

Coercion and language change: A usage-based approach*

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Yoon, Soyeon. 2019. Coercion and language change: A usage-based approach. *Linguistic Research* 36(1), 111-139. This study explores the roles of frequency and expressions that are not perfectly compatible with existing grammar on the usage-based assumption that linguistic knowledge is grounded in language use. Specifically, this study examines grammatical knowledge regarding semantic compatibility between Korean *do*-light verb construction ([NP-*ul ha-ta*] 'do NP') and its co-occurring noun phrase (NP), and the resolution of their incompatibility (i.e., coercion). Altogether, 163 Korean native speakers were randomly assigned to four groups, each reading passages with five embedded sentences 10 times belonging to one of the four compatibility categories ([no/mild/strong/impossible] coercion) during five input sessions. When acceptability scores judged after the input sessions were compared to those before the sessions, the coerced sentences were judged more acceptable in general. Specifically, improvement in judgments on all compatibility degrees was the greatest in the group that read the strong coercion sentences, showing that the degree of grammar extension is correlated with the degree of coercion that the speakers have experienced. Moreover, judgments on sentences not exposed in the input sessions also similarly improved in the posttest, implying that speakers generalize the frequent coerced pattern applying it to new instances. The study demonstrates that frequency in relatively ungrammatical expressions in language use is one of the central mechanisms of language change. (Incheon National University)

Keywords semantic compatibility, coercion, frequency, language change, Korean light verb construction

1. Introduction

This study attempts to provide evidence to two questions regarding the relation between frequency in language use and language change: whether a

* This work was supported by the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2017S1A5A8020897). I would like to thank anonymous reviewers of this journal for their helpful and insightful comments.

linguistic pattern that is frequently exposed to language users eventually changes their existing grammatical knowledge, and what kind of linguistic pattern causes this change. I hypothesized that a pattern that is marginally inconsistent with existing grammar—for example in this study, a coerced pattern—causes the change if speakers frequently experience it. I tested the hypothesis through an experiment on Korean coerced expressions.

This hypothesis was proposed according to the assumption of the usage-based model of language (Kemmer and Barlow 2000; Kemmer 2008; Langacker 1988, 1991) that linguistic knowledge (grammar) is grounded in language use. The model predicts that if speakers experience similar instances repeatedly, they can generalize them into a pattern or schemas by extracting common features, constructing linguistic knowledge based on the pattern. Therefore, in the usage-based model, the frequency of a linguistic pattern plays an important role in establishing grammar; if a language user experiences a pattern frequently, it is cognitively entrenched as a schema in the language system.

In fact, studies on first language (L1) acquisition (Goldberg *et al.* 2004; Goldberg 2006, 2009) and foreign (or second) language (L2) acquisition (Ellis and Ferreira-Junior 2009; Ellis and Collins 2009; Wonnacott *et al.* 2012) indicate that frequency in language use does influence grammar formation when speakers acquire grammatical features. Note, however, that these speakers acquire the given grammatical features for the first time in their life. On the other hand, the effect of frequency in language use on existing grammar in speakers' minds has not been investigated. If this effect exists, frequency in language use can be considered an important factor that causes language change over time.

To explore the role of frequency in language change, this study focuses on the grammatical knowledge of semantic compatibility between a construction and a lexical item that occurs in it. Typically, a lexical item that is semantically compatible with the construction can occur together, as in the case where *give* is used in the ditransitive construction. They are semantically compatible because both the lexical item and the construction denote “transfer of possession.” Conversely, *cut*, a mono-transitive verb, is not very compatible with the ditransitive construction. However, it can occur in the construction as in, *I cut him a belt*, interpreted as “I made a belt by cutting it out of leather and gave it

to him” (Yoon 2012). Resolving the semantic incompatibility between a construction and a lexical item in it is called *coercion* (Michaelis 2005; Ziegeler 2007). In this study, I examined if a coerced linguistic pattern can change existing grammatical knowledge regarding semantic compatibility by experimenting on the coercion occurring in the Korean construction [N-*ul ha-ta*] ‘do N’ (e.g., *sanchaek-ul ha-ta* ‘do a stroll, have a stroll’). I examined if speakers’ acceptability judgments regarding expressions of different degrees of coercion improved after they were recurrently exposed to the coerced expressions over a certain period. I also examined the requisite strength in the coercion to effect change in judgments.

2. The correlation between frequency in language use and linguistic knowledge

In Cognitive Grammar (Langacker 1988) that the usage-based model is based on, coercion is a case of schema extension. A schema—a type of grammatical knowledge—is a pattern generalized from similar instances. For example, from instances such as *I gave him a toy* and *John handed her a book*, speakers derive a schema of a ditransitive construction where the form is [Subj [V NP1 NP2]] and the meaning is ‘Subj transfers possession of NP2 to NP1.’ In addition, in several instances that use *give*, speakers derive a schema of the word *give* where the form is *g-i-v-e* and meaning is ‘transfer of possession.’ Now they form a grammar regarding semantic compatibility where both are mutually compatible because their meanings are relatively similar. In turn, they can produce new compatible instances using this schema such as *Sarah lent him some money*. However, when they hear *I cut him a belt* where *cut* is not compatible with the ditransitive construction, they may *extend* the schemas of the construction and the word so they can process the sentence and interpret it as ‘cut and give.’ In other words, coercion occurs. The schema can be extended temporarily if speakers encounter a coerced sentence once in a while, but the following question arises: what will happen to the schema if they frequently extend the existing schema to process coerced sentences.

As briefly mentioned in Section 1, the usage-based model claims that a

frequent pattern is cognitively entrenched as a schema, affecting linguistic knowledge. If a construction and its co-occurring lexical item are less semantically compatible, it has been demonstrated that they occur less frequently and their co-occurrence requires longer processing time (Yoon 2012, 2013). However, this correlation between linguistic knowledge regarding semantic compatibility, frequency, and processing time does not suggest causality among these factors. Essentially, this correlation does not reveal if frequency in language use is one of the “causes” for the establishment of linguistic knowledge or grammar.

There has been extensive discussion in L1 acquisition literature regarding the acquisition of grammatical knowledge, frequency, cognitive salience, and prototype. Goldberg and her colleagues explored how children acquire abstract and schematic constructions by observing various verb-argument structure constructions in English (Goldberg *et al.* 2004; Goldberg 2006, 2009) and novel constructions (Wonnacott *et al.* 2012). Specifically, Goldberg *et al.* (2004) observed that the frequency pattern where children use various verbs within the target construction is similar to their care-givers. Interestingly, both care-givers and children use a particular verb within a target construction much more than other verbs (e.g., *give* was the most frequent verb in the ditransitive construction, and *put* in the caused-motion construction). Essentially, the frequent pattern significantly affects the acquisition of the grammatical feature. Kidd, Lieven, and Tomasello (2010) also demonstrated that children’s performance in the experiment was better when the sentence contained high frequency verbs. These results imply that the particular verb, which is the most frequently used within the construction, represents the other verbs that can be used in the construction, and children acquire grammatical knowledge regarding the construction based on that particular verb.

In addition, studies on the usage-based approach in L2 acquisition indicated similar results. Ellis and Collins (2009) claimed that if a verb exemplar is frequently exposed to learners, it contributes to defining the verb category that the exemplar belongs to and will be recognized as the prototype of the verbal category. Ellis, O’Donnell, and Römer (2014) proposed that prototypical inputs have additional advantages in learning the verb-argument structure because learners experience the prototype most frequently, strengthening the association

between the verb and the construction. Conversely, studies in L1 (Wonnacott *et al.* 2012) and L2 acquisition (Year and Gordon 2009) exist, demonstrating that children or learners can generalize patterns even for unfamiliar verbs better when they are exposed to inputs where the target construction is used with various verbs than when inputs are skewed to one or two particular verbs.

Whether inputs are skewed to particular verbs or balanced to various verbs, studies employing the usage-based approach to language acquisition thus far have supported the important role of frequency. Note that they utilize inputs that are considered grammatical or novel in the language. These inputs may form grammar and considerably entrench the existing grammar, but may not contribute to changing it. If frequent exposure to expressions that do not match existing grammatical knowledge can influence already existing grammar, we can support the role of frequency in forming and even changing linguistic knowledge.

Based on this prediction, Yoon (2016) examined if coerced expressions could affect acceptability judgments on exposed sentences and if this judgment could be generalized to unfamiliar expressions. In the experiment, the stimuli sentences comprised English ditransitive construction and various main verbs. The selected verbs had different degrees of semantic compatibility with the construction. The participants were Korean adults who had learned English for more than 10 years. They were divided into two groups, i.e., experiment and control groups. The experiment group judged the acceptability of the coerced sentences (pretest), read the target coerced sentences embedded in the passages eight times for four weeks (input sessions), then judged the acceptability once again (posttest). The control group read passages without coerced sentences. The participants judged the target coerced sentences more acceptable in the posttest than the pretest. Moreover, when they judged the coerced sentences that did not appear in the input sessions but only appeared in the pre/posttests, the acceptability increased in the posttest although the improvement was not as significant as the sentences appearing in the input sessions. The control group displayed no improvement. This suggests that acceptability improvement is not the consequence of frequent exposure to some particular sentences because participants could generalize the pattern to other similar new sentences. This study indicates that frequent experience of expressions that do not match existing grammar can change the

grammar.

Note, however, that participants in all the studies mentioned above were children who were at the initial stage of their L1 acquisition (Goldberg *et al.* 2004; Goldberg 2006, 2009; Kidd *et al.* 2010; Wonnacott *et al.* 2012) or L2 learners with no firmly established grammatical knowledge regarding the target grammatical features (Yoon 2016; Ellis *et al.* 2014; Ellis and Collins 2009; Year and Gordon 2009). Therefore, these studies do not demonstrate the role of frequency in language change because language change assumes that established grammar exists in speakers' minds. For example, in Yoon's study (2016), the Korean participants reported lack of confidence in their acceptability judgments. In addition, native English speakers who consulted the English sentences in the study judged the coerced sentences closer to the extreme (highly acceptable/highly unacceptable). This implies that adult native speakers' grammatical knowledge may be less susceptible to frequency.

Despite the expected resistance to frequency, if adult native speakers recurrently experience coerced expressions that can be generalized, it strongly highlights the role of frequency in forming grammar and further suggests that a pattern that is slightly "off" from existing grammar engenders change in grammatical knowledge. Therefore, this study attempts to explore if frequent experience of coerced expression can affect the existing grammar of adult native speakers. It also attempts to comprehend the extent to which degree of coercion affects grammar most effectively.

The experiments in the studies discussed in this section so far were all conducted in a controlled setting for relatively short period of time. Thus, the grammar established through the experiments may end up with "temporal" grammar unless the participants experience the target expressions continuously after the experiments are completed. Also, it is very difficult to observe and control the participants' linguistic knowledge for a few months or years. Nevertheless, the motivation of the generalizing the experimental results to the change in a linguistic system is the usage-based assumption: The frequent experience of a certain type of expression plays a key role in establishing grammar. The unfamiliar expressions in the experiments may be new and nonsense to the speakers, but if they experience the similar expressions recurrently for a long time, they can generalize the pattern out of the instances,

and eventually, the pattern becomes a part of their grammar in their linguistic system. Along with the previous usage-based studies in L1 and L2 acquisition, through a controlled experimental setting, this study attempts to simulate how frequency in usage can play a role in constructing and possibly changing grammar in reality.

3. Research method

By utilizing Korean sentences of different degrees of coercion, I examined if the acceptability judgments of Korean speakers change when they read these coerced sentences repeatedly.¹ The experiment comprises the acceptability judgment test (pretest), input of the target sentences 10 times throughout five sessions (input sessions), and another acceptability test (posttest).

3.1 Participants

Altogether 163 Korean native speakers (103 females and 60 males) volunteered for the experiment. All were university students between the ages of 19-24 from various majors. The participants were randomly assigned to four groups, each of which read passages that contained different sentences with different degrees of semantic compatibility. Consequently, 42, 40, 42, and 39 were assigned to Group 1, 2, 3, and 4, respectively. Group 1 read sentences with the best semantic compatibility (no coercion), Group 2 read sentences with the second best compatibility (mild coercion), Group 3 read sentences with the third best compatibility (strong coercion), and Group 4 read sentences with the worst compatibility (impossible coercion). The target sentence design is described in Section 3.2.

¹ This study assumes that acceptability judgments on sentences reflect speakers' grammar, although it is controversial to say that it is the best or the only representation of speakers' grammatical knowledge (Schütze 2016).

3.2 Korean light verb construction and its coercion

When setting up four categories of different degrees of semantic compatibility, rigorous semantic criteria are necessary. This study adopts the criteria proposed by Im and Lee (2013) which dealt with coercion occurring in Korean *do*-Light Verb Construction in the framework of Generative Lexicon.² Before introducing the criteria to determine the degrees of coercion in Korean LVC, I briefly illustrate how Generative Lexicon deals with coercion occurring in (1) (Pustejovsky 1991, 1995).

- (1) John began *a novel*.

The word *begin* typically requires an event type object as in *John began to read/write a novel*. Yet, we can understand (1) because *novel* is coerced into the meaning 'to read/write a book.' Pustejovsky (1995) claims that coercion of *novel* into the meaning of an event occurs based on "qualia structure." Qualia structure is a set of systematic properties of a lexical item which involves inherent semantic knowledge associated with the following four semantic types: material (Constitutive role); weight, shape, and color (Formal role); origin of the entity (Agentive role); built-in function (Telic role). In the case of *novel*, the constitutive quale is 'narrative' because it is made of narratives, the formal quale is 'book' because it takes the form of a book, the agentive quale is 'write' because it is created through being written by someone, and finally the telic quale is 'read' because it is made so that someone can read it.

When coercion occurs, we do not bring any random meaning. We don't see 'John began to burry a novel' as one of the readings of (1) unless we are given a specific context. Rather, we exploit the relevant meaning of a *novel*, i.e., we employ the inherent semantics of the word represented in its qualia structure. In the case of (1), we select either the telic role or the agentive role to understand

2 The Usage-based model and Generative Lexical theory may seem incompatible to adopt in one study because they take quite different views regarding language acquisition and use. This study does not attempt to compromise the two different views. Rather, the current study employs Generative Lexicon only to design different degrees of semantic compatibility in Korean LVC based on the previously proposed semantic foundation. Therefore, the explanation regarding Generative Lexicon in this section is somewhat simplified.

it as ‘John began to read/ write a novel.’ In this way, the qualia structure functions as a reference site when coercion occurs.

In the Generative Lexicon framework, Jun (2004) and Im and Lee (2013) studied Korean *do*-LVC (*do*-LVC) [NP-*ul* + *ha-ta*] (NP-accusative particle + ‘do’-declarative ending) and examined NP semantic conditions that can occur in this construction.

As in (2), this LVC typically requires an event type NP argument, implying that someone performs the NP action. Essentially, in Korean speakers’ minds, linguistic knowledge regarding semantic compatibility between the NP and *do*-LVC is that the NP denotes an event.

- (2) a. *Jane-un talimcil ha-ko-iss-ta* (Im and Lee 2013: 203)
 J-TOP ironing-ACC do-CON-PROG-DEC
 ‘Jane is doing ironing.’
 b. *haksayng-tul-i siwui-lul ha-ko-iss-ta* (Im and Lee 2013: 203)
 student-PL-NOM demonstration-ACC do-CON-PROG-DEC
 ‘Students are demonstrating.’

In (2), both “ironing” and “demonstration” are compatible with the LVC because they satisfy its semantic requirement that the arguments denote an action or an event. However, if the NP is an entity type, the sentence is ungrammatical as in (3).

- (3) **na-nun [khep/yeonphil]-ul hay-ss-ta*
 I-TOP [cup/pencil]-ACC do-PAST-DEC
 ‘I did a [cup/pencil].’

Since both “cup” and “pencil” denote an entity, not an event, the expressions in (3) do not meet Korean speakers’ linguistic knowledge.

Interestingly, however, the sentence in (4a) is not considered completely ungrammatical although the NPs indicate entities. These expressions can be interpreted as (4b). Here, the entity meaning is coerced to mean ‘to perform an activity relevant to the designated entity,’ and the incompatibility is resolved.

- (4) a. *John-un* [*piano/thayksi*]-*lul* *ha-n-ta* (Im and Lee 2013: 204, 219)
 John-TOP piano/taxi-ACC do-PRES-DEC
 ‘(lit.) John does a [piano/taxi]’
 b. ‘John [plays the piano /drives a taxi].’ (Im and Lee 2013: 204, 219)

In the case of *piano*, its telic quale is ‘to play’ because the built-in function of a piano is to play. As for *taxi*, its telic quale is ‘to drive.’ In order for an entity to be interpreted as an event, the telic role, which designates an event, is readily called for.

According to Im and Lee (2013), there are two conditions wherein coercion can occur in the *do*-LVC.³ First, if the argument is an entity, it must not be an entity of a natural type. For example, a noun, such as *wolf* and *rock*, is not an artifact, and has no function/purpose (Im and Lee 2013). In the qualia structure of these nouns, telic role and agentive role are empty. Since coercion in Korean LVC occurs due to the telic role, the natural type nouns cannot be coerced in the LVC as in **do a wolf/rock*.⁴ In order for coercion to occur, the NP must be a functional type entity, i.e., must have its function, like *taxi* and *piano*. For example, a taxi exists for the purpose of driving, a piano exists for the purpose of performing, and both exist because people created them.

Second, the entity must be a direct object of the event or activity that is linked to its telic quale. Briefly, it must have a *direct telic quale*. For example, *piano* is usually regarded as a direct object of the predicate *play*, and we can say that *piano* has a direct telic quale. If *piano* is used in the *do*-LVC, the expression can be coerced by exploiting the predicate of the direct telic quale; thus, “doing the piano” can be interpreted as “playing the piano” as in (4).

3 In addition to the two conditions presented in this study, Im and Lee (2013) propose one more condition regarding the aspectual constraint. Since this aspectual constraint is not a factor for determining the degree of coercion in this experiment, it is not discussed in this study. Also, they proposed *extended qualia* in order to explain semantic and syntactic behavior involved with the nouns. However, discussing the details of their proposal is beyond the scope of the current study.

4 Im and Lee (2013: 217) indicates that *toyaci* ‘pig’ and *kotunge* ‘mackerel’ in Korean are originally natural type but ‘reified as a unified functional type noun.’ These nouns have telic and agent roles because we ‘eat’ them by ‘catching’ them. Also, *namwu* ‘tree’ is a natural entity but it can also be a functional entity in that we ‘cut’ it for the purpose of ‘making paper’ or ‘using as firewood.’ When designing the experiment stimuli, I excluded the natural kind entities that can possibly be interpreted as a functional type.

Conversely, some nouns are functional type entities but do not have a direct telic quale. For example, a *desk* is an artifact and exists for the purpose of studying. Note, however, that a *desk* is not usually a direct object of the predicate *study*, but a locative (**to study a desk/to study at the desk*). In the case of *cup* in (3) the noun is an instruments (**to drink a cup / to drink with a cup*). Some might claim that we can exploit the direct telic quale ‘use’ or the agentive quale ‘make,’ but these predicates are never sufficiently specific to be associated with this particular noun as all functional type entities are made or used. Therefore, nouns that do not have a direct telic quale may hardly occur in the *do*-LVC. If we ever use *desk* in the *do*-LVC, we may be able to coerce it to mean – ‘to make a desk as an occupation’ or ‘the person’s job is to make a desk’ (Im and Lee 2013), but this coercion may require more processing effort.

Thus, at least four degrees of semantic compatibility between an NP and the *do*-LVC can be established as follows. The most compatible NP is an event or activity type. If the NP is a functional entity with a direct telic quale, it is less compatible with the construction, so it requires mild coercion. If it is a functional entity without a direct telic, it is even less compatible, requiring more coercion effort. When an entity is a natural type NP, it is the least compatible, and in this case, coercion is impossible because this expression cannot be interpreted at all.

Based on the semantic constraints on NP presented above, eight sentences were created for each degree. Two in each degree were presented to the participants 10 times during both pre/posttests and all input sessions. These sentences are presented in Table 1 with their assigned groups, corresponding semantic compatibility with the *do*-LVC, degree of expected coercion, and the NP semantic properties discussed thus far. Each sentence takes the form of [Subj-*nun* NP-(*l*)*ul hay-ss-ta*] (Subj-TOP NP-ACC *do*-PAST-DEC) where Subj was randomly created and NP varied according to its semantic properties. The literal translation of the sentence was presented with its expected coerced meaning in parentheses. Note that the literal translation in Group 1 is perfectly grammatical in Korean although the English translation is also presented in parentheses. In Groups 2 and 3, the literal translation is not perfectly grammatical in Korean, and the sentences require some degree of coercion. Finally, the sentences in Group 4 is impossible to coerce.⁵

Table 1. Target sentences used in pre/posttests and input sessions (test-input sentences)

Group	Compatibility	Coercion	NP Semantics	Sentences
1	very high	no coercion	event or activity type	a) <i>chelswu-nun talincil-ul hay-ss-ta</i> 'C did ironing.' (C ironed.) b) <i>Yenghi-nun chengso-lul hay-ss-ta</i> 'Y did cleaning.' (Y cleaned.)
2	slightly high	mild coercion	functional entity direct telic	c) <i>Tayyengi-nun swul-ul hay-ss-ta</i> 'T did alcohol.' (T drank.) d) <i>Swumini-nun phiano-lul hay-ss-ta</i> 'S did a piano.' (S played the piano.)
3	slightly low	strong coercion	functional entity no direct telic	e) <i>cinyengi-nun seythakki-lul hay-ss-ta</i> 'C did a washer.' (C made a washer.) f) <i>Sohi-nun uyca-lul hay-ss-ta</i> 'S did a chair.' (S made a chair.)
4	very low	impossible to coerce	natural entity	g) <i>Chelswu-nun kang-ul hay-ss-ta</i> 'C did a river.' h) <i>Yenghi-nun tol-ul hay-ss-ta</i> 'Y did a stone.'

Among the eight sentences in each category, three were presented only during the input sessions and three others only appeared during the pre/posttests. This replacement was to ensure any significant change in the acceptability judgment score was not because speakers became familiar with the specific expression through frequent exposure; instead, speakers could generalize the pattern of similar instances and apply it to new instances that they had not encountered in the input sessions. If they could generalize the pattern, the

5 As one of the anonymous reviewers pointed out, it may be possible to coerce the sentences in Group 4 if an appropriate context is given. The effect of context was dealt with as a major issue in Yoon (2018). In that study, many participants replied that the sentence in Group 4 was impossible to understand without any given context. Even if the participants ever understood it, the interpretations were too diverse to be systematically generalized as coercion. For example, *I did a river* was interpreted as 'I crossed/researched/watched/drew/ the river' depending on the context that the respondents imagined. I do not ignore the effect of context and possible diverse interpretations, but as the experiment results in the current study where no context was given in the pre/post tests showed (Mean in the pretest = 4.60), coercion of LVC was almost impossible if there was no direct telic involved with the noun semantics.

acceptability scores of the three sentences that appeared only in the tests would be judged more acceptable in the posttest.

In sum, eight sentences were created for each of the four categories, i.e., 32 sentences altogether (see Appendix for sentences other than those in). In each category, two were used for both pre/posttests and input sessions (test-input sentences), three appeared as test sentences (test-only sentences), and three were embedded in the passages as input sentences (input-only sentences).

3.3 Procedure

The participants were divided into four groups, and they visited the experiment room five times based on their own schedule. Visits occurred twice a week with two to four days intervals and they took approximately 18 days to complete the five visits.

The experiment comprised an acceptability judgment test (pretest), five input sessions, followed by another acceptability test (posttest). In each input session, the participants read a passage of about 440 words. For each group, five to six different passages were selected from books or Internet blogs and news and modified to embed the input sentences naturally in the content. In each passage, the five input sentences were embedded twice. The sentences corresponded to the assigned group as shown in Table 1 and Appendix. In order to ensure that the participants read the passages carefully, they had to answer questions regarding the passage content, irrelevant to the input sentences. Following (5a-d) are the excerpts from one of the passages, translated into English. The embedded sentences are underlined (Note that the underlined expressions are literal translation of Korean LVC). Group 1 read the sentences of the best compatibility, Group 2 read the sentences of the second best compatibility, and so on.

- (5) a. [Group 1] In order to do ironing the collars of the gowns, you need to do ironing from the back of the collars. (···)
- b. [Group 2] On the first date, he did a watch that seemed extremely expensive. (···) He said that his father did a company, and he himself also would do the company after his father. (···)

- c. [Group 3] The city government gave a birthday party for the seniors.
(...) These senior citizens had done chairs, had done desks, or had done keys in the village for a few decades before they quitted the jobs.
(...)
- d. [Group 4] (...) In the morning, it rained for a while, and I had to do rain. After doing rain, I started to walk along the River Vltava doing stones. (...)

During the first experiment visit, pretest was conducted. The participants read 20 target sentences (five test sentences x four compatibility categories) and 80 filler sentences and judged each sentence's acceptability on a five-point Likert scale: 1 being most acceptable and 5 being least acceptable (pretest). Subsequently, they took input session 1. During the second to fourth visit, they performed input sessions 2 to 4. During the fifth visit, they performed input session 5. Throughout all the sessions, they experienced the sentences of assigned semantic compatibility 50 times overall [(two test-input sentences + three input-only sentences) x twice in each session x five input sessions]. Subsequently, they took the posttest where they judged the sentences' acceptability. Once again, 20 test sentences of all four compatibility categories were presented. Among these 20 sentences, participants were familiar with only two sentences that they experienced during the input sessions, but the other 18 were unfamiliar – three were in the same category but did not appear in the input sessions and 15 were sentences from other categories.

3.4 Analysis

Repeated measures ANOVA was conducted employing IBM SPSS Statistics 23. The dependent variable was the acceptability scores. Each score was defined by both three within-subject variables and one between-subject variable.

The between-subject (BS) variable was the Group of four levels: the participants were assigned to four different groups depending on the semantic compatibility of the sentences that they read in the input sessions – Group 1 read those most compatible and Group 4 read those least compatible.

The first within-subject (WS) variable was the semantic compatibility (Sem) of four levels – 1 being most compatible and 4 being least compatible. Note that in the pre/posttests, all participants judged not only the sentences that they read during the input sessions but also the sentences from other Sem categories.

The second WS variable was the Item of two levels. There were five sentences in each Sem. Note that two were test-input sentences whereas three were test-only sentences. The latter three expressions were created to demonstrate that the score difference between pre and posttest were not the consequence of exposure frequency but pattern generalization. Therefore, the factor Item had two levels: the average score of the two test-input sentences and the average score of the three test-only sentences.

Finally, the third WS variable was the Test of two levels – pretest and posttest.

The primary concerns of the statistical analyses were as follows.

- [1] When participants are exposed to input sentences recurrently, will they judge the test sentences more acceptable in the posttest than the pretest? (main effect of Test) If so, which group will display the greatest improvement? (interaction of Test x Group)
- [2] For an expression requiring stronger coercion (as in Sem 2, Sem 3, and Sem 4), which group will display the greatest improvement during posttest? (interaction of Sem x Test x Group)
- [3] If the acceptability judgment improves during posttest, is it merely the consequence of frequent exposure to sentences during the input sessions or due to pattern generalization? Essentially, will the test-only sentences demonstrate similar improvement during the posttest as test-input sentences? (interaction of Test x Item)

4. Results

4.1 Effect of frequency on each group

Note that judgment score 1 was the most acceptable and 5 was the least

acceptable.

There was a main effect of Test (Test 1 Mean = 3.41, Test 2 Mean = 3.18, $F(1,159) = 45.83$, $p < .001$, partial $\eta^2 = .22$). This implies that participants' grammar regarding semantic compatibility was affected by recurrent experience of similar Korean *do*-LVC patterns regardless of groups.

Moreover, there was an interaction of Test $\times$ Group ($F(3,159) = 5.36$, $p < .01$, partial $\eta^2 = .09$), indicating that the Test score difference in pre and posttests was significantly different in at least one Group. When repeated measures ANOVA was conducted only on pretest scores, where WS variables were Sem and Item and BS variable was Group ($4 \times 2 \times 4$), it resulted no Group effect ($F(3,159) = 1.22$, $p = .306$, partial $\eta^2 = .22$). However, when it was conducted only on posttest scores, there was a Group effect ($F(3,159) = 2.95$, $p < .05$, partial $\eta^2 = .05$). In the subsequent Ryan-Einot-Gabriel-Welsch (REGW) post hoc test, Group 2, 3, and 4 were grouped together, and Group 1, 2, and 4 were grouped as homogeneous. Consequently, at least Group 1 and 3 were significantly different in posttest. The result implies that in the pretest, all groups' judgments were similar, but after recurrent LVC experience, score improvement was significant in Group 3 compared to Group 1. The result revealed that Group 3 that read the strong coercion sentences demonstrated the greatest improvement in acceptability judgments.

The Test score differences according to Group and Sem are presented in Figure 1. As illustrated, there is no significant Group difference in Group 1 and Group 4, but the improvement diverges slightly in Group 2 and considerably in Group 3.

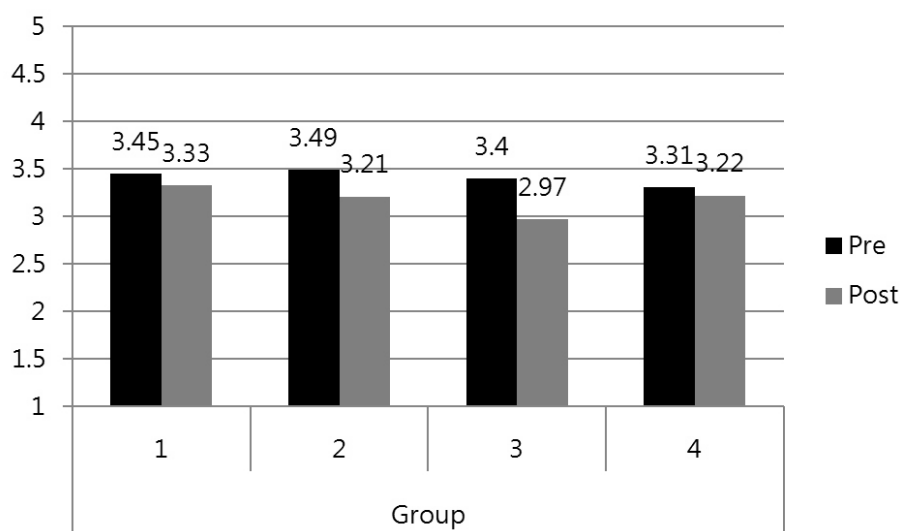


Figure 1. Group mean of the acceptability score in pretest and posttest

4.2 Effect of frequency and semantic compatibility on each group

The interaction of Sem, Test, and Group was significant ($F(8.60, 455.69) = 7.01, p < .001$, partial $\eta^2 = .12$)⁶, implying that the test scores in different groups displayed varied extent of improvement during the posttest depending on the target sentences' degree of semantic compatibility.

In order to explore which Groups are statistically different from others specifically in each Sem level, a new variable was created where the posttest score was subtracted from the pretest score. Repeated measures ANOVA was conducted on this variable with Sem and Item as WS factors and Group as a BS factor and the result is presented in Figure 2.

⁶ The sphericity assumption does not hold as the p -value of Mauchly's test was smaller than the significance level of .05 ($p = .00$). Since the epsilon was .92, the reported df was modified to the Huynh-Feldt result (Field 2013; Howell 2012).

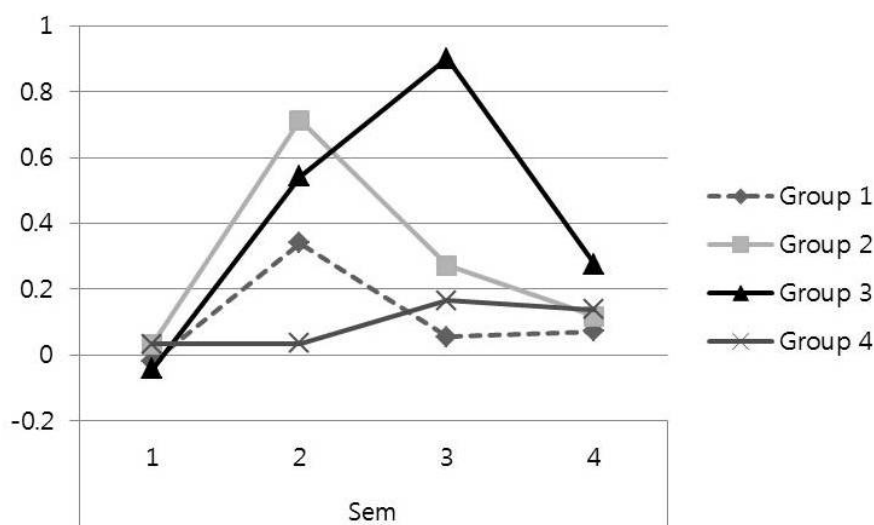


Figure 2. Test score difference (pretest - posttest) according to Group and Sem

The result indicated a Group effect on Sem 2 ($F(3, 159) = 5.70, p = .001$, partial $\eta^2 = .10$) and Sem 3 ($F(3, 159) = 10.03, p < .001$, partial $\eta^2 = .16$). According to the REGW post hoc test, Groups 1 and 4 were one and Groups 1, 2, 3 were the other in Sem 2. Approximately, Groups 2 and 3 improved more significantly than Groups 1 and 4 did in Sem 2. In addition, in Sem 3, Group 3 was significantly different from Groups 1, 2, and 4 according to the REGW post hoc test.

The results imply that the form of input exposure plays a role when coercion is required, as in Sem 2 and Sem 3. If participants in Groups 2 and 3 experienced the coerced expressions recurrently, they judged the coerced sentences more acceptable in the posttest than participants in Groups 1 and 4. Note that the participants in Group 1 and 4 did not experience coerced expressions at all (Group 1) or experienced sentences too incompatible to coerce (Group 4). It means that if the test sentence was so compatible that coercion was unnecessary as in Sem 1 or if the test sentence was too incompatible and almost impossible to comprehend as in Sem 4, the function of frequent experience was minimal; the Sem 1 sentences were always judged very acceptable and Sem 4 sentences were always very unacceptable. Therefore, if a lexical item and a

construction were very compatible or incompatible, their frequent exposure did not play a role in grammaticality judgments.

4.3 Generalization of the pattern

In each Sem category, there were two levels: two test-input sentences (Item 1), and three sentences (test-only). If participants generalized the pattern of the five input sentences that they experienced in the input sessions and applied this pattern to Item 2 sentences, the score difference between Items 1 and 2 must not be significant especially in posttest. Essentially, there must be no interaction of Item $\times$ Test.

In fact, the result of the repeated measures ANOVA revealed no interaction of Item $\times$ Test ($F(1, 159) = .00, p = .998$, partial $\eta^2 = .00$). Moreover, there was no main effect of Item, no interaction of Item $\times$ Group, Sem $\times$ Item $\times$ Test, Sem $\times$ Item $\times$ Group, and Sem $\times$ Item $\times$ Test $\times$ Group, implying that the difference in Item was not a critical factor in general.

However, there was interaction of Sem $\times$ Item ($F(1.96, 311.85) = 73.63, p < .001$, partial $\eta^2 = .32$)⁷ and Item $\times$ Test $\times$ Group ($F(3, 159) = 4.06, p < .01$, partial $\eta^2 = .07$). The emergence of significance needs to be thoroughly examined.

First, the interaction of Sem $\times$ Item implies that the difference in Item varied depending on the Sem categories. I first created new values for the difference in Items by subtracting the scores of Item 1 from Item 2, subsequently conducting repeated measures ANOVA with Sem and Test as WS factors to observe at which Sem level Item difference is significant. As illustrated in Figure 3, the difference between Item scores is the greatest in Sem 2.

⁷ The sphericity assumption does not hold as the p -value of Mauchly's test was smaller than the significance level of .05 ($p = .00$). Since the epsilon was .65, the reported df was modified to the Greenhouse-Geisser result (Field 2013; Howell 2012).

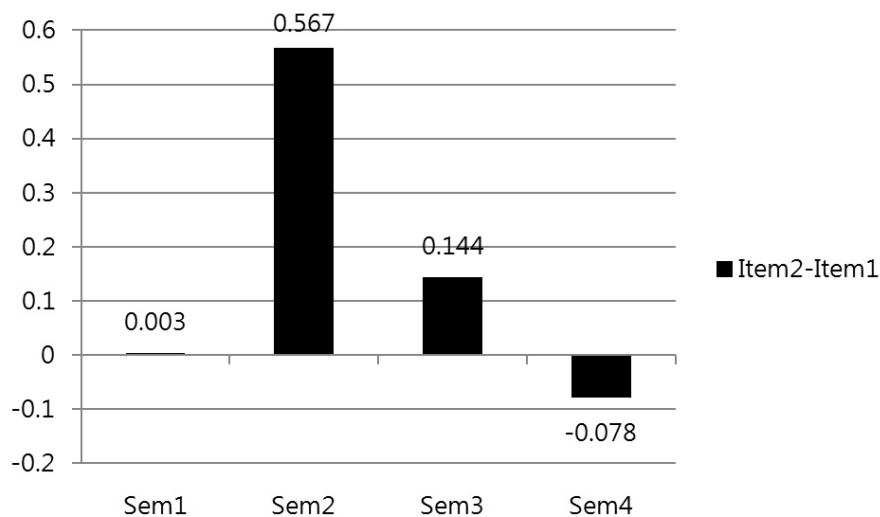


Figure 3. The difference in Item scores depending on Sem categories

Ideally, Item difference should not exist across Sem categories. However, the interaction of Sem $\times$ Item implies that the test sentences in Sem 2 were not homogeneous in terms of semantic compatibility. For further analysis, I conducted a t -test (two-tailed) to compare Item 1 and Item 2 scores in each Sem and Test. Results revealed that in pretest there was Item difference in Sem 2 (Item 1 Mean = 3.30, Item 2 Mean = 3.83, $t(324) = 5.32$, $p < .001$) and Sem 3 (Item 1 Mean = 4.37, Item 2 Mean = 4.55, $t(324) = 2.45$, $p < .05$). This implies that the two test sentences and the other three in Sem 2 and 3 were not designed for similar semantic compatibility. Also, in posttest there was Item difference in Sem 2 only (Item 1 Mean = 2.86, Item 2 Mean = 3.45, $t(324) = 5.30$, $p < .001$). The significant difference in Item 1 and 2 in Sem 2 led to the interaction of Sem $\times$ Item.

Next, the interaction of Item $\times$ Test $\times$ Group indicates that Item difference varied depending on Test and Group. To identify which test revealed the difference in Item scores depending on Group, I first conducted repeated measures ANOVA on the value of Item 2 – Item 1 at pretest and posttest level, with Sem as a WS factor and Group as a BS factor. There was no Group effect at pretest ($F(3, 159) = .49$, $p = .693$, partial $\eta^2 = .01$), implying that even if Item

difference existed, especially in Sem 2 as suggested above, the difference is quite similar across Groups in pretest.

However, there was a Group effect at posttest ($F(3, 159) = 3.68, p < .05$, partial $\eta^2 = .07$). The REGW post hoc test reveals that Group 2 was significantly different from the other groups, as illustrated in Figure 4. Across the Sems, Item difference in Group 2 was significantly greater than the other Groups. In addition, the peaks of all groups in Sem 2 suggest that the participants in all groups judged Item 1 and Item 2 in Sem 2 differently.

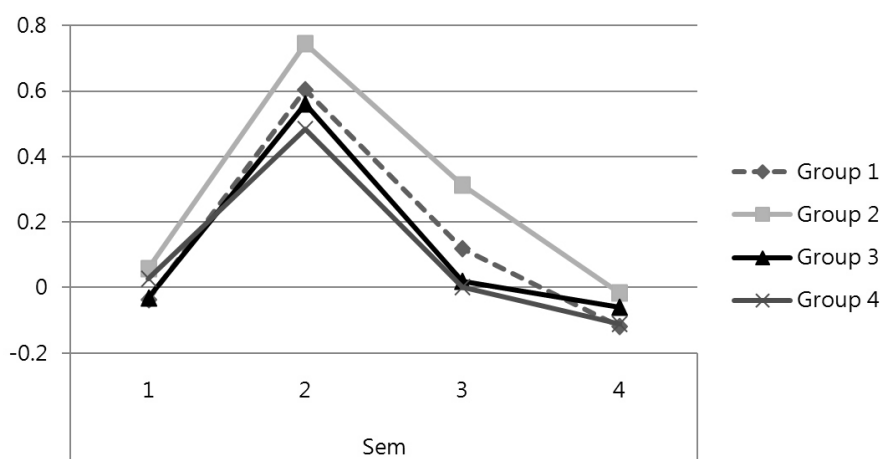


Figure 4. Item difference between Groups across Sems in posttest

Overall, the difference in Item 1 and Item 2 was not a critical factor since the main effect of Item, the interaction of Item $\times$ Test, which were the main concerns in this study, and most of the interactions involved with Item were not significant. This implies that the participants judged not only the test-input sentences but also the test-only sentences more acceptable during posttest. However, it is true that Sem $\times$ Item and Item $\times$ Test $\times$ Group were significant. These interactions demonstrate that Item difference in Sem 2 was significantly great and Group 2 judged the items differently during posttest.

5. Discussion

The results in Section 4.1 reveal that when participants were exposed to the input sentences recurrently, they judged the test sentences more acceptable during the posttest than the pretest. In general, frequent experience of instances of a similar pattern (Korean *do-LV*, in this study) may produce improved acceptability judgments scores. However, if speakers' grammar changes through frequency, it is important to understand what kind of input can change the grammar. Based on the interaction of Test $\times$ Group where Group 3's judgment significantly improved during posttest, it can be concluded that when people experience strong coercion, they will accommodate or extend (Langacker 1988) existing grammar regarding semantic compatibility to comprehend the coerced expression; if this extension occurs recurrently, the extended schema will be entrenched as their grammar. The experiment results indicate that if input sentences are perfectly grammatical, they do not contribute to language change; if they are highly incompatible, speakers fail to resolve the incompatibility, thus unable to accommodate the grammar. Therefore, these inputs also do not lead to language change. Mild degree of coercion may change grammar (as in Group 2's input sentences), but the most effective inputs are those of strong coercion (like Group 3's input sentences).

The claim that sentences requiring coercion engender change in linguistic knowledge is supported by the results in Section 4.2. As observed in Figure 2, the difference in pre vs. posttest scores diverges when coercion is mild (Sem 2): The difference is greater in Groups 2 and 3 compared to Groups 1 and 4, implying that when speakers are exposed to some degree of coercion, they become more generous to incompatible expressions. However, if they fail (Group 4) or need not (Group 1) accommodate their linguistic knowledge, they do not accept incompatible sentences. Interestingly, Group 2's improvement was similar to the improvement of Group 1 and 4 in Sem 3 (See Figure 2). This demonstrates that when the degree of incompatibility exceeds what the participants have experienced thus far, they fail to accommodate their grammar. Conversely, Group 3's improvement was not different from Group 2's in Sem 2 as displayed in Figure 2. When speakers experience relatively strong coercion frequently, they accept sentences of not only mild coercion but also strong

coercion as easily as speakers who experienced mild coercion alone. Thus, it can be concluded that the degree of grammar extension correlates to the degree of coercion that the speakers have experienced.

Finally, change in acceptability is not the consequence of frequent exposure to specific expressions. In general, the effect of Item was not very significant, implying that participants judged not only the test-input sentences but also the test-only sentences more acceptable during posttest.

Unfortunately, however, the sentences in Sem 2 and Sem 3 were not designed to ensure similarity in degree of semantic compatibility between Item 1 and Item 2 as their score discrepancy during pretest indicates. The Item difference had been checked through a small-scale pilot experiment, but the result was unexpectedly different in the actual experiment with 163 participants. This discrepancy in Sem 3 disappears but remains in Sem 2 during posttest. Careful examination of the posttest result in Figure 4 indicates that test-input sentences were judged much better than test-only sentences in Group 2 at Sem 2 and Sem 3. This indicates that mild degree of coercion does not lead to sufficient pattern generalization. Rather, they are influenced by item-specific factors that should be elaborated on in future studies. Conversely, Group 3's judgments on Item 1 and Item 2 were not as different as Group 2's. This implies that speakers who are exposed to sentences of strong coercion can generalize the coerced pattern. If Item difference were controlled more carefully, the issue would be resolved and we could effectively conclude that participants generalize coerced patterns and apply this to unfamiliar instances.

Although this study explored only a segment of grammatical knowledge in one language, i.e., semantic compatibility and coercion in Korean *do*-LVC, it provides an opportunity to study language change mechanism. Language change is triggered by instances that do not comply with existing grammar. In order to process and comprehend these unusual expressions, our grammar requires accommodation. If we experience similar instances recurrently, the accommodation is repeated until this pattern is finally entrenched as grammar. This study revealed that strong coercion, rather than mild coercion, would produce language change. This is because the speakers in the current experiment had to judge the sentences of all Sems, and therefore, the speakers who experienced strong coercion could extend the grammar the most effectively.

However, the frequent occurrence of strong coercion in reality may not be very plausible, as supported by the correlation between frequency and semantic compatibility that semantically less compatible expressions are used less frequently (Yoon 2012). Also, participants in this experiment were intensely exposed to coerced expressions within a short period. A more realistic model of language change would be as follows: speakers experience mildly coerced expressions and the frequency of using these expressions gradually increases; speakers' grammar is accommodated and entrenched to accept coerced grammar naturally; speakers experience more strongly coerced expressions; they gradually accommodate their grammar again. This predicted process may take several years or hundreds of years, but the role of frequency in language use and relatively ungrammatical expressions will be one of the central mechanisms of language change.

6. Summary and conclusion

The usage-based approach to language acquisition predicts that speakers' linguistic knowledge is constructed through language use. If they experience similar linguistic instances frequently, they will generalize a pattern from the instances and this generalized pattern is cognitively entrenched and established as their linguistic knowledge. It further predicts that this established linguistic knowledge could change through language use. Numerous studies in L1 and L2 acquisition support the prediction that frequency in language use plays an important role in language acquisition. However, whether or not and how frequency in language use can change native speakers' existing grammar has not been examined empirically.

This study attempted to investigate the role of frequency in speakers' grammar change regarding semantic compatibility between a construction and a lexical item that occurs in it. Specifically, native Korean speakers were exposed to sentences where the Korean *do*-LVC was composed of NPs of four different degrees of semantic compatibility. The participants were divided into four groups and each group read five sentences that belong to one of the four degrees of semantic compatibility 10 times throughout five input sessions (50

times in total). Comparison of the acceptability judgments during the pretest and posttest on the sentences of various semantic compatibility categories revealed that the coerced sentences were judged more acceptable in general after the participants experienced the inputs 50 times. The acceptability improved significantly if the exposed sentences required strong coercion rather than the other degrees of coercion, showing that the degree of grammar extension is correlated with the degree of coercion that speakers have experienced. This improvement was applied even to sentences that the participants had not experienced during the input session, implying that they could generalize the pattern out of specific instances. However, when the exposed items were so semantically compatible or incompatible that coercion was unnecessary or failed, the participants did not accommodate their linguistic knowledge and acceptability did not improve.

The result implies that expressions that are grammatically unusual expressions may lead to language change eventually if similar patterns are experienced repetitively. In reality, the change may progress gradually over a long period of time. Also, there are a lot of confounding factors other than frequency in language change. Thus, it might not be appropriate to directly generalize and extend the results to language change over time since the results were obtained from a controlled experiment setting. Nevertheless, I hope that the study serves as a stepping stone toward identifying one of the driving forces of language change.

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Appendix

Sentences used only in the Tests and only in the Input Sessions

The sentences within the single quotation marks are literal translations, and the ones within the parentheses are English translations (in the case of Groups 1 sentences) or coerced interpretations (in the case of Groups 2 and 3). Since the Group 4 sentences were too incompatible to coerce, their coerced interpretations are not provided.

<Test-only Sentences>

Group	Compatibility	Coercion	NP Semantics	Sentences
1	1 very high	no coercion	event or activity type	a) <i>minho-nun kongpwu-lul hay-ss-ta</i> 'C did study.' (C studied.) b) <i>cenga-nun sancheyk-lul hay-ss-ta</i> 'C strolled.' (C had a stroll.) c) <i>cengmini-nun siwi-lul hay-ss-ta</i> 'C demonstrated.' (C demonstrated.)
2	2 slightly high	mild coercion	functional entity direct telic	a) <i>seyawoni-nun khephi-lul hay-ss-ta</i> 'S did coffee.' (S drank coffee.) b) <i>chinkwu-nun tambay-lul hay-ss-ta</i> 'C did a piano.' (S played the piano.)

				c) <i>seywoni -nun thulek-ul hay-ss-ta</i> 'S did a truck.' (S drove a truck as an occupation.)
3	3 slightly low	strong coercion	functional entity no direct telic	a) <i>minho-nun sophu-lul hay-ss-ta</i> 'M did a sofa.' (M made a sofa as an occupation. / M worked for a sofa-making company.) b) <i>cengmi-nun TV-lul hay-ss-ta</i> 'C did a TV.' (C made a TV as an occupation. / C worked for a TV-making company.) c) <i>minhi-nun mwun-ul hay-ss-ta</i> 'M did a TV.' (M made doors [as an occupation]).'
4	4 very low	impossible to coerce	natural entity	a) <i>kiwoni-nun kwulum-ul hay-ss-ta</i> 'C did a cloud.' b) <i>cinswu-nun hulk-ul hay-ss-ta</i> 'C did soil.' c) <i>mina-nun phwul-ul hay-ss-ta</i> 'M did grass.'

<Input-only Sentences>

Group	Compatibility	Coercion	NP Semantics	Sentences
1	1 very high	no coercion	event or activity type	a) <i>minho-nun thonghwa-lul hay-ss-ta</i> 'C did phone.' (C talked on the phone.) b) <i>cenga-nun yenkwu-lul hay-ss-ta</i> 'C did research.' (C researched.) c) <i>cengmini-nun talliki-lul hay-ss-ta</i> 'C did running.' (C ran.)
2	2 slightly high	mild coercion	functional entity direct telic	a) <i>seywoni-nun sikey-lul hay-ss-ta</i> 'S did a watch.' (S wore a watch.) b) <i>chinkwu-nun thayksi-lul hay-ss-ta</i> 'C did a taxi.' (C drove a taxi as an occupation.) c) <i>seywoni -nun hweysa-ul hay-ss-ta</i> 'S did a company.' (S ran a company.)

3	3 slightly low	strong coercion	functional entity no direct telic	a) <i>minho-nun chayksang-ul hay-ss-ta</i> 'M did a desk.' (M made a desk as an occupation. / M worked for a desk-making company.) b) <i>cengmi-nun kyeysanki-lul hay-ss-ta</i> 'C did a calculator.' (C made a calculator as an occupation. / C worked for a calculator-making company) c) <i>minhi-nun yelswey-ul hay-ss-ta</i> 'M did a key.' (M made keys [as an occupation]).
4	4 very low	impossible to coerce	natural entity	a) <i>kiwoni-nun pi-lul hay-ss-ta</i> 'C did rain.' b) <i>cinswu-nun nakyeop-ul hay-ss-ta</i> 'C did fallen leaves.' c) <i>mina-nun say-lul hay-ss-ta</i> 'M did a bird.'

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Received: 2018. 11. 20.

Revised: 2019. 02. 13.

Accepted: 2019. 02. 20.