



# A SET OF JAPANESE WORD COHORTS RATED FOR RELATIVE FAMILIARITY

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## ABSTRACT

A database is presented of relative familiarity ratings for 24 sets of Japanese words, each set comprising words overlapping in the initial portions. These ratings are useful for the generation of material sets for research in the recognition of spoken words.

## 1. INTRODUCTION

Spoken-language recognition proceeds in time - the beginnings of words arrive before the ends. Research on spoken-language recognition thus often makes use of words which begin similarly and diverge at a later point. For instance, Marslen-Wilson and Zwitserlood<sup>1)</sup> and Zwitserlood<sup>2)</sup> examined the associates activated by the presentation of fragments which could be the beginning of more than one word - in Zwitserlood's experiment, for example, the fragment *kapit-* which could begin the Dutch words *kapitein* ('captain') or *kapitaal* ('capital'). Taft and Hambly<sup>3)</sup> compared recognition of English words beginning in the same way but ending differently such as *difficult* and *diffident*; Slowiaczek, Nusbaum and Pisoni<sup>4)</sup> presented words with initial overlap to listeners under conditions of noise masking. Many other experiments have used such material.

In our research on the role of pitch-accent pattern in the recognition of spoken Japanese words<sup>5) 6) 7)</sup> we were interested in the question of whether listeners make use of suprasegmental cues to word identity at an early stage in lexical processing. Therefore we selected pairs of words which begin with the same CVCV sequence but which, in Tokyo Japanese, have different accentual patterns. One member of each pair had accent pattern 1, while the other had accent pattern 0, 2 or 3. Examples are *nagasa* versus *nagashi*, which both begin *naga-*.

In a gating experiment (see <sup>6)</sup>, for details) these words were presented in fragments of increasing length to listeners who guessed what the words might be. The guesses to smaller fragments were naturally hardly ever correct. For instance, given *na-* from *nagasa*, listeners produced 16 different word guesses, all incorrect: *Narita, Nattoo, Nara, Naruse, Nasa, nanzan, nama, nasu, napukin, nabe, naifu, namida, naito, naka, nagashi, nakai*.

There are many types of perceptual experiments in which listeners

are asked to guess about the identity of a speech signal which is in some way difficult to perceive; in gating the input is fragmentary, but other methods involve presentation of filtered or noise-masked or faint signals. In most such studies there is a strong familiarity effect: listeners guess words which are familiar to them rather than words which are unfamiliar. The above list suggests that the same was true in this study. However, in order to establish that this was so, it was necessary to compare the relative familiarity of the guessed words and the actually presented words. Unfortunately we found no existing database available for such a comparison.

It was therefore necessary to collect familiarity ratings for the words in question. Studies of subjective familiarity rating (Gernsbacher<sup>8)</sup>, Kreuz<sup>9)</sup>) have shown very high inter-rater reliability and a better correlation with experimental results in language processing than is found for frequency counts based on written text. We therefore collected relative familiarity judgements from 45 naive raters for every stimulus-response pair which our experiment had produced, as well as for the paired items which we had used as stimuli. Across the 48 stimulus words which we used, there were in total 1033 separate guesses, and we also collected ratings for the 24 paired sets of stimuli. Thus *nagasa* occurred in 26 pairs, because it was rated for relative familiarity with its stimulus pair *nagashi*, with the 15 words other than *nagashi* listed above which were produced as guesses given the fragment *na-*, and for 10 further guesses which were produced at other fragments.

Because the word guesses naturally began with the fragment which listeners had heard, the words which are compared overlap in the initial portions. These familiarity ratings could therefore, we believe, prove considerably useful to other researchers conducting spoken-word recognition studies in Japanese, and it is for this reason that we make the results of our ratings study available in the present report.

## 2. METHOD

*Subjects.* Subjects were 45 undergraduate students at Dokkyo University and Tsuda College, who completed the questionnaire in return for a small payment. They were all native speakers of Japanese from the Kanto area.

*Materials and procedure.* 1147 pairs of words were printed on 6 pages of B4 size paper. Instructions were printed on the left side of the first page. Words were written (according to the relevant convention for their orthographical representation) in kanji, hiragana or katakana, or on occasion in a combination of these. All loanwords were written in katakana. Most words of Chinese origin were written in Kanji, but some Kanji words, which in the judgement of the first author were unlikely to be well known in their conventional written form, were written either in hiragana, or with additional kana to indicate pronunciation.

The total of 1147 included all stimulus words from the gating study plus all guessed words from the gating study, with some additional filler items which, unlike the items derived from the gating study, did not form extensive initial-overlap sets. 12 pairs were repeated for use as a reliability check

Subjects were tested individually or in a group of as many as 6 in a room. They completed the questionnaire at their own speed.

Their instructions were: "The purpose of this investigation is to investigate the familiarity of Japanese words to Japanese people. You will see 1147 pairs of words on the following pages. Look at each pair, and decide which word is more familiar to you. Once you decide, circle the word you chose. You may feel that it is hard to decide, but never fail to choose one from each pair of words. For instance, you may see *yama - compyuutaa* ('mountain-computer'). Look at these words, and decide which word is more familiar to you. If you feel that *yama* is more familiar to you, circle that word. If you feel *compyuutaa* is more familiar, choose that word."

### 3. RESULTS AND DISCUSSION

The completed questionnaires were scored and the number of respondents choosing each member of each pair collated.

The repeated items used for the reliability check produced a correlation of .97 between the first and second occurrence.

The guessed words proved more familiar than the stimulus words in 62.62% of cases. For guesses with the same initial accent pattern (HL- or LH-, where LH- collapses across all accent patterns except accent 1), rated familiarity was higher than the stimulus word in 61.51% of cases, while for guesses with different initial accent pattern, rated familiarity was higher than the stimulus word in 64.96% of cases.

The raw data from the sets of words derived from the gating study, in terms of numbers of subjects rating each item as relatively more familiar than the stimulus word it was paired with, are listed in the Appendix. Accent pattern in Tokyo Japanese of the guessed words, which was the focus of our study, is not recorded in the Appendix since this information is easily available from dictionary sources<sup>10</sup>.

The guesses provide a view of the range of lexical options available to speakers of Tokyo Japanese given the initial ambiguous word

fragments used in the study. Perhaps predictably, there is a tendency for the guesses to be reasonably familiar and for the words used as stimulus material also to be regarded as familiar. Thus many of the guesses are rated as more familiar than the stimulus words by around half of the subjects. However, the lists do include some which are rated as more familiar than the stimulus words by most subjects (for *nagasa*, for example, such words are *nasu*, *napukin*, *naifu*, *namida*), as well as others rated as less familiar by most subjects (for *nagasa*, *Naruse*, *nanzan*, *nakai*, *nagaku*, *nagase*).

### 4. ACKNOWLEDGMENTS

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## 6. APPENDIX

The numbers after each item refer to the number of subjects rating that item as more familiar than the stimulus word. The remainder of the 45 subjects rated the stimulus word as more familiar. Thus for the example *nagasa*, 24 subjects rated *nagasa* as more familiar than *nagashi*, while 21 subjects rated *nagashi* as more familiar than *nagasa*; 20 subjects rated *NASA* as more familiar than *nagasa*, implying that 25 subjects rated *nagasa* as more familiar than *NASA*; and so on. Two words with the same Roman orthography are distinguished: e.g. *washi* (1), *washi* (2).

1. **bakuhu** bakuchi 19, baasan 35, baggu 37, baiku 40, baiorin 38, baka 36, bakku 31, baku 5, bakudan 30, bakuro 37, banana 43, basya 25, bataa 41, battaa 37, batto 14  
**bakuchi** bakuhu 26, bacchi 28, baggu 37, baka 36, bakemono 25, bakkin 31, bakku 35, bakkunetto 12, baku 4, bakuchiku 18, bakudan 26, basuketto 34, batsu 35, batta 29, batto 32
2. **hanabi** hanawa 9, hada 31, hage 25, haguki 14, haisha 31, hakka 5, hakubi 5, hamachi 17, hamaki 9, hamu 30, hanare 12, hanashi 32, hanchou 17, handan 18, handoru 26, hankachi 34, hanki 5, hanpen 20, hanshi 4, hanten 5, happa 16, happi 16, haru 30, hashika 13, hatena 11, hato 26, hattari 19, hatto 7, hachi 22  
**hanawa** hanabi 36, hadagi 30, hande 30, hana 41, hanami 39, hanamizu 35, hanao 13, hanashi 35, hanauta 30, hanaya 36, hanga 25, hankachi 41, hanko 36, hankyou 34, hanran 27, hanshi 26, hantai 34, hanten 12, happa 36, haramaki 20, hari 12, hashi 37, hasu 21, hato 31, hatten 32
3. **hokubu** hokuro 28, hokutou 35, hotaru 32  
**hokuro** hokubu 16, hoken 20, hokkai 6, hokkaidou 28, hokke 17, hokkyoku 14, hokuriku 14, hokutou 9, hon 36, honto 34, hontou 28, hoshi 32, hotaru 10, hotto 21, hottodokku 29, houseki 23
4. **kamotsu** kamome 33, kaisya 40, kaji 40, kakashi 27, kaki (2) 29, kakko 30, kakkou 23, kaku 29, kamameshi 30, kamera 38, kamikaze 15, kamo 24, kamonabe 10, kamu 35, kan 38, kanbutsu 15, kanmuri 19, kanpa 23, kanpou 32, kantou 42, kanzume 37, kappu 38, karasu 36, karate 28, karuteru 18, kashi 40, kattaa 35, katei 41, katsu 35, kattou 31  
**kamome** kamotsu 12, kami 35, kabu 25, kabuto 13, kachime 25, kaidan 38, kaisha 32, kakashi 22, kakke 12, kakkou 9, kamaboko 33, kamakiri 23, kamisama 40, kamo-resu 14, kamoku 28, kamon 13, kamoniku 14, kan 18, kana 18, kanbotsu 5, kankou 37, kanmuri 13, kanpachi 12, kanso 36, kantan 23, kanten 29, karasu 24, karate 24, kashi 38, katana 20, katte 22, kauntaa 28, kabin 29
5. **karasu** karada 33, kabin 31, kai 29, kaki (1) 28, kaki (2) 20, kakki 23, kakugo 21, kakuteru 22, kamera 34, kami 29, kanna 8, kanpa 20, kanpo 7, kansou 36, kappa 15, kappumen 34, kappuru 36, karahuru 26, karui 22, karumen 12, karuta 20, karute 15, karuteru 1, kasegi 24, kashi 40, kattaa 35, kaze 37, kazoku 39  
**karada** karasu 12, kaki (1) 19, kamera 23, karabukin 8, kasutera 28, katai 11, katatsumuri 18, katsu 16, katte 14, kai 18, kaibutsu 11, kaki (2) 19, kakkoi 29, kamakiri 18, kaminoke 27, kamisama 19, kan 18, kani 24, kantou 17, kappa 11, kappu 15, karaa 18, karaage 31, karakuchi 19, karakuri 11, karameru 13, karami 4, karamu 8, karappo 19, karashi 18, karasumi 5, karate 15, kashira 5, kasugai 8, katachi 12, katsute 14, kattaa 28, katsura 15, kaze 36, karasu 12
6. **karahuru** karamatsu 14, kakato 30, kaki (2) 24, kaki (1) 35, kakke 14, kamera 32, kamisama 30, kanda 18, kantou 29, kappu 34, karaa 35, karahuto 16, karai 26, karasu 24, karochin 27, karoushi 26, karui 21, karuta 24, kata (2) 30, katachi 22, kattaa 27, katte 28, kazamuki 28, kasan 21, kazoku 37, katorisenkou 26  
**karamatu** karahuru 31, gasu 38, kabi 37, kabin 42, kabuto 34, kaede 40, kage 33, kaimono 32, kake 33, kaki (2) 36, kaki (1) 29, kame 36, kamera 40, kami 38, kaminari 38, kanada 38, kanryou 39, kappa 28, karai 37, karamari 22, karamaru 28, karamawari 38, karami 21, karan 13, karappo 30, karasu 39, karate 35, karu 32, karubona 37, karui 35, karuta 37, karute 37, karuwaza 12, kasa 38, kasetto 43, kashi 39, kasutera 38, katachi 34, katamomi 36, kattaa 31, katsura 34, kayaku 30
7. **karuteru** karudera 17, kabin 41, kabuto 24, kaisou 41, kajitsu 40, kaki (2) 32, kaki (1) 40, kakki 39, kakkou 35, kakugo 41, kamakiri 38, kame 38, kappa 33, kappu 41, kappuru 39, karashi 40, karasu 40, karei 41, karu 31, karubona 13, karui 37, karuta 36, karute 39, kasa 31, kashi 40, katsudon 42, kattaa 40, katsura 38, kattou 35, kaya 24, kazoku 42  
**karudera** karuteru 28, kai 41, kaigara 42, kaimono 32, kaki (1) 39, kakkou 38, kakyou 20, kami 38, kamo 33, kamotsu 38, karaage 42, karasu 42, karate 36, karuchaa 41, karuchaashokku 38, karugamo 37, karui 32, karuishi 35, karuku 36, karume 39, karumen 34, karusa 43, karusyuumu 43, karuta 38, karutatori 35, karute 40, kashi 41, kata (1) 32, katachi 36, katai 36, katakana 41, katana 33, katari 39, katsu 40, kaze (1) 39, kazoku 41, kazunoko 36
8. **kasegi** kasetsu 21, kaaten 35, kaba 30, kabuto 16, kajitsu 33, kaki (1) 33, kame 26, kamera 37, kami 35, kan 37, kanban 25, kanna 9, kanro 13, kappa 19, karasu 30, karin 24, karuta 28, kasa 34, kasei 25, kaseki 13, kasen (1) 22, kasen (2) 13, kasetto 39, kashi 40, kasu 12, kasumi 13, kasumisou 29, kasutanetto 26, kata (2) 32, katatsumuri 30, katou 12, kattaa 37, kaze (1) 36  
**kasetsu** kasegi 24, kachiki 26, kai (2) 30, kaki (1) 27, kaki 32, kamera 38, kamisama 33, kappa 27, karasu 28, kasetto 37, kaso 27, kasu 15, kasukabe 22, kasumisou 35, kasuri 17,

- kasutanetto 29, kasutera 38, kata (1) 17, katachi 24, katai 16, katana 20, katorisenkou 14, katsu 32, katsura 28, katte 32, kaze (1) 39, kama 19
- 9. kokugi** kokugo 34, kokudo 24, konoha 36, koohii 38, kopii 41, koppu 37, koban 23, kodomo 40, kogu 26, koguma 19, koi 34, kokka 30, kokki 28, kokku 32, kokuhu 6, kokushi 25, koma 31, komichi 30, komori 31, kon 35, konbu 40, kondo 30, konki 33, konma 21, konya 38, kouto 38, kotoba 41, kotton 36, kotoshi 41
- kokugo** kokugi 11, kobudashi 27, kodomo 35, kokka 15, kokkai 22, kokki 12, kokku 19, koku 10, kokuban 28, kokubun 5, kokudo 8, kokuhou 12, kokuhuku 19, kokuji 11, kokumin 26, kokumotsu 17, komaasyaru 35, konoha 17, koon 28, koppu 31, kotori 29, kotsubu 8, kotton 28, koma 15
- 10. maguchi** maguro 43, mabuta 45, macchi 42, mada 40, maguma 35, makura 43, mane 39, manto 39, matto 44, mattoresu 42, matsu 40, machi 42, magunetto 43, magunicyuudo 43, magure 41, mangetsu 42, mari 39, matsuge 44
- maguro** maguchi 8, maccha 26, mado 35, magukappu 33, magunetto 17, make 21, maku 7, makura 32, mandarin 14, manga 27, manto 17, mari 13, matsu 26, matsutake 18, mato 14
- 11. moguri** mogura 31, modosu 37, mogusa 14, moji 41, mokkin 28, mokuba 24, mokugyo 14, mokuhi 38, mokume 30, momiji 38, momo 43, mon 31, monburan 38, monosashi 41, moshi 40, motsu 36, mottou 37, motsunabe 32, motsuyaki 30
- mogura** moguri 14, mo 16, mochi 38, mochuu 24, moguru 13, mogusa 10, mokkin 20, mokuu 14, mukusei 25, mukuyou 36, momiji 37, momo 39, mon 32, mondai 34, mono 31, moushon 18, moppu 29, mori 38, moroi 25, moto 14, mouri 10, mura 33, monpe 10
- 12. mokuba** mokuji 38, mogura 28, mokki 9, mokkin 30, mokuu 21, mokugyo 14, mokuhi 32, mukuyou 40, momi 24, momiji 42, momo 43, mon 31, monchicchi 29, monooki 31, moppu 31, moraimono 33, mori 41, morokko 23, moshi 39, motsu 33, mottou 28
- mokuji** mokuba 7, mokkin 13, mokuu 3, mokuu 7, mokudoku 11, mokugyo 8, mukuroku 9, mukusei 20, mokutan 8, mokutou 14, mukuyou 33, mukuyoubi 37, mokuu 16, mokuu 14, mongen 25, monku 29, mono 19, moppu 20, morokko 20, mukume 9, mukuroku 14, momo 31, monpe 7, mori 28
- 13. nagasa** nagashi 21, nasa 20, nani 19, nabe 17, nasu 35, nama 27, naka 18, nara 24, natou 17, nazeka 24, naasu 25, naito 22, naihu 35, naruse 0, narita 27, nagaku 8, nagase 4, nagano 27, namida 36, napukin 30, nanzan 6, nameko 27, nakai 6, nattou 25, natsumikan 26
- nagashi** nagasa 21, nabe 33, nagagutsu 28, nagai 25, nagaimo 20, nagaisu 28, nagame 39, nagameru 32, nagashima 14, nagashime 23, nagatachou 21, naguri 19, naguru 32, naka 20, nakai 17, namae 41, namako 14, namida 41, nanmon 28, nappa 28, naruto 15, nashi 33, natsu 39, nattou 40, nattsu 23, natsumikan 28, nagatoro 12
- 14. namida** namiki 8, nachisu 12, nakami 12, namae 32, napukin 24, naihu 8, nameko 18, nami 17, nana 2, nanda 8, nanzan 6, naru 8, nasubi 11, nasu 18
- namiki** namida 37, nagai 25, naginata 17, nakai 6, namari 22, namekuji 18, nami 18, namidame 24, namikaze 18, namikimichi 23, namima 28, naminori 14, nanten 20, nashi 33, natsu 37, natsumikan 34, nattou 39
- 15. nimotsu** nimono 34, nidai 13, nihon 34, nijii 30, nikkou 32, niku 36, ningen 36, ninjin 36, ninjyou 27, ninzoo 31, nishi 12, ninpou 12, ninpu 14, ninjya 21
- nimono** nimotsu 11, nihon 14, nijii 26, nikki 20, niku 30, ningen 23, ninniku 27, ninjin 31, nishi 12
- 16. nomichi** nomiya 37, nobara 26, nobita 15, nobiru 29, nohara 33, nokogiri 29, nomi 21, nomi 3, nomimono 41, nomu 36, nonbei 18, nonbiri 35, nonki 37, noppo 29, nougyou 37, nouka 30, nouto 41
- nomiya** nomichi 8, nobori 14, nogiku 7, nohara 13, nokogiri 11, nomi 3, nomikai 32, nomikomu 14, nomimizu 16, nomimono 19, nori 23, noppo 14
- 17. sashizu** sashiki 11, saccha 24, saka 35, sakka 38, sakki 29, saku 4, sapporo 24, sarada 40, sashi 1, sashiba 21, sashimi 34, sashite 7, sasshi 17, sasyo 4, satoimo 24, satou 42, sattou 24, saru 36
- sashiki** sashizu 34, saitan 35, saka 36, sakana 39, sashiba 30, sashie 35, sashikizu 30, sashiko 7, sashikomi 22, sashimi 39, sashimono 10, satoimo 38, satou 38, saru 39
- 18. sekiri** sekiryu 41, seibutsu 39, seiji 41, sekai 44, seki (1) 41, sekimu 24, sekinin 42, sekkachi 38, sekkai 33, sekken 41, sekki 23, sekkou 22, sensei 45, settai 34, settsu 10, seki (2) 36
- sekiryu** sekiri 4, seikaku 33, seki (1) 16, sekidou 10, sekiei 3, sekii 9, sekisetsu 12, sekitan 39, sekizui 11, sekkai 6, sekken 27, sekki 7, sekkou 6, sekkyou 19, semento 24, semi 23, sendo 24, seiseki 31, seri 7, setsu 7
- 19. tachiba** tachiki 9, tabako 35, tabi 41, tacchi 19, Tachi Hiroshi 23, tachippanshi 23, taido 32, taiiku 30, takasa 29, take 25, taki 27, takibi 32, takoyaki 39, tan 13, tani 16, tanmen 17, tansu 35, tanuki 31, tappaa 27, tarou 25, tasu 16, tate 10, tatsu 22, tama 25, tachi 0
- tachiki** tachiba 36, tachikurami 40, tachinori 33, taima 28, takai 38, takkyuu 41, tama 36, tabasuko 40, tachibana 20, tachibasami 28, tachii 19, tachikiri 20, tachimi 24, tachiuo 15, tai 35, taiku 38, takara 39, taki 30, takigi 36, tamago 39, tamanegi 43, tanbo 40, tansu 41, tanuki 39, tatemono 40, tachi 11, takibi 40
- 20. tomato** tomari 11, tochi 10, tomaru 12, tomin 8, tonai 21, tonbi 4, toppu 13, tora 8, toranpu 17, tori 21, tosyokan 30, tokei 30, tonari 17, tonbo 16, tomu 7
- tomari** tomato 34, tobira 16, todana 19, toire 34, tokage 18, tomakomai 10, tomare 16, tomaru 15, tonari 24, tonbo 19, toride 13, totsui 2, tomatteiru 10, tomodachi 35, tori 24, todo 10
- 21. wakaba** wakate 23, waido 29, waka 17, wakame 33, wakasa 35, wakkusu 35, wani 34, waon 19, wara 12, waru 25, warutsu 23, washi (1) 23, watto 16
- wakate** wakaba 25, wagashi 36, waka 24, wakadori 24, wakai 32, wakame 31, wakamono 30, wakare 31, wakaruru 28, wakasa

30, wakasagi 21, wakatta 33, wakayama 21, waki 22, wakka 9, wakkanai 17, wakusei 27, washi (1) 25, washi (2) 14, wasyoku 40, wata 25, watagashi 32, watashi 37

**22. wakame** wakare 16, wadachi 7, waido 18, wain 31, waka 10, wakaba 14, wakai 13, wakasa 22, waki 16, wakoku , wan 5, wani 14, warutsu 15, watari 4, watashi 36, wara 10

**wakare** wakame 29, wa 6, wagashi 29, waisyatsu 30, waka 11, wakaba 14, wakadori 28, wakai 21, wakaranai 26, wakaruru 17, wakasa 21, wakasagi 6, wakatta 17, wakayama 19, wakka 7, waku 10, wan 13, wanage 10, wappa 2, waribashi 31, waru 18, washi (2) 10, wata 20, wataru 13, watashi 26

**23. warabi** waraji 20, waapu 27, wain 42, waisyatsu 37, wajutsu 27, waka 28, wakaba 26, wakame 39, wakkusu 33, wana 29, waon 19, wara 29, warera 29, warutsu 29, washi (2) 28, washi

(1) 30, wataame 21, wani 31

**waraji** warabi 25, wan 31, waragutsu 9, wakai 35, wakame 38, wakaranai 35, wanage 31, wani 34, warabeuta 11, warabukiyane 17, warai 38, warau 3, waribashi 42, warui 34, washi (1) 33, wata 30, watagashi 35, watashi 43

**24. yomichi** yomise 15, yo 17, yogiri 16, yoiko 30, yoka 29, yokaze 23, yomikaki 30, yomimono 25, yominokuni 16, yomu 27, yon 2, yondan 6, yondo 8, yonhon 8, yonko 7, yonku 20, youkan 29, yoru 36, yotto 28

**yomise** yomichi 30, yobina 28, yoka 35, yokyou 22, yomikiri 26, yomimono 28, yomisute 9, yomiuri 17, yonaka 33, yononaka 34, yopparai 35, yorei 17, yorokobi 36, yosaku 5, yosenabe 34, yosou 22, yotsuba 24, yotto 28, yoko 29, yomi 25, yomikata 35, yomitori 22, yoroi 17, yotsuya 16, yoru 37