Non-Concatenative Morphological Processes

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February 6, 2024

Introduction

Most morphology involves concatenating morphemes together:

- Prefixation
- Suffixation
- Compounding

Consider, however, the following examples: In fact, non-concatenative morphological processes are common throughout the languages of the world.

Table 1: Examples of umlaut in English.

SINGULAR	PLURAL
foot	feet
tooth	teeth
goose	geese
man	men
mouse	mice

Generalized Glossing Guidelines

In order to more effectively GLOSS non-concatenative processes, we developed an annotation convention called G3 (Generalized Glossing Guidelines)[1]. It represents non-concatenative processes as string rewrites:

(1) I have two left f{oo>ee}t
1.SG have two left foot{PL}
'I have two left feet'

Similarly, here is an example of umlaut in German:

(2) Ich habe vier Br{u>ü}der
1.SG have.1.SG four brother{PL}
'I have four brothers.'

The same convention can be used to annotate the whole gamut of non-concatenative processes:

We will talk about each of these processes in more detail.

[1] David R. Mortensen, Ela Gulsen, Taiqi He, Nathaniel Robinson, Jonathan Amith, Lindia Tjuatja, and Lori Levin. Generalized glossing guidelines: An explicit, human- and machine-readable, item-and-process convention for morphological annotation. In Garrett Nicolai, Eleanor Chodroff, Frederic Mailhot, and Çağrı Çöltekin, editors, *Proceedings of the 20th SIGMORPHON workshop on Computational Research in Phonetics, Phonology, and Morphology*, pages 58–67, Toronto, Canada, July 2023. Association for Computational Linguistics. DOI: 10.18653/v1/2023.sigmorphon-1.7. URL https://aclanthology.org/2023.sigmorphon-1.7

Infixation

Ulwa, a Misumalpan language of Nicaragua has suffixing infixation:

Type	Example	Glosss
Infixation	s{>um}ulat	write{PFV}
Reduplication	{>su}sulat	write{PROSP}
Transfixation	k{i>u}t{a>u}b	book{PL;1,2}
Apophony	t{u>i}θ	tooth{PL}
Segmental overwriting	{xi>ku}3xi3	eat{IRR}
Tonal overwriting	ku{3>14}ni2	want{NEG}

Table 2: Example forms and glosses for a range of morphological processes.

(3) a. wahai{>ki}
wahai{ki}
brother{POSS::1.SG}
'my brother'

b. sû{>ki}lu
sû{ki}lu
dog{POSS::1.SG}
'my dog'

But there was also infixation in Latin:

(4) ta{>n}g{>o}
ta{n}g{o}
touch1.SG.PRS.IND
'I touch.'

Reduplication

(5) Nahautl reduplication with fixed segmentism

a. ti- ne:ch- {>teh}te:mowa -0
SUBJ::2S- OBJ::1S- look_for{RED} -PRS.IND.S
'You miss me.'

b. ni- mits- {>ih}ita -0
SUBJ::1S- OBJ::2S- see{RED} -PRS.IND.S
'I visit you.'

An example from Mangap-Mbula:

(6) kuk{>uk}
kuk{uk}
bark{PROG}
'be barking'

Pima:

(7) a. ma{>m}viṭ
ma{m}viṭ
lion{PL}
'lions'

b. ʧi{>ʧ}maiṭ
ʧi{ʧ}maiṭ
drum{PL}
'drums'

Latin:

(8) ”s{>po}pond>ī”
spopondī
perform{1.SG.PRF.IND;1,2}
trans ‘’

Conversion

Truncation

Murle:

(9) a. nyoo{n>0}
nyoo{}
lamb{PL}
‘lambs’

b. wawo{c>0}
wawo{}
white_heron{PL}
‘white herons’

Apophony

ʃku’ta	‘sour’	**s**ku’ta	‘a little sour’
ʃuːni’	‘bitter’	**s**uːni’	‘a little bitter’
tʃi’tʃ	‘hot’	ts**s**i’ts	‘a little hot’

Table 3: Totonac diminutives

Irish:

(10) a. c{ea>i}nn
c{i}nn
head{PL}
‘heads’

b. m{ui>a}r{>a}
m{a}r{a}
sea{PL;1,2}
‘seas’

Tonal Overwriting

Mixtec:

(11) ta’{3>1>4}bi{>1}4
ta’{4}bi{14}
get-broken{HAB;1,2}
‘habitually get broken’

Other Prosodies

Stress shift

English:

'object ob'ject

Table 4: Stress shift in English

Laryngealization

Segmental Overwriting

(12) {xi>ku}3xi3
{ku}3xi3
eat{IRR}
'eat'

Transfixation

A few languages, mostly belonging to the AFROASIATIC family[2], have a kind of non-concatenative morphology called root-and-pattern morphology. The basic operation, in such a system, is a transfix. Transfixes add vowels across bases (not just one place) and may also lengthen consonants.

[2] Afroasiatic is the language family to which Semitic, Berber, Chadic, Cushitic, Omotic, and Egyptian belong. The best known Afroasiatic languages are Arabic, Hebrew, and Amharic.

	Perfect		Imperfect		Participle	
	Active	Passive	Active	Passive	Active	Passive
I	katab	kutib	ktub	ktab	kaatib	ktuub
II	kattab	kuttib	kattib	kattab	kattib	kattab
III	kaatab	kuutib	kaatib	kaatab	kaatib	kaatab
IV	ʔaktab	ʔuktib	ktib	ktab	ktib	ktab
V	takattab	tukuttib	takattab	takattab	takattib	takattab
VI	takaatab	tukuutib	takaatab	takaatab	takaatib	takaatab
VII	nkatab	nkutib	nkatib	nkatab	nkatib	nkatab
VIII	ktatab	ktutib	ktatib	ktatab	ktatib	ktatab
IX	ktab(a)b	ktab(i)b	ktab(i)b			
X	staktab	stuktib	staktib	staktab	staktib	staktab

Table 5: An Arabic paradign for the root *k-t-b* '(related to) writing'.

Morphological Operations as Functions from Sign to Sign

References

David R. Mortensen, Ela Gulsen, Taiqi He, Nathaniel Robinson, Jonathan Amith, Lindia Tjuatja, and Lori Levin. Generalized glossing guidelines: An explicit, human- and machine-readable, item-and-process convention for morphological annotation. In Garrett Nicolai, Eleanor Chodroff, Frederic Mailhot, and Çağrı Çöltekin, editors, *Proceedings of the 20th SIGMOR-*

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