Describing morphology in Aanaar Saami: what, how, and for whom?

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Background

- Traditional accounts of AS morphology (e.g. Itkonen 1946, 1971, etc.; Korhonen 1967, 1969, 1981, etc.; Lagercrantz 1927):
  - Intended for an audience of linguists, not lay learners.
  - Focus on explaining the system from the POV of historical linguistics
    - Morphophonological alternation as sound change
- New synchronic descriptions (Morottaja & Olthuis 2022; Valtonen et al. 2022) now available, but follow tradition in many respects.
- Morphophonological alternation difficult in L2 acquisition (Martin 1995)

Example: Gradation in disyllabic nouns

'wind'	SG	PL
NOM	pǐeggâ	piegah
GEN	piegâ	piegâi
ACC	piegâ	piegâid
ILL	piegân	pǐeggáid
LOC	piegâst	piegâin
COM	pǐeggáin	pǐegâigijn
ABE	pǐegâttáá	pǐegâittáá
ESS	pǐeggân	
PART	pǐeggâd	

'faith'	SG	PL
NOM	osko	o'skoh
GEN	o'sko	o'skoi
ACC	o'sko	oskoid
ILL	ooskon	oskoid
LOC	oskoost	oskoin
COM	oskoin	o'skoigijn
ABE	o'skottáá	o'skoittáá
ESS	oskon	
PART	oskod	

'worm'	SG	PL
NOM	máátu	mááđuh
GEN	mááđu	mááđui
ACC	mááđu	mááđuid
ILL	máátun	mááđoid
LOC	mááđust	mááđuin
COM	mááđoin	máđuigijn
ABE	máđuttáá	máđuittáá
ESS	mááttun	
PART	mááttud	

- strong grade
- weak grade
- lengthened strong grade
- lengthened weak grade
- shortened strong grade
- (shortened weak grade)

Example: Gradation in disyllabic nouns

	SG	PL
NOM	-gg-	-g-
GEN	-g-	-g-
ACC	-g-	-g-
ILL	-g-	-gg-
LOC	-g-	-g-
COM	-gg-	-g-
ABE	-g-	-g-
ESS	-gg-	
PART	-gg-	

	SG	PL
NOM	-sk-	-’sk-
GEN	-’sk-	-’sk-
ACC	-’sk-	-sk-
ILL	-’sk-	-sk-
LOC	-sk-	-sk-
COM	-sk-	-’sk-
ABE	-’sk-	-’sk-
ESS	-sk-	
PART	-sk-	

	SG	PL
NOM	-t-	-đ-
GEN	-đ-	-đ-
ACC	-đ-	-đ-
ILL	-t-	-đ-
LOC	-đ-	-đ-
COM	-đ-	-đ-
ABE	-đ-	-đ-
ESS	-tt-	
PART	-tt-	

- Diachronically based, same pattern explains (almost) all instances
- Rather complex, maps differently onto different consonants

Example: Gradation in disyllabic nouns

	SG	PL
NOM	-gg-	-g-
GEN	-g-	-g-
ACC	-g-	-g-
ILL	-g-	-gg-
LOC	-g-	-g-
COM	-gg-	-g-
ABE	-g-	-g-
ESS	-gg-	
PART	-gg-	

	SG	PL
NOM	-sk-	-’sk-
GEN	-’sk-	-’sk-
ACC	-’sk-	-sk-
ILL	-’sk-	-sk-
LOC	-sk-	-sk-
COM	-sk-	-’sk-
ABE	-’sk-	-’sk-
ESS	-sk-	
PART	-sk-	

	SG	PL
NOM	-t-	-đ-
GEN	-đ-	-đ-
ACC	-đ-	-đ-
ILL	-t-	-đ-
LOC	-đ-	-đ-
COM	-đ-	-đ-
ABE	-đ-	-đ-
ESS	-tt-	
PART	-tt-	

QIII QII QI

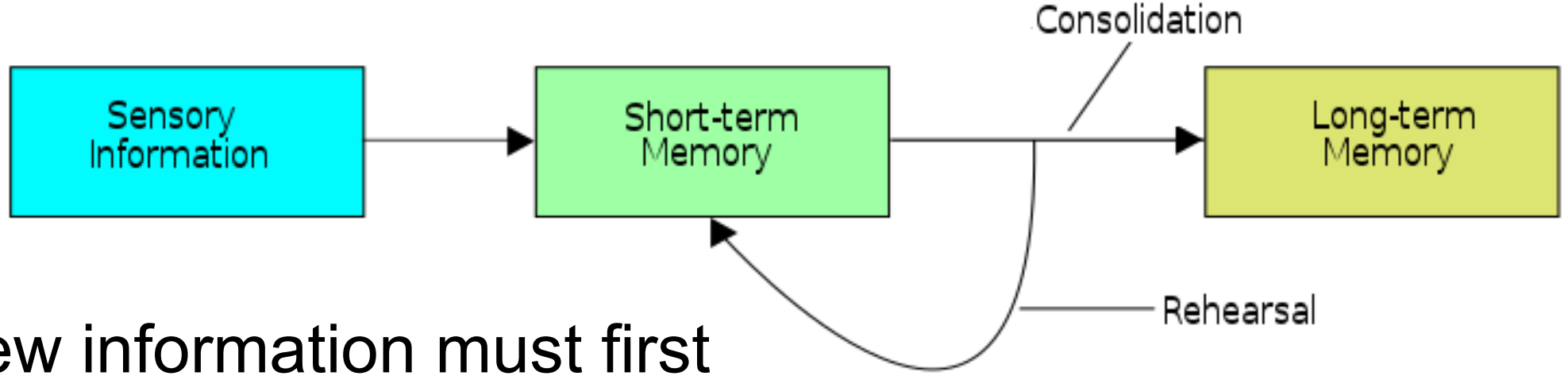
- Different (relatively simple) pattern for different consonants

Example: Metaphony

tiettiđ ’know’, PRS.3SG *tiätá*, PST.1SG *tiettim*
ǔáiniđ, ’see’, PRS.3SG *ǔáiná*, PST.1SG *oinim*
jyehiđ, ’divide’, PRS.3SG *juáhá*, PST.1SG *juohim*

- Morottaja & Olthuis 2022 (24-25): three different *types* of 2nd-syllable vowel, 1st syllable changes to match
  - Same 2nd-syllable vowel may belong to two different types: *ǔáiniđ* (type 1) vs. *oinim* (type 3)
  - System maps differently onto different vowels, same 1st-syllable vowel may appear before different types: *tiettiđ* (type 1), *tiettim* (type 3); *ǔáiniđ* (type 1), *ǔáiná* (type 2)
    - Only the series ye – uá – uo distinguishes all three

Memory and learning



- All new information must first be processed in working (/short-term) memory.
- In order for a thing to be learned, it must be stored and consolidated in long-term memory.
  - Capacity of long-term memory to store things effectively unlimited.
- Working memory is also used for items retrieved from long-term memory into consciousness for use.

Memory and learning

- Capacity of working memory is limited.
  - 7 ± 2 *chunks* (Miller 1956).
    - Exact numbers disputed, type of information seems important.
  - Amount of information per chunk less important than number of chunks > larger chunks effectively enable more information to be processed at once.
- New information is first processed as small individual chunks (e.g. an unfamiliar word as a string of phonemes or syllables), but can subsequently be combined (*recoded*) into larger chunks (e.g. words).

Memory and learning

- Schema theory
  - Knowledge is stored in long-term memory as *schemata*.
  - A schema is an organized structure of information categorized as relating to a particular subject or situation.
  - A schema can be treated as a single element in working memory.
  - An *automated* schema may bypass working memory entirely, allowing a person to act in familiar situations without much conscious processing (e.g. proficient readers do not need to consciously process each individual letter to understand a text).
  - Novel information easily acquired as additions to existing schemata; constructing entirely new schemata is dispreferred.

Memory and learning

- Cognitive load theory
  - Working memory is taxed both by the number of items held in it and the need to process relationships between them.
    - Quickly overwhelmed by more than a few novel interrelated items.
  - Storage in long-term memory and schema construction:
    - Require a certain amount of properly directed processing in short-term memory (*germane cognitive load*).
    - Impeded when short-term memory capacity is exceeded.
- Reducing cognitive load:
  - Reduce number of novel items presented at once
  - Introduce complex topics in parts independently of each other

Aims of grammatical descriptions

- Phenomenological description (Haspelmath 2004):
  - Surface-level structural model of language
  - Aim to predict (directly observable) linguistic behavior of native speakers
- Cognitive description (Haspelmath 2012; Chomsky 1988):
  - Theoretical model of native-speaker competence
  - Often in relationship to a general theory of human language

Users of grammatical descriptions

- Linguists:
  - Needs depend on branch, e.g.:
    - historical: requires diachronically accurate descriptions
    - language technology: machine-readable, preferably concise
    - general theoretical linguistics: model must suit chosen framework, often quite technical
  - Can be expected to understand complex theoretical descriptions (?)
    - Not necessarily outside own school (Haspelmath 2012: 342)
- Learners:
  - *”Prima facie, any instructional design that flouts or merely ignores working memory limitations inevitably is deficient.”* (Sweller et al. 1998: 253)
- Linguists wishing to learn the language?

Consonant gradation: binary type

'wind'	SG	PL
NOM	pïeggâ	piegah
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■ QIII ■ QII

- Most consonants only have two distinct grades!
- Alternation pattern depends on 2nd-syllable vowel
  - Two main patterns: one for *â*, *i*, *u,* other for *o*
  - *e* is mixed
  - *a*, *á* rare
    - *a:* same as *o*
    - *á:* either pattern

Consonant gradation: binary type

'dolt'	SG	PL
NOM	káigá	kááigáh
GEN	kááigá	kááigái
ACC	kááigá	kááigáid
ILL	kááigán	káigáid
LOC	kááigást	kááigáin
COM	káigáin	káigáigijn
ABE	káigáttáá	kaigáittáá
ESS	káigán	
PART	káigád	

'top'	SG	PL
NOM	pirrá	piṛáh
GEN	piṛá	piṛái
ACC	piṛá	pirráid
ILL	piiṛán	pirráid
LOC	pirráást	pirráin
COM	pirráin	piṛáigijn
ABE	piṛáttáá	piṛáittáá
ESS	pirrán	
PART	pirrád	

'sky'	SG	PL
NOM	alme	a'lmeh
GEN	a'lme	oolmij
ACC	a'lme	oolmijd
ILL	aalman	olmijd
LOC	almeest	oolmijn
COM	olmijn	o'lmijgijn
ABE	a'lmettáá	o'lmijttáá
ESS	almen	
PART	almed	

■ QIII ■ QII

Consonant gradation: ternary type

- Sonorant consonants may feature three distinct grades
  - *p* and *t* alternate with sonorants in the same pattern, with *v* and *đ* respectively acting as shortest grade (QI)
- One main alternation pattern, a few slightly different subtypes (see Koukkari 2020: 59-65; 2022b)
- Historical geminates feature binary gradation (cf. *pirrá* above)

’fire’	SG	PL
NOM	tullâ	tuulah
GEN	tuulâ	tuulâi
ACC	tuulâ	tuulâid
ILL	tuuļân	tuuláid
LOC	tuulâst	tuulâin
COM	tuuláin	tulâigijn
ABE	tulâttáá	tulâittáá
ESS	tullân	
PART	tullâd	

QIII QII QI

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COM	mááđoin	máđuigijn
ABE	máđuttáá	máđuittáá
ESS	mááttun	
PART	mááttud	

QIII QII QI

Consonant gradation: complex type

'moth'	SG	PL
NOM	muocâ	muosah
GEN	muosâ	muosâi
ACC	muosâ	muosâid
ILL	muocân	mŭossáid
LOC	muosâst	muosâin
COM	mŭossáin	mŭosâigijn
ABE	mŭosâttáá	mŭosâittáá
ESS	muoccân	
PART	muoccâd	

'week'	SG	PL
NOM	okko	ohoh
GEN	oho	ohoi
ACC	oho	ohoid
ILL	ookon	ohhoid
LOC	ohhoost	ohoin
COM	ohhoin	ohoigijn
ABE	ohottáá	ohoittáá
ESS	okkon	
PART	okkod	

■ QIII ■ QII

- Most complicated type: mixed quantitative & qualitative alternation, four distinct grades
- Only affects *c*, *č*, *k*, *h*!
  - (*s*, *j*, *ʏ* as alternants)
- Quantity follows (almost) same patterns as in binary gradation
  - *h* vs. *ḥ*? Requires further research.

Consonant gradation: notes

- Sibilants formerly featured ternary gradation, but QI and QII merged in late 20th century
  - Normal binary gradation for one subtype, others keep patterns resembling ternary gradation but with distinction between QI and QII lost: *ráášu* ’downpour’, GEN.SG *ráášu* (cf. *máátu* : *mááđu*)
  - Possibly still speakers who distinguish *s, š* vs. *ṣ, ṣ̌*?
    - Regular ternary gradation if extant (*ráášu* : *ráášu*)
- Only absolute declension of disyllabic nouns covered above, but same types of gradation found in possessive declension as well as verbal inflection (see Koukkari 2022b)
- Rarest (sub)types outside scope of this presentation

Metaphony: fronting

- Applies to non-high back vowels in â-stems
- Occurs when 2nd-syllable *â* changes to *e* or *i*

/ɑ/ > /æ/: *kačč̲âđ* ’run’, PRS.1DU *käčč̲een*, PRS.3PL *käčč̲ih*

/o/ > /uæ/: *toimâđ* ’function’, PRS.1DU *tŭáimeen*, PRS.3PL *tŭáimih*

/ə/ > /e/: *kečč̲âđ* ’look’, PRS.1DU *kečč̲een*, PRS.3PL *kečč̲ih*
/kəttʃəð/ /kettʃeːn/ /kettʃih/

/uo/ > /ye/: *čŭoppâđ* ’cut’, PRS.1DU *čÿeppeen*, PRS.3PL *čÿeppih*

Metaphony: backing

- Inverse change of fronting, happens in i-stems and u-stems.
  - Different pattern, affects fewer forms in latter
- No visible change in 2nd-syllable vowel

/æ/ > /ɑ/: *väldiđ* ’take’, PST.1SG *valdim*, PST.3SG *vaaldij*
sárnuđ ’speak’, PST.1SG *sarnum,* PST.3SG *sáárnui*

/uæ/ > /o/: *ŭáiniđ* ’see’, PST.1SG *oinim*, PST.3SG *ooinij*
tŭálvuđ ’take’, PST.1SG *tolvum,* PST.3SG *tuálvui*

/ye/ > /uo/: *vyelgiđ* ’leave’, PST.1SG *vŭolgim*, PST.3SG *vuolgij*

Metaphony: breaking/brightening

- Applies to dark and e-type vowels (Koukkari 2022a) in â-stems and i-stems, turn into æ-type.
- Occurs when the 2nd-syllable vowel gets replaced by *á*, *o* or *u*

/ɑ/ > /æ/: *kačč**â**đ,* IMP.3PL *káčč**u**s,* IMP.1DU *káčč**o**on* PRS.3SG *káčč**á***

/ə e ie/ > /iæ/ *kečč**â**đ : kiäčč**u**s : kiäčč**o**on : kiäčč**á***
estiđ 'prevent' *: ïästus : ïästoon : ïästá*
tiettiđ : tiättus : tiättoon : tiätá

/o uo ye/ > /uá/ *toimâđ : tŭáimus : tŭáimoon : tŭáimá*
čŭoppâđ : čŭáppus : čŭáppoon : čŭáppá
vyelgiđ : vŭálgus : vŭálgoon : vŭálgá

Metaphony: raising

- Affects /a/ and /o/ in e-stems and i-stems
- Occurs when 2nd-syllable vowel is itself raised

/ɑ/ > /o/: *p<u>a</u>steđ* ’be able’, PST.3SG *p<u>oo</u>stij*

/o/ > /u/: *<u>o</u>skođ ’believe’,* PST.3PL *<u>u</u>skuu*

Metaphony: lowering

- Inverse change of raising
- Occurs in â-stems
- Main complication: /o/ in â-stems is affected by *either* lowering or breaking, determined lexically
  - Similarly, /u/ is affected either by lowering or not at all

moonnâđ ’go’, PRS.3SG *maṇa*
cf. (*toimâđ* : *tŭáimá*)

juurrâđ ’spin’, PRS.3SG *joṛá*
juuhâđ ’drink’, PRS.3SG *juhá*

Conclusion

- Traditional descriptions of Aanaar Saami morphophonology rely heavily on diachronics
  - As different historical phenomena interact in complex ways and same phenomenon can have had different outcomes in different contexts, the rules map onto synchronic surface realizations in rather complicated ways
- Human memory can store very complex schemata, but these must be built gradually from simpler units of information
  - Learning operates most efficiently on small chunks
- It is possible to derive grammatical rules for Aanaar Saami purely from synchronic surface forms
  - Results in relatively many but relatively simple rules

Takkâ!

https://github.com/tkoukkar/anaraskiela/

Bibliography

CHOMSKY, NOAM 1988: Language and Problems of Knowledge: The Managua Lectures. Cambridge, MA.: MIT Press.

GOBET, FERNAND 2005: Chunking Models of Expertise: Implications for Education. *Applied Cognitive Psychology* 19: 183–204. DOI: 10.1002/acp.1110.

GOBET, FERNAND – SIMON, HERBERT 1996: Templates in chess memory: A mechanism for recalling several boards. *Cognitive Psychology*, 31, 1-40.

GOBET, FERNAND – LANE, PETER – CROKER, STEVE – CHENG, PETER – JONES, GARY – OLIVER, IAIN – PINE, JULIAN 2001: Chunking mechanisms in human learning. *TRENDS in Cognitive Sciences* Vol.5 No.6: 236–243.

HASPELMATH, MARTIN 2004: Does linguistic explanation presuppose linguistic description? *Studies in Language* 28, 3: 554–579

—— 2012: Framework-Free Grammatical Theory. In Bernd Heine & Heiko Narrog (eds.), *The Oxford Handbook of Linguistic Analysis*: 341–366.

Bibliography (cont.)

ITKONEN, ERKKI 1941: Über den Charakter des ostlappischen Stufenwechselsystems. *Finnisch-Ugrische Forschungen* XXVII: 137-167.

—— 1946: *Struktur und Entwicklung der ostlappischen Quantitätssysteme*. Suomalais-Ugrilaisen Seuran toimituksia LXXXVIII. Helsinki: Suomalais-Ugrilainen Seura.

—— 1971: Ehdotus inarinlapin fonemaattiseksi transkriptioksi. In Erkki Itkonen, Terho Itkonen, Mikko Korhonen & Pekka Sammallahti (eds.), *Lapin murteiden fonologiaa*: 43–67. Castrenianumin toimitteita 1. Helsinki: Suomalais-Ugrilainen Seura.

DE JONG, TON 2009: Cognitive load theory, educational research, and instructional design: some food for thought. *Instructional Science* 38:105–134 DOI 10.1007/s11251-009-9110-0

KIMPPA, L. – SHTYROV, Y. – HUT, S. – HEDLUND, L. – LEMINEN, M.– LEMINEN, A. 2019: Acquisition of L2 morphology by adult language learners. *Cortex* 116: 74-90.

KORHONEN, MIKKO 1967: Lapin kielen vartalonsisäisten äännevaihtelujen morfologisesta funktiosta. *Virittäjä* 71: 353–358.

Bibliography (cont.)

—— 1969: Die Entwicklung der morphologischen Methode im Lappischen. *Finnisch-Ugrische Forschungen* 37: 203–362.

—— 1981: *Johdatus lapin kielen historiaan*. Suomalaisen Kirjallisuuden Seuran toimituksia 370. Helsinki: Suomalaisen Kirjallisuuden Seura.

KOUKKARI, TUOMAS 2020: *Kvantiteettivaihtelu inarinsaamen nominintaivutuksessa.* Master's thesis, University of Helsinki.

—— 2022a: *Vowel Harmony and Related Phenomena in Inari Saami*. Presentation at CIFU XIII at the University of Vienna, 24.08.2022. Slides available online: https://github.com/tkoukkar/anaraskiela/raw/master/Koukkari_Tuomas-CIFU_XIII-oovdanpyehtim.pdf

—— 2022b: *A new synchronic view on gradation and quantitative alternation in Aanaar Saami*. Presentation at SaaLS 5 at the University of Tartu 23.09.2022. https://github.com/tkoukkar/anaraskiela/raw/master/Koukkari_Tuomas-SaaLS5-oovdanpyehtim.pdf

Bibliography (cont.)

LAGERCRANTZ, ELIEL 1927: *Strukturtypen und Gestaltwechsel im Lappischen*. Suomalais-Ugrilaisen Seuran toimituksia LVII. Helsinki: Suomalais-Ugrilainen Seura.

MARTIN, MAISA 1995: *The Map and the Rope: Finnish Nominal Inflection as a Learning Target*. Studia Philologica Jyväskyläensia 38. University of Jyväskylä.

MILLER, GEORGE 1956: The Magical Number Seven, Plus or Minus Two - Some Limits on Our Capacity for Processing Information. *Psychological Review* Vol. 101, No. 2, 343-352.

MOROTTAJA, PETTER – OLTHUIS, MARJA-LIISA 2022: *Inarinsaamen taivutusoppi*. Aanaar: Sämitigge.

PANKIN, JEFF 2013: *Schema Theory*. MIT. https://web.mit.edu/pankin/www/Schema_Theory_and_Concept_Formation.pdf

Bibliography (cont.)

PASANEN, ANNIKA 2015: *Kuávsui já peeivičuovâ 'Sarastus ja päivänvalo' – Inarinsaamen kielen revitalisaatio*. Uralica Helsingiensia 9. Helsinki: Helsingin yliopiston Suomen kielen, suomalais-ugrilaisten ja pohjoismaisten kielten ja kirjallisuuksien laitos & Suomalais-Ugrilainen Seura.

SWELLER, JOHN 1988: Cognitive Load During Problem Solving: Effects on Learning. *Cognitive Science* 12: 257-285.

- 2011: Cognitive Load Theory. In Jose P. Mestre & Brian H. Ross (eds.), *Cognition in Education*: 37-76. The Psychology of Learning and Motivation Vol. 55. Elsevier. https://doi.org/10.1016/B978-0-12-387691-1.00002-8.

SWELLER, JOHN - VAN MERRIENBOER, JEROEN. - PAAS, FRED 1998: Cognitive Architecture and Instructional Design. *Educational Psychology Review* 10, 251-296.

VALTONEN, TAARNA – YLIKOSKI, JUSSI – AIKIO = LUOBBAL SÁMMOL SÁMMOL ÁNTE 2022: Aanaar (Inari) Saami. In Marianne Bakró-Nagy, Johanna Laakso & Elena Skribnik (eds.) *The Oxford Guide to the Uralic Languages*: 178-195. Oxford University Press.