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Redundancy in Japanese Compounds: the Apophony-Rendaku Interface

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Our research has gone quite some way to explaining both the redundancy and productivity of apophony. Viewed within the larger questions of compounding phenomena in Japanese, we hope this will clarify how it fits together with rendaku in marking element boundaries in words.

Two of our three research goals were completed - one is still ongoing.
Research Goal 1 was published in International Journal of Japanese Linguistics, and published in FY4 ad DOI: 10.1515/jjl-2021-2032). Research Goal 3 was published as https://www.hs.yamagata-u.ac.jp/wp-content/uploads/2020/09/5c7f942368a45e80b2be60d7508fa413.pdf.

linguistics

rendaku apophony morphophonology compounding redundancy interface survey database

## １．研究開始当初の背景

Setting aside suprasegmental issues, compoundhood in Japanese may be flagged by two different morphophonological phenomena: apophony or rendaku. On the latter, much has been written, with descriptions or analyses of rendaku forming some of the earliest extant research on the Japanese language in both Japanese (Motoori 1822) and English (Lyman 1894). Here, non-initial elements in compounds may undergo initial voicing under certain conditions: e.g. *nodo* 'throat' + *hotoke* 'Buddha' > *nodobotoke* 'Adam's apple'. For a thorough overview of rendaku, consult Vance (2015) or the range of papers in Vance & Irwin (2016). Research on apophony, in contrast, has been curiously scant and been conducted from an historical or diachronic perspective: see Arisaka (1931, 1934), Sakakura (1986) or Frellesvig (2010). With apophony, the initial elements in compounds exhibit one of three different pairs of final vowel alternations, as follows:

i.　*e ~ a-　ame+　ki* → *ama-gi*
　　　　　'rain'　'wear'　'rainwear'
ii.　*i ~ o-　hi+　teri* → *ho-teri*
　　　　　　'fire'　'shine'　'flush'
iii.　*i ~ u-　tuki* +　*yo* → *tuku-yo*
　　　　　　'moon'　'night'　'moonlight'

　The second vowel in each pair above, *a*, *o* and *u*, occurs only in bound forms, where the allomorph is termed 'covert'. On the other hand, the first vowel in each of the three pairs, *e* and *i*, occurs in both bound or unbound forms since, like rendaku, apophony is not compulsory: *ame* 'rain' in (i)　may, for example, appear as bound *ame* in *amehuri* 'rainfall'. These allomorphs are termed 'overt'. The appearance of the covert or overt form in a compound is not predictable. Some compounds only occur with the overt alternant, some occur only with the covert one, while yet others display both variants (*ametubu ~ amatubu* 'raindrop').

　This dissymmetry between covert and overt allomorphs in apophony is mirrored by the dissymmetry between voiced and voiceless allomorphs in rendaku. If we consider the overt (in apophony) and voiceless (in rendaku) allomorph to be the unmarked allomorph within their respective phenomenon, then their behaviour is identical, as shown in Table 1 below. While the unmarked allomorph may occur in either word type, the marked allomorph is banned from simplex words and restricted to compounds.

| word type | marked | unmarked |
|-----------|--------|----------|
| simplex | ✘ | ✓ |
| compound | ✓ | ✓ |

*Table 1*

　　While both rendaku and apophony are alike in being 'optional' phenomena, in other respects they differ. Although both phenomena are manifested immediately adjacent to the element boundary in a compound, rendaku voicing occurs immediately to the right (on the initial consonant of the second element), while apophony occurs immediately to the left (on the final vowel of the first element). The mass of research on rendaku allows us to claim that rendaku is predictable to a certain extent: no research on this matter has been conducted in regard to apophony. While rendaku is undoubtedly productive, research is lacking on this question when it comes to apophony. The foregoing is summarized in Table 2 below.

| | Rendaku | Apophony |
|--|---------|----------|
| compulsory? | NO | NO |
| manifested | immediately to right of element boundary | immediately to left of element boundary |
| predictable? | to a certain extent | UNKNOWN |
| productive? | YES | UNKNOWN |

*Table 2*

## ２．研究の目的

The research programme had three goals, which were prioritized in the following order: redundancy → predictability → productivity.

(1) REDUNDANCY. As hinted at in the title, it is not difficult to find compounds where rendaku and apophony co-occur:

i.　*ame+　to* → *ama-do*
　　　　　'rain'　'door'　'shutter'
ii.　*ki+ tati* → *ko-dat*
　　　　　'tree'　'stand'　'thicket'

　Here, compoundhood is doubly marked on both sides of the element boundary. At what statistical level

of frequency does such redundancy occur? What are its phonological motivations? Do semantics, element frequency, vocabulary stratum, part of speech, suprasegmentals or some other hitherto unrecognized, perhaps sociolinguistic, factor play a role?

    (2) PREDICTABILITY. As shown in Table 2 above, our current knowledge of the phenomenon does not allow us to come to a conclusion as to the predictability of apophony. Might there exist an apophonic version of Motoori/Lyman's Law? At what statistical level of frequency does apophony occur in the Japanese lexicon? Does this frequency vary, or is it motivated by, phonology, semantics, element frequency, vocabulary stratum, part of speech, suprasegmentals or some other hitherto unrecognized factor? Can readily applicable rules or constraints be deduced to predict the occurrence of apophony in a given compound type?

    (3) PRODUCTIVITY. As shown in Table 2 above, our current knowledge of the phenomenon does not allow us to come to a conclusion as to the productivity of apophony. Do neologisms undergo apophony? If apophony is being blocked, to what extent, and under what conditions?

  Research was data-driven. In order to accomplish research goals (1) and (2), the creation of an extensive apophony database was planned, upon which will be conducted a batch of statistical tests. A large-scale rendaku database (Irwin et. al (2017): see Irwin (2016) for a summary), already exists, allowing research goal (1) to be pursued in great depth. The data for research goal (3) will be gathered via surveys.

## ３．研究の方法

The principal investigator conducted this research with a noted Japanese phonologist affiliated to the University of Bordeaux, France. The person in question (henceforth 'OC' = 'overseas collaborator') is not listed as an official co-researcher in the proposal, as (s)he is not affiliated to a Japanese university. the two corresponded via electronic media througout the research period.

  The initial proposal was as the chart below. It was proposed that the focus of FY1 would be on research goals (1) and (2), specifically on compilation of the apophony database, work on which had already begun. In order to complete the apophony database, we proposed employing Japanese native-speaker students who are part of the faculty Linguistics Programme: in the end this was necessary, as the budget was unavailable and sufficient time was available for the researchers to do so themselves. Simultaneously to (1) and (2), a 'nonce apophony compound' survey would be designed and implemented for research goal (3). FY2 was to focus on statistical analysis, specifically of the apophony survey for goals (1) and (2), and the survey results for goal (3). It was envisaged at the planning stage that an interim presentation on research goal (1) will be given in the second half of FY2 at a national linguistics conference, most probably the Phonological Society of Japan. We had also hoped to give interim presentations on goals (2) and (3) if time, and prioritization, allowed. In FY3 the intention was to formulate hypotheses based on statistical analysis, test them and present our conclusions at an international conference, most probably the European Association of Japanese Linguistics or Japanese/Korean Linguistics.

| FISCAL YEAR | FY1 = 2018 | | | | FY2 = 2019 | | | | FY3 = 2020 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| **Research Goal (1)**<br>apophony database<br>statistical analysis<br>interim presentation<br>final presentation | | | | | | | | | | | | |
| **Research Goal (2)**<br>apophony database<br>statistical analysis<br>final presentation | | | | | | | | | | | | |
| **Research Goal (3)**<br>survey construction<br>conduct survey<br>survey analysis<br>final presentation | | | | | | | | | | | | |

４．研究成果

In FY1 Research Goal 1, a statistical analysis of the Apophony Database, was compiled and completed by the overseas collaborator. Analyses weere carried out on the phonological, suprasegmental and length effects of both the first and second elements in the relevant compounds. An analysis of redundancy (the rate of co-occurrence of apophony and rendaku) also progressed well. Research Goal 2, the nonce apophony compound survey, was begun ahead of time (it was decided to carry out the survey prior to the results of the grant being known). A statistical analysis of this survey also commenced, which will encompass the phonological, suprasegmental and length effects of both the first and second elements in the relevant compounds. Preparation for an interim presentation in FY2 began.

In FY2, the data for Research Goal 1 was presented at the Phonological Society of Japan summer conference in Tokyo. A paper was submitted to the international *Journal of Japanese Linguistics*, which was eventually published in FY4 (DOI: 10.1515/jjl-2021-2032). The survey required for Research Goal 3 was completed ahead of schedule in FY1. Unfortunately, however, the heavy workload involved in presenting, and preparing for publication, Research Goal 2 has meant that we were unable to present the data during FY2.

Due to the corona pandemic, presenting Research Goal 2 was not possible in FY3. Instead, the conference presentation was skipped and work published in https://www-hs.yamagata-u.ac.jp/wp-content/uploads/2020/09/5c7f942368a45e80b2be60d7508fa413.pdf. Work on research Goal 2 continued into FY4 and FY5 despite the pandemic and the constraints this imposed. Although we are still some way from answering the questions posed by predictability, we are still working on this issue despite the end of funding and hope to have a paper ready during the coming academic year.

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