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Paradigm Competition: An Experimental Note on Finnish Verbs

Abstract

In languages with a high number of inflectional paradigms, morphological forms may interact across paradigms irrespective of stringent paradigm-defining properties such as phonological shape. The present pseudo-verb inflection task of Finnish shows that in spite of transparent phonological constraints on paradigm membership, one morphological paradigm, viz., that of the so-called contracted verbs, shows an overwhelming effect among the verbs of this language. This override effect is not fortuitous, since it can be explained, e.g., with the relative lack of phonological alternation in affixation. In this respect, Finnish appears to favor agglutination, although in some other areas the language shows developmental traits towards increasing fusionality.

1. Introduction

The topic of the present study, i.e., Finnish verb inflection, involves a complex bundle of forms containing transparent morpho(phono)logy and competition of closely-related paradigms. Finnish verbs may be claimed to have as many as 45 (e.g. *Nyky-suomen sanakirja* [‘Dictionary of Present-day Finnish’], 1973, 2401 pages), or 25 (non-defective) inflectional classes (e.g. *Suomen kielen perussanakirja* [‘Basic Dictionary of Finnish’], 1990, 2008 pages). Allowing for drastic morphophonological and phonological abstractions the number of these paradigms can be somewhat reduced (Karlsson 1983: 212 & *passim*). Whatever the number of paradigms in the descriptions of theoretical morphology, it is a pre-theoretical fact that in this language multi-member phonological strings (partially) determine the various surface inflectional patterns (for mathematical modelling of Finnish verb inflection, see the analogy model of Skousen 1989; for Optimality-

Theoretical accounts on the inter-paradigmatic competition, variation and diachronic tendencies in the complex (noun) inflection of Finnish, see, e.g., Anttila 1997a, 1997b, 1999, Anttila & Yu Cho 1998, Kiparsky 2003, Nikolaev & Niemi 2005). Another feature that makes the present language inflectionally a highly complex one is that speakers often have to choose among *both* stem *and* suffix allomorphs to arrive at the correct output (for the importance of bound stem allomorphs in processing in Finnish, see Niemi, Laine & Tuominen 1994, Järvikivi & Niemi 2002a, 2002b). In spite of the formal changes in affixation, the morphological segmentation of Finnish complex words is relatively straightforward (Sproat 1992). In other words, in the typical case, morphological boundaries are not phonologically blurred, although affixation often involves drastic formal changes—to use a metaphor—in the area flanking the boundary.

In addition to competing stem and affixal allomorphy, the assumed processing load in Finnish verb inflection is enhanced still as we observe that (i) in language production and reception the morphological operator(s) of Finnish speakers must be highly active since about half of the words (i.e., 48 %) carry a non-zero inflectional marker in spoken language, and in written text, the proportion is higher still, as about 77 per cent of running words contain a non-zero inflectional marker (Pajunen & Palomäki 1984: 50–51, esp. Table 6). (ii) As specifically for verbs, they lack a morphologically simplex form. Thus, even the dictionary entry infinitive (the so-called *T* infinitive) carries an affix (for psycholinguistic experiments on the base form status of the three competing inflectional forms, viz., between the bound *T* infinitive stem, e.g., *haka-*, *men-*, of ‘beat’, and ‘go’, respectively, the *T* infinitive, e.g., *haka-ta*, *men-nä* and the 3sg., e.g., *hakkaa*, *menee*, see Niemi, Laine & Koivuselkä-Sallinen 1994). (iii) The potential number of surface forms per lexeme is relatively high, since each non-defective Finnish verb may have up to 12,000 to 15,000 surface forms (Karlsson & Koskeniemi 1985).

2. Method

2.1 Subjects and Data

48 monolingual Finnish-speaking 13–14-year-old schoolchildren were group-tested in the present experiment. 80 pseudoverbs were created by changing the consonant onset of real verbs (for a noun inflection study with this segmental manipulation procedure, see Niemi & Heikkinen 2000, Niemi & Niemi 2002). The pseudoverbs represented four paradigms (20 verbs in each): (i) ***Oi-dA* paradigm with multisyllabic stems**. Here the stem-final *Oi-* sequence is an unambiguous paradigm assigner (/dA/ is here the *T* infinitive marker). This paradigm was chosen as a distractor typically needed in these type of tasks to divert the subjects' attention from the actual research issue. The *Oi-dA* paradigm is a good candidate for a distractor class, as it is inflectionally distant from any other paradigm and thus unlikely to cause a considerable number of inter-paradigmatic errors. The three remaining and crucial, potentially competing paradigms were the following: (ii) The so-called **contracted verb paradigm** carries, *inter alia*, suffixal agglutination with concomitant grade alternation of the stem-internal stop consonants in the present and past tenses (like *haka-ta*, INF, cf. [hän] *hakkaa* '[s/he] beats', *hakka-si* '[s/he] beat'). This paradigm is highly productive, since, e.g., it attracts novel disyllabic items, e.g., computerese items like *seiva-ta* 'save [a file]', *meila-ta* 'send e-mail', or colloquial/slang verbs like *roka-ta* 'rock and roll' and *skeita-ta* 'roller-skate'. Moreover, in such language contact situations in which Finnish is the subordinate language, speakers tend to place loan verbs from the superordinate language in the contracted verb paradigm (see, e.g., Martin 1993 for American Finnish). Finally, forms resembling the contracted verbs are often incorrectly used in other paradigms at the early stages of language acquisition (Niemi & Niemi 1987). In the more complex, less agglutinative (iii) **antaa** and (iv) **ottaa** paradigms the stem final /a/ is either raised to an /o/ (*anta-* : *anto-i*) or deleted (*otta-* : *ott-i*), depending on the labiality of the first syllable vowel. The four paradigms with the relevant inflectional forms are presented in Table 1.

Table 1. Paradigms and inflectional forms used and lexical frequencies (Karlsson 1983) of verbs in the pseudoverb inflection task exemplified through real items.

	<i>Oi-da</i>	Contr. vb.	<i>Antaa</i>	<i>Ottaa</i>
1st infinitive	<i>Tupakoi-da</i>	<i>haka-ta</i>	<i>anta-a</i>	<i>otta-a</i>
<i>mA</i> infinitive	<i>tupakoi-ma-ssa</i>	<i>hakkaa-massa</i>	<i>anta-massa</i>	<i>otta-massa</i>
Past	<i>tupakoi</i>	<i>hakka-si</i>	<i>anto-i</i>	<i>ott-i</i>
negation ¹	<i>tupakoi</i>	<i>hakkaa</i>	<i>anna</i>	<i>ota</i>
Gloss	‘smoke’	‘beat’	‘give’	‘take’
Lexical frequency	961	1,688	81	4,904

(Karlsson 1983, Table on p. 210; total no. of verbs: 15,623)

The purpose of the present study is, for the first time, to test the relative productivity of Finnish verbs in a *controlled* off-line production task with stimuli whose output should unambiguously produce—in the eyes of a theoretical morphologist—representatives of their target paradigms only.

2.2 Procedures

The written-form experiment carried 80 (4 x 20) multi-sentence test-items constructed in the following manner (below with approximate English translations). The subjects’ task was to fill in the cloze slots, in writing, with the appropriate morphosyntactic form of the pseudoverb given in the *mA* infinitive form of the first sentence, e.g.:

- (1) *Anneli on sauhamassa.* (2) *Eilenkin hän [expected: sauhoi].*
 ‘Anneli is wug-INF-in [‘wugging’]. Yesterday-too she ____.
- (3) *Tainankin pitäisi [exp.: sauhaa], mutta silti hän ei [exp.: sauha].*
 Taina-too should _____, but still she does not _____.’

3. Results

In spite of the unambiguous transparency of paradigm membership of the pseudoverbs the overall error rate is as high as 47.0%. Table 2 shows the

¹ The negation marker is a verb, with the main verb in an unaltered NEG form in the present tense (e.g., *e-n tupakoi* ‘I-do-not smoke’, *e-t tupakoi*, ‘you-do-not smoke’).

stimulus—output relations between the four inflectional paradigms studied here. The response pattern shows that the *Oi-dA* paradigm is—as expected—extremely robust to any inter-paradigmatic effects, since practically all these instances remain within their own paradigm. Similarly, the majority of the contracted verb items are correctly produced. However, the *antaa* and *ottaa* paradigms obtain the lowest scores, with about 12–14 % correctness rates. The most significant attractor is the contracted verb paradigm, since the shifts away from the *antaa* and *ottaa* types heavily concentrate on this paradigm with circa 85% attraction rates. It is to be noted that these observations pertain to paradigms, not to types of morphological operations (in the grammatical sense of the term) or to morphological categories, since the three inflectional categories behave similarly within the same paradigm (Figure 1).

Table 2. Confusion matrix of errors (in %) within the four paradigms (outliers excluded, N's of the outliers as low as 4.2%, or 482 instances).

	<i>Oi-dA</i>	Produced			Total N
		Contr. vb.	<i>antaa</i>	<i>ottaa</i>	
Expected					
<i>Oi-dA</i>	99.4	0.6	0	0	2792
Contr. vb.	1.1	97.3	1.7 ²	²	2707
<i>antaa</i>	1.8	86.0	11.8	0.4	2798
<i>ottaa</i>	1.3	84.8	0.4	13.5	2741

² The 45 errors are partly ambiguous as to the distinction *antaa* – *ottaa*. However, the errors in the past form showed that *antaa* was the most attractive error category of the two (i.e. vowel alternation *a* : *o* is preferred over the vowel loss *a* > \emptyset). Thus these items were analysed as *antaa* output.

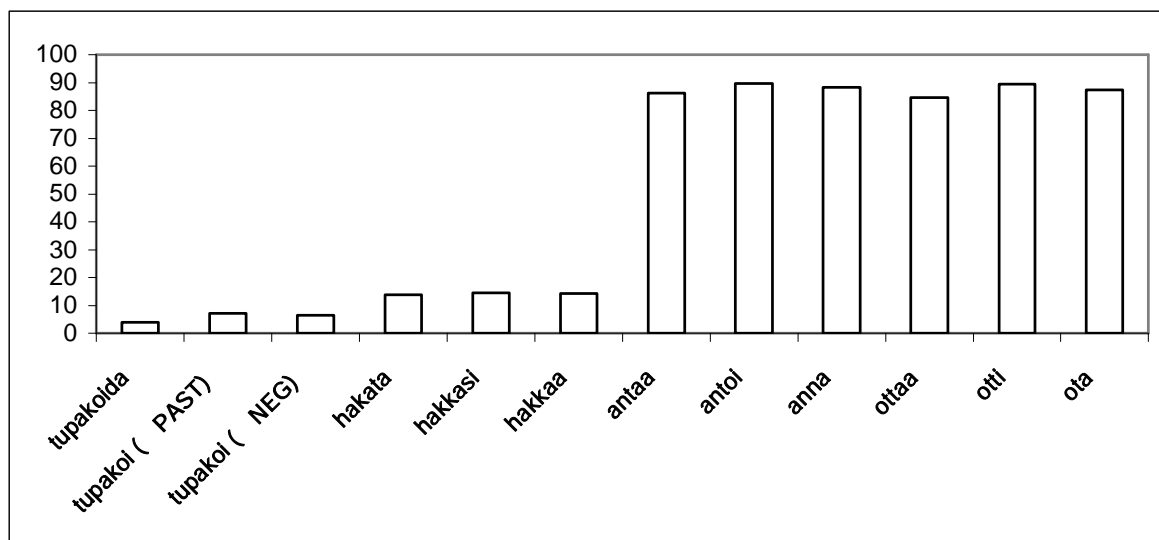


Figure 1. Percentage of errors broken down by inflectional category.

4. Conclusions

It may be concluded that the present metalinguistic, off-line data show that contracted verbs (a) are resistant to error, and (b) that this paradigm attracts items from the neighboring *antaa* and *ottaa* paradigms. One of the reasons for this state of affairs is—it is here claimed—due to their semiotically relatively expedient affixation (Karlsson 1983, for a semiotic view of morphology, see Dressler 1985). Somewhat elaboratedly we may claim the following: as regards the stems, the forms studied here do not involve any stem final vowel change, while the other competing paradigms do (*antaa* : *anto-i*, *ottaa* : *ott-i*). The only morphophonological operation—to use a metaphor (see the importance of allomorph in this language, Järvikivi & Niemi, 2002a, 2002b)—that is applicable to the contracted verbs in these environments is the weakening (grade alternation) of the (possible) internal stops only. And this process (or stem to stem relation) is applicable throughout Finnish morphology irrespective of syntactic category (cf. *hattu* : *hatu-n*, and *aate* : *aattee-n*, nom.sg. and accusative-genitive sg. of ‘hat’ and ‘idea’, respectively, and *sata* ‘hundred’ : *sada-s* ‘hundredth’). Thus, in affixation the contracted verbs require relatively straightforward agglutination (with concomitant consonant gradation changes, if applicable, and with phonological adjustment like vowel harmony). As for the suffixes, the *T* infinitive marker and the *-si* past tense marker represent the prototypical CV syllable, and thus they exhibit ideal candidates for a high degree of

isomorphy between meaning and (affixal) form (one morpheme – one syllable, see Dressler 1985). It should be stressed in this connection that also in the case of nouns the more agglutinative paradigms are the invading ones in Finnish (see Niemi & Heikkinen 2000, Niemi & Niemi 2002). Finally, the negation form in this paradigm (like *hakkaa*) is homophonous with the 3sg., which has been claimed to be one of the cognitive “base forms” of the Finnish verb, the two others being the stem (like *haka-*) and the *T* infinitive (*haka-ta*) (see Karlsson 1983, Niemi, Laine & Koivuselkä-Sallinen 1994).³

References

- Anttila, Arto (1997a) *Variation in Finnish Phonology and Morphology*. PhD thesis, Stanford University.
- (1997b) Deriving variation from grammar. In Frans Hinskens, Roeland van Hout & W. Leo Wetzels (eds.) *Variation, Change and Phonological Theory*, pp. 35–68. Current Issues in Linguistic Theory 146. Amsterdam & Philadelphia, PA: John Benjamins.
- (1999) Derived environment effects in colloquial Helsinki Finnish. Rutgers Optimality Archive (ROA), URL: <http://roa.rutgers.edu/files/406-0800/406-0800-ANTTILA-0-0.PDF>.
- Anttila, Arto & Young-Mee Yu Cho (1998) Variation and change in Optimality Theory. *Lingua* 104: 31–56.
- Dressler, Wolfgang (1985) *Morphonology: The Dynamics of Derivation*. Linguistica Extranea, Studia 12. Ann Arbor, MI: Karoma Publishers.
- Järvikivi, Juhani & Niemi, Jussi (2002a) Allomorphs as paradigm indices: On-line experiments with Finnish free and bound stems. *SKY Journal of Linguistics* 15: 119–143.

³ Interestingly enough, but somewhat beyond the research interest of the present article, in the colloquial speech of young speakers the “3rd p. paradigmatic levelling” effect seems to affect (a) even the *T* infinitives of the contracted verbs (e.g., *En viitsi skeittaa* (for *skeita-ta*) ‘I do not bother/like to skate’), and (b) the *mA* infinitives in structures like *En pysty skeittaa* (for *skeittaa-ma-an*) ‘I am unable to skate’. There may also be phonological factors involved, since, e.g., the /eA/ verbs (and adjectives) tend to carry a long monophthong instead of the vowel combination, i.e., owing to a phonological change these type of verb forms tend to be homophonous with the 3rd p. forms (*En viitsi hakea* → coll. *En viitsi hakee* ‘I do not bother to fetch/get [X]’, see Anttila 1999, for a detailed OT account of the phenomenon and its variation). The diachronically relevant question is now whether spoken Finnish at large will eventually adopt the new, mixed “Helsinki-slang-type” paradigm for what once basically was (and still for most of the speakers is—at least in writing (see present results)) the contracted verb paradigm (for the contracted verb *T* infinitive in Helsinki slang, see, e.g., Paunonen 2000: 20–21).

- (2002b) Form-based representation in the mental lexicon: Priming (with) bound stem allomorphs in Finnish. *Brain and Language* 81: 412–423.
- Karlsson, Fred (1983) *Suomen kielen äänne- ja muotorakenne*. Porvoo, Helsinki & Juva: Werner Söderström Osakeyhtiö.
- Karlsson, Fred & Kimmo Koskeniemi (1985) A process model of morphology and lexicon. *Folia Linguistica* XIX.1–2: 207–231.
- Kiparsky, Paul (2003) Finnish noun inflection. In Diane Nelson & Satu Manninen (eds.) *Generative Approaches to Finnic and Saami Languages: Case, features and constraints*, pp. 109–161. CSLI Lecture Notes. Stanford: CSLI Publications.
- Martin, Maisa (1993) Muoto-opin seikkoja. In Pertti Virtaranta, Hannele Jönsson-Korhola, Maisa Martin & Maija Kainulainen (eds.) *Amerikansuomi*, pp. 97–101. Tietolipas 125. Helsinki: Suomalaisen Kirjallisuuden Seura.
- Niemi, Jussi & Heikkinen, Janne (2000) Paradigmatic and syntagmatic inflectional morphology in Specific Language Impairment. *Journal of Language and Verbal Behaviour* 3: 80–85.
- Niemi, Jussi, Matti Laine & Päivi Koivuselkä-Sallinen (1994) Mental morphology and the Finnish verb: Aphasiological and normal data. *Brain and Language* 47: 509–511.
- Niemi, Jussi, Matti Laine & Juhani Tuominen (1994) Cognitive morphology in Finnish: Foundations of a new model. *Language and Cognitive Processes* 9: 423–446.
- Niemi, Jussi & Sinikka Niemi (1987) Acquisition of inflectional marking: A case study of Finnish. *Nordic Journal of Linguistics* 10: 59–89.
- Niemi, Sinikka & Jussi Niemi (2002) Emergent nature of morphological paradigms: Plural inflection in Swedish and Finnish. In Renate Pajusalu & Tiit Hennoste (eds.) *Tähendusepüüdja: pühendusteos professor Haldur Õimu 60. sünnipäevaks 22. jaanuaril 2002. Catcher of the Meaning: Festschrift for Professor Haldur Õim on the Occasion of his 60th Birthday*, pp. 285–296. Tartu Ülikooli üldkeeleteaduse õppetooli toimetised 3. Tartu: Tartu Ülikool.
- Nikolaev, Alexandre & Jussi Niemi (2005) Suomen nominien taivutuksesta: rytmi-, sivupainoa ja agglutinaatiohypooteesien testausta. *Virittäjä* 109: 530–553.
- Pajunen, Anneli & Palomäki, Ulla (1984) *Tilastotietoja suomen kielen rakenteesta / Frequency analysis of spoken and written discourse in Finnish, 1*. Kotimaisten kielten tutkimuskeskuksen julkaisuja 30. Helsinki: Kotimaisten kielten tutkimuskeskus.
- Paunonen, Heikki (2000) *Tsennaaks Stadii, bonjaaks slangii: Stadin slangin suursanakirja*. Porvoo, Helsinki & Juva: Werner Söderström Osakeyhtiö.
- Skousen, Royal (1989) *Analogical Modeling of Language*. Dordrecht: Kluwer.
- Sproat, Richard (1992) *Morphology and Computation*. ACL-MIT Series in Natural Language Processing. Cambridge, MA: The MIT Press.

Acknowledgments. The study is part of the project *Words in the Mind, Words in the Brain*, which is an *MCRI* (Major Collaborative Research Initiative, Social Sciences and Humanities Research Council of Canada) project co-ordinated by prof. Gary Libben (Linguistics, University of Alberta). I would like to thank Janne Heikkinen and Juhani Järvikivi for their assistance in stimulus preparation and Janne Heikkinen for his meticulous scoring of the response data.

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