Maximizing (Non-)identity in Consonant Insertion*

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An, Young-ran. (2013). Maximizing (Non-)identity in Consonant Insertion. *The Linguistic Association of Korea Journal, 21*(3), 79-95. This paper discusses the role of vowels and consonants in the consonant insertion in such a reduplicative form as allok-tallok 'dappled' in Korean. Generally, when a consonant is to be epenthesized into the reduplicant in the total reduplication, the consonant tends to be dissimilar from the existing base consonants. This was attested in my dictionary examination and behavioral experiment, as well. However, when the existing vowels are already identical, the inserted consonant tends to be identical to one of the base consonants. This ends up producing two identical strings of CV in the form of CVCVC, which shows the influence of vowels on the choice of inserted consonants. The opposing tendencies of the inserted consonants to be non-identical and identical to base consonants is a nontrivial finding of this paper.

Key Words: consonant insertion, total reduplication, dissimilar, identical strings

1. Introduction

Any Korean consonants that can occur in the onset, /p, p^h, p', t, t^h, t', k, k^h, k', ʧ, $ʧ^h$, ʧ', m, n, s, s', h, l, w, j/, can also occur in the reduplicant (underlined in examples) as a consonant that is inserted (bold faced in examples) in the Korean total reduplication in which the base starts with a vowel. The consonant to be inserted is abbreviated as CI in my paper, from here forth.

(1) a.   allok-**t**allok   'dappled'

    b.   ʌlmʌŋ-**t**ʌlmʌŋ   'lumpy'

    c.   umul-**ʧʼ**umul   'hesitantly'

    d.   osun-**t**osun   'on good terms'

    e.   ulak-**p**ulak   'roughly'

    f.   aki-**ʧ**aki   'charming'

In the examples above, the determination of the bases is grounded in Jun and Lee (2006) where the cases of total reduplication beginning with a vowel have been classified into four types, Type I where only the second portion can stand alone, Type II where only the first portion can be used independently, Type III where either of the two portions has an independent form and meaning, and Type IV where neither of the two portions can stand on its own.

(2) a. ollok-pollok, omil-ʧomil   Type I

    b. allok-tallok, aoŋ-taoŋ   Type II

    c. asak-pasak, ukɨl-pukɨl   Type III

    d. ulak-pulak, osun-tosun   Type IV

According to this classification, (1a-c) are of Type II and (1d-f) of Type IV and I am concerned with these two types, assuming that the first half is the base and a consonant is inserted in the initial onset of the second half. When neither of the two portions is an independent form as in Type IV, I consider the one without an onset to be the base and the one with an onset to be the reduplicant in accord with the universal principle that the unmarked, i.e., the one with an onset in this case, will emerge in the reduplicant.

With respect to the choice of CIs, an investigation of the dictionary (*Eysseynsu Kwuke Sacen [Essence Korean Dictionary]*, 2006) revealed that various consonants can be inserted in the reduplicated words and in addition the choice among possible CIs is not arbitrary.
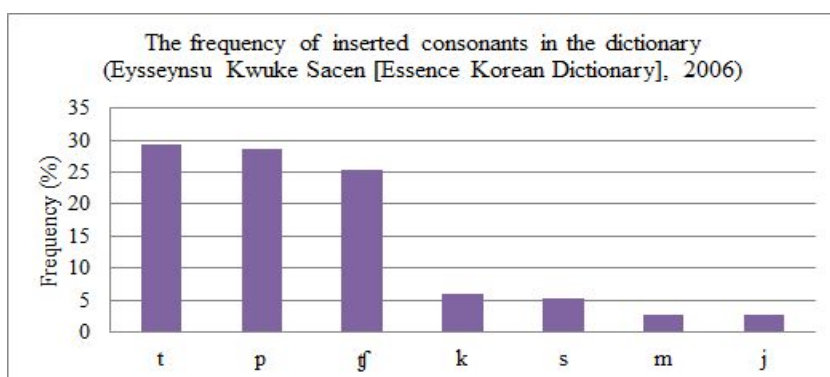
Figure 1. The frequency of inserted consonants in the dictionary

As seen in Figure 1, we do not see random choices, but some patterns. For instance, /t, p, ʧ/ are much more frequent than /k, s, m, j/ as CIs. This indicates that all the possible onset consonants do not have even chances of being chosen as CIs. There must be a reason that can account for this pattern. I argue that the choice of CIs is predictable to some extent, although it may not be completely predictable.

In what follows, I examine some plausible factors, among others, that appear to affect the choice of CIs, dissimilarity, aka non-identity (OCP), and similarity or identity. For dissimilarity the interaction between a CI and the existing consonants is crucial whereas for identity it is the contextual vowels that come into play. Section 2 shows the method of research. Section 3 provides the results. The last two sections give some discussion and conclusion, respectively.

2. Method

I examined a Korean dictionary (*Eysseynsu Kwuke Sacen* [*Essence Korean Dictionary*], 2006; Appendix A), which revealed 150 entries that are V-initial. Among these V-initial reduplicated words, I looked into the forms of Jun and Lee's Type II and IV that are made up of VCVC bases.

In addition, I conducted a real time behavioral experiment, in which Korean speakers were asked to create the most natural reduplicated word with a nonce base (word creation task; Appendix B). There were 55 participants altogether,

ages ranging from 20's to 60's, who were recruited in Seoul. There were 40 simuli in the task, and 15 out of them consisted of VCVC bases. I included other forms with a view to investigation of other factors, and I am focusing on the 15 forms with VCVC bases in this paper. The participants were asked to pronounce aloud the forms they were just making up, and I assumed that the created words were spoken forms, rather than written forms. Any erroneous responses were removed, and I ended up with 472 responses.

3. Results: Dissimilarity vs. Identity

3.1. Dissimilarity Preferred

In the preceding section, it was shown that certain consonants were preferred as CIs. In expounding the reason for this seemingly non-arbitrary phenomenon, I postulate the following hypothesis and conducted an experiment.

(3) **Hypothesis 1**

CIs are dissimilar from the existing base Cs.

The result of a behavioral experiment (word creation task, N=55, 472 tokens, VCVC bases, CI=/p, t, ʧ/), along with the examination of the dictionary data, showed that there is a tendency to insert a consonant which is dissimilar from the extant base consonants, confirming Hypothesis 1.
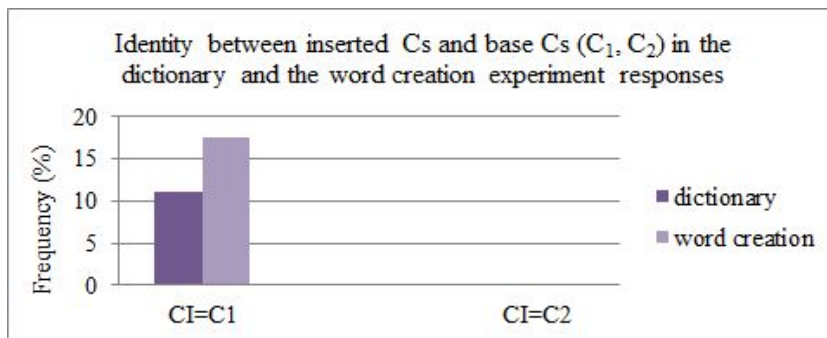

Figure 2. Identity relationship of inserted consonants and Cs in VCVC-bases with CI=/p, t, ʧ/

I exclusively looked into the total reduplication with a form of VC_1VC_2-**C**VC_1VC_2 in order to see an exhaustive effect of the two base consonants. Figure 2 shows that there is no identical pair of CI and the second C (C_2) in the base, whereas there are some identical pairs of CI and the first C (C_1) in the base, both in the data from the dictionary and the behavioral experiment. That is, a CI is never identical to the second base C (0% in the dictionary and the experiment). In the case of a CI and the first base C, there are some instances in which the CI is identical to the first base C, i.e., 11.11% of the time in the dictionary data and 17.58% of the time in the experiment responses.

This tendency to prefer a non-identical or dissimilar C from the existing Cs has been attested in many other languages. For instance, Turkish emphatic reduplication prefers to choose /p/ unless a labial C, including /p/, already exists in the base (Wedel, 1999; Yip, 1995; Yu, 1999).

(4) Turkish emphatic reduplication
    a. kara   'dark'   <u>kap</u>kara   'pitch black'
    b. belli   'clear'   <u>bes</u>belli   'obvious'
    c. bejaz   'white'   <u>bem</u>bejaz   'bright white'
    d. temiz   'clean'   <u>ter</u>temiz   'spotless'

Wedel (1999, 2000) argue on the basis of the research on the online Turkish language lexicon that the epenthetic C in the Turkish reduplication does not repeat the same segment as one of the base Cs. He also found that when Turkish speakers were asked to create a reduplicated version of adjectives that normally are not subject to emphatic reduplication in Turkish, they avoided inserting a consonant identical to a base consonant. For example, bodur 'squat' → <u>bo**s**</u>bodur (for all participants), mest 'enchanted' → <u>me**p**</u>mest (for all participants), pinti 'very stingy' → <u>pi**m**</u>pinti ~ <u>pi**s**</u>pinti. What is interesting is that the suggested identity avoidance constraint was more strictly observed in the elicited data than in the attested data.

The avoidance of having identical consonants is also observed in some English data. In a well-formedness judgment experiment with the native speakers of English, Hay, Pierrehumbert, and Beckman (2004) found that nonce

forms like /stɹimsi/, which contains two stridents, were rated lower than similar forms like /stɹimpi/, even though words containing two strident obstruents are certainly allowed in English as in 'space' /speɪs/ or 'starch' /stɑɹʧ/. English is also known to have restrictions against co-occurrence of homorganic identical consonants within a word; that is, in a word with a form of sCVC in which the Cs are stops, two /k/'s or two /p/'s are not allowed, e.g. *skeak*, *speap*. However, two /t/'s are allowed, e.g. *state*, *stoat*, *stet* (Coetzee, 2005, 2008; Davis, 1991; Fudge, 1969). Coetzee (2005) found that listeners in a perception task tended to perceive an ambiguous percept as an OCP-obeying item. This kind of perceptual bias was also found for the forms with two coronal stops, although words with two /t/'s actually exist in the lexicon.

This OCP-like tendency of dissimilarity between the CI and the base consonants in the Korean data certainly appears to be grounded in languages in general. However, interestingly, this tendency does not seem to be categorical. According to Figure 2, the tendency of CIs being dissimilar from the existing base consonants does not apply across the board; rather, there were some cases in which a CI and C1 are identical. There must be some other factors in operation in the choice of CIs, and I argue for similarity or identity between a CI and the base Cs among such factors, under specific circumstances.

3.2. Identity Preferred

There is a tendency that strings in syllables become similar, and this kind of tendency has been found in the literature (Zuraw, 2002). I argue that the choice of CIs in the Korean reduplication also instantiates it. When a consonant is considered for a CI, it is generally preferred to be distinct from the existing base consonants. However, a CI is sometimes likely to be identical to one of the existing consonants when certain conditions are satisfied.

Languages have shown this tendency of having similar segments across syllables: for example, in English a kind of a repair strategy has been observed in the non-standard spellings, in which intra-word similar syllables get repaired to yet greater similarity.

(5) a.　pompon　　→　pompo**m**

　　b.　sherbet　　→　sherbe**r**t

　　c.　orangutan　→　oranguta**ng**

　　d.　hara-kiri　→　har**i**-k**a**ri

　　e.　persevere　→　pers**er**vere

This tendency to prefer output forms to contain a reduplication-like structure is captured by the analysis with a constraint that "a word must contain some substrings that are coupled" (Zuraw, 2002).

Peruvian Aymara allows only one ejective per morpheme, unless the ejectives are identical, and only one aspirated stop per morpheme, unless the aspirated stops are identical (de Lucca, 1987; MacEachern, 1999; Rose & Walker, 2004; Zuraw, 2002):

(6) a.　[k'ink'u]　　'clay'

　　b.　[p^{h}usp^{h}u]　'boiled beans'

　　c.　*[t^{h}ata]

　　d.　*[t'ata]

The two ejectives and the two aspirated stops can co-occur since they are identical in their features, in (6a) and (6b), respectively, whereas laryngeally dissimilar homorganic consonants, as in (6c, d) are hardly allowed since they cannot be dissimilar in glottal properties and identical in other features, e.g., [t^h] and [t], [t'] and [t]. In Sundanese two/r/'s in the onsets of adjacent syllables cannot be dissimilated, i.e., *r…r* cannot become *l…r* (Suzuki, 1999; Zuraw, 2002).

The analysis of having identical segments in adjacent distinct syllables predicts that the identical ejectives or aspirated stops in Peruvian Aymara and the rhotics in Sundanese should be followed by identical vowels more frequently than non-identical stops or rhotics would be, which has been borne out according to the lexical statistics in both languages. According to a dictionary study (Deza Galindo, 1989), "the vowels are identical in 21 of 25 $C^h_1V_2(C)C^h_1V_3$... roots (84%), and in 18 of 23 $C'_1V_2(C)C'_1V_3$... roots (78%)" (Zuraw, 2002, p. 432). That is, there should be many forms like (6b) in which

Vs are identical and few forms like (6a) in which Vs are not identical. The examination of a Sundanese dictionary (Basa & Sunda, 1985) showed that in the 105 roots with more than one /r/ the vowels V_1 and V_2 are identical in 57 of 67 rV_1rV_2… roots, e.g., [rorod] 'pull in,' and the substrings V_1C_1 and V_2C_2 are identical in 19 of 20 $rV_1C_1rV_2C_2$ roots, e.g., [ribrib] 'arms overly full' (Cohn, 1992; Zuraw, 2002).

Based on the tendency of favoring identical substrings in a word in these languages, I motivate the following hypothesis for the Korean reduplication data:

(7) **Hypothesis 2**

  If vowels are identical, then consonants will also be identical.

That is, when vowels existing in a context are already identical, a consonant yet to be inserted is predicted to be the one identical to an existing context consonant: in a form of $V_1C_1V_2C_2$-**C**$V_1C_1V_2C_2$, if $V_1=V_2$, then **C**$V_1=C_1V_2$.

In the preceding section we have seen that there is a tendency to avoid identical consonants in the choice of CIs: the CIs tend to differ from the existing base Cs. However, not all CIs were different from existing Cs, and some CIs were identical to one of the existing Cs in the base. According to Figure 2, the CIs tend to differ from the base Cs. There are no instances in which the CIs are identical to C_2; however, there are *some* cases in which the CIs are identical to C_1. In fact, the statistics showed that the CIs did not significantly differ from C_1 both in the dictionary and the experimental data. This indicates that there are more chances of the CIs being identical to C_1 than to C_2 for a reason. Why are there cases in which CIs are the same as extant Cs? More specifically, why is it C_1, not C_2 that CIs are chosen to be identical to?

I argue that there are two opposing forces in the field, dissimilarity preference and identity preference, according to the former of which CIs tend to be dissimilar to existing Cs like the second C of the base, whereas according to the latter CIs are preferred to be identical to the first C of the base. This identity preference requires that CIs should be identical to C_1 when the existing base Vs are already identical. That is, in the form of VC_1VC_2-**C**VC_1VC_2, there are greater chances for the CI to be identical to C_1 when the two Vs happen to be identical already.

We can account for the data based on REDUP and CORR-ҡҡ constraints which require coupled strings to be similar. I do not go over formal analyses with these constraints, and it suffices to mention that the interaction of these two constraints and the input-output constraints (CORR-IO) results in typological difference in the output forms (modified from Zuraw, 2002, p. 406):

(8) a. REDUP, IDENT-IO >> IDENT-ҡҡ
       coupling despite imperfect similarity
  b. REDUP, IDENT-ҡҡ >> IDENT-IO
       perfect coupling
  c. IDENT-IO, IDENT-ҡҡ >> REDUP
       no coupling

The hypothesis that the identical pairs of CI and C_1 in the Korean reduplication tend to be followed by identical Vs was confirmed by the experimental data of word creation task. That is, the participants showed a tendency to insert a C that is identical to C_1 when the resulting output forms came to have two identical substrings of CV. The number of identical pairs of CI and C_1 was even greater when the two nucleus Vs were identical than when Vs were non-identical (28.89% vs. 7.29%). To put it another way, it was more likely to have identical Vs in the cases in which CI and C_1 are identical (78.31%), than in the control cases (41.13%). The data from the dictionary and the corpus (*Sejong Balanced Corpus*, 2007) also corroborate this tendency; i.e., it was more likely that we have identical Vs when CI and C_1 are the same than when they are not, in the dictionary data (80% vs. 41.30%) and in the corpus (100% vs. 50%).

Table 1. Dictionary, Corpus (*Sejong*), and Experiment results with regard to identical CV strings (CIV and C1V): VCVC−bases, CI=/p, t, ʧ/

Source	**CI**V=C_1V when **CI**=C_1	V=V when **CI**≠C_1
Dictionary	80%	41.30%
Corpus	100%	50%
Experiment	78.31%	41.13%

The test results show that in fact for the dictionary data there was no significant association between the sameness of Vs and whether a CI is identical to C_1.[1] However, there was a significant association between the sameness of Vs and whether a CI is identical to C_1 in the corpus $\chi^2(1, N = 191) = 4.87$, $p < .05$, and in the experiment $\chi^2(1, N = 472) = 37.91$, $p < .001$. That is, both in the corpus and the experimental results, CI and C_1 were significantly more likely to be identical if Vs were identical than if Vs were non-identical, which therefore confirms Hypothesis 2.

The tendency to insert a consonant that is identical to an existing consonant in the base of the Korean reduplication, in spite of a general opposing tendency to avoid inserting a similar consonant in the same position, has been captured by the argument for a tendency to have identical substrings across syllables. Therefore, the constraint of identity in coupled strings can be one other factor that is influential in the choice of CIs, in which sense the Korean data are differentiated from other data which exclusively show avoidance of identity.

4. Discussion

Thus far in the preceding sections, we have seen that in the Korean reduplication there is a tendency to have an inserted consonant that is dissimilar to the existing base consonants. This tendency of avoiding an identical C in the choice of CIs was crucially attested both in the dictionary data and the newly created reduplicative forms in the experiment.

In the meantime, the tendency of having similar CV strings in a word, which has been observed in languages, was also found to serve as a nontrivial factor in determining a CI. When there were two vowels that are identical already, they preferred to appear as two identical CVs in the form of

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1) This may be interpreted as that there was a positive association between the sameness of Vs and whether a CI is identical to C_1 since the significance level can be called marginal $\chi^2(1, N = 51) = 2.73$, $p = .099$. Hence, based on the odds ratio, CI and C_1 were 5.25 times more likely to be identical if Vs were identical than if Vs were different. The statistical non-significance could be ascribed to the fact that the dictionary, as opposed to the other sources (corpus and experiment), actually does not deal with token frequency, but it only shows type frequency.

reduplicant, **C**VCVC.

The tension between these two factors, dissimilarity preference and identity preference, seems surely to be at work, and with regard to the tendency of having identical CV strings in the Korean reduplication we can find some supportive evidence for the close relationship between a C and its following V.

It seems that there is indispensible relationship between a consonant and a vowel, to the extent that C and V tend to behave in tandem, which has been found cross-linguistically. I argue that the close-knit relationship of CV in the Korean reduplication is also motivated from the language internal structure.

In my examination of the CV combination pattern in the speakers' behavior and in the lexicon, the reduplication-only corpus (*Sejong Balanced Corpus*, 2007) in particular, I found significant correlation between the two patterns, r_s = .797, p < .01. This shows that the frequency of CI and V combinations in the experiment reflects the frequency of C and V combinations in the reduplication-only corpus.

CV combinations in the experiment and the reduplication corpus (*Sejong Balanced Corpus*, 2007)

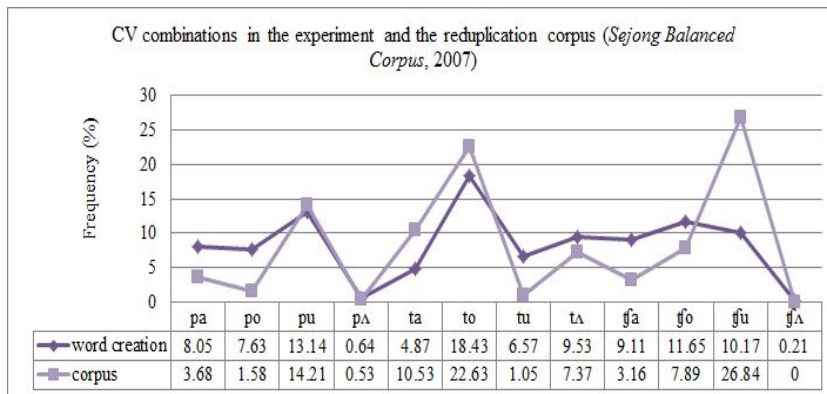|	pa	po	pu	pʌ	ta	to	tu	tʌ	tʃa	tʃo	tʃu	tʃʌ
word creation	8.05	7.63	13.14	0.64	4.87	18.43	6.57	9.53	9.11	11.65	10.17	0.21
corpus	3.68	1.58	14.21	0.53	10.53	22.63	1.05	7.37	3.16	7.89	26.84	0

Figure 3. CV combinations in the experiment and the reduplication-only corpus (*Sejong Balanced Corpus*, 2007): VCVC-bases, C=/p, t, tʃ/, V=/a, o, u, ʌ/

This replication of the CV combining pattern in the experiment and the corpus implies that the CV combination in the experiment may be simply due to the existing pattern in the lexicon, or else there may be a deeper reason for the parallel between the two patterns. I hypothesize that there is close relationship between onset C and nucleus V in the choice decision of CIs in the Korean

reduplication. More specifically, speakers are aware of the close relationship between onset C and nucleus V when they choose a C for CI.

Behavioral experiments have shown that Korean speakers tend to group C_1 and V, rather than V and C_2, as a unit in a syllable of C_1VC_2, contrary to prediction that V and C_2 will form a sub-syllabic unit on the basis of the traditional syllable structure, onset + rime which sub-hierarchically consists of nucleus V and coda C (Chen et al., 2004; Derwing et al., 1993; Lee, 2006). I maintain that this seemingly language-specific property of Korean cannot be simply attributed to an abstract representation of a syllable, which is usually dubbed as "body (= onset + nucleus) + coda." Rather, I suggest that there is a sub-syllabic template that requires interdependency between C and V, not V and C, to which speakers of the language make reference in their behavior.

With respect to the CI choice in the reduplication, I propose that Korean speakers are implicitly aware that onset and nucleus are more tightly connected than nucleus and coda at the sub-syllabic level. The CV combination patterns both in the word-creation experiment and the reduplication-only corpus testify that existing Vs affect the choice of CIs, which indicates an intimate relation between onset C and nucleus V. This close relationship between onset C and nucleus V explains why a CI tends to refer to the following V in the selection process. Hence, I argue that the native speakers' behavior does not merely mirror what exists in the lexicon for CV combinations, but it in fact reflects the speakers' phonotactical knowledge of the sub-syllabic template.

It appears that the phonotactic probabilities in speakers' mind affect the choice of CIs in the case of the Korean reduplication. Speakers may remember frequent reduplicated forms whose CV combinations are also in store for them to use in creating new reduplicated forms, which means that more frequent forms are more influential in creating novel forms. For instance, Figure 3 shows that the speakers in the experiment chose /pu/, /to/, /ʧo/ most frequently, among other CV combinations of pV, tV, ʧV, respectively, which is actually confirmed by the fact that the most frequent single reduplicated forms with pV, tV, ʧV are ulthuŋ-**p**ulthuŋ 'bumpy,' oson-**t**oson' 'harmoniously,' oŋki-**ʧ**oŋki 'thickly' (closely after umul-**ʧ'**umul 'hesitantly' and aki-**ʧ**aki 'charming') in the corpus. This may suggest that the most frequent CV combinations, not the entire CV combinations, have some impact on the established phonotactics.

However, this conjecture is yet to be confirmed through more careful scrutiny and I leave it for further research.

5. Conclusion

The argument in this paper captures two kinds of tendency in the choice of inserted consonants in the Korean total reduplication. The inserted consonants generally tend to be non-identical to the extant base consonants. Meanwhile, it inclines to be identical to one of the existing base consonants under specific conditions. Hence, this paper accounts for the deviant behavior of the Korean reduplication data which would otherwise parallel other languages that show an exclusive tendency of identity avoidance.

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Appendix A. Dictionary (*Eysseynsu Kwuke Sacen* 2006)

Reduplication with VCVC-bases

1. 우물쭈물   umul-**ʧʼ**umul
2. 오목조목   omok-**ʧ**omok
3. 우묵주묵   umuk-**ʧ**umuk
4. 어빡자빡   ʌpʼak-**ʧ**apʼak
5. 우격지격   ukʌk-**ʧ**ikʌk
6. 이판사판   ipʰan-**s**apʰan
7. 오톨도톨   otʰol-**t**otʰol
8. 우툴두툴   utʰul-**t**utʰul
9. 어정버정   ʌʧʌŋ-**p**ʌʧʌŋ
10. 아장바장   aʧaŋ-**p**aʧaŋ
11. 어런더런   ʌlʌn-**t**ʌlʌn
12. 어룽더룽   ʌluŋ-**t**ʌluŋ
13. 어영부영   ʌjʌŋ-**p**ujʌŋ
14. 아롱다롱   aloŋ-**t**aloŋ
15. 오손도손   oson-**t**oson
16. 오순도순   osun-**t**osun
17. 이몽가몽   imoŋ-**k**amoŋ
18. 애동대동   etoŋ-**t**etoŋ
19. 어근버근   ʌkin-**p**ʌkin
20. 어금버금   ʌkim-**p**ʌkim
21. 아근바근   akin-**p**akin
22. 알록달록   allok-**t**allok
23. 어룩더룩   ʌluk-**t**ʌluk
24. 얼럭덜럭   ʌllʌk-**t**ʌllʌk
25. 얼룩덜룩   ʌlluk-**t**ʌlluk
26. 우락부락   ulak-**p**ulak
27. 아록다록   alok-**t**alok
28. 알락달락   allak-**t**allak
29. 어뜩비뜩   ʌtʼik-**p**itʼik

Appendix B. Experiment (word creation task)

Directions: Each of the following morphemes is part of a reduplicative form. Based on your intuition as a native speaker of Korean, please create a reduplicated word by adding a consonant to the given item. When you create a reduplicant, please make sure that a segment at the outset should be different from the correspondent in the given morpheme. Also make sure to read new forms aloud when you are creating them.[2]

Stimuli with a VCVC base

1. 우술　usul
2. 오독　otok
3. 오작　otʃak
4. 아식　asik
5. 아달　atal
6. 우칠　utʃʰil
7. 어중　ʌtʃuŋ
8. 오삼　osam
9. 우끈　uk'in
10. 아장　atʃaŋ
11. 우설　usʌl
12. 오공　okoŋ
13. 아밤　apam
14. 오감　okam
15. 오롱　oloŋ

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2) The stimuli were given in Korean to the participants. The stimuli were newly made up for the sake of the experiment, except for a few which happen to be identical to those in a dialect that are not known well.

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