion has contributed to the creation of an independent word and Okada's claim that the benefactive pattern (*-as-ase-te-itadak-* pattern) is especially frequent in *sa*-Insertion. However, the claim of Chen (2002) that *sa*-Insertion occurs in almost all the consonant verbs regardless of stem length is refuted. Based on the effects of the preceding and following contexts, *sa*-Insertion does not necessarily lead to the simplification of the conjugation of verbs in Japanese, as claimed by Inoue (2003). Okada's claim that the reanalysis caused the emergence of *sa*-Insertion is implausible. The issue of verb-length cannot necessarily be attributed to the difference between the lexicon and the grammar, as Kinsui (2003) argues. The traditional hypothesis that negative contexts tend to show the conservative behavior in language change compared to affirmative contexts is supported.

I conclude that *sa*-Insertion is in the beginning of a language change; that change will most likely proceed in an S-curve fashion. In addition, the ongoing grammaticalization process and the general tendency of diffusion from particular contexts are observed. The distribution of *sa*-Insertion is greatly affected by language internal and external factors. Furthermore, the factors governing the distribution of *sa*-Insertion have been demonstrated to interact with each other (e.g. self-controllability restriction).

The research of *sa*-Insertion in the Diet database captures the beginning of language change. This implies that we can conduct real-time studies of the phenomenon hereafter. Traditionally, the beginning of language change of particular phenomena has already passed when we have noticed the phenomena and initiated the research (e.g. *ra*-deletion, Matsuda 1993; velar nasalization, Hibiya 1995). Therefore, the beginning of language change has been under researched. The continuous real-time study of *sa*-Insertion can reveal various properties of language change that remain to be explored.

4.2 CSJ

In this section, I explain how I conducted analysis of *sa*-Insertion in CSJ, according to each factor. An exhaustive examination of CSJ brought forth a total of 42 causative forms with *sa*-Insertion, as opposed to a total of 1,498 standard causative forms; thus, the rate of *sa*-Insertion (*sa*-Insertion/(*sa*-Insertion + standard causatives) *100) amounts to 6.66 percent, as shown in Table 23 below.

Table 23. Distribution of causatives (CSJ)[40]

	#
sa-Insertion	42
standard causatives	1,498
rate (%)	2.73

In Section 4.2.1, I examine the effects of internal factors. In Section 4.2.2, I discuss the lexical diffusion and the frequency effect. In Section 4.2.3, I examine the effects of external factors. Section 4.2.4 describes how I conducted the multivariate analysis. Finally, Section 4.2.5 summarizes the discussion. Here, I focus primarily on the analysis of external factors which are the main feature of CSJ, along with internal factors.

4.2.1 Internal factors

In this section, I examine the effects of internal factors. In Section 4.2.1.1, I examine

[40] I exclude the speeches labeled as 'R' (readings) or 'D' (dialogs) where no *sa*-Insertion is observed. Furthermore, it is not the case that every item of the speaker data and the impressionistic rating data are annotated to every speech. For certain cases, there are no records, labeled as 'nr.' In such a case, I regard it as a missing value, and exclude from the subject of the analysis. Therefore, in each factor-by-factor analysis the total frequency of *sa*-Insertion and standard causative does not necessarily amount to 42 and 1,498, respectively.

the categorical effects of six internal factors: 1) whether *sa*-Insertion occurs in idioms and nouns; 2) the affirmative/negative distinction; 3) the self-controllability restriction; 4) the transitivity; 5) whether *sa*-Insertion contains the sequence *sasa* (OCP (μ)); 6) the effect of consonant/vowel verb distinction. In Section 4.2.1.2, I examine the effect of following context on the distribution of *sa*-Insertion (grammaticalization). Section 4.2.1.3 examines the effect of verb-length.

4.2.1.1. Categorical factors

In this section, I examine the six internal factors that show categorical or close to categorical effects in the Diet database. I examined each factor by looking into the distribution of *sa*-Insertion and standard causatives. The results are summarized in Table 24.

Table 24. Categorical effects of six internal factors on the distribution of *sa*-Insertion (CSJ)

factors	effects
idioms & nouns	*Sa*-Insertion does not occur in idioms and nouns.
affirmative/negative	*Sa*-Insertion does not occur in negative context.
transitivity	*Sa*-Insertion is restricted to the intransitive (action or process) verbs.
self-controllability	*Sa*-Insertion is restricted to self-controllable verbs.
phonological sequence *sasa*	*Sa*-Insertion does not contain the sequence *sasa*.
consonant/vowel verb distinction	*Sa*-Insertion is restricted to consonant verbs.

The results of the examination of six factors in CSJ are consistent with those in the

Diet database: *sa*-Insertion does not occur in idioms and nouns. The result supports the idiomatic expression's resitance to language change; *sa*-Insertion does not occur in negative context; *sa*-Insertion is restricted to self-controllable verbs and the intransitive (action or process) verbs. These are caused by the incompatibility of non-self-controllable verbs and transitive (action and process) verbs with the *-te-itadak-* component of the *-as-ase-te-itadak-* pattern. This is associated with the grammaticalization of the independent word *-as-ase-te-itadak-* which is accompanied by the change of *sa*-Insertion; *sa*-Insertion does not contain the sequence *sasa*, and it is restricted to consonant verbs. The results show that *sa*-Insertion is subject to OCP (μ).

Importantly, the affirmative/negative distinction has a categorical effect in CSJ: Every *sa*-Insertion occurs in an affirmative context, and no example in a negative context is observed. In the Diet database, *sa*-Insertion is more compatible with the affirmative context, namely the effect of affirmative/negative distinction is gradient rather than categorical, although the distribution is close to categorical (1 token). The single token of *sa*-Insertion in negative context is observed in 1973, and no such case has been found in the past 25 years. This implies that the gradient effect of affirmative/negative distinction is en route to becoming a categorical one, although the difference in the amount of the data may affect the result: The present data includes 42 tokens of *sa*-Insertion in CSJ, 352 tokens in the Diet database. The effects of internal factors (hard constraint) may change from gradient to categorical in the course of the change.

4.2.1.2 Following context

In the examination of the Diet database I obtained the following results: *sa*-Insertion predominantly occurs with the *-as-ase-te-itadak-* pattern; the grammaticalization process is currently underway; *sa*-Insertion is contributing to the grammaticalization of the independent word *-as-ase-te-itadak-*. In this section, I examine the effect of following context on the distribution of *sa*-Insertion in CSJ, with reference to the grammaticalization. I classify *sa*-Insertions and standard causatives according to the following context. The result is shown below.

Table 25. Distribution of causatives by following context (CSJ)

context	*sa*-Insertion	standard causative	rate of *sa*-Insertion(%)
-te-itadak-	37	543	6.38
others[41]	5	955	0.52
total	42	1,498	2.73

X^2 =46.78, d.f.=1, p<0.001 (p<0.001)

As Table 25 shows, the frequency of *sa*-Insertion in the *-as-ase-te-itadak-* pattern is 37, among a total of 42 occurrences of *sa*-Insertion, and compared to other patterns, the rate of *sa*-Insertion in the *-as-ase-te-itadak-* pattern shows a high percentage: 6.38 percent. That is, most of the *sa*-Insertions occur with the *-as-ase-te-itadak-* pattern. The results of the examination in CSJ is consistent with that in the Diet database: The *-as-ase-te-itadak-* pattern is predominant; the following context of *sa*-Insertion, however, is not limited to the *-as-ase-te-itadak-* pattern. (Other patterns are also observed.) This implies that the grammaticalization process remains to be completed and is currently underway. Thus, the results support the grammaticalization hypothesis.

[41] Among the following context, I observed the following patterns besides the *-as-ase-te-itadak-* pattern: *-te* (2), *-ru*, *-te-kure*, none (1).

4.2.1.3 Preceding context (verb-length)

The examination of the Diet database shows that *sa*-Insertion is more compatible with the shorter verbs than the longer verbs, with a higher rate in shorter verbs than in longer verbs in the beginning of language change. In this section, I examine the effect of verb-length on the distribution of *sa*-Insertion in CSJ. Assuming the result of the Diet database and the view that the language change (esp. morphological, syntactic one) proceeds from short verb stems to long verb stems, I found that the frequency and the rate of *sa*-Insertion is higher in shorter verbs than in longer verbs. The results are shown below.

Table 26. Distribution of causatives by verb-length measured by mora (CSJ)

mora	*sa*-Insertion	standard causative	rate of *sa*-Insertion(%)
2 morae	8	515	1.53
3 morae	31	736	4.04
4 morae	1	192	0.52
5 morae	2	51	3.77
6 morae	0	4	0.00
total	42	1,498	2.73

$X^2 = 11.7$, d.f.=4, $p<0.02$ ($p<0.01$)

As Table 26 shows, the frequency of *sa*-Insertion in 2 and 3 morae verbs is 8 and 31, respectively. On the other hand, the frequency of *sa*-Insertion in 4 and 5 morae verbs is only 1 and 2, respectively. In 6 morae verbs, I observed no token of *sa*-Insertion. Likewise, the rate of *sa*-Insertion in 2 and 3 morae verbs is over 1.5 percent, while in 4, 5 and 6 morae verbs, the rate is low.[42] These results show that the distribution of *sa*-Insertion is affected by verb-length. *Sa*-Insertion is more compatible with the short verb stems. In the beginning of language change, *sa*-Insertion seldom occurs in verbs of more than 4 morae in length and the assumption that the change diffuses from shorter verbs to longer verbs is true for the case of *sa*-Insertion. The results in CSJ are consistent with those in the Diet database, with the exception that the frequency as well as the rate of *sa*-Insertion is low with 4 morae verbs in CSJ. The results support the view that the change proceeds from short verb stems to long verb stems.

So far, I have examined the effects of internal factors on the distribution of *sa*-Insertion. The six internal factors have the categorical effects. As to the gradient factors, *sa*-Insertion: is in the course of grammaticalizing and creating the independent word, *-as-ase-te-itadak*; seldom occurs in verbs more than 4 morae in length. Most of the results in CSJ are consistent with those in the Diet database.

4.2.2 Lexical diffusion and frequency effect

In CSJ, I again observed lexical diffusion of *sa*-Insertion. The change of *sa*-Insertion does not diffuse uniformly among all verbs, but begins with particular verbs and spreads to other verbs. I present the representative verbs with *sa*-Insertion and their frequency: *owar-u* 'finish' (22); *yob-u* 'call' (3); *ugok-u* 'move,' *kubar-u* 'distribute' (2); *yar-u* 'do,' *tsukur-u* 'make,' *hair-u* 'enter,' *tsuk-u* 'accede,' *erab-u* 'select,' *yom-u* 'read,' *nom-u* 'drink,' *tob-u* 'fly,' *mawar-u* 'compass,' *furikaer-u* 'review,' *habuk-u* 'skip' (1). The results support the claim of the lexical diffusion theory.

[42] The rate of *sa*-Insertion is high in 5 morae. This may be because the token frequency of *sa*-Insertion in the present data is low (42), therefore even one token has a great impact on the result.

As mentioned above, the lexical diffusion of *sa*-Insertion is associated with the frequency effect. I examined the correlation between the frequency of the representative verbs in CSJ with *sa*-Insertion and the frequency of these verbs in NIJL (2005). If the frequency effect plays a role, the frequency of *sa*-Insertion will be high with frequent verbs, and low with less frequent verbs. I show the result in Table 27.

Table 27. Frequency of representative verbs in CSJ with *sa*-Insertion and in NIJL (2005)

verbs	frequency in CSJ with *sa*-Insertion	frequency in NIJL (2005)
owar-u	22	128
yob-u	3	191
ugok-u	2	88
kubar-u	2	15
yar-u	1	665
tsukur-u	1	654
hair-u	1	486
tsuk-u	1	336
erab-u	1	267
yom-u	1	246
nom-u	1	179
tob-u	1	94
mawar-u	1	68
furikaer-u	1	26
habuk-u	1	15

Correlation coefficient: -0.158

As Table 27 shows, the frequency of *sa*-Insertion is high: 22 with infrequent verbs *owar-u* (22), however the frequency of *sa*-Insertion is low: 1 not only with frequent verbs such as *yar-u* (665) and *tsukur-u* (654) but also with infrequent verbs such as *furikaer-u* (26) and *habuk-u* (15). The correlation coefficient between frequency in CSJ with *sa*-Insertion and frequency in NIJL (2005) is -0.158. Although the correlation shows the inverse one, the result is not significant. This may result from the size of the data: the frequency of most of the verbs in CSJ with *sa*-Insertion is no more than 1. The extremely low frequency smoothes the differences among verbs. The frequency effect is not significant, as far as the present data is concerned.

4.2.3 External factors

In this section, I examine the effects of external factors on the distribution of *sa*-Insertion. The factors examined are "speech type (APS/SPS)," "gender," "birth-year," "geographical difference," "spontaneity of speech," "speech style," "speech skill," "speech experience." These factors are subject to the analysis in turn.

4.2.3.1 Speech type (APS/SPS)

In this section, I examine the effect of the speech type (APS/SPS) on the distribution of *sa*-Insertion. As mentioned above, it is empirically known that *sa*-Insertion is more compatible with the formal settings. Although the results of the examination of stylistic difference in the Diet database as well as the discussion of the relationship between *sa*-Insertion and *-as-ase-te-itadak-* pattern show that *sa*-Insertion is used in formal settings that is consistent with the empirical knowledge that the style in the Diet tends to be formal and that the utterances in casual settings such as the daily conversation are unlikely. In other words, there exists no absolute index of stylistic difference in the Diet database: The stylistic difference between Councilors and Representatives, plenary session and committee are not defined by a rigorous methodology. On the other hand, in CSJ where the extensive information concerning external factors, including the impressionistic rating data is annotated, enables the detailed analysis of external factors. In this section, I use the impressionistic rating data as the absolute index of the style in each speech.

In CSJ, the speech type constitutes the principal factor which represents the factors associated with the characteristics of speech. Although the Academic Presentation Speech (APS) and the Simulated Public Speaking (SPS) are the same in the sense that both speeches are monologues in front of the public audiences, a number of differences with respect to the character of speech are summarized in the APS/SPS distinction: the APS is characterized by the logical, relatively nonspontaneous, and formal style, the SPS, on the other hand is characterized by the spontaneous, relaxed, and casual style (Maekawa 2004). Based on the consideration of the difference between APS and SPS, I hypothesize that the frequency and the rate of *sa*-Insertion is higher in APS, where the speech style is formal, than in SPS, where the speech style is casual. I verify the hypothesis by examining the distribution of *sa*-Insertion and standard causatives according the APS/SPS distinction.[43] The results are shown below.

Table 28. Distribution of causatives by speech type (APS/SPS)

speech type	*sa*-Insertion	standard causative	rate of *sa*-Insertion (%)
APS	14	545	2.50
SPS	18	913	1.93
total	32	1,458	2.15

X^2 =0.54, d.f.=1, n.s.

[43] Although the analysis of *sa*-Insertion in CSJ focuses on the academic presentation speech (APS), the simulated public speaking (SPS), and “others” (M), the character of others (M) is not strictly defined, and it is difficult to define. Therefore, I exclude the others (M) from the examination of speech type, since it seems impossible to develop the linguistically convincing argument, even if the results are significant.

As Table 28 shows, the rate of *sa*-Insetion is higher in APS than in SPS. This shows that *sa*-Insertion is more compatible with the APS, which includes the stylistically formal speeches, than the SPS, which includes stylistically casual speeches, as the hypothesis predicts. In addition, I verified the results of the examination in the Diet database as well as the empirical insight in an objective manner. However, the result of the chi-square test is not significant. This implies that the speech type is not significant as an independent factor, and the interaction between the speech type and other factors associated with the characteristics of speech contributes to the distribution of causatives by speech type. In what follows, I conduct the analysis with this possibility in mind.

4.2.3.2 Gender

In the study of language variation and change, the contribution of gender difference has been emphasized in a number of cases (cf. Labov 1990, among others). However, the issues of gender remain to be explored with respect to *sa*-Insertion, due to the properties of the data. Thus, the examination of the effect of gender difference on the distribution of *sa*-Insertion is another main aim of the analysis in CSJ. In language change, females have been considered to take the lead of the change (Labov 1990, 2001; Milroy and Gordon 2003, among others). Putting this insight into the present context, we can say that if females take the lead in the change of *sa*-Insertion, the frequency and the rate of *sa*-Insertion are higher in females than in males in the present data that represents the beginning of the change. I verify this hypothesis by examining the distribution of *sa*-Insertion and standard causatives by gender. The results are shown below.

Table 29. Distribution of causatives by gender

gender	*sa*-Insertion	standard causative	rate of *sa*-Insertion (%)
male	34	890	3.68
female	8	608	1.30
total	42	1,498	2.73

X^2 =7.9, d.f.=1, p<0.005

As Table 29 show, the frequency and the rate of *sa*-Insertion are higher in male than in female. The results contradict the hypothesis. However, the ratio of the male-female makeup differs greatly by the speech type in CSJ. The difference between APS and SPS with respect to the ratio of the male-female makeup might affect the results.[44] I verify this possibility by examining the distribution of *sa*-Insertion and standard causative by considering the speech type in addition to the gender by means of the cross-tabulation. The results are shown below.

[44] As mentioned above, although the distribution of male and female is balanced in SPS, males are predominant in APS.

Table 30. Distribution of causatives by speech type and gender

APS	*sa*-Insertion	standard causative	rate of *sa*-Insertion (%)
male	9	450	1.96
female	5	95	5.00
total	14	545	2.50
SPS	*sa*-Insertion	standard causative	rate of *sa*-Insertion (%)
male	15	416	3.48
female	3	497	0.60
total	18	913	1.93

X^2 =198.65, d.f.=3, p<0.001 (p<0.002)

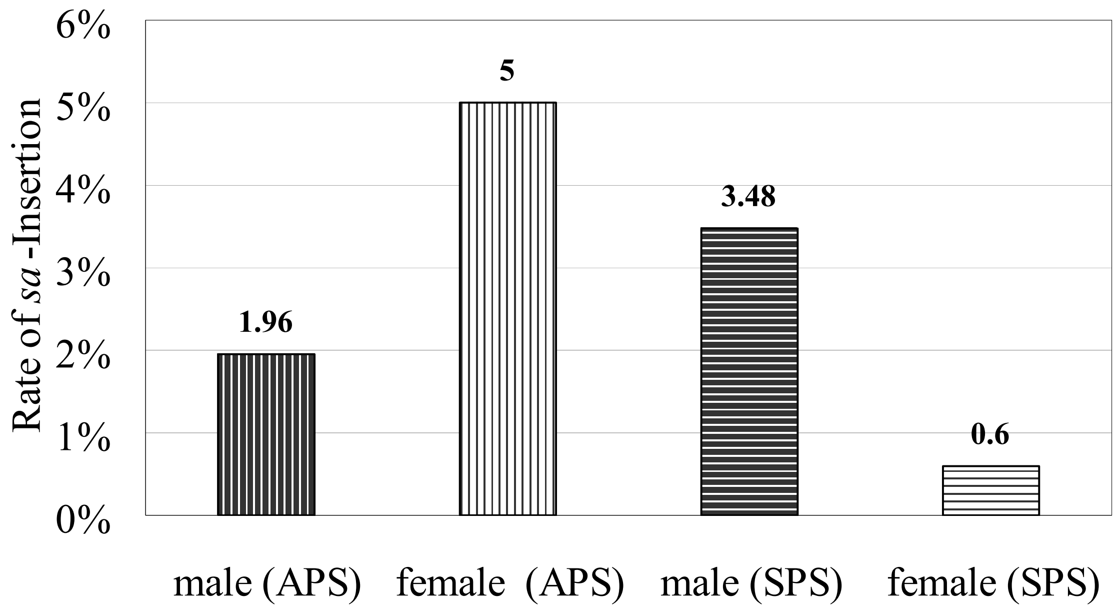

Figure 7. Distribution of *sa*-Insertion by speech type and gender

As Table 30 and Figure 7 show, in APS the rate of *sa*-Insertion is higher in female than in male, on the other hand, in SPS the rate of *sa*-Insertion is higher in male than in female. The distribution of *sa*-Insertion differs greatly according to the speech type. This indicates that the interaction between gender and speech is reflected in the distribution of *sa*-Insertion in gender as an independent factor. Furthermore, as to the difference of the rate of *sa*-Insertion between APS and SPS in male and female, respectively, the difference is 1.5 percent in male, while it amounts to 4.5 percent in female. Why does *sa*-Insertion is more compatible with female than male in APS and why is it more compatible with male to female in SPS? Why the difference of the rate of *sa*-Insertion between APS and SPS differs by male and female? One possible answer is as follows: The variation range in style according to the settings is greater in females than in males, and females are positive to use the innovative form in formal settings, while on the other hand males tend to have the strong awareness towards the social norm and remain reluctant to do so. The results support the traditional assumption that females take the lead of the change.

4.2.3.3 Birth-year

In this section, I consider whether the birth-year has an influence on the distribution of *sa*-Insertion. If *sa*-Insertion is an instance of the language change, the correlation between the distribution of *sa*-Insertion and the birth-year is observed. More specifically, identifying the birth-year as an apparent-time (cf. Bailey 2002), the distribution of *sa*-Insertion is associated in some way with the passage of time. To verify this possibility, I classify each *sa*-Insertion and standard causative for every 10 years, and I examine the distribution of causatives. The results are shown below.

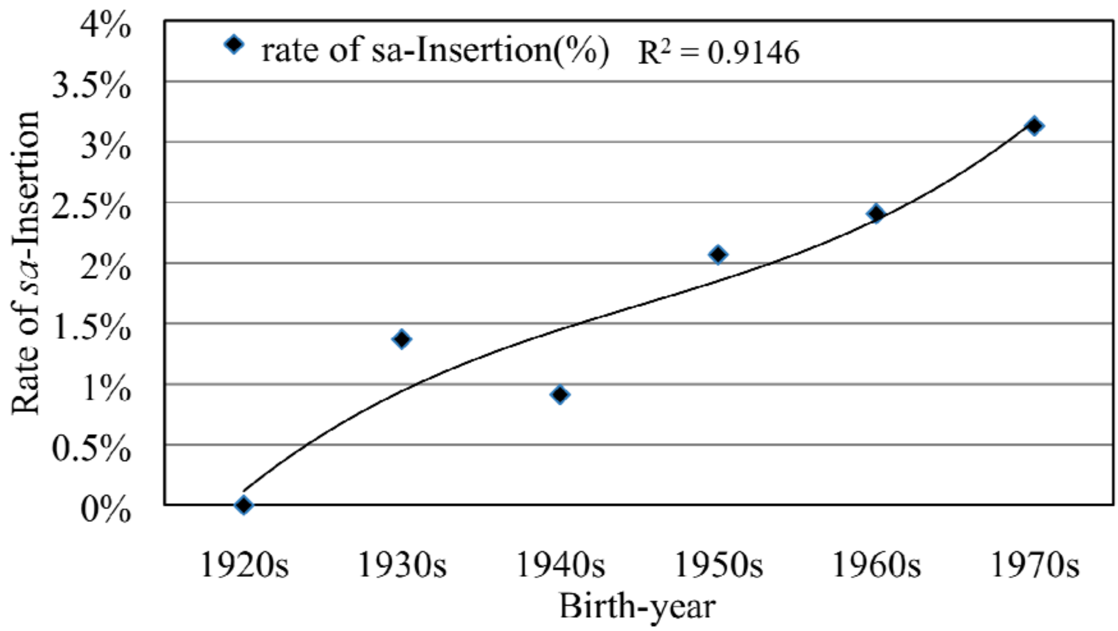

Figure 8. Distribution of *sa*-Insertion by birth year (CSJ)

As Figure 8 shows, the rate of *sa*-Insertion is gradually increasing from the 1920s, where no *sa*-Insertion is observed, to the 1970s. The distribution of *sa*-Insertion and the birth-year correlate with each other, specifically the more recent the birth-year, the higher the rate of *sa*-Insertion. The results show that *sa*-Insertion is an instance of language change, and the change is in progress and currently in the beginning.

The distribution of *sa*-Insertion in CSJ shows close similarity to that in the Diet database. I predict again that the change proceeds in an S-curve manner. Note that in the 1940s the rate of *sa*-Insertion manifests the decline as observed in the analysis of the Diet database. This supports the above argument of the influence of the language policy in wartime and the firm awareness to Japanese tradition.

4.2.3.4 Geographical difference

In this section, I examine the effect of geographical difference on the distribution of *sa*-Insertion and discuss the issues of acquisition and transmission. Among the previous studies of *sa*-Insertion, the issue of the geographical difference remains to be explored. Thus, the geographical distribution of *sa*-Insertion, and the following questions: Where *sa*-Insertion emerged, how *sa*-Insertion has spread, have yet to be revealed.

In CSJ, the information associated with the geographical difference such as residence (present) and residence (critical period) is annotated as data for each speaker. I implement residence (present) and residence (critical period) for the analysis. I reclassify the residence into 11 areas: Hokkaido, Tohoku, Kanto, Chubu, Kinki, Chugoku, Shikoku, Kyusyu, Okinawa, and Abroad (see appendix II). I determined the residence (present) of each speaker according to the following criteria:

(28) The residence (present) is the area where the speaker has lived for the longest period (at least 3 years), in the recent 10 years of all the residential background.

The residence (critical period) is the area where the speaker has lived for the longest period in his/her critical period.

I classify *sa*-Insertion and standard causative according to the above criteria, and examined the distribution of causatives by residence (present) and residence (critical period). The results are shown below.

Table 31. Distribution of causatives by residence (critical period)

residence (critical period)	*sa*-Insertion	standard causative	rate of *sa*-Insertion (%)
Hokkaido (23)[45]	8	40	16.67
Tohoku (27)	0	84	0.00
Kanto (340)	23	801	2.79
Chubu (77)	6	175	3.31
Kinki (87)	2	169	1.17
Chugoku (39)	0	73	0.00
Shikoku (22)	0	37	0.00
Kyusyu (52)	2	103	1.90
Okinawa (1)	0	1	0.00
Abroad (6)	1	11	8.33
total	42	1,494	2.73

[45] The number indicated on the right hand side of each area in the parentheses shows the number of speakers who fall under the relevant area in the present data (e.g. Hokkaido (23)).

Table 32. Distribution of causatives by residence (present)

residence (present)		*sa*-Insertion	standard causative	rate of *sa*-Insertion (%)
Hokkaido	(6)	0	8	0.00
Tohoku	(16)	2	45	4.26
Kanto	(493)	38	1,160	3.17
Chubu	(33)	2	60	3.23
Kinki	(74)	0	128	0.00
Chugoku	(22)	0	43	0.00
Shikoku	(3)	0	3	0.00
Kyusyu	(13)	0	19	0.00
Okinawa	(1)	0	1	0.00
Abroad	(14)	0	29	0.00
total		42	1,496	2.73

As Tables 31 and 32 shows, *sa*-Insertion is distributed over the wide range of areas in residence (critical period). [46] On the other hand, in residence (present) the distribution of *sa*-Insertion is restricted to Kanto, Tohoku, and Chubu areas, centering around Kanto area. Given that the language change spreads in a rippled manner, one can argue that the distribution in residence (present) is more plausible than that in residence (critical period). If we assume the distribution in residence (critical period), the change should spread jumping over the in-between area. It follows that *sa*-Insertion is acquired in adulthood after the critical period. However, the following possibility is

[46] The frequency of *sa*-Insertion and standard causative is extremely high in Kanto area. This is again due to the fact that the recording of CSJ is conducted in Tokyo (Kanto area).

conceivable: *sa*-Insertion is acquired in critical period and retained in adulthood, instead of being acquired in adulthood after the critical period. If this possibility is on the right track, it follows that *sa*-Insertion, which belongs to the morphosyntactic category, is acquired in adulthood, and this serves as a counterexample to the claim concerning the language acquisition that the linguistic categories other than the lexical items (phonological, morphological and syntactic one) are acquired within the critical period and remain stable afterwards (Weinreich 1968; Labov 1994). I verify this possibility by examining the distribution of causatives by residence (present) and residence (critical period) with cross-tabulation.

Table 33. Cross tabulation of the distribution of *sa*-Insertion by residence (present) and residence (critical period)

present / critical period	Hokkaido	Tohoku	Kanto	Chubu	Kinki	Chugoku	Shikoku	Kyusyu	Okinawa	Abroad
Hokkaido			8							
Tohoku										
Kanto		1	22							
Chubu		1	3	2						
Kinki			2							
Chugoku										
Shikoku										
Kyusyu			2							
Okinawa										
Abroad			1							

Table 34. Cross tabulation of the distribution of standard causative

by residence (present) and residence (critical period)

critical period \ present	Hokkaido	Tohoku	Kanto	Chubu	Kinki	Chugoku	Shikoku	Kyusyu	Okinawa	Abroad
Hokkaido	1		34	2	2			1		
Tohoku	1	18	56	6	1			1		1
Kanto	4	17	710	10	36	6	1	4		13
Chubu	1	2	128	31	8			1		4
Kinki	1	1	97	1	60	6		2		1
Chugoku		5	32	3	4	22	1	1		5
Shikoku			14	2	10	3	1	1	1	5
Kyusyu		2	78	3	6	6		8		
Okinawa			1							
Abroad			8	2	1					

In Tables 33 and 34, the longitudinal axis represents the residence (critical period) and the abscissa axis represents the residence (present). As Table 33 shows, among the speakers who utter *sa*-Insertion, most of the speakers who have spent their critical period in the areas other than Kanto area are concentrated in Kanto area nowadays. This shows that such speakers acquired *sa*-Insertion after they had moved to Kanto area. This in turn implies that *sa*-Insertion emerged in Kanto area and has been transmitted to the surrounding areas. Furthermore, *sa*-Insertion is not observed in Hokkaido, Abroad, Kinki area and to the west in the present distribution. It is unlikely for a speaker to be exposed to *sa*-Insertion in critical period (past), which is the present-day language change, as an input to the acquisition in such areas. Therefore, the results support the acquisition of *sa*-Insertion in adulthood. As opposed to the distribution of *sa*-Insertion, standard causative is observed in many areas in the present distribution as Table 34 illustrates. This shows that the standard causative is uttered in such areas in critical period (past). Therefore, standard causative is acquired in critical period and retained in adulthood, instead of being acquired in adulthood after the critical period.

The shaded cells represent the tokens in which residence (critical period) and residence (present) coincide. These cells in Table 33 show that the speakers who have consistently lived in Kanto and Chubu areas utter *sa*-Insertion. In order for such speakers to be exposed to *sa*-Insertion as an input, *sa*-Insertion should have been uttered in these areas. This supports the assumption that *sa*-Insertion emerged in Kanto area or Chubu area and has been transmitted to the surrounding areas.

Going back to the discussion of the acquisition, the acquisition of *sa*-Insertion, which belongs to the morphosyntactic category, in adulthood serves as the counterexample to the claim concerning the language acquisition that the linguistic categories other than the lexical items (phonological, morphological and syntactic one) are acquired within the critical period and remain stable afterwards. If the grammaticalization hypothesis is on the right track, *sa*-Insertion is categorized as a lexical item, and the acquisition in adulthood does not serve as the counterexample to the above claim. However, the results of the analysis show that the grammaticalization remains to be completed. It is not necessarily the case that *sa*-Insertion is a lexical item. Hence, there is a good likelihood that the results of the present analysis serve as the counterexample to the claim of language acquisition.

4.2.3.5 Spontaneity

In this section, I examine the effect of spontaneity on the distribution of *sa*-Insertion. The spontaneity is subsumed under the supercategory, speech type (APS/SPS), along with the speech style and speech experience that I discuss in subsequent sections, in other words the speech type amalgamates various factors associated with the characteristics of speech, and it includes also the speech style and speech experience as its subcategories.[47] However, the degree of spontaneity by the speech type (APS/SPS) is the attribute defined on the inter-speech type basis, not on the intra-speech type basis. It is the case that spontaneous speeches are included in the APS which is characterized by less spontaneous speech, and less spontaneous speeches are included in the SPS which is characterized by spontaneous speech. Thus, the examination depending solely upon the speech type with respect to the spontaneity is insufficient, and it is necessary to examine the spontaneity as an independent factor. I verify the effect of the spontaneity by looking into the distribution of *sa*-Insertion and standard causative by the degree of spontaneity. The results are shown below.

[47] In the present analysis, the supercategory and the subcategory represent the structure and relationship among each factor in affecting the distribution of linguistic phenomena, and I do not mean that CSJ is designed to include the structure and relationship among each factor.

Table 35. Distribution of causatives by spontaneity

spontaneity	*sa*-Insertion	standard causative	rate of *sa*-Insertion (%)
lowest	2	139	1.42
lower	2	125	1.57
middle	6	272	2.16
higher	8	407	1.93
highest	24	554	4.15
total	42	1,497	2.73

X^2 =7.31, d.f.=4, n.s. (n.s.)

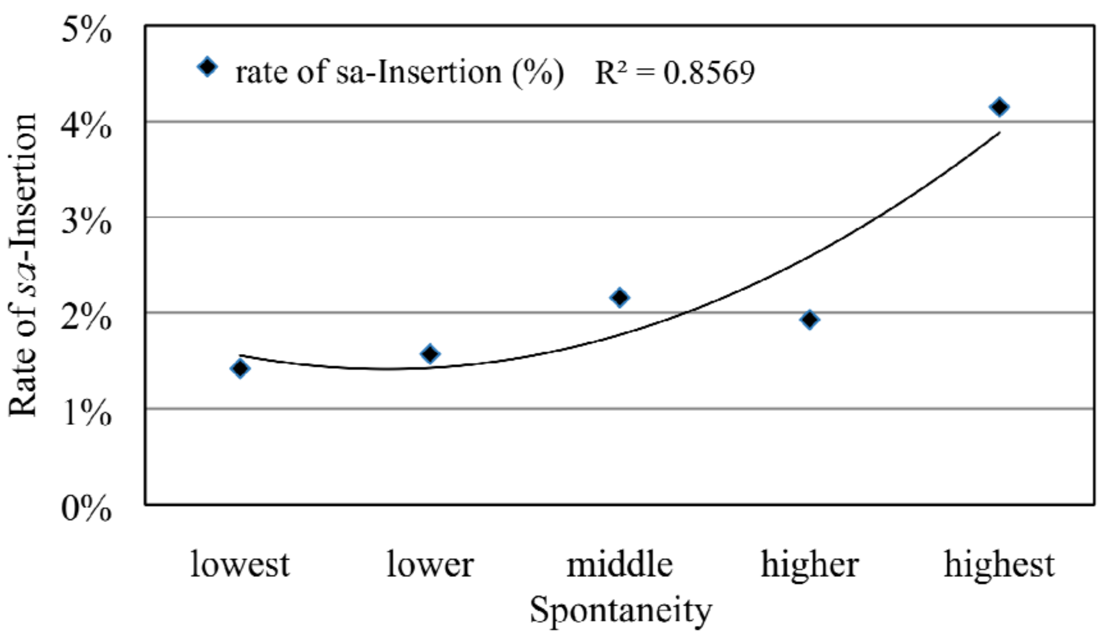

Figure 9. Distribution of *sa*-Insertion by spontaneity

As Table 35 and Figure 9 illustrate, a particular tendency of the distribution of *sa*-Insertion is observed: The higher the degree of spontaneity, the higher the frequency and the rate of *sa*-Insertion. *Sa*-Insertion is more compatible with the speech with high spontaneity. The result contradicts the prediction based on the results in speech type. The result of the chi-square test also shows the distribution is not significant. This implies that the interaction between factors comes into play. I examine the distribution of *sa*-Insertion and standard causative considering the interaction between spontaneity and gender by means of the cross-tabulation.

Table 36. Distribution of causatives by spontaneity and gender

male	*sa*-Insertion	standard causative	rate of *sa*-Insertion (%)
lowest	0	87	0.00
lower	2	58	3.33
middle	5	155	3.13
higher	6	253	2.32
highest	21	336	5.88
total	34	889	3.68
female	***sa*-Insertion**	**standard causative**	**rate of *sa*-Insertion (%)**
lowest	2	52	3.70
lower	0	67	0.00
middle	1	117	0.85
higher	2	154	1.28
highest	3	218	1.36
total	8	608	1.30

X^2 =22.6, d.f.=9, p<0.01 (p<0.01)

As Table 36 shows, the distribution of *sa*-Insertion is not related to spontaneity in females, and the correlation between the distribution and spontaneity is attributed to males. I assume the interaction between spontaneity and gender. The results imply that *sa*-Insertion is affected by spontaneity as an independent factor, and the higher the degree of spontaneity, the higher the frequency and the rate of *sa*-Insertion. Also in speech type, *sa*-Insertion is more compatible with SPS, which is high in spontaneity. However, the effects of various factors such as speech style and gender cancel out the effect of spontaneity through the interaction. As a result, *sa*-Insertion is more compatible with APS which is low in spontaneity with respect to speech type as an independent factor.

At this point, I mention that the change of *sa*-Insertion is not so advanced that it occurs in written language. The results show that the higher the degree of spontaneity, the higher the frequency and the rate of *sa*-Insertion. As in the claim of Chen (2002) that *sa*-Insertion does not occur in written language in the beginning of the change, the language change is assumed to proceed from spoken language to written language. The speech with high spontaneity is “spoken-languagewise”, on the other hand the speech with low spontaneity is “written-languagewise.” Therefore, *sa*-Insertion which is in the beginning of the change is more compatible with the speech with high spontaneity.

4.2.3.6 Speech style

In this section, I examine the effect of speech style, which is subsumed under speech type, on the distribution of *sa*-Insertion. The discussion of the relationship and the structure among factors also applies to speech style. Thus, the examination of speech style as an independent factor is necessary. Based on the observation that *sa*-Insertion is more compatible with the formal settings, I hypothesize that *sa*-Insertion shows the higher rate in formal speech than in casual speech with respect to speech style. I stratify the speech style into "casual," "middle," and "formal," and I classify each token according to the strata. I examine the effect of speech style as well as the interaction between speech style and gender. The results are shown below.

Table 37. Distribution of causatives by speech style[48]

style	*sa*-Insertion	standard causative	rate of *sa*-Insertion (%)
casual	8	346	2.26
middle	20	678	2.87
formal	14	422	3.21
total	42	1,446	2.82

$X^2 = 0.65$, d.f. = 2, n.s.

[48] In CSJ, the speech style is originally evaluated on an ascending risk scale of 1 to 5 (The formality increases from 1 to 5.), and the result of the evaluation is annotated to each speech as the impressionistic rating data. The annotated data is not applicable to the present analysis in its original form, on the grounds that for some item the token is too small with the scale of 1 to 5 to obtain the statistically significant results. In order to obtain the distribution available for the statistical analysis, I smooth the extreme irregularities for each item by the following transform of the scale: I merge "1" and "2" into "casual," "4" and "5" into "formal," and conduct the statistical analysis (I do not apply the transform to "3", since it is available for the analysis in its original form.). The same argument also applies to other factors. I applied the transform to speech skill and speech experience. The speech skill is originally evaluated by a 4-level rating system: "skillful," "somewhat skillful," "somewhat unskillful," and "unskillful." I merge "skillful" and "somewhat skillful" into "skillful," and "somewhat unskillful," and "unskillful" into "unskillful." The speech experience is originally evaluated by a 5-level rating system: "first time," "fewer than 5 times," "fewer than 10 times," "fewer than 20 times," and "more than 21 times." I merged "first time" and "fewer than 5 times" into "up to 5 times," and "fewer than 10 times," "fewer than 20 times," and "more than 21 times" into "more than 6 times."

Table 38. Distribution of causatives by speech style and gender

male	*sa*-Insertion	standard causative	rate of *sa*-Insertion (%)	female	*sa*-Insertion	standard causative	rate of *sa*-Insertion (%)
casual	6	216	2.7	casual	2	130	1.52
middle	17	377	4.31	middle	3	301	0.99
formal	11	264	4.00	formal	3	158	1.86
total	34	857	3.82	total	8	589	1.34

X^2 = 9.7, d.f. = 5, n.s. (n.s.)

As Table 37 shows, *sa*-Insertion shows the higher frequency and rate in formal. Although a certain level of difference is observed according to the gender, the tendency is still maintained as in Table 38. The results support the hypothesis that *sa*-Insertion is more compatible with the formal speech. However, the result of the chi-square test is not significant. This implies the interaction of speech style with some other factors. I discuss this issue in later sections.

I turn to the discussion of the relationship and the structure among factors. With respect to speech style as a subcategory of speech type, the higher the degree of formality, the higher the rate of *sa*-Insertion. Similarly, *sa*-Insertion is more compatible with APS which is inherently formal in style with respect to speech type. This implies that the effect of speech style is directly reflected in the effect of the supercategory, speech type. It follows that speech style is the major factor comprising speech type in its effect on the distribution of *sa*-Insertion, unlike spontaneity.[49]

[49] I discuss the interaction among these factors at length in section 4.3.

4.2.3.7 Speech skill

In this section, I examine the effect of speech skill on the distribution of *sa*-Insertion. The speech skill is the index which refers to the speakers' skill in speechmaking. The speech skill is not evaluated by the recording staff, but this item is the self-evaluation in which speakers answer whether they are good or bad at speechmaking in the questionnaire before the recording. Unlike the items such as the speech style and spontaneity that are evaluated by the recording staff, speech skill is considered an independent factor. I classify each token into skillful and unskillful. I examine the effect of speech skill by looking into the distribution of *sa*-Insertion and standard causative. The results are shown below.

Table 39. Distribution of causatives by speech skill

speech skill	*sa*-Insertion	standard causative	rate of *sa*-Insertion (%)
skillful	19	401	4.52
unskillful	23	1,055	2.13
total	42	1,456	2.80

X^2 =6.34, d.f.=1, p<0.02

As Table 39 shows, the rate of *sa*-Insertion is higher in skillful than in unskillful. In other words, the speakers who regard themselves as being good at speechmaking prefer *sa*-Insertion. This indicates that the speakers' awareness towards their own speech skill has an influence on the distribution of *sa*-Insertion.

4.2.3.8 Speech experience

Finally I examine the effect of speech experience on the distribution of *sa*-Insertion. Although the argument that the speakers who make the academic presentation have broader experience in speechmaking than the speakers who make the simulated public speaking applies to the speech experience, the examination of the effect of speech experience as an independent factor within speech type is necessary. I classify each token into "more than 6 times" and "up to 5 times" with respect to speech experience. I examined the effect of speech experience by looking into the distribution of *sa*-Insertion and standard causative. The results are shown below.

Table 40 Distribution of causatives by speech experience

speech experience	*sa*-Insertion	standard causative	rate of *sa*-Insertion (%)
more than 6 times	20	454	4.22
up to 5 times	22	1,018	2.12
total	42	1,472	2.77

X^2 =5.34, d.f.=1, p<0.025

As Table 40 shows, the rate of *sa*-Insertion is higher in the speakers with the speech experience of more than 6 times than in the speakers with the speech experience of up to 5 times. The results show that the broader the speech experience, the more the speakers use *sa*-Insertion. With respect to speech style as a subcategory of speech type, the broader the speech experience, the higher the rate of *sa*-Insertion. Similarly, *sa*-Insertion is more compatible with APS, where the speaker with broader speech experience is predominant, with respect to speech type. This implies that the effect of speech experience is directly reflected in the effect of the supercategory, speech type. It follows that speech style is also the major factor along with speech style comprising speech type in its effect on the distribution of *sa*-Insertion.

The results of the examination of the effect of speech skill on the distribution of *sa*-Insertion in Section 4.2.3.7 show that the speakers who regard themselves as being good at speechmaking prefer *sa*-Insertion. Again, the results of the examination of the effect of speech experience show that the broader the speech experience, the higher the rate of *sa*-Insertion is. *Sa*-Insertion manifests similar behavior to these two factors, namely it is more compatible with the positive option than negative option with respect to the "speech." At this point, the possibility arises that these two factors are interacting with each other. The speakers with broader speech experience have confidence in their speech skill. In other words, the speakers with broader experience regard themselves as being good at speechmaking. As a result, *sa*-Insertion manifests the similar behavior for these two factors. This implies the interaction of speech skill and speech experience. I examine this possibility by conducting the multivariate analysis in the next section.

In Section 4.2.3, I conducted the analysis of the external factors. The results show that *sa*-Insertion: 1) is more compatible with APS than SPS; 2) is preferred by females in APS, and by males in SPS; 3) is preferred by the speakers with more recent birth-years; 4) is most frequent in Kanto area; 5) is more compatible with the speech with high spontaneity; 6) is more compatible with the speech with high formality; 7) is preferred by the skillful speaker in speechmaking; 8) is preferred by the speaker with broader speech experience. These results strongly support the claim that *sa*-Insertion is an instance of language change in progress and the change is currently in the beginning, and it tends to be used in formal settings. Furthermore, I showed that gender difference plays a crucial role in the change of *sa*-Insertion in an objective manner. I also argued that *sa*-Insertion emerged in Kanto or Chubu area, it is acquired in adulthood, and it may serve as the counterexample to the claim of language acquisition.

4.2.4 Multivariate analysis

In this section, I conduct the multivariate analysis, in order to examine the degree of the contribution of each factor to the distribution of *sa*-Insertion, and the interaction among internal and external factors, based on the results of the factor-by-factor analysis in previous sections. Specifically, I conduct the binominal logistic regression analysis; the dependent variable is the choice of *sa*-Insertion/standard causative, and the independent variable (the predictor) includes two internal factors: verb-length and following context; and eight external factors: speech type, gender, birth-year, geographical difference, spontaneity, speech style, speech skill, and speech experience.[50] I identify the coefficients of each independent variable as the weight of each factor. I show the results of the analysis below, firstly the correlation matrix:

[50] The present data corresponds to the so-called "rare case" where the number of *sa*-Insertion is extremely small, compared to that of standard causative. Therefore, although the logistic regression analysis may not yield the completely accurate results, the results are significant in terms of taking advantage of the insights from the results for the advanced discussion.

Table 41. Correlation matrix among dependent variable and independent variables (*sa*-Insertion, CSJ)

	Constant	speech type	verb-length	follow-ing	gender	birth-year	geogra-phical	spontan-eity	style	skill	experience
Constant	1.000	.111	-.315	-.208	-.196	-.447	-.482	-.488	-.444	.063	-.068
speech type	.111	1.000	-.022	-.117	-.310	-.216	-.087	.318	-.297	.125	-.539
verb length	-.315	-.022	1.000	.108	-.012	-.022	.000	-.019	-.036	-.010	.049
following	-.208	-.117	.108	1.000	.022	.003	-.076	-.054	-.043	-.066	.067
gender	-.196	-.310	-.012	.022	1.000	.060	-.041	-.012	.171	-.143	.054
birth-year	-.447	-.216	-.022	.003	.060	1.000	-.038	.065	.028	.004	.239
geographical	-.482	-.087	.000	-.076	-.041	-.038	1.000	-.081	.048	-.005	.047
spontaneity	-.488	.318	-.019	-.054	-.012	.065	-.081	1.000	.277	-.043	-.239
speech style	-.444	-.297	-.036	-.043	.171	.028	.048	.277	1.000	-.191	-.012
speech skill	.063	.125	-.010	-.066	-.143	.004	-.005	-.043	-.191	1.000	-.250
speech experience	-.068	-.539	.049	.067	.054	.239	.047	-.239	-.012	-.250	1.000

Firstly, I discuss the correlation of each factor in Table 41. As Table 41 shows, verb-length and following context are mutually independent, and these factors do not show any significant correlation with any of external factors. Each internal factor independently affects the distribution of *sa*-Insertion. Thus, the independence of each internal factor is borne out. On the other hand, type of the House and birth-year show high correlation coefficient. The results again support the claim concerning the relationship among internal and external factors.

As to the relationship between speech type and the external factors such as spontaneity, speech style, and speech experience, which are subsumed under the subcategory of speech type, show a certain degree of interaction with speech type, also spontaneity and speech style are slightly interacting with each other. This shows that spontaneity and speech style interact with each other, and speech experience as well as gender in turn come into play. The effects of these factors are projected on the speech style, and the complex of factors eventually affects the distribution of *sa*-Insertion in the form of the supercategory speech style. The correlation between gender and speech style is attributed to the fact that males are predominant in APS. Furthermore, speech experience and speech skill show a slight correlation, and the two factors are interacting with each other as I hypothesized in Section 4.2.3.8. This is associated with the fact that the speakers with broader speech experience regard themselves as being good at speechmaking. As a result, *sa*-Insertion manifests the similar behavior to these two factors. These insights are modeled as in Figure 10.

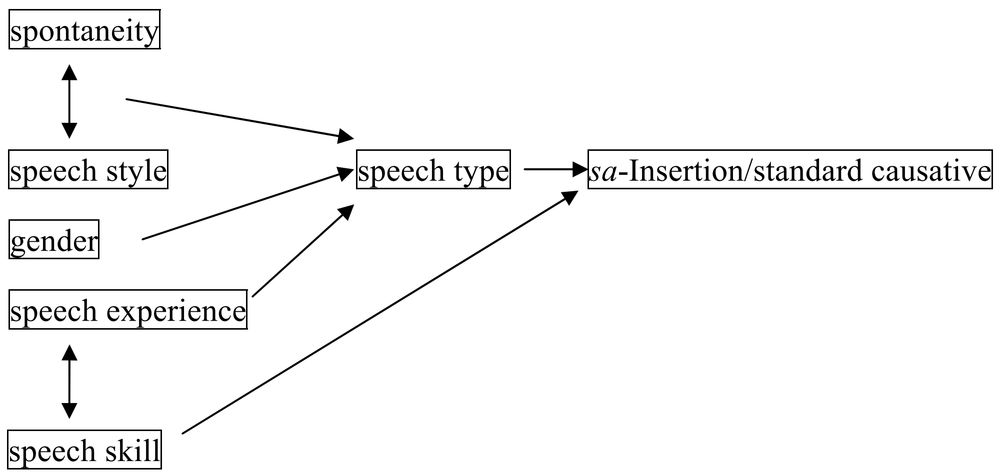

Figure 10. Model of the relationships among spontaneity, speech style, gender, speech experience, speech skill, and speech type

Next, I discuss the degree of contribution of each factor to the distribution of *sa*-Insertion. I show the result of logistic regression below.

Table 42. Result of the logistic regression (*sa*-Insertion, CSJ)

variables in the equation

	β	SE	Wald	d.f.	P-value	Exp(β)
speech type	4.843	2.603	3.461	1	.063	126.829
verb-length	.185	.321	.331	1	.565	1.203
following context	2.608	.556	21.964	1	.000	13.571
gender	1.932	.672	8.258	1	.004	6.906
birth-year	.292	.170	2.957	1	.086	1.339
geographical difference	-.747	.329	5.144	1	.023	.474
spontaneity	.643	.676	.904	1	.342	1.902
speech style	.870	1.348	.417	1	.519	2.388
speech skill	-.417	.591	.497	1	.481	.659
speech experience	.511	.803	.405	1	.525	1.666
type by gender	-3.307	.942	12.319	1	.000	.037
experience by type	-1.544	.920	2.818	1	.093	.213
experience by skill	1.339	.940	2.028	1	.154	3.816
style by spontaneity	-.208	.289	.515	1	.473	.812
style by type	-.809	.742	1.187	1	.276	.446
type by spontaneity	-.066	.448	.022	1	.883	.936
Constant	-8.889	3.672	5.859	1	.016	.000

-2 Log likelihood = 234.052, Cox & Snell R^2 = .050, Nagelkerke R^2 = .251

As Table 42 shows, following context, gender, geographical difference, and speech type by gender are significant with high probability, according to the P-values. Although speech type (.063), birth-year (.086) and speech experience by speech type (0.93) are not significant with five percent level, the tendency for the significance is observed. This shows that these factors have an influence on the distribution of *sa*-Insertion. Meanwhile, verb-length, spontaneity, speech style, speech skill, speech experience, speech experience by speech skill, speech style by spontaneity, speech style by speech type, speech type by spontaneity are not significant; namely, these factors do not contribute to the distribution of *sa*-Insertion. Note that speech experience and speech skill, for example, are not significant as an independent factor. But if I combine these two factors into the interaction term speech experience by speech skill, the significance probability increases and speech experience by speech skill shows the tendency for the significance. This shows that these factors do not play a role independently, but contribute to the distribution of *sa*-Insertion while interacting with each other.

According to the coefficients of each significant factor ("β" in Table 42), among the significant factors (speech type, following context, gender, geographical difference, speech type by gender, gender, and speech experience by speech type), speech type is the most influential factor, and other factors are ranked as follows according to their contribution: speech type by gender, following context, gender, speech experience by speech type, geographical difference, and birth-year. In other words, the factors affect the distribution of *sa*-Insertion in the order of: speech type, speech type by gender, following context, gender, speech experience by speech type, geographical difference, and birth-year.

Among the significant external factors, the interaction terms show the higher coefficients on the whole. The results show that each factor affects the distribution of *sa*-Insertion interacting with each other in an intricate way, instead of playing a role independently, as shown in Figure 10. Specifically, the relationship and the structure between speech type and other factors subsumed under speech style were revealed. Furthermore, the extremely high coefficient of speech style supports the argument that the effects of various external factors in its subcategory are projected on speech style, and the complex of factors eventually affects the distribution of *sa*-Insertion in the form of the supercategory speech style.[51] Speech style is the principal factor in CSJ. The present analysis gives evidence of that aspect. Thus, I obtained the detailed insights about the effects of internal and external factors and their interaction coupled with the results of the factor-by-factor analysis.

4.2.5 Summary

In this section, I conducted statistical analyses of *sa*-Insertion via CSJ. Specifically, I examined the effects of internal and external factors on the distribution of *sa*-Insertion. The results of the analysis via CSJ are consistent with those via the Diet database in many respects. Specifically, the results of the factor-by-factor analysis show that: 1) as to the internal factors, *sa*-Insertion is restricted to short verb stems, and it is in the course of grammaticalizing and creating the independent word, *-as-ase-te-itadak-* which are consistent with the claim of previous studies; 2) *sa*-Insertion is an instance of language change in progress, and is currently in the beginning of the change; 3) *sa*-Insertion is also subject to the lexical diffusion; 4) as to the external factors, *sa*-Insertion is affected by the effect of the external factors such as gender, birth-year, geographical difference, and speech style. The results strongly support the claim that *sa*-Insertion is an instance of language change in progress and the change is currently

[51] The fact that the logistic regression analysis without the interaction terms makes speech style not significant shows the existence of the interactions among each factor.

in the beginning, and it tends to be used in formal settings. I also argued that *sa*-Insertion emerged in Kanto or Chubu area, it is acquired in adulthood, and it may serve as the counterexample to the claim of language acquisition.

I proposed the model of the relationships between speech type and factors in the subcategory such as spontaneity, speech style, gender, and between speech experience and speech skill. The multivariate analysis reveals the degree of the contribution of each factor to the distribution of *sa*-Insertion, and the interaction among internal and external factors. Specifically, the factors affect the distribution of *sa*-Insertion in the order of: speech type, speech type by gender, following context, gender, speech experience by speech type, geographical difference, and birth-year.

The results further support the claim that in language variation and change, the internal factors are mutually independent; internal factors and external factors are also mutually independent; while external factors are interrelated (Labov 1982). The results, coupled with the categorical/gradient distinction, imply that the internal and external factors occupy distinct rooms in human linguistic competence. The present analysis provides the insights about the unexplored properties of *sa*-Insertion in terms of the factor-by-factor analysis and the multivariate analysis. The results also show that it is not necessarily the case that the internal factors are categorical, and the strength of internal factors does not necessarily override that of external factors; some external factor shows extremely significant contribution. Heretofore, there has been no discussion about the structure and the relationship among factors in CSJ. The present analysis sheds light on this issue, and uncovers these significant properties of CSJ.

Although the change of *sa*-Insertion starts with the formal style, it is regarded as the "error," due to the social pressure toward the correction. (The view that standard causative is the correct form is still in common currency.) Therefore, the change of *sa*-Insertion is classified into the *change from above* (cf. Labov 1994). The argument that *sa*-Insertion shows higher frequency and rate with female in formal settings, since the change of *sa*-Insertion is an instance of the change from above is consistent with the claim of Principle Ia (Labov 1990).

(29) Principle Ia (Labov 1990: 213)

In the change from above, women favour the incoming prestige forms more than men.

Furthermore, I argue that the hypercorrection (Labov 1966b), in which the speaker accidentally uttered *sa*-Insertion instead of standard causative, as a result of trying to use the more polite form in formal settings, is the trigger of the change of *sa*-Insertion. The example of the hypercorrection in Labov (1966b) demonstrates the interaction between social class and style. Assuming that gender plays a role instead of social class in the present case, we can argue that exactly the same type of change as in Labov (1966b) is currently underway.

The change of *sa*-Insertion tends to be used in formal style, since it is the change from above as opposed to the *change from below* (Labov 1990) in which the innovative form is more compatible with the casual style. I give a functional account to this point. Okada (2003) claims that *sa*-Insertion serves to reinforce politeness (the intensifier of the level of politeness). If Okada's claim is on the right track, it follows that *sa*-Insertion is more compatible with the formal style, in which polite expression is required, to casual style because of its function to reinforce the level of politeness. Furthermore, the function of *sa*-Insertion is associated with the grammaticalization process: It is assumed that the *-as-ase-te-itadak-* pattern, which is an inherently polite expression is used in formal settings. *Sa*-Insertion, which is accompanied by the -*as-ase-te-itadak*- pattern, is also used in formal settings, as mentioned in Section 4.1.4.1.

The research of *sa*-Insertion in CSJ again captures the beginning of language change. The continuous real-time study of *sa*-Insertion in CSJ especially with respect to the external factors can contribute to the clarification of the whole picture of language change.

Chapter 5. Statistical analysis of *ra*-Deletion

In this chapter, I conduct a statistical analysis of *ra*-Deletion. Following the procedure in chapter 4, I conduct the factor-by-factor analysis by comparing the distributions of *ra*-Deletion and of the standard potential, followed by the multivariate analysis focusing on the weight of each constraint as well as the interaction of the factors. Firstly, I present the analysis employing the Diet database, and secondly I conduct the analysis based on CSJ.

5.1 The Diet database

In this section, I conduct analysis of *ra*-Deletion in the Diet database, according to each factor. An exhaustive examination of the Diet database brought forth a total of 95 potential forms with *ra*-Deletion, as opposed to a total of 1,599 standard potential forms; thus, the rate of *ra*-Deletion (*ra*-Deletion/(*ra*-Deletion + standard potentials) *100) amounts to 5.61 percent, as shown in Table 43 below.

Table 43. Distribution of potentials (Diet database)

	#
ra-Deletion	95
standard potentials	1,599
rate (%)	5.61

As mentioned above, the frequency and the rate of *ra*-Deletion are still low, due to the correction policy, and it is not necessarily the case that the present data describes the exact nature of the variation and change of *ra*-Deletion. In what follows, I proceed the analysis with this in mind. In Section 5.1.1, I examine the chronological change of the distribution of *ra*-Deletion. Section 5.1.2 examines the effect of stylistic difference in the Diet. Section 5.1.3 examines whether *ra*-Deletion occurs in idioms and nouns. In Section 5.1.4, I examine the effect of following context on the distribution of *ra*-Deletion. Section 5.1.5 examines the effect of preceding context on the distribution of *ra*-Deletion. In Section 5.1.6, I discuss the lexical diffusion and the frequency effect. In Section 5.1.7, I discuss the cause of the change. Section 5.1.8 conducts the multivariate analysis. Finally, Section 5.1.9 summarizes the discussion.

5.1.1 Chronological change

The chronological change of *ra*-Insertion has been analyzed in previous studies and these studies identified the status of *ra*-Deletion as an instance of language change. (Matsuda 1993, 2008, among others). Following the previous studies, I examine the chronological change of the distribution of *ra*-Deletion. If *ra*-Deletion is an instance of language change, the distribution of *ra*-Deletion should show a correlation with the birth-year of the member. To verify this, I first examined the relationship between the distribution of *ra*-Deletion and the birth-year of the member, where *ra*-Deletions and standard potentials are sorted according to the birth-year of the members (grouped every ten years). I then considered the relationship between the year-period and the occurrence of *ra*-Deletion, where *ra*-Deletions and standard potentials are displayed, grouped for every five years. The distribution of *ra*-Deletion by birth-year is shown in Figure 11, and the distribution of *ra*-Deletion by five-year period is shown in Figure 12.

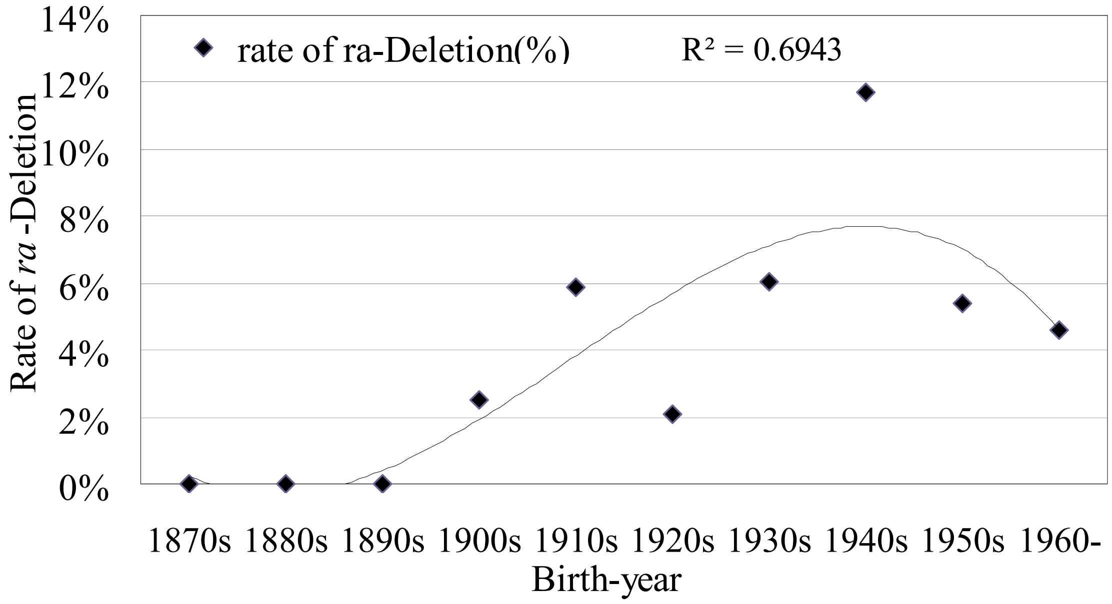

Figure 11. Distribution of *ra*-Deletion by birth year (Diet database)

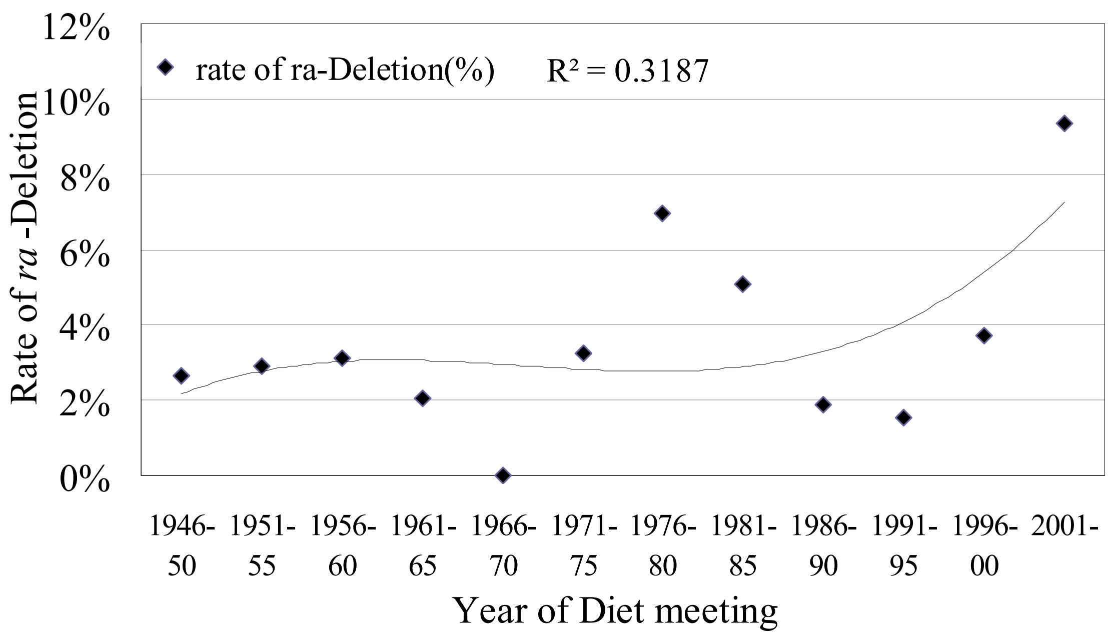

Figure 12. Distribution of *ra*-Deletion by five-year period

In Figure 11, although the distribution of *ra*-Deletion is apparently discrete, a significant correlation can be found between the distribution of *ra*-Deletion and birth-years (X^2 = 33.5, d.f. = 9, $p<0.001$ ($p<0.001$)), namely, the more recent the birth-year of the member is, the higher the rate of *ra*-Deletion. Although the rate of *ra*-Deletion has gradually increased from the 1900s, some fluctuation is observed. Similarly, in Figure 12 some fluctuation is observed although the rate of *ra*-Deletion is shown to be gradually rising from year to year. The results partly show that *ra*-Deletion is an instance of language change. The rate of *ra*-Deletion does not show any sharp rise in the present data, unlike *sa*-Insertion. However, I postpone the detailed discussion at this point, considering the property of the data.

5.1.2 Style

In this section, I examine the effect of stylistic difference. Firstly, I discuss the type of the Diet meeting: plenary sessions/committees, and secondly the type of the House: Representatives/Councilors.

5.1.2.1 Type of the Diet meeting

In this section, I examine the effect of the type of the Diet meeting on the distribution of *ra*-Deletion. As mentioned above, each meeting of the Diet is classified into either the plenary sessions or the committees. This constitutes one of the major stylistic differences in the Diet. In the analysis of *sa*-Insertion, the type of the Diet meeting does not affect the distribution of *sa*-Insertion. Here, I consider whether the type of the Diet meeting has an influence on the distribution of *ra*-Deletion. I examine the effect by comparing the distribution of *ra*-Insertion and standard potentials. The result is shown in Table 44.

Table 44. Distribution of potentials by type of the Diet meeting

Diet	*ra*-Deletion	standard potential	rate of *ra*-Deletion (%)
plenary session	1	71	1.39
committee	94	1,528	5.80
total	95	1,599	5.61

$X^2 =$ 2.53, d.f. = 1, n.s. (n.s.)

As Table 44 shows, the frequency of *ra*-Deletion is extremely low in plenary sessions, and the rate of *ra*-Deletion is higher in the committees than in the plenary sessions. Although *ra*-Deletion seems to be more compatible with plenary session, the result of the chi-square test shows that the distinction between plenary session and committee does not contribute to the choice of the variants. The result is consistent with that of the analysis of *sa*-Insertion. Thus, I do not focus on type of the Diet meeting as an independent significant factor.

5.1.2.2 Type of the House

In this section, I examine the effect of type of the House, which is another major stylistic difference in the Diet. Unlike the type of the Diet meeting, I showed that the type of the House has an influence on the distribution of *sa*-Insertion. If the type of the Diet meeting has an influence on the distribution of *ra*-Deletion, *ra*-Deletion is more compatible with either the Representatives or the Councilors. Based on the result of the analysis of *sa*-Insertion, I hypothesize that the difference of the Houses has an influence on the distribution of *ra*-Deletion. I examine the effect by comparing the distribution of *ra*-Deletion and standard potentials. The result is shown in Table 45.

Table 45. Distribution of *ra*-Deletion by type of the House

House	*ra*-Deletion	standard potential	rate of *ra*-Deletion (%)
Representatives	24	934	2.51
Councilors	71	665	9.65
total	95	1,599	5.61

$X^2 = 40.1$, d.f. = 1, $p<0.001$

As shown in Table 45, the frequency and the rate of *ra*-Deletion are significantly higher in Councilors than in Representatives. The result is again consistent with that of the analysis of *sa*-Insertion. Given that Councilors are more formal than Representatives, we can argue that *ra*-Deletion is more compatible with the stylistically formal settings. However, *ra*-Deletion does not have any property associated with the formality, unlike *sa*-Insertion. I discuss this issue in Section 5.2 after the full-fledged stylistic analysis by means of CSJ is completed.

5.1.3 Idioms and nouns

In this section, I examine whether *ra*-Deletion occurs in idioms and nouns. As mentioned above, idioms are assumed to be resistant to the language change, and the analysis of *sa*-Insertion yields the result that supports the empirical findings. Following the analysis of *sa*-Insertion, I assume that *ra*-Deletion also does not occur in idioms.

Although there are idioms in Japanese which include potential forms such as *se-ni hara-wa kae-<u>rare</u>-nai* ‘Close is my shirt, but closer is my skin,’ *me-mo ate-<u>rare</u>-nai* ‘be too terrible to look at,’ *hito-no kuti-niwa to-wa tate-<u>rare</u>-nu* ‘You cannot prevent people from spreading rumors,’ no idioms which include *ra*-Deletion are observed. This is partly due to the property of the data: The present data focuses on only 32 verbs, and the probability of the occurrence of idioms is restricted. The result shows that the change of *ra*-Deletion is currently not so advanced that it occurs in idioms, as far as the present data is concerned.

Similarly, no nouns that include *ra*-Deletion are observed in the present data. The same argument as was used in the idioms also applies to this case.[52] Thus, I verified that *ra*-Deletion does not occur in idioms and nouns.

5.1.4 Following context

In this section, I examine the effect of following context on the distribution of *ra*-Deletion, specifically focusing on the affirmative/negative distinction.

5.1.4.1 Type of the following context

Before I examine the effect of affirmative/negative distinction, I describe the following context of *ra*-Deletion. Does *ra*-Deletion manifest any specific property in connection with the following context, as in *sa*-Insertion? To answer this, I examine the distribution of *ra*-Deletion and the standard potential by following context. The result is shown below.

[52] To the best of my knowledge, idioms that include (standard) potential forms do not exist.

Table 46. Distribution of potentials by following context (Diet database)

context	*ra*-Deletion	standard potential	rate of *ra*-Deletion(%)
-ru	47	646	6.78
negative	40	835	4.57
-te-	3	17	15.00
-ta	2	20	9.09
-masu	2	45	4.26
-tara	1	6	14.29

As Table 46 shows, the frequency of *ra*-Deletion in the *-ru* pattern (conclusive form) is 47, and the one in negative context is 40, among a total of 95 occurrences of *ra*-Deletion. On the other hand, the rate of *ra*-Deletion in some other patterns shows higher percentage than in the *-ru* pattern or negative context. This may be due to the low frequency of *ra*-Deletion and standard potential in *-te-*, *-ta*, *-masu*, and *-tara* patterns: Even a single token has a great impact on the in the context with low frequency. Thus, most of the *ra*-Deletions occur in either the *-ru* pattern or negative context.

Incidentally, the potential forms frequently occur in negative context, compared to other forms such as causative forms. I give a functional account to this point: The expressions with potential forms inherently focus on whether the events are possible or impossible. In other words, the possible/impossible distinction does matter a lot in such expressions. Thus, the frequency of potential forms is high in negative context, as opposed to other forms in which the politeness, for instance, is the primary concern.

5.1.4.2 Affirmative/negative distinction

In this section, I examine the effect of the affirmative/negative distinction. As mentioned above, negative contexts tend to show the more conservative behavior in language change compared to the affirmative contexts (Givón 1979; Matsuda 1993, among others). Following the results of the analysis of *sa*-Insertion, I hypothesize that the rate of *ra*-Deletion is lower in negative contexts than in affirmative ones. I show the distribution of potentials classified according to the affirmative/negative distinction below.

Table 47. Distribution of potentials by affirmative/negative context (Diet database)

context	*ra*-Deletion	standard potential	rate of *ra*-Deletion(%)
affirmative	55	764	6.72
negative	40	835	4.57
total	95	1,599	5.61

$X^2 = 3.67$, d.f.= 1, $p<0.05$

As Table 47 illustrates, the frequency and the rate of *ra*-Deletion are higher in affirmative context than in negative context. The change of *ra*-Deletion is currently more advanced in affirmative context than in negative context. This shows that the change of *ra*-Deletion spreads from affirmative context to negative context. Thus, the result supports the above hypothesis.

To capture the change of *ra*-Deletion in negative context, I examine the chronological change of *ra*-Deletion in negative context.

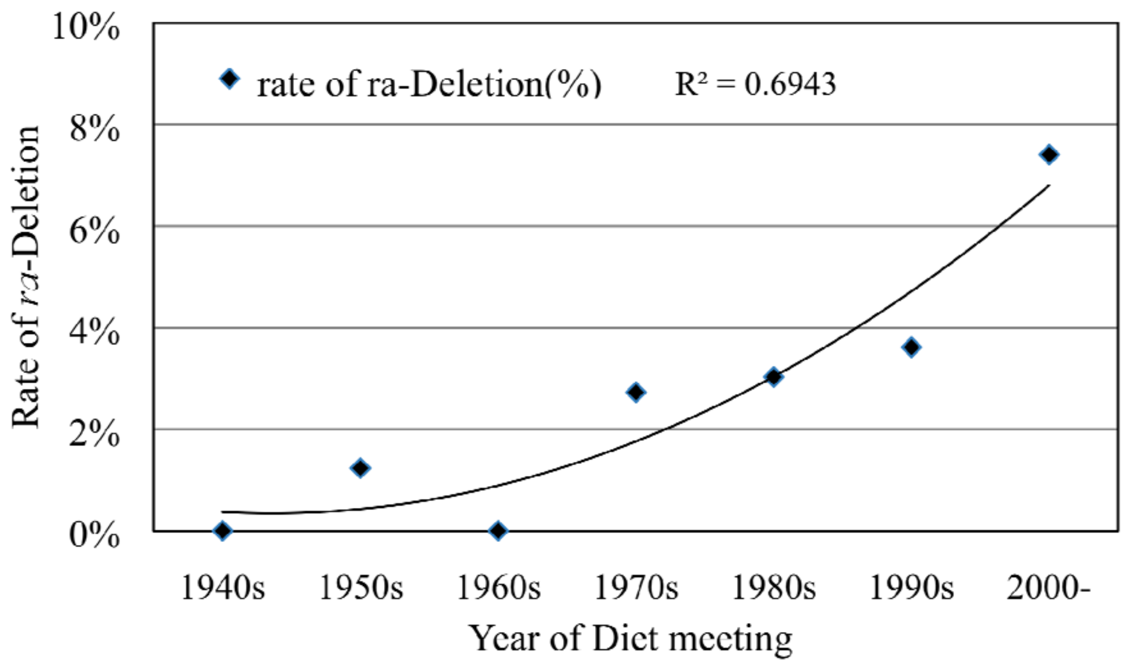

Figure 13. Chronological change of *ra*-Deletion in negative context

As Figure 13 shows, the rate of *ra*-Deletion in negative context is gradually increasing from year to year. Specifically, *ra*-Deletion in negative context was first observed in 1955. After the 1950s, *ra*-Deletion keeps the gradual increase, and its occurrence explodes after the 1990s. Note that the change of *ra*-Deletion in negative context does not follow the same trajectory as the entire change of *ra*-Deletion. Although the rate of *ra*-Deletion in every context is close to three percent in the 1940s, the rate of *ra*-Deletion in negative context is 0 percent. The change of *ra*-Deletion in negative context is less advanced than the entire change of *ra*-Deletion. The change of *ra*-Deletion starts from affirmative context, and spreads to negative context. This result also supports the hypothesis that negative contexts tend to show more conservative behavior in language change compared to affirmative contexts.

5.1.5 Preceding context

In this section, I examine the relationship between the preceding context of *ra*-Deletion and the distribution of *ra*-Deletion; in Section 5.1.5.1 I examine the effect of verb length; Section 5.1.5.2 examines the effect of the conjugation type of the verb (*i*-stem/*e*-stem); Section 5.1.5.3 examines the effect of the morphological structure of the preceding stem (monomorphemic verb/complex verb); In Section 5.1.5.4 I examine the effect of embeddedness; and finally I discuss the effect of OCP (μ) in Section 5.1.5.5.[53]

5.1.5.1 Effect of verb-length

In this section, I examine the effect of verb-length on the distribution of *ra*-Deletion. Following the traditional assumption that the change diffuses from shorter verbs to longer verbs, I hypothesize that *ra*-Deletion is more compatible with the shorter verbs than the longer verbs, with a higher rate in shorter verbs than in longer verbs. To verify the hypothesis, I examined the distribution of *ra*-Deletion and the standard potential by verb-length measured by mora. The results are shown below.

[53] In the present analysis, I do not examine the effect of the self-controllability restriction, since the present data is restricted to 32 verbs which are all self-controllable verbs, and the examination of the self-controllable/non-selfcontrollable distinction is unavailable. I leave this to the analysis in Section 5.2.1.1 with CSJ.

Table 48. Distribution of potentials by verb-length measured by mora (Diet database)

Token	*ra*-Deletion	standard potential	rate of *ra*-Deletion(%)
2 morae	86	225	27.65
3 morae	9	980	0.91
4 morae	0	394	0.00
total	95	1599	5.61
Type	*ra*-Deletion	standard potential	rate of *ra*-Deletion(%)
2 morae	4	5	44.44
3 morae	6	16	27.27
4 morae	0	9	0.00
total	10	30	25.00

Token: X^2 =350.16, d.f. = 2, p<0.001 (p<0.001) Type: X^2 = 4.88, d.f. = 4, n.s. (n.s.)

As Table 48 shows, the Token frequency of *ra*-Deletion in 2 and 3 morae verbs is 86 and 9, respectively. On the other hand, no *ra*-Deletion is observed in 4 morae verbs. Likewise, the rate of *ra*-Deletion in 2 morae verbs is 27.6 percent, while in 3 and 4 morae verbs, the rate is less than one percent.

These results show that the distribution of *ra*-Deletion is affected by verb-length, as claimed by Matsuda (1993, 2008). Specifically, the shorter the verb-length, the higher the frequency and the rate of *ra*-Deletion is. This tendency is also observed in Type frequency. Furthermore, *ra*-Deletion is restricted to verbs of less than 3 morae in length, as far as the present data is concerned. Thus, *ra*-Deletion is more compatible with the short verb stems. The results support the hypothesis that the change diffuses from shorter verbs to longer verbs.[54]

5.1.5.2 Effect of the conjugation type of the verb

The vowel verbs in Japanese are classified into either *i*-stem verbs (with the upper unigrade conjugation pattern) which end in *i* or *e*-stem verbs (with the lower unigrade conjugation pattern) which end in *e*, according to the conjugation type.[55] Among these verbs, *ra*-Deletion is more compatible with *i*-stem verbs than *e*-stem verbs (Nakamura 1953, Okazaki 1980, Nakata 1982, Kato 1988, Mastuda 1993). If this claim is on the right track, the frequency and the rate of *ra*-Deletion are higher with *i*-stem verbs than with *e*-stem verbs. I examine the effect of the conjugation type of the verb by comparing the distribution of *ra*-Deletion and standard potential. The result is shown in Table 49.

Table 49. Distribution of potentials by the conjugation type of the verb (Diet database)

conjugation pattern	*ra*-Deletion	standard potential	rate of *ra*-Deletion(%)
i-stem	44	260	14.47
e-stem	38	1,324	2.79
total	82	1,584	4.92

$X^2 = 72.5$, d.f.=1, $p<0.001$

As Table 49 shows, the frequency of *ra*-Deletion is 44 with *i*-stem verbs, and 38 with

[54] In the present analysis I do not examine the claim of Kinsui (2003) about the issue of verb-length, since the present data is restricted to 32 verbs, and no *ra*-Deletion with more than 4 morae verbs in length is observed. Furthermore, most of the Tokens of *ra*-Deletion are restricted to 2 morae verbs. The examination of Kinsui's claim is unavailable. I leave this to the analysis in Section 5.2 with CSJ.

[55] *Ka* irregular verb is restricted to *ku-ru*, and I exclude it from the present analysis.

e-stem verbs. Likewise, the rate of *ra*-Deletion is 14.47 percent with *i*-stem verbs, and 2.79 percent with *e*-stem verbs. The frequency and the rate of *ra*-Deletion are significantly higher with *i*-stem verbs than with *e*-stem verbs. Thus, the result shows that *ra*-Deletion is more compatible with *i*-stem verbs than *e*-stem verbs, and it gives a further support for the above claim.

At this point, I discuss why *ra*-Deletion is more compatible with *i*-stem verbs than *e*-stem verbs, and give a phonological account. If *e*-stem verbs, such as *tabe-ru* 'eat,' *kotae-ru* 'answer,' *kime-ru* 'decide,' and *oboe-ru* 'memorize' were to undergo *ra*-Deletion, two vowels having the same feature [-low, -high] (mid vowels) would be included in the adjacent syllables, being separated by the onset of the following syllable *r*, as in [ta.b<u>e.re</u>.ru], [ko.ta.<u>e.re</u>.ru], [ki.m<u>e.re</u>.ru], and [o.bo.<u>e.re</u>.ru]. On the other hand, *i*-stem verbs, such as *mi-ru* 'see,' *ki-ru* 'wear,' *kari-ru* 'borrow,' and *oki-ru* 'wake up' were to undergo *ra*-Deletion, two vowels in such a context have the distinct features [-low, +high] and [-low, -high] (high vowel and mid vowel), as in [m<u>i.re</u>.ru], [k<u>i.re</u>.ru], [ka.r<u>i.re</u>.ru], and [o.k<u>i.re</u>.ru]. This observation suggests that *ra*-Deletion with *e*-stem verbs including the vowels with the same feature is subject to the Obligatory Contour Principle (Leben 1973, Goldsmith 1976, McCarthy 1986).

(30) Obligatory Contour Principle (OCP)

No identical features are adjacent.[56]

The OCP bars the adjacent identical linguistic features. In this case, the consecutive vowel features [-low, -high] and [-low, -high] are subject to this constraint. Due to the OCP, *ra*-Deletions with *e*-stem verbs including the vowels with the same feature, as in

[56] I slightly modified the original definition.

tabe-re-ru, *kotae-re-ru*, *kime-re-ru*, and *oboe-re-ru*, are dispreferred, and *ra*-Deletions with *i*-stem verbs including the vowels with distinct features, as in *mi-re-ru*, *ki-re-ru*, *kari-re-ru*, and *oki-re-ru* are preferred. This is reflected in the distribution of *ra*-Deletion by the conjugation type of the verb: The frequency and the rate of *ra*-Deletion are significantly higher with *i*-stem verbs than with *e*-stem verbs.

Importantly, the effect of OCP on the distribution of *ra*-Deletion with respect to the conjugation type of the verb is rather gradient than categorical, in other words the OCP here is a soft constraint, rather than a hard one. This shows that there exists the categorical/gradient distinction even within the internal factors, and that the internal/external distinction is not necessarily consistent with the categorical/gradient distinction. This argument contradicts the assumption that internal factors constrain the phenomena categorically and that the internal factors are associated with the grammaticality (hard constraint), while on the other hand external factors constrain the phenomena gradiently and the external factors are associated with the acceptability (soft constraint) (Keller 2000, among others).

5.1.5.3 Effect of the morphological structure of the preceding stem

In this section, I examine the effect of the morphological structure of the preceding stem. If the stems to which the potential suffix can attach vary in their internal morphological structure, such a difference may well affect the probability with which *ra*-Deletion occurs. Matsuda (1993) claims that *ra*-Deletion is restricted to monomorphemic verbs, and that it never occurs in compound verbs, auxiliary verbs, and causative verbs. To verify this claim, I examine the distribution of *ra*-Deletion and standard potential according to the monomorphemic verb/causative verb distinction.[57] The result is shown below.

Table 50. Distribution of potentials by morphological structure of the preceding stem (Diet database)

stem type	*ra*-Deletion	standard potential	rate of *ra*-Deletion(%)
monomorphemic verb	94	1,571	5.65
causative verb	1	28	3.45
total	95	1,599	5.61

X^2 = 0.26, d.f.=1, n.s. (n.s.)

As Table 50 shows, the frequency of *ra*-Deletion is 94 with monomorphemic verbs, and 1 with causative verbs. Similarly, the rate of *ra*-Deletion is 5.65 percent with monomorphemic verbs, and 3.45 percent with causative verbs. *Ra*-Deletion predominantly occurs with monomorphemic verbs. Thus, the result shows that *ra*-Deletion is more compatible with monomorphemic verbs although the distribution is not categorical, and it partly supports the above claim.

5.1.5.4 Effect of the embeddedness

In this section, I examine the effect of the embeddedness on the distribution of

[57] Matsuda (2008) arranges some criteria in the data-extraction. One of the criteria is concerned with the morphological structure of the preceding stem: Matsuda (2008) focuses on the monomorphemic verbs, and excludes the compounds, based on the generalization of Matsuda (1993) that the innovative forms do not occur in the compounds or auxiliary verbs. Assuming the compounds with *ire-ru*, the following examples are excluded from the data: *ukeire-ru* 'accept', *toriire-ru* 'adopt', *mukaeire-ru* 'welcome.' As mentioned above, I also focus on 32 verbs and 3 phrases in the analysis of *ra*-Deletion with the Diet database following the list of verbs in Matsuda (2008). It follows that the compounds and auxiliary verbs are logically excluded in the present analysis.

ra-Deletion. Givón (1979) hypothesized that syntactic changes tend to be slow in subordinate clauses, based on the empirical evidence from syntactic changes in various languages. Among the previous studies of *ra*-Deletion, Matsuda (1993) revealed that *ra*-Deletion is more frequent in main clauses than in subordinate clauses. In order to verify the hypothesis with respect to the syntactic conservatism and resistance to change of the subordinate clauses in the change of *ra*-Deletion, I examine the distribution of *ra*-Deletion and standard potential according to the main/subordinate distinction. The result is shown below.

Table 51. Distribution of potentials by clause type (Diet database)

clause type	*ra*-Deletion	standard potential	rate of *ra*-Deletion(%)
main	53	716	6.89
subordinate	42	883	4.54
total	95	1,599	5.61

$X^2 = 4.39$, d.f.=1, $p<0.05$

As Table 51 shows, the frequency of *ra*-Deletion is 53 in main clauses, and 42 in subordinate clauses. Likewise, the rate of *ra*-Deletion is 6.89 percent in main clauses, and 4.54 percent in subordinate clauses. The frequency and the rate of *ra*-Deletion are higher in main clauses than in subordinate clauses. The result shows that the change of *ra*-Deletion is less advanced in subordinate clauses than in main clauses. Thus, the change of *ra*-Deletion manifests the syntactic conservatism and the resistance to the change of the subordinate clauses. The result gives a further support for the above hypothesis.

5.1.5.5 OCP (μ)

This section discusses the effect of OCP (μ) on the distribution of *ra*-Deletion that remains to be explored in the previous studies. If vowel verbs ending in *–re*, such as *ire-ru* 'put in,' *hure-ru* 'touch,' *hanare-ru* 'get away,' and *wasure-ru* 'forget' were to undergo *ra*-Deletion, the sequence *rere* would be created, as in **ire-re-ru*, **hure-re-ru*, **hanare-re-ru*, and **wasure-re-ru*.

Although the vowel verbs ending in *–re* amount to a total of 55 in token frequency, no *ra*-Deletion with this kind of verbs is observed in the present data. In other words, *ra*-Deletion which contains the sequence *rere* cannot occur. The result implies that *ra*-Deletion is also subject to the effect of OCP (μ). The OCP (μ) bars the adjacent identical morae, such as /**re.re*/. In this case, the sequence *rere* in the matrix of the verb stem and the potential suffix is subject to this constraint. Due to the OCP (μ), *ra*-Deletion which contains the sequence *rere*, as in **ire-re-*, **hure-re-*, **hanare-re-*, and **wasure-re-*, is prohibited.

Note that the standard potential does not create the sequence *rere* in the matrix of the verb stem and the potential suffix. This is because *ra* in the potential suffix intervenes between *re* of the verb stem and *re* in the potential suffix, and breaks the sequence as in *ire-***ra***re-ru*, *hure-***ra***re-ru*, *hanare-***ra***re-ru*, and *wasure-***ra***re-ru*. It follows that no standard potential includes the sequence *rere* at least in the matrix of the verb stem and the potential suffix.

5.1.6 Lexical diffusion and frequency effect

In the present data, I again observed lexical diffusion of *ra*-Deletion. The change of *ra*-Deletion does not diffuse uniformly among all verbs, but begins with particular verbs and spreads to other verbs. I present the representative verbs with *ra*-Deletion and their frequency: *mi-ru* 'look' (42); *de-ru* 'go out' (27); *ku-ru* 'come' (13); *ne-ru* 'sleep' (4); *uke-ru* 'receive,' *kari-ru* 'borrow' (2); *sase-ru* 'let,' *ire-ru* 'feed in,' *tabe-ru* 'eat,' *kime-ru* 'decide' (1). The results support the claim of the lexical diffusion theory.

As mentioned above, the lexical diffusion of *ra*-Deletion is associated with the frequency effect. Following the procedure of the analysis of *sa*-Insertion, I examined the correlation between the frequency of the representative verbs in the Diet database with *ra*-Deletion and the frequency of these verbs in NIJL (2005). If the frequency effect plays a role, the inverse correlation should appear: The frequency of *ra*-Deletion is high with frequent verbs, and low with less frequent verbs. I show the result in Table 52.

Table 52. Frequency of representative verbs in the Diet database with *ra*-Deletion and in NIJL (2005)

verbs	frequency in the Diet database with *ra*-Deletion	frequency in NIJL (2005)
mi-ru	42	1,670
de-ru	27	613
ku-ru	13	1,845
ne-ru	4	53
uke-ru	2	232
kari-ru	2	28
sase-ru	1	488
ire-ru	1	392
tabe-ru	1	276
kime-ru	1	140

Correlation coefficient: 0.707

As Table 52 shows, the result contradicts the hypothesis. The frequency of *ra*-Deletion is high: 47, 27, and 13, respectively with frequent verbs *mi-ru* (1,670), *de-ru* (613), and *ku-ru* (1,845). On the other hand, the frequency of *ra*-Deletion is low: 4 and 2 with less frequent verbs such as *ne-ru* (53), *uke-ru* (232), and *kari-ru* (28). The correlation coefficient between frequency in the Diet database with *ra*-Deletion and frequency in NIJL (2005) is 0.707. The correlation, instead of the inverse one, is observed with high correlation coefficient. Although the result implies that the change of *ra*-Deletion is so advanced and spread among many verbs that it overrides the frequency effect, I hold back from discussing this issue at this point, considering the property of the data.

5.1.7 The origin of the change of *ra*-Deletion

In this section, I discuss the potential driving force of the change of *ra*-Deletion. In the discussion of the origin of the change of *ra*-Deletion, it has been assumed that two major factors are responsible for the emergence of *ra*-Deletion:[58] The semantic disambiguation among four meanings, and the restructuring of the conjugation of verbs in Japanese by analogical leveling.

I firstly touch upon the semantic disambiguation. As mentioned above, the morpheme *rare* for vowel verbs carries four meanings; passive, honorific, potential and spontaneous. If the meaning potential is carried by the innovative morpheme *re* with *ra*-Deletion, then the functional load of *rare* will decrease (it carries three meanings), and the differences between the potential and the other three meanings are semantically disambiguated as shown below. Table 5 is repeated here as Table 53.

Table 53. The meanings passive, honorific, potential and spontaneous and their forms

paradigm	meaning	Form	
traditional	passive, honorific, potential, spontaneous	*rare*	(standard potential)
innovative	potential	*re*	(*ra*-Deletion)
	passive, honorific, spontaneous	*rare*	(standard potential)

Secondly, I mention the restructuring of the conjugation of verbs by analogical leveling in *ra*-Deletion. Traditionally, there has been a significant discrepancy between the allomorphs in potential forms, compared to those in other forms. This is schematized

[58] As to the overall picture of the historical transition of potential forms, see Shibuya 1990 or Inoue 1998, among others.

as follows according to Ito and Mester (2004).

Table 54. Suffix allomorphy for vowel verbs and consonant verbs in the traditional paradigm

conjugation form	vowel verb e.g. *tabe-*	consonant verb e.g. *nom-*
present negative	*-nai*	*-anai*
plain present	*-ru*	*-u*
inchoative	*-yoo*	*-oo*
imperative	*-ro*	*-e*
conditional	*-reba*	*-eba*
causative	*-sase-*	*-ase-*
passive	*-rare-*	*-are-*
potential	***-rare-* (standard potential)**	***-e-***

Looking at the allomorphy of suffixes between vowel verbs and consonant verbs, we find that apart from the suppletive imperative *–ro*/*-e*, the discrepancy of the forms is limited to the existence of a single segment: an initial consonant in *–ru*/*-u*, *-reba*/*-eba*, *-rare*/*-are*, *-sase*/*-ase*, *-yoo*/*-oo*, or an initial vowel in *–anai*/*-nai*. On the other hand, the distance between the allomorphs of the potential *–rare*, *-e* constitutes a much more significant discrepancy between the allomorphs. The analogical leveling restructures the correspondence between consonant verbs and vowel verbs of conjugation pattern in potential form with reference to the conjugation pattern in other forms. If *ra* of the potential suffix for vowel verbs is deleted, the correspondence between consonant verbs and vowel verbs in potential form will be similar to that of other forms, as shown in Table 55.

Table 55. Suffix allomorphy for vowel verbs and consonant verbs in the innovative paradigm

conjugation form	vowel verb e.g. *tabe-*	consonant verb e.g. *nom-*
present negative	*-nai*	*-anai*
plain present	*-ru*	*-u*
inchoative	*-yoo*	*-oo*
imperative	*-ro*	*-e*
conditional	*-reba*	*-eba*
causative	*-sase-*	*-ase-*
passive	*-rare-*	*-are-*
potential	***-re-*** **(*ra*-Deletion)**	***-e-***

The conjugation pattern of vowel verbs in potential form has changed (*rare* → *re*) taking the form of *ra*-Deletion. *Ra*-Deletion reduces the discrepancy between the allomorphs to a single segment, making them more similar to the usual case. This process leads to the simplification of the conjugation of verbs in Japanese.

I argued that the change of *sa*-Insertion is triggered by the functional demand associated with the honorifics (intensifier of the level of politeness), and this in turn leads to the restructuring of the conjugation paradigm by analogical leveling. Thinking in parallel, I assume that the change of *ra*-Deletion is triggered by the functional demands associated with the semantic disambiguation, and this results in the restructuring of the conjugation paradigm by analogical leveling. That is, the underlying internal grammatical change is actuated by external pressures. This implies that the functional demands rise up to the surface through the optimization by analogical leveling of the conjugation paradigm in voice system.

5.1.8 Multivariate analysis

In this section, I examine the degree of the contribution of each factor to the distribution of *ra*-Deletion and the interaction among internal and external factors by means of the multivariate analysis, based on the results of the factor-by-factor analysis in previous sections. In previous sections, I demonstrated that the internal and external factors have an influence on the distribution of *sa*-Insertion by means of factor-by-factor analysis. As the multivariate analysis of *sa*-Insertion, I conduct the binominal logistic regression analysis; the dependent variable is the choice of *ra*-Deletion /standard potential, and the independent variable (the predictor) includes five internal factors: verb-length, affirmative/negative distinction, conjugation type of the verb (*i*-stem/*e*-stem), morphological structure of the preceding stem (monomorphemic verb/causative verb), and embeddedness; and three external factors: birth-year, type of the Diet meeting, and type of the House. Among the result of the analysis, the coefficients of each independent variable correspond to the degree of contribution (weight) of each factor to the distribution of the variation. Firstly, I examine the correlation among variables. In the following, I discuss the results of the analysis. I present the correlation matrix below.

Table 56. Correlation matrix among dependent variable and independent variables (*ra*-Deletion, Diet database)

	Constant	birth-year	House	Diet	Aff/Neg	verb-length	Table 16. stem/ *e*-stem	mono/ caus	embedded-ness
Constant	1.000	-.992	.075	-.015	-.054	.079	.076	-.020	-.060
birth-year	-.992	1.000	-.091	.013	.021	-.182	-.142	-.079	.048
House	.075	-.091	1.000	.069	.132	.108	.085	.017	-.015
Diet	-.015	.013	.069	1.000	.031	.019	-.003	-.011	-.028
Aff/Neg	-.054	.021	.132	.031	1.000	.219	.227	.045	-.041
verb-length	.079	-.182	.108	.019	.219	1.000	.631	.329	.013
i-stem/*e*-stem	.076	-.142	.085	-.003	.227	.631	1.000	.186	.046
mono/caus	-.020	-.079	.017	-.011	.045	.329	.186	1.000	.013
embeddedness	-.060	.048	-.015	-.028	-.041	.013	.046	.013	1.000

Firstly, I discuss the interaction among factors, based on the results shown in Table 56. Assuming the claim that internal factors are mutually independent, internal factors and external factors are also mutually independent; while external factors are interrelated, we can argue that the internal factors such as verb-length and affirmative/negative distinction are mutually independent, internal factors and external factors such as type of the House, type of the Diet meeting, and birth-year are also mutually independent, and only the external factors are interrelated.

In Table 56, some interaction among internal factors is observed: verb-length and *i*-stem/*e*-stem shows the high correlation coefficient (.631); verb-length and monomorphemic verb/causative verb distinction, as well as *i*-stem/*e*-stem distinction and affirmative/negative distinction show the high correlation coefficients. That is, verb-length interacts with conjugation type of the verb and morphological structure of the preceding stem, and conjugation type of the verb interacts with affirmative/negative distinction. Other internal factors are mutually independent. The external factors: birth-year, type of the Diet meeting, and type of the House are also mutually independent, and these factors do not show any significant correlation with internal factors. The results contradict the hypothesis: The interaction within internal factors is observed; on the other hand, the interaction within external factors is not. However, the interaction between internal factors and external factors is not observed. This implies that the internal factors that are mutually independent in the beginning of the change become interrelated, and the external factors that are interrelated in the beginning of the change along the progress of the change become independent, considering the fact that *ra*-Deletion is in the intermediate stage of the change. Given the discussion so far, we can claim that the change of the relationship among factors is a corollary of the change of the effect of each factor along the progress of the change. Furthermore, the fact that the independence between internal factors and external factors is blind to the progress of the change shows the enormous difference between internal factors and external factors.

To be sure, the factors that show the interaction in the present analysis are all associated with the properties of verbs. This may result in the interaction among internal factors.

Next, I discuss the degree of contribution of each factor to the distribution of *ra*-Deletion. I show the result of logistic regression below.

Table 57. Result of the logistic regression (*ra*-Deletion, Diet database)

variables in the equation

	β	SE	Wald	d.f.	P-value	Exp(β)
birth-year	.025	.008	10.640	1	.001	1.025
House	-1.635	.304	28.908	1	.000	.195
Diet	-1.538	1.092	1.983	1	.159	.215
Aff/Neg	-1.215	.416	8.520	1	.004	.297
verb-length	-4.368	.492	78.676	1	.000	.013
i-stem/*e*-stem	-4.445	1.835	5.871	1	.015	.012
mono/caus	-1.989	1.122	3.144	1	.076	.137
embeddedness	.273	.275	.986	1	.321	1.314
Aff/Neg by *i*-stem/*e*-stem	1.601	.571	7.852	1	.005	4.958
i-stem/*e*-stem by verb-length	1.777	.838	4.501	1	.034	5.914
Constant	-37.065	14.537	6.501	1	.011	.000

-2 Log likelihood = 363.736, Cox & Snell R^2 = .160, Nagelkerke R^2 = .492

As Table 57 shows, every factor except for type of the Diet meeting and embeddedness is significant, according to the P-values. Although mono/caus (.076) is not significant with five percent level, the tendency for the significance is observed. These factors contribute to the distribution of *ra*-Deletion. As to the interaction among factors, the interaction terms affirmative/negative distinction by *i*-stem/*e*-stem distinction and *i*-stem/*e*-stem distinction by verb-length are also significant. This shows that these factors do not play a role independently, but contribute to the distribution of *ra*-Deletion while interacting with each other.

Looking into the coefficients of each significant factor ("β" in Table 57), among the significant factors, we observe that verb-length and *i*-stem/*e*-stem distinction are the most influential factors, and that other factors are ranked as follows according to their contribution: monomorphemic verb/causative verb distinction, *i*-stem/*e*-stem distinction by verb-length, affirmative/negative distinction by *i*-stem/*e*-stem distinction, type of the House, affirmative/negative distinction, and birth-year. The factors affect the distribution of *ra*-Deletion in this order. Note that the coefficient of birth-year is the lowest. This is associated with the fact that *ra*-Deletion does not show the high correlation with birth-year in the intermediate stage.

Based on the results, I model the relationship among each factor as follows.

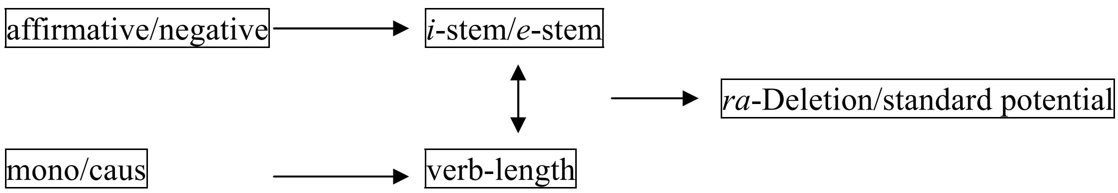

Figure 14. Model of the relationships among affirmative/negative distinction, *i*-stem/*e*-stem distinction, monomorphemic/causative distinction, and verb-length

5.1.9 Summary

In this section, I conducted statistical analyses of *ra*-Deletion via the Diet database. As a result, some unexplored properties of *ra*-Deletion were revealed, and claims of previous studies were verified in an objective and empirical manner. Specifically, the results show that *ra*-Deletion: 1) has been gradually increasing; 2) is more compatible with the stylistically formal settings (Councilors and committees); 3) does not occur in idioms and nouns; 4) is more compatible with the affirmative context; 5) does not occur in verbs over 3 morae in length; 6) is more compatible with *i*-stem verbs than *e*-stem verbs (OCP); 7) predominantly occurs with monomorphemic verbs (close to categorical); 8) is more compatible with the main clauses than subordinate clauses; 9) does not contain the sequence *rere* (OCP (μ)); 10) is subject to the lexical diffusion, but immune to the frequency effect. I discussed the origin of the change of *ra*-Deletion with reference to the internal grammatical change and the external pressure. *Ra*-Deletion manifests similar properties to *sa*-Insertion with respect to the observations #1, 2, 3, 4, 5, 9, and 10. Specifically, every factor plays a role in the same direction (*ra*-Deletion is more compatible with the same alternatives as *sa*-Insertion) although the degree of each factor's impact differs: The effect of affirmative/negative distinction is close to categorical in *sa*-Insertion, while it is gradient in *ra*-Deletion; on the other hand, the effect of verb-length is more restrictive in *ra*-Deletion. In *ra*-Deletion, the internal factors which play a role in a categorical manner are restricted to the observation #3 and 9, and other internal factors are gradient (#4, 5, 6, 7, 8). Compared to *sa*-Insertion, I observe many gradient internal factors in *ra*-Deletion. This may be associated with the degree of progression of the change. As mentioned above, there exists the categorical/gradient distinction even within the internal factors, and the internal/external distinction is not necessarily consistent with the categorical/gradient distinction. On the other hand, every external factor contributes to the distribution gradiently (#1 and 2). This shows that the manner in which each factor affects the distribution differs depending on the properties of each phenomenon as well as the degree of progression of each change. The factors show the alteration with respect to categorical/gradient or soft/hard distinctions from the initial stage through the final stage of the change.

The multivariate analysis reveals the degree of the contribution of each factor to the distribution of *ra*-Deletion and the interaction among internal and external factors. Firstly, as to the interaction among factors, the interaction within internal factors is observed, while the one within external factors is not observed, contrary to the claim about the relationship among factors. This implies the change of the relationship among factors along the progress of the change. On the other hand, the independence between internal factors and external factors is maintained. The results, coupled with the categorical/gradient distinction, imply that the internal and external factors occupy distinct rooms in human linguistic competence. Secondly, as to the degree of the contribution of each factor, factors affect the distribution of *ra*-Deletion in the order of: verb-length, *i*-stem/*e*-stem distinction, monomorphemic verb/causative verb distinction, *i*-stem/*e*-stem distinction by verb-length, affirmative/negative distinction by *i*-stem/*e*-stem distinction, type of the House, affirmative/negative distinction, and birth-year. The birth-year does not show high degree of contribution to the distribution of *ra*-Deletion which is in the intermediate stage of the change.

The present analyses give further support to the claims of the previous studies (Nakamura 1953; Okazaki 1980; Nakata 1982; Kato 1988; Matsuda 1993, 2008; Inoue 1998, among others) that *ra*-Deletion 1) is restricted to verbs within 4 morae in length; 2) is more compatible with verbs that end in *i* than verbs that end in *e*; 3) is more compatible with the negative context than the affirmative context; 4) does not occur in compound verbs, auxiliary verbs, and causative verbs; 5) is more frequent in main clauses than in subordinate clauses. The semantic disambiguation and the restructuring of the conjugation paradigm are responsible for the change of *ra*-Deletion, as Inoue (1998) and Fukushima (2004) claim. The traditional hypothesis that negative contexts tend to show the conservative behavior in language change compared to affirmative ones is supported. In addition, the syntactic conservatism and the resistance to the change in a particular context, OCP effects, and the general tendency of diffusion from particular contexts are observed.

I conclude that *ra*-Deletion is in the intermediate stage of a language change. The distribution of *ra*-Deletion is greatly affected by language internal and external factors. Furthermore, the factors governing the distribution of *ra*-Deletion have been demonstrated to interact with each other (e.g. verb-length and *i*-stem/*e*-stem, verb-length and monomorphemic verb/causative verb distinction, and *i*-stem/*e*-stem distinction and affirmative/negative distinction).

Although the present analysis cannot give a detailed description of the change of *ra*-Deletion due to the property of the data, the continuous real-time study of *ra*-Deletion can reveal various properties of language change that remain to be explored, specifically with respect to the process winding down.

5.2 CSJ

In this section, I conduct analyses of *ra*-Deletion in CSJ, according to each factor. An exhaustive examination of CSJ brought forth a total of 543 potential forms with *ra*-Deletion, as opposed to a total of 7,615 standard potential forms; thus, the rate of *ra*-Deletion (*ra*-Deletion /(*ra*-Deletion + standard potentials) *100) amounts to 6.66 percent, as shown in Table 58 below.

Table 58. Distribution of potentials (CSJ)[59]

	#
ra-Deletion	543
standard potentials	7,615
rate (%)	6.66

In Section 5.2.1, I examine the effects of internal factors. In Section 5.2.2, I discuss the lexical diffusion and the frequency effect. In Section 5.2.3, I examine the effects of external factors. Section 5.2.4 conducts the multivariate analysis. Finally, Section 5.2.5 summarizes the discussion.

5.2.1 Internal factors

In this section, I examine the effects of internal factors. In Section 5.2.1.1, I examine the categorical effects of two internal factors: 1) whether *ra*-Deletion occurs in idioms and nouns; 2) the self-controllability restriction. In Section 5.2.1.2, I examine the effect of the type of the following context (affirmative/negative distinction). Section 5.2.1.3

[59] As in *sa*-Insertion, in each factor-by-factor analysis the total frequency of *ra*-Deletion and standard potential does not necessarily amount to 543 and 7,615, respectively, since some values are missing or labeled as ‘nr’ for certain cases.

examines the effect of verb-length. Section 5.2.1.4 examines the effect of the conjugation type of the verb (*i*-stem/*e*-stem); Section 5.2.1.5 examines the effect of the morphological structure of the preceding stem (monomorphemic verb/complex verb); In Section 5.1.5.6 I examine the effect of embeddedness. In Section 5.2.1.7 I examine whether *ra*-Deletion contains the sequence *rere* (OCP (μ)).

5.2.1.1. Categorical factors

In this section, I examine the two internal factors that show categorical or close to categorical effects in the Diet database. I examined each factor by looking into the distribution of *ra*-Deletion and standard potentials. I show the results in Table 59.

Table 59. Categorical effects of two internal factors on the distribution of *ra*-Deletion (CSJ)

factors	effects
idioms & nouns	*Ra*-Deletion does not occur in idioms and nouns.
self-controllability	*Ra*-Deletion is restricted to self-controllable verbs.

The results of the examination of two factors in CSJ are exactly the same as that in the Diet database: *ra*-Deletion does not occur in idioms and nouns. The result shows that idioms and nouns are resistant to the language change. *Ra*-Deletion is restricted to self-controllable verbs. This shows that *ra*-Deletion is subject to the self-controllability restriction. The (standard) potential forms are in principle restricted to verbs that describe volitional actions (Kinsui 2003, among others). With respect to the self-controllability, *ra*-Deletion manifests the same property as standard potential.

Note that *ra*-Deletion still does not occur in idioms and nouns, despite the fact that the change of *ra*-Deletion is in the intermediate stage, and it is advanced compared to the change of *sa*-Insertion. This shows that among the contexts that govern the language change, idioms and nouns are extremely resistant to the language change. The innovative forms can occur in newly-created idioms and nouns only after considerable progress of the change.

5.2.1.2 Following context

In this section, I examine the effect of following context on the distribution of *ra*-Deletion, specifically focusing on the affirmative/negative distinction. Before I examine the effect of affirmative/negative distinction, I describe the following context of *ra*-Deletion. Does *ra*-Deletion manifest any specific property in connection with the following context, as in *sa*-Insertion? To answer this, I examine the distribution of *ra*-Deletion and the standard potential by following context. The result is shown below.

Table 60. Distribution of potentials by following context (CSJ)

context	*ra*-Deletion	standard potential	rate of *ra*-Deletion(%)
-ru	240	2,195	9.86
negative	199	1,260	13.64
-te-	29	583	4.74
-ta	33	644	4.87
-reba	7	15	31.82
-masu	27	2,744	0.97
-tari	3	17	15.00
-soo	3	15	16.67
ϕ	1	124	0.80
-tara	1	17	5.56

As Table 60 shows, the frequency of *ra*-Deletion in the *-ru* pattern (conclusive form) is 240, and the one in negative context is 199, comprising about four-fifths of the total of 543 occurrences of *ra*-Deletion. On the other hand, the rate of *ra*-Deletion in some other patterns shows higher percentage than in the *-ru* pattern or negative context. This may be due to the low frequency of *ra*-Deletion and standard potential in -*reba*, -*tari*, -*soo*, ϕ, and -*tara* patterns: Even a single token has a great impact on the rate in the context with low frequency. Thus, most of the *ra*-Deletions occur in either the *-ru* pattern or negative context. Note that the *-masu* pattern includes the polite meaning, and thus this pattern is expected to be more compatible with formal style. The frequency of *ra*-Deletion is particularly low in *-masu* pattern (27) compared to the frequency of standard potential (2,744). The result implies that *ra*-Deletion is an instance of change from below (Labov 1990) in which the innovative form is more compatible with the casual style than the formal style. I will discuss this issue in subsequent sections.

At this point, I mention the ranges of application of OCP (μ). If potential suffix takes conditional form in conjugation pattern, the verb phrase including the potential suffix ends in the sequence *rereba*, and the phrase contains the sequence *rere*. According to the discussion so far, such a phrase should be barred by OCP (μ). However, a number of tokens of this kind are observed in the present data: such as *mi-rereba* 'If one can see,' *tabe-rereba* 'If one can eat,' and *kangae-rereba* 'If one can think.' Looking into the morphological structure of these phrases, we observe that the sequence *rereba* falls within the single morpheme, as in *mi|rereba*, *tabe|rereba*, and *kangae|rereba*. On the other hand, the sequence that violates OCP (μ) crosses the morphological boundary, as in **das|as|ase*- 'let someone give something,' **ire|re*- 'can put in.' This observation suggests the possibility of the revision of OCP (μ) with reference to the ranges of application. I introduce the revised version of OCP (μ).

(31) OCP (μ) (revised)

No morae with identical CV sequences are adjacent across the morphological boundary.

The revised OCP (μ) does not apply to the morae with identical CV sequences within a single morpheme. Therefore, although the phrases including identical morae across the morphological boundary such as *das-as-ase-* and *ire-re-* are subject to OCP (μ), the phrases including identical morae within the single morpheme such as *mi-rereba*, *tabe-rereba*, and *kangae-rereba* are not. The revision yields further consequences. As mentioned above, there are some nouns containing *sasa* in Japanese, such as *sasa* ‘bamboo grass’ and *Sasaki* (proper noun). These nouns are also outside the scope of OCP (μ), since the sequence *sasa* falls within the single morpheme (noun). Thus, the verb phrase including the potential suffix ends in the sequence *rereba* does not violate OCP (μ), and it can freely occur.

Next, I examine the effect of the affirmative/negative distinction. As mentioned above, negative contexts tend to show the conservative behavior in language change compared to affirmative ones (Givón 1979; Matsuda 1993, among others). Following the results in the Diet database, I hypothesize that the rate of *ra*-Deletion is lower in negative contexts than in affirmative ones. I show the distribution of potentials classified according to the affirmative/negative distinction below.

Table 61. Distribution of potentials by affirmative/negative context (CSJ)

context	*ra*-Deletion	standard potential	rate of *ra*-Deletion(%)
affirmative	344	6,355	5.14
negative	199	1,260	13.64
total	543	7,615	6.66

X^2 =139.47, d.f.=1, p<0.001

As Table 61 illustrates, the rate of *ra*-Deletion is higher in negative context than in affirmative context. The result is exactly the opposite to the hypothesis. The change of *ra*-Deletion is currently more advanced in negative context than in affirmative context. This implies that the change of *ra*-Deletion is so advanced that it is immune to the effect of affirmative/negative context, and the specific property of *ra*-Deletion is coming up to the surface: *ra*-Deletion is more compatible with the negative context, in other words, one of the functions of *ra*-Deletion among the potential forms is to form the negative expressions.

To capture the change of *ra*-Deletion in negative context, I examine the chronological change of *ra*-Deletion in negative context.

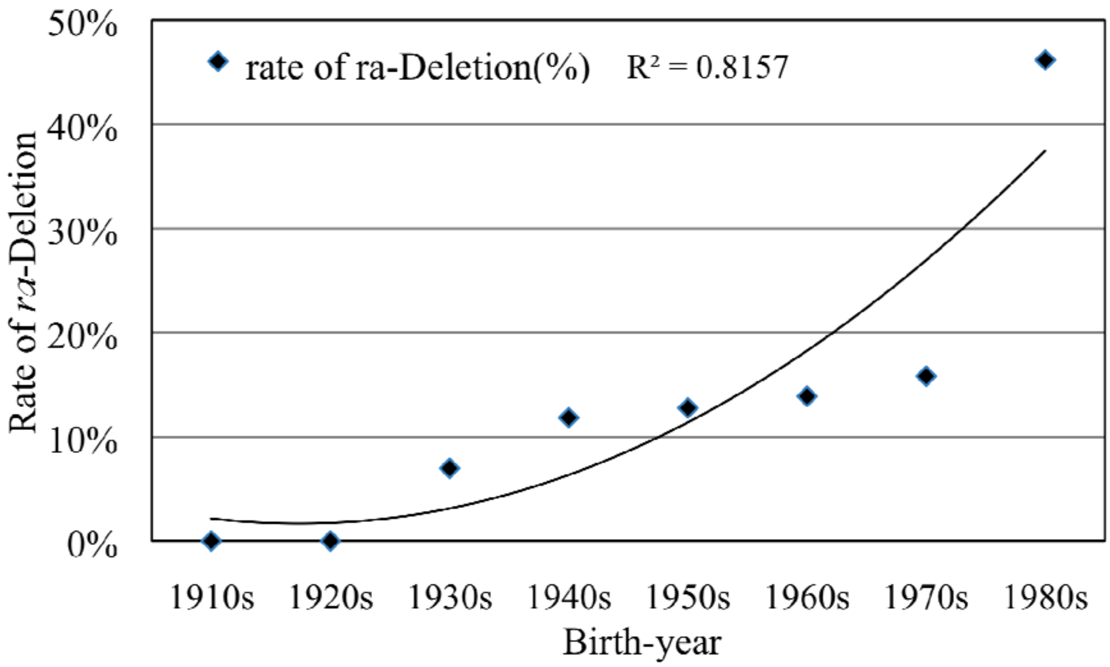

Figure 15. Distribution of *ra*-Deletion by birth-year in negative context

As Figure 15 shows, the rate of *ra*-Deletion in negative context is gradually increasing along the age line. Specifically, the change of *ra*-Deletion in negative context follows the entire change of *ra*-Deletion: *ra*-Deletion has gradually increased from the 1910s,[60] and *ra*-Deletion in negative context has increased after the 1930s. The result supports the hypothesis that negative contexts tend to show the conservative behavior in

[60] I describe the chronological change in detail in Section 5.2.3.3

language change compared to affirmative ones. However, the rate of *ra*-Deletion in negative contexts exceeds the rate for all after the 1930s. This shows that, although the effect of affirmative/negative distinction has contributed to the distribution of *ra*-Deletion before the 1930s, *ra*-Deletion has become unsuppressed by the effect after the 1930s, and it has gradually increased with its specific property. Furthermore, it is predicted that *ra*-Deletion might become the potential form for negative context.

5.2.1.3 Effect of verb-length

The examination of the Diet database shows that *ra*-Deletion is more compatible with the shorter verbs than the longer verbs, and the distribution is close to categorical: *ra*-Deletion is restricted to the verbs less than 3 morae in length. In this section, I examine the effect of verb-length on the distribution of *ra*-Deletion in CSJ. Following the traditional assumption that the change diffuses from shorter verbs to longer verbs, I hypothesize that *ra*-Deletion is more compatible with the shorter verbs than the longer verbs, with a higher rate in shorter verbs than in longer verbs. To verify the hypothesis, I examined the distribution of *ra*-Deletion and the standard potential by verb-length measured by mora. The results are shown below.

Table 62. Distribution of potentials by verb-length measured by mora (CSJ)

Token	*ra*-Deletion	standard potential	rate of *ra*-Deletion(%)
2 morae	277	3,233	7.89
3 morae	162	1,074	13.11
4 morae	25	1,011	2.41
5 morae	46	2,169	2.08
6 morae	24	29	45.28
7 morae	9	9	50.00
total	543	7,525	6.73
Type	***ra*-Deletion**	**standard potential**	**rate of *ra*-Deletion(%)**
2 morae	11	8	57.89
3 morae	24	60	28.57
4 morae	14	73	16.09
5 morae	17	46	26.98
6 morae	9	15	37.50
7 morae	2	5	28.57
total	77	141	35.32

Token: X^2 =373.95, d.f.=5, p<0.001   Type: X^2 =15.87, d.f.=5, p<0.01

As Table 62 shows, the Token frequency of *ra*-Deletion in 2 and 3 morae verbs is 277 and 162, respectively, comprising over 80 percent of the entire tokens of *ra*-Deletion. However, some *ra*-Deletion is also observed in verbs more than 4 morae. Likewise, the rate of *ra*-Deletion is high in 2 and 3 morae verbs, and low in 4 and 5 morae verbs.

Interestingly, although the rate of *ra*-Deletion declines in 4 and 5 morae verbs, in 6 and 7 morae verbs *ra*-Deletion soars steeply with the highest percentages. This tendency is also observed in Type frequency. Thus, it is not necessarily the case that *ra*-Deletion is more compatible with the short verb stems, although the distribution of *ra*-Deletion is affected by the effect of verb-length as the results of the chi-square test show. This shows that the assumption that the change diffuses from shorter verb to longer verb is true for the case of *ra*-Deletion; however, the effect of verb-length has declined with the progress of the change of *ra*-Deletion, and *ra*-Deletion has become compatible with longer verbs. Why is *ra*-Deletion compatible with only the super-long verbs over 6 morae among longer verbs? This appears to be associated with another function of *ra*-Deletion: The verb phrases with *ra*-Deletion are one mora shorter than the one with standard potential, in other words, *ra*-Deletion has the function to shorten the phrases. Therefore, the economy forces the super-long stem to attract *ra*-Deletion, in order to shorten the phrases and reduce the burden. Thus, *ra*-Deletion is more compatible with shorter verbs than longer verbs by the effect of verb-length, on the other hand, *ra*-Deletion is preferred by super-long verbs, following the economy principle. The latter property comes up to the surface with the decline of the effect of verb-length.

At this point, I examine Kinsui's (2003) hypothesis about the issue of verb-length in the change of *ra*-Deletion. I reintroduce the hypothesis. *Ra*-deletion with short verbs is acquired as lexical items, while *ra*-Deletion with long verbs is acquired as a module of the grammar. If a speaker has already passed the critical period of language acquisition and do not have the grammar which includes the morphology of *ra*-Deletion, the speaker cannot generate *ra*-Deletion with long verbs. If Kinsui's hypothesis is on the right track, then *ra*-Deletion with long verbs is restricted to the younger generation, since the speakers of the older generation have already passed the critical period and they do not have the relevant grammar although *ra*-Deletion with short verbs is observed in relatively wider range. I examine the distribution of *ra*-Deletion by birth-year and verb-length by means of the cross-tabulation. The result is shown below.

Table 63. Distribution of *ra*-Deletion by birth-year and verb-length measured by mora

verb-length / birth-year	2 morae	3 morae	4 morae	5 morae	6 morae	7morae
1910s	0	0	0	0	0	0
1920s	1	0	0	0	0	0
1930s	12	6	2	0	2	0
1940s	21	20	3	3	4	1
1950s	45	15	3	6	5	2
1960s	74	52	7	18	8	1
1970s	119	63	9	19	5	4
1980s	5	6	1	0	0	0

As Table 63 shows, *ra*-Deletion in 2, 3 and 4 morae verbs are observed over a wider range of generations. However, the distribution of *ra*-Deletion in 5, 6, and 7 morae verbs is similar to that of shorter verbs: *ra*-Deletion with longer verbs is also observed in older generations: 1930s-1940s, contrary to the hypothesis. Thus, the issue of verb-length cannot necessarily be attributed to the difference between the lexicon and the grammar, as Kinsui argues.

5.2.1.4 Effect of the conjugation type of the verb

In the analysis of the Diet database, I found that *ra*-Deletion is more compatible with *i*-stem verbs than *e*-stem verbs, as a number of sociolinguistic researches claim. If this claim is on the right track, the frequency and the rate of *ra*-Deletion are higher with *i*-stem verbs than with *e*-stem verbs. I examine the effect of the conjugation type of the verb by comparing the distribution of *ra*-Deletion and standard potential. The result is shown below.

Table 64. Distribution of potentials by the conjugation type of the verb (CSJ)

conjugation pattern	*ra*-Deletion	standard potential	rate of *ra*-Deletion(%)
i-stem	201	1,917	9.49
e-stem	261	5,672	4.40
total	462	7,589	5.74

X^2 =74.79, d.f.=1, p<0.001

As Table 64 shows, although the frequency of *ra*-Deletion is 201 with *i*-stem verbs, and 261 with *e*-stem verbs, the rate of *ra*-Deletion is 9.49 percent with *i*-stem verbs, and 4.40 percent with *e*-stem verbs. The rate of *ra*-Deletion is significantly higher with *i*-stem verbs than with *e*-stem verbs. Thus, the result is consistent with the one in the Diet database in showing that *ra*-Deletion is more compatible with *i*-stem verbs than *e*-stem verbs. I argue that the soft effect of OCP also plays a role here: *ra*-Deletion with *e*-stem verbs is dispreferred in having the consecutive identical vowel features.

5.2.1.5 Effect of the morphological structure of the preceding stem

In this section, I examine the effect of the morphological structure of the preceding stem. The analysis of the Diet database shows that *ra*-Deletion is restricted to monomorphemic verbs. *Ra*-Deletion never occurs in compound verbs, auxiliary verbs, and it seldom occurs in causative verbs, supporting the claim of Matsuda (1993). To verify this claim, I examine the distribution of *ra*-Deletion and standard potential according to the morphological structure of the preceding stem. The result is shown below.

Table 65. Distribution of potentials by morphological structure of the preceding stem (CSJ)

stem type	*ra*-Deletion	standard potential	rate of *ra*-Deletion(%)
monomorphemic	466	7,272	6.02
compound	70	239	22.65
auxiliary	7	96	6.80
causative	0	8	0.00
total	543	7,615	6.66

X^2 =132.86, d.f.=3, p<0.001 (p<0.001)

As Table 65 shows, the frequency of *ra*-Deletion is 466 with monomorphemic verbs, 70 with compound verbs, and 7 with auxiliary verbs although *ra*-Deletion does not occur with causative verbs. Furthermore, the rate of *ra*-Deletion is higher in compound verbs (22.65 percent) and auxiliary verbs (6.80 percent) than in monomorphemic verbs (6.02). Thus, the result shows that *ra*-Deletion is more compatible with complex verbs than monomorphemic verbs, contrary to the claim that *ra*-Deletion is restricted to monomorphemic verbs. Considering the fact that 55 tokens among total of 77 of compound verbs and auxiliary verbs are restricted to the birth-year after 1960s, the effect of the morphological structure of the preceding stem has declined with the progress of the change of *ra*-Deletion, and *ra*-Deletion has become compatible complex verbs. The weakening of the effect of the morphological structure of the preceding stem is associated with the weakening of the effect of verb-length. Why is the rate of *ra*-Deletion with complex verbs much higher than that with monomorphemic verbs? This appears to be associated with the shortening function of *ra*-Deletion that I discussed in Section 5.2.1.3: The complex verbs are generally long in themselves. These verbs are also subject to the effect of verb-length. However, the effect of verb-length has declined with the progress of the change of *ra*-Deletion, and *ra*-Deletion has become compatible with complex verbs. The economy, in turn, forces the complex verbs to attract *ra*-Deletion, in order to shorten the verb phrases and reduce the burden. The result supports the discussion of the shortening function of *ra*-Deletion.

5.2.1.6 Effect of the embeddedness

In this section, I examine the effect of the embeddedness on the distribution of *ra*-Deletion. The result of the Diet database shows that *ra*-Deletion is more frequent in main clauses than in subordinate clauses, as Matsuda (1993) claims. In order to verify the hypothesis with respect to the syntactic conservatism and resistance to change of the subordinate clauses in the change of *ra*-Deletion, I examine the distribution of *ra*-Deletion and standard potential according to the main/subordinate distinction. The result is shown below.

Table 66. Distribution of potentials by clause type (CSJ)

clause type	*ra*-Deletion	standard potential	rate of *ra*-Deletion(%)
main	378	6,035	5.89
subordinate	165	1,580	9.46
total	543	7,615	6.66

X^2 =909.84, d.f.=1, p<0.001

As Table 66 shows, although the frequency of *ra*-Deletion is 378 in main clauses, and 165 in subordinate clauses, the rate of *ra*-Deletion is higher in subordinate clauses (9.46 percent) than to main clauses (5.89 percent). *Ra*-Deletion is more compatible with the subordinate clauses than the main clauses, and the change of *ra*-Deletion does not show the syntactic conservatism and the resistance to the change of the subordinate clauses contrary to the claim of Matsuda (1993). Assuming the fact that 108 tokens among total of 165 in subordinate clauses are restricted to the birth-year after 1960s, we can claim that the effect of the embeddedness declined with the progress of the change of *ra*-Deletion, as the effect of morphological structure of the preceding stem.

5.2.1.7 OCP (μ)

In this section, I discuss the effect of OCP (μ) on the distribution of *ra*-Deletion. In the analysis of the Diet database, it is revealed that *ra*-Deletion does not include the sequence *rere* due to the effect of OCP (μ).

In CSJ, the standard potential including vowel verbs ending in *-re* such as *ire-ru* 'put in,' *hure-ru* 'touch,' *hanare-ru* 'get away,' and *wasure-ru* 'forget' amounts to a total of 104 in token frequency, and *ra*-Deletion with this kind of verbs amounts to

6 in token frequency. The result in CSJ slightly differs from the one in the Diet database in the sense that the distribution is categorical in the Diet database, while in CSJ, the distribution is gradient. In other words, OCP (μ) has the categorical (hard) effect on the distribution of *ra*-Deletion in the former case, while it has the gradient (soft) effect in the latter case. This implies that the effect of OCP (μ) has declined, and changed from categorical to gradient with the progress of the change of *ra*-Deletion.

So far, I examined the effects of internal factors on the distribution of *ra*-Deletion. The two internal factors have the categorical effects. As to the gradient factors, the effects of many factors have declined with the progress of the change of *ra*-Deletion. As a result, the specific function and property of *ra*-Deletion has come up to the surface. Most of the results in CSJ differ from the one in the Diet database. *Ra*-Deletion: 1) is more compatible with the negative context than the affirmative one; 2) is more compatible with the super-long verbs; 3) is more compatible with complex verbs than monomorphemic verbs; 4) is more compatible with subordinate clauses than main clauses; 5) is gradiently constrained by OCP (μ). I also proposed the revised version of OCP (μ).

5.2.2 Lexical diffusion and frequency effect

In CSJ, I again observed lexical diffusion of *ra*-Deletion. The change of *ra*-Deletion does not diffuse uniformly among all verbs, but begins with particular verbs and spreads to other verbs. I present the representative verbs with *ra*-Deletion and their frequency: *mi-ru* 'look' (143); *tabe-ru* 'eat' (97); *de-ru* 'go out' (41); *ku-ru* 'come' (35); *ne-ru* 'sleep' (24); *kangae-ru* 'think' (14); *uke-ru* 'receive,' *ki-ru* 'wear' (9); *kotae-ru* 'answer,' *kari-ru* 'borrow' (7); *e-ru* 'get,' *iki-ru* 'live,' *oki-ru* 'wake up,' and *tate-ru* 'set up' (5). The results give a further support to the claim of the lexical diffusion theory.

In the Diet database, the lexical diffusion of *ra*-Deletion is associated with the frequency effect. I examine the correlation between the frequency of the representative verbs in CSJ with *ra*-Deletion and the frequency of these verbs in NIJL (2005). If the frequency effect plays a role, the frequency of *ra*-Deletion will be high with frequent verbs, and low with less frequent verbs. I show the result in Table 67.

Table 67. Frequency of representative verbs in CSJ with *ra*-Deletion and in NIJL (2005)

verbs	frequency in CSJ with *ra*-Deletion	frequency in NIJL (2005)
mi-ru	143	1,670
tabe-ru	97	276
de-ru	41	613
ku-ru	35	1,845
ne-ru	24	53
kangae-ru	14	607
uke-ru	9	232
ki-ru	9	115
kotae-ru	7	141
kari-ru	7	28
e-ru	5	206
iki-ru	5	199
oki-ru	5	79
tate-ru	5	78

Correlation coefficient: 0.615

As Table 67 shows, the result contradicts the hypothesis. The frequency of *ra*-Deletion is high: 143 and 35, respectively with frequent verbs such as *mi-ru* (1,670) and *ku-ru* (1,845). On the other hand, the frequency of *ra*-Deletion is low: 5 with less frequent verbs such as *oki-ru* (79), and *tate-ru* (78). The correlation coefficient between frequency in the Diet database with *ra*-Deletion and frequency in NIJL (2005) is 0.615.

The correlation, instead of the inverse one, is observed with a high correlation coefficient. The result of CSJ is consistent with that of Diet database. I argue that the change of *ra*-Deletion is so advanced and has spread among so many verbs that it overrides the frequency effect, as I speculated in 5.1.2. At the intermediate stage, *ra*-Deletion is free from the frequency effect, and the frequency of *ra*-Deletion assimilates into the frequency of each verb.

5.2.3 External factors

In this section, I examine the effects of external factors on the distribution of *ra*-Deletion. The factors examined are “speech type (APS/SPS),” “gender,” “birth-year,” “geographical difference,” “education,” “spontaneity of speech,” “speech style,” “speech skill,” and “speech experience.” I conduct the analysis of each factor one by one.

5.2.3.1 Speech type (APS/SPS)

In this section, I examine the effect of the speech type (APS/SPS) on the distribution of *ra*-Deletion. Heretofore, no previous studies have found any significant correlation between stylistic difference and the distribution of *ra*-Deletion. In addition, although the results of the examination of the effect of stylistic difference on *ra*-Deletion in the Diet database show that *ra*-Deletion is more compatible with the formal settings, there exists no absolute index of stylistic difference in the Diet database. However, it would be reasonable to expect that the stylistic difference plays a role in language variation and change. As mentioned above, in CSJ the speech type constitutes the principal factor which represents the factors associated with the characteristics of speech. Based on the consideration of the difference between APS and SPS, I hypothesize that the frequency and the rate of *ra*-Deletion is higher in APS, where the speech style is formal, than in SPS, where the speech style is casual. I verify the hypothesis by examining the distribution of *ra*-Deletion and standard potentials according the APS/SPS distinction. The results are shown below.

Table 68. Distribution of potentials by speech type (APS/SPS)

speech type	*ra*-Deletion	standard potential	rate of *ra*-Deletion(%)
APS	78	5,421	1.42
SPS	452	1,721	20.80
total	530	7,142	6.91

X^2 =909.84, d.f.=1, p<0.001

As Table 68 shows, the frequency and the rate of *ra*-Deletion is significantly higher in SPS than in APS. The frequency of *ra*-Deletion in SPS is 452 among a total of 530 occurrences of *ra*-Deletion, and the difference of the rate of *ra*-Deletion between APS and SPS amounts to over 19 percent. This shows that *ra*-Deletion is more compatible with the SPS, which includes the stylistically casual speeches, than the APS, which includes stylistically formal speeches, and the effect of speech type is quite strong. The result contradicts the one in the Diet database; however, I adopt the present result considering the property of the data. I claim that *ra*-Deletion is more compatible with the stylistically casual settings. Unlike the case of *sa*-Insertion, speech style plays a role in governing the distribution of *ra*-Deletion as an independent factor. Furthermore, the result shows that *ra*-Deletion is an instance of change from below (Labov 1990) in which the innovative form is more compatible with the casual style.

5.2.3.2 Gender

As mentioned above, in the study of language variation and change, the contribution of gender difference has been emphasized in a number of cases (cf. Labov 1990, among others). Among the examinations of gender difference in *ra*-Deletion, Matsuda (1993) claims that *ra*-Deletion is preferred by female speakers. In language change, females have been considered to take the lead of a change (Labov 1990, 2001; Milroy and Gordon 2003, among others). Putting this insight into the present context, we can say that if females take the lead in the change of *ra*-Deletion, the frequency and the rate of *ra*-Deletion are higher in females than in males. I verify Matsuda's claim as well as the above hypothesis by examining the distribution of *ra*-Deletion and standard potentials by gender. The result is shown below.

Table 69. Distribution of potentials by gender

gender	*ra*-Deletion	standard potential	rate of *ra*-Deletion(%)
male	271	5,018	5.12
female	272	2,597	9.48
total	543	7,615	6.66

$X^2 = 56.83$, d.f. = 1, $p<0.001$

As Table 69 shows, although the frequency of *ra*-Deletion is almost the same in male and female, the rate of *ra*-Deletion is higher in female than in male. The result is consistent with Matsuda's claim, and it gives a further support to the traditional hypothesis that females take the lead of a change. Furthermore, the result that *ra*-Deletion shows higher rates in female and in casual settings supports the argument that *ra*-Deletion is an instance of the change from below in terms of the claim of Principle II (Labov 1990).

(32) Principle II (Labov 1990: 215)

In the change from below, women are most often the innovators.

5.2.3.3 Birth-year

In this section, I examine whether the birth-year has an influence on the distribution of *ra*-Deletion. If *ra*-Deletion is an instance of the language change, the correlation between the distribution of *ra*-Deletion and the birth-year will be observed. More specifically, identifying the birth-year as an apparent-time, the distribution of *ra*-Deletion is associated in some way with the passage of time. To verify the hypothesis, I classify each *ra*-Deletion and standard potential for every 10 years, and I examine the distribution of potentials. The result is shown below.

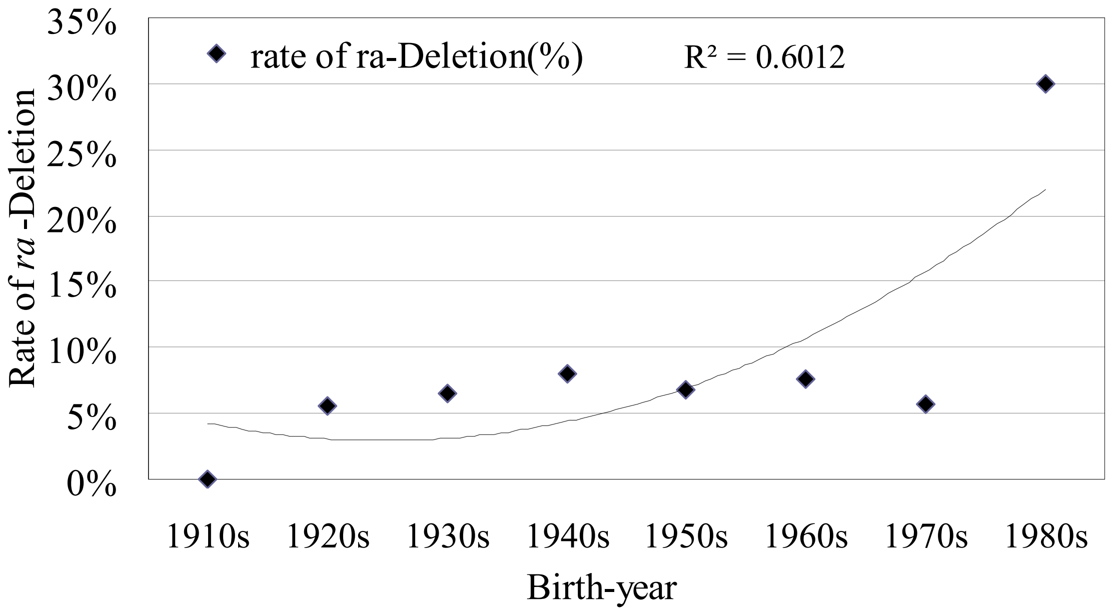

Figure 16. Distribution of *ra*-Deletion by birth year (CSJ)

As Figure 16 shows, *ra*-Deletion is first observed in the first half of the 1920s in the present data. Subsequently, the rate hovers from 5.5 to 8 percent from the 1920s to the 1970s. The rate is relatively stable during this period. In the 1980s, however, the rate of *ra*-Deletion shows steep rising. This shows that the change of *ra*-Deletion still demonstrates the upward trend although the change has already advanced and it is currently in the intermediate stage.

The distribution of *ra*-Deletion and the birth-year correlate with each other as the result of the chi-square test shows (X^2 =46.96, d.f.=7, p<0.001 (p<0.01)). The result shows that *ra*-Deletion is an instance of language change. The distribution of *ra*-Deletion in CSJ is similar to that in the Diet database in the sense that the transition of the rate of *ra*-Deletion does not show any sharp rise, and it is relatively stable.

5.2.3.4 Geographical difference

In this section, I examine the effect of geographical difference on the distribution of *ra*-Deletion and discuss the issues of acquisition and transmission. The issue of the geographical difference of *ra*-Deletion has been explored in a number of sociolinguistic researches from various perspectives. These researches show that *ra*-Deletion is first observed in the early 20th century. Geographically, the change begins in Chubu area, Chugoku area, and Shikoku area and the change is advanced in these areas. Hokkaido area is remarkable in that the change has progressed rapidly, in spite of its remoteness to these areas.

In order to verify these claims, I examine the geographical difference of *ra*-Deletion implementing the information associated with the geographical difference such as residence (present) and residence (critical period) that is available in CSJ. I classify *ra*-Deletion and standard potential according to the criteria (28) in the analysis of *sa*-Insertion, and examined the distribution of potentials by residence (present) and residence (critical period). The results are shown below.

Table 70. Distribution of potentials by residence (critical period)

residence (critical period)		*ra*-Deletion	standard potential	rate of *ra*-Deletion (%)
Hokkaido	(35)	8	183	4.19
Tohoku	(73)	22	438	4.78
Kanto	(598)	315	3,364	8.56
Chubu	(167)	45	979	4.39
Kinki	(196)	66	1,335	4.71
Chugoku	(58)	10	350	2.78
Shikoku	(42)	11	277	3.82
Kyusyu	(98)	57	599	8.69
Okinawa	(2)	2	7	22.22
Abroad	(12)	5	47	9.62
total		541	7,579	6.66

Table 71. Distribution of potentials by residence (present)

residence (present)		*ra*-Deletion	standard potential	rate of *ra*-Deletion (%)
Hokkaido	(16)	2	74	2.63
Tohoku	(42)	7	261	2.61
Kanto	(858)	433	4,749	8.36
Chubu	(98)	16	632	2.47
Kinki	(163)	52	1,181	4.22
Chugoku	(30)	6	227	2.58
Shikoku	(13)	2	140	1.41
Kyusyu	(33)	7	226	3.00
Okinawa	(4)	5	13	27.78
Abroad	(23)	12	78	13.33
total		542	7,581	6.67

As Tables 70 and 71 show, *ra*-Deletion is distributed over the wide range of areas both in residence (critical period) and in residence (present), compared to the distribution of *sa*-Insertion. The frequency of *ra*-Deletion is higher in the central area of Japan than in peripheral areas, centering around Kanto area. Given that the language change spreads in a rippled manner, one can argue that the distribution in residence (critical period) is also plausible in addition to the distribution in residence (present). The distribution in residence (critical period) shows that the change spreads in a rippled manner. The possibility that *ra*-Deletion is acquired in critical period and retained in adulthood is guaranteed. Furthermore, the frequency of *ra*-Deletion in Chubu area is relatively high. This partly supports the claim that the change begins in Chubu area, Chugoku area, and

Shikoku area and the change is advanced in these areas.[61]

In order to verify the possibility that *ra*-Deletion is acquired in critical period and retained in adulthood, instead of being acquired in adulthood after the critical period, I examine the distribution of potentials by residence (present) and residence (critical period) with cross-tabulation.

Table 72. Cross tabulation of the distribution of *ra*-Deletion by residence (present) and residence (critical period)

present / critical period	Hokkaido	Tohoku	Kanto	Chubu	Kinki	Chugoku	Shikoku	Kyusyu	Okinawa	Abroad
Hokkaido			7		1					
Tohoku			22							
Kanto	2	7	283	1	10	1		1		10
Chubu			28	13	2					2
Kinki			29	37						
Chugoku			4			5		1		
Shikoku			6	1	2		2			
Kyusyu			48	1				5	3	
Okinawa					4				3	
Abroad			37	3	7					

[61] The frequency of *ra*-Deletion and standard potential is extremely high in Kanto area. This is due to the fact that the recording of CSJ is conducted in Tokyo (Kanto area).

Table 73. Cross tabulation of the distribution of standard potential by residence (present) and residence (critical period)

critical period \ present	Hokkaido	Tohoku	Kanto	Chubu	Kinki	Chugoku	Shikoku	Kyusyu	Okinawa	Abroad
Hokkaido	28	7	119	21	8					
Tohoku		84	298	47						9
Kanto	31	92	2921	82	105	36	24	22	6	45
Chubu	8	40	458	374	80		5			14
Kinki	7	20	319	45	839	32	32	39		2
Chugoku		18	158	32	29	98		14		1
Shikoku			89	12	84	3	71	17		1
Kyusyu			348	16	25	58	8	134	4	6
Okinawa			1							
Abroad			8	2	1					

As Table 72 shows, *ra*-Deletion is distributed over a wide range of areas even in residence (present). Therefore, it is likely to be exposed to *ra*-Deletion in critical period (past), which is the present-day language change, as an input to the acquisition in such areas. The change of *ra*-Deletion has already progressed in the critical period of the speakers in the present data. Furthermore, among the speakers who utter *ra*-Deletion, most of the speakers who have spent their critical period in the areas other than Kanto area are concentrated in Kanto area nowadays. Specifically, the distribution shows that relatively many speakers moved from Chubu area to Kanto area. This partly supports the traditional assumption that *ra*-Deletion was transmitted from Chubu area to Kanto area.

Similar to the distribution of *ra*-Deletion, standard potential is observed in many areas in the present distribution as Table 73 illustrates. This shows that the standard potential is uttered in such areas in critical period (past). Therefore, standard potential is acquired in critical period and retained in adulthood, instead of being acquired in adulthood after the critical period.

The shaded cells represent the tokens in which residence (critical period) and residence (present) coincide. These cells in Table 72 show that the speakers who have consistently lived in Kanto and Chubu areas utter *ra*-Deletion. In order for such speakers to be exposed to *ra*-Deletion as an input, *ra*-Deletion should have been uttered in these areas. The result shows that *ra*-Deletion has already been uttered in Kanto and Chubu areas in the critical period of speakers who have consistently lived in Kanto and Chubu areas.

5.2.3.5 Education

In the study of language variation and change, social class is a central concept along with other factors such as style and gender. The social class is defined by the following characteristics: occupation, income and education (Ash 2002). In a number of sociolinguistic researches, education has been employed as a predictor of rating the social class (Michael 1962; Labov 2001, among others). It would be reasonable to expect that the level of education affects the distribution of *ra*-Deletion. CSJ is equipped with the parameter "education" which can be an index for estimating the level of education; therefore, the examination of the effect of the level of education is available. According to the generalization in Labov (1966a), the speakers of the lower class prefer the innovative forms. If we put this insight into the present context, *ra*-Deletion is more compatible with lower level of education, in other words, the lower the level of education, the higher the rate of *ra*-Deletion. I verify the hypothesis by examining the distribution of *ra*-Deletion and standard potential according to the stratification of the level of education in CSJ. The result is shown below.

Table 74. Distribution of potentials by education

education	*ra*-Deletion	standard potential	rate of *ra*-Deletion(%)
Junior high school graduate	5	16	23.81
High school graduate	155	814	16.00
University graduate	305	2,708	10.12
Post graduate	71	4,038	1.73
total	536	7,576	6.61

X^2 =367.36, d.f.=3, $p<0.001$ ($p<0.001$)

As Table 74 shows, the rate of *ra*-Deletion is 23.81 percent in Junior high school graduates, 16 percent in High school graduates, 10.12 percent in University graduates, and 1.73 percent in Post graduates. The rate of *ra*-Deletion shows the sharp decline as the level of education increases. The result shows that *ra*-Deletion is more compatible with lower level of education, and it supports the hypothesis.

As mentioned above, *ra*-Deletion is an instance of the change from below. Labov (1966a) made the generalization about the expected distribution of linguistic variants for the change from below with respect to social class and age group. Although in change from below the lower the social class, the higher the probability of the innovative forms in both age groups, the probability is higher in the younger group than in the older group. Based on Labov's (1966a) generalization, I examine the distribution of *ra*-Deletion by education and birth-year.

Table 75. Distribution of potentials by education and birth-year

younger	*ra*-Deletion	standard potential	rate of *ra*-Deletion(%)
Junior high school graduate	2	4	33.33
High school graduate	118	393	23.09
University graduate	214	2,046	9.47
Post graduate	52	3,128	1.64
total	386	5,571	6.48
older	***ra*-Deletion**	**standard potential**	**rate of *ra*-Deletion(%)**
Junior high school graduate	3	12	20.00
High school graduate	37	421	8.08
University graduate	91	662	12.08
Post graduate	19	896	2.08
total	150	1,991	7.01

X^2 =1014.71, d.f.=7, p<0.001 (p<0.001)

As Table 75 shows, in the younger group the rate of *ra*-Deletion is shows the sharp decline as the level of education increases, and this tendency is also observed in the older group. However, in Junior high school graduates and High school graduates, the rate of *ra*-Deletion is higher in the younger group: 33.33 percent and 23.09 percent, respectively than in the older group: 20 percent and 8.08 percent, respectively. The rate in High school graduates in the older group is close to the one in Junior high school graduates in the younger group. The result shows that the lower the level of education, the higher the probability of *ra*-Deletion in both age groups, while the probability is relatively higher in the younger group than in the older group. This is schematized as follows.

Table 76. Generalization of the probability of *ra*-Deletion by birth-year and education

	Junior high	High	University	Post grad.
Younger	high	medium	low	low
Older	medium	low	low	low

Thus, the results show that *ra*-Deletion is more compatible with lower level of education and *ra*-Deletion is an instance of the change from below in support of Labov's (1966a) generalization.

5.2.3.6 Spontaneity

In this section, I examine the effect of spontaneity on the distribution of *ra*-Deletion. As mentioned above, the degree of spontaneity by the speech type (APS/SPS) is the attribute defined on the inter-speech type basis, not on the intra-speech type basis. It is the case that spontaneous speeches are included in the APS which is characterized by less spontaneous speech, and less spontaneous speeches are included in the SPS which is characterized by spontaneous speech. Thus, the examination depending solely upon the speech type with respect to the spontaneity is insufficient, and it is necessary to examine the spontaneity as an independent factor. I verify the effect of the spontaneity by looking into the distribution of *ra*-Deletion and standard potential by the degree of spontaneity. The results are shown below.

Table 77. Distribution of potentials by spontaneity

spontaneity	*ra*-Deletion	standard potential	rate of *ra*-Deletion(%)
lowest	3	1,040	0.29
lower	32	858	3.60
middle	56	1,673	3.24
higher	179	2,025	8.12
highest	256	1,638	13.52
total	526	7,234	6.78

X^2 =260.46, d.f.=4, p<0.001

As Table 77 illustrates, the frequency and the rate of *ra*-Deletion is higher in speeches with high spontaneity than in speeches with low spontaneity. The frequency and the rate of *ra*-Deletion correlate with the degree of spontaneity: The higher the degree of spontaneity, the higher the frequency and the rate of *ra*-Deletion. *Ra*-Deletion is more compatible with the speech with high spontaneity. As the result of the chi-square test shows, speech style plays a role in governing the distribution of *ra*-Deletion as an independent factor.

As in *sa*-Insertion, I examine the distribution of *ra*-Deletion and standard potential with respect to the interaction between spontaneity and gender by means of the cross-tabulation.

Table 78. Distribution of potentials by spontaneity and gender

male	*ra*-Deletion	standard potential	rate of *ra*-Deletion (%)
lowest	2	606	0.33
lower	14	608	2.25
middle	24	981	2.39
higher	96	1,472	6.12
highest	122	1,175	9.41
total	258	4842	5.06
female	***ra*-Deletion**	**standard potential**	**rate of *ra*-Deletion (%)**
lowest	1	434	0.23
lower	18	250	6.72
middle	32	692	4.42
higher	83	553	13.05
highest	134	463	22.45
total	268	2,392	10.08

$X^2 = 413.497$, d.f.=9, $p<0.001$ ($p<0.001$)

As Table 78 shows, the frequency and the rate of *ra*-Deletion is higher in speeches with high spontaneity than in speeches with low spontaneity both in male and in female. However, the rate of *ra*-Deletion varies greatly from lowest (0.23 percent) to highest (22.45 percent) in female, compared to male (from 0.33 percent to 9.41

percent). I assume the interaction between spontaneity and gender.[62] At this point, I consider the reason why the difference of the rate of *ra*-Deletion by the degree of spontaneity differs by male and female. As mentioned above, the variation range in style according to the settings is greater in female than in male, and females are positive to use the innovative form, on the other hand males tend to have the strong awareness towards the social norm and remain reluctant to do so. The results again support the traditional assumption that females take the lead of the change.

The results show that the higher the degree of spontaneity, the higher the frequency and the rate of *ra*-Deletion. The speech with high spontaneity is "spoken-languagewise;" on the other hand the speech with low spontaneity is "written-languagewise." On the assumption that the language change proceeds from spoken language to written language, the change of *ra*-Deletion is not so advanced that it occurs in written language.

5.2.3.7 Speech style

In this section, I examine the effect of speech style on the distribution of *ra*-Deletion. The discussion of the relationship and the structure among factors also applies to speech style, as with spontaneity. Thus, the examination of speech style as an independent factor is necessary. Based on the observation that *ra*-Deletion is more compatible with the casual settings, I hypothesize that he rate of *ra*-Deletion is higher in casual speech than in formal speech with respect to speech style. I stratify the speech style into "most casual," "casual," "middle," "formal," and "most formal," and I classify each token according to the strata. The result is shown below.

[62] I discuss the interaction among factors at length in Section 5.3.

Table 79. Distribution of potentials by speech style[63]

style	*ra*-Deletion	standard potential	rate of *ra*-Deletion(%)
most casual	39	91	30.00
casual	177	609	22.52
middle	226	3,243	6.51
formal	67	1,953	3.32
most formal	10	726	1.36
total	519	6,622	7.27

X^2 =458.78, d.f.=4, p<0.001

As Table 79 shows, the rate of *ra*-Deletion is 30 percent in most casual, 22.52 percent in casual, 6.51 percent in middle, 3.32 percent in formal, and 1.36 percent in most formal. The rate of *ra*-Deletion increases as the speech style becomes more casual. The result shows that *ra*-Deletion is more compatible with the casual speech than formal speech in support of the above hypothesis. The distribution of *ra*-Deletion by speech style is highly significant as the result of the chi-square test shows. This implies that speech style plays a role as an independent factor, instead of interacting with some other factors.

5.2.3.8 Speech skill

In this section, I examine the effect of speech skill on the distribution of *ra*-Deletion.

[63] As mentioned above, the speech style is originally evaluated on an ascending risk scale of 1 to 5, and the result of the evaluation is annotated to each speech as the impressionistic rating data. The annotated data in CSJ is directly applicable to the analysis of *ra*-Deletion in its original form, since I collected enough examples of *ra*-Deletion (543 tokens) and every item has enough tokens with original scales to obtain the statistically significant results Therefore, I do not apply the transform to the analysis of *ra*-Deletion.

The speech skill is the index which refers to the speakers' skill in speechmaking. The speech skill is the self-evaluation in which speakers answer whether they are good or bad at speechmaking in the questionnaire before the recording. I stratify the speech skill into "most skillful," "skillful," "less skillful," and "unskillful," and I classify each token according to the strata. I examine the effect of speech skill by looking into the distribution of *ra*-Deletion and standard potential. The result is shown below.

Table 80. Distribution of potentials by speech skill

speech skill	*ra*-Deletion	standard potential	rate of *ra*-Deletion(%)
most skillful	6	163	3.55
skillful	146	1,749	7.70
less skillful	261	3,839	6.37
unskillful	104	1,376	7.03
total	517	7,127	6.76

X^2 =6.62, d.f.=3, n.s.

As Table 80 shows, no significant correlation between the distribution of *ra*-Deletion and speech skill. This indicates that the speakers' awareness towards their own speech skill does not affect the distribution of *ra*-Deletion. However, the result shows the possibility that speech skill interacts with other factors. Specifically, speech skill may interact with speech experience according to the result of the analysis of *sa*-Insertion. I examine this possibility by conducting the multivariate analysis in Section 5.2.4.

5.2.3.9 Speech experience

Finally I examine the effect of speech experience on the distribution of *ra*-Deletion. Although the argument that the speakers who make the academic presentations have broader experience in speechmaking than the speakers who make the simulated public speaking applies to the speech experience, the examination of the effect of speech experience as an independent factor within speech type is necessary. I stratify the speech skill into "first time," "5," "10," "20," and "21-," and I classify each token according to the strata. I examined the effect of speech experience by looking into the distribution of *ra*-Deletion and standard potential. The results are shown below.

Table 81 Distribution of potentials by speech experience

speech experience	*ra*-Deletion	standard potential	rate of *ra*-Deletion(%)
first time	317	2,174	12.73
5	92	2,019	4.36
10	53	943	5.32
20	22	817	2.62
21-	32	1,223	2.55
total	516	7,176	6.71

$X^2 = 5.344$, d.f.=1, $p<0.025$

As Table 81 shows, the frequency and the rate of *ra*-Deletion are higher for less speech experience than for broader speech experience. Specifically, most of *ra*-Deletions are concentrated in first time (317) in frequency. The rate of *ra*-Deletion decreases as the speech experience becomes broader. The result shows that *ra*-Deletion is preferred by the speakers with less speech experience.

In Section 5.2.3, I conducted the analyses of external factors. The results show that *ra*-Deletion: 1) is more compatible with SPS than APS; 2) is preferred by females; 3) is preferred by the speakers with more recent birth-years; 4) is currently most frequent in Kanto area; 5) is more compatible with the speech with high spontaneity; 6) is preferred by the speaker with lower level of education; 7) is more compatible with the casual speech; 8) is unaffected by the speakers' awareness towards their own speech skill; 9) is preferred by the speaker with less speech experience. These results strongly support the claim that *ra*-Deletion is an instance of the change from below, and it tends to be used in casual settings. Furthermore, I showed the interaction between education as a subcategory of social class and age groups in the change of *ra*-Deletion. I also argued that *ra*-Deletion: is acquired in critical period and retained in adulthood. The claim that *ra*-Deletion was transmitted from Chubu area to Kanto area is partly supported.

5.2.4 Multivariate analysis

In this section, I conduct the multivariate analysis, in order to examine the degree of the contribution of each factor to the distribution of *ra*-Deletion, and the interaction among internal and external factors, based on the results of the factor-by-factor analysis in previous sections. Specifically, I conduct the binominal logistic regression analysis; the dependent variable is the choice of *ra*-Deletion/standard potential, and the independent variable (the predictor) includes five internal factors: affirmative/negative distinction, verb-length, conjugation type of the verb (*i*-stem/*e*-stem), morphological structure of the preceding stem (monomorphemic verb/causative verb), and embeddedness; and nine external factors: speech type, gender, birth-year, geographical difference, education, spontaneity, speech style, speech skill, and speech experience. I identify the coefficients of each independent variable as the weight of each factor. I show the results of the analysis below, firstly the correlation matrix.

Table 82. Correlation matrix among dependent variable and independent variables (*ra*-Deletion, CSJ)

	Constant	Aff/ Neg	V- length	*i*-stem/ *e*-stem	mono/ complex	embed- dedness	speech type	gender	birth- year	geogra- phical	educa- tion	spontan- eity	style	skill	experi- ence
Constant	1.000	-.046	-.062	-.058	-.120	-.069	-.019	-.198	-.888	-.082	-.876	-.327	-.212	-.152	-.062
Aff/Neg	-.046	1.000	-.034	-.020	-.029	-.077	.097	-.006	.011	-.001	.020	-.033	.088	.008	-.013
V-length	-.062	-.034	1.000	.387	-.018	-.018	.140	-.010	-.033	.017	-.028	.011	-.032	-.025	-.033
i-stem/*e*-stem	-.058	-.020	.387	1.000	-.095	-.057	.017	.016	-.011	.004	-.017	.007	-.038	.034	-.002
mono/complex	-.120	-.029	-.018	-.095	1.000	.035	.038	.010	.014	.003	.017	-.011	.020	-.033	-.029
embeddedness	-.069	-.077	-.018	-.057	.035	1.000	-.042	-.029	.014	-.001	.031	.019	-.029	-.018	-.026
speech type	-.019	.097	.140	.017	.038	-.042	1.000	-.200	.125	-.076	.071	.052	-.105	-.025	-.204
gender	-.198	-.006	-.010	.016	.010	-.029	-.200	1.000	.014	-.001	.010	.667	.020	-.065	-.030
birth-year	-.888	.011	-.033	-.011	.014	.014	.125	.014	1.000	-.009	.943	.052	.046	-.021	-.082
geographical	-.082	-.001	.017	.004	.003	-.001	-.076	-.001	-.009	1.000	-.018	.036	.050	-.016	-.021
education	-.876	.020	-.028	-.017	.017	.031	.071	.010	.943	-.018	1.000	.035	-.016	-.009	-.106
spontaneity	-.327	-.033	.011	.007	-.011	.019	.052	.667	.052	.036	.035	1.000	.189	-.093	-.056
style	-.212	.088	-.032	-.038	.020	-.029	-.105	.020	.046	.050	-.016	.189	1.000	.044	.036
skill	-.152	.008	-.025	.034	-.033	-.018	-.025	-.065	-.021	-.016	-.009	-.093	.044	1.000	.712
experience	-.062	-.013	-.033	-.002	-.029	-.026	-.204	-.030	-.082	-.021	-.106	-.056	.036	.712	1.000

Firstly, I discuss the correlation of each factor in Table 82. Assuming the claim that internal factors are mutually independent, internal factors and external factors are also mutually independent; while external factors are interrelated, we can say that the internal factors such as affirmative/negative distinction and verb-length are mutually independent, internal factors and external factors such as type of the House, type of the Diet meeting, and birth-year are also mutually independent, and only the external factors are interrelated.

As Table 82 shows, verb-length and conjugation type of the verb (*i*-stem/*e*-stem) interact with each other. Other internal factors are mutually independent. No internal factor shows any significant correlation with any external factors. On the other hand, within external factors gender and spontaneity, birth-year and education, and speech skill and speech experience show high correlation coefficients, namely these factors respectively interact with each other.

The results contradict the hypothesis in the sense that some interaction within internal factors is observed. Although the interaction within external factors is observed, the tendency towards the decrease of interactions is observed compared to the results in *sa*-Insertion. However, the lack of interaction between internal factors and external factors is maintained. This implies that the internal factors that are mutually independent in the beginning of the change become interrelated and the external factors that are interrelated in the beginning of the change become independent along the progress of the change, considering the fact that *ra*-Deletion is in the intermediate stage of the change. As mentioned above, the change of the relationship among factors is a corollary of the change of the effect of each factor along the progress of the change. Furthermore, the fact that the independence between internal factors and external factors is blind to the progress of the change shows the enormous difference between internal factors and external factors. The results are parallel to those in the Diet database.

Although I assumed the relationship between speech type and the external factors such as spontaneity, speech style, and speech experience that are subsumed under the subcategory of speech type, these factors do not interact with each other. This shows that the subcategorial factors have become strong enough to play a role independently without being canceled out by the effect of speech type.

The correlation between verb-length and conjugation type of the verb is attributed to the fact that these factors are all associated with the property of verbs. This may result in the interaction among internal factors. The correlation between birth-year and education is associated with the generalization about the expected distribution of linguistic variants for the change from below with respect to social class and age group. The correlation between gender and spontaneity may be because the variation range in style is greater in females than in males, and females are positive to use the innovative form, while on the other hand males tend to have the strong awareness towards the social norm and remain reluctant to do so. Furthermore, speech experience and speech skill show some correlation, and both factors are interacting with each other as I hypothesized in Section 5.2.3.8. This is associated with the fact that the speakers with broader speech experience regard themselves as being good at speechmaking.

Next, I discuss the degree of contribution of each factor to the distribution of *ra*-Deletion. I show the result of logistic regression below.

Table 83. Result of the logistic regression (*ra*-Deletion, CSJ)

variables in the equation

	β	SE	Wald	d.f.	P-value	Exp(β)
affirmative/negative	-.152	.124	1.488	1	.223	.859
verb-length	-.496	.067	55.329	1	.000	.609
i-stem/*e*-stem	.371	.126	8.649	1	.003	1.449
monomorphemic/complex	-.385	.145	7.106	1	.008	.680
embeddedness	-.044	.123	.128	1	.720	.957
speech type	-2.873	.217	175.518	1	.000	.057
gender	1.126	.501	5.053	1	.025	3.083
birth-year	.895	.203	19.364	1	.000	2.448
geographical difference	.108	.038	7.920	1	.005	1.114
education	1.300	.454	8.192	1	.004	3.668
spontaneity	.463	.089	27.339	1	.000	1.589
speech style	-.245	.074	11.105	1	.001	.783
speech skill	.401	.133	9.083	1	.003	1.493
speech experience	.459	.147	9.794	1	.002	1.582
gender by spontaneity	-.259	.117	4.905	1	.027	.772
birth-year by education	-.222	.073	9.170	1	.002	.801
speech skill by speech experience	-.198	.059	11.245	1	.001	.821
Constant	-7.816	1.375	32.290	1	.000	.000

-2 Log likelihood = 2264.354, Cox & Snell R^2 = .126, Nagelkerke R^2 = .336

As Table 83 shows, every factor except for affirmative/negative distinction and embeddedness is significant with high probability, according to the P-values. This shows that these factors have an influence on the distribution of *ra*-Deletion, while on the other hand, affirmative/negative distinction and embeddedness do not contribute to the distribution of *ra*-Deletion. The fact that the interaction terms are significant shows that gender and spontaneity, birth-year and education, speech skill and speech experience interact with each other. These factors do not play a role independently, but contribute to the distribution of *ra*-Deletion while interacting with each other.

According to the coefficients of each significant factor ("β" in Table 83), among the significant factors, speech type is the most influential factor, and other factors are ranked as follows according to their contribution: education, gender, birth-year, verb-length, spontaneity, speech experience, speech skill, morphological structure of the preceding stem (monomorphemic verb/complex verb), conjugation type of the verb (*i*-stem/*e*-stem), gender by spontaneity, speech style, birth-year by education, speech skill by speech experience, and geographical difference. In other words, the factors affect the distribution of *ra*-Deletion in the above order.

Among the significant external factors, the high coefficient of speech type shows that speech type constitutes the principal factor which represents the major factors associated with the characteristics of speech. These insights can be modeled shown as in Figure 17.

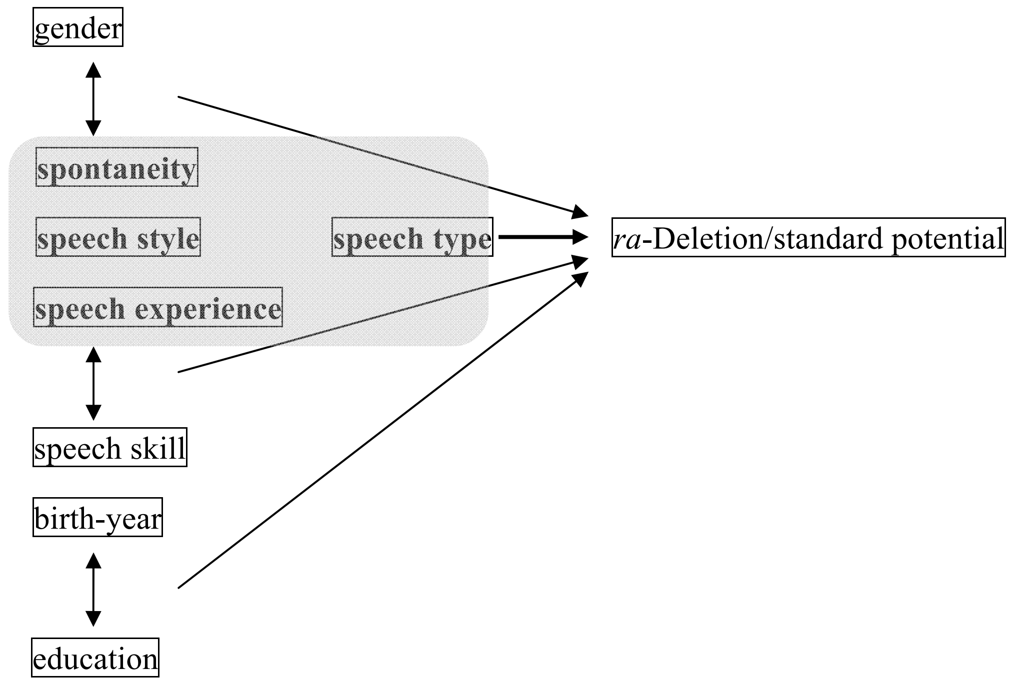

Figure 17. Model of the relationships among speech type, birth-year, gender, spontaneity, education, speech style, speech skill, and speech experience

5.2.5 Summary

In this section, I conducted statistical analyses of *ra*-Deletion via CSJ. Specifically, I examined the effects of internal and external factors on the distribution of *ra*-Deletion. The factors which affect the distribution of *ra*-Deletion categorically are restricted to two internal factors: *ra*-Deletion does not occur in idioms and nouns; *ra*-Deletion is restricted to self-controllable verbs. As to the gradient factors, the effects of many factors have declined with the progress of the change of *ra*-Deletion. As a result, the specific function and property of *ra*-Deletion has come up to the surface: *ra*-Deletion is more compatible with the negative context, *ra*-Deletion is preferred by super-long verbs, following the economy principle. The results of the analysis via CSJ differ from the one via the Diet database in many respects. *Ra*-Deletion: 1) is more compatible with the negative context than the affirmative one; 2) is preferred by the super-long verbs; 3) is more compatible with complex verbs than monomorphemic verbs; 4) is more compatible with subordinate clauses than main clauses; 5) is gradiently constrained by OCP (μ). I also proposed the revised version of OCP (μ) which refers to the morphological boundary. The following results are consistent with the results in the Diet database: *ra*-Deletion 6) is more compatible with *i*-stem verbs than *e*-stem verbs (OCP); 7) is subject to the lexical diffusion, but immune to the frequency effect. Compared to *sa*-Insertion, I observe many gradient internal factors in *ra*-Deletion. This shows that the manner in which each factor affects on the distribution differs depending on the properties of each phenomenon as well as the degree of progression of each change. The factors show the alteration with respect to categorical/gradient or soft/hard distinctions from the initial stage through the final stage of the change.

As to the external factors, *ra*-Deletion: 1) is more compatible with SPS than APS; 2) is preferred by females; 3) is preferred by the speakers with more recent birth-years; 4) is currently most frequent in Kanto area; 5) is more compatible with the speech with high spontaneity; 6) is preferred by the speaker with lower level of education; 7) is more compatible with the casual speech; 8) is unaffected by the speakers' awareness towards their own speech skill; 9) is preferred by the speaker with less speech experience. These results strongly support the claim that *ra*-Deletion is an instance of the change from below, and it tends to be used in casual settings. Furthermore, I showed the interaction between education as a subcategory of social class and age groups in the change of *ra*-Deletion. I also argued that *ra*-Deletion is acquired in critical period and retained in adulthood.

At this point, I discuss the relationship between the supercategory speech type and spontaneity, speech style, and speech experience which are subsumed under speech type with respect to the compatibility of *ra*-Deletion to these factors. The results of the analysis of *ra*-Deletion indicate that *ra*-Deletion shows the similar behavior to four factors related to the stylistic difference. The supercategorial factor and the subcategorial factors act in the same direction, in other words, *ra*-Deletion is more compatible with the negative option than positive option with respect to "speech:" With respect to spontaneity, the more spontaneous the speech, the higher the rate of *ra*-Deletion; with respect to speech style, the lower the degree of formality, the higher the rate of *ra*-Deletion; with respect to speech experience, the less the speech experience, the higher the rate of *ra*-Deletion; similarly with respect to speech type, *ra*-Deletion is more compatible with SPS where inherently spontaneous, casual speeches as well as the speaker with less speech experience are predominant. This implies that the effects of subcategorial factors are directly reflected in the effect of the supercategory speech type. It follows that spontaneity, speech style, and speech experience are the major factors comprising speech type in their effect on the distribution of *ra*-Deletion.

The change of *ra*-Deletion tends to be used in casual style, since it is the change from below as opposed to the change from above (Labov 1990) in which the innovative form is more compatible with the formal style. The results support the claim that *ra*-Deletion is an instance of the change from below and the change of *ra*-Deletion differs from the change of *sa*-Insertion which is an instance of the change from above and is more compatible with the positive option with respect to "speech." Furthermore, three subcategorial factors are significant as independent factors. This shows that the subcategorial factors have become strong enough to play a role independently without being canceled out by the effect of speech type.

The multivariate analysis reveals the degree of the contribution of each factor to the distribution of *ra*-Deletion, as well as the interaction among internal and external factors. Firstly, as to the interaction among factors, the interaction within internal factors is observed. This implies some changes of the relationships among factors along the progress of the change. On the other hand, the independence between internal factors and external factors is maintained. Such results, coupled with the categorical/gradient distinction, imply that the internal and external factors occupy distinct rooms in human linguistic competence. Secondly, as to the degree of the contribution of each factor, the factors affect the distribution of *ra*-Deletion in the order of: speech type, education, gender, birth-year, verb-length, spontaneity, speech experience, speech skill, morphological structure of the preceding stem (monomorphemic verb/complex verb), conjugation type of the verb (*i*-stem/*e*-stem), gender by spontaneity, speech style, birth-year by education, speech skill by speech experience, and geographical difference. Speech type is shown to be the principal factor in CSJ. The results also show that it is not necessarily the case that the internal factors are categorical, and the strength of internal factors does not necessarily override that of external factors; some external factors show extremely significant contributions.

The results of the present analysis contradict the claims of the previous studies (Nakamura 1953; Okazaki 1980; Nakata 1982; Kato 1988; Mastuda 1993, 2008; Inoue 1998, among others) that *ra*-Deletion 1) is restricted to verbs within 4 morae in length; 2) is more compatible with the negative context than the affirmative context; 3) does not occur in compound verbs, auxiliary verbs, and causative verbs; 4) is more frequent in main clauses than in subordinate clauses. The claim that *ra*-Deletion is more compatible with verbs that end in *i* than verbs that end in *e* is supported. The claim that *ra*-Deletion was transmitted from Chubu area to Kanto area is also partly supported. In addition, the issue of verb-length cannot necessarily be attributed to the difference between the lexicon and the grammar, as Kinsui (2003) argues.

Chapter 6. Statistical analysis of *re*-Insertion

In this chapter, I conduct analysis of *re*-Insertion in CSJ, according to each factor.[64] An exhaustive examination of CSJ brought forth a total of 20 potential forms with *re*-Insertion, as opposed to a total of 3,657, traditional counterpart (TC); thus, the rate of *re*-Insertion (*re*-Insertion /(*re*-Insertion + TC) *100) amounts to 0.54 percent, as shown in Table 84 below.

Table 84. Distribution of *re*-Insertion and TC[65]

	#
re-Insertion	20
TC	3,657
rate (%)	0.54

In Section 6.1, I examine the effects of internal factors. In Section 6.2, I discuss the origin of the change of *re*-Insertion. In Section 6.3, I examine the effects of external factors. Section 6.4 conducts the multivariate analysis. Finally, Section 6.5 summarizes the discussion.[66]

6.1 Internal factors

In this section, I examine the effects of internal factors. In Section 6.1.1, I examine the categorical effects of three internal factors: 1) whether *re*-Insertion occurs in idioms and nouns; 2) the self-controllability restriction. In Section 6.1.2, I examine the effect

[64] In this chapter, I do not conduct the analysis of *re*-Insertion via Diet database, since no *re*-Insertion is observed in the Diet database.
[65] As in *ra*-Deletion, in each factor-by-factor analysis the total frequency of *re*-Insertion and TC does not necessarily amount to 20 and 3,657, respectively, since some values are missing or labeled as ‘nr’ for certain cases.
[66] In the analysis of *re*-Insertion, I do not discuss the lexical diffusion theory, since the total frequency of *re*-Insertion amounts to only 20 in CSJ which is insufficient for the examination.

of the type of the following context (affirmative/negative distinction). Section 6.1.3 examines the effect of verb-length. Section 6.1.4 examines the effect of verb type (vowel verb/consonant verb); Section 6.1.5 examines the effect of the morphological structure of the preceding stem (monomorphemic verb/complex verb); In Section 6.1.6 I examine the effect of embeddedness. In Section 6.1.7 I examine whether *re*-Insertion contains the sequence *rere* (OCP (μ)).

6.1.1 Categorical factors

In this section, I examine the two internal factors that show categorical effects on the distribution of *re*-Insertion. I examined each factor by looking into the distribution of *re*-Insertion and TC. I show the results in Table 85.

Table 85. Categorical effects of two internal factors on the distribution of *re*-Insertion

factors	effects
idioms & nouns	*Re*-Insertion does not occur in idioms and nouns.
self-controllability	*Re*-Insertion is restricted to self-controllable verbs.

The results of the examination of two factors in *re*-Insertion are exactly the same as the one in *ra*-Deletion: *Re*-Insertion does not occur in idioms and nouns. The result supports the assumption that idioms and nouns are resistant to the language change; *re*-Insertion is restricted to self-controllable verbs. This shows that *re*-Insertion is subject to the self-controllability restriction. *Re*-Insertion is currently in the very beginning of language change, and it also follows the change of *sa*-Insertion and *ra*-Deletion. *Sa*-Insertion and *ra*-Deletion do not occur in idioms and nouns. Assuming these facts, we can say that the result that *re*-Insertion does not occur in idioms and nouns is a natural consequence. In addition, the innovative forms in three variations never occur in idioms and nouns in the present research. The result supports the view that idioms and nouns are extremely resistant to the language change, among the contexts that govern the language change. The innovative forms can occur in newly-created idioms and nouns only after considerable progress of the change.

The potential forms are in principle restricted to verbs that describe volitional actions (Kinsui 2003, among others). With respect to the self-controllability, *re*-Insertion manifests the same property as other potential forms including *ra*-Deletion.

6.1.2 Following context

In this section, I examine the effect of following context on the distribution of *re*-Insertion, specifically focusing on the affirmative/negative distinction. Before I examine the effect of affirmative/negative distinction, I describe the distribution of the following context. Does *re*-Insertion manifest any specific property in connection with the following context, as in *sa*-Insertion and *ra*-Deletion? To answer this, I examine the distribution of *re*-Insertion and the TC by following context. The result is shown below.

Table 86. Distribution of *re*-Insertion and TC by following context

context	*re*-Insertion	TC	rate of *re*-Insertion(%)
-ru	7	765	0.91
negative	4	228	1.72
-masu	3	1,366	0.22
ϕ	3	0	100.00
-te	2	161	1.23
-tara	1	3	25.00

As Table 86 shows, the frequency of *re*-Insertion in the *-ru* pattern (conclusive form) is 7, and the one in negative context is 4, comprising nearly half of the 20 occurrences of *re*-Insertion. Most of *re*-Insertions occur either in the *-ru* pattern (conclusive form) or the negative pattern according to the frequency and the rate of *re*-Insertion. On the other hand, the frequency of *re*-Insertion is particularly low in *-masu* pattern (3) compared to the frequency of TC (1,366). The result implies that *re*-Insertion is an instance of change from below, as *ra*-Deletion, in which the innovative form is more compatible with the casual style than formal style.

Next, I examine the effect of the affirmative/negative distinction. As mentioned above, negative contexts tend to show the conservative behavior in language change compared to affirmative ones (Givón 1979; Matsuda 1993, among others). Following the discussion in the previous chapters, I hypothesize that the rate of *re*-Insertion is lower in negative contexts than in affirmative ones. I show the distribution of *re*-Insertion and TC by the affirmative/negative distinction below.

Table 87. Distribution of *re*-Insertion and TC by affirmative/negative context

context	*re*-Insertion	TC	rate of *re*-Insertion(%)
affirmative	16	3,429	0.46
negative	4	228	1.72
total	20	3,657	0.54

$X^2 = 6.38$, d.f.=1, $p<0.01$ ($p<0.03$)

As Table 87 illustrates, the rate of *re*-Insertion is higher in negative context than in affirmative context. The result is exactly the opposite to the hypothesis. The change of *re*-Insertion is currently more advanced in negative context than in affirmative context. Considering the fact that in the potential forms the change of *re*-Insertion follows the change of *ra*-Deletion, *re*-Insertion might inherit the specific property of *ra*-Deletion that it is more compatible with the negative context to form the negative expressions from *re*-Insertion.

To capture the change of *re*-Insertion in negative context, I examine the chronological change of *re*-Insertion in negative context.

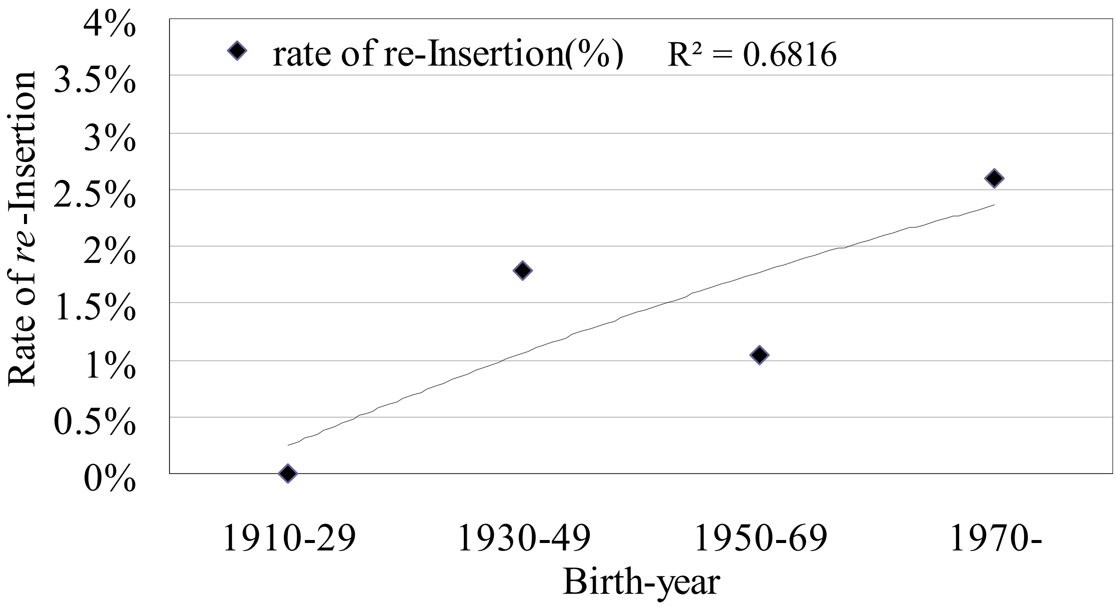

Figure 18. Distribution of *re*-Insertion by birth-year in negative context

As Figure 18 shows, the rate of *re*-Insertion in negative context is gradually increasing along the age line. Specifically, the change of *re*-Insertion in negative context follows the entire change of *re*-Insertion: The rate of *re*-Insertion in entire context is higher than the one in negative context before the 1930s.[67] The result supports the hypothesis that negative contexts tend to show the conservative behavior in language change compared to affirmative ones. However, the rate of *re*-Insertion in negative context exceeds the rate for all after 1950. This shows that, although the effect of affirmative/negative distinction has contributed to the distribution of *re*-Insertion before 1950, *re*-Insertion has become unsuppressed by the effect after 1950, and it has gradually increased with its specific property. Thus, the results are consistent with the ones in *ra*-Deletion.

[67] I describe the chronological change of *re*-Insertion in Section 6.2.3.

6.1.3 Effect of verb-length

In this section, I examine the effect of verb-length on the distribution of *re*-Insertion in CSJ. Following the traditional assumption that the change diffuses from shorter verbs to longer verbs, I hypothesize that *re*-Insertion is more compatible with the shorter verbs than the longer verbs in the beginning of language change, with a higher rate in shorter verbs than in longer verbs. To verify the hypothesis, I examined the distribution of *re*-Insertion and the TC by verb-length measured by mora. The results are shown below.

Table 88. Distribution of *re*-Insertion and TC by verb-length measured by mora

verb-length	*re*-Insertion	TC	rate of *re*-Insertion(%)
2 morae	5	1,074	0.46
3 morae	6	76	7.32
4 morae	5	288	1.71
5 morae	4	2,219	0.18
total	20	3,657	0.54

X^2 =82.43, d.f.=3, p<0.01 (p<0.001)

As Table 88 shows, *re*-Insertion is distributed evenly from 2 morae verbs to 5 morae verbs in frequency. However, the rate of *re*-Insertion is high within 4 morae verbs, and low in 5 morae verbs. Thus, it is true that *re*-Insertion is more compatible with the short verb stems and the hypothesis that the change diffuses from shorter verb to longer verb is true for the case of *re*-Insertion; however, the effect of verb-length on the distribution of *re*-Insertion is relatively weak. Although the change of *re*-Insertion is currently in the earliest stage, the effect of verb-length is not that strong. This is reminiscent of the case of *ra*-Deletion: *ra*-Deletion has become compatible with longer verbs due to the decline of the effect of verb-length with the progress of the change of *ra*-Deletion. Considering the facts that these two variants grammatically and functionally belong to the same category potential forms and the change of *ra*-Deletion is followed by the change of *re*-Insertion, one can conclude that the degree of the effect of verb-length on *ra*-Deletion in the intermediate stage of the change is inherited by *re*-Insertion. In other words, verb-length continuously governs the entire change of potential forms, it does not govern the individual change of *ra*-Deletion and *re*-Insertion separately. Furthermore, this shows that although the change of *re*-Insertion is currently in the earliest stage, the change is in the intermediate stage as the entire change of potential forms.

At this point, I examine Kinsui's (2003) hypothesis about the issue of verb-length. I reintroduce the hypothesis. *Ra*-Deletion with short verbs is acquired as lexical items, while *ra*-Deletion with long verbs is acquired as a module of the grammar. If a speaker has already passed the critical period of language acquisition and does not have the grammar which includes the morphology of *ra*-Deletion, the speaker cannot generate *ra*-Deletion with long verbs. If Kinsui's hypothesis is on the right track, then *re*-Insertion with long verbs is also restricted to the younger generation, since the speakers of the older generation has already passed the critical period and they do not have the relevant grammar, although *re*-Insertion with short verbs is observed in relatively wider range. I examine the distribution of *re*-Insertion by birth-year and verb-length by means of the cross-tabulation. The result is shown below.

Table 89. Distribution of *re*-Insertion by birth-year and verb-length measured by mora

verb-length / birth-year	2 morae	3 morae	4 morae	5 morae
1910s	0	0	0	0
1920s	0	0	0	0
1930s	0	2	3	0
1940s	1	1	0	0
1950s	1	0	0	0
1960s	2	0	0	1
1970s	1	2	2	3
1980s	0	1	0	0

As Table 89 shows, *re*-Insertion in 2, 3 and 4 morae verbs are observed over a wider range of generations. However, the distribution of *re*-Insertion in 5 morae verbs is restricted to younger generations: *re*-Insertion with longer verbs is not observed in older generations: 1910s-1950s, as the hypothesis. Thus, the result support Kinsui' (2003) hypothesis at least in the very beginning of the change of *re*-Insertion.

6.1.4 Effect of verb type

As mentioned above, Japanese verbs are classified into two types: consonant verbs (e.g. *yar-*, *hair-*) and vowel verbs (*mi-*, *tabe-*). The change of *re*-Insertion diffuses from consonant verbs to vowel verbs (Inoue and Yarimizu 2002). If this claim is on the right track, the frequency and the rate of *re*-Insertion will be higher with consonant verbs than with vowel verbs. I examine the effect of the effect of verb type by comparing the distribution of *re*-Insertion and TC. The result is shown below.

Table 90. Distribution of *re*-Insertion and TC by conjugation type of the verb

verb type	*re*-Insertion	TC	rate of *re*-Insertion(%)
vowel verb	11	2,361	0.46
consonant verb	9	1,296	0.69
total	20	3,657	0.54

X^2 = 0.79, d.f.=1, n.s.

As Table 90 shows, although the frequency of *re*-Insertion is 11 with vowel verbs, and 9 with consonant verbs, the rate of *re*-Insertion is 0.69 percent with consonant verbs, and 0.46 percent with vowel verbs. The rate of *re*-Insertion is higher with consonant verbs than with vowel verbs. Thus, the result shows that *re*-Insertion is more compatible with consonant verbs than vowel verbs in support of the claim that the change of *re*-Insertion diffuses from consonant verbs to vowel verbs.

The diffusion of *re*-Insertion with respect to verb type is associated with the effect of OCP (μ). *Re*-Insertion with vowel verbs obligatorily contains the sequence *rere* as in *tabe-<u>re-re</u>* ‘can eat,’ *mi-<u>re-re</u>* ‘can see,’ and *kangae-<u>re-re</u>* ‘can think’ and this kind of example has been barred by OCP (μ). Therefore, *re*-Insertion with vowel verbs is dispreferred in having the consecutive identical morae although the effect is not categorical. Thus, the frequency and the rate of *re*-Insertion increase if the effect of OCP (μ) declines.

6.1.5 Effect of the morphological structure of the preceding stem

In this section, I examine the effect of the morphological structure of the preceding stem. The analysis of *ra*-Deletion in CSJ shows that *ra*-Deletion is more compatible with complex verbs including compound verbs, auxiliary verbs, and causative verbs than monomorphemic verbs, contrary to the claim of Matsuda (1993). Based on this result, I hypothesize that *re*-Insertion is more compatible with complex verbs than monomorphemic verbs. To verify the hypothesis, I examine the distribution of *re*-Insertion and TC according to the morphological structure of the preceding stem. The result is shown below.

Table 91. Distribution of *re*-Insertion and TC by morphological structure of the preceding stem

stem type	*re*-Insertion	TC	rate of *re*-Insertion(%)
monomorphemic	17	3,313	0.51
compound	2	331	0.60
auxiliary	0	5	0.00
causative	1	8	11.11
total	20	3,657	0.54

$X^2 = 18.7$, d.f.=3, $p<0.001$ (n.s.)

As Table 91 shows, the frequency of *re*-Insertion is 17 with monomorphemic verbs, 2 with compound verbs, 0 with auxiliary verb, and 1 with causative verbs. Most of *re*-Insertion is concentrated in monomorphemic verbs in frequency. On the other hand, the rate of *re*-Insertion is higher in compound verbs (0.6 percent) and causative verbs (11.11 percent) than in monomorphemic verbs (0.51 percent). Thus, the result shows that *re*-Insertion is more compatible with complex verbs than monomorphemic verbs, in support of the above hypothesis.

In the analysis of *ra*-Deletion, I argued that the effect of the morphological structure of the preceding stem with the progress of the change of *ra*-Deletion, and *ra*-Deletion has become compatible with complex verbs. Assuming that *re*-Insertion and *ra*-Deletion are a series of changes in potential forms and the change of *ra*-Deletion is followed by the change of *re*-Insertion, one can conclude that the degree of the effect of the morphological structure of the preceding stem on *ra*-Deletion in the intermediate stage of the change is inherited by *re*-Insertion. In other words, the morphological structure of the preceding stem continuously governs the entire change of potential forms.

The weakening of the effect of the morphological structure of the preceding stem is associated with the weakening of the effect of verb-length, since the complex verbs are generally long, and are also subject to the effect of verb-length.

6.1.6 Effect of the embeddedness

In this section, I examine the effect of the embeddedness on the distribution of *re*-Insertion. Givón (1979) hypothesized that syntactic changes tend to be slow in subordinate clauses. If this hypothesis is on the right track, the frequency and the rate of *re*-Insertion will be higher in main clauses than in subordinate clauses. In order to verify the hypothesis with respect to the syntactic conservatism and resistance to change of the subordinate clauses in the change of *re*-Insertion, I examine the distribution of *re*-Insertion and TC according to the main/subordinate distinction. The result is shown below.

Table 92. Distribution of *re*-Insertion and TC by clause type

clause type	*re*-Insertion	TC	rate of *re*-Insertion(%)
main	17	2,796	0.60
subordinate	3	861	0.35
total	20	3,657	0.54

X^2 = 0.81, d.f.=1, n.s. (n.s.)

As Table 92 shows, the frequency of *re*-Insertion is 17 in main clauses, and 3 in subordinate clauses. Similarly, the rate of *re*-Insertion is higher in main clauses (0.6 percent) than in subordinate clauses (0.35 percent). *Re*-Insertion is more compatible with the main clauses than the subordinate clauses, and the change of *re*-Insertion manifests the syntactic conservatism and the resistance to the change of the subordinate clauses.

The result contradicts the one in *ra*-Deletion; also, *re*-Insertion manifests the different behavior from *ra*-Deletion only with respect to embeddedness, although the behavior of these two variants is consistent with respect to other internal factors. This is associated with the grammatical difference to which each factor refers. Embeddedness refers to the main clause/subordinate clause distinction. This distinction is syntactic and global. On the other hand, other factors such as affirmative/negative distinction, verb-length, verb type, and morphological structure of the preceding stem refer to the preceding or following context of the potential suffix. Because of the agglutinative nature of the Japanese language, these factors are morphological and local. The changes of *ra*-Deletion and of *re*-Insertion are the same as far as the potential suffix is concerned. Thus, the two behave in the same manner only with respect to the factors which are associated with the potential suffix. However, these two variants behave differently with respect to embeddedness, which is irrelevant to the potential suffix.

6.1.7 OCP (μ)

In this section, I discuss the effect of OCP (μ) on the distribution of *re*-Insertion. The results of the examination so far show that both *sa*-Insertion and *ra*-Deletion are subject to OCP (μ). However, the manner by which OCP (μ) constrains the distribution of these two variants differs: *sa*-Insertion is categorically constrained by OCP (μ) (*sa*-Insertion does not contain the sequence *sasa*), on the other hand, *ra*-Deletion is gradiently constrained by OCP (μ) (*ra*-Deletion with the sequence *rere* is infrequent).

In CSJ, although no TC including the sequence *rere* is observed, *re*-Insertion with the sequence *rere* amounts to 10 among a total of 20 tokens. The examination in CSJ brought forth a total of 6 *ra*-Deletions with the sequence *rere* among a total of 543 occurrences. The result of the examination of *re*-Insertion slightly differs from the one of *ra*-Deletion. OCP (μ) mildly constrains the sequence *rere* in *re*-Insertion compared to *ra*-Deletion. This supports the claim that the effect of OCP (μ) has declined with the progress of the change in potential forms. As mentioned above, *re*-Insertion with vowel verbs obligatorily contains the sequence *rere* as in *tabe-re-re* 'can eat,' *mi-re-re* 'can see,' and *kangae-re-re* 'can think' and this kind of example has been barred by OCP (μ). However, the decline of the effect of OCP (μ) enables *re*-Insertion with vowel verbs to occur. The decline of the OCP (μ) effect is one of the causes of the emergence and the progress of the change of *re*-Insertion preceded by the change of *ra*-Deletion although various factors concerning the analogical leveling also come into play.

So far, I examined the effects of internal factors on the distribution of *re*-Insertion. The two internal factors have the categorical effects. As to the gradient factors, *re*-Insertion: 1) is more compatible with the negative context than the affirmative one; 2) is more compatible with the short stem verbs, but also occurs with long stem verbs; 3) is more compatible with complex verbs than monomorphemic verbs; 4) is more compatible with main clauses than subordinate clauses; 5) is gradiently constrained by OCP (μ). Most of the properties of *re*-Insertion are consistent with the properties of *ra*-Deletion (observations # 1, 2, 3, 5). I argue that the degree of the effects of some factor on *ra*-Deletion in the intermediate stage of the change is inherited by *re*-Insertion, since *re*-Insertion and *ra*-Deletion are a series of changes in potential forms. In other words, each factor continuously governs the entire change of potential forms.

6.2 The origin of the change of *re*-Insertion

In this section, I discuss the potential driving force of the change of *re*-Insertion. Among the discussions of the origin of the change of *re*-Insertion, Shioda (2000) points out that the spread of *ra*-Deletion actuated the change of *re*-Insertion: For consonant verbs, the potential suffix traditionally takes the form *e* as in *ik-e-ru* or *yom-e-ru*; however, the spread of *ra*-Deletion initiated the generalization of the suffix *re* of *ra*-Deletion for vowel verbs such as *mi-re-ru* or *tabe-re-ru* to every verb, including consonant verbs, by analogical leveling. This process yields *re*-Insertion such as *ik-ere-ru* or *yom-ere-ru*.

This analysis, however, is problematic because it is primarily based on the *Kana* spelling of Japanese. If one analyzes the phenomenon phonologically, the suffix allomorphy is not leveled by the change of *re*-Insertion, as in Table 93.

Table 93. Suffix allomorphy for potential forms in the traditional and innovative paradigm

paradigm	vowel verb e.g. *mi*-, *tabe-*	consonant verb e.g. *ik*-, *yom-*
traditional	*-re-* (*ra*-Deletion)	*-e-*
innovative	*-re-* (*ra*-Deletion)	*-ere-* (*re*-Insertion)

Looking into the allomorphy of suffixes between vowel verbs and consonant verbs in Table 93, we see that the discrepancy of the forms is limited to the existence of a single segment: an initial consonant in *-re-*/*-e-* in the traditional paradigm. Similarly, the discrepancy of the forms is limited to the existence of a single segment: an initial vowel in *-re-/-ere-* in the innovative paradigm. The discrepancy between the suffixes remains to be simplified in the innovative paradigm. Rather, the correspondence between consonant verbs and vowel verbs in potential form became different from the correspondence in other forms: apart from the suppletive imperative *-ro*/*-e*, the discrepancy of the forms is limited to the existence of a single segment: an initial consonant in *-ru*/*-u* (plain present), *-reba*/*-eba* (conditional), *-rare*/*-are* (passive), *-sase*/*-ase* (causative), *-yoo*/*-oo* (inchoative). The traditional paradigm with *ra*-Deletion follows this schema. The uniformity of potential form with other forms with respect to the suffix allomorphy becomes more inconsistent due to the existence of *re*-Insertion. Because of these facts, the analysis requires other motivations for the change of *re*-Insertion.

At this point, I propose the functional motivation for the change of *re*-Insertion. As Inoue and Yarimizu (2002) claim, *re*-Insertion has a function to reinforce the meaning of potential, compared to standard potential forms. This may be associated with the fact that *re*-Insertion is a double potential which includes two potential suffixes. The meaning of potential of *re*-Insertion is stronger than the traditional potential forms including standard potential and *ra*-Deletion. Assuming the order of the transition in potential forms, we deduce that *re*-Insertion emerged in order to intensify the meaning of potential in the potential forms.

However as mentioned above, the uniformity of potential form with other forms with respect to the suffix allomorphy becomes more inconsistent due to the existence of *re*-Insertion. Looking into the course of the diffusion of *re*-Insertion, I uncover a clue to the further stage of the change of *re*-Insertion which settles this problem. As mentioned above, the change of *re*-Insertion diffuses from consonant verbs to vowel verbs. Although if the change of *re*-Insertion is limited to consonant verbs, the suffix allomorphy of potential form is inconsistent to other forms as in the above discussion, if the change of *re*-Insertion diffuses to vowel verbs, the suffix allomorphy of potential form is in conformity with other forms: the discrepancy of the forms is limited to the existence of a single segment: an initial consonant in *-rere-*/*-ere-*. In other words, the diffusion of the change of *re*-Insertion to vowel verbs leads to the restructuring of the conjugation paradigm by analogical leveling. The conjugation paradigm including *re*-Insertion in both vowel verbs and consonant verbs is schematized below.

Table 94. Suffix allomorphy for vowel verbs and consonant verbs with *re*-Insertion

conjugation form	vowel verb e.g. *tabe-*	consonant verb e.g. *nom-*
present negative	*-nai*	*-anai*
plain present	*-ru*	*-u*
inchoative	*-yoo*	*-oo*
imperative	*-ro*	*-e*
conditional	*-reba*	*-eba*
causative	*-sase-*	*-ase-*
passive, honorific, spontaneous	***-rare-***	***-are-***
potential	***-rere-* (*re*-Insertion)**	***-ere-* (*re*-Insertion)**

As Table 94 shows, the potential form takes the suffix allomorphy in exactly the same way as the plain present, inchoative, conditional, causative, and passive in the sense that the discrepancy of the forms is limited to the existence of the initial consonant. Note that the potential form comprised exclusively of *re*-Insertion is consistent with the passive, honorific, and spontaneous forms with the same phonological structure and the minimal segmental discrepancy: the initial vowel of each allomorph as in *-rare-*/*-rere-* and *-are-*/*-ere-*. This is indicative of the semantic proximity in these forms sharing the same morphological origin.

Thus, the change of *re*-Insertion is firstly driven by the functional motivation and it spreads to consonant verbs. Subsequently, the change diffuses to vowel verbs motivated by the analogical leveling for the optimization of the conjugation paradigm.

Characterizing the change of *re*-Insertion in the transition of the suffix allomorphy, I discuss the entire change of the potential form. The transition of the suffix allomorphy in potential form is schematized below.

Table 95. Transition of the suffix allomorphy for vowel verbs and consonant verbs in potential form

stages	vowel verb e.g. *mi-*, *tabe-*	consonant verb e.g. *ik-*, *yom-*	motivation for change
1st stage[68]	*-rare-*	*-are*	—
2nd stage	*-rare-*	*-e-*	semantic disambiguation
3rd stage	*-re-* (*ra*-Deletion)	*-e-*	analogical leveling
4th stage	*-re-* (*ra*-Deletion)	*-ere-* (*re*-Insertion)	double potentialization
5th stage	*-rere-* (*re*-Insertion)	*-ere-* (*re*-Insertion)	analogical leveling

In the 1st stage, the potential form takes exactly the same suffix allomorphy as the passive, honorific, and spontaneous forms as in *mi-rare-* 'can see' and *ik-are* 'can go' (Shibuya 1990; Inoue 1998, among others). From the 1st to the 2nd stage, the change is motivated by the semantic disambiguation among four meanings. From the 2nd to the 3rd stage, the change is motivated by the analogical leveling for the optimization of the conjugation paradigm in the form of *ra*-Deletion, in order to adjust the expanded discrepancy by the preceding change in suffix allomorphy. From the 3rd to the 4th stage, the change is again motivated by the functional motivation: reinforcement of the

[68] In the present analysis, I do not explore the 1st stage with respect to the statistical analysis, since this paradigm is archaic, and thus I did not collect enough data. The interested reader is referred to Shibuya 1990 and Inoue 1998, among others.

potential meaning, taking the form of *re*-Insertion with consonant verbs. This change further triggers the subsequent change from the 4th to the 5th stage, where the change is motivated by the analogical leveling for the optimization of the conjugation paradigm in the form of *re*-Insertion with vowel verbs, which minimizes the expanded discrepancy by the change of *re*-Insertion with consonant verbs in suffix allomorphy.

Generalizing the results, I suggest that a particular change comprising the entire change of potential form is firstly motivated by the functional demand. A change of this kind expands the discrepancy in suffix allomorphy, since it is functionally oriented and blind to the uniformity. Therefore, the subsequent change is triggered by the analogical leveling for the optimization of the conjugation paradigm. The subsequent change reorganizes the expanded discrepancy caused by the preceding change for the uniformity in conjugation paradigm. Thus, I propose that the two-step process is the core mechanism of the change in potential form. Furthermore, the following generalization holds: the change firstly occurs in consonant verbs (functional motivation), and diffuses to vowel verbs (analogical leveling).

6.3 External factors

In this section, I examine the effects of external factors on the distribution of *re*-Insertion. The factors examined are “speech type (APS/SPS),” “gender,” “birth-year,” “geographical difference,” “education,” “spontaneity of speech,” “speech style,” “speech skill,” and “speech experience.” I conduct the analysis of each factor one by one.

6.3.1 Speech type (APS/SPS)

In this section, I examine the effect of the speech type (APS/SPS) on the distribution of *re*-Insertion. Heretofore, no previous studies have explored the correlation between stylistic differences and the distribution of *re*-Insertion. However, the discussion of the following context in Section 6.1.2 implies that *re*-Insertion is an instance of change from below, in which the innovative form is more compatible with the casual style than the formal style. In addition, the results of the examination of the effect of stylistic difference on *ra*-Deletion in the previous chapter show that *ra*-Deletion is more compatible with the casual settings than formal settings. Assuming *ra*-Deletion and *re*-Insertion are a set of changes in potential forms, one would expect *re*-Insertion to show the property similar to that of *ra*-Deletion.

As mentioned above, in CSJ the speech type constitutes the principal factor which represents the factors associated with the characteristics of speech. Therefore, it would be reasonable to expect that the stylistic difference plays a role in language variation and change. Based on the consideration of the difference between APS and SPS, I hypothesize that the frequency and the rate of *re*-Insertion is higher in APS, where the speech style is formal, than in SPS, where the speech style is casual. I verify the hypothesis by examining the distribution of *re*-Insertion and TCs according to the APS/SPS distinction. The results are shown below.

Table 96. Distribution of *re*-Insertion and TC by speech type (APS/SPS)

speech type	*re*-Insertion	TC	rate of *re*-Insertion(%)
APS	4	1,950	0.20
SPS	14	1,345	1.03
total	18	3,295	0.54

$X^2 = 10.11$, d.f.=1, $p<0.001$ ($p<0.003$)

As Table 96 shows, the frequency and the rate of *re*-Insertion are significantly higher in SPS than in APS: the frequency of *re*-Insertion in SPS is 14, and 4 in APS among a total of 18 occurrences of *ra*-Deletion; the rate of *re*-Insertion amounts to 1.3 percent in SPS, and 0.2 percent in APS; the difference of the rate of *re*-Insertion APS and SPS amounts to over 0.8 percent. The result shows that *ra*-Deletion is more compatible with the SPS, which includes the stylistically casual speeches, than the APS, which includes stylistically formal speeches, and that the effect of speech type is quite strong. The result supports the above hypothesis. I claim that *ra*-Deletion is more compatible with the stylistically formal settings. Similar to *ra*-Deletion, speech style plays a role in governing the distribution of *re*-Insertion as an independent factor. Furthermore, the result shows that *re*-Insertion is an instance of change from below (Labov 1990) in which the innovative form is more compatible with the causual style.

6.3.2 Gender

As mentioned above, in the study of language variation and change, the contribution of gender difference has been emphasized in a number of cases (cf. Labov 1990, among others). Among the examinations of gender difference in *ra*-Deletion, Matsuda (1993) claims that *ra*-Deletion is preferred by female speakers. In language change, females have been considered to take the lead of the change (Labov 1990, 2001; Milroy and Gordon 2003, among others). Putting this insight into the present context, we can argue that, if females take the lead in the change of *re*-Insertion, the frequency and the rate of *re*-Insertion will be higher in females than in males. I verify the above hypothesis by examining the distribution of *re*-Insertion and TCs by gender. The result is shown below.

Table 97. Distribution of *re*-Insertion and TC by gender

gender	*re*-Insertion	TC	rate of *re*-Insertion(%)
male	16	2,327	0.68
female	4	1,330	0.30
total	20	3,657	0.54

$X^2 = 2.31$, d.f.=1, n.s. (n.s.)

As Table 97 shows, the frequency of *re*-Insertion is 16 in male and 4 in female, and the rate of *re*-Insertion is 0.68 percent in male and 0.30 percent in female. Both the frequency and the rate of *re*-Insertion are higher in males than in females. The result contradicts the above hypothesis and the result of the analysis of *ra*-Deletion. The higher rate of *re*-Insertion in males can be explained as the orientation to the covert prestige (Trudgill 1972) of the nonstandard forms which symbolizes the roughness and toughness which are associated with masculinity. Males tend to prefer nonstandard forms which are connotative of masculinity. Males create an image of masculinity by daring to use the nonstandard forms which are socially stigmatized. The orientation of this kind is associated with the covert prestige. *Re*-Insertion is currently a nonstandard form. Therefore, the covert prestige is reflected in the higher rate of *re*-Insertion.

However, the ratio of the male-female makeup differs greatly by the speech type in CSJ. The difference between APS and SPS with respect to the ratio of the male-female makeup might affect the results. I check this possibility by examining the distribution of *re*-Insertion and TCs according to the speech type and the gender by the cross-tabulation. The results are shown below.

Table 98. Distribution of *re*-Insertion and TC by gender and speech type

APS	*re*-Insertion	TC	rate of *re*-Insertion(%)
male	4	1,515	0.26
female	0	435	0.00
total	4	1950	0.20
SPS	*re*-Insertion	TC	rate of *re*-Insertion(%)
male	10	616	1.60
female	4	729	0.55
total	14	1,345	1.03

X^2 =198.650, d.f.=3, p<0.001 (p<0.001)

As Table 98 shows, the frequency and the rate of *re*-Insertion is higher in males than in females both in APS and SPS, although the difference of the rate of *re*-Insertion between APS and SPS is greater in males (1.34 percent) than in females (0.55 percent). The result shows that the gender difference affects the distribution of *re*-Insertion independent of the effect of speech style. This in turn indicates that the gender difference plays a role as an independent factor without the interaction with speech style.

6.3.3 Birth-year

In this section, I examine whether the birth-year has an influence on the distribution of *re*-Insertion. If *re*-Insertion is an instance of the language change, a correlation between the distribution of *re*-Insertion and the birth-year should be observed. More specifically, identifying the birth-year as an apparent-time, the distribution of *re*-Insertion is associated in some way with the passage of time. To verify the hypothesis, I classify each *re*-Insertion and TC for every 10 years, and I examine the distribution. The result is shown below.

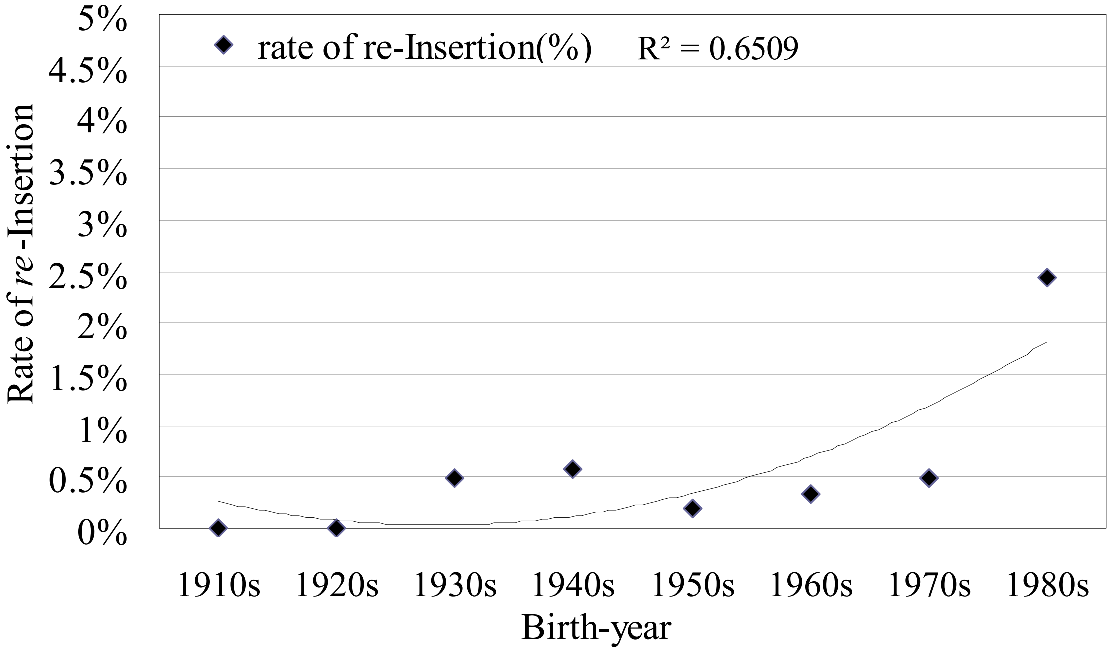

Figure 19. Distribution of *re*-Insertion by birth year

The distribution of *re*-Insertion and the birth-year is not significant as the result of the chi-square test confirms (X^2 =4.9, d.f.=7, n.s. (n.s.)). The result shows that the change of *re*-Insertion is not advanced yet as it shows the correlation with birth-year; namely, it is currently in the very beginning of the change.

As Figure 19 shows, *re*-Insertion is first observed in the first half of the 1930s in the present data. Subsequently, the rate of *re*-Insertion shows the minor tendency for the increase from 1950s to 1980s although some fluctuations are observed. An explosive increase of the rate of *re*-Insertion is yet to be observed. The result shows that the change of *re*-Insertion is in the very beginning of a language change. I predict that the change of *re*-Insertion will show the shape of an S-curve (Bailey 1973; Chambers and Trudgill 1980, among others) in several decades, as will the change of *sa*-Insertion.

If we compare the distribution of *re*-Insertion with the distribution of *ra*-Deletion, the picture becomes clearer.

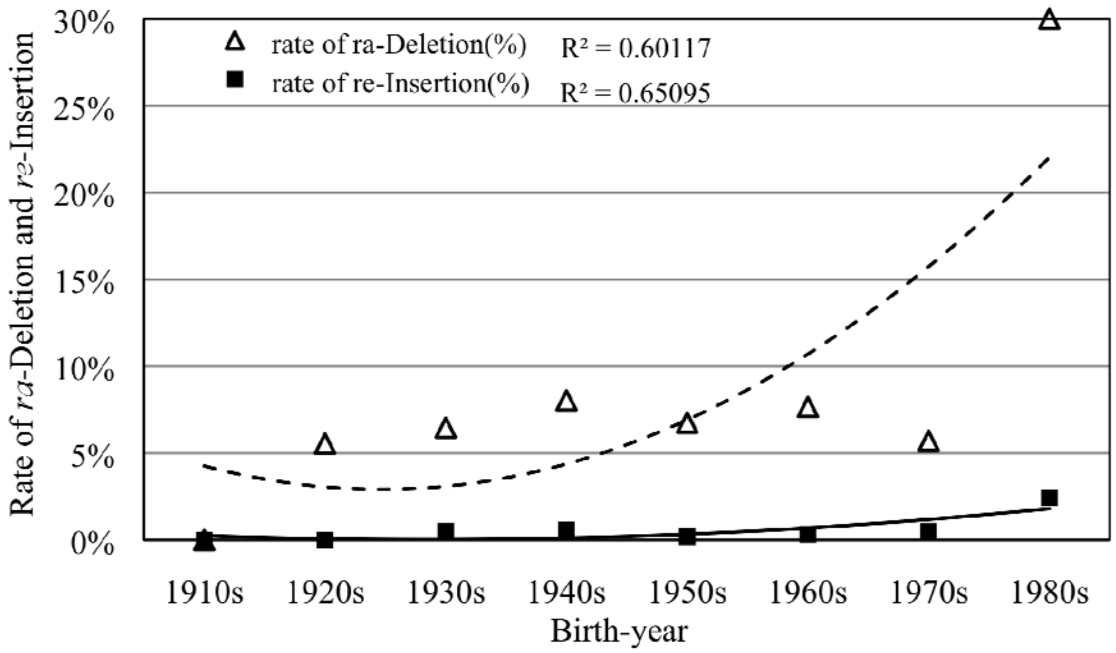

Figure 20. Distribution of *ra*-Deletion and *re*-Insertion by birth year (CSJ)

As Figure 20 shows, the rate of *ra*-Deletion is consistently higher than the rate of *re*-Insertion in every generation. As the slopes of each line show, the change of *ra*-Deletion shows the continuous explosive increase, which corresponds to the intermediate stage of the S-curve; on the other hand, the change of *re*-Insertion has not yet showed the explosive increase, which corresponds to the earliest stage of the S-curve. The change of *re*-Insertion is less advanced than the change of *ra*-Deletion. The order of the change (*ra*-Deletion => *re*-Insertion) is also confirmed.

6.3.4 Geographical difference

In this section, I examine the effect of geographical difference on the distribution of *re*-Insertion and discuss the issues of acquisition and transmission. The issue of the geographical difference of *re*-Insertion has been explored in some publications. Geographically, the change begins in Chubu area, Chugoku area, and Shikoku area, and is prevalent in Chubu area, Chugoku area, and Shikoku area as well as Hokkaido area where *ra*-Deletion has already spread (Inoue and Yarimizu 2002).

In order to verify the claim, I examine the geographical difference of *re*-Insertion implementing the information associated with the geographical difference such as residence (present) and residence (critical period) that is available in CSJ. I classify *re*-Insertion and TC according to the criteria (28) in the analysis of *sa*-Insertion, and examined the distribution of *re*-Insertion and TCs by residence (present) and residence (critical period). The results are shown below.

Table 99. Distribution of *re*-Insertion and TC by residence (critical period)

residence (critical period)		*re*-Insertion	TC	rate of *re*-Insertion (%)
Hokkaido	(23)	2	19	9.52
Tohoku	(55)	0	93	0.00
Kanto	(511)	11	2,450	0.45
Chubu	(143)	2	245	0.81
Kinki	(148)	1	500	0.20
Chugoku	(50)	2	114	1.72
Shikoku	(24)	0	63	0.00
Kyusyu	(81)	2	92	2.13
Okinawa	(2)	0	5	0.00
Abroad	(11)	0	49	0.00
total		20	3,630	0.55

Table 100. Distribution of *re*-Insertion and TC by residence (present)

residence (present)		*re*-Insertion	TC	rate of *re*-Insertion (%)
Hokkaido	(8)	0	79	0.00
Tohoku	(28)	0	189	0.00
Kanto	(733)	15	1,655	0.90
Chubu	(80)	1	473	0.21
Kinki	(124)	1	598	0.17
Chugoku	(24)	3	164	1.80
Shikoku	(8)	0	108	0.00
Kyusyu	(6)	0	327	0.00
Okinawa	(3)	0	4	0.00
Abroad	(13)	0	32	0.00
total		20	3,629	0.55

As Tables 99 and 100 show, *re*-Insertion is distributed over the wide range of areas in residence (critical period). On the other hand, in residence (present) the distribution of *re*-Insertion is restricted to Kanto, Chubu, Kinki, and Chugoku areas. Given that the language change spreads in a rippled manner, one can argue that the distribution in residence (present) is more plausible than the one in residence (critical period). If we assume the distribution in residence (critical period), the change should spread jumping over the in-between areas. It follows that *re*-Insertion is acquired in adulthood after the critical period. The result is consistent with the result of *sa*-Insertion.

Furthermore, *re*-Insertion is observed in the Chubu and Chugoku areas in both residence (critical period) and residence (present). This partly supports the claim that the change begins in the Chubu area, Chugoku area, and Shikoku area and the change is advanced in these areas.[69]

In order to verify the possibility that *re*-Insertion is acquired in critical period and retained in adulthood, instead of being acquired in adulthood after the critical period, I examine the distribution of *re*-Insertion and TCs by residence (present) and residence (critical period) with cross-tabulation.

Table 101. Cross tabulation of the distribution of *re*-Insertion by residence (present) and residence (critical period)

present / critical period	Hokkaido	Tohoku	Kanto	Chubu	Kinki	Chugoku	Shikoku	Kyusyu	Okinawa	Abroad
Hokkaido			2							
Tohoku										
Kanto			10			1				
Chubu			1	1						
Kinki					1					
Chugoku						2				
Shikoku										
Kyusyu			2							
Okinawa										
Abroad										

69 The frequency of *re*-Insertion and TC is extremely high in the Kanto area. This is again due to the fact that the recording of CSJ is conducted in Tokyo (Kanto area).

Table 102. Cross tabulation of the distribution of TC by residence (present) and residence (critical period)

present / critical period	Hokkaido	Tohoku	Kanto	Chubu	Kinki	Chugoku	Shikoku	Kyusyu	Okinawa	Abroad
Hokkaido	6	1	63	6	3					
Tohoku		35	145	3						6
Kanto	8	36	1490	24	45	16	1	9		26
Chubu	5	13	229	160	51					15
Kinki		8	163	13	363	20	18	13		
Chugoku			85	20	9	44		6		
Shikoku			35	5	16	2	42	8		
Kyusyu			213	13	6	32	2	56	3	2
Okinawa					2				2	
Abroad			26	1	5					

As Table 101 shows, *re*-Insertion is not observed in Hokkaido, Tohoku, Abroad, Shikoku area and to the west in the present distribution. It is unlikely for a speaker to be exposed to *re*-Insertion in critical period (past), which is the present-day language change, as an input to the acquisition in such areas. Therefore, the results support the acquisition of *re*-Insertion in adulthood. As opposed to the distribution of *re*-Insertion, TC is observed in many areas in the present distribution, as Table 102 illustrates. This shows that the TC is uttered in such areas in critical period (past). Therefore, TC is acquired in critical period and retained in adulthood, instead of being acquired in adulthood after the critical period.

The shaded cells represent the tokens in which residence (critical period) and residence (present) coincide. These cells in Table 101 show that the speakers who have consistently lived in Kanto and Chubu areas utter *re*-Insertion. In order for such speakers to be exposed to *re*-Insertion as an input, *re*-Insertion should have been uttered in these areas. This suggests that *re*-Insertion emerged also in Kanto and Kinki areas in addition to Chubu, Chugoku, and Shikoku areas and has been transmitted to the surrounding areas.

Going back to the discussion of the acquisition, the acquisition of *re*-Insertion, which belongs to the morphosyntactic category, in adulthood serves as the counterexample to the claim concerning the language acquisition that the linguistic categories other than the lexical items (phonological, morphological and syntactic one) are acquired within the critical period and remain stable afterwards (Weinreich 1968, Labov 1994).

6.3.5 Education

In this section, I examine the effect of education on the distribution of *re*-Insertion. The examination of the effect of the level of education in the previous chapter shows that *ra*-Deletion is more compatible with lower level of education. Thus, it would be reasonable to expect that the level of education also affects the distribution of *re*-Insertion. According to the generalization in Labov (1966a), the speakers of the lower class prefer the innovative forms. Putting this insight into the present context, we can argue that *re*-Insertion is more compatible with lower level of education, in other words, the lower the level of education, the higher the rate of *re*-Insertion. I verify the hypothesis by examining the distribution of *re*-Insertion and TCs according to the stratification of the level of education in CSJ. The result is shown below.

Table 103. Distribution of *re*-Insertion and TC by education[70]

education	*re*-Insertion	TC	rate of *re*-Insertion(%)
Junior high school and High school graduate	5	564	0.88
University graduate	12	1,556	0.77
Post graduate	3	1,498	0.20
total	20	3,618	0.55

X^2 = 5.82, d.f.=2, p<0.05 (p<0.03)

As Table 103 shows, the rate of *ra*-Deletion is 0.88 percent in Junior high school and High school graduates, 0.77 percent in University graduates, and 0.2 percent in Post graduates. The rate of *re*-Insertion gradually declines as the level of education increases. The result shows that *re*-Insertion is more compatible with lower level of education, and it supports the hypothesis.

As mentioned above, *re*-Insertion is an instance of the change from below. Labov (1966a) made the generalization about the expected distribution of linguistic variants for the change from below with respect to social class and age group. Although in change from below, the lower the social class, the higher the probability of the innovative forms in both age groups, the probability is higher in the younger group than in the older group. Based on Labov's (1966a) generalization, I examine the distribution of *re*-Insertion by education and birth-year.

[70] I merged "Junior high school graduates" and "High school graduates" into "Junior high school and High school graduates," since I observed only 10 TCs and no *re*-Insertion in Junior high school graduates.

Table 104. Distribution of *re*-Insertion and TC by education and birth-year

younger	*ra*-Deletion	standard potential	rate of *ra*-Deletion(%)
Junior high school and High school graduate	4	259	1.52
University graduate	5	476	1.04
Post graduate	3	322	0.92
total	12	1,057	1.12
older	***ra*-Deletion**	**standard potential**	**rate of *ra*-Deletion(%)**
Junior high school and High school graduate	1	305	0.33
University graduate	7	1,080	0.64
Post graduate	0	1,169	0.00
total	8	2554	0.31

X^2 =14.36, d.f.=5, $p<0.01$ ($p<0.001$)

As Table 104 shows, in the younger group the rate of *ra*-Deletion is shows the sharp decline as the level of education increases, and this tendency is also observed in the older group. However, in every strata, the rate of *re*-Insertion is higher in the younger group: 1.52 percent, 1.04 percent and 0.92 percent, respectively than in the older group: 0.33 percent, 0.64 percent and 0 percent, respectively. The rate in University graduates in the older group is close to the rate in Post graduates in the younger group. The result shows that the lower the level of education, the higher the probability of *re*-Insertion in both age groups; the probability is relatively higher in the younger group than in the older group. This is schematized as follows.

Table 105. Generalization of the probability of *ra*-Deletion by education and birth-year

	Junior high and High	University	Post grad.
Younger	high	high	medium
Older	low	medium	low

Thus, the results show that *re*-Insertion is more compatible with lower levels of education and that *re*-Insertion is an instance of the change from below, in support of Labov's (1966a) generalization.

6.3.6 Spontaneity

In this section, I examine the effect of spontaneity on the distribution of *re*-Insertion. As mentioned above, the degree of spontaneity by the speech type (APS/SPS) is an attribute defined on the inter-speech type basis, not on the intra-speech type basis. It is the case that spontaneous speeches are included in the APS which is characterized by less spontaneous speech, and less spontaneous speeches are included in the SPS which is characterized by spontaneous speech. Thus, the examination depending solely upon the speech type with respect to the spontaneity is insufficient, and it is necessary to examine the spontaneity as an independent factor. Assuming that the change of *re*-Insertion is an instance of the change from below, we can expect that *re*-Insertion is more compatible with the speech with high spontaneity as *ra*-Deletion. I verify the effect of the spontaneity by looking into the distribution of *re*-Insertion and TCs by the degree of spontaneity. The results are shown below.

Table 106. Distribution of *re*-Insertion and TC by spontaneity[71]

spontaneity	*re*-Insertion	TC	rate of *re*-Insertion(%)
low	1	797	0.13
middle	4	671	0.59
high	13	1,879	0.69
total	18	3,347	0.53

$X^2 = 3.38$, d.f.=2, n.s. (n.s.)

As Table 106 illustrates, the frequency and the rate of *re*-Insertion is higher in speeches with high spontaneity than in speeches with low spontaneity. The frequency and the rate of *re*-Insertion correlate with the degree of spontaneity: The higher the degree of spontaneity, the higher the frequency and the rate of *re*-Insertion. *Re*-Insertion is more compatible with the speech with high spontaneity. The result is consistent with the result of *ra*-Deletion and it supports the claim that *re*-Insertion is an instance of the change from below. The result also shows that the higher the degree of spontaneity, the higher the frequency and the rate of *re*-Insertion. The speech with high spontaneity is "spoken-languagewise," on the other hand the speech with low spontaneity is "written-languagewise." On the assumption that the language change proceeds from the spoken language to the written language, the change of *re*-Insertion

[71] I applied the transform to spontaneity, speech style, speech skill and speech experience. The spontaneity is originally evaluated on an ascending risk scale of 1 to 5 (The formality increases from 1 to 5.). I merge "1" and "2" into "low," "4" and "5" into "high." (I do not apply the transform to "3", since it is available for the analysis in its original form.) The speech style is originally evaluated on an ascending risk scale of 1 to 5 (The formality increases from 1 to 5.). I merge "1" and "2" into "casual," "4" and "5" into "formal." (I do not apply the transform to "3", since it is available for the analysis in its original form.) The speech skill is originally evaluated by a 4-level rating system: "skillful," "somewhat skillful," "somewhat unskillful," and "unskillful." I merge "skillful" and "somewhat skillful" into "skillful," and "somewhat unskillful," and "unskillful" into "unskillful." The speech experience is originally evaluated by a 5-level rating system: "first time," "fewer than 5 times," "fewer than 10 times," "fewer than 20 times," and "more than 20 times." I merged "fewer than 5 times" and "fewer than 10 times" into "2-10" and "fewer than 20 times" and "more than 21 times" into "11-." (I do not apply the transform to "first time", since it is available for the analysis in its original form.)

is not so advanced that it occurs in written language.

I examine the distribution of *re*-Insertion and TCs with respect to the interaction between spontaneity and gender by means of the cross-tabulation.

Table 107. Distribution of *re*-Insertion and TC by spontaneity and gender

male	*re*-Insertion	TC	rate of *re*-Insertion(%)
low	0	541	0.00
middle	3	368	0.81
high	11	1,261	0.86
total	14	2,170	0.64
female	***re*-Insertion**	**TC**	**rate of *re*-Insertion(%)**
low	1	256	0.39
middle	1	303	0.33
high	2	618	0.32
total	4	1,177	0.34

X^2 =6.9, d.f.=5, n.s. (n.s.)

As Table 107 shows, the frequency and the rate of *re*-Insertion are higher in speeches with high spontaneity than in speeches with low spontaneity in males. Specifically, the rate of *re*-Insertion varies greatly between low (0 percent), and middle (0.81 percent) or high (0.86 percent). Males prefer *re*-Insertion in more spontaneous speeches. On the other hand, the distribution of *re*-Insertion is relatively unaffected by the degree of spontaneity; rather, the rate of *re*-Insertion slightly decreases as the speech becomes spontaneous in females. The result shows that the correlation between the distribution of *re*-Insertion and spontaneity can be attributed to males.

6.3.7 Speech style

In this section, I examine the effect of speech style on the distribution of *re*-Insertion. The discussion of the relationship and the structure among factors also applies to speech style, such as spontaneity. Thus, the examination of speech style as an independent factor is necessary. Based on the observation that *re*-Insertion is more compatible with the casual settings, I hypothesize that he rate of *re*-Insertion is higher in casual speech than in formal speech with respect to speech style. I examine the distribution of *re*-Insertion and TCs by speech style. The result is shown below.

Table 108. Distribution of *re*-Insertion and TC by speech style

style	*re*-Insertion	TC	rate of *re*-Insertion(%)
casual	4	579	0.69
middle	9	1,470	0.61
formal	5	1,090	0.46
total	18	3,139	0.57

$X^2 = 0.43$, d.f.=2, n.s. (n.s.)

As Table 108 shows, the rate of *re*-Insertion is 0.69 percent in casual, 0.61 percent in middle, and 0.46 percent in formal. The rate of *re*-Insertion increases as the speech style becomes more casual. The result shows that *re*-Insertion is more compatible with the casual speech to formal speech, in support of the above hypothesis. The distribution of *re*-Insertion by speech style is not significant, as the result of the chi-square test shows. This implies that speech style does not play a role as an independent factor; instead, it interacts with some other factors.

I examine the distribution of *re*-Insertion and TCs with respect to the interaction between spontaneity and gender by means of the cross-tabulation. The result is shown below.

Table 109. Distribution of *re*-Insertion and TC by gender and speech style

male	*re*-Insertion	TC	rate of *re*-Insertion(%)
casual	4	335	1.18
middle	6	943	0.63
formal	4	713	0.56
total	14	1,991	0.70
female	*re*-Insertion	TC	rate of *re*-Insertion(%)
casual	0	244	0.00
middle	3	523	0.57
formal	1	377	0.26
total	4	1,144	0.35

X^2 =4.31, d.f.=5, n.s. (n.s.)

As Table 109 shows, the rate of *re*-Insertion is higher in casual speeches than in formal speeches in males. Specifically, the rate of *re*-Insertion varies greatly between casual (1.18 percent), and middle (0.63 percent) or high (0.56 percent). Males prefer *re*-Insertion in more casual speeches. On the other hand, the distribution of *re*-Insertion is relatively unaffected by speech style in females. The result shows that the correlation between the distribution of *re*-Insertion and speech style is attributed to males.

The examination of the interaction between spontaneity and gender and between speech style and gender in *re*-Insertion coupled with the examination in *sa*-Insertion shows that female speakers are insensitive to the characters associated with intra-speech type difference, such as spontaneity and speech style in language variation and change.

6.3.8 Speech skill

In this section, I examine the effect of speech skill on the distribution of *re*-Insertion. As mentioned above, the speech skill is the index which refers to the speakers' skill in speechmaking. The speech skill is the self-evaluation in which speakers answer whether they are good or bad at speechmaking in the questionnaire before the recording. I stratify the speech skill into "skillful" and "unskillful," and I classify each token according to the strata. I examine the effect of speech skill by looking into the distribution of *re*-Insertion and TCs. The result is shown below.

Table 110. Distribution of *re*-Insertion and TC by speech skill

speech skill	*re*-Insertion	TC	rate of *re*-Insertion(%)
skillful	4	870	0.46
unskillful	14	1,824	0.76
total	18	2,694	0.66

X^2 = 1.62, d.f.=1, n.s. (n.s.)

As Table 110 shows, the frequency of *re*-Insertion is 4 in skillful and 14 in unskillful, and the rate of *re*-Insertion is 0.46 percent in skillful and 0.76 percent in unskillful. Both the frequency and the rate of *re*-Insertion are higher in unskillful than in unskillful. The result shows that the speakers who regard themselves as being weak in speechmaking prefer *re*-Insertion. This indicates that the speakers' awareness towards their own speech skill has an influence on the distribution of *re*-Insertion, as was found in *sa*-Insertion. However, the result shows the possibility that speech skill interacts with other factors. Specifically, speech skill may interact with speech experience according to the result of the analysis of *re*-Insertion. I examine this possibility by conducting the multivariate analysis in Section 6.4.

6.3.9 Speech experience

Finally, I examine the effect of speech experience on the distribution of *re*-Insertion. Also in *re*-Insertion, although the argument that the speakers who make the academic presentation have broader experience in speechmaking than the speakers who make the simulated public speaking applies to the speech experience, the examination of the effect of speech experience as an independent factor within speech type is necessary. I stratify the speech skill into "first time," "2-10," and "11-," and I classify each token according to the strata. I examined the effect of speech experience by looking into the distribution of *re*-Insertion and TCs. The results are shown below.

Table 111 Distribution of *re*-Insertion and TC by speech experience

speech experience	*re*-Insertion	TC	rate of *re*-Insertion(%)
first time	7	1,281	0.54
2-10	8	1,323	0.60
11-	3	701	0.43
total	18	3,305	0.54

X^2 = 0.26, d.f.=2, n.s. (n.s.)

As Table 111 shows, the frequency of *re*-Insertion is 7 in first time, 8 in 2-10 and 3 in 11-, and the rate of *re*-Insertion is 0.54 percent in first time, 0.6 percent in 2-10 and 0.43 percent in 11-. Both the frequency and the rate of *re*-Insertion are higher in first time and 2-10 than in 11-. Specifically, there is a big difference in the use of *re*-Insertion between the speaker with the speech experience up to 10 times and those with more than 11 experiences. The result shows that *re*-Insertion is preferred by the speaker with less speech experience, as in *ra*-Deletion.

In Section 6.3, I conducted the analysis of external factors. The results show that *re*-Insertion: 1) is more compatible with SPS than APS; 2) is preferred by males; 3) is preferred by the speakers with more recent birth-years; 4) is observed in Kanto, Chubu, Kinki, and Chugoku area in the present distribution; 5) is more compatible with the speech with high spontaneity; 6) is preferred by the speaker with lower level of education; 7) is more compatible with the casual speech; 8) is preferred by the unskillful speaker in speechmaking; 9) is preferred by the speaker with less speech experience. These results strongly support the claim that *re*-Insertion is an instance of the change from below, and it tends to be used in casual settings.

The results of the examination of *re*-Insertion are consistent with those of *ra*-Deletion. This supports the claim that both changes are instances of the change from below and that *re*-Insertion and *ra*-Deletion are a series of changes in potential forms.

Furthermore, I showed the interaction between education as a subcategory of social class and age groups in the change of *re*-Insertion. I also argued that *re*-Insertion is acquired in adulthood, and it may serve as the counterexample to the claim of language acquisition. The claim that the change begins in Chubu area, Chugoku area, and Shikoku area and the change is advanced in these areas is partly supported. In addition, I pointed out the possibility that *re*-Insertion emerged also in Kanto and Kinki area in addition to Chubu, Chugoku, and Shikoku areas and has been transmitted to the surrounding areas.

6.4 Multivariate analysis

In this section, I conduct the multivariate analysis, in order to examine the degree of the contribution of each factor to the distribution of *re*-Insertion, and the interaction among internal and external factors, based on the results of the factor-by-factor analysis in previous sections. Specifically, I conduct the binominal logistic regression analysis; the dependent variable is the choice of *re*-Insertion/TC, and the independent variable (the predictor) includes five internal factors: affirmative/negative distinction, verb-length, verb type (vowel verb/consonant verb), morphological structure of the preceding stem (monomorphemic verb/causative verb), and embeddedness; and nine external factors: speech type, gender, birth-year, geographical difference, education, spontaneity, speech style, speech skill, and speech experience. I identify the coefficients of each independent variable as the weight of each factor. I show the results of the analysis below, firstly the correlation matrix.

Table 112. Correlation matrix among dependent variable and independent variables (*re*-Insertion, CSJ)

	Constant	Aff/ Neg	V- length	V-verb/ C-verb	mono/ complex	embed- dedness	speech type	gender	birth- year	geogra- phical	educa- tion	spontan- eity	style	skill	experi- ence
Constant	1.000	.055	-.019	-.058	-.122	-.047	.129	-.167	-.905	-.882	-.076	-.129	-.120	-.245	-.043
Aff/Neg	.055	1.000	-.171	-.152	-.044	.093	.144	.021	-.158	-.185	.205	.102	.221	-.019	-.015
V-length	-.019	-.171	1.000	.687	.274	-.119	.010	-.072	-.008	.009	-.189	-.133	-.235	.132	-.016
V-verb/C-verb	-.058	-.152	.687	1.000	.471	-.144	-.095	-.047	.000	.003	-.070	-.150	-.116	.111	.036
mono/complex	-.122	-.044	.274	.471	1.000	.053	.100	-.023	.032	.017	-.021	-.073	-.026	.020	.023
embeddedness	-.047	.093	-.119	-.144	.053	1.000	.064	-.035	.013	.018	-.115	.012	-.103	-.023	.092
speech type	.129	.144	.010	-.095	.100	.064	1.000	-.239	-.051	-.021	-.256	.116	-.121	.043	-.172
gender	-.167	.021	-.072	-.047	-.023	-.035	-.239	1.000	.089	.046	.156	.002	.154	-.143	-.014
birth-year	-.905	-.158	-.008	.000	.032	.013	-.051	.089	1.000	.979	-.271	-.010	-.232	.197	.044
geographical	-.882	-.185	.009	.003	.017	.018	-.021	.046	.979	1.000	-.302	-.016	-.265	.172	.044
education	-.076	.205	-.189	-.070	-.021	-.115	-.256	.156	-.271	-.302	1.000	.052	.909	.033	-.150
spontaneity	-.129	.102	-.133	-.150	-.073	.012	.116	.002	-.010	-.016	.052	1.000	.152	-.146	-.111
style	-.120	.221	-.235	-.116	-.026	-.103	-.121	.154	-.232	-.265	.909	.152	1.000	-.006	-.060
skill	-.245	-.019	.132	.111	.020	-.023	.043	-.143	.197	.172	.033	-.146	-.006	1.000	-.271
experience	-.043	-.015	-.016	.036	.023	.092	-.172	-.014	.044	.044	-.150	-.111	-.060	-.271	1.000

Firstly, I discuss the correlation of each factor in Table 112. On the assumption that the claim that internal factors are mutually independent, internal factors and external factors are also mutually independent; while external factors are interrelated, the internal factors such as affirmative/negative distinction and verb-length will be mutually independent, internal factors and external factors will be also mutually independent, and only the external factors such as type of the House, type of the Diet meeting, and birth-year will be interrelated.

As Table 112 shows, verb-length and verb type (vowel verb/consonant verb), and also verb type and morphological structure of the preceding stem (monomorphemic verb/complex verb) interact with each other. In addition, verb-length and morphological structure of the preceding stem show a relatively high correlation coefficient. Other internal factors are mutually independent. That is, verb-length interacts with verb type and morphological structure of the preceding stem, and verb type with morphological structure of the preceding stem. On the other hand, within external factors gender and geographical difference, and education and style show remarkably high correlation coefficients Slightly high correlation coefficients are observed between education and birth-year, between education and geographical difference, and between speech skill and speech experience. These factors interact with each other, respectively.

The results contradict the hypothesis in the sense that some interaction within internal factors is observed. However, the existence of interaction within external factors as well as the lack of interaction between internal factors and external factors are maintained. The result supports the view that the internal and external factors occupy distinct rooms in human linguistic competence. The results are parallel to the ones of *ra*-Deletion.

Although I assumed the relationship between speech type and the external factors such as spontaneity, speech style, and speech experience that are subsumed under the subcategory of speech type, these factors do not interact with each other as the correlation coefficients show. This shows that the subcategorial factors have become strong enough to play a role independently without being canceled out by the effect of speech type along the overall change in potential forms. In other words, speech type affects the distribution of *re*-Insertion as an independent factor.

The correlations among verb-length, verb type, and morphological structure of the preceding stem are attributed to the fact that these factors are all associated with the property of verbs. This may result in the interaction among internal factors. A number of correlations in which geographical difference is involved (birth-year and geographical difference, education and geographical difference, and gender and geographical difference) are observed. This shows that the effect of geographical difference is reflected in a number of external factors. The correlation between birth-year and education is associated with the generalization about the expected distribution of linguistic variants for the change from below with respect to social class and age group. As to the correlation between education and style, the following reasoning may hold: The speakers with high educational background have relatively broad experience in formal speech, and thus their way of speaking tends to be formal especially in public speaking. On the other hand, the speakers with low educational background are not so experienced in formal speech, and their way of speaking tends to be casual. Furthermore, speech experience and speech skill show the correlation, and both factors are interacting with each other as I hypothesized in Section 6.3.8. This is associated with the fact that the speakers with broader speech experience regard themselves as being good at speechmaking.

Next, I discuss the degree of contribution of each factor to the distribution of *re*-Insertion. I show the result of logistic regression below.

Table 113. Result of the logistic regression (*re*-Insertion, CSJ)

variables in the equation

	β	SE	Wald	d.f.	P-value	Exp(β)
affirmative/negative	1.295	.703	3.398	1	.065	3.651
verb-length	-1.898	.371	26.175	1	.000	.150
V-verb/C-verb	-5.236	1.815	8.324	1	.004	.005
monomorphemic/complex	-.188	.467	.161	1	.688	.829
embeddedness	1.146	.693	2.736	1	.098	3.145
speech type	-2.564	.988	6.732	1	.009	.077
gender	1.221	.651	3.516	1	.061	3.391
birth-year	-1.742	1.198	2.113	1	.146	.175
geographical difference	-3.730	2.616	2.034	1	.154	.024
education	3.391	1.569	4.669	1	.031	29.684
spontaneity	.620	.446	1.929	1	.165	1.859
speech style	3.546	1.384	6.561	1	.010	34.661
speech skill	-1.004	.692	2.104	1	.147	.366
speech experience	.479	.398	1.445	1	.229	1.614
V-verb/C-verb by verb-length	3.598	.614	34.388	1	.000	36.542
monomorphemic/complex by V-verb/C-verb	-3.719	1.549	5.766	1	.016	.024
birth-year by geographical difference	.579	.379	2.335	1	.126	1.785
education by speech style	-1.434	.681	4.440	1	.035	.238
Constant	2.461	8.175	.091	1	1 .763	11.711

-2 Log likelihood = 150.625, Cox & Snell R^2 = .023, Nagelkerke R^2 = .324

As Table 113 shows, verb-length, verb type (vowel verb/consonant verb), speech type, education, speech style, verb type by verb-length, morphological structure of the preceding stem (monomorphemic/complex) by verb type, education by speech style are significant with high probability, according to the P-values. Although gender (.061) and affirmative/negative distinction (.065) are not significant with five percent level, the tendency for the significance is observed. This shows that these factors have an influence on the distribution of *re*-Insertion. On the other hand, morphological structure of the preceding stem, embeddedness, birth-year, geographical difference, spontaneity, speech skill, and speech experience do not contribute to the distribution of *re*-Insertion. The significance of the interaction terms shows that verb type and verb-length, morphological structure of the preceding stem and verb type, and education and speech style interact with each other, respectively. These factors do not play a role independently, but contribute to the distribution of *re*-Insertion interacting with each other.

According to the coefficients of each significant factor ("β" in Table 113), among the significant factors the verb type is the most influential factor. Other factors are ranked as follows according to their contribution: morphological structure of the preceding stem by verb type, verb type by verb-length, speech style, education, speech type, verb-length, education by speech style, affirmative/negative distinction, and gender. In other words, the factors affect the distribution of *re*-Insertion in the above order.

The high correlation coefficient of the internal factors, specifically the factors in which verb type is involved, is remarkable. On the other hand, the coefficient of speech type, which constitutes the principal factor which represents the major factors associated with the characteristics of speech, is not so high. The result of the logistic regression also shows that birth-year is not a significant factor in shaping the distribution of *re*-Insertion. This is associated with the fact that *re*-Insertion is currently in the earliest stage of the change, and the rate of *re*-Insertion does not show explosive increase with the passage of time. These insights can be modeled as in Figure 21.

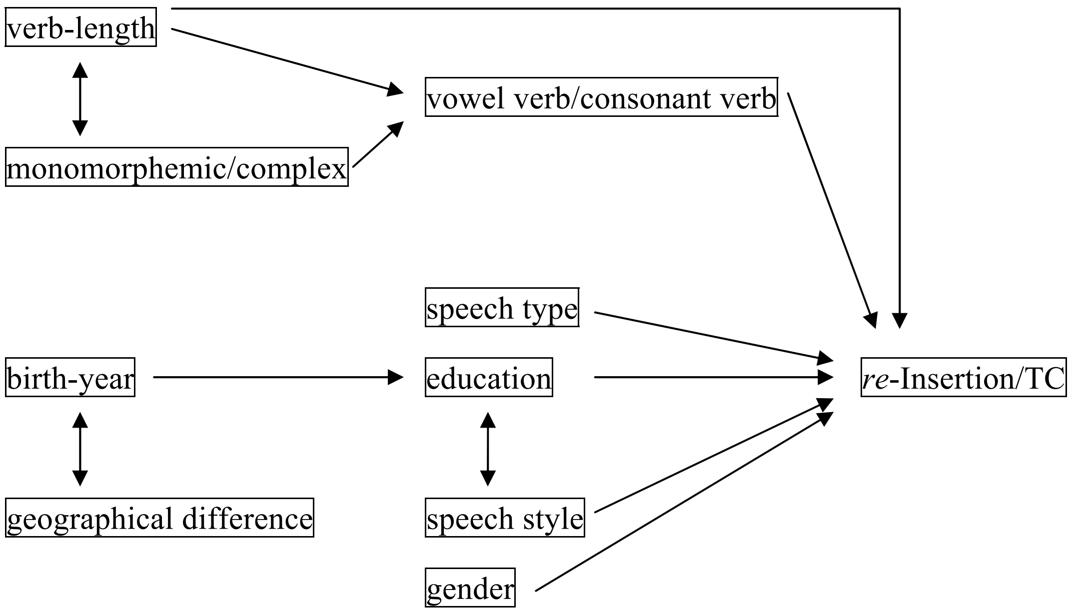

Figure 21. Model of the relationships among verb-length, morphological structure of the preceding stem, verb type, speech type, birth-year, gender, geographical difference, education, speech style

6.5 Summary

In this section, I conducted statistical analyses of *re*-Insertion via CSJ. Specifically, I examined the effects of internal and external factors on the distribution of *re*-Insertion. The factors which affect the distribution of *re*-Insertion categorically are restricted to two internal factors: *re*-Insertion does not occur in idioms and nouns; *re*-Insertion is restricted to self-controllable verbs. As to the gradient internal factors, *re*-Insertion: 1) is more compatible with the negative context than the affirmative one; 2) is more compatible with the short stem verbs, but also occurs with long stem verbs; 3) is more compatible with complex verbs than monomorphemic verbs; 4) is more compatible with main clauses than subordinate clauses; 5) is gradiently constrained by OCP (μ).

As to the external factors, *re*-Insertion: 1) is more compatible with SPS than APS; 2) is preferred by males; 3) is preferred by the speakers with more recent birth-years; 4) is observed in Kanto, Chubu, Kinki, and Chugoku area in the present distribution; 5) is more compatible with the speech with high spontaneity; 6) is preferred by the speaker with lower level of education; 7) is more compatible with the casual speech; 8) is preferred by the unskillful speaker in speechmaking; 9) is preferred by the speaker with less speech experience. These results strongly support the claim that *re*-Insertion is an instance of the change from below, and it tends to be used in casual settings.

Most of the properties of *re*-Insertion are consistent with the properties of *ra*-Deletion (observations # 1, 2, 3, 5 (internal factors), # 1, 3, 5, 6, 7, 9 (external factors)). I argued that the degree of the effects of some factor on *ra*-Deletion in the intermediate stage of the change is inherted by *re*-Insertion, since *re*-Insertion and *ra*-Deletion are a series of changes in potential forms. In other words, each factor continuously governs the entire change of potential forms. The results also support the claim that both changes are instances of the change from below. In addition, I argued that female speakers are insensitive to the characters associated with intra-speech type difference such as spontaneity and speech style in language variation and change.

At this point, I discuss the relationship between the supercategory speech type and spontaneity, speech style, and speech experience, which are subsumed under speech type with respect to the compatibility of *re*-Insertion to these factors. The results of the analysis of *re*-Insertion indicate that *re*-Insertion manifests the similar behavior for five factors related to the stylistic difference. The supercategorial factor and the subcategorial factors act in the same direction, in other words, *re*-Insertion is more compatible with the negative option than positive option with respect to "speech:" With respect to spontaneity, the more spontaneous the speech, the higher the rate of *re*-Insertion; with respect to speech style, the lower the degree of formality, the higher the rate of *re*-Insertion; with respect to speech skill, is preferred by the unskillful speaker in speechmaking; with respect to speech experience, the less the speech experience, the higher the rate of *re*-Insertion; similarly with respect to speech type, *re*-Insertion is more compatible with SPS where inherently spontaneous, casual speeches as well as the speaker with less speech experience are predominant.

The change of *re*-Insertion tends to be used in casual style, since it is the change from below as opposed to the change from above (Labov 1990) in which the innovative form is more compatible with the formal style. The results support the claim that *re*-Insertion is an instance of the change from below as *ra*-Deletion, and the change of *ra*-Deletion and *re*-Insertion differ from the change of *sa*-Insertion which is an instance of the change from above and is more compatible with the positive option with respect to "speech."

I discussed the origin of the change of *re*-Insertion, and I proposed that the two-step process is the core mechanism of the entire change in potential form: The change is firstly driven by the functional motivation and it starts with consonant verbs. Subsequently, the change diffuses to vowel verbs motivated by the analogical leveling for the optimization of the conjugation paradigm.

The multivariate analysis reveals the degree of the contribution of each factor to the distribution of *re*-Insertion, as well as the interaction among internal and external factors. Firstly, as to the interaction among factors, some interaction within internal factors is observed. On the other hand, the independence between internal factors and external factors is maintained. The results, coupled with the categorical/gradient distinction, imply that the internal and external factors occupy distinct rooms in human linguistic competence. Secondly, as to the degree of the contribution of each factor, the factors affect the distribution of *re*-Insertion in the order of: verb type, morphological structure of the preceding stem by verb type, verb type by verb-length, speech style, education, speech type, verb-length, education by speech style, affirmative/negative distinction, and gender.

The results support the view that the effects of each factor change along the progress of the change. The correlation coefficients of the internal factors, specifically the factors in which verb type is involved, are remarkably high. On the other hand, the coefficients of some external factors such as speech type are not so high. This implies that, in the beginning of language change, the effects of internal factors is so strong that the distribution becomes categorical; on the other hand, the effects of external factors is not so strong, on the assumption that *re*-Insertion itself is currently in the earliest stage of the change. The results also show that some internal factors have gradient effects, and some external factors show more significant contributions to the distribution of *re*-Insertion than that of internal factors.

As to the previous studies, the change of *re*-Insertion follows the change of *ra*-Deletion as Inoue and Yarimizu (2002) claim. The claim of Inoue and Yarimizu (2002) that *re*-Insertion is prevalent in Chubu area, Chugoku area, and Shikoku area as well as Hokkaido area where *ra*-Deletion has already spread is partly supported. Shin (2004) claims that *re*-Insertion is more frequent in short stem verbs than in long stem verbs, and it is less frequent in verbs (potential forms) end in *re* such as *to<u>re</u>-ru* 'come off' or *mi-<u>re</u>-ru* 'can see.' The present analysis supports Shin's (2004) claim in the form of the effect of verb-length and OCP(μ).

Chapter 7. Summary of the statistical analysis

In this chapter, I summarize the results of the statistical analysis of *sa*-Insertion in Chapter 4, of *ra*-Deletion in Chapter 5, and of *re*-Insertion in Chapter 6, and subsequently I discuss the theoretical implications and the mechanism of language change on the whole with reference to the results.

Table 114. Summary of the statistical analysis with respect to the compatibility of three innovative forms[72]

factor	*sa*-Insertion	*ra*-Deletion	*re*-Insertion
idioms and nouns	never occurs	never occurs	never occurs
self-controllability	never occurs	never occurs	never occurs
type of the House	councilors	councilors	
type of the Diet meeting	−	−	
lexical diffusion	+	+	
frequency effect	+	−	
transitivity	+	−	−
affirmative/negative	**affirmative**	negative	negative
following	***-te-itadak* pattern**	-*ru*, negative pattern	-*ru*, negative pattern
verb-length	**short stem**	super long stem	short and long stem
i-stem/*e*-stem (OCP)		*i*-stem	
verb type (OCP(μ))	+ (*sasa*)	+ (*rere*)	+ (*rere*)
monomorphemic/complex		complex	complex

72 In Table 114, I follow the following convention: The shaded cells indicate the categorical distribution; horizontal-striped cells indicate the close to categorical distribution; diagonal-lined cells indicate that the item in question is not explored in the present analysis; "+" indicates "affected"; "-" indicates "unaffected."

embeddedness		subordinate	main
speech type	APS	SPS	SPS
gender	male	female	male
birth-year	younger	younger	younger
geographical difference	+	+	+
education	–[73]	low	low
spontaneity	high	high	high
speech style	formal	casual	casual
speech skill	skillful	–	unskillful
speech experience	broader	less	less

As Table 114 shows, most of internal factors categorically govern the distribution of *sa*-Insertion. Assuming that the change of *sa*-Insertion is currently in the beginning, we can argue that the internal factors categorically govern the distribution of *sa*-Insertion in the beginning of the change. In the beginning of language change where the change is yet to be diffused, the contexts in which innovative forms can occur are restricted to a narrow range. The innovative forms occur only in specific contexts. This is reflected in the manner of the contribution of each factor: factors that stipulate the contexts play a role categorically. Assuming the affirmative/negative distinction, for example, we can argue that the effect of affirmative/negative distinction on the distribution of *sa*-Insertion is close to categorical, since the change of *sa*-Insertion has not diffused into the negative context. In other words, if internal factors categorically govern the distribution of innovative forms, then the change is not advanced and is in the beginning.

[73] *Sa*-Insertion is shown to be unaffected by the effect of education in the pilot study.

On the other hand, most of internal factors gradiently govern the distribution of *ra*-Deletion and *re*-Insertion. Assuming that the changes of *ra*-Deletion and *re*-Insertion are in the intermediate stage of the entire change of potential form, we can deduce that the internal factors gradiently govern the distribution of these two innovative forms in the intermediate stage. In the intermediate stage of language change where the change is advanced, the contexts in which innovative forms can occur distribute in a wider range. The innovative forms occur in a variety of contexts relatively freely. This is reflected in the manner of the contribution of each factor: Factors that stipulate the contexts play a role gradiently. If we take the conjugation type of the verb (*i*-stem/*e*-stem), for example, the effect of this factor on the distribution of *ra*-Deletion is gradient, namely, *ra*-Deletion occurs both with *i*-stem verbs and *e*-stem verbs to some degree or another, since the change of *ra*-Deletion has diffused into the *e*-stem verbs in addition to the *i*-stem verbs. In other words, if internal factors gradiently govern the distribution of innovative forms, then the change is advanced and is in the intermediate stage or later. I generalize these observations as follows.

(33) Generalization about the progress of the change and internal factors

If internal factors categorically govern the distribution of innovative forms, then the change is not advanced and is in the beginning; if internal factors gradiently govern the distribution of innovative forms, then the change is advanced and is in the intermediate stage or later.

Ra-Deletion and *re*-Insertion show the similar compatibility with respect to the effects of each factor. The results support the claim that the changes of *ra*-Deletion and *re*-Insertion are a set of changes in potential form.

I summarize the results with respect to the specific issues below.

Acquisition

The examination of the geographical difference shows that *sa*-Insertion and *re*-Insertion are acquired in adulthood. On the other hand, *ra*-Deletion is acquired in critical period and retained in adulthood, instead of being acquired in adulthood after the critical period. Given that the change of *ra*-Deletion has already spread in many areas, we see that the present method does not serve to verify the acquisition problem of *ra*-Deletion. The result suggests that these innovative forms in voice are acquired in adulthood. It follows that the acquisition of these innovative forms, which belong to the morphosyntactic category, in adulthood serves as the counterexample to the claim concerning the language acquisition that the linguistic categories other than the lexical items (phonological, morphological and syntactic one) are acquired within the critical period and remain stable afterwards (Weinreich 1968; Labov 1994).

Change from above/below

The exhaustive examination of the stylistic difference shows that the change of *ra*-Deletion and *re*-Insertion, which are more compatible with the negative option with respect to "speech," are instances of the change from below in which the innovative form is more compatible with the casual style in terms of Principle II (Labov 1990). On the other hand, *sa*-Insertion, which is more compatible with the positive option with respect to "speech," is an instance of the change from above in which the innovative form is more compatible with the formal style in terms of Principle Ia (Labov 1990).

Order of the change

The examination of the correlation between birth-year and the distribution of variants indirectly shows the order of the change. Assuming that the change spreads gradually and the rates of each innovative forms reflect the degree of progression (the higher the rate of an innovative form, the more advanced the change), we can deduce that the order of the change of each variation is as follows: *ra*-Deletion => *sa*-insertion => *re*-Insertion. The result partly supports the claims of previous studies: *ra*-Deletion was first observed at the end of the 19th century, *sa*-Insertion in 1947, and *re*-Insertion at the end of the 20th century. The results of the examination of lexical diffusion theory and frequency effect also support the order of the change. Although every explored variant is subject to the lexical diffusion, *sa*-Insertion is also subject to the frequency effect and *ra*-Deletion is not. I argued that *sa*-Insertion is affected by the frequency effect, since it is currently in the beginning of language change, on the other hand, the change of *ra*-Deletion is so advanced and so spread among many verbs that it overrides the frequency effect. This in turn shows that if a phenomenon is subject to the frequency effect, its change is not advanced and is in the beginning, and if a phenomenon is immune to the frequency effect, the change is advanced and is in the intermediate stage or later.

Gender

The examination of the interaction between spontaneity and gender and between speech style and gender in *re*-Insertion coupled with the examination in *sa*-Insertion shows that female speakers are insensitive to the characters associated with intra-speech type difference such as spontaneity and speech style in language variation and change.

Categorical/gradient distinction

It is claimed that internal factors constrain the phenomena categorically and the internal factors are associated with the grammaticality (hard constraint), on the other hand external factors constrain the phenomena gradiently and the external factors are associated with the acceptability (soft constraint) (Keller 2000, among others). However, the results of the analyses show that it is not necessarily the case that the internal factors are categorical. Furthermore, the strength of internal factors does not necessarily override that of external factors; some external factors show extremely significant contributions.

Internal/external distinction

In language variation and change, the following tendency with respect to the interaction of factors is observed: internal factors are mutually independent, in other words, there exists no significant interaction within internal factors; internal factors and external factors are also mutually independent; while external factors are interrelated (Labov 1982). In the multivariate analysis, it is not necessarily the case that internal factors are independent, and external factors are interrelated. In some case, the interaction within internal factors is observed, and the interaction within external factors is not observed. However, the interaction between internal factors and external factors is never observed. The independence of internal factors and external factors is maintained. The results, coupled with the categorical/gradient distinction, imply that the internal and external factors occupy distinct rooms in human linguistic competence.

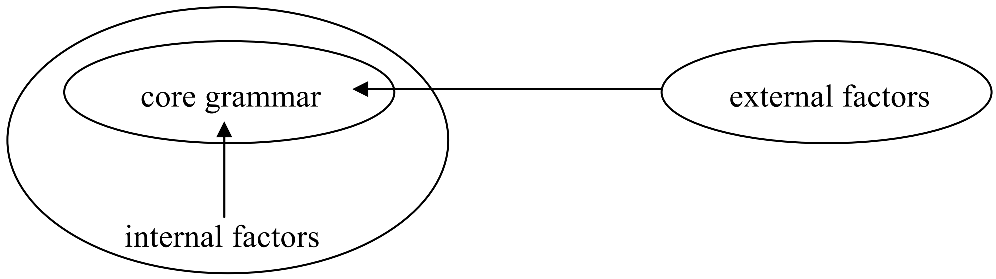

Figure 22. Model of the human linguistic competence and internal and external factors

Change of factors (Dynamic Interaction Hypothesis)

In the examination of each factor, I suggested that the effects of the internal factors that are categorical in the beginning of the change decline and become gradient, and the effects of external factors that are gradient in the beginning of the change increase and approach categorical along the progress of the change. Likewise, the internal factors that are mutually independent in the beginning of the change become interrelated, and the external factors that are interrelated in the beginning of the change become independent along the progress of the change. The above claim implies that if the effect of a particular factor is categorical, the factor plays a role independently without any interaction, and if the effect of a particular factor is gradient, the factor has some interaction with other factors. The change of the relationship (interaction) among factors is a corollary of the change of the effects of each factor along the progress of the change. This is schematized as follows.

internal factors	categorical	→	gradient
	[-interaction]		[+ interaction]
external factors	gradient	→	categorical
	[+ interaction]		[- interaction]

time →

Figure 23. Change of the effects and the relationship of factors

Formulating this idea, I propose the following hypothesis.

(34) Dynamic Interaction Hypothesis (DIH)

In language change, internal factors become gradient, showing statistical interaction among themselves, while external factors become statistically independent from each other.

Generally, although various factors hinder the occurrence of innovative forms and block the diffusion of the change in the beginning of language change, the driving force for the change overrides the effects of factors and the change diffuses into the various contexts with the passage of time.

Markedness and frequency effect

The diffusion of language change is governed by the following two competing factors: Firstly, language change diffuses from morphologically, syntactically unmarked contexts such as main clause, monomorphemic verbs, or affirmative context to marked contexts such as subordinate clause, complex verbs, or negative context. Secondly, language change diffuses from infrequent forms to frequent forms such as irregular verbs (frequency effect). The unmarked options are simple and frequent, and thus the change ingresses more easily than marked options which are complex and infrequent. However, the frequent forms more salient and strongly stand out in one's memory than infrequent forms, and thus these forms are resistant to the change. Thus, the two factors are incompatible with each other.

Given the fact that *sa*-Insertion is more compatible with the unmarked options, we can argue that the markedness overrides the frequency effect. On the other hand, *ra*-Deletion is more compatible with the marked options, thus the frequency effect overrides the markedness for the change of *ra*-Deletion. This implies that, assuming the order of the change of these two variants, markedness has a great impact on the change in the beginning, however, the frequency effect overrides it along the progress of the change.

Constant Rate Hypothesis

I verify whether *sa*-Insertion, *ra*-Insertion, and *re*-Insertion are instances of language change with reference to the Constant Rate Hypothesis (CRH, Kroch 1989). The CRH predicts that the rate of change is uniform across the linguistic environments in which the change occurs, as formulated below:

> […] when grammatical option replaces another with which it is in competition across a set of linguistic contexts, the rate of replacement, properly measured, is the same in all of them. The contexts generally differ from one another at each period in the degree to which they favor the spreading form, but they do not differ in the rate at which the form spreads.
>
> (Kroch 1989: 200)

To put the definition differently, we can argue that the CRH claims that in language change the time and the internal factors are independent. Taking the discussion one step further, Matsuda (2003) proposed the Extended Constant Rate Hypothesis (henceforth ECRH) by replacing time with age taking its contrapositive. The ECRH predicts whether an observed synchronic age-correlation is a case of ongoing change or an age-grading. He formulates this insight as follows:

> If the linguistic contextual effect shows interaction with age, the observed age-correlation cannot be a case of language change (and, thus, it must be a case of age-grading). (Matsuda 2003)

In light of the ECRH, whether *sa*-Insertion, *ra*-Insertion, and *re*-Insertion are instances of language change is testable. If no interaction between birth-year and the internal factors is observed, each phenomenon is language change. As the results of the multivariate analysis show, birth-year never interacts with any of the internal factors in three variations. Therefore, *sa*-Insertion, *ra*-Insertion, and *re*-Insertion are shown to be language changes.

However, some results of the present analysis, coupled with DIH, can serve as a counterexample to CRH. I claimed that the effect of OCP (μ) has declined with the progress of the change in potential forms. Furthermore, I showed that the preferences of following factors had changed along the progress of the change. This is summarized below.

Table 115. Change in preferences of factors

factor	change of preference
verb-length	shorter > longer => longer > shorter
morphological structure of the preceding stem	monomorphemic > complex => complex > monomorphemic
embeddedness	main > subordinate => subordinate > main
affirmative/negative distinction	affirmative > negative => negative > affirmative

With respect to the preferred options of each factor, shorter verbs, monomorphemic verbs, main clauses, and affirmative contexts are preferred rather than longer verbs, complex verbs, subordinate clauses, and negative contexts in the beginning of language change; on the other hand, longer verbs, complex verbs, subordinate clauses, and negative contexts are preferred rather than shorter verbs, monomorphemic verbs, main clauses, and affirmative contexts in later stages. This implies that the rate of change is not constant across a set of linguistic contexts, unlike the claim of CRH; instead, the rate of change is higher in some options than other options: the change spreads faster in longer verbs, complex verbs, subordinate clauses, and negative contexts than in shorter verbs, monomorphemic verbs, main clauses, and affirmative contexts. Taking embeddedness as an example, I schematize this situation below.

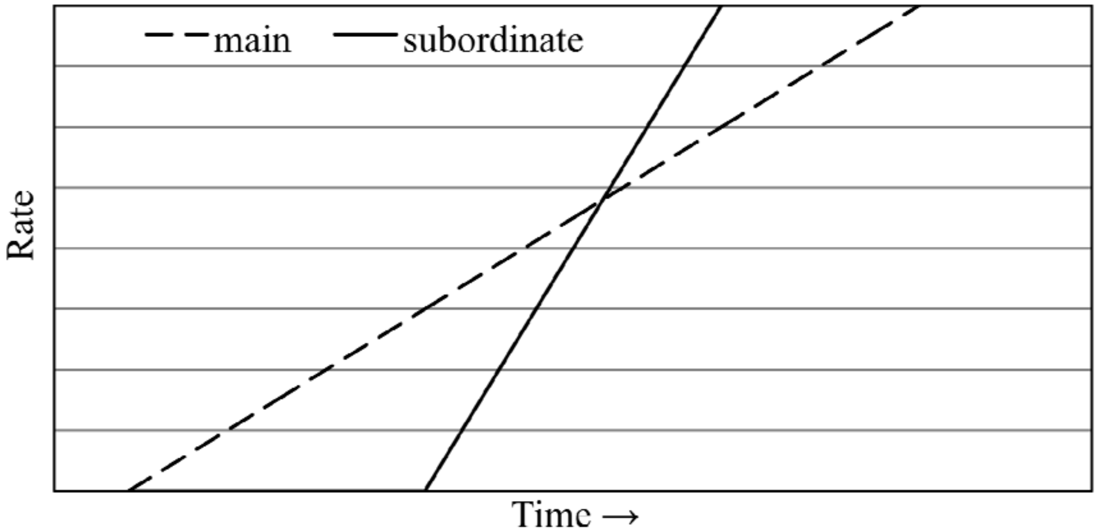

Figure 24. Chronological change in main/subordinate clauses (present analysis)

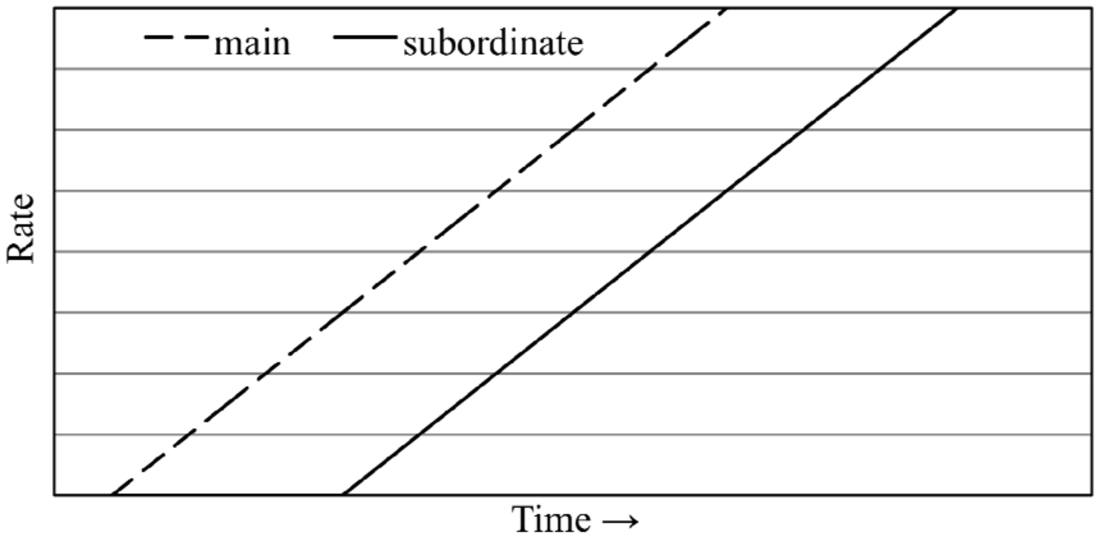

Figure 25. Chronological change in main/subordinate clauses (CRH)

Figure 24 illustrates the chronological change in each context of embeddedness in the present analysis. In Figure 25, the change starts with main clauses and the rate of innovative forms in main clauses is higher than the rate in subordinate clauses in the beginning; subsequently, the change in sunordinate clauses progresses so fast that it gets ahead of the rate in main clauses in the intermediate stage, although the change in subordinate clauses delays. Obviously, the rate of change differs from one context to another. This is the sole scenario which yields the results of the present analysis: without assuming different rates of change for each context, we cannot derive the change of the preferences. Figure 25 illustrates the prediction of CRH for the same options as Figure 24. In Figure 25, the rate of change is constant both in main clauses and in subordinate clauses although the change in main clauses precedes the change in subordinate clauses, and the rate of innovative forms is consistently higher in main clauses. Thus, the results of the present analysis contradict the prediction of CRH. If the present analysis is on the right track, the results would serve as a counterexample to CRH.[74]

So far, the evidence for the CRH comes from the past syntactic changes. Thus, it remains to be revealed whether the CRH also applies to the changes in the other linguistic categories than the syntactic changes. Furthermore, the real-time investigation of the CRH in language change in progress has not been done. The present analysis provides the demonstration of CRH concerning a morphosyntactic category in a real-time study of language change in progress.

I discussed the origin of the change with respect to three innovative forms.

[74] The CRH is originally based on four historical syntactic changes: the replacement of *have* by *have got* in British English (Noble 1985); the rise of the definite article in the Portuguese possessive NP (Oliveira e Silva 1982); the loss of V2 order in Middle French (Adams 1987); the rise of periphrastic *do* in Modern English. Subsequent research added examples from Old English (Pintzuk 1995) and Yiddish (Santorini 1993). However, when it comes to the phonological changes, some interesting counterevidence emerges from the very first variationist study: the centralization of diphthongs in Martha's Vineyard involved an interaction between age and the weight of the following segment (Labov 1963), a scenario that should not be possible under the CRH. The reorganization of environments of this sort does not seem so uncommon in phonological changes. Furthermore, the CRH is not valid for three variations in the present study, which are categorized as the morphological change. Phonological and morphological changes seem more compatible with the DIH. At this point, a possible parametric variation linked to the grammatical category arises with respect to the validity of CRH and of DIH: CRH applies to the syntactic changes, and not to the non-syntactic changes (changes in smaller elements than syntactic ones); DIH applies to the phonological and morphological changes, and not to the syntactic changes (changes in larger elements than phonological and morphological ones). This issue should be verified by further exploration of a wide variety of changes in each category.

I showed that the changes are all driven by functional demands and analogical leveling. Specifically, I pointed out that *ra*-Deletion and *re*-Insertion are instances in a series of an entire change in potential form. Furthermore, I proposed DIH about the change of factors in language change. In the following chapters, I formalize the mechanism of the change in Japanese voice system driven by functional demands and the optimization of the conjugation paradigm by analogical leveling in terms of Optimality Theory.

PART III

In Part III, I present the Optimality-Theoretic analysis in Chapter 8. Subsequently in Chapter 9, I conduct the Probabilistic OT analysis based on the results of the standard OT analysis. I construct a model of the changes of *sa*-Insertion, *ra*-Deletion and *re*-Insertion and explain the mechanism of analogical leveling in a formal manner. Furthermore, I show that the mechanisms of the changes of three variations can be reduced in essence to the interaction of this small set of constraints: OCP (morph), Max-IO, ParContrast and AlloCorr.

Chapter 8. Optimality-Theoretic analysis

In this chapter, I conduct the standard OT analysis of each variation phenomenon. Section 8.1 presents some preliminaries to the present analysis. In Section 8.2, I conduct the OT analysis of *sa*-Insertion, introducing several constraints that are crucial to the emergence as well as the spread of *sa*-Insertion. In Section 8.3, I conduct the OT analysis of *ra*-Deletion. In Section 8.4, I conduct the OT analysis of *re*-Insertion. In Section 8.5, I summarize the discussion of this chapter.

8.1 Preliminaries to OT analysis

In the present analysis, I assume that inputs consist of a verb stem and a set of morphemes which are to be phonologically spelled out in the output such as *yar-ase* or *tabe-rare*. In response to inputs of this kind, the Gen generates a class of candidates and the candidates are in turn evaluated following the constraint ranking by Eval. A form which best satisfies the constraints in their ranking on which other candidates conflict is selected as an optimal output.

Within the framework of Transderivational Correspondence Theory (TCT, Benua 1995, 1997; Kenstowicz 1996, 1997; Steriade 2000, among others), analogical leveling is made possible by the high-ranking of output-to-output correspondence constraint (OO-correspondence). The OO-correspondence constraints compare and evaluate the different groups of paradigmatically related words in terms of the degree of discrepancy between the members; in other words, what is crucial for the evaluation by the OO-correspondence constraints is not the input-to-output mapping but the relationship between one output and other outputs. To take the aforementioned suffix allomorphy in Japanese as an example, the OO-correspondence constraints compare and evaluate the discrepancies between the allomorphs for vowel verbs and for consonant verbs. I reintroduce Table 54 with a slight modification as Table 116.

Table 116. Suffix allomorphy for vowel verbs and consonant verbs in the traditional paradigm

conjugation form	vowel verb e.g. *tabe-*	consonant verb e.g. *nom-*
present negative	*-nai*	*-anai*
plain present	*-ru*	*-u*
inchoative	*-yoo*	*-oo*
imperative	*-ro*	*-e*
conditional	*-reba*	*-eba*
causative	*-sase-*	*-ase-*
passive	*-rare-*	*-are-*
potential (traditional)	***-rare-* (standard potential)**	***-e-***
potential (innovative)	***-re-* (*ra*-Deletion)**	***-e-***

As mentioned above, apart from the suppletive imperative *-ro*/*-e*, the discrepancy between the allomorphs for vowel verbs and for consonant verbs is limited to the existence of a single segment: an initial consonant in *-ru*/*-u*, *-reba*/*-eba*, *-rare*/*-are*, *-sase*/*-ase*, *-yoo*/*-oo*, or an initial vowel in *-anai*/*-nai*. However, the distance between the allomorphs of the traditional potential *-rare*, *-e* constitutes a much more significant discrepancy between the allomorphs. On the other hand, the distance between the allomorphs of the innovative potential *-re*, *-e* is reduced by *ra*-Deletion: the discrepancy between the allomorphs is limited to a single segment, making them paradigmatically more similar to the usual case. When it comes to the allomorphy in the potential paradigm, the OO-correspondence constraints compare and evaluate the traditional paradigm and the innovative paradigm with respect to the discrepancy between the allomorphs for vowel verbs and for consonant verbs. The OO-correspondence constraints are in favor of the innovative potential paradigm which harmonizes with other paradigms than the traditional potential paradigm. Thus, the evaluation in terms of the OO-correspondence constraints is in principle paradigmatic rather than derivational.

From the perspective of language change, the mechanism of analogical leveling in OT is as follows: The lower-ranked OO-correspondence constraints in previous times are promoted and they outrank other faithfulness constraints; as a result, paradigmatically uniform outputs, which seemingly disobey phonology in some cases, are generated.

In order to model the analogical leveling in voice in Japanese, I conduct the OT analysis with reference to the constraints which are members of the OO-correspondence family.

8.2 OT analysis of *sa*-Insertion

In this section, I conduct the OT analysis of *sa*-Insertion. In Section 8.2.1, I analyze the single causative. In Section 8.2.2, I analyze the double causative. In Section 8.2.3, I analyze *sa*-Insertion in terms of OO-correspondence constraints. Section 8.2.4 discusses the fact that *sa*-Insertion does not contain the sequence *sasa* within the OT framework. Section 8.2.5 discusses the issue of language change. Finally, Section 8.2.6 summarizes this section.

8.2.1 Single causative

In this section, I analyze the input-to-output mapping of single causatives. As mentioned above, the standard causative which is the counterpart of *sa*-Insertion in causative form is a single causative which consists of a verb stem and one causative suffix. Thus, the input consists of a verb stem and a causative suffix as in *yar-ase*.

Japanese has an open-syllable sound pattern and in principle it does not allow codas. Thus, the sequence in the input specification *yar-ase* is shaped in the mapping so as to fit into the phonological structure of Japanese. I introduce the relevant faithfulness constraint: Ident-IO and markedness constraints: Onset, NoCoda, and Align-Morph-L below.

faithfulness

(35) Ident-IO[F]

Let α be a segment in I(nput), and β be a correspondent of α in O(utput).

If α is [γF], then β is [γF].

markedness

(36) Onset

Syllables must have onsets.

(37) NoCoda

Syllables are open.

(38) Align-Morph-L (Kager 1999)

The left edge of a morpheme coincides with the left edge of a syllable.

Ident-IO requires the segments in the input and the segments in the output have identical values. Onset requires a syllable to have onsets. NoCoda bars a syllable which has codas. Align-Morph-L monitors the coincidence of the left edge of a morpheme with the left edge of some prosodic category: a syllable in this case. I assume that the ranking of each constraint is arranged as follows: Onset, NoCoda >> Ident-IO, Align-Morph-L. I demonstrate the evaluation with concrete examples.

(39)

Input: /yar-ase/	Onset	NoCoda	Ident-IO	Align-Morph-L
☞a. ya.ra.se				*
b. yar.a.se	*!	*		
c. yar.as.e	**!	**		
d. ya.ra.re			*!	*
e. yar.a.re	*!	*	*	

As in (39), although candidate (b) *yar.a.se* satisfies lower-ranked Ident-IO and Align-Morph-L, since it faithfully maps the input segments with respect to their values and the left edge of the causative suffix *ase* coincide with the left edge of syllables *a* and *as*, it violates higher-ranked Onset and NoCoda, since the penultimate syllable does not have an onset and the antepenultimate syllable has a coda. Thus, candidate (b) is excluded. Similarly, candidate (c) *yar.as.e* satisfies Ident-IO and Align-Morph-L, but it incurs two violations of Onset and NoCoda, respectively, and thus it is excluded. The candidate (e) is excluded due to violation of Ident-IO in addition to the violations of Onset, NoCoda. In candidate (e), the onset of the final syllable *s* is replaced by *r*. The candidate (d) *ya.ra.re*, which is the passive form of *yar* including the passive suffix *are*, and the candidate (a) *ya.ra.se* satisfy the higher-ranked Onset and Nocoda. On the other hand, they violate Align-Morph-L, since the left edge of the causative suffix *ase* does not coincide with the left edge of a syllable *ra*. However, the candidate (d) further incurs one violation of Ident-IO in that the onset of the final syllable *s* is replaced by *r*. Therefore, the most harmonic candidate (a) is selected as the output.

In this section, I showed the mapping of single causatives and I showed that the input is shaped in conformity with the CV structure of Japanese.

8.2.2 Double causative

In this section, I analyze the input-to-output mapping of double causatives, specifically focusing on the fact that a double causative is not allowed in Japanese. The double causative contains two causative suffixes. Thus, I assume that the input consists of a verb stem and two causative suffixes as in *yar-as-ase*.

Traditionally, the double causative is not allowed in Japanese and the occurrence of two causative suffixes leads to unacceptability. Instead, one of the causative suffixes is suppressed in double causative construction and a single causative surfaces (Shibatani 1973; Martin 1975; Kuroda 1993). As a result, double causative and single causative surface as identical form: single causative. Based on this observation, I introduce the markedness constraint Obligatory Contour Principle (morph).

(40) OCP (morph)[75]

No identical morphological categories are adjacent.

OCP (morph) blocks the occurrence of adjacent identical morphemes. I assume that the ranking of each constraint is arranged as follows: OCP (morph), Onset, NoCoda >> Ident-IO, Align-Morph-L. I show how the double causative is suppressed to a single causative in terms of this constraint and how the sequence in the input specification *yar-as-ase* is shaped in the mapping so as to fit into the phonological structure of Japanese. I demonstrate the evaluation with concrete examples below.

[75] Shin-ichi Tanaka points out that OCP (morph) incorrectly rules out reduplicative compounds in Japanese, such as *hitobito* (person + person) 'people', *kamigami* (god + god) 'gods and goddesses', and *kazukazu* (number + number) 'a great number,' since these compounds include identical morphemes adjacently. (The consonants in initial position of the second part in *hitobito* and *kamigami* undergo the sequential voicing (cf. MacCawley 1968)) However, this is not the case for the following reasons: 1) these compounds are considered to be established as single lexical items at least in modern Japanese, on the grounds that their meanings are not the sum of the meanings of each word, and are semantically opaque or noncompositional; 2) if we assume that these compounds are reduplicative compounds, rather than single lexical items, they consist of distinct morphemes: reduplicant + base (e.g. RED + *hito*) (McCarthy and Prince 1995); 3) if we assume, based on their meanings, that these compounds are plural forms of each noun, they again consist of distinct morphemes: noun + plural morpheme (e.g. *hito* + <plural>).

(41)

Input: /yar-as-ase/	OCP (morph)	Onset	NoCoda	Ident-IO	Align-Morph-L
☞a. ya.ra.se				*	*
b. yar.as.ase	*!	**	**		
c. ya.ra.sa.se	*!				**
d. ya.ra.re				**!	*
e. yar.ase		*!	*	*	

As shown in (41), although candidate (b) *yar.as.ase* satisfies lower-ranked Ident-IO and Align-Morph-L, since they faithfully map the input segments with respect to their features and the left edges of the causative suffixes coincide with the left edges of syllables, it violates higher-ranked OCP (morph), Onset and NoCoda, since it contains two causative suffixes adjacently; furthermore, penultimate and final syllables do not have onsets and antepenultimate and penultimate syllables have a coda. Thus, candidate (b) is excluded. Similarly, although candidate (c) *ya.ra.sa.se* with a CV structure satisfies Onset, NoCoda and Ident-IO, it is excluded in violation of the higher-ranked OCP (morph) in addition to the violation of Align-Morph-L. The candidates (a), (d) and (e) all satisfy OCP (morph), and they move on to the next competition. The candidate (e) *yar.ase* violates higher-ranked Onset and NoCoda, and is thus excluded. The candidate (d) *ya.ra.re*, which is the passive form of *yar* including the passive suffix *are*, and the candidate (a) *ya.ra.se* satisfy the higher-ranked Onset and NoCoda. On the other hand, they violate Align-Morph-L, since the left edge of the causative suffix *ase* does not coincide with the left edge of a syllable *ra*. With respect to Ident-IO, the candidate (d) incurs two violations of Ident-IO in that *sa* (5th and 6th segments from the front) is replaced by *re*; on the other hand, the candidate (a) incurs only one violation of Ident-IO in that *a* (6th segment from the front) is replaced by *e*. Therefore, the optimal candidate (a) is selected as the output.

In this section, I demonstrated the mapping of double causatives and I showed that the double causative is suppressed to a single causative by OCP (morph) and that the input is shaped in conformity with the phonological structure of Japanese. Specifically, although the double causative contains two causative suffixes in the input specification, OCP (morph) blocks the occurrence of two adjacent causative suffixes and a single causative surfaces.

8.2.3 *Sa*-Insertion

In this section, I analyze the mapping of *sa*-Insertion. Specifically, I take the cause of the emergence of *sa*-Insertion with respect to the reduction of the functional load and the analogical leveling into consideration. In Section 8.2.3.1, I analyze *sa*-Insertion with respect to the reduction of the functional load. In Section 8.2.3.2, I analyze *sa*-Insertion with respect to the optimization of the conjugation paradigm by analogical leveling. In Section 8.2.3.3, I analyze the mapping of *sa*-Insertion with OCP (morph), ParContrast and AlloCorr.

8.2.3.1 Paradigm Contrast

In this section, I discuss the issue of the reduction of the functional load. As we saw above, the double causative is subject to OCP (morph), and although it contains two causative suffixes in the input specification, a single causative surfaces. As claimed by Okada (2003) and Sano (2006), *sa*-Insertion is a double causative; namely, it contains two causative suffixes. Thus, it would be reasonable to expect that *sa*-Insertion is also blocked by OCP (morph). Then, why is *sa*-Insertion which should be suboptimal due to the effect of OCP (morph) selected as the optimal candidate and why does it come into existence? I consider the forces opposite to OCP (morph) which prompt the emergence of *sa*-Insertion in terms of OT constraints.

As Okada (2003) claims, the meaning of *sa*-Insertion is honorific, rather than causative. *Sa*-Insertion plays a role in reducing the functional load with respect to these two meanings. To capture this observation in OT terms, I introduce the markedness constraint Paradigm Contrast (Ito and Mester 2004).

(42) ParContrast (Paradigm Contrast, Ito and Mester 2004):

The cells of a paradigm are pair-wise phonologically distinct.

ParContrast requires one-to-one correspondence between form and content. As mentioned above, the morpheme *rare* for vowel verbs carries four meanings: passive, honorific, potential and spontaneous. If ParContrast plays a role on this paradigm and the meaning potential gets carried by the innovative morpheme *re* in the form of *ra*-Deletion, then the one-to-one correspondence between its form and the meaning ‘potential’ will hold. As a result, the functional load of *rare* will decrease (it carries three meanings), and the differences between the potential and other three meanings are semantically disambiguated. Assuming that the meaning of *sa*-Insertion is honorific rather than a literal double causative, one can apply the same argument as the morpheme *rare* also to the causative suffix.

Unlike the constraints in IO family, ParContrast needs to compare and evaluate the output forms of both causative and honorific forms in a single tableau. In this respect, ParContrast is categorized as an OO-correspondence constraint. I illustrate the evaluation in terms of this constraint with the tableau.

(43)

Candidate paradigms for /yar-/			ParContrast
☞a. causative:	ya.ra.se	(standard causative)	
honorific:	ya.ra.sa.se	(*sa*-Insertion)	
b. causative:	ya.ra.se	(standard causative)	*!
honorific:	ya.ra.se	(standard causative)	

In paradigm (a), the meanings ‘causative’ and ‘honorific’ take distinct forms: ‘causative’ takes *ya.ra.se* which is standard causative, ‘honorific’ takes *ya.ra.sa.se* which is *sa*-Insertion. The paradigm (a) satisfies one-to-one correspondence between form and content. On the other hand, in paradigm (b), ‘causative’ and ‘honorific’ take the identical form *ya.ra.se*. In other words, *ya.ra.se*, which is standard causative, carries two meanings. This results in the higher functional load of *sase*. The paradigm (b) does not satisfy one-to-one correspondence, and violates ParContrast. Thus, the paradigm (a), which includes *sa*-Insertion, is selected as the optimal candidate with no violation of ParContrast, and it follows that ParContrast is in favor of *sa*-Insertion.[76]

8.2.3.2 Allomorph Correspondence

In this section, I discuss the issue of analogical leveling. As mentioned above, Japanese verbs are classified into two types, according to the stem-ending: one type is a consonant verb which ends in a consonant (e.g. *yar*-‘do,’ *hair*- ‘enter’), and the other

[76] The following question arises with respect to the meaning of *sa*-Insertion: Why does the paradigm where *sa*-Insertion carries the meaning ‘honorific’ and standard causative carries the meaning ‘causative’ stand as the candidate, instead of the paradigm where *sa*-Insertion carries the meaning ‘causative’ and standard causative carries the meaning ‘honorific’? Both paradigms should satisfy one-to-one correspondence (Joe Pater, personal communication). As to the reason for this point, Japanese expresses the honorific meaning by directing causation to the speaker, and the meaning is enhanced by attaching extra morphemes of causation. Therefore, the extra causative suffix may fit the honorific meaning. Along these lines, Okada (2003) claims that the extra causative suffix is the honorific booster.

type is a vowel verb which ends in a vowel (e.g. *mi-* 'see,' *tabe-* 'eat') (Bloch 1946). The Japanese causative suffix shows morphophonemic alternation, according to the types of verb stem: a consonant verb takes *ase*, as in *yar-ase* or *hair-ase* while a vowel verb takes *sase*, as in *mi-sase* or *tabe-sase*. *Sa*-Insertion plays a role in eliminating the allomorphy by analogical leveling (Inoue 2003). To capture the analogical leveling in OT terms, I introduce the markedness constraint Allomorph Correspondence (AlloCorr).

(44) AlloCorr (Allomorph Correspondence, Ito and Mester 2004):[77]

Morphs in a relation of allomorphy are identical.

AlloCorr requires allomorphs to take the identical form. The AlloCorr evaluates the identity between forms within paradigms with respect to segments. To take imaginary phonological sequences *sa* and *sa* as examples, AlloCorr monitors the correspondence between two *s*'s and between two *a*'s. In this case, the identity holds in both segments, and thus these two phonological sequences satisfy AlloCorr. The Japanese causative suffix shows morphophonemic alternation, according to the types of verb stem: a consonant verb takes *ase* and a vowel verb takes *sase*. The AlloCorr requires these two allomorphs to take the identical form. I illustrate the evaluation in terms of this constraint with the tableau.

[77] I slightly modified the original definition.

(45)[78]

Candidate paradigms for /yar-/ and /tabe-/			AlloCorr
☞a. consonant verb:	ya.ra.**sa.se**	(*sa*-Insertion)	
vowel verb:	ta.be.**sa.se**	(standard causative)	
b. consonant verb:	ya.ra.**se**	(standard causative)	***!
vowel verb:	ta.be.**sa.se**	(standard causative)	

The paradigm (a) which includes *sa*-Insertion and standard causative shows no allomorphy, namely, both consonant verb and vowel verb uniformly take the causative suffix *sase*. On the other hand, the paradigm (b), which consists only of standard causative shows the allomorphy, namely, the consonant verb takes *se*, while the vowel verb takes *sase*, and the three segments do not have identical segments as their counterparts. This results in three violations of AlloCorr. Thus, the paradigm (a), which includes *sa*-Insertion, is selected as the optimal candidate with no violation of AlloCorr, and it follows that AlloCorr is in favor of *sa*-Insertion. The analogical leveling in the change of *sa*-Insertion is formalized in terms of AlloCorr. Incidentally, *sa*-Insertion is the sole candidate which satisfies AlloCorr. This implies that the promotion of AlloCorr is one of the triggers of the change of *sa*-Insertion.

8.2.3.3 Interaction of three constraints

Finally, I turn to the analysis of the mapping of *sa*-Insertion with OCP (morph), ParContrast and AlloCorr.[79] The input of *sa*-Insertion is exactly the same as those of

[78] In what follows, I conduct the evaluation by AlloCorr assuming that the initial vowel of the causative or potential suffix for consonant verbs is incorporated into the verb stem (nucleus of the final syllable) in conformity with the phonological structure of Japanese based on the claim of Inoue (2003).

[79] I omit the evaluation of *sa*-Insertion in terms of the constraints associated with the phonological structure, since I have already showed that the candidate *ya.ra.sa.se* is the winner for

the double causative. Firstly, I assume the traditional ranking of each constraint arranged as follows: OCP (morph) >> ParContrast, AlloCorr. I demonstrate the evaluation with the tableau.

(46)

Candidate paradigms for /yar-/		OCP (morph)	ParContrast	AlloCorr
☞a. causative: honorific & consonant verb: vowel verb:	**ya.ra.se** **ya.ra.se** **ta.be.sa.se**		*	***
b. causative: honorific & consonant verb: vowel verb:	**ya.ra.se** **ya.ra.sa.se** **ta.be.sa.se**	*!		
c. causative: honorific & consonant verb: vowel verb:	**ya.ra.se** **ya.ra.se.sa.se** **ta.be.sa.se**	*!		****

In the left column of (46), the relationship between two meanings on the left-hand side is subject to ParContrast, and the allomorphic relationship between consonant verb and vowel verb on the right hand side is subject to AlloCorr. The candidate paradigm (b) satisfies ParContrast and AlloCorr, since it satisfies one-to-one correspondence between form and content in that the meanings 'causative' and 'honorific' take distinct forms and they show no allomorphy, namely, both consonant verb and vowel verb uniformly take the causative suffix *sa.se*. The candidate paradigm (c) satisfies

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the double causative, as far as the phonological structure is concerned. The same result is expected for *sa*-Insertion.

ParContrast, since it satisfies one-to-one correspondence between form and content in that the meanings ‘causative’ and ‘honorific’ take distinct forms, while it incurs four violations of AlloCorr, since it shows allomorphy, namely, the consonant verb takes the causative suffix *se.sa.se* and the vowel verb takes the causative suffix *sa.se*. However, these two candidate paradigms violate the higher-ranked OCP (morph), since the underlined forms contain two causative suffixes adjacently. Thus, the candidate paradigms (b) and (c) are excluded. The candidate paradigm (a) satisfies OCP (morph) although it violates ParContrast and AlloCorr, since it does not satisfy one-to-one correspondence between form and content in that the meanings ‘causative’ and ‘honorific’ take the identical form and it shows allomorphy, namely, consonant verb takes the causative suffix *se* and vowel verb takes the causative suffix *sa.se*. Therefore, the optimal candidate (a) which consists of standard causatives is selected as the output.

Next, I analyze the mapping of *sa*-Insertion with OCP (morph), ParContrast and AlloCorr assuming the innovative ranking of each constraint arranged as follows: ParContrast, AlloCorr >> OCP (morph). I demonstrate the evaluation with the tableau.

(47)

Candidate paradigms for /yar-/		ParContrast	AlloCorr	OCP (morph)
a. causative:	**ya.ra.se**	*!	***	
honorific & consonant verb:	**<u>ya.ra.se</u>**			
vowel verb:	**ta.be.sa.se**			
☞b. causative:	**ya.ra.se**			
honorific & consonant verb:	**<u>ya.ra.sa.se</u>**			*
vowel verb:	**ta.be.sa.se**			
c. causative:	**ya.ra.se**		****!	
honorific & consonant verb:	**<u>ya.ra.se.sa.se</u>**			*
vowel verb:	**ta.be.sa.se**			

As shown in (47), although the candidate paradigm (a) satisfies OCP (morph), since the underlined form contains only one causative suffix, it violates the higher-ranked ParContrast and AlloCorr, since it does not satisfy one-to-one correspondence between form and content, and it shows allomorphy. Thus, the candidate paradigm (a) is excluded. The candidate paradigms (b) and (c) violate the lower-ranked OCP (morph). The candidate paradigm (c) satisfies ParContrast, since it satisfies one-to-one correspondence between form and content, while it incurs four violations of AlloCorr, since it shows allomorphy. The candidate paradigm (b) satisfies both ParContrast and AlloCorr, since it satisfies one-to-one correspondence between form and content, and it shows no allomorphy. Therefore, the optimal candidate (b) which includes *sa*-Insertion is selected as the output.

In summary, OCP (morph) is against *sa*-Insertion, while ParContrast, AlloCorr are in favor of *sa*-Insertion. I showed that the change of *sa*-Insertion is governed by the competition among these three constraints. Assuming the standard OT, we can expect that if ParContrast and AlloCorr dominate OCP (morph), standard causative is selected as the optimal candidate; on the other hand, if OCP (morph) dominates ParContrast and AlloCorr, *sa*-Insertion is selected as the optimal candidate. In the traditional paradigm, although the double causative contains two causative suffixes in the input specification, OCP (morph) blocks the occurrence of two adjacent causative suffixes and single causative surfaces under the ranking OCP (morph) >> ParContrast, AlloCorr. As a result, double causative and single causative surface as identical form: single causative *ya.ra.se*. The reranking of these three constraints to ParContrast, AlloCorr >> OCP (morph) in the innovative paradigm enables the emergence of *sa*-Insertion.[80] With respect to ParContrast, the meaning 'causative' and 'honorific' take *ya.ra.se* and *ya.ra.sa.se*, respectively, and the correspondence between form and content is satisfied by the existence of *sa*-Insertion. With respect to AlloCorr, the suffix allomorphy between consonant verbs and vowel verbs is reduced by the existence of *sa*-Insertion; namely, both consonant verbs and vowel verbs uniformly take the causative suffix *sase*. This suggests that the change of *sa*-Insertion is triggered by the demands for the optimization of the conjugation paradigm by analogical leveling and for the reduction of the functional load of each form.

8.2.4 OCP (μ)

In this section, I discuss some of the results of the statistical analysis. Specifically, I

[80] With respect to the trigger of language change, the reranking in standard OT terms is nearly equivalent to the change in ranking values in Probabilistic OT terms. To the best of my knowledge, there has been no extensive discussion on the mechanism of reranking or change in ranking values that takes the external motivation into account. The mechanism of reranking or change in ranking values will be discussed in 9.3 (p.376) and Chapter 10 (pp.389-390).

formalize two properties of *sa*-Insertion within an OT framework: *sa*-Insertion does not contain the sequence *sasa*; *sa*-Insertion is restricted to consonant verbs. These properties are a corollary of OCP (μ). I show how this constraint interacts with other constraints with respect to the properties of *sa*-Insertion. In Section 8.2.4.1, I analyze *sa*-Insertion with respect to the observation that *sa*-Insertion does not contain the sequence *sasa*. In Section 8.2.4.2, I analyze *sa*-Insertion with respect to the observation that *sa*-Insertion is restricted to consonant verbs.

8.2.4.1 *Sa*-Insertion with the sequence *sasa*

As mentioned above, if consonant verbs ending in *-s*, such as *das-u* 'give,' *tadas-u* 'correct,' and *tobas-u* 'fly' were to undergo *sa*-Insertion, the sequence *sasa* would be created, as in **da<u>s-as-a</u>se-*, **tada<u>s-as-a</u>se-*, and **toba<u>s-as-a</u>se-*. The result of the statistical analysis shows that *sa*-Insertion with the consonant verbs ending in *-s* is not observed in the present data. In other words, *sa*-Insertion which contains the sequence *sasa* cannot occur. In order to account for this observation in OT terms, I reintroduce the markedness constraint OCP (μ).

(48) OCP (μ) (revised)

> No morae with identical CV sequences are adjacent across the morphological boundary.

The OCP (μ) bars the adjacent morae with identical CV sequences, such as /**sa.sa*/. In this case, the sequence *sasa* in the matrix of the verb stem and the causative suffix is subject to this constraint. I assume the innovative ranking of each constraint in which

OCP (μ) is highest-ranked and OCP (morph) is lowest-ranked: OCP (μ) >> ParContrast, AlloCorr >> OCP (morph). I demonstrate the evaluation with the tableau.

(49)

Candidate paradigms for /das-/	OCP (μ)	ParContrast	AlloCorr	OCP (morph)
a. causative: **da.sa.se** honorific & consonant verb: **da.sa.sa.se** vowel verb: **ta.be.sa.se**	*!			*
☞b. causative: **da.sa.se** honorific & consonant verb: **da.sa.se** vowel verb: **ta.be.sa.se**		*	***	

In (49), the candidate paradigm (a) violates the highest-ranked OCP (μ), since the honorific form *da.sa.sa.se* contains the sequence *sasa*, although the paradigm (a) satisfies the lower-ranked ParContrast and AlloCorr since it satisfies one-to-one correspondence between form and content and it does not show allomorphy. Thus, the candidate paradigm (a) is excluded. The candidate paradigm (b) satisfies OCP (μ) and OCP (morph), since the honorific form *da.sa.se* does not contain the sequence *sasa*, and it does not contain two causative suffixes adjacently, although the paradigm (b) violates ParContrast and AlloCorr, since it does not satisfy one-to-one correspondence between form and content and it does show allomorphy. The optimal candidate (b) which does not include *sa*-Insertion is selected as the output.

The paradigm which includes *sa*-Insertion with the sequence *sasa* is excluded by OCP (μ) even if it satisfies the demands for the optimization of the conjugation paradigm by analogical leveling and for the reduction of the functional load of each form, and the paradigm which exclusively consists of standard causative is selected. Due to this process, *sa*-Insertion with the sequence *sasa* cannot occur and still standard causative is predominant, although the change of *sa*-Insertion has been progressing in other contexts.

8.2.4.1 *Sa*-Insertion with vowel verbs

I discuss the observation that *sa*-Insertion is restricted to consonant verbs and it does not occur with vowel verbs. As mentioned above, Japanese verbs are classified into two types: consonant verbs (e.g. *yar*-, *hair*-) and vowel verbs (*mi*-, *tabe*-). In the present data, *sa*-Insertion is restricted to consonant verbs and cannot occur with vowel verbs, as Inoue (2003) claims. This derives from the phonological property of *sa*-Insertion with vowel verbs: any *sa*-Insertions with vowel verbs obligatorily contain the sequence *sasa*, as in **tabe-sas-ase* or **mi-sas-ase*. Thus, *sa*-Insertion with vowel verbs is excluded again by the OCP (μ), as in the examples above. I account for this observation in OT terms. Here, the evaluation of identity between the causative suffix for consonant verbs and the one for vowel verbs is irrelevant, since the conjugation of vowel verbs itself is the point at issue. Hence, AlloCorr does not play a role. I assume the innovative ranking of each constraint in which OCP (μ) is highest-ranked and OCP (morph) is lowest-ranked: OCP (μ) >> ParContrast, AlloCorr >> OCP (morph). I demonstrate the evaluation with the tableau.

(50)

Candidate paradigms for /tabe-/				OCP (μ)	ParContrast	AlloCorr	OCP (morph)
	a. causative:	ta.be.sa.se	(standard causative)				
	honorific:	ta.be.sa.sa.se	(*sa*-Insertion)	*!			*
☞	b. causative:	ta.be.sa.se	(standard causative)		*		
	honorific:	ta.be.sa.se	(standard causative)				

In (50), the candidate paradigm (a) violates the highest-ranked OCP (μ), since the honorific form *ta.be.sa.sa.se* contains the sequence *sasa*, although the paradigm (a) satisfies the lower-ranked ParContrast, since it satisfies one-to-one correspondence between form and content. Thus, the candidate paradigm (a) is excluded. The candidate paradigm (b) satisfies OCP (μ) and OCP (morph), since the honorific form *ta.be.sa.se* does not contain the sequence *sasa*, and it does not contain two causative suffixes adjacently, although the paradigm (b) violates ParContrast, since it does not satisfy one-to-one correspondence between form and content. The optimal candidate (b) which does not include *sa*-Insertion is selected as the output.

The paradigm which includes *sa*-Insertion with vowel verbs is excluded by OCP (μ) even if it satisfies the demand for the reduction of the functional load of each form, and the paradigm which exclusively consists of standard causative is selected. By the effect of OCP (μ), *sa*-Insertion with vowel verbs cannot occur and still standard causative is predominant, although the change of *sa*-Insertion has been progressing in other contexts. The incompatibility of *sa*-Insertion with vowel verbs has a general phonological ground (it is not a specific property of vowel verbs). The observation that *sa*-Insertion is restricted to vowel verbs is explained by OCP (μ), without appeal to any additional machinery.

Thus, *sa*-Insertion is blocked by OCP (μ), with respect to both the sequence *sasa* and the vowel verbs. The results imply that if OCP (μ) is demoted with the progress of the change of *sa*-Insertion, *sa*-Insertion would occur in these contexts.

8.2.5 Language change

How the language change of *sa*-Insertion is accounted for in terms of standard OT? As mentioned above, the change of *sa*-Insertion is triggered by the reranking of each constraint. The traditional ranking of each constraint is assumed to be as follows: OCP (μ) >> **OCP (morph)** >> **ParContrast**, **AlloCorr** >> Onset, NoCoda >> Ident-IO >> Align-Morph-L. Crucially, OCP (morph) which is against *sa*-Insertion outranks ParContrast and AlloCorr. Under the traditional ranking of each constraint, one of the causative suffixes is suppressed in the double causative construction and a single causative surfaces, although the double causative contains two causative suffixes in the input specification. The traditional ranking of each constraint is reranked as follows: OCP (μ) >> **ParContrast**, **AlloCorr** >> **OCP (morph)** >> Onset, NoCoda >> Ident-IO >> Align-Morph-L. ParContrast and AlloCorr, which are in favor of *sa*-Insertion, dominate OCP (morph).[81] The reranking enables the double causative (*sa*-Insertion) to

[81] The change of *sa*-Insertion is attributed to the demotion of the markedness constraint OCP (morph) among the other markedness constraints. However, the historical change is generally characterized as the demotion of the faithfulness constraint in ranking, and languages are en route to more unmarked states (Shin-ichi Tanaka, personal communication, cf. Gess1996; Hutton1996; Holt 1997; Anttila and Cho 1998, among others). As far as Tanaka's claim is on the right track, the demotion of the markedness constraint in the present case contradicts this generalization (although there are a number of exceptions (cf. Jacobs 1995; Zubritskaya 1997; Ito and Mester 1998; Clark 2004, among others). However, given the fact that the grammatical system is sensitive to a wide variety of external motivations as triggers of language change (Chapter 10), and the historical change does not necessarily lead to the unmarked state of a language, it would be fair to say that the criterion of markedness or well-formedness (what is unmarked or well-formed) also undergoes changes; consequently, the change happens in the relationship among markedness constraits, which includes the promotion of as well as the demotion of markedness constraints, irrespective of the input. In the present case, which targets the conjugation paradigm in the overall voice system, the demotion of markedness constraint is selected among other options, in order to generate the outputs in conformity with the demands for the optimization of the conjugation paradigm by analogical leveling and for the reduction of the functional load of each form as an external motivation.

surface without being suppressed to a single causative. The reranking does not occur in an abrupt manner, but it proceeds gradiently. Assuming the partial ordering model, we can schematize the process of the reranking roughly as in (51).

(51)

initial stage	intermediate stage	final stage
OCP (morph) ≫ ParContrast, AlloCorr	ParContrast, AlloCorr, OCP (morph)	ParContrast, AlloCorr ≫ OCP (morph)
standard causative: 100% *sa*-Insertion: 0%	standard causative: 50% *sa*-Insertion: 50%	standard causative: 0% *sa*-Insertion: 100%

In the initial stage, the ranking of OCP (morph), ParContrast and AlloCorr is arranged as OCP (morph) >> ParContrast, AlloCorr. Under this ranking, *sa*-Insertion does not occur. Since the initial stage, the reranking begins. In the intermediate stage, each constraint is unranked. It follows that the variation arises where standard causative and *sa*-Insertion occur with equal probability. In the final stage, the process of reranking completes, and the ranking of each constraint is arranged as ParContrast, AlloCorr ≫ OCP (morph). Under this ranking, the probability of *sa*-Insertion becomes 100% and standard causative does not occur. As might be expected, it is not necessarily the case that the change of *sa*-Insertion proceeds uniformly in every context, since various language-internal and -external factors play roles in the change. Instead, the change diffuses from a particular context, and gradually proceeds toward the final stage.

8.2.6 Summary

In this section, I conducted the OT analysis of *sa*-Insertion. Firstly, I summarize the evaluation of single causative, standard causative and *sa*-Insertion.

(52) single causative

Input: /yar-ase/	OCP (μ)	OCP (morph)	ParContrast, AlloCorr	Onset, NoCoda	Ident-IO	Align-Morph-L
☞a. ya.ra.se						*
b. yar.a.se				*!/*		
c. yar.a.re				*!/*	*	

In the evaluation of single causative, the candidates (b) *yar.a.se* and (c) *yar.a.re* incur violations of the constraints associated with the phonological structure, and thus these candidates are excluded. Hence, the optimal candidate (a) *ya.ra.se* is selected as the output. The higher ranked OCP (morph), ParContrast and AlloCorr do not play a role.

(53) standard causative (traditional ranking)

Input: /yar-as-ase/	OCP (μ)	OCP (morph)	ParContrast, AlloCorr	Onset, NoCoda	Ident-IO	Align-Morph-L
a. yar.as.a.se		*!		**/**		
b. ya.ra.sa.se		*!				*
c. yar.a.se			*/***	*!/*		
☞d. ya.ra.se			*/***			*

In the evaluation of standard causative, OCP (morph) dominates ParContrast and AlloCorr. The candidates (a) *yar.as.a.se* and (b) *ya.ra.sa.se* are excluded in fatal violation of OCP (morph), aside from the violations of other constraints. The candidates (c) *yar.a.se* and (d) *ya.ra.se* violate ParContrast and AlloCorr. The candidate (c) further incurs the violation of the constraints associated with the phonological structure, and it is excluded. Therefore, the optimal candidate (d) is selected as the output.

(54) *sa*-Insertion (innovative ranking)

Input: /yar-as-ase/, /das-as-ase/, /tabe-sas-ase/	OCP (μ)	ParContrast, AlloCorr	OCP (morph)	Onset, NoCoda	Ident-IO	Align-Morph-L
☞a. ya.ra.sa.se			*			*
b. da.sa.sa.se	*!		*			*
c. ta.be.sa.sa.se	*!		*			*
d. ya.ra.se		*!/***				*

In the evaluation of *sa*-Insertion, ParContrast and AlloCorr dominate OCP (morph). The candidates (b) *da.sa.sa.se* and (c) *ta.be.sa.sa.se* are excluded in fatal violation of OCP (μ), although they satisfy ParContrast and AlloCorr. The candidate (d) *ya.ra.se* incurs the violations of ParContrast and AlloCorr although it satisfies OCP (morph). Thus, the candidate (d) is excluded. Therefore, the optimal candidate (a) *ya.ra.sa.se* is selected as the output.

I argued that, under the traditional ranking, one of the causative suffixes is suppressed in the double causative construction and a single causative surfaces, although the double causative contains two causative suffixes in the input specification. The reranking enables the double causative (*sa*-Insertion) to surface without being suppressed to a single causative. The results show that the change of *sa*-Insertion is triggered by the demands for the optimization of the conjugation paradigm by analogical leveling and for the reduction of the functional load of each form. This is schematized in Table 117.

Table 117. Correspondence between form and content in traditional and innovative paradigm (*sa*-Insertion)

traditional	suffix allomorphy (AlloCorr)	causative/honorific (ParContrast)
content form	1 2	2 1
innovative	suffix allomorphy (AlloCorr)	causative/honorific (ParContrast)
content form	1 1	2 2

With respect to the suffix allomorphy, the causative suffix (1 content) takes two allomorphs according to the type of verbs to which it attaches (2 forms) in the traditional paradigm; on the other hand, the causative suffix (1 content) takes one allomorph irrespective of the type of verbs to which it attaches (1 form) in the innovative paradigm. With respect to the causative/honorific distinction, the meanings 'causative' and 'honorific' (2 contents) take the identical form (1 form) in the traditional paradigm; on the other hand, the meanings 'causative' and 'honorific' (2 contents) take the distinct forms (2 forms) in the innovative paradigm. The traditional paradigm does not satisfy one-to-one correspondence between form and content with respect either to the suffix allomorphy or the causative/honorific distinction; on the other hand, the innovative paradigm satisfies one-to-one correspondence. This shows that the demands for the optimization of the conjugation paradigm by analogical leveling and for the reduction of the functional load of each form is reflected in the promotion of ParContrast and AlloCorr, and the demand in turn comes up to the surface in the form of *sa*-Insertion.

8.3 OT analysis of *ra*-Deletion

In this section, I conduct the OT analysis of *ra*-Deletion. In Section 8.3.1, I analyze the standard potential. In Section 8.3.2, I analyze *ra*-Deletion in terms of OO-correspondence constraints. Section 8.3.3 discusses the fact that *ra*-Deletion seldom contains the sequence *rere* and that *ra*-Deletion is more frequent with *i*-stem verbs than with *e*-stem verbs within the OT framework. Section 8.3.4 discusses the issue of language change. Finally, Section 8.3.5 summarizes this section.

8.3.1 Standard potential

In this section, I analyze the input-to-output mapping of standard potential. As mentioned above, the standard potential, which is the counterpart of *ra*-Deletion in potential form, consists of a verb stem and one potential suffix. Thus, the input consists of a verb stem and a potential suffix as in *tabe-rare*. Notice that *ra*-Deletion is an instance of the renewal of the potential suffix within a single morpheme, rather than an instance of the morpheme insertion or deletion where multiple morphemes come into play, as with *sa*-Insertion. Thus, I assume that *ra*-Deletion and standard potential share the common input: the input for *ra*-Deletion also consists of a verb stem and a potential suffix as in *tabe-rare*.

Japanese has an open-syllable sound pattern and in principle it does not allow codas. Thus, the sequence in the input specification *tabe-rare* is shaped in the mapping so as to fit into the phonological structure of Japanese. In addition to the above constraints which are associated with the phonological structure, I introduce the relevant markedness constraint Max-IO.

(55) Max-IO

Every segment in I(nput) has a correspondent in O(utput.) (No deletion)

Max-IO monitors the correspondence between input segments and output segments. Thus, Max-IO bars the deletion of input segments in the output.[82] I assume that the ranking of each constraint is arranged as follows: Max-IO >> Onset, NoCoda >> Ident-IO, Align-Morph-L. I demonstrate the evaluation with concrete examples.

(56)

Input: /tabe-rare/	Max-IO	Onset	NoCoda	Ident-IO	Align-Morph-L
☞a. ta.be.ra.re					
b. ta.be.a.re	*!	*			*
c. ta.be.rar	*!		*		
d. ta.be.re	**!				**
e. ta.be.sa.se				**!	

In (56), the initial *r* of the potential suffix is deleted in candidate (b) *ta.be.a.re*. Thus, it incurs one violation of higher-ranked Max-IO. This deletion leads to further violations of Onset and Align-Morph-L, since the penultimate syllable does not have an onset; the left edge of the potential suffix *rare* does not coincide with the left edge of a syllable *a*.

[82] I assume that Max-IO does not militate against the omission of input morphemes in the output. For example, the mapping which includes the deletion of causative suffix as in /yar-as-ase/ → [yar.ase] is not subject to this constraint.

Therefore, candidate (b) is excluded in fatal violation of the higher-ranked Max-IO. Similarly, *e* of the potential suffix is deleted in candidate (c) *ta.be.rar*. Thus, it incurs one violation of higher-ranked Max-IO. Furthermore, it incurs one violation of NoCoda, since the final syllable *rar* has a coda. Therefore, the candidate (c) is excluded. In candidate (d) *ta.be.re* which is *ra*-Deletion, *ra* of the potential suffix is deleted. Thus, it is excluded due to two violations of Max-IO. Incidentally, it incurs two violations of Align-Morph-L, since the left edge of the potential suffix *ra**re*** does not coincide with the left edge of a syllable *re*. Among the remaining candidates, in candidate (e) which is the causative form of *tabe* including the causative suffix *sase*, two *r*'s of the potential suffix are replaced by two *s*'s in the output, although no deletion is observed. Thus, candidate (e) is excluded in two violations of Ident-IO. On the other hand, candidate (a) *ta.be.ra.re* which is the standard potential faithfully maps the input, and incurs no violation. Therefore, the most harmonic candidate (a) is selected as the output.

In this section, I showed the mapping of standard potential and that the input is shaped in conformity with the CV structure of Japanese. The result shows that *ra*-Deletion is excluded by Max-IO, and the standard potential wins under the above constraint ranking. Furthermore, the candidates which include the deletion are excluded by the constraints associated with the phonological structure, except for *ra*-Deletion. In other words, *ra*-Deletion is the sole option which can satisfy the constraints associated with the phonological structure.

8.3.2 *Ra*-Deletion

In this section, I analyze the mapping of *ra*-Deletion. Specifically, I take the cause of the emergence of *ra*-Deletion with respect to the reduction of the functional load and the analogical leveling into consideration. In Section 8.3.2.1, I analyze *ra*-Deletion with respect to the reduction of the functional load. In Section 8.3.2.2, I analyze *ra*-Deletion with respect to the optimization of the conjugation paradigm by analogical leveling. In Section 8.3.2.3, I analyze the mapping of *ra*-Deletion with Max-IO, ParContrast and AlloCorr.

8.3.2.1 Paradigm Contrast

In this section, I discuss the issue of the reduction of the functional load. As we saw above, *ra*-Deletion is excluded by Max-IO, and standard potential is exclusively selected as the output under the above constraint ranking. Then, why is *ra*-Deletion, which should be suboptimal due to the effect of Max-IO, selected as the output and why does it come into existence? I consider the forces opposite to Max-IO which prompt the emergence of *ra*-Deletion in terms of OT constraints.

As mentioned above, the morpheme *rare* for vowel verbs carries four meanings: passive, honorific, potential and spontaneous. If ParContrast plays a role on this paradigm and the meaning potential gets carried by the innovative morpheme *re* in the form of *ra*-Deletion, then the one-to-one correspondence between its form and the meaning ‘potential’ will hold. As a result, the functional load of *rare* will decrease (it carries three meanings), and the difference between the potential and the other three meanings is semantically disambiguated. *Ra*-Deletion plays a role in reducing the functional load with respect to these two meanings. To capture this observation in OT terms, I firstly consider the evaluation by Paradigm Contrast independently. I illustrate the evaluation in terms of this constraint with the tableau.

(57)

Candidate paradigms for /tabe-/			ParContrast
☞a. passive, honorific,			
spontaneous:	ta.be.ra.re	(standard potential)	
potential:	ta.be.re	(*ra*-Deletion)	
b. passive, honorific,			*!
spontaneous:	ta.be.ra.re	(standard potential)	
potential:	ta.be.ra.re	(standard potential)	

In paradigm (a), the meanings 'passive,' 'honorific,' 'spontaneous,' and 'potential' take distinct forms: 'passive,' 'honorific,' and 'spontaneous' take *ta.be.ra.re* which is standard potential; on the other hand, 'passive' takes *ta.be.re* which is *ra*-Deletion. In paradigm (a), the functional load of *rare* decreases in that it now carries only three meanings, and the one-to-one correspondence between form and content is satisfied with respect to 'potential.' On the other hand, in paradigm (b), 'passive,' 'honorific,' 'spontaneous,' and 'potential' take the identical form *ta.be.ra.re*. In other words, *ta.be.ra.re*, which is standard potential, carries four meanings. This results in the higher functional load of *rare*. The paradigm (b) does not satisfy one-to-one correspondence in any respects, and it incurs one violation of ParContrast. Thus, the paradigm (a), which includes *ra*-Deletion, is selected as the optimal candidate with no violation of ParContrast, and it follows that ParContrast is in favor of *ra*-Deletion.

8.3.2.2 Allomorph Correspondence

In this section, I discuss the issue of analogical leveling. As mentioned above, Japanese verbs are classified into two types, according to the stem-ending: one type is a consonant verb which ends in a consonant (e.g. *yar*-'do,' *hair*- 'enter'), and the other type is a vowel verb which ends in a vowel (e.g. *mi*- 'see,' *tabe*- 'eat') (Bloch 1946). The Japanese potential suffix shows morphophonemic alternation, according to the types of verb stem: a consonant verb takes *e*, as in *yar-e* or *hair-e*, while a vowel verb takes *rare*, as in *mi-rare* or *tabe-rare*. *Ra*-Deletion plays a role in eliminating the allomorphy of suffixes between vowel verbs and consonant verbs in potential forms by analogical leveling (Inoue 1998; Fukushima 2004; Ito and Mester 2004). Here, I consider another force opposite to Max-IO which prompts the emergence of *ra*-Deletion. To capture the analogical leveling in OT terms, I consider the evaluation by Allomorph Correspondence independently. I illustrate the evaluation in terms of this constraint with the tableau.

(58)

Candidate paradigms for /yar-/ and /tabe-/			AlloCorr
☞a. consonant verb:	ya.re	(*ra*-Deletion)	**
vowel verb:	ta.be.**re**	(standard potential)	
b. consonant verb:	ya.re	(standard potential)	****!
vowel verb:	ta.be. **ra.re**	(standard potential)	

Both the paradigm (a) which includes *ra*-Deletion and standard potential and the paradigm (b) which consists only of standard potential show allomorphy. In paradigm (a), a vowel verb takes *re*, while a consonant verb does not, and two segments do not have identical segments as their counterparts. This results in two violations of AlloCorr. On the other hand, in paradigm (b) vowel verb takes *rare*, while consonant verb does not, and four segments do not have identical segments as their counterparts. This results in four violations of AlloCorr. Thus, the paradigm (a), which includes *ra*-Deletion, is selected as the optimal candidate with fewer violations of AlloCorr, and it follows that AlloCorr is in favor of *ra*-Deletion.

The conjugation pattern of vowel verbs in potential form has changed (*rare* → *re*) taking the form of *ra*-Deletion. *Ra*-Deletion reduces the discrepancy between the allomorphs to a single segment, making them more similar to the usual case. This process leads to the simplification of the conjugation of verbs in Japanese. The analogical leveling in the change of *ra*-Deletion is formalized in terms of AlloCorr. This implies that the promotion of AlloCorr is one of the triggers of the change of *ra*-Deletion.

8.3.2.3 Interaction of three constraints

Finally, I turn to the analysis of the mapping of *ra*-Deletion with Max-IO, ParContrast and AlloCorr. As mentioned above, the input of *ra*-Deletion is exactly the same as those of standard potential. Firstly, I assume the traditional ranking of each constraint arranged as follows: Max-IO >> ParContrast, AlloCorr. I demonstrate the evaluation with the tableau.

(59)[83]

Candidate paradigms for /tabe-/	Max-IO	ParContrast	AlloCorr
☞a. potental: **ta.be.ra.re** others & vowel verb: **ta.be.ra.re** consonant verb: **ya.re**		*	****
b. potental: **ta.be.ra.re** others & vowel verb: **ta.be.re** consonant verb: **ya.re**	**!		**
c. potental: **ta.be.ra.re** others & vowel verb: **ta.be.a.re** consonant verb: **ya.re**	*!		***

Both the candidate paradigms (b) and (c) satisfy ParContrast, since the functional load of *rare* decreases in that it carries three meanings, and the one-to-one correspondence between form and content is satisfied with respect to 'potential.' The candidate paradigm (b) incurs two violations of AlloCorr in that the vowel verb takes *re*, while the consonant verb does not, and thus two segments do not have identical segments as their counterparts. The candidate paradigm (b) further incurs two violations of higher-ranked Max-IO, since *ra* of the potential suffix is deleted. Similarly, the candidate paradigm (c) incurs three violations of AlloCorr in that the vowel verb takes *a.re*, while the consonant verb does not, and the three segments do not have identical segments as their counterparts. The candidate paradigm (c) incurs one further violation of higher-ranked Max-IO, since *r* of the potential suffix is deleted. Thus, the candidate

[83] In the following tableaux of this sort, I describe the meanings 'passive,' 'honorific,' and 'spontaneous' simply as 'others' for descriptive purposes.

paradigms (b) and (c) are excluded. The candidate paradigm (a) satisfies the higher-ranked Max-IO, since no segment of potential suffix *rare* is deleted, although it violates ParContrast and AlloCorr, since it does not satisfy one-to-one correspondence between form and content in that the meanings 'passive,' 'honorific,' 'spontaneous,' and 'potential' take the identical form; and the vowel verb takes *ra.re*, while the consonant verb does not, and thus the four segments do not have identical segments as their counterparts. Therefore, the optimal candidate (a) which consists of standard potential is selected as the output.

Next, I analyze the mapping of *ra*-Deletion with Max-IO, ParContrast and AlloCorr assuming the innovative ranking of each constraint arranged as follows: ParContrast, AlloCorr >> Max-IO. I demonstrate the evaluation with the tableau.

(60)

Candidate paradigms for /tabe-/		ParContrast	AlloCorr	Max-IO
a. potental:	**ta.be.ra.re**	*!	****	
others & vowel verb:	<u>**ta.be.ra.re**</u>			
consonant verb:	**ya.re**			
☞b. potental:	**ta.be.ra.re**		**	
others & vowel verb:	<u>**ta.be.re**</u>			**
consonant verb:	**ya.re**			
c. potental:	**ta.be.ra.re**		***!	
others & vowel verb:	<u>**ta.be.a.re**</u>			*
consonant verb:	**ya.re**			

As shown in (60), although the candidate paradigm (a) satisfies the lower-ranked

Max-IO, since no segment of potential suffix *rare* is deleted, it violates higher-ranked ParContrast and AlloCorr, since it does not satisfy one-to-one correspondence between form and content in that the meanings 'passive,' 'honorific,' 'spontaneous,' and 'potential' take the identical form; and the vowel verb takes *ra.re*, while the consonant verb does not, and four segments do not have identical segments as their counterparts. Thus, the candidate paradigm (a) is excluded. Both the candidate paradigm (b) and (c) satisfy the higher-ranked ParContrast, since the functional load of *rare* decreases in that it carries three meanings, and the one-to-one correspondence between form and content is satisfied with respect to 'potential.' The candidate paradigm (b) incurs two violations of lower-ranked Max-IO, since *ra* of the potential suffix is deleted. Similarly, the candidate paradigm (c) incurs one violation of Max-IO, since *r* of the potential suffix is deleted. The crucial difference emerges in the evaluation by AlloCorr: The candidate paradigm (c) incurs three violations of AlloCorr in that the vowel verb takes *a.re*, while the consonant verb does not, and the three segments do not have identical segments as their counterparts; on the other hand, the candidate paradigm (b) incurs two violations of AlloCorr in that the vowel verb takes *re* while the consonant verb does not, and two segments do not have identical segments as their counterparts. Therefore, the optimal candidate (b), which includes *ra*-Deletion, is selected as the output.

In summary, Max-IO is against *ra*-Deletion, while ParContrast, AlloCorr are in favor of *ra*-Deletion. I showed that the change of *ra*-Deletion is governed by the competition among these three constraints. Assuming the standard OT, we can argue that if ParContrast and AlloCorr dominate Max-IO, standard potential is selected as the optimal candidate; on the other hand, if Max-IO dominates ParContrast and AlloCorr, *ra*-Deletion is selected as the optimal candidate. In the traditional paradigm, although the double causative contains two causative suffixes in the input specification, Max-IO blocks the deletion of *ra* in the potential suffix and standard potential surfaces under the ranking Max-IO >> ParContrast, AlloCorr. The reranking of these three constraints to ParContrast, AlloCorr >> Max-IO in the innovative paradigm enables the emergence of *ra*-Deletion. With respect to ParContrast, the meaning ‘passive,’ ‘honorific,’ and ‘spontaneous’ take *ta.be.ra.re*, while ‘potential’ takes *ta.be.re*, respectively, and the functional load of *rare* decreases; the one-to-one correspondence between form and content is satisfied with respect to ‘potential’ by the existence of *ra*-Deletion. With respect to AlloCorr, the suffix allomorphy between consonant verbs and vowel verbs is reduced by the existence of *ra*-Deletion. This suggests that the change of *ra*-Deletion is again triggered by the demands for the optimization of the conjugation paradigm by analogical leveling and for the reduction of the functional load of each form.

8.3.3 OCP

In this section, I discuss some of the results of the statistical analysis. Specifically, I formalize two properties of *ra*-Deletion within OT framework: *ra*-Deletion seldom contains the sequence *rere*; *ra*-Deletion is more frequent with *i*-stem verbs than with *e*-stem verbs. These properties are a corollary of OCP (μ) and OCP, respectively. I show how this constraint interacts with other constraints with respect to the properties of *ra*-Deletion. In Section 8.3.3.1, I analyze *ra*-Deletion with respect to the observation that *ra*-Deletion does not contain the sequence *rere*. In Section 8.3.3.2, I analyze *ra*-Deletion with respect to the observation that *ra*-Deletion is restricted to consonant verbs.

8.3.3.1 *Ra*-Deletion with the sequence *rere*

As mentioned above, if vowel verbs ending in *-re*, such as *ire-ru* 'put in,' *hure-ru* 'touch,' *hanare-ru* 'get away,' and *wasure-ru* 'forget' were to undergo *ra*-Deletion, the sequence *rere* would be created, as in **ire-re-ru*, **hure-re-ru*, **hanare-re-ru*, and **wasure-re-ru*. The result of the statistical analysis shows that, although the distribution is not categorical, I observed few examples of *ra*-Deletion with vowel verbs ending in *-re* in the present data. In other words, *ra*-Deletion which contains the sequence *rere* seldom occurs.

In order to account for this observation in OT terms, I consider the evaluation by OCP (μ). The OCP (μ) bars the adjacent identical morae, such as /**re.re*/. In this case, the sequence *rere* in the matrix of the verb stem and the potential suffix is subject to this constraint. I assume the innovative ranking of each constraint in which OCP (μ) is highest-ranked and Max-IO is lowest-ranked: OCP (μ) >> ParContrast, AlloCorr >> Max-IO. I demonstrate the evaluation with the tableau.

(61)

Candidate paradigms for /ire-/		OCP (μ)	ParContrast	AlloCorr	Max-IO
a. potental: others & vowel verb: consonant verb:	**i.re.re** **i.re.ra.re** **ya.re**	*!		**	**
☞b. potental: others & vowel verb: consonant verb:	**i.re.ra.re** **i.re.ra.re** **ya.re**		*	****	

As in (61), the paradigm (a) satisfies lower-ranked ParContrast, since the functional load of *rare* decreases, and the one-to-one correspondence between form and content is satisfied with respect to 'potential.' With respect to AlloCorr, the paradigm (a) better satisfies this constraint, since the suffix allomorphy between consonant verbs and vowel verbs is reduced in paradigm (a). However, the candidate paradigm (a) violates the highest-ranked OCP (μ), since the potential form *i.re.re* contains the sequence *rere*, Thus, the candidate paradigm (a) is excluded. The candidate paradigm (b) satisfies OCP (μ) and Max-IO, since the potential form *i.re.ra.re* does not contain the sequence *rere*; no segment of potential suffix *rare* is deleted, although the paradigm (b) violates ParContrast, since it does not satisfy one-to-one correspondence between form and content. The optimal candidate (b) which does not include *ra*-Deletion is selected as the output.

The paradigm which includes *ra*-Deletion with the sequence *rere* is excluded by OCP (μ) even if it satisfies the demands for the optimization of the conjugation paradigm by analogical leveling and for the reduction of the functional load of each form, and the paradigm which exclusively consists of standard potential is selected. Due to this process, *ra*-Deletion with the sequence *rere* cannot occur and still standard potential is predominant, although the change of *ra*-Deletion has been progressing in other contexts.

8.3.3.1 ***Ra*-Deletion with *e*-stem verbs**

I discuss the observation that *ra*-Deletion is more frequent with *i*-stem verbs than with *e*-stem verbs. As mentioned above, the vowel verbs in Japanese are classified into either *i*-stem verbs which end in *i* or *e*-stem verbs which end in *e*, according to the conjugation type. The result of the statistical analysis shows that the frequency and the rate of *ra*-Deletion are significantly higher with *i*-stem verbs than with *e*-stem verbs. I argued that the soft effect of OCP plays a role: *ra*-Deletion with *e*-stem verbs is dispreferred in having the consecutive identical vowel features. In order to account for this observation in OT terms, I reintroduce OCP.

(62) Obligatory Contour Principle (OCP)

No identical features are adjacent.

The OCP bars the adjacent identical linguistic features. In this case, the consecutive vowel features [-low, -high] and [-low, -high] are subject to this constraint. Due to the OCP, *ra*-Deletions with *e*-stem verbs including the vowels with the same feature, as in *tabe-re-ru*, *kotae-re-ru*, *kime-re-ru*, and *oboe-re-ru*, are dispreferred, and *ra*-Deletions with *i*-stem verbs including the vowels with distinct features, as in *mi-re-ru*, *ki-re-ru*, *kari-re-ru*, and *oki-re-ru* are preferred.

I assume the innovative ranking of each constraint in which OCP is highest-ranked and Max-IO is lowest-ranked: OCP >> ParContrast, AlloCorr >> Max-IO. I demonstrate the evaluation with the tableau.

(63)

Candidate paradigms for /mi-/ and /tabe-/		OCP	ParContrast	AlloCorr	Max-IO
☞a. potental: others & vowel verb: consonant verb:	**mi.re** **mi.ra.re** **ya.re**			**	**
b. potental: others & vowel verb: consonant verb:	**ta.be.re** **ta.be.ra.re** **ya.re**	*!		**	**

In (63), both candidate paradigms (a) and (b) satisfies ParContrast, since the functional load of *rare* decreases, and the one-to-one correspondence between form and content is satisfied with respect to 'potential.' These two paradigms further incur two violations of AlloCorr in that the vowel verb takes *re*, while the consonant verb does not, and the two segments do not have identical segments as their counterparts. Furthermore, they incur two violations of lower-ranked Max-IO, since *ra* of the potential suffix is deleted. Looking at the evaluation by OCP, we observe the crucial difference between candidate paradigms (a) and (b). Candidate paradigm (b) violates OCP, since *ta.be.re* includes the consecutive identical vowel features, while candidate paradigm (a) does not. Thus, the optimal candidate (a) which includes *ra*-Deletion with *i*-stem verb is selected as the output.

The paradigm which contains *ra*-Deletion with *e*-stem verbs including the vowels with the same feature is excluded by OCP, and the paradigm which contains *ra*-Deletion with *i*-stem verbs including the vowels with distinct features is selected, other things being equal. This is reflected in the distribution of *ra*-Deletion by the conjugation type of the verb: The frequency and the rate of *ra*-Deletion are significantly higher with *i*-stem verbs than with *e*-stem verbs.

Thus, *ra*-Deletion is blocked by OCP (μ) and OCP, with respect to the sequence *rere* and the *e*-stem verbs. The results imply that if OCP (μ) and OCP are demoted with the progress of the change of *ra*-Deletion, *ra*-Deletion would occur in these contexts.

8.3.4 Language change

In this section, I discuss the language change of *ra*-Deletion based on the results of the OT analysis. As mentioned above, the change of *ra*-Deletion is triggered by the reranking of each constraint. The ranking of each constraint is assumed to be as follows: OCP (μ), OCP >> **Max-IO** >> **ParContrast**, **AlloCorr** >> Onset, NoCoda >> Ident-IO >> Align-Morph-L. Crucially, Max-IO which is against *ra*-Deletion outranks ParContrast and AlloCorr. Under the traditional ranking of each constraint, the deletion of *ra* in the potential suffix is blocked and standard potential surfaces. The traditional ranking of each constraint is reranked as follows: OCP (μ), OCP >> **ParContrast**, **AlloCorr** >> **Max-IO** >> Onset, NoCoda >> Ident-IO >> Align-Morph-L. ParContrast and AlloCorr which are in favor of *ra*-Deletion dominate Max-IO. The reranking enables the emergence of *ra*-Deletion. The reranking does not occur in an abrupt manner, but it proceeds gradiently. Assuming the partial ordering model, we can schematize the process of the reranking roughly as in (64).

(64)

initial stage	intermediate stage	final stage
Max-IO ≫ ParContrast, AlloCorr	ParContrast, AlloCorr, Max-IO	ParContrast, AlloCorr ≫ Max-IO
standard potential: 100% *ra*-Deletion: 0%	standard potential: 50% *ra*-Deletion: 50%	standard potential: 0% *ra*-Deletion: 100%

In the initial stage, the ranking of Max-IO, ParContrast and AlloCorr is arranged as Max-IO >> ParContrast, AlloCorr. Under this ranking, *ra*-Deletion does not occur. After the initial stage, the reranking begins. In the intermediate stage, each constraint is unranked. It follows that some variation arises where standard potential and *ra*-Deletion occur with equal probability. In the final stage, the process of reranking completes, and the ranking of each constraint is arranged as ParContrast, AlloCorr ≫

Max-IO. Under this ranking, the probability of *ra*-Deletion becomes 100% and standard potential does not occur. As might be expected, it is not necessarily the case that the change of *ra*-Deletion proceeds uniformly in every context, since various language-internal and -external factors play a role in the change. Instead, the change diffuses from a particular context, and gradually proceeds toward the final stage.

8.3.5 Summary

In this section, I conducted the OT analysis of *ra*-Deletion. Firstly, I summarize the evaluation of standard potential and *ra*-Deletion.

(65) standard potential (traditional ranking)

Input: /tabe-rare/	OCP (μ), OCP	Max-IO	ParContrast, AlloCorr	Onset, NoCoda	Ident-IO	Align-Morph-L
☞a. ta.be.ra.re			*/****			
b. ta.be.rar		*!	***	*		
c. ta.be.a.re		*!	***	*		*
d. ta.be.re		**!	**			**

In the evaluation of standard potential, Max-IO dominates ParContrast and AlloCorr. Although the candidates (b) *ta.be.rar*, (c) *ta.be.a.re*, and (d) *ta.be.re*, better satisfy ParContrast and AlloCorr than the candidate (a) *ta.be.ra.re*, they are excluded in fatal violation of higher-ranked Max-IO, aside from the violations of other constraints. Although the candidate (a) incurs relatively many violations of ParContrast and AlloCorr, it satisfies Max-IO. Therefore, the optimal candidate (a) which is the standard potential is selected as the output.

(66) *ra*-Deletion (innovative ranking)

Input: /mi-rare/, /tabe-rare/, /ire-rare/	OCP (μ), OCP	ParContrast, AlloCorr	Max-IO	Onset, NoCoda	Ident-IO	Align-Morph-L
☞a. mi.re		**	**			**
b. ta.be.re	*!	**	**			**
c. i.re.re	*!	**	**	*		**
d. ta.be.ra.re		*!/****				**

In the evaluation of *ra*-Deletion, ParContrast and AlloCorr dominate Max-IO. The candidates (b) *ta.be.re* and (c) *i.re.re* are excluded in fatal violation of either OCP (μ) or OCP, although they better satisfy ParContrast and AlloCorr than standard potential such as the candidate (d) *ta.be.ra.re*. The candidate (d) incurs the violations of ParContrast and AlloCorr although it satisfies Max-IO. Thus, the candidate (d) is excluded. Therefore, the optimal candidate (a) *mi.re* is selected as the output.

I argued that under the traditional ranking, the deletion of *ra* in the potential suffix is blocked and standard potential surfaces. The reranking enables the emergence of *ra*-Deletion. The results show that the change of *ra*-Deletion is triggered by the demands for the optimization of the conjugation paradigm by analogical leveling and for the reduction of the functional load of each form. This is schematized in Table 118.

Table 118. Correspondence between form and content in traditional and innovative paradigm (*ra*-Deletion)

traditional	suffix allomorphy (AlloCorr)	potential/passive, honorific, spontaneous (ParContrast)	
content form	1 2 (less analogous)	4 1	
innovative	suffix allomorphy (AlloCorr)	potential/passive, honorific, spontaneous (ParContrast)	
content form	1 2 (more analogous)	1 (potential) 1	3 (others) 1

With respect to the suffix allomorphy, the potential suffix (1 content) takes two allomorphs according to the type of verbs to which it attaches (2 forms) in both paradigms. However, the discrepancy between the potential suffixes for consonant verb and for vowel verb is reduced in the innovative paradigm. In other words, two allomorphs are more analogous in the innovative paradigm than in the traditional paradigm. With respect to the potential/others distinction, the meanings 'potential,' 'passive,' 'honorific,' and 'spontaneous' (4 contents) take the identical form (1 form) in the traditional paradigm; on the other hand, in the innovative paradigm the meaning 'potential' (1 content) is carried by the innovative morpheme *re* (1 form) and other meanings 'passive,' 'honorific,' and 'spontaneous' (3 contents) are carried by the traditional morpheme *rare* (1 form).

The traditional paradigm does not satisfy one-to-one correspondence between form and content with respect both to the suffix allomorphy and the potential/others distinction; on the other hand, the innovative paradigm gets closer to one-to-one correspondence, although *ra*-Deletion does not satisfy the correspondence perfectly as *sa*-Insertion. This shows that the demands for the optimization of the conjugation paradigm by analogical leveling and for the reduction of the functional load of each form is reflected in the promotion of ParContrast and AlloCorr, and the demand in turn comes up to the surface in the form of *ra*-Deletion.

8.4 OT analysis of *re*-Insertion

In this section, I conduct the OT analysis of *re*-Insertion. In Section 8.4.1, I analyze the single potential. In Section 8.4.2, I analyze the double potential. In Section 8.4.3, I analyze *re*-Insertion in terms of OO-correspondence constraints. Section 8.4.4 discusses the fact that *re*-Insertion with the sequence *rere* is less frequent within the OT framework. Section 8.4.5 discusses the issue of language change. Finally, Section 8.4.6 summarizes this section.

8.4.1 Single potential

In this section, I analyze the input-to-output mapping of single potential. As mentioned above, the single potential, which is the counterpart of *re*-Insertion in potential form, consists of a verb stem and one potential suffix. As mentioned above, the change of *re*-Insertion begins with consonant verbs, and rate of *re*-Insertion is currently higher with consonant verbs than with vowel verbs. Thus, I conduct the OT analysis assuming the consonant verb and the potential suffix for consonant verbs as an input, as in *yom-e* ‘can read.’

Japanese has an open-syllable sound pattern and in principle it does not allow codas. Thus, the sequence in the input specification *ik-e* is shaped in the mapping so as to fit into the phonological structure of Japanese. I assume that the ranking of each constraint is arranged as follows: Onset, NoCoda >> Ident-IO, Align-Morph-L. I demonstrate the evaluation with concrete examples.

(67)

Input: /yom-e/	Onset	NoCoda	Ident-IO	Align-Morph-L
☞a. yo.me				*
b. yom.e	*!	*		
c. yo.mi			*!	*
d. yom.i	*!	*	*	

As shown in (67), although candidate (b) *yom.e* satisfies lower-ranked Ident-IO and Align-Morph-L, since it faithfully maps the input segments with respect to their values and the left edge of the potential suffix *e* coincides with the left edge of syllable *e*, it violates higher-ranked Onset and NoCoda, since the final syllable does not have an onset and the penultimate syllable has a coda. Thus, candidate (b) is excluded. The candidate (d) *yom.i*, which is the continuative form of *yom*, is excluded in violation of Onset or NoCoda in addition to the violation of Ident-IO.

The candidates (a) *yo.me* and (c) *yo.mi*, which also is the continuative form of *yom*, violate Align-Morph-L, since the left edge of the potential suffix *e* does not coincide with the left edge of syllable *e*. However, the candidate (d) further incurs one violation of Ident-IO in that the potential suffix *e* is replaced by *i*. Therefore, the most harmonic candidate (a) is selected as the output.

In this section, I showed the mapping of single potential and that the input is shaped in conformity with the CV structure of Japanese.

8.4.2 Double potential

In this section, I analyze the input-to-output mapping of double potential, specifically focusing on the fact that double potential is not allowed in Japanese.

The double potential contains two potential suffixes. Thus, I assume that the input consists of a verb stem and two potential suffixes as in *yom-e-re*.[84] As in the causative forms, the double potential is not allowed in Japanese and the occurrence of two potential suffixes leads to unacceptability. This implies that OCP (morph) again comes into play. I assume that the ranking of each constraint is arranged as follows: OCP (morph), Onset, NoCoda >> Ident-IO, Align-Morph-L. I show how the double potential is blocked in terms of this constraint and how the sequence in the input specification *yom-e-re* is shaped in the mapping so as to fit into the phonological structure of Japanese. I demonstrate the evaluation with concrete examples below.

(68)

Input: /yom-e-re/	OCP (morph)	Onset	NoCoda	Ident-IO	Align-Morph-L
☞a. yo.me.					*
b. yo.mi				*!	*
c. yom.e.re	*!	**	**		
d. yo.me.re	*!				*
e. yom.re		*!	*		

As shown in (68), although candidate (c) *yom.e.re* satisfies lower-ranked Ident-IO and Align-Morph-L, since it faithfully map the input segments with respect to their features

[84] I assume that the input for the second potential suffix is *re* instead of *rare* for the following reasons: This form is the unmarked form among *re*-Insertions in the present data; assuming the fact that the change of *ra*-Deletion is followed by the change of *re*-Insertion, we can deduce that the potential suffix *rare* had already changed to *re* by and large when the change of *re*-Insertion began.

and the left edge of the potential suffixes coincide with the left edge of syllables, it violates higher-ranked OCP (morph), Onset and NoCoda, since it contains two potential suffixes adjacently; furthermore, penultimate and final syllables do not have onsets, while antepenultimate and penultimate syllables have a coda. Thus, candidate (c) is excluded. Similarly, although candidate (d) *yo.me.re* with a CV structure satisfies Onset, NoCoda and Ident-IO, it is excluded in violation of the higher-ranked OCP (morph) in addition to the violation of Align-Morph-L. The candidates (a), (b) and (e) all satisfy OCP (morph), and they move on to the next competition. The candidate (e) *yom.re* violates higher-ranked Onset and NoCoda, and is thus excluded. Among the remaining candidates, the candidate (b) *yo.mi* which is the continuative form of *yom*, and the candidate (a) *yo.me* satisfy the higher-ranked Onset and Nocoda. On the other hand, they violate Align-Morph-L, since the left edge of *i* and *e* do not coincide with the left edge of syllables *mi* and *me*, respectively. With respect to Ident-IO, the candidate (b) incurs one violation of Ident-IO in that the potential suffix *e* is replaced by *i*; on the other hand, the candidate (a) satisfies Ident-IO. Therefore, the optimal candidate (a) is selected as the output.

In this section, I demonstrated the mapping of double potential. I also showed that the double potential is blocked by OCP (morph) and that the input is shaped in conformity with the phonological structure of Japanese. Specifically, although the double potential contains two potential suffixes in the input specification, OCP (morph) blocks the occurrence of two adjacent potential suffixes and single potential surfaces.

8.4.3 *Re*-Insertion

In this section, I analyze the mapping of *re*-Insertion. Specifically, I take into consideration the cause of the emergence of *re*-Insertion with respect to the reduction of the functional load and the analogical leveling. In Section 8.4.3.1, I analyze *re*-Insertion with respect to the reduction of the functional load. In Section 8.4.3.2, I analyze *re*-Insertion with respect to the optimization of the conjugation paradigm by analogical leveling. In Section 8.4.3.3, I analyze the mapping of *re*-Insertion with OCP (morph), ParContrast and AlloCorr.

8.4.3.1 Paradigm Contrast

In this section, I discuss the issue of the reduction of the functional load. As we saw above, the double potential is subject to OCP (morph), and although the double potential contains two potential suffixes in the input specification, one of the potential suffixes is suppressed and a single potential surfaces. As claimed by Inoue and Yarimizu (2002), *re*-Insertion is a double potential; namely, it contains two potential suffixes. Thus, it would be reasonable to expect that *re*-Insertion is also blocked by OCP (morph). Then, why is *re*-Insertion, which should be suboptimal due to the effect of OCP (morph), selected as the optimal candidate and why does it come into existence? I consider the forces opposite to OCP (morph) which prompt the emergence of *re*-Insertion in terms of OT constraints.

As Inoue and Yarimizu (2002) claim, *re*-Insertion has a function to reinforce the meaning of potential more than standard potential forms can do. Thus, the meanings of standard potential and *re*-Insertion respectively are ‘potential’ and ‘strong potential.’ *Re*-Insertion plays a role in reducing the functional load with respect to these two meanings. To capture this observation in OT terms, I firstly consider the evaluation by Paradigm Contrast independently. I illustrate the evaluation in terms of this constraint with the tableau.

(69)

Candidate paradigms for /yom-/			ParContrast
☞a. potential:	yo.me	(standard potential)	
strong potential:	yo.me.re	(*re*-Insertion)	
b. potential:	yo.me	(standard potential)	*!
strong potential:	yo.me	(standard potential)	

In paradigm (a), the meanings 'potential' and 'strong potential' take distinct forms: 'potential' takes *yo.me* which is standard potential, 'strong potential' takes *yo.me.re* which is *re*-Insertion. The paradigm (a) satisfies one-to-one correspondence between form and content. On the other hand, in paradigm (b), 'potential' and 'strong potential' take the identical form *yo.me*. In other words, *yo.me*, which is standard potenital, carries two meanings. This results in a higher functional load for *e*. The paradigm (b) does not satisfy one-to-one correspondence, and violates ParContrast. Thus, the paradigm (a), which includes *re*-Insertion, is selected as the optimal candidate with no violation of ParContrast, and it follows that ParContrast is in favor of *re*-Insertion.

The result shows that the distinction of the forms by *re*-Insertion is necessary, in order to maintain the coexistence of two meanings and in order not to increase the functional load of the potential suffix at the same time.

8.4.3.2 Allomorph Correspondence

In this section, I discuss the issue of analogical leveling. As mentioned above, Japanese verbs are classified into two types, according to the stem-ending; one type is a consonant verb which ends in a consonant (e.g. *yar*-'do,' *hair*- 'enter'), and the other type is a vowel verb which ends in a vowel (e.g. *mi*- 'see,' *tabe*- 'eat') (Bloch 1946).

The Japanese potential suffix shows morphophonemic alternation, according to the types of verb stem: a consonant verb takes *e*, as in *yar-e* or *hair-e*, while a vowel verb takes *rare*, as in *mi-rare* or *tabe-rare*. As discussed above, *re*-Insertion plays a role in eliminating the allomorphy of suffixes between vowel verbs and consonant verbs in potential forms by analogical leveling. Here, I consider another force opposite to OCP (morph) which prompts the emergence of *re*-Insertion. To capture the analogical leveling in OT terms, I consider the evaluation by Allomorph Correspondence independently. I illustrate the evaluation in terms of this constraint with the tableau.

(70)[85]

Candidate paradigms for /yom-/ and /tabe-/			AlloCorr
☞a. consonant verb:	yo.me.**re**	(*re*-Insertion)	
vowel verb:	ta.be.**re**	(*ra*-Deletion)	
b. consonant verb:	yo.me	(standard potential)	**!
vowel verb:	ta.be.**re**	(*ra*-Deletion)	

The paradigm (a) which includes *re*-Insertion and *ra*-Deletion shows no allomorphy, namely, both consonant verb and vowel verb uniformly take the potential suffix *re*. On the other hand, the paradigm (b), which consists of standard potential and *ra*-Deletion shows the allomorphy, namely, the vowel verb takes *re*, while the consonant verb does not, and two segments do not have identical segments as their counterparts. This results in the two violations of AlloCorr. Thus, the paradigm (a), which includes *re*-Insertion, is selected as the optimal candidate with no violation of AlloCorr, and

[85] Based on the fact that the change of *ra*-Deletion is followed by the change of *re*-Insertion, I assume that the potential form for vowel verbs is *ra*-Deletion as in *tabe-re* instead of standard potential as in *tabe-rare*.

AlloCorr turns out to be in favor of *re*-Insertion. The analogical leveling in the change of *re*-Insertion is formalized in terms of AlloCorr. Incidentally, *re*-Insertion is the sole candidate which satisfies AlloCorr. This implies that the promotion of AlloCorr is one of the triggers of the change of *re*-Insertion.

8.4.3.3 Interaction of three constraints

Finally, I turn to the analysis of the mapping of *re*-Insertion with OCP (morph), ParContrast and AlloCorr. The input of *re*-Insertion is exactly the same as those of double potential. Firstly, I assume the traditional ranking of each constraint arranged as follows: OCP (morph) >> ParContrast, AlloCorr. I demonstrate the evaluation with the tableau.

(71)

Candidate paradigms for /yom-/	OCP (morph)	ParContrast	AlloCorr
☞a. potential: **yo.me** strong potential & consonant verb: **yo.me** vowel verb: **ta.be.re**		*	**
b. potential: **yo.me** strong potential & consonant verb: **yo.me.re** vowel verb: **ta.be.re**	*!		
c. potential: **yo.me** strong potential & consonant verb: **yo.me.rare** vowel verb: **ta.be.re**	*!		**

As shown in (71), the candidate paradigm (b) satisfies ParContrast and AlloCorr, since it satisfies one-to-one correspondence between form and content in that the meanings 'potential' and 'strong potential' take distinct forms and they show no allomorphy, namely, both consonant verb and vowel verb uniformly take the potential suffix *re*. The candidate paradigm (c) satisfies ParContrast, since it satisfies one-to-one correspondence between form and content in that the meanings 'potential' and 'strong potential' take distinct forms, but it incurs two violations of AlloCorr, since it shows allomorphy, namely, a consonant verb takes the potential suffix *rare* and a vowel verb takes the potential suffix *re*. However, these two candidate paradigms violate the higher-ranked OCP (morph), since the underlined forms contain two potential suffixes adjacently. Thus, the candidate paradigms (b) and (c) are excluded. The candidate paradigm (a) satisfies OCP (morph) although it violates ParContrast and AlloCorr, since it does not satisfy one-to-one correspondence between form and content in that the meanings 'potential' and 'strong potential' take the identical form and since it shows allomorphy, namely, vowel verb takes *re*, while consonant verb does not, and the two segments do not have identical segments as their counterparts. Therefore, the optimal candidate (a) which consists of standard potentials is selected as the output.

Next, I analyze the mapping of *re*-Insertion with OCP (morph), ParContrast and AlloCorr assuming the innovative ranking of each constraint arranged as follows: ParContrast, AlloCorr >> OCP (morph). I demonstrate the evaluation with the tableau.

(72)

Candidate paradigms for /yom-/		ParContrast	AlloCorr	OCP (morph)
a. potential:	**yo.me**	*!	**	
strong potential & consonant verb:	**<u>yo.me</u>**			
vowel verb:	**ta.be.re**			
☞b. potential:	**yo.me**			
strong potential & consonant verb:	**<u>yo.me.re</u>**			*
vowel verb:	**ta.be.re**			
c. potential:	**yo.me**		**!	
strong potential & consonant verb:	**<u>yo.me.rare</u>**			*
vowel verb:	**ta.be.re**			

As shown in (72), although the candidate paradigm (a) satisfies OCP (morph), since the underlined form contains only one potential suffix, it violates the higher-ranked ParContrast and AlloCorr, since it does not satisfy one-to-one correspondence between form and content, and it shows allomorphy. Thus, the candidate paradigm (a) is excluded. The candidate paradigms (b) and (c) violate the lower-ranked OCP (morph). The candidate paradigm (c) satisfies ParContrast, since it satisfies one-to-one correspondence between form and content, while it incurs two violations of AlloCorr, since it shows allomorphy. The candidate paradigm (b) satisfies both ParContrast and AlloCorr, since it satisfies one-to-one correspondence between form and content, and it shows no allomorphy. Therefore, the optimal candidate (b) which includes *re*-Insertion is selected as the output.

In summary, OCP (morph) is against *re*-Insertion, while ParContrast and

AlloCorr are in favor of *re*-Insertion. I showed that the change of *re*-Insertion is governed by the competition among these three constraints. Assuming the standard OT, we can expect that, if ParContrast and AlloCorr dominate OCP (morph), standard potential is selected as the optimal candidate; on the other hand, if OCP (morph) dominates ParContrast and AlloCorr, *re*-Insertion is selected as the optimal candidate. In the traditional paradigm, although the double potential contains two potential suffixes in the input specification, OCP (morph) blocks the occurrence of two adjacent potential suffixes and standard potential surfaces under the ranking OCP (morph) >> ParContrast, AlloCorr. The reranking of these three constraints to ParContrast, AlloCorr >> OCP (morph) in the innovative paradigm enables the emergence of *re*-Insertion. With respect to ParContrast, the meaning 'potential' and 'strong potential' take *yo.me* and *yo.me.re*, respectively, and the correspondence between form and content is satisfied by the existence of *re*-Insertion. With respect to AlloCorr, the suffix allomorphy between consonant verbs and vowel verbs is reduced by the existence of *re*-Insertion; namely, both consonant verbs and vowel verbs uniformly take the potential suffix *re*. This suggests that the change of *re*-Insertion is triggered by the demands for the optimization of the conjugation paradigm by analogical leveling and for the reduction of the functional load of each form.

8.4.4 OCP (μ)

In this section, I discuss some of the results of the statistical analysis. Specifically, I formalize two properties of *re*-Insertion within OT framework: first, *re*-Insertion with the sequence *rere* in the matrix of verb stems and, secondly, potential suffixes do not occur; the rate of *re*-Insertion is higher with consonant verbs than with vowel verbs. These properties are a corollary of OCP (μ). I will show how this constraint interacts with other constraints with respect to the properties of *re*-Insertion. In Section 8.4.4.1, I analyze *re*-Insertion with respect to the observation that *re*-Insertion with the sequence *rere* in the matrix of verb stem and potential suffixes does not occur. In Section 8.4.4.2, I analyze *re*-Insertion with respect to the observation that the rate of *re*-Insertion is higher with consonant verbs than with vowel verbs.

8.4.4.1 *Re*-Insertion with the sequence *rere*

If consonant verbs ending in *-r*, such as *hair-u* 'enter,' *tor-u* 'take,' and *yar-u* 'do' were to undergo *re*-Insertion, the sequence *rere* would be created, as in **hair-e-re*-, **tor-e-re*-, and **yar-e-re*-. The result of the statistical analysis shows that *re*-Insertion with this kind of verbs does not occur in the present data. In order to account for this observation in OT terms, I consider the evaluation by OCP (μ).

The OCP (μ) bars the adjacent identical morae, such as /**re.re*/. In this case, the sequence *rere* in the matrix of the verb stem and the potential suffixes is subject to this constraint. I assume the innovative ranking of each constraint in which OCP (μ) is highest-ranked: OCP (μ) >> ParContrast, AlloCorr >> Max-IO. I demonstrate the evaluation with the tableau.

(73)

Candidate paradigms for /yar-/	OCP (μ)	ParContrast	AlloCorr	OCP (morph)
a. potential: **ya.re** strong potential & consonant verb: <u>**ya.re.re**</u> vowel verb: **ta.be.re**	*!			*
☞b. potential: **ya.re** strong potential & consonant verb: <u>**ya.re**</u> vowel verb: **ta.be.re**		*	**	

As shown in (73), the candidate paradigm (a) violates the highest-ranked OCP (μ), since the strong potential form *ya.re.re* contains the sequence *rere*, although the paradigm (a) satisfies lower-ranked ParContrast and AlloCorr since it satisfies one-to-one correspondence between form and content, and it does not show allomorphy. Thus, the candidate paradigm (a) is excluded. The candidate paradigm (b) satisfies OCP (μ) and OCP (morph), since the strong potential form *ya.re* does not contain the sequence *rere*, and it does not contain two potential suffixes adjacently, although the paradigm (b) violates ParContrast and AlloCorr, since it does not satisfy one-to-one correspondence between form and content, and it shows allomorphy. The optimal candidate (b), which does not include *re*-Insertion is selected as the output.

The paradigm which includes *re*-Insertion with the sequence *rere* is excluded by OCP (μ) even if it satisfies the demands for the optimization of the conjugation paradigm by analogical leveling and the demand for the reduction of the functional load of each form; the paradigm which exclusively consists of standard thus potential is selected. Due to this process, *re*-Insertion with the sequence *rere* cannot occur and still standard potential is predominant, although the change of *re*-Insertion has been progressing in other contexts.

8.4.4.1 ***Re*-Insertion with vowel verbs**

I discuss the observation that the rate of *re*-Insertion is higher with consonant verbs than with vowel verbs. As mentioned above, Japanese verbs are classified into two types: consonant verbs (e.g. *yar-*, *hair-*) and vowel verbs (*mi-*, *tabe-*). The result of the statistical analysis shows that the rate of *re*-Insertion is higher with consonant verbs than with vowel verbs. This derives from the phonological property of *re*-Insertion with vowel verbs: any *re*-Insertion with vowel verbs obligatorily contains the sequence *rere* as in *tabe-re-re* 'can eat,' *mi-re-re* 'can see,' and *kangae-re-re* 'can think' and this kind of example has been barred by OCP (μ).[86] Therefore, *re*-Insertion with vowel verbs is dispreferred because of having the consecutive identical morae although the effect is not categorical. I will account for this observation in OT terms. Here, the evaluation of identity between the potential suffix for consonant verbs and the one for vowel verbs is irrelevant, since the conjugation of vowel verbs itself is the problem. I assume the innovative ranking of each constraint, in which OCP (μ) is highest-ranked and OCP (morph) is lowest-ranked: OCP (μ) >> ParContrast, AlloCorr >> OCP (morph). I demonstrate the evaluation with the tableau.

[86] The sequence *rere* in consonant verbs, which shows the categorical distribution, includes the verb stem and two causative suffixes as in *yar-e-re*. On the other hand, the one in vowel verbs, which shows the gradient distribution, falls within two potential suffixes as in *tabe-re-re*. This implies the possibility of further revision of OCP (μ) with respect to the grammatical category. I leave this issue for future research.

(74)

Candidate paradigms for /tabe-/	OCP (μ)	ParContrast	AlloCorr	OCP (morph)
a. potential: ta.be.re (*ra*-Deletion) strong potential: ta.be.re.re (*re*-Insertion)	*!			*
☞b. potential: ta.be.re (*ra*-Deletion) strong potential: ta.be.re (*ra*-Deletion)		*		

As shown in (74), the candidate paradigm (a) violates the highest-ranked OCP (μ), since the strong potential form *ta.be.re.re* contains the sequence *rere*, although the paradigm (a) satisfies lower-ranked ParContrast, since it satisfies one-to-one correspondence between form and content. Thus, the candidate paradigm (a) is excluded. The candidate paradigm (b) satisfies OCP (μ) and OCP (morph), since no form contains the sequence *rere*, and it does not contain two potential suffixes adjacently, although the paradigm (b) violates ParContrast, since it does not satisfy one-to-one correspondence between form and content. The optimal candidate (b), which does not include, *re*-Insertion is selected as the output.

The paradigm which includes *re*-Insertion with vowel verbs is excluded by OCP (μ) even though it satisfies the demand for the reduction of the functional load of each form, and the paradigm which exclusively consists of standard potential is selected. By the effect of OCP (μ), *re*-Insertion with vowel verbs is infrequent and the standard potential is still frequent although the change of *re*-Insertion has been progressing in other contexts. The incompatibility of *re*-Insertion with vowel verbs has a general phonological ground (it is not a specific property of vowel verbs). The observation that the rate of *re*-Insertion is higher with consonant verbs than with vowel verbs is explained, without appeal to any additional machinery.

Thus, *re*-Insertion is blocked by OCP (μ), with respect to both the sequence *rere* and the vowel verbs. The results imply that, if OCP (μ) is demoted with the progress of the change of *re*-Insertion, *re*-Insertion would occur in these contexts.

8.4.5 Language change

In this section, I discuss the language change of *re*-Insertion based on the results of the OT analysis. As mentioned above, the change of *re*-Insertion is triggered by the reranking of each constraint. The traditional ranking of each constraint is assumed to be as follows: OCP (μ) >> **OCP (morph)** >> **ParContrast**, **AlloCorr** >> Onset, NoCoda >> Ident-IO >> Align-Morph-L. Crucially, OCP (morph) which is against *re*-Insertion outranks ParContrast and AlloCorr. Under the traditional ranking of each constraint, one of the potential suffixes is suppressed in the double potential construction and a standard potential surfaces although the double potential contains two potential suffixes in the input specification. The traditional ranking of each constraint is reranked as follows: OCP (μ) >> **ParContrast**, **AlloCorr** >> **OCP (morph)** >> Onset, NoCoda >> Ident-IO >> Align-Morph-L. ParContrast and AlloCorr which are in favor of *re*-Insertion dominate OCP (morph). The reranking enables the double potential (*re*-Insertion) to surface without being suppressed to a standard potential. The reranking does not occur in an abrupt manner, but it proceeds gradiently. Assuming the partial ordering model, we can schematize the process of the reranking roughly as in (75).

(75)

initial stage	intermediate stage	final stage
OCP (morph) ≫ ParContrast, AlloCorr	ParContrast, AlloCorr, OCP (morph)	ParContrast, AlloCorr ≫ OCP (morph)
standard potential: 100% *re*-Insertion: 0%	standard potential: 50% *re*-Insertion: 50%	standard potential: 0% *re*-Insertion: 100%

In the initial stage, the ranking of OCP (morph), ParContrast and AlloCorr is arranged as OCP (morph) >> ParContrast, AlloCorr. Under this ranking, *re*-Insertion does not occur. Since the initial stage, the reranking begins. In the intermediate stage, each constraint is unranked. It follows that the variation arises where standard potential and *re*-Insertion occur with equal probability. In the final stage, the process of reranking completes, and the ranking of each constraint is arranged as ParContrast, AlloCorr ≫ OCP (morph). Under this ranking, the probability of *re*-Insertion becomes 100% and standard potential does not occur. As might be expected, it is not necessarily the case that the change of *re*-Insertion proceeds uniformly in every context, since various language-internal and -external factors play a role in the change. Instead, the change diffuses from a particular context, and gradually proceeds toward the final stage.

8.4.6 Summary

In this section, I conducted the OT analysis of *re*-Insertion. Firstly, I summarize the evaluation of single potential, standard potential and *re*-Insertion.

(76) single potential

Input: /yom-e/	OCP (μ)	OCP (morph)	ParContrast, AlloCorr	Onset, NoCoda	Ident-IO	Align-Morph-L
☞a. yo.me						*
b. yom.e				*!/*		
c. yom.i				*!/*	*	

In the evaluation of single potential, the candidates (b) *yom.e* and (c) *yom.i* incur violations of the constraints associated with the phonological structure, and thus these candidates are excluded. Hence, the optimal candidate (a) *yo.me* is selected as the output. The higher ranked OCP (morph), ParContrast and AlloCorr do not play a role.

(77) standard potential (traditional ranking)

Input: /yom-e-re/	OCP (μ)	OCP (morph)	ParContrast, AlloCorr	Onset, NoCoda	Ident-IO	Align-Morph-L
a. yom.e.re		*!		*/*		
b. yo.me.re		*!				*
c. yom.e			*/**	*!/*		
☞d. yo.me			*/**			*

In the evaluation of standard potential, OCP (morph) dominates ParContrast and AlloCorr. The candidates (a) *yom.e.re* and (b) *yo.me.re* are excluded in fatal violation of OCP (morph), aside from the violations of other constraints. The candidates (c) *yom.e* and (d) *yo.me* violate ParContrast and AlloCorr. The candidate (c) further incurs the violation of the constraints associated with the phonological structure, and it is excluded. Therefore, the optimal candidate (d) is selected as the output.

(78) *re*-Insertion (innovative ranking)

Input: /yom-e-re/, /yar-e-re/, /tabe-re-re/	OCP (μ)	ParContrast, AlloCorr	OCP (morph)	Onset, NoCoda	Ident-IO	Align-Morph-L
☞a. yo.me.re			*			*
b. ya.re.re	*!		*			*
c. ta.be.re.re	*!		*			
d. yo.me		*!/**				*

In the evaluation of *re*-Insertion, ParContrast and AlloCorr dominate OCP (morph). The candidates (b) *ya.re.re* and (c) *ta.be.re.re* are excluded in fatal violation of OCP (μ), although they satisfy ParContrast and AlloCorr. The candidate (d) *yo.me* incurs the violations of ParContrast and AlloCorr although it satisfies OCP (morph). Thus, the candidate (d) is excluded. Therefore, the optimal candidate (a) *yo.me.re* is selected as the output.

I argued that, under the traditional ranking, one of the potential suffixes is suppressed in the double potential construction and a standard potential surfaces, even though the double potential contains two potential suffixes in the input specification. The reranking enables the double potential (*re*-Insertion) to surface without being suppressed to a single potential. The results show that the change of *re*-Insertion is triggered by the demands for the optimization of the conjugation paradigm by analogical leveling and for the reduction of the functional load of each form. This is schematized in Table 119.

Table 119. Correspondence between form and content in traditional and innovative paradigm (*re*-Insertion)

traditional	suffix allomorphy (AlloCorr)	potential/strong potential (ParContrast)
content	1	2
form	2	1
innovative	suffix allomorphy (AlloCorr)	potential/strong potential (ParContrast)
content	1	2
form	1	2

With respect to the suffix allomorphy, the potential suffix (1 content) takes two allomorphs according to the type of verbs to which it attaches (2 forms) in the traditional paradigm; on the other hand, the potential suffix (1 content) takes one allomorph irrespective of the type of verbs to which it attaches (1 form) in the innovative paradigm. With respect to the potential/strong potential distinction, the meanings 'potential' and 'strong potential' (2 contents) take the identical form (1 form) in the traditional paradigm; on the other hand, the meanings 'potential' and 'strong potential' (2 contents) take the distinct forms (2 forms) in the innovative paradigm. The traditional paradigm does not satisfy one-to-one correspondence between form and content with respect both to the suffix allomorphy and the potential/strong potential distinction; on the other hand, the innovative paradigm satisfies one-to-one correspondence. This shows that the demands for the optimization of the conjugation paradigm by analogical leveling and for the reduction of the functional load of each form is reflected in the promotion of ParContrast and AlloCorr, and the demand in turn comes up to the surface in the form of *re*-Insertion.

8.5 Chapter Summary

In this chapter, I conducted the OT analyses of *sa*-Insertion, *ra*-Deletion and *re*-Insertion. Specifically, I explained the mechanism of analogical leveling in a formal manner. Furthermore, I also formalized some properties of each variation observed in the statistical analyses.

The results show that every variation is driven by the demands for the optimization of the conjugation paradigm by analogical leveling and for the reduction of the functional load of each form; the overall change in voice in Japanese is essentially governed by the interaction of a small set of constraints: OCP (morph) or Max-IO vs. ParContrast and AlloCorr.

The OT analyses reveal that, although these three variations share the same driving force, each variation and change differs according to their properties: the changes of *sa*-Insertion and the changes of *re*-Insertion are instances of the emergence of the doubling of the identical suffixes; on the other hand, the change of *ra*-Deletion differs in that it is an instance of the renewal of the potential suffix within a single morpheme. The innovative forms, which have been blocked by the constraints of OCP family or Max-IO under the traditional ranking, came into existence due to the declination of the relative ranking of these constraints by functional demand (external force) or grammatical demand (internal force). It is not necessarily the case that the changes proceed uniformly in every context; instead, the changes may well be stuck in a particular context even if the changes are already progressed, since some constraints such as OCP, OCP (μ) come into play. The change diffuses from a particular context, and gradually proceeds toward the final stage.

In this chapter, I argue that within the OT grammar, the locus of variation and change is attributed to the reranking of each constraint. The explanation of the mechanism of the change with the standard OT machinery, nevertheless, is insufficient in the sense that it is rather categorical than gradient, assuming the fairly gradient nature of variation and change (see Section 2.1.2.2): as mentioned above, the transition of the rate of each variation is from 0% (initial stage), 50% (intermediate stage), to 100% (final stage), as far as the standard OT analysis is concerned. Therefore, the more precise modeling of the mechanism, which better captures the gradience and better reflects the observed data, is necessary. In the next chapter, I conduct the Probilistic OT analysis based on the findings of this chapter.

Chapter 9. Probabilistic OT analysis

In this chapter, I conduct the Probabilistic OT analysis, based on the results of the standard OT analysis. In Section 9.1, I conduct the Stochastic OT and the Maximum Entropy OT analysis. In Section 9.2, I analyze the order of the change of three variations and the relationships among them by means of T-order. In section 9.3, I predict the changes of three variations with evolOT. Section 9.4 summarizes this chapter.

9.1 Stochastic OT and Maximum Entropy OT analysis

Assuming the Stochastic OT model and Maximum Entropy OT model, I conduct the analysis based on the collected data and the constraints. Firstly, I outline the method, and then I move on to the analysis, followed by the prediction.

I implemented the analysis by means of GLA (Stochastic evaluation) and SGA (MaxEnt evaluation) in Praat program (Boersma and Weenink 1992-2008).[87] GLA and SGA calculate and identify the ranking values of each constraint based on the OT grammar which specifies input and output pairs, constraints, violation profiles, and the learning data which consists of the frequency distribution of each variant. GLA and SGA in turn generate the distribution of variants based on the ranking values.

As mentioned above, the Diet database includes the following problems: the Diet database applies the correction policy to the transcription, and *ra*-Deletion has also long been subject to the correction policy and most of the examples of *ra*-Deletion have been corrected to their traditional equivalent; in addition, I observed no examples of *re*-Insertion in the Diet database. Therefore, I employ the data in CSJ as the learning data. Unlike the Diet database with a longstanding data collection, CSJ focuses on a

[87] The present analysis does not focus on any comparison of the degrees of precision for Stochastic evaluation and for MaxEnt evaluation.

particular time period. Thus, I identify the birth-year of the speaker, instead of the year of utterance, as an apparent-time. In the present analysis, I focused on three birth-year periods: 1915-1939, 1940-1959, and 1960-. I classified the tokens of *sa*-Insertion and standard causative, *ra*-Deletion and standard potential, and *re*-Insertion and TC into these time periods, respectively. The frequency distributions of *sa*-Insertion and standard causative, *ra*-Deletion and standard potential, and *re*-Insertion and TC in each time period are shown in Tables 120 through 122.

Table 120. Chronological change of the frequency of *sa*-Insertion and standard causative

	1915-39	1940-59	1960-
sa-Insertion	2	8	24
standard causative	149	428	842

Table 121. Chronological change of the frequency of *ra*-Deletion and standard potential

	1915-39	1940-59	1960-
ra-Deletion	23	128	391
standard potential	350	1644	5573

Table 122. Chronological change of the frequency of *re*-Insertion and TC

	1915-39	1940-59	1960-
re-Insertion	1	3	12
TC	205	858	2560

I hypothesize that the chronological change of the distribution of three variations can be attributed to the change of the ranking values of each constraint. I derived the ranking values of each constraint in three time periods based on the OT grammar and the frequency distribution.[88] After the learning, GLA (Stochastic evaluation) and SGA (MaxEnt evaluation) has assigned the following ranking values to the constraints.

Table 123. Chronological change of the ranking value of each constraint (Stochastic)

	1915-39	1940-59	1960-
OCP(morph)	103.299	103.228	103.188
Max-IO	100.924	100.899	100.899
ParContrast	95.777	95.873	95.913
AlloCorr	95.777	95.873	95.913

Table 124. Chronological change of the ranking value of each constraint (MaxEnt)

	1915-39	1940-59	1960-
OCP(morph)	103.083	103.017	102.863
Max-IO	100.675	100.551	100.669
ParContrast	96.242	96.433	96.468
AlloCorr	89.402	89.849	90.074

Table 123 illustrates the chronological change of the ranking values of each constraint generated by the Stochastic evaluation. The ranking value of OCP (morph), which is against *sa*-Insertion and *re*-Insertion, gradually decreases: 103.299 (1915-39), 103.228

[88] I set the representative parameters in learning as follows: Decision strategy: Exponential Maximum Entropy; Initial ranking: 100; Evaluation noise: 2.0; Ranking strategy: symmetric all; Initial plasticity: 1.0; Replications per plasticity: 100,000.

(1940-59), and 103.188 (1960-). Similarly, the ranking value of Max-IO, which is against *ra*-Deletion, gradually decreases: 100.924 (1915-39), 100.899 (1940-59), 100.899 (1960-). On the other hand, the ranking values of ParContrast and AlloCorr, which are in favor of the three innovative forms, gradually increase as the birth-year becomes more recent: 95.777 (1915-39), 95.873 (1940-59), 95.913 (1960-).

Table 124 illustrates the chronological change of the ranking values of each constraint generated by the MaxEnt evaluation. Similar to the results of Stochastic evaluation, the ranking value of OCP (morph), which is against *sa*-Insertion and *re*-Insertion, gradually decreases: 103.083 (1915-39), 103.017 (1940-59), and 102.863 (1960-). The ranking value of Max-IO, which is against *ra*-Deletion, manifests an equivocal behavior: although the value is relatively stable as a whole, it falls and rises as in 100.675 (1915-39), 100.551 (1940-59), 100.669 (1960-). On the other hand, the ranking value of ParContrast, which is in favor of the three innovative forms, gradually increases: 96.242 (1915-39), 96.433 (1940-59), 96.468 (1960-). Similarly, the ranking value of AlloCorr, which is in favor of three innovative forms, gradually increases as the birth-year becomes more recent: 89.402 (1915-39), 89.849 (1940-59), 90.074 (1960-).

More variations are observed if the ranking values of constraints become closer. The results of the examination show that the ranking values of OCP (morph) and Max-IO come closer, as do those of ParContrast and AlloCorr. As a result, the probability of the occurrence of three variations increases. Thus, the gradient approximation of the ranking values of each constraint caused the emergence and the gradual increase of the three innovative forms.

Note that the ranking value of Max-IO, which is against *ra*-Deletion, is relatively stable across three birth-year periods (the fluctuation is limited within 0.25) in Stochastic evaluation. In MaxEnt evaluation, although the ranking value of Max-IO is relatively stable as a whole, it falls between 1915-39 and 1940-59 and rises between 1940-59 and 1960-. These results are associated with the fact that the distribution of *ra*-Deletion is more stable compared to other variations, since the change of *ra*-Deletion is advanced.

The results of Stochastic evaluation and MaxEnt evaluation are consistent, except for the following one: the ranking values of ParContrast and AlloCorr take exactly the same values for each birth-year period in Stochastic evaluation. On the other hand, the ranking values of ParContrast and AlloCorr take different values in MaxEnt evaluation. This is attributed to the counting cumulativity mentioned above: the traditional forms of each variation incur only single violations of ParContrast, while the violations of AlloCorr are multiple. According to the basic assumption of Stochastic OT, once a competition is decided, the number of constraint violations plays no role, and how high the winner wins is not taken into account. On the other hand, in MaxEnt evaluation, where the counting cumulativity is assumed, the number of constraint violations has an impact on the probability of a candidate. This is reflected in the difference between Stochastic evaluation and MaxEnt evaluation with respect to the ranking values of ParContrast and AlloCorr. In the present analyses, the effect of counting cumulativity is observed in variation and change of voice in Japanese. Furthermore, the results show that MaxEnt evaluation is more adequate than Stochastic evaluation: although there is not much to choose between the two with respect to the precision (as a series of Average fraction corrects shows), MaxEnt evaluation captures the difference between AlloCorr and ParContrast in their ranking values in governing three variations; on the other hand, Stochastic evaluation cannot derive the difference due to its inability to handle the counting cumulativity; in other words, MaxEnt evaluation can handle a wider range of phenomena and has a higher likelihood of reflecting the reality than Stochastic evaluation.

Next, I turn to the verification of the adequacy of the above analysis. GLA and SGA generate the frequency of each variation (*output distributions*) according to the resulting grammar, namely, the ranking values of each constraint in Tables 123 and 124. The output distributions for the above grammars are shown below: Tables 125 through 127 show the frequency distributions of three variations in each birth-year period in Stochastic evaluation. Figures 26 through 28 show the transition of the rate of each variation in Stochastic evaluation.

Table 125. Observed and predicted distributions of three variations

(Stochastic, 1915-39)

1915-39	*sa*-Insertion	standard causative	*ra*-Deletion	standard potential	*re*-Insertion	TC
observed	2	149	23	350	1	205
predicted	2	149	24	349	1	205

Average fraction correct: 0.935, X^2 =0.04, d.f.=5, n.s.[89]

89 The "fraction correct" is defined as the quotient of the number of correct classifications and the sum of t he entries in the matrix. Correct classifications have identical row and column labels (Boersma and Weenink 1992-2008). In addition, in Tables 125 through 130 each distribution is subject to the chi-square goodness of fit test. If the result is not significant, the null hypothesis is maintained and it follows that the distributions (observed and predicted) are equivalent.

Table 126. Observed and predicted distributions of three variations

(Stochastic, 1940-59)

1940-59	*sa*-Insertion	standard causative	*ra*-Deletion	standard potential	*re*-Insertion	TC
observed	8	428	128	1,644	3	858
predicted	7	429	127	1,645	9	852

Average fraction correct: 0.918, X^2 =4.2, d.f.=5, n.s.

Table 127. Observed and predicted distributions of three variations

(Stochastic, 1960-)

1960-	*sa*-Insertion	standard causative	*ra*-Deletion	standard potential	*re*-Insertion	TC
observed	24	842	391	5,573	12	2,560
predicted	18	848	398	5,566	19	2,553

Average fraction correct: 0.912, X^2 =4.77, d.f.=5, n.s.

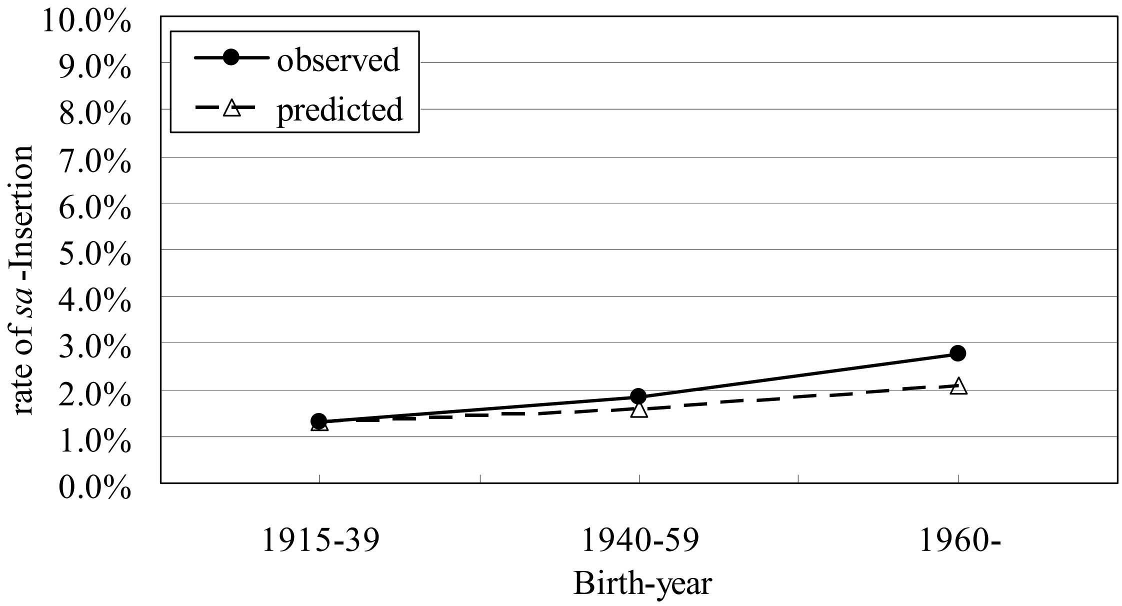


Figure 26. Observed and predicted transitions of the distribution of *sa*-Insertion

(Stochastic)

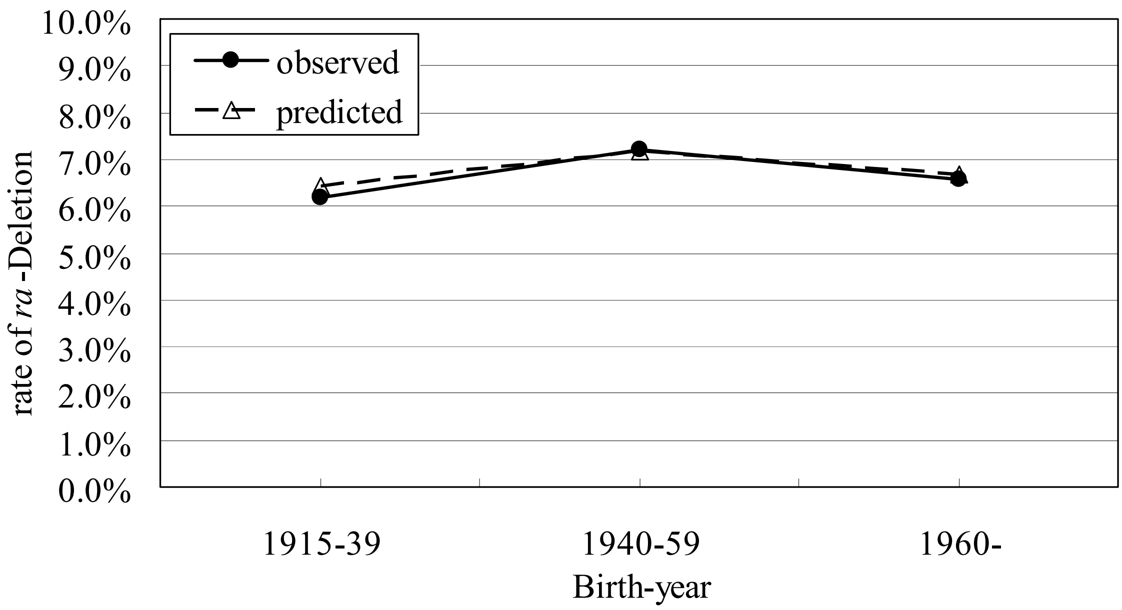


Figure 27. Observed and predicted transitions of the distribution of *ra*-Deletion

(Stochastic)

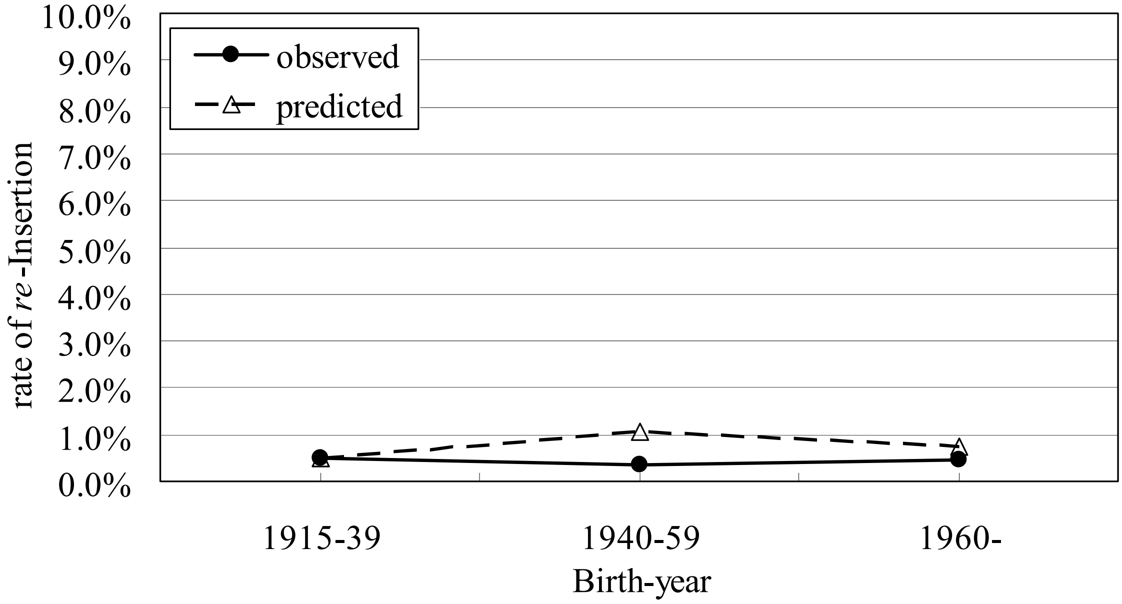


Figure 28. Observed and predicted transitions of the distribution of *re*-Insertion (Stochastic)

The observed frequency and the predicted frequency of innovative forms and of traditional forms in each time period are shown in Tables 122 through 124, and the observed and predicted rates of innovative forms in each time period are shown in Figures 26 through 28. In all Tables and Figures, the predicted distribution is consistent with the observed distribution in Stochastic evaluation. This is also supported by the high fraction correct (over 0.91) between the observed and predicted distributions. Thus, the analysis by Stochastic evaluation is verified to be adequate.

Next, I show the result of MaxEnt evaluation. Tables 128 through 130 show the frequency of three variations in each birth-year period in MaxEnt evaluation. Figures 29 through 31 show the transition of the rate of each variation in MaxEnt evaluation.

Table 128. The observed and predicted distributions of three variations

(MaxEnt, 1915-39)

1915-39	*sa*-Insertion	standard causative	*ra*-Deletion	standard potential	*re*-Insertion	TC
observed	2	149	23	350	1	205
predicted	2	149	23	350	1	205

Average fraction correct: 0.937, X^2 =0, d.f.=5, n.s.

Table 129. Observed and predicted distributions of three variations

(MaxEnt, 1940-59)

1940-59	*sa*-Insertion	standard causative	*ra*-Deletion	standard potential	*re*-Insertion	TC
observed	8	428	128	1,644	3	858
predicted	7	429	125	1,647	5	856

Average fraction correct: 0.914, X^2 =1.03, d.f.=5, n.s.

Table 130. Observed and predicted distributions of three variations

(MaxEnt, 1960-)

1960-	*sa*-Insertion	standard causative	*ra*-Deletion	standard potential	*re*-Insertion	TC
observed	24	842	391	5,573	12	2,560
predicted	16	850	396	5,568	23	2,549

Average fraction correct: 0.913, X^2 =9.45, d.f.=5, n.s.

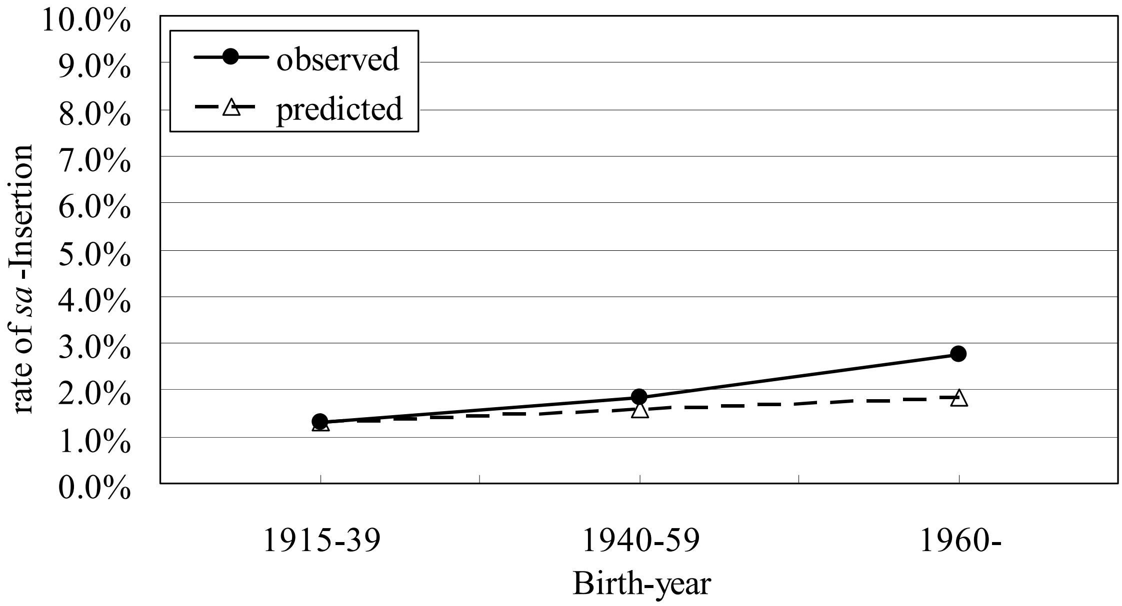


Figure 29. Observed and predicted transitions of the distribution of *sa*-Insertion

(MaxEnt)

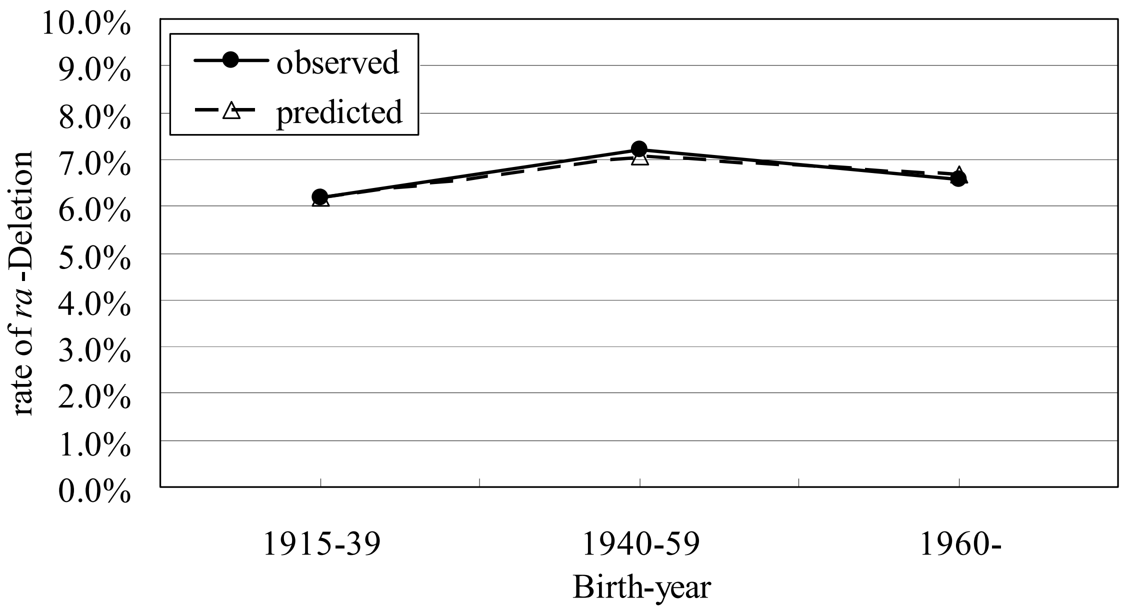


Figure 30. Observed and predicted transitions of the distribution of *ra*-Deletion

(MaxEnt)

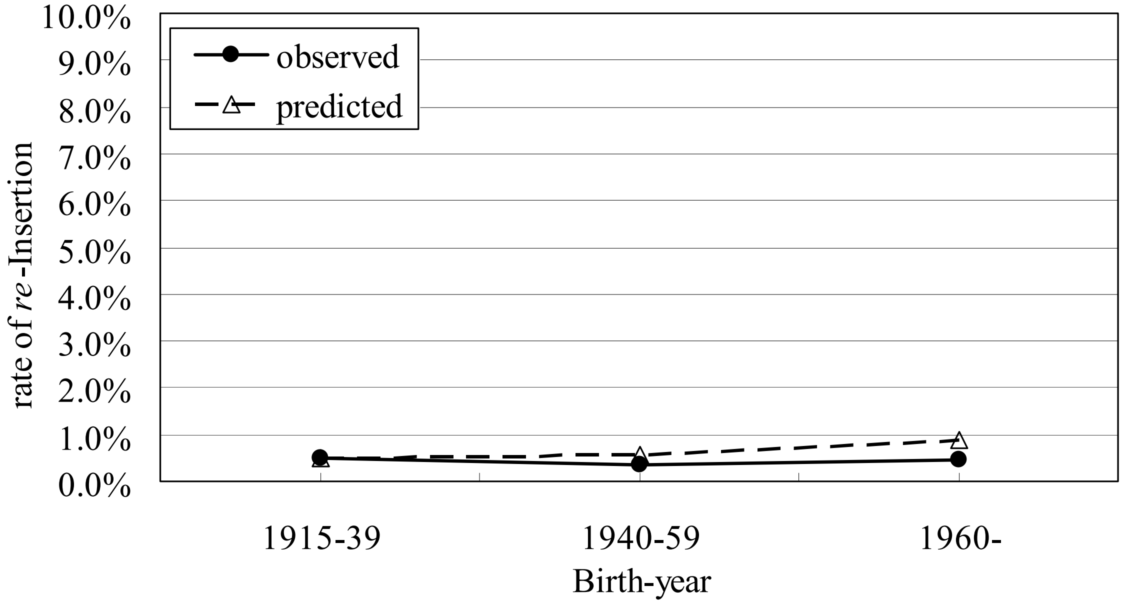


Figure 31. Observed and predicted transitions of the distribution of *re*-Insertion (MaxEnt)

As in Stochastic evaluation, the observed frequency and the predicted frequency of innovative forms and of traditional forms in each time period are shown in Tables 128 through 130, and the observed and predicted rate of innovative forms in each time period are shown in Figures 29 through 31. In all Tables and Figures, the predicted distribution is consistent with the observed distribution in Stochastic evaluation. This is also supported by the extremely high fraction correct (over 0.91) between the observed and predicted distributions. Thus, the analysis by MaxEnt evaluation is also verified to be adequate.

In this section, I conducted the Stochastic OT and the Maximum Entropy OT analysis. I derived the ranking values of each constraint in three time periods. The results show that the gradient approximation of the ranking values of each constraint caused the emergence and the gradual increase of three innovative forms. Furthermore, the fact that the observed distribution and the predicted distribution of innovative forms and traditional forms closely match shows that the analyses by Stochastic and MaxEnt evaluation are adequate.

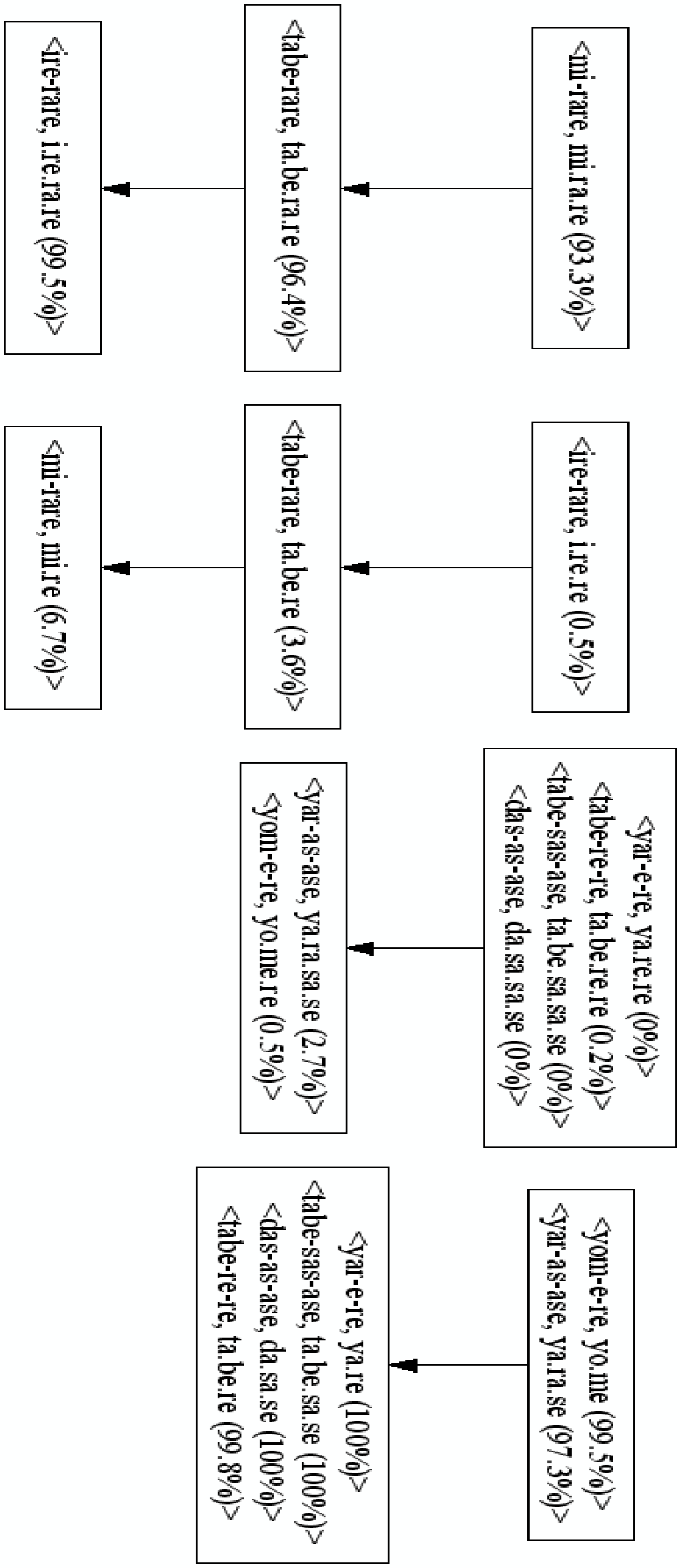
9.2 T-order

In this section, I analyze the order of the change of three variations and the relationship among them by means of T-order. Factorial typology is a set of all possible patterns of input-to-output pairs predicted by logically possible grammars (every possible ranking of constraints) and T-order is defined as the set of all implicational universals in the factorial typology (Anttila and Andrus 2006). For example in *t,d*-deletion (Anttila and Andrus 2006), five constraints yield 120 possible grammars (5!). However, the number of input-to-output patterns produced by 120 possible grammars does not amount to 120 but it amounts to six: several distinct grammars produce the same input-to-output patterns. This set of six input-to-output patterns is a factorial typology. In turn, T-order diagrammatically shows two implicational universals, such as "If *t,d*-deletion occurs before a vowel, it also occurs before a consonant" and "If *t,d*-deletion occurs before a pause, it also occurs before a consonant," that hold true of six patterns in factorial typology.

I implemented the T-order generator which takes a factorial typology as input and returns the corresponding T-order as a directed graph. By applying the analysis by means of T-order generator to three variations, we can impose universal limits on the quantitative variation permitted by a constraint set, and reveal the implicational universals in *sa*-Insertion, *ra*-Deletion and *re*-Insertion. The implicational universals tell us much about the changes including the order of the change and the relationships among the three variations.

I introduce OCP (μ) and OCP, in addition to OCP (morph), Max-IO, ParContrast and AlloCorr. I arranged three candidates of innovative forms for each variation: the candidate with adjacent identical morae (*sasa* or *rere*) and is subject to OCP (μ), such as *da.sa.sa.se*, (*sa*-Insertion) *i.re.re* (*ra*-Deletion) and *mi.re.re* (*re*-Insertion); the candidate with consecutive vowel features (e.g. [-low, -high] and [-low. -high]) and is subject to OCP, such as *ta.be.re* (*ra*-Deletion); the candidate which is not subject to these two constraints such as *mi.re* (*ra*-Deletion). Note that any *sa*-Insertion and *re*-Insertion obligatorily contain the consecutive vowel features as in *i.ka.sa.se* (*sa*-Insertion) and *yo.me.re* (*re*-Insertion) and are subject to OCP, since the suffixes of these innovative forms themselves contain the consecutive vowel features as in *as-ase* and *e-re*. I also arranged the traditional forms of three variations as the counterparts of the innovative forms. Thus, I conducted the analysis with 18 candidates. The result is shown in Figure 32.

Figure 32. T-order in three variations



In Figure 32, each angled bracket represents the input-to-output mapping: the strings on the upper side indicate the input (verb stem and suffix(es)); the strings on the lower side represent the output; the parenthesized rate represents the probability of the output in the observed data (CSJ). To take “<mi-rare, mi.ra.re (93.3%)>” and “<mi-rare, mi.re (6.7%)>” as examples, the mapping from the input *mi-rare* to the output *mi.ra.re* (standard potential) is found with 93.3%; on the other hand, the same input *mi-rare* is found in the form *mi.re* (*ra*-Deletion) with 6.7% in the data. Each arrow extends from unmarked mapping to marked mapping. In other words, the mapping on the right hand side implies the mapping on the left hand side (in the middle). This relationship is interpreted as “If A exists, then B also exists.” The mappings which share the same property in the implicational universals are grouped together in the box.

Looking into the rates in each mapping, we can observe that every arrow extends from the mapping with the lower percentage to the one with the higher percentage in each row. In other words, the implicational universals correspond to the relationships that hold in the distribution in the observed data. This shows that the OT grammar correctly represents the distribution in the observed data.

The first row represents the implicational universal in the mappings of standard potential, and the second row represents the one in the mappings of *ra*-Deletion. In the second row, the mapping with the output *i.re.re* which is subject to OCP (μ) comes to the right; the mapping with the output *ta.be.re* which is subject to OCP comes in the middle; the mapping with the output *mi.re* which is not subject to these two constraints comes to the left. On the other hand, in the first row, the mapping with the output *mi.ra.re* which is the counterpart of *mi.re* comes to the right; the mapping with the output *ta.be.ra.re* which is the counterpart of *ta.be.re* comes in the middle; the mapping with the output *i.re.ra.re* which is the counterpart of *i.re.re* comes to the left. The first row and the second row look like mirror images of each other.

Similarly, the third row represents the implicational universal in the mappings of *sa*-Insertion and *re*-Insertion, and the fourth row represents the one in the mappings of standard potential and TC. In the fourth row, the mapping with the outputs *da.sa.sa.se*, *ta.be.sa.sa.se*, *ya.re.re* and *ta.be.re.re* which are subject to OCP (μ) and OCP comes to the right; the mapping with the outputs *ya.ra.sa.se* and *yo.me.re* which are subject to OCP comes comes to the left. On the other hand, in the third row, the mapping with the outputs *ya.ra.se* and *yo.me* which are the counterparts of *ya.ra.sa.se* and *yo.me.re* comes to the right; the mapping with the outputs *da.sa.se*, *ta.be.sa.se*, *ya.re* and *ta.be.re* which are the counterparts of *da.sa.sa.se*, *ta.be.sa.sa.se*, *ya.re.re* and *ta.be.re.re* comes to the left. The third row and the fourth row look like mirror images of each other. That is, the following relationship holds: if the innovative forms are frequent, then the traditional forms are infrequent and vice versa.

The mappings with the outputs which incur violations of OCP (μ) and/or OCP additionally come to the right; namely, these outputs are marked. This is consistent with the observed data: these forms are less frequent. As mentioned above, the mapping on the right hand side implies the mapping on the left hand side (in the middle). The existence of the mapping with the output which is subject to OCP (μ) implies the mapping with the output which is subject to OCP; the existence of the mapping with the output which is subject to OCP further implies the mapping with the output which is not subject to these two constraints.[90] Putting this observation into the discussion of the order of the change for each variation, we can say that the change of three variations spreads from the forms which are not subject to these two constraints, first to the forms which are subject to OCP, and finally to the forms which are subject

[90] In *sa*-Insertion and *re*-Insertion, OCP is irrelevant to the implicational universals, since every *sa*-Insertion and *re*-Insertion is subject to this constraint.

to OCP (μ).

Furthermore, the implicational universals concerning *sa*-Insertion and *re*-Insertion are grouped together in the third and fourth rows; namely, these two innovative forms share the same property. On the other hand, the implicational universals concerning *ra*-Deletion are separately described in the first and second rows. The result supports the fact that the change of *ra*-Deletion is different from those of *sa*-Insertion and *re*-Insertion: *ra*-Deletion is an instance of the renewal of a single suffix; *sa*-Insertion and *re*-Insertion are instances of morpheme insertion.

In this section, I discussed the order of the change and the relationship among three variations based on the T-order. The results are consistent with the observed data.

9.3 evolOT

Finally, I predict the chronological change of three variations. I employed evolOT (Jäger 2002). The evolOT predicts the transition of ranking values of each constraint over time, based on the OT grammar and the frequency distribution of the phenomena at a particular point, and it further generates a series of frequency distributions, according to the resulting ranking values. In the prediction simulated by evolOT, one cycle of learning (by means of GLA[91]) and production represents one generation in the evolutionary process that is simulated by evolOT.[92] The results of the simulation are shown below.

[91] The evolOT assumes the Stochastic evaluation.
[92] I set the parameters as follows: Initial ranking = 0; Plasticity = 10; Noise = 20; Number of observations = 20,000; Number of generations.

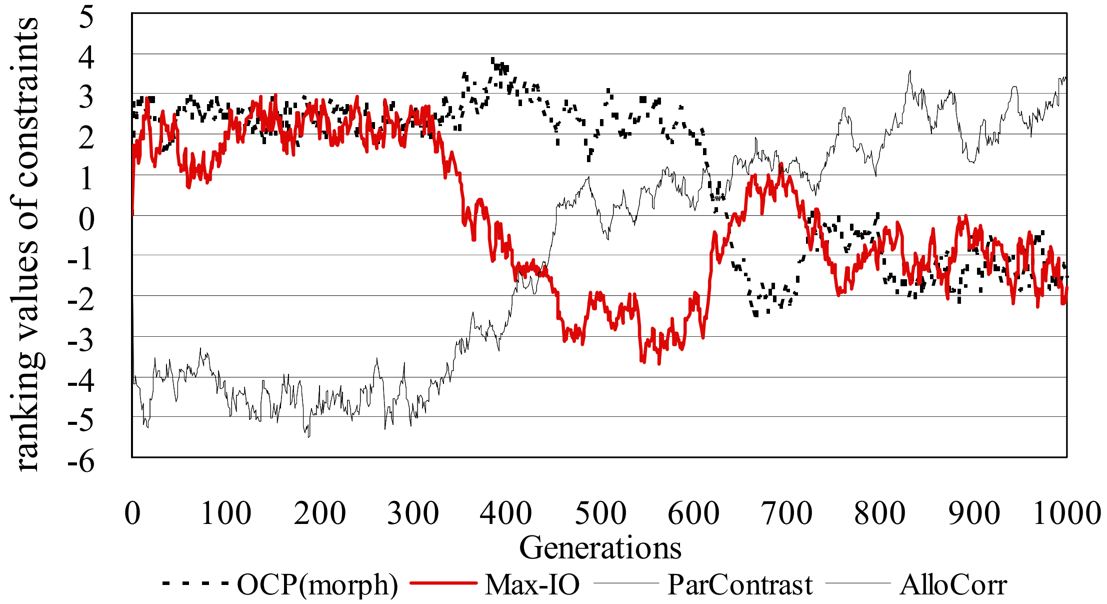


Figure 33. Prediction of the ranking values of constraints

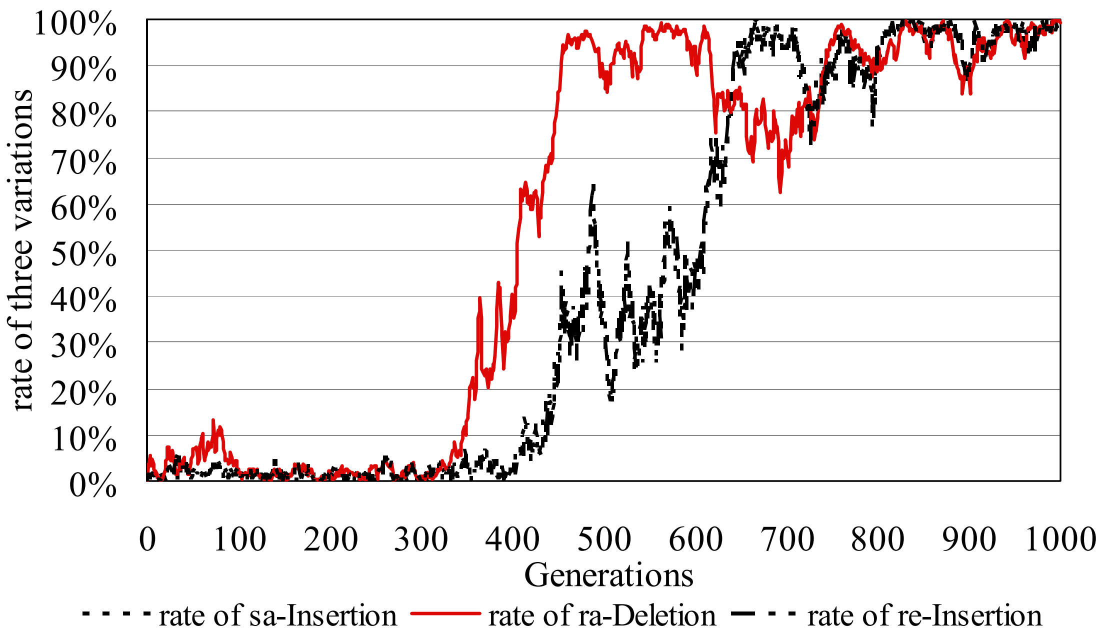


Figure 34. Prediction of the change of three variations

Figure 33 illustrates the predicted chronological transition of the ranking values of constraints. Figure 34 illustrates the predicted chronological transition of the rate of three variations.

As mentioned above, if the ranking values of constraints are distant, the distribution will be close to categorical; on the other hand, if the ranking values of constraints are close, more variations are observed. As shown in Figure 33, from generations 0 to 300, the ranking values of OCP (morph) and Max-IO are much higher than those of ParContrast and AlloCorr. From generations 300 to 750, the ranking values of these four constraints come closer due to the gradual decrease of the ranking values of OCP (morph) and Max-IO and the gradual increase of those of ParContrast and AlloCorr. From generations 750 to 1000, the ranking values of ParContrast and AlloCorr become much higher than those of OCP (morph) and Max-IO. Note that the ranking value of Max-IO begins to decrease around generation 300; on the other hand, the ranking value of OCP begins to decrease around generation 600. The ranking value of Max-IO decreases earlier than the one of OCP (morph).

The transition of the ranking values of constraints is reflected in the distribution of three variations. As Figure 34 shows, from generations 0 to 300, the traditional forms are predominant, and the innovative forms rarely occur. The distribution is close to categorical. From generations 300-750, the innovative forms as well as the traditional forms occur with a certain degree of probability. From generations 750 to 1000, the innovative forms become predominant, and the traditional forms rarely occur. The distribution is again categorical. The innovative forms gradually increase; finally, the innovative forms exceed the traditional forms in their probability, and they become predominant. On the other hand, the traditional forms gradually decrease; finally, they almost disappear.

The rate of three variations remains stagnant in the beginning; after that, it gradually increases; it subsequently explodes; finally it becomes stable with the highest percentage. This shows that the changes of *sa*-Insertion, *ra*-Deletion and *re*-Insertion proceed in an S-curve manner as I predicted in the statistical analyses.

Among the three innovative forms, *ra*-Deletion firstly begins to increase (from generations 300 to 500), followed by *sa*-Insertion and *re*-Insertion (from generations 400 to 700). This result is associated with the transition of the ranking values of Max-IO and OCP (morph). *Ra*-Deletion reaches the categorical distribution within about 200 generations; on the other hand, *sa*-Insertion and *re*-Insertion take about 300 generations to reach the categorical distribution. Moreover, the transition of *sa*-Insertion and *re*-Insertion traces the same track. These results partially support the order of the change, and the fact that the change of *ra*-Deletion is different from those of *sa*-Insertion and *re*-Insertion: *ra*-Deletion is an instance of the renewal of a single suffix; *sa*-Insertion and *re*-Insertion are instances of morpheme insertion.

At this point, I consider the reason why the rate of three variations increases in an S-curve manner, instead of the rate of three variations remaining stable. Assuming a UG factor, such that at each cycle of learning, the raw ranking values get altered, with higher values for UG-favored constraints, this produces a slightly different distribution, which could then serve as the learning data for the next generation. Such a procedure could create an S-curve.[93] The UG factor in the change of Japanese voice system is exactly the demands for the optimization of the conjugation paradigm by analogical leveling and for the reduction of the functional load of each form.

In this section, I predicted the chronological change of three variations by means of evolOT. The evolOT predicts the chronological transition of the ranking

[93] A suggestion by Bruce Hayes stimulated this idea.

values of constraints and the chronological transition of the rate of three variations. The results show that the changes of three variations will proceed in an S-curve manner. Furthermore, the results partly support the order of the change of three variations, and show the difference between the change of *ra*-Deletion and the changes of *sa*-Insertion and *re*-Insertion.

9.4 Summary

In this chapter, I conducted the Probabilistic OT analysis, based on the results of the standard OT analysis. Specifically, I conducted the Stochastic OT and the Maximum Entropy OT analysis. I analyzed the order of the change of three variations and the relationships among them by means of T-order. Furthermore, I predicted the changes of three variations with evolOT.

I derived the ranking values of each constraint in three time periods. The results show that the gradient approximation of the ranking values of each constraint caused the emergence and the gradual increase of three innovative forms. In addition, the derived OT grammar adequately predicts the distributions of innovative forms and traditional forms.

The T-order revealed the order of the change within each variation: the changes of three variations spread from the forms which are not subject to OCP (μ) and OCP, first to the forms which are subject to OCP, and finally to the forms which are subject to OCP (μ). The T-order further shows the difference between the change of *ra*-Deletion and those of *sa*-Insertion and *re*-Insertion: *ra*-Deletion is an instance of the renewal of a single suffix; *sa*-Insertion and *re*-Insertion are instances of morpheme insertion; and the T-order shows the relationship between the innovative forms and traditional forms: if the innovative forms are frequent, then the traditional forms are infrequent and vice versa. The results are consistent with the observed data.

The evolOT predicted the chronological transition of the ranking values of constraints and the chronological transition of the rates of the three variations. The results show that the changes of three variations will proceed in an S-curve manner. Furthermore, the results partly support the order of the change of three variations: the change of *ra*-Deletion firstly shows an explosive increase and reaches the final stage, the changes of *sa*-Insertion and *re*-Insertion follow the change of *ra*-Deletion; and such results support the view that the difference between the change of *ra*-Deletion and those of *sa*-Insertion and *re*-Insertion: *ra*-Deletion is an instance of the renewal of a single suffix; *sa*-Insertion and *re*-Insertion are instances of morpheme insertion.

I showed that the mechanisms of the changes of *sa*-Insertion, *ra*-Deletion and *re*-Insertion can be reduced in essence to the interaction of the small set of constraints: OCP (morph), Max-IO, ParContrast and AlloCorr. The Probabilistic OT constructs a model of the change with a fairly gradient nature, unlike the reranking account.

Chapter 10. Conclusion

In this conclusion, I summarize the core developments of this thesis, and then turn to the discussion of the model of linguistic competence that inherently includes language variation and change as well as the characterization of the roles of Internal and External factors in the organization of human linguistic competence.

In this thesis, I presented an exhaustive research about ongoing language variation and change of *sa*-Insertion, *ra*-Deletion and *re*-Insertion in the Japanese voice system from the perspectives of the variationist approach and the Optimality-Theoretic approach. I employed two large-scale Japanese corpora: the *On-line full text database of the minutes of the Diet* and the *Corpus of Spontaneous Japanese*, complementally taking advantage of the strong points of each corpus for the exhaustive research about language variation and change.

Statistical analysis

Firstly, I conducted the statistical analyses of *sa*-Insertion (Chapter 4), *ra*-Deletion (Chapter 5), and *re*-Insertion (Chapter 6). As a result, some unexplored properties of three variations were revealed; I obtained some detailed insights about the factors that govern language variation and change; claims of previous studies were verified in an objective and empirical manner. I summarize the results for each factor.[94]

Internal factors

idioms and nouns: No innovative forms occur in idioms and nouns.

self-controllability: Every innovative form is restricted to self-controllable verbs.

lexical diffusion: *Sa*-Insertion and *ra*-Deletion are subject to the lexical diffusion.

[94] These results are schematized in Table 114.

frequency effect: *Sa*-Insertion is subject to the frequency effect, while *ra*-Deletion is not.

transitivity: *Sa*-Insertion is restricted to the intransitive (action or process) verbs, while *ra*-Deletion and *re*-Insertion are not.

affirmative/negative distinction: *Sa*-Insertion is mostly restricted to affirmative context (close to categorical), while *ra*-Deletion and *re*-Insertion are more compatible with negative context.

following: *Sa*-Insertion with the *te-itadak pattern* is predominant (grammaticalization). *Ra*-deletion and *re*-Insertion with *ru* or negative pattern are predominant.

verb-length: *Sa*-Insertion is mostly restricted to short stem verbs, while *ra*-Deletion occurs with super-long stem verbs and *re*-Insertion occurs either with short or long stem verbs.

conjugation type of the verb (*i*-stem/*e*-stem (OCP)): *Ra*-Deletion is more compatible with *i*-stem verbs than with *e*-stem verbs.

verb type (OCP(μ)) : *Sa*-Insertion never includes the sequence *sasa*. *Ra*-Deletion and *re*-Insertion with the sequence *rere* are infrequent.

morphological structure of the preceding stem (monomorphemic/complex): *Ra*-Deletion and *re*-Insertion are more compatible with complex verbs.

embeddedness: *Ra*-Deletion is more compatible with subordinate clauses, while *re*-Insertion is more compatible with main clauses.

External factors

type of the House: *Sa*-Insertion and *re*-Insertion are more compatible with Councilors.

type of the Diet meeting: *Sa*-Insertion and *re*-Insertion are not affected by the type of the Diet meeting.

speech type: *Sa*-Insertion is more compatible with APS, while *ra*-Deletion and *re*-Insertion are more compatible with SPS.

gender: *Sa*-Insertion and *re*-Insertion are preferred by male speakers, while *ra*-Deletion is preferred by female speakers.

birth-year: Every innovative form is preferred by younger speakers (language change, S-curve).

geographical difference: Every innovative form is subject to the geographical difference.

education: *Ra*-Deletion and *re*-Insertion are preferred by the speakers with lower level of education.

spontaneity: Every innovative form is more compatible with the speech with high spontaneity.

speech style: *Sa*-Insertion is more compatible with the formal setting, while *ra*-Deletion and *re*-Insertion are more compatible with the casual settings.

speech skill: *Sa*-Insertion is preferred by the speaker who is skillful in speechmaking, while *re*-Insertion is preferred by the unskillful speaker.

speech experience: *Sa*-Insertion is preferred by the speakers with broader speech experience, while *ra*-Deletion and *re*-Insertion are preferred by the speakers with less speech experience.

These results provides a number of important insights:[95]

Acquisition

The acquisition of *sa*-Insertion and *re*-Insertion, which belong to the morphosyntactic category, in adulthood serves as a counterexample to the claim concerning the language acquisition that the linguistic categories other than the lexical items (phonological, morphological and syntactic ones) are acquired within the critical period and remain stable afterwards (Weinreich 1968, Labov 1994).

Change from above/below

Ra-Deletion and *re*-Insertion, which are more compatible with the negative option with respect to "speech," are instances of the change from below in which the innovative form is more compatible with the casual style in terms of Principle II (Labov 1990). On the other hand, *sa*-Insertion, which is more compatible with the positive option with respect to "speech," is an instance of the change from above in which the innovative form is more compatible with the formal style in terms of Principle Ia (Labov 1990).

[95] The following arguments are discussed in Chapter 7.

Order of the change

The order of the change of each variation is as follows: *ra*-Deletion => *sa*-insertion => *re*-Insertion.

frequency effect

If a phenomenon is subject to the frequency effect, its change is not advanced and is in the beginning, and if a phenomenon is immune to the frequency effect, the change is advanced and is in the intermediate stage or later.

Gender

Female speakers are insensitive to the characters associated with intra-speech type difference such as spontaneity and speech style in language variation and change.

Categorical/gradient distinction

It is claimed that internal factors constrain the phenomena categorically and that the internal factors are associated with the grammaticality (hard constraint), while on the other hand external factors constrain the phenomena gradiently and the external factors are associated with the acceptability (soft constraint) (Keller 2000, among others). However, the results of these analyses show that it is not necessarily the case that the internal factors are categorical. Furthermore, the strength of internal factors does not necessarily override that of external factors; some external factors show extremely significant contributions.

Internal/external distinction

In language variation and change, the following tendency with respect to the interaction of factors is observed: internal factors are mutually independent, in other words, there exists no significant interaction within internal factors; internal factors and external factors are also mutually independent, while external factors are interrelated (Labov 1982). However, only the independence of internal factors and external factors is maintained. The results, coupled with the categorical/gradient distinction, imply that the internal factors and the external factors occupy distinct rooms in human linguistic competence.

Change of factors (Dynamic Interaction Hypothesis)

The effects of the internal factors that are categorical in the beginning of the change decline and become gradient, and the effects of external factors that are gradient in the beginning of the change increase and approach categorical along the progress of the change. Likewise, the internal factors that are mutually independent in the beginning of the change become interrelated, and the external factors that are interrelated in the beginning of the change become independent along the progress of the change.

Markedness and frequency effect

The diffusion of language change is governed by the following two competing factors: Firstly, language change diffuses from morphologically, syntactically unmarked contexts to marked contexts (syntactic conservatism and resistance to the change). Secondly, language change diffuses from infrequent forms to frequent forms. Although the markedness has a great impact on the change in the beginning, the frequency effect overrides it along the progress of the change.

Constant Rate Hypothesis

Sa-Insertion, *ra*-Insertion, and *re*-Insertion are shown to be language changes in light of the ECRH (Matsuda 2003). Furthermore, I pointed out that some results of the present analysis, coupled with DIH, can serve as a counterexample to CRH.

Origin of the change

I discussed the origin of the change with respect to three innovative forms. I showed that the changes are all driven by functional demands and analogical leveling. Specifically, I pointed out that *ra*-Deletion and *re*-Insertion are instances in a series of an entire change in potential form. Furthermore, I proposed that the two-step process is the core mechanism of the entire change in potential form: The change is firstly driven by the functional motivation and it starts with consonant verbs. Subsequently, the change diffuses to vowel verbs motivated by the analogical leveling for the optimization of the conjugation paradigm (Section 6.2).

In addition to the above arguments, I discussed the following points:

Idiosyncratic properties of ra-Deletion

The effects of many factors have declined with the progress of the change of *ra*-Deletion. As a result, the specific function and property of *ra*-Deletion have come up to the surface: *ra*-Deletion is more compatible with the negative context and *ra*-Deletion is preferred by super-long verbs, following the economy principle (Section 5.2.1).

OCP (μ)

I also proposed a revised version of OCP (μ) which refers to the morphological boundary (Section 5.2.1.2).

Social class and age group

The examination of the effect of education on the distribution of *ra*-Deletion and *re*-Insertion shows that, although in change from below the lower the social class, the higher the probability of the innovative forms in both age groups, the probability is higher in the younger group than in the older group, in support of Labov's (1966a) generalization (Sections 5.2.3.5 and 6.3.5).

Speech type and subcategorial factors

I discussed the relationship between the supercategory speech type and spontaneity, speech style, and speech experience, which are subsumed under speech type, and I constructed some models. In *sa*-Insertion and *re*-Insertion, the effects of subcategorial factors are directly reflected in the effect of the supercategory speech type. In *ra*-Deletion, however, subcategorial factors are significant as independent factors. This shows that the subcategorial factors have become strong enough to play a role independently without being canceled out by the effect of speech type (Sections 4.2.4, 5.2.5 and 6.5).

OT analysis

In Chapters 8 and 9, I conducted the OT analyses of *sa*-Insertion, *ra*-Deletion and *re*-Insertion. Specifically, I explained the mechanism of analogical leveling in a formal manner. I also formalized some properties of each variation observed in the statistical analyses. I adopted the Stochastic OT model and the Maximum Entropy OT model. I analyzed the order of the change of the three variations and the relationships among them by means of T-order. Furthermore, I predicted the changes of three variations with evolOT.

I introduced four constraints which are crucial to the change in voice in Japanese, among other constraints: OCP (morph), Max-IO, ParContrast and AlloCorr. OCP (morph), which blocks the occurrence of adjacent identical morphemes, and Max-IO, which bars the deletion of input segments in the output, are against innovative forms. ParContrast, which requires one-to-one correspondence between form and content, and AlloCorr, which requires allomorphs to take the identical form, are in favor of innovative forms. If ParContrast and AlloCorr dominate OCP (morph) or Max-IO, traditional forms are selected as the optimal candidate; on the other hand, if OCP (morph) or Max-IO dominates ParContrast and AlloCorr, innovative forms are selected as the optimal candidate.

I derived the ranking values of each constraint in three time periods. The results show that the ranking values of OCP (morph) and Max-IO, which are against innovative forms, gradually decrease; on the other hand, the ranking values of ParContrast and AlloCorr, which are in favor of the three innovative forms, gradually increase as the birth-year becomes more recent. The gradient approximation of the ranking values of each constraint caused the emergence and the gradual increase of three innovative forms. In addition, the derived OT grammar adequately predicts the distributions of innovative forms and traditional forms. Incidentally, the counting cumulativity has an influence on the difference between the ranking values of ParContrast and of AlloCorr.

The T-order revealed the order of the change within each variation: the changes of three variations spread from the forms which are not subject to OCP (μ) and OCP, first to the forms which are subject to OCP, and finally to the forms which are subject to OCP (μ). The T-order further shows the difference between the change of *ra*-Deletion and those of *sa*-Insertion and *re*-Insertion: *ra*-Deletion is an instance of the renewal of a single suffix; *sa*-Insertion and *re*-Insertion are instances of morpheme insertion; and the T-order shows the relationship between the innovative forms and traditional forms: if the innovative forms are frequent, then the traditional forms are infrequent and vice versa. The results are consistent with the observed data. The change diffuses from a particular context, and gradually proceeds toward the final stage.

The evolOT predicted that the changes of three variations will proceed in an S-curve manner; the change of *ra*-Deletion firstly shows an explosive increase and reaches the final stage; the changes of *sa*-Insertion and *re*-Insertion follow the change of *ra*-Deletion. Furthermore, the result shows the difference between the change of *ra*-Deletion and those of *sa*-Insertion and *re*-Insertion.

I conclude that every variation is driven by the common demands for the optimization of the conjugation paradigm by analogical leveling and for the reduction of the functional load of each form; the overall change in voice in Japanese is essentially governed by the interaction of a small set of constraints: OCP (morph) or Max-IO vs. ParContrast and AlloCorr.

Based on the above discussion, I construct models of the human linguistic competence and of the mechanism of language change.

Model of the human linguistic competence (revision of the Probabilistic OT model)

I propose a model of linguistic competence that inherently includes language variation and change with a slight modification of the Probabilistic OT model.

Labov (1969) proposes the variable rule notation as an augmentation of the standard rule writing convention. The variable rules notation specifies elements of the context of a rule as affecting the probability of application of the rewrite rule. The manner of the application of a rewrite rule is affected by the contextual factors. Based on the variable rule notation, I argue that the contextual factors can be incorporated into the Probabilistic OT model as the random value, evaluation noise. As mentioned above, in Probabilistic OT the evaluation noise is added to the ranking value and the final value of the constraint is determined at every speaking event. It follows that the evaluation process of OT grammar (constraints) is affected by internal and external factors. For example, if the speech style has an effect on the evaluation process, the ranking value of a particular constraint will increase/decrease according to the level of formality. In other words, although the ranking values of the constraints themselves are fixed and the resulting outputs are uniformly determined, the effects of internal and external factors slightly change the ranking values; multiple outputs for a single input are obtained according to their effects. Note that this model also accommodates the categorical output: if the ranking values of constraints are distant and the ranges of each constraint never overlap, there will be no variation; if the effects of internal and external factors are so insubstantial that they do not change the relationships among constraints with respect to their ranking values, there will again be no variation. Thus, the locus of variation and change is attributed to the effects of internal and external factors, not to the random value of an unknown nature. At the same time, the current model is consistent with the claim that the human linguistic competence accommodates and generates variation, and includes a quantitative, noncategorical, and nondeterministic component (Weinreich et al. 1968). In conjunction with the human linguistic competence, the model is schematized below.

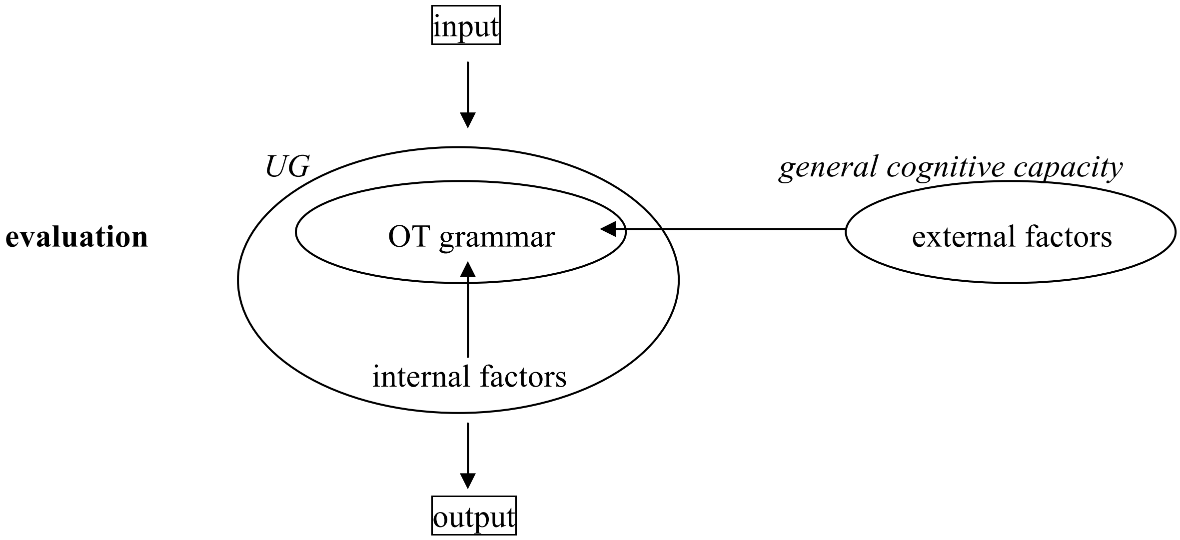


Figure 35. Model of the human linguistic competence

This model enables the detailed prediction of the outputs, taking full-blown complex sets of factors that govern the distribution of each variation into account. At the same time, this means that the Probabilistic OT analysis and the statistical analysis can cooperate to explain the mechanism of language variation and change.

The above model is consistent with the model proposed in Figure 22 in the sense that the OT grammar corresponds to the core grammar: the OT grammar is surrounded by the internal factors, the external factor resides in a distinct domain; and they interact with each other in the evaluation of the input-to-output mapping. I argue that in this model UG consists of OT grammar and internal factors; the external factors are the property of the general cognitive capacity rather than of UG.

Language change and human linguistic competence

At this point, I discuss the mechanism of language change in connection with the human linguistic competence, considering all the results of the above analyses together.

In language change, the external motivation such as the communication needs is reflected in the functional demands such as the demands for the optimization of the conjugation paradigm by analogical leveling and for the reduction of the functional load of each form. The functional demand in turn is reflected in the slight change in the grammatical system, such as the reranking or the promotion/demotion of ranking values of constraints. The grammatical system undergoes a change in order to fulfill the functional demand. This process eventually comes up to the surface in the form of a tangible linguistic change. This is the very mechanism of language change. The grammatical system is sensitive to the external motivation. In other words, external motivation shapes the grammatical system. I schematize the mechanism below.

$$
\begin{array}{ccccc}
 & & \boxed{\text{external motivation}} & & \\
 & & \downarrow & & \\
 & & \boxed{\text{functional demand}} & & \\
 & & \downarrow & & \\
\boxed{\text{internal factor}} & \rightarrow & \boxed{\text{grammatical system}} & \leftarrow & \boxed{\text{external factor}} \\
 & & \downarrow & & \\
 & & \boxed{\text{surface change}} & &
\end{array}
$$

Figure 36. Mechanism of language change

Once the change begins, the change becomes subject to the effects of internal and external factors where the innovative forms are dispreffered in some contexts such as negative contexts, subordinate clauses and long verbs. The driving force of the change competes with internal and external factors. If the driving force is strong enough that it overrides the effects of such factors, the change gradually diffuses to every context.

The relationship between the functional demand and the grammatical system maintains equilibrium under normal conditions, and they are in a steady state. However, if some sort of motivation external to the grammatical system arises anew, the existing grammatical system does not fulfill the functional demand and the equilibrium will be lost. Then, in order to fulfill the functional demand, the grammatical system undergoes a change. Thus, I argue that the disruption of equilibrium between the functional demand and the grammatical system activates language change. Conversely, unless the equilibrium is lost by some sort of motivation, language change does not occur. This argument gives a partial answer to the actuation problem (Weinreich et al. 1968).

Finally, I present some remaining issues of which I did not give an account in the present research.

Remaining issues

As the present research shows, the changes of *sa*-Insertion and *re*-Insertion are in the beginning of language change, thus the complete change of these variations remain to be revealed. Moreover, the analysis of *ra*-Deletion is limited due to the property of the data. Therefore, the continuous real-time study of these three variations in voice in Japanese can contribute to the clarification of the whole picture of language change, especially with respect to the change of the effects of internal and external factors with the passage of time.

I proposed a model of the human linguistic competence (Figure 36). This model enables the detailed prediction of the outputs, taking full-blown complex sets of factors that govern the distribution of each variation into account; at the same time, the locus of variation and change is attributed to the effects of internal and external factors, instead of the noise. However, I do not propose a new computer model in light of the above model as a modification of the existing models such as GLA and SGA. In order to test the adequacy of the model of the human linguistic competence and to bring the theory closer to reality, the computer modeling needs to be done.

I discussed Kinsui's (2003) hypothesis associated with the issue of verb-length. Kinsui's argument is as follows: *ra*-deletion with short verbs is acquired as a lexical item, while *ra*-Deletion with long verbs are acquired as a module of the grammar. If a speaker has already passed the critical period of language acquisition and does not have the grammar which includes the morphology of *ra*-Deletion, the speaker cannot generate *ra*-Deletion with long verbs. Although I raised some counterexamples and argued that the issue of verb-length cannot necessarily be attributed to the difference between the lexicon and the grammar, I can not show any alternative explanation in a conclusive manner. The issue of verb-length remains to be explained, in spite of its importance in the study of language variation and change. I leave this issue for future work.

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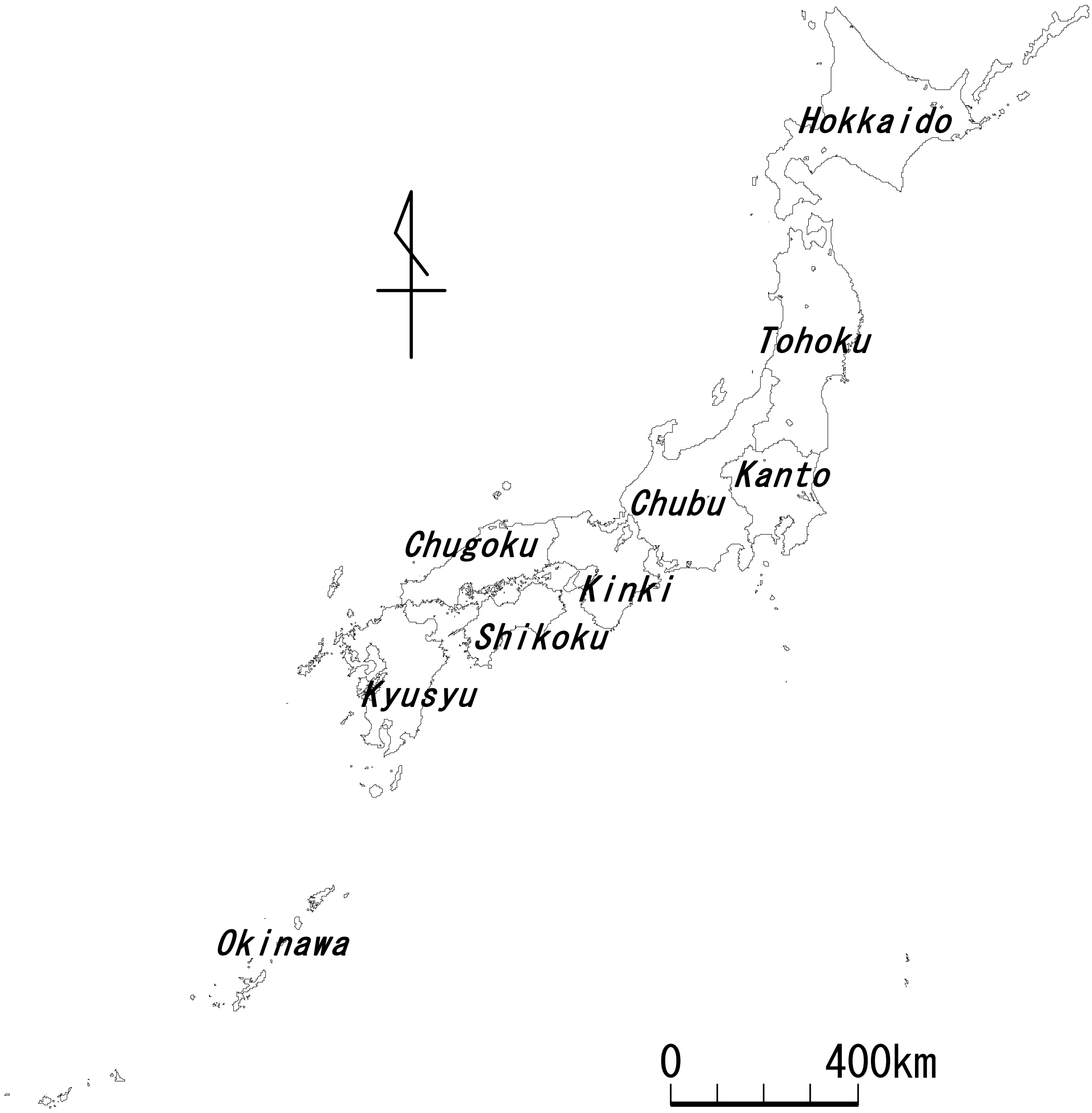
On-line full-text database of the Minutes of the Diet <http://kokkai.ndl.go.jp>

Appendix I: List of the members of the Diet

Name	Birth-year	House
Amano, Kimiyoshi	1921	Representatives
Ando, Masazumi	1876	Representatives
Arai, Kyota	1887	Representatives
Arishima, Shigetake	1924	Representatives
Asao, Keiichiro	1964	Councilors
Azuma, Syozo	1951	Representatives
Den, Hideo	1923	Councilors
Fujii, Hirohisa	1932	Representatives
Fukuda, Tokuyasu	1906	Representatives
Fukuyama, Tetsuro	1962	Councilors
Goto, Shigeyuki	1955	Representatives
Hagiuda, Koichi	1963	Representatives
Hara, Bumbee	1913	Councilors
Harashima, Koji	1909	Councilors
Hasegawa, Syozo	1914	Representatives
Hatoyama, Ichiro	1883	Representatives
Hatoyama, Iichiro	1918	Councilors
Hori, Kosuke	1934	Representatives
Hori, Toshikazu	1950	Councilors
Hosaka, Sanzo	1939	Councilors
Imamura, Chusuke	1899	Representatives
Ino, Hiroya	1891	Representatives
Inoue, Kazuo	1952	Representatives
Inukai, Takeru	1896	Representatives
Ishiguro, Tadaatsu	1884	Councilors
Ishii, Keiichi	1958	Representatives
Ishikawa, Yozo	1925	Representatives
Ito, Tatsuya	1961	Representatives
Iwakawa, Yosuke	1886	Representatives
Iwamoto, Sota	1940	Councilors
Kakizawa, Koji	1933	Representatives
Kamoshita, Ichiro	1949	Representatives
Kashima, Toshio	1907	Councilors
Kashiwagi, Kuraji	1888	Councilors
Katayanagi, Shinkichi	1905	Councilors
Kawakami, Jotaro	1889	Representatives
Kikuchi, Yoshiro	1890	Representatives
Kobayashi, Koki	1944	Representatives
Koike, Akira	1960	Councilors
Kondo, Tsuyoshi	1941	Councilors
Kuroiwa, Takahiro	1966	Councilors

Kuroyanagi, Akira	1931	Councilors
Matsubara, Jin	1956	Representatives
Matsuoka, Toshizo	1880	Representatives
Miki, Jiro	1885	Councilors
Minobe, Ryokichi	1904	Councilors
Mizuno, Seiichi	1946	Councilors
Mizushima, Hiroko	1968	Representatives
Morita, Tsuguo	1937	Councilors
Nagata, Hisayasu	1969	Representatives
Nakahara, So	1936	Councilors
Nakajima, Moritoshi	1877	Representatives
Nakamura, Umekichi	1901	Representatives
Nakayama, Yoshikatsu	1945	Representatives
Namiki, Yoshio	1908	Representatives
Narasaki, Yasumasa	1928	Councilors
Nishikawa, Taiichiro	1942	Representatives
Ochi, Michio	1929	Representatives
Ogawa, Toshio	1948	Councilors
Ogata, Yasuo	1947	Councilors
Okada, Soji	1902	Councilors
Okuma, Nobuyuki	1910	Councilors
Ouchi, Keigo	1930	Representatives
Ozawa, Kiyoshi	1927	Representatives
Sakurauchi, Yoshio	1912	Representatives
Shimamura, Ichiro	1894	Representatives
Shimizu, Kayoko	1935	Councilors
Shiragi, Giichiro	1919	Councilors
Takagi, Matsukichi	1898	Representatives
Takagi, Yosuke	1959	Representatives
Takahashi, Ichiro	1926	Representatives
Takayama, Satoshi	1970	Representatives
Takeuchi, Kiyoshi	1920	Councilors
Taki, Makoto	1938	Representatives
Tokugawa, Muneyoshi	1897	Councilors
Tokugawa, Yorisada	1892	Councilors
Wakabayashi, Hideki	1954	Councilors
Yamaguchi, Shizue	1917	Representatives
Yamahana, Ikuo	1967	Representatives
Yamamoto, Kumekichi	1893	Representatives
Yamaoka, Kenji	1943	Representatives

Appendix II: Geographical regions of Japan



Appendix III: Examples of *sa*-Insertion in Diet database

House	Name	Date	*sa*-Insertion
Councilors	Jiro Miki	1949/12/21	yom-as-ase-te-itadak-
Councilors	Bumbee Hara	1976/10/20	ukagaw-as-ase-te-itadak-
Councilors	Iichiro Hatoyama	1977/4/27	torikum-as-ase-te-itadak-
Councilors	Iichiro Hatoyama	1977/5/24	tor-as-ase-te-itadak-
Councilors	Yasumasa Narasaki	1993/4/22	utur-as-ase-te-itadak-
Councilors	Yasumasa Narasaki	1994/1/19	hirak-as-ase-te-itadak-
Councilors	Yasumasa Narasaki	1994/3/29	utur-as-ase-te-itadak-
Councilors	Yasumasa Narasaki	1994/3/31	yar-as-ase-te-itadak-
Councilors	Yasumasa Narasaki	1994/3/31	yom-as-ase-te-itadak-
Councilors	Yasumasa Narasaki	1994/6/22	hair-as-ase-te-itadak-
Councilors	Yasumasa Narasaki	1994/6/22	owar-as-ase-te-itadak-
Councilors	Yasumasa Narasaki	1994/10/18	modor-as-ase-te-itadak-
Councilors	Yasumasa Narasaki	1996/4/9	yom-as-ase-te-itadak-
Councilors	Yasumasa Narasaki	1996/6/18	utur-as-ase-te-itadak-
Councilors	Yasumasa Narasaki	1997/12/11	owar-as-ase-te-itadak-
Councilors	Yasumasa Narasaki	1998/1/8	yar-as-ase-te-itadak-
Councilors	Akira Kuroyanagi	1970/3/4	yom-as-ase-te-itadak-
Councilors	Akira Kuroyanagi	1971/12/22	yom-as-ase-te-itadak-
Councilors	Akira Kuroyanagi	1973/4/6	haraw-as-ase-nai
Councilors	Tsuguo Morita	2000/3/23	ukagaw-as-ase-te-itadak-
Councilors	Tsuguo Morita	2002/3/19	tob-as-ase-te-itadak-
Councilors	Sanzo Hosaka	1998/4/10	medat-as-ase-teiku
Councilors	Sota Iwamoto	2001/5/31	utur-as-ase-te-itadak-
Councilors	Sota Iwamoto	2001/6/19	manab-as-ase-te-itadak-
Councilors	Sota Iwamoto	2003/5/27	modor-as-ase-te-itadak-
Councilors	Tsuyoshi Kondo	2004/1/26	yar-as-ase-te-itadak-
Councilors	Tsuyoshi Kondo	2004/5/27	yar-as-ase-te-itadak-
Councilors	Seiichi Mizuno	1995/9/27	yom-as-ase-te-itadak-
Councilors	Toshio Ogawa	2004/3/30	utur-as-ase-te-itadak-
Councilors	Toshio Ogawa	2007/3/29	utur-as-ase-te-itadak-
Councilors	Toshio Ogawa	2007/6/29	isuwar-as-ase-te-simatta
Councilors	Toshikazu Hori	1990/5/24	yom-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2001/10/30	kik-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2001/10/30	owar-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2002/2/1	owar-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2002/4/11	yom-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2002/4/18	utur-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2002/4/18	owar-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2002/4/18	owar-as-ase-te-itadak-

Councilors	Hideki Wakabayashi	2002/7/4	hair-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2002/7/11	yom-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2002/11/26	susum-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2002/11/26	susum-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2002/11/26	owar-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2002/11/26	tob-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2003/3/17	utur-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2003/3/19	yom-as-ase-te-itadaite-
Councilors	Hideki Wakabayashi	2003/3/19	utur-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2003/4/22	hair-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2003/7/9	hair-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2003/7/18	yom-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2003/7/22	owar-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2003/7/26	owar-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2003/10/7	habuk-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2003/10/7	hair-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2003/10/7	utur-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2003/12/6	owar-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2004/2/5	yuzur-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2004/2/5	kubar-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2004/3/18	owar-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2004/4/5	owar-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2004/4/6	tor-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2004/5/19	hair-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2004/5/20	tukaw-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2004/5/27	owar-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2004/6/11	tukaw-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2004/11/16	tob-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2005/2/21	kik-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2005/3/18	hair-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2005/3/28	kak-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2005/3/28	owar-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2005/7/19	tob-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2005/8/4	owar-as-ase-te-itadak-
Councilors	Hideki Wakabayashi	2007/3/9	yom-as-ase-te-itadak-
Councilors	Tetsuro Fukuyama	2000/3/15	yar-as-ase-te-itadak-
Councilors	Tetsuro Fukuyama	2001/3/27	kodawar-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/6/21	susum-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/6/22	hair-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/6/23	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/6/24	hair-as-ase-te-itadak-

Councilors	Keiichiro Asao	2001/6/25	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/6/26	modor-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/6/27	owar-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/6/28	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/6/29	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/6/30	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/1	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/2	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/3	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/4	yuzur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/5	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/6	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/7	modor-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/8	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/9	hair-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/10	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/11	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/12	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/13	kubar-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/14	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/15	hair-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/16	modor-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/17	hair-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/18	hair-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/19	hair-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/20	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/21	hair-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/22	kubar-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/23	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/24	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/25	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/26	hair-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/27	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/28	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/29	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/30	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/7/31	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/1	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/2	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/3	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/4	utur-as-ase-te-itadak-

Councilors	Keiichiro Asao	2001/8/5	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/6	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/7	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/8	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/9	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/10	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/11	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/12	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/13	kubar-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/14	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/15	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/16	hair-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/17	yuzur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/18	yar-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/19	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/20	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/21	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/22	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/23	hair-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/24	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/25	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/26	hair-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/27	modor-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/28	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/29	okonaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/30	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/8/31	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/1	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/2	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/3	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/4	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/5	okonaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/6	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/7	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/8	hair-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/9	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/10	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/11	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/12	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/13	ukagaw-as-ase-te
Councilors	Keiichiro Asao	2001/9/14	ukagaw-as-ase-te-itadak-

Councilors	Keiichiro Asao	2001/9/15	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/16	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/17	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/18	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/19	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/20	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/21	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/22	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/23	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/24	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/25	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/26	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/27	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/28	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/29	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/9/30	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/10/1	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/10/2	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/10/3	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/10/4	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/10/5	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2001/10/6	isog-as-ase-te-itadak-
Councilors	Keiichiro Asao	2002/3/13	susum-as-ase-te-itadak-
Councilors	Keiichiro Asao	2004/5/20	hair-as-ase-te-itadak-
Councilors	Keiichiro Asao	2004/5/20	hair-as-ase-te-itadak-
Councilors	Keiichiro Asao	2005/5/12	torihakar-as-ase-te-itadak-
Councilors	Keiichiro Asao	2005/10/4	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2005/10/4	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2005/10/4	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2005/10/20	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2006/3/17	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2006/6/1	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2006/6/2	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2006/10/12	owar-as-ase-te-itadak-
Councilors	Keiichiro Asao	2006/10/26	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2006/11/28	ukagaw-as-ase-te-itadak-
Councilors	Keiichiro Asao	2006/12/13	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2007/3/9	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2007/3/20	hair-as-ase-te-itadak-
Councilors	Keiichiro Asao	2007/3/20	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2007/6/19	hair-as-ase-te-itadak-

Councilors	Keiichiro Asao	2007/6/19	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2007/6/28	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2007/10/17	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2007/11/27	yom-as-ase-te-itadak-
Councilors	Keiichiro Asao	2007/11/29	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2007/11/29	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2007/11/29	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2007/12/18	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2007/12/18	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2008/1/8	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2008/1/8	utur-as-ase-te-itadak-
Councilors	Keiichiro Asao	2008/2/5	utur-as-ase-te-itadak-
Councilors	Takahiro Kuroiwa	2002/5/23	utur-as-ase-te-itadak-
Councilors	Takahiro Kuroiwa	2002/5/23	utur-as-ase-te-itadak-
Councilors	Takahiro Kuroiwa	2002/5/23	owar-as-ase-te-itadak-
Councilors	Takahiro Kuroiwa	2002/6/6	kat-as-ase-te-itadak-
Councilors	Takahiro Kuroiwa	2002/6/6	utur-as-ase-te-itadak-
Councilors	Takahiro Kuroiwa	2002/7/23	utur-as-ase-te-itadak-
Councilors	Takahiro Kuroiwa	2002/12/3	kik-as-ase-te-itadak-
Councilors	Takahiro Kuroiwa	2003/5/8	yom-as-ase-te-itadak-
Councilors	Takahiro Kuroiwa	2003/5/14	yom-as-ase-te-itadak-
Councilors	Takahiro Kuroiwa	2003/5/15	kik-as-ase-te-itadak-
Councilors	Takahiro Kuroiwa	2006/6/9	utur-as-ase-te-itadak-
Representatives	Ichiro Hatoyama	1955/1/22	mot-as-ase-ru-koto
Representatives	Matsukichi Takagi	1952/1/30	ukeow-as-ase-ta-mono
Representatives	Yoshio Sakurauchi	1973/4/5	torihakob-as-ase-tai
Representatives	Syozo Hasegawa	1967/6/30	utikir-as-ase-te-itadak-
Representatives	Shigetake Arishima	1970/3/17	ukagaw-as-ase-te-itadak-
Representatives	Shigetake Arishima	1977/3/4	motikom-as-ase-ru-toiu
Representatives	Michio Ochi	1989/6/15	yar-as-ase-te-itadak-
Representatives	Michio Ochi	1991/3/7	yar-as-ase-te-itadak-
Representatives	Michio Ochi	1991/3/12	mikom-as-ase-te-itadak-
Representatives	Michio Ochi	1991/3/12	hurikaer-as-ase-te-itadak-
Representatives	Michio Ochi	1991/7/4	yar-as-ase-te-itadak-
Representatives	Michio Ochi	1991/7/4	gambar-as-ase-te-itadak-
Representatives	Michio Ochi	1991/10/1	kubar-as-ase-te-itadak-
Representatives	Michio Ochi	1994/6/7	modor-as-ase-te-itadak-
Representatives	Michio Ochi	1995/2/6	hair-as-ase-te-itadak-
Representatives	Michio Ochi	1997/2/17	hair-as-ase-te-itadak-
Representatives	Keigo Ouchi	1993/12/13	yar-as-ase-te-itadak-
Representatives	Keigo Ouchi	1993/12/14	ukagaw-as-ase-te-itadak-

Representatives	Keigo Ouchi	1994/1/5	yar-as-ase-te-itadak-
Representatives	Keigo Ouchi	1994/6/7	kum-as-ase-te-itadak-
Representatives	Hirohisa Fujii	1991/6/21	yar-as-ase-te-itadak-
Representatives	Hirohisa Fujii	1994/3/25	tor-as-ase-te-itadak-
Representatives	Hirohisa Fujii	1994/3/29	tukaw-as-ase-te-itadak-
Representatives	Hirohisa Fujii	1994/6/14	hikitug-as-ase-te-itadak-
Representatives	Koji Kakizawa	1981/4/8	yom-as-ase-te-moratte
Representatives	Kosuke Hori	1990/4/25	ukagaw-as-ase-te-itadak-
Representatives	Kosuke Hori	1990/4/26	mat-as-ase-te-itadak-
Representatives	Kosuke Hori	1990/6/15	okonaw-as-ase-te-itadak-
Representatives	Kosuke Hori	1990/12/18	kum-as-ase-te-itadak-
Representatives	Kosuke Hori	1990/12/18	kum-as-ase-te-itadak-
Representatives	Kosuke Hori	1993/12/8	iw-as-ase-te-itadak-
Representatives	Kosuke Hori	2000/3/16	usinaw-as-ase-te-ha-ikenai
Representatives	Kosuke Hori	2000/3/16	humikir-as-ase-te-itadak-
Representatives	Kosuke Hori	2000/5/10	ukagaw-as-ase-te-itadak-
Representatives	Makoto Taki	1993/3/25	miokur-as-ase-te-itadak-
Representatives	Makoto Taki	1993/3/29	uketor-as-ase-te-itadak-
Representatives	Makoto Taki	1997/4/24	uketamawar-as-ase-te-itadak-
Representatives	Makoto Taki	1998/4/22	uketamawar-as-ase-te-itadak-
Representatives	Kenji Yamaoka	1991/9/3	owar-as-ase-te-itadak-
Representatives	Syozo Azuma	1990/5/24	iw-as-ase-te-itadak-
Representatives	Syozo Azuma	1990/11/5	owar-as-ase-te-itadak-
Representatives	Syozo Azuma	1991/2/20	yom-as-ase-te-itadak-
Representatives	Syozo Azuma	1991/2/20	owar-as-ase-te-itadak-
Representatives	Syozo Azuma	1991/11/18	owar-as-ase-te-itadak-
Representatives	Syozo Azuma	1991/11/18	iw-as-ase-te-itadak-
Representatives	Syozo Azuma	1991/11/21	utur-as-ase-te-itadak-
Representatives	Syozo Azuma	1991/11/21	owar-as-ase-te-itadak-
Representatives	Syozo Azuma	1992/2/27	yar-as-ase-te-itadak-
Representatives	Syozo Azuma	1993/4/21	owar-as-ase-te-itadak-
Representatives	Syozo Azuma	1993/4/21	tob-as-ase-te-itadak-
Representatives	Syozo Azuma	1993/5/20	yar-as-ase-te-itadak-
Representatives	Syozo Azuma	1993/5/20	yar-as-ase-te-itadak-
Representatives	Syozo Azuma	1993/5/20	tukaw-as-ase-te-itadak-
Representatives	Syozo Azuma	1995/4/27	mawar-as-ase-te-itadak-
Representatives	Syozo Azuma	1995/5/10	yar-as-ase-te-itadak-
Representatives	Syozo Azuma	1995/10/20	ik-as-ase-te-itadak-
Representatives	Syozo Azuma	1995/10/20	ik-as-ase-te-itadak-
Representatives	Syozo Azuma	1996/12/5	hair-as-ase-te-itadak-
Representatives	Syozo Azuma	1996/12/5	ukagaw-as-ase-te-itadak-

Representatives	Syozo Azuma	1997/4/10	iw-as-ase-te-itadak-
Representatives	Syozo Azuma	1997/5/16	hair-as-ase-te-itadak-
Representatives	Syozo Azuma	1997/11/26	tukkom-as-ase-te-itadak-
Representatives	Syozo Azuma	1997/11/26	manab-as-ase-te-itadak-
Representatives	Syozo Azuma	1998/3/18	owar-as-ase-te-itadak-
Representatives	Syozo Azuma	1998/4/17	hair-as-ase-te-itadak-
Representatives	Syozo Azuma	1998/4/17	owar-as-ase-te-itadak-
Representatives	Syozo Azuma	1998/5/15	owar-as-ase-te-itadak-
Representatives	Syozo Azuma	1998/5/20	hair-as-ase-te-itadak-
Representatives	Syozo Azuma	1998/5/20	yar-as-ase-te-itadak-
Representatives	Syozo Azuma	1998/5/20	owar-as-ase-te-itadak-
Representatives	Syozo Azuma	1998/5/22	ik-as-ase-te-itadak-
Representatives	Syozo Azuma	1998/6/1	ik-as-ase-te-itadak-
Representatives	Syozo Azuma	1998/9/2	utur-as-ase-te-itadak-
Representatives	Syozo Azuma	1998/10/14	kik-as-ase-te-itadak-
Representatives	Syozo Azuma	1999/3/18	nor-as-ase-te-itadak-
Representatives	Syozo Azuma	1999/3/18	nor-as-ase-te-itadak-
Representatives	Syozo Azuma	2002/11/11	yar-as-ase-te-moratte
Representatives	Syozo Azuma	2002/11/11	kik-as-ase-te-itadak-
Representatives	Syozo Azuma	2002/11/11	yar-as-ase-te-itadak-
Representatives	Syozo Azuma	2002/11/11	iw-as-ase-te-itadak-
Representatives	Syozo Azuma	2003/4/24	kik-as-ase-te-itadak-
Representatives	Kazuo Inoue	2001/3/21	owar-as-ase-te-itadak-
Representatives	Kazuo Inoue	2002/3/29	yar-as-ase-te-itadak-
Representatives	Kazuo Inoue	2003/5/21	utur-as-ase-te-itadak-
Representatives	Jin Matsubara	2005/8/3	yom-as-ase-te-itadak-
Representatives	Keiichi Ishii	1996/2/13	yom-as-ase-te-itadak-
Representatives	Keiichi Ishii	2003/7/17	tor-as-ase-te-itadak-
Representatives	Keiichi Ishii	2003/7/17	tor-as-ase-te-itadak-
Representatives	Keiichi Ishii	2004/3/24	okonaw-as-ase-te-itadak-
Representatives	Keiichi Ishii	2004/3/29	yar-as-ase-te-itadak-
Representatives	Keiichi Ishii	2005/1/27	yom-as-ase-te-itadak-
Representatives	Yosuke Takagi	1995/3/10	okonaw-as-ase-te-itadak-
Representatives	Yosuke Takagi	2005/4/15	yom-as-ase-te-itadak-
Representatives	Yosuke Takagi	2006/4/14	okonaw-as-ase-te-itadak-
Representatives	Tatsuya Ito	1994/10/21	ik-as-ase-te-itadak-
Representatives	Tatsuya Ito	1994/10/21	utur-as-ase-te-itadak-
Representatives	Tatsuya Ito	1995/1/31	utur-as-ase-te-itadak-
Representatives	Tatsuya Ito	1995/4/20	utur-as-ase-te-itadak-
Representatives	Tatsuya Ito	1995/4/20	utur-as-ase-te-itadak-
Representatives	Tatsuya Ito	1995/4/20	owar-as-ase-te-itadak-

Representatives	Tatsuya Ito	1995/11/7	utur-as-ase-te-itadak-
Representatives	Tatsuya Ito	1996/2/7	utur-as-ase-te-itadak-
Representatives	Tatsuya Ito	1997/4/11	owar-as-ase-te-itadak-
Representatives	Tatsuya Ito	2000/10/5	nor-as-ase-te-itadak-
Representatives	Tatsuya Ito	2002/11/19	yom-as-ase-te-itadak-
Representatives	Tatsuya Ito	2002/11/28	morikom-as-ase-te-itadak-
Representatives	Tatsuya Ito	2002/12/5	kak-as-ase-te-itadak-
Representatives	Tatsuya Ito	2002/12/5	kak-as-ase-te-itadak-
Representatives	Tatsuya Ito	2002/12/5	kak-as-ase-te-itadak-
Representatives	Tatsuya Ito	2002/12/5	kak-as-ase-te-itadak-
Representatives	Tatsuya Ito	2002/12/5	kak-as-ase-te-itadak-
Representatives	Tatsuya Ito	2002/12/5	kak-as-ase-te-itadak-
Representatives	Tatsuya Ito	2002/12/5	kak-as-ase-te-itadak-
Representatives	Tatsuya Ito	2002/12/5	tor-as-ase-te-itadak-
Representatives	Tatsuya Ito	2003/3/25	tukur-as-ase-te-itadak-
Representatives	Tatsuya Ito	2003/5/22	tor-as-ase-te-itadak-
Representatives	Tatsuya Ito	2003/6/25	yar-as-ase-te-itadak-
Representatives	Tatsuya Ito	2004/10/26	okonaw-as-ase-te-itadak-
Representatives	Tatsuya Ito	2004/10/26	okonaw-as-ase-te-itadak-
Representatives	Tatsuya Ito	2004/11/4	okonaw-as-ase-te-itadak-
Representatives	Tatsuya Ito	2004/11/4	okonaw-as-ase-te-itadak-
Representatives	Tatsuya Ito	2004/11/30	tukur-as-ase-te-itadak-
Representatives	Tatsuya Ito	2005/3/15	morikom-as-ase-te-itadak-
Representatives	Tatsuya Ito	2005/10/25	tor-as-ase-te-itadak-
Representatives	Tatsuya Ito	2005/10/25	tukaw-as-ase-te-itadak-
Representatives	Ikuo Yamahana	2001/3/28	hair-as-ase-te-itadak-

Appendix IV: Examples of *sa*-Insertion in CSJ

Speech ID	*sa*-Insertion
A01M0115	yob-as-asi-te-itadak-imasu
A01M0838	yob-as-asi-te-itadak-imasu-ga
A01M0889	yob-as-asi-te-itadak-imasu
A02F0800	hair-as-asi-te-itadak-imasu
A02M0854	yom-as-ase-te-itadak-imasu-to
A03M0016	owar-as-asi-te-itadak-imasu
A03M0583	ugok-as-asi-te
A04M0229	owar-as-ase-te-itadak-imasu
A05M0858	habuk-as-asi-te-itadak-imasita
A06F0210	tob-as-asi-te-itadak-imasi-te
A07F0366	yar-as-ase-te-itadaita-n-desu-keredomo
A07F0366	kubar-as-ase-te-itadaita-n-desu-keredomo
A08F0323	kubar-as-asi-te
A10M0580	furikaer-as-asite-itadak-imasu
M01M0007	kumiaw-as-ase
M01M0011	owar-as-ase-te-itadakitai-to-omoi-masu-keredomo
S00F0595	owar-as-ase-te-itadak-imasu
S01F1522	kawaigar-as-asi-te-itadaite-masu
S01M0460	owar-as-asi-te-itadak-imasu
S01M0464	owar-as-ase-te-itadakitai-to-omoi-masu-keredomo
S01M0851	owar-as-asi-te-itadak-imasu
S02M0478	owar-as-asi-te-itadak-imasu
S02M0772	owar-as-asi-te-itadak-imasu
S02M1331	owar-as-ase-te-itadak-imasu
S02M1372	owar-as-asi-te-itadak-imasu
S03M0081	owar-as-asi-te-itadak-imasu
S03M0976	owar-as-asi-te-itadak-imasu
S04M0379	owar-as-asi-te-itadaite-yorosii-desyoo-ka
S04M0880	tuk-as-asi-te-itadaki
S04M1251	owar-as-asi-te-itadak-imasu
S04M1451	nom-as-asi-te-itadak-imasita
S05M0626	owar-as-ase-te-itadak-imasu
S06M0784	owar-as-asi-te-itadak-imasu
S06M0872	owar-as-asi-te-itadak-imasu
S06M1125	mawar-as-asi-te-itadak-imasita
S07F1336	tukur-as-ase-ru-yootien-datta-n-desu-keredo
S07M0714	owar-as-ase-te-itadak-imasu
S07M1052	owar-as-asi-te-itadak-imasu
S07M1366	erab-as-ase-te-itadak-imasita
S09M0974	owar-as-asi-te-itadak-imasu
S09M1274	owar-as-asi-te-itadak-imasu
S11M1257	ugok-as-asi-te-kure-to-ittemo

Appendix V: Examples of *ra*-Deletion in Diet database

House	Name	Date	*ra*-Deletion
Councilors	Soji Okada	1951/11/16	wakar-ase-re-ru-node
Councilors	Iichiro Hatoyama	1956/3/6	de-re-ru-ga
Councilors	Akira Kuroyanagi	1971/11/4	mi-re-ru-no-desuyo
Councilors	Akira Kuroyanagi	1971/12/8	mi-re-nai-koto-wa
Councilors	Akira Kuroyanagi	1976/10/29	de-re-nai-toiu-sindan
Councilors	Akira Kuroyanagi	1976/10/29	de-re-nai-toiu-sindan
Councilors	Iichiro Hatoyama	1977/5/18	mi-re-ru-mondai
Councilors	Iichiro Hatoyama	1977/5/19	mi-re-ru-nja-nai-ka-to
Councilors	Akira Kuroyanagi	1980/3/28	ko-re-masu-ka
Councilors	Akira Kuroyanagi	1981/6/1	mi-re-nai
Councilors	Akira Kuroyanagi	1984/7/4	mi-re-ru-ka-dooka
Councilors	Yasumasa Narasaki	1994/1/19	mi-re-ru-hireidaihyoosei
Councilors	Sanzo Hosaka	1997/5/13	mi-re-naku-naru
Councilors	Yasuo Ogata	1997/12/16	mi-re-nai
Councilors	Sanzo Hosaka	1998/4/2	mi-re-nai
Councilors	Yasuo Ogata	1998/9/29	mi-re-ru-wake
Councilors	Sota Iwamoto	1999/3/9	mi-re-naku-naru-to
Councilors	Sota Iwamoto	1999/9/30	ko-re-nai
Councilors	Sota Iwamoto	1999/10/13	mi-re-ru-to
Councilors	Sota Iwamoto	1999/10/15	mi-re-nai-koto
Councilors	Toshio Ogawa	1999/11/18	mi-re-ru-to-wa
Councilors	Akira Koike	2001/5/30	ko-re-masen
Councilors	Toshio Ogawa	2002/4/8	de-re-nai-mama
Councilors	Toshio Ogawa	2002/4/8	de-re-ru-ka
Councilors	Toshio Ogawa	2002/4/8	de-re-nai-ka
Councilors	Toshio Ogawa	2002/4/8	de-re-ru-koto-ni
Councilors	Toshio Ogawa	2002/4/8	de-re-ru-to
Councilors	Toshio Ogawa	2002/4/8	de-re-ru-ka
Councilors	Toshio Ogawa	2002/4/8	de-re-ru-koto-ni
Councilors	Toshio Ogawa	2002/4/8	de-re-ru-kara-toiu
Councilors	Toshio Ogawa	2002/4/8	de-re-ru-ka
Councilors	Toshio Ogawa	2002/4/8	de-re-nai-toiu-jootai
Councilors	Toshio Ogawa	2002/4/8	de-re-ru-ka
Councilors	Toshio Ogawa	2002/4/8	de-re-nai-ka
Councilors	Toshio Ogawa	2002/4/8	de-re-nai-toiu-koto
Councilors	Toshio Ogawa	2002/4/8	de-re-ru-toiu-no
Councilors	Toshio Ogawa	2002/4/8	de-re-te
Councilors	Toshio Ogawa	2002/4/8	de-re-nai-to
Councilors	Toshio Ogawa	2002/4/8	de-re-nai-wake-desu
Councilors	Toshio Ogawa	2002/4/8	de-re-nai-wake-desuyone
Councilors	Toshio Ogawa	2002/5/21	mi-re-ru-basyo
Councilors	Toshio Ogawa	2002/6/4	ne-re-naku-nattyau-nde

Councilors	Kayoko Shimizu	2002/11/20	ko-re-ru-yooni-natta
Councilors	Kayoko Shimizu	2002/11/20	ko-re-nai-yoona-sikumi
Councilors	Kayoko Shimizu	2002/11/20	ko-re-nai-toiu-no-wa
Councilors	Kayoko Shimizu	2002/11/20	ko-re-nai
Councilors	Takahiro Kuroiwa	2003/5/27	uke-re-masen-kara
Councilors	Kayoko Shimizu	2004/3/3	de-re-ru-no-ka-toiu-koto
Councilors	Kayoko Shimizu	2004/3/3	de-re-ru-yoona-jookyoo
Councilors	Toshio Ogawa	2004/3/30	mi-re-nai-yoona-mono
Councilors	Toshio Ogawa	2004/3/30	mi-re-nai-wake
Councilors	Toshio Ogawa	2004/3/30	mi-re-ru-toiu-koto
Councilors	Toshio Ogawa	2004/3/30	mi-re-ru-toiu-yoona
Councilors	Sota Iwamoto	2004/5/19	de-re-nai-toiu
Councilors	Hideki Wakabayashi	2005/3/9	mi-re-ru-yosa
Councilors	Hideki Wakabayashi	2005/3/18	mi-re-nai-wake-desu
Councilors	Takahiro Kuroiwa	2005/3/31	kime-re-masu-kara
Councilors	Hideki Wakabayashi	2005/5/11	ko-re-ta-toiu-no-wa
Councilors	Akira Koike	2005/6/16	mi-re-nai-nda-to
Councilors	Akira Koike	2005/6/16	mi-re-nai-nda-toiu
Councilors	Hideki Wakabayashi	2005/7/19	de-re-ru-yooni
Councilors	Hideki Wakabayashi	2005/8/4	tabe-re-ru-wake-ja-nai
Councilors	Hideki Wakabayashi	2005/12/12	mi-re-ta-toiu
Councilors	Takahiro Kuroiwa	2006/3/8	mi-re-nai-to
Councilors	Akira Koike	2006/3/16	mi-re-ru-yooni-natte-ita-to
Councilors	Takahiro Kuroiwa	2006/5/30	uke-re-nai-nja-nai-ka-toiu
Councilors	Akira Koike	2007/3/15	ne-re-ru-yooni-natteiru-ndesune
Councilors	Akira Koike	2007/3/15	ne-re-ru-yoona-jootai
Councilors	Akira Koike	2007/5/29	ne-re-ru-dake-ii-to
Councilors	Akira Koike	2007/5/29	kari-re-ru-yooni
Councilors	Akira Koike	2007/11/27	mi-re-nai-intoranetto-ni
Representatives	Yoshio Sakurauchi	1950/12/8	ire-re-te-iku
Representatives	Yoshio Namiki	1953/10/31	de-re-ru-mono-o
Representatives	Yoshio Namiki	1954/3/22	kakudai-sare-re-te-ori-masu
Representatives	Yoshio Namiki	1955/7/30	ko-re-nai-toiu-jijoo
Representatives	Yoshio Sakurauchi	1965/2/18	mi-re-ru-no-ka-toiu-koto
Representatives	Yoshio Sakurauchi	1973/4/17	kari-re-ru-kufuu
Representatives	Michio Ochi	1976/7/13	ko-re-tara
Representatives	Yoshio Sakurauchi	1978/6/23	mi-re-ru-mono-ka-toiu
Representatives	Keigo Ouchi	1980/4/14	mi-re-nai-koto-mo-nai-to
Representatives	Michio Ochi	1981/9/8	de-re-ru-no-ka
Representatives	Keigo Ouchi	1986/2/6	mi-re-ru-toiu
Representatives	Michio Ochi	1994/3/30	mi-re-ru-ndesu-keredomo
Representatives	Tastuya Ito	1998/3/11	mi-re-ru-yoona-sooiu-nihon
Representatives	Kenji Yamaoka	2001/5/15	mi-re-ru-mono-ja-nai
Representatives	Shozo Azuma	2002/5/21	ko-re-ru-hazu-nai
Representatives	Shozo Azuma	2002/5/29	mi-re-nai

Representatives	Keiichi Ishii	2002/6/5	ko-re-nai
Representatives	Yoshikatsu Nakayama	2003/2/26	mi-re-ru-si
Representatives	Ikuo Yamahana	2003/2/26	mi-re-ru-jookyoo-ni-aru
Representatives	Jin Matsubara	2004/2/18	ko-re-nakatta-no-ka
Representatives	Jin Matsubara	2004/4/14	mi-re-ru-ndesuyo
Representatives	Jin Matsubara	2004/4/14	mi-re-ru-ndesuyo
Representatives	Yoshikatsu Nakayama	2004/6/11	mi-re-masen-ka
Representatives	Satoshi Takayama	2005/5/13	mi-re-nakya-ikenai-toiu

Appendix VI: Examples of *ra*-Deletion in CSJ

Speech ID	*ra*-Deletion
A01F0305	kotae-re-ru-yooni
A01M0007	hippatteko-re-ru-toiu
A01M0052	e-re-teimasu
A01M0054	nige-re-ru-yooni
A01M0088	atae-re-ru
A01M0269	tasikame-re-ru-toiu
A01M0280	mi-re-ru-yooni
A01M0284	tate-re-ru-nodewanaika-toiu
A01M0326	kumiawase-re-naika-tteiu
A01M0517	mise-re-reba
A01M0517	mi-re-nai-si
A01M0517	mise-re-masen-ga
A01M0525	kangae-re-masu-kedomo
A01M0565	mi-re-masu
A01M0590	ko-re-naku
A01M0723	nose-re-nakatta-ndesukeredo
A01M0965	mi-re-naika-toiu
A02F0116	kangae-re-ru-mononado
A03M0050	tuke-re-nai-daroo-to
A03M0167	kotae-re-ru-no-wa
A03M0167	osae-re-reba
A03M0167	kotae-re-masukara
A03M0179	hippatteko-re-ru-ndesukedo
A03M0197	kangae-re-naika-to
A03M0252	mituke-re-nai-to
A03M0343	mi-re-masen-de
A03M0404	wake-re-ru
A03M0465	kangae-re-ru
A03M0465	matomeage-re-ru-tteiu
A03M0555	kangae-re-ru-wakedesu-keredomo
A03M0555	kangae-re-ru-ndesu-ga
A03M0555	kangae-re-masu
A03M0589	age-re-ru
A03M0875	matome-re-ru
A04M0229	tae-re-ru-yooni
A04M0392	mi-re-ru-yooni
A04M0392	mi-re-ru-yooni
A04M0477	mi-re-ru-to
A04M0569	kangae-re-masu
A04M0570	mi-re-ru-yooni
A04M0680	mi-re-ru-dearoo-to
A04M0696	kotae-re-nai-yoona

A04M0699	totteko-re-ru
A04M0919	totteko-re-ru-wakedesune
A05M0217	tabe-re-masu-si
A05M0217	tame-re-ru-to
A05M0217	mi-re-ru-wakenandesune
A05M0724	mi-re-ru
A05M0762	ko-re-nai-tteiu-yoona
A05M0890	kankeeduke-re-teru-wakedesu-keredomo
A05M0890	ko-re-nai-tteiu
A05M0890	oko-re-nai-toiu
A06M0092	mi-re-ta-ndesu-ga
A07F0827	hippatteko-re-reba
A07M0329	kotae-re-ru-katte
A07M0329	kotae-re-soona
A07M0329	mi-re-ru-wakenandesu-ga
A07M0374	mise-re-nai-nsu-ga
A07M0534	motteko-re-masen-desita-node
A07M0630	tuke-re-ru-ndesune
A07M0733	e-re-ru-yoona
A07M0740	tasikame-re-masu-ga
A07M0781	mi-re-te
A07M0843	ko-re-naku
A07M0848	mi-re-ru
A07M0926	kangae-re-rare-teimasite
A07M0961	mi-re-ru-to
A08F0499	tabe-re-nakatta-no-desu
A08M0515	kangae-re-masitara
A08M0948	tate-re-ta-to
A08M0948	tate-re-ta
A09M0863	kangae-re-ru-to
A09M0863	ukeire-re-ru-monode-nai
A12M0980	ire-re-reba
A12M0986	hippatteko-re-ru
A12M0986	hippatteko-re-ru-yooni
A12M0986	hippatteko-re-te
A12M0986	hippatteko-re-ru-yoona
D01F0057	sinji-re-ta
D01M0012	de-re-nai-ndesune
D01M0019	ne-re-nai-si
D01M0043	tabe-re-naku
D01M0043	tabe-re-nakatta-tteiu-hodo-demo
D04M0041	mi-re-nai-desukara
M01M0012	motteko-re-nai-nja-naika-to
M02M0018	mi-re-ta-ndesu-kedomo
M03M0009	mi-re-nai-wake-desu

R00F0287	mi-re-ru-ndesuyo
R00M0286	e-re-n-node-areba
R00M0286	uke-re-ru-node-areba
R03F0083	narabe-re-ru-n-desu
S00F0018	ki-re-ru-yoona-mon-ga
S00F0019	tabe-re-ru-ndesu-keredomo
S00F0019	tabe-re-te
S00F0019	mi-re-nakatta-no-ga
S00F0066	mi-re-nakute
S00F0082	tabe-re-ru-nde
S00F0086	tabe-re-nai
S00F0088	oriteko-re-ru-ndesu-ga
S00F0095	tabe-re-te
S00F0114	mi-re-ru-nanteiu
S00F0178	mi-re-ru-ndesu-keredomo
S00F0197	mi-re-ta-toiu
S00F0197	mi-re-masita-node
S00F0222	tabe-re-nai
S00F0230	ne-re-nai-toiu
S00F0327	de-re-ru-yoona-tokoro-ga
S00F0537	kari-re-naku
S00F0631	mi-re-ta-ndesu-keredomo
S00F0697	deteko-re-nai-yoona
S00F0730	ki-re-ru-yoona
S00F0817	tuiteko-re-nai
S00F1043	ne-re-ru-kana-mitaina
S00F1186	tabe-re-ta-no-tte
S00F1186	tabe-re-ru-ndesu-kedo
S00F1186	tabe-re-nai-ndesuyo
S00F1305	ki-re-nakattari
S00F1309	mi-re-nai
S00F1445	de-re-ru-yoona
S00M0002	tabe-re-ru
S00M0059	de-re-ru-yooni
S00M0228	de-re-nai-yoona
S00M0287	toji-re-nai-si
S00M0287	mi-re-nai-desune
S00M0287	ne-re-zu-ni
S00M0441	de-re-nai-ndayo
S00M0473	de-re-ru-ndesuyo
S00M0475	mi-re-naku
S00M0477	kaimami-re-ru
S00M0477	modotteko-re-nai-toka
S00M0793	yame-re-nai-node
S00M0834	de-re-naku

S00M1500	suwanaide-i-re-ru-tteiu
S00M1500	i-re-ru-naraba
S00M1629	tabe-re-nai-nda-tteiu
S00M1667	tabe-re-nai-toiu
S01F0006	tabe-re-nai-toiu
S01F0050	ne-re-masen-desita
S01F0050	mi-re-ta-tteiu
S01F0050	mi-re-te
S01F0064	ne-re-nai-ndesu-kedo
S01F0064	mi-re-ru
S01F0105	mi-re-ta-to
S01F0105	ko-re-ta-tteiu-no-ga
S01F0105	mi-re-ta-to
S01F0183	de-re-nai
S01F0217	mi-re-ruyo-tteiu-tokoro-o
S01F0217	tabe-re-nai
S01F0220	ki-re-nai
S01F0237	tabe-re-ru-yoona
S01F0282	mi-re-nakute
S01F0282	mi-re-nakatta-node
S01F0282	oboe-re-nai-nde
S01F0283	oboe-re-ru
S01F0482	tabe-re-ru-yooni
S01F0507	mi-re-te
S01F0676	ko-re-naku
S01F0915	deteko-re-nai-toiu-yoona
S01F1035	oki-re-nai-ndesu-ga
S01F1163	mi-re-te
S01F1163	motteko-re-nai-rasikute
S01F1163	mi-re-ru-toiu
S01F1281	itteko-re-masita
S01F1387	iki-re-ru-ni-wa
S01F1452	de-re-nai
S01F1452	de-re-nai-tteiu
S01F1516	mi-re-ta
S01F1527	mi-re-ru-tteiu
S01F1527	mi-re-ru-kana-tte
S01F1527	mi-re-ru-ndesuyo
S01F1527	mi-re-ru-si
S01F1527	mi-re-ru-nda-mitaina
S01F1527	mi-re-nai-kara
S01M0005	tabe-re-ru-to
S01M0101	mi-re-nakatta-ndesu
S01M0182	tabe-re-naku
S01M0182	tabe-re-nai-to

S01M0227	ne-re-ru
S01M0227	ne-re-nai
S01M0450	de-re-ru-no-wa
S01M0450	ne-re-naku-te
S01M0460	kaimami-re-ta-yoona
S01M0706	mi-re-nai-ndesuyone
S01M0760	kaetteko-re-nai-node
S01M0998	e-re-ru-node-areba
S01M0998	uke-re-ru-node-areba
S01M1009	kakikae-re-ru-sina-toka-tte
S01M1120	de-re-ru-yooni
S01M1256	oki-re-ru-nokana
S01M1480	mi-re-te
S01M1492	de-re-ru-yooni
S01M1592	mi-re-ru-ndesuyo
S01M1592	mi-re-ta-noka-to
S01M1614	kari-re-ru-daroo-to
S01M1647	de-re-ru-ka
S01M1647	de-re-ta-tteiu
S01M1647	de-re-ru-yooni
S01M1681	mi-re-ru-na-to
S01M1681	mi-re-ru-to
S01M1681	mi-re-te
S02F0012	ko-re-masen-desita
S02F0120	ko-re-nai-yoona
S02F0160	kaetteko-re-nakute
S02F0273	mi-re-nakatta-desune
S02F0273	mi-re-masen
S02F0273	tabe-re-masen
S02F0433	tabe-re-nai-node
S02F0433	tabe-re-nai
S02F0433	kanji-re-ru
S02F0756	oki-re-naku-te
S02F0923	tabe-re-ru-rasii-ndesu-kedo
S02F1109	kaetteko-re-nai-toka
S02F1209	uke-re-ru-tokoro-ga
S02F1209	uke-re-ru-tokoro-ga
S02F1209	uke-re-ru-mitaina
S02F1209	uke-re-ru-si
S02F1209	uke-re-soona
S02F1211	oki-re-naku-te
S02F1313	yorokonde-age-re-nakattari
S02F1639	okiteko-re-nai-n-ja-naika-tteiu-yoona
S02F1639	motteko-re-nai-node
S02F1639	toji-re-nakute

S02F1639	toji-re-ru-yooni
S02F1671	kotae-re-ru-yooni
S02F1695	ori-re-masen-desita
S02M0011	ne-re-ru-no-o
S02M0011	ne-re-ru-si
S02M0011	ne-re-ru-si
S02M0245	i-re-ru-toiu
S02M0461	i-re-ru-wake-desu-kara
S02M0461	torinozoite-age-re-ru-yoona
S02M0586	mi-re-nai-tte
S02M0663	ire-re-ru-ndesu-kedomo
S02M0673	i-re-nakatta-no-kana-to
S02M0791	kaetteko-re-nai-nda-to
S02M1004	iki-re-te
S02M1004	iki-re-ru-to-wa
S02M1167	tabe-re-nai
S02M1167	tabe-re-nakatta
S02M1167	mi-re-ru-si-nante
S02M1167	kaetteko-re-ru
S02M1279	yame-re-nakatta
S02M1338	tabe-re-nakatta-to
S02M1422	ne-re-naku-te
S02M1504	kaetteko-re-nai-janai-to
S03F0087	de-re-masu-si
S03F0087	oki-re-naku-te
S03F0119	mi-re-masu
S03F0133	haitteko-re-nai-node
S03F0175	kari-re-tyau-yoona
S03F0175	kari-re-tyau-gurai-no
S03F0229	mi-re-ru-tte
S03F0440	mi-re-ru-ndesu
S03F0501	i-re-nai-ndesu-kedo
S03F0501	mi-re-ta-ndesu-ga
S03F0737	mi-re-ru-ndesuyo
S03F0816	de-re-ru
S03F0879	ko-re-te
S03F0918	de-re-ru-node
S03F0918	tabe-re-nai-node
S03F0918	tabe-re-ru-node
S03F0936	tabe-re-masen
S03F0964	mi-re-ru-toiu
S03F0964	mi-re-ru-no-ga
S03F1162	tabe-re-nai
S03F1162	tabe-re-ru
S03F1443	ko-re-masu-node

S03F1532	tabe-re-masen
S03M0046	ko-re-masu-si
S03M0089	de-re-masu-ne
S03M0138	ko-re-masu
S03M0147	oikake-re-nai-toko-niwa
S03M0465	tabe-re-ru
S03M0570	tabe-re-nai-to
S03M0570	sume-re-tara
S03M0671	tabe-re-ru-si
S03M1049	mi-re-nai-hodo-datta-ndesu-kedomo
S03M1284	de-re-masu
S03M1335	tabe-re-ru
S03M1335	tabe-re-nai-node
S03M1615	tabe-re-te
S03M1630	mi-re-nai-to
S04F0371	tuduke-re-ru-to
S04F0411	mi-re-ta-si
S04F0411	mi-re-ta-si
S04F0506	mi-re-ru-yooni
S04F0506	de-re-ru
S04F0542	de-re-tyau-ndesuyone
S04F0814	deteko-re-masu-node
S04F0814	kaetteko-re-ru-ndesu
S04F0849	ko-re-nakatta-ndesu-keredomo
S04F0925	mi-re-ru-tteiu
S04F0925	mi-re-nai-mono-ga
S04F0925	tabe-re-ru-toiu
S04F0925	tabe-re-ru
S04F0925	tabe-re-ru-tteiu
S04F1079	mi-re-ru-kara-desu
S04F1079	mi-re-nai
S04F1105	de-re-nai-ndesune
S04F1148	tabe-re-ru-tteiu
S04F1356	mi-re-ru-toiu
S04F1356	tabe-re-ru-karane-tte
S04F1356	tabe-re-ru-tteiu
S04F1358	ko-re-ru-ndesu-kedomo
S04F1470	ko-re-ta-no-mo
S04F1682	ko-re-ta-ndesu-keredomo
S04M0304	tabe-re-ru-mon-desu-kara
S04M0304	tabe-re-masu-kara
S04M0330	mi-re-ru
S04M0330	ko-re-ru-toiu
S04M0421	de-re-nakatta-ndesu-kedo
S04M0527	mi-re-te

S04M0568	ire-re-ru-toiu
S04M0662	mi-re-ru
S04M0662	mi-re-ru-node
S04M0869	mi-re-ru-tokane
S04M0869	mi-re-nai
S04M0965	mi-re-ru-tokoro-ga
S04M1087	mi-re-ru-toiu
S04M1140	mi-re-ru-ndesune
S04M1263	mi-re-ru
S04M1494	tate-re-te-desune
S04M1494	ta-te-re-te
S04M1512	motteike-re-ru-yooni
S05F0170	mi-re-ru
S05F0240	ko-re-naina
S05F0250	mi-re-masu-node
S05F0292	kangae-re-ru
S05F0435	ori-re-nakattari
S05F0435	tabe-re-ru-node
S05F0435	tabe-re-ta-si
S05F0463	e-re-ta-toiu-koto-demo
S05F0474	iki-re-ruyo-toka
S05F0485	i-re-ru-nda
S05F0516	tabe-re-te
S05F0549	oboe-re-ru-yooni
S05F0549	uke-re-ru-kara
S05F0600	ki-re-nai-mono-toka
S05F0612	de-re-nai
S05F0612	mi-re-ru-ndesu-kedo
S05F0612	de-re-naku
S05F0625	ko-re-nai
S05F0629	mi-re-ta-node
S05F0661	ko-re-nakatta-node
S05F0810	tabe-re-masen
S05F0899	tabe-re-masen
S05F0899	mi-re-masita
S05F0952	kari-re-ta-node
S05F0952	modotteko-re-naku
S05F1033	tabe-re-ru-yoona
S05F1033	kaimami-re-ta
S05F1072	mi-re-ta-yoode
S05F1072	mi-re-nai
S05F1357	tabe-re-ru-yoona-mono-dewa-naku
S05F1391	mi-re-nai-mono
S05F1407	kari-re-ta-tokoro-datta-kana-tte
S05F1456	ko-re-naku

S05F1471	ko-re-naku-tesa-tte
S05F1654	mi-re-ta-no-mo
S05M0259	mi-re-nai
S05M0417	mi-re-ru-toiu
S05M0613	ne-re-nai
S05M0650	itteko-re-masu-node
S05M0746	yame-re-nai-to
S05M0746	tabe-re-ru-yooni
S05M0797	sake-re-ta-kamo-sirenai-tte
S05M0891	mi-re-ru-tokoro-ga
S05M0891	mi-re-zu-ni-tte
S05M0891	mi-re-nai-yoona
S05M0905	mi-re-nakatta-ndesu-ga
S05M1258	de-re-masen-si
S05M1623	ko-re-naku
S05M1688	mi-re-ta
S05M1688	mi-re-nai-tte
S06F0167	kanji-re-reba
S06F0363	uketome-re-naku-te
S06F0452	de-re-ru-rasii-ndesune
S06F0845	mi-re-te
S06F0845	ne-re-ru-to
S06F1031	deteko-re-nai-si
S06F1037	ire-re-ru
S06F1123	de-re-nai-mitaida-si
S06F1195	mi-re-ru
S06F1195	torituduke-re-na-kereba-nara-nai-mono-desu-node
S06F1273	ne-re-ru-tte
S06F1273	ne-re-nai-toka-tte
S06F1280	mi-re-ru-tteiu-no-ga
S06F1280	mi-re-ru-tteiu
S06F1280	mi-re-ru-si
S06F1369	ki-re-naku
S06F1625	mi-re-masen-desita
S06F1679	daite-age-re-nakatta-no-ka
S06F1679	sasinobe-re-nakatta-no-ka-toiu
S06F1679	sasinobe-re-nakatta-no-ka
S06F1679	sasinobe-re-nakatta-no-ka
S06M0262	kaimami-re-ru-mono-de
S06M0262	mi-re-nai-wake-de
S06M0557	tuiteko-re-nai-kedo
S06M0795	kime-re-ru
S06M0846	mukae-re-runa-to
S06M0846	uke-re-ru
S06M1125	mi-re-ru-yoona

S06M1190	de-re-nakattari
S06M1219	de-re-nai-tteiu-no-wa
S06M1219	kaimami-re-te-ite
S06M1454	de-re-ru-toiu
S06M1661	haitteko-re-masen-si
S07F0372	mi-re-ru
S07F0372	mi-re-ru-nja-nai-kana-nante
S07F0372	mi-re-ru-nja-nai-ka
S07F0372	tabe-re-ru-nja-nai-kana-tteiu-tokoro-de
S07F0372	iki-re-ru-ka
S07F0523	ikinobi-re-ru-ndewa-nai-kana-toiu
S07F0654	tabe-re-ru-mono-wa
S07F0654	ne-re-ru-ndesu-kedo
S07F0654	tuke-re-nai-gurai
S07F0654	tabe-re-nai-kamo-sirenai-si
S07F0762	tabe-re-naku-te
S07F0770	kaetteko-re-ru-no-kana-tteiu
S07F0947	de-re-ru-ndesu-keredomo
S07F1023	tabe-re-ru-ka
S07F1023	tabe-re-nai-ka-toka
S07F1023	tabe-re-nai
S07F1023	tabe-re-ru-mono
S07F1023	tabe-re-nai-mono
S07F1023	tabe-re-ru-wake-ja-nai-desu-kara
S07F1023	tabe-re-ru-yo
S07F1023	tabe-re-naiyo-toka-iu-yoonane
S07F1023	tabe-re-ru-toka
S07F1023	ikinobi-re-ru-da-toka
S07F1070	ne-re-nai-no-desu
S07F1070	ne-re-nai-no-desu
S07F1070	ne-re-ru-to
S07F1161	ne-re-te
S07F1161	ne-re-ta
S07F1426	ko-re-nai-daroo-toiu
S07F1487	mi-re-ru-mono-nanode
S07F1487	ne-re-ru-kana-tomo
S07F1561	tabe-re-ru-mono-mo
S07F1561	tabe-re-ru
S07F1586	mi-re-ru-to
S07F1638	mi-re-ru-nja-nai-kana
S07F1645	mi-re-nai-keredomo
S07M0588	tabe-re-ru
S07M0604	tabe-re-ru-to
S07M0604	tabe-re-ru-kana-to
S07M0688	ne-re-ru-no-kana-nante

S07M0738	tabe-re-ru
S07M0738	tabe-re-ru-mono
S07M0738	tabe-re-ru-mono-o
S07M0847	i-re-ru
S07M0911	tabe-re-ru-mono
S07M0911	tabe-re-nai-mono
S07M1101	mi-re-te
S07M1332	mi-re-nai-nde
S07M1389	kaetteko-re-ru
S07M1389	kaetteko-re-ru-toiu
S07M1389	mi-re-ru-wake-demo-nai-si
S07M1389	ikinobi-re-ru-kana-mitaina
S07M1572	tuke-re-soona
S07M1628	ko-re-ru
S07M1632	tabe-re-ru
S08F0857	ko-re-nai
S08F0857	ko-re-nai-mono-tteiu-no-wa
S08F0857	ko-re-nai
S08F0876	tabe-re-ru-node
S08F1200	ki-re-ru-tteiu
S08F1429	mi-re-masu
S08F1435	tabe-re-nai-gurai
S08F1489	mi-re-ru-no-ga
S08M0510	tabe-re-te
S08M0692	mituke-re-reba-desune
S08M0726	hippatteko-re-masen-kara
S08M0726	tukure-te-ko-re-masen
S08M0819	mi-re-ru
S08M0914	tabe-re-ru-mono-o
S08M0984	mi-re-te
S08M0984	tabe-re-masu-kara
S08M0985	kari-re-masita
S08M0985	tabe-re-masu-keredomo
S08M1255	kime-re-ru-no-ni
S08M1255	osae-re-nakatta-si
S08M1265	tabe-re-ru-yoona
S08M1421	kazoe-re-ru-yooni
S09F0276	mi-re-ta
S09F0813	i-re-nai-ndesune
S09F0888	tabe-re-ru
S09F0888	tabe-re-ru-toka
S09F0888	tabe-re-ru-node
S09M0236	de-re-nai
S09M0236	de-re-nai-tteiu
S09M0236	de-re-ru

S09M0325	yame-re-ta-si-toka
S09M0336	omoware-re-ru
S09M1523	kangae-re-ru-nara
S09M1523	mi-re-nai-yoona
S09M1528	de-re-nai
S09M1528	de-re-nakatta-no-desu-ga
S10F0437	ki-re-nakattari
S10F0455	mi-re-naku
S10F0545	ko-re-nai-nja-nai-no-kana
S10F1096	ko-re-ru-yooni-to
S10F1676	i-re-nai-node
S10F1676	de-re-ru-yooni
S10M0289	mi-re-tari
S10M0289	mi-re-tari
S10M0289	mi-re-tari
S10M0491	mi-re-ru-wake-desune
S10M0504	haitteko-re-nai-to
S10M0920	ko-re-nai
S10M0957	kanae-re-ru-mon-dewa-nai-to
S10M0957	misite-age-re-ru-yoona
S10M0957	teikyoo-site-age-re-ru-yoona
S10M1488	umareteko-re-nai
S10M1488	ko-re-nakatta
S10M1488	tabe-re-nai-yoona-mono-o
S10M1608	ne-re-nai-toka
S11F0249	mi-re-ru-si
S11F0249	mi-re-ru-kana-to
S11F0544	ki-re-nai-tteiu
S11F0755	mi-re-ru-to
S11F0820	mi-re-nai-ndesu-kedone
S11F0820	mi-re-nai
S11F0823	tabe-re-ru
S11F0823	tabe-re-ru-toiu
S11F1015	tabe-re-naku-te
S11F1089	ko-re-nakatta-desu-keredo
S11F1102	ko-re-ru
S11F1469	mi-re-naku-te
S11F1485	haitteko-re-nai-si
S11F1485	haitteko-re-nai
S11F1485	mi-re-ru
S11F1502	mi-re-nai
S11F1641	dase-re
S11M0253	ikiteko-re-te-ru-gurai
S11M0309	tabe-re-nai-noni
S11M0414	otositeko-re-ru-to

S11M0414	ko-re-ru-to
S11M0419	nete-re-reba
S11M0454	kangae-re-masu
S11M0935	ukeire-re-ru
S11M1521	kaetteko-re-ru-tteiu
S11M1640	mi-re-ru

Appendix VII: Examples of *re*-Insertion in CSJ

Speech ID	*re*-Insertion
A05M0724	nar-e-re-naikara
A05M0729	or-e-re-masukeredo
A07M0926	kangae-re-rare-te-i-masite
A07M0956	arawas-e-re-ru-wakede
R00M0286	uke-re-re-runode-areba
R02M0115	narabe-rare-re-ru-ndesu
S00F0109	wake-rare-re-te
S00F0409	kangae-rare-re-nai-kurai
S01M1492	tuke-re-re-ruyooni
S03M0570	sum-e-re-tara
S04M1512	motteik-e-re-ruyooni
S04M1525	arawas-e-rare-nai
S06M1348	kakage-re-rare-masita
S07F1269	nokos-e-rare-ru-si
S07M0738	ikiteik-e-re-koto-ga
S07M0738	ik-e-re
S07M1052	sase-rare-re-masu-ne
S08M1255	kime-re-re-rutte-iu-kara
S11F1641	das-e-re
S11M1596	wasure-re-rare-naide-ori-masu