Tonal Morphology: Is it Different?
Larry M. Hyman
University of California, Berkeley

(1) Tone: Is it different? (Hyman 2007)

Tone is like segmental phonology in every way—only more so!

a. **Quantitatively** more so: tone does certain things more frequently, to a greater extent, or more obviously (i.e. in a more straightforward fashion) than segmental phonology.

b. **Qualitatively** more so: tone can do everything segments and non-tonal prosodies can do, but segments and non-tonal prosodies cannot do everything tone can do.

(2) Ex.: Tones of one word may be realized on another; Giryama [Kenya] (Philipppson 1998:321)

a. ku-tsol-a  ki-revu ‘to choose a beard’  /-tsol-/  ‘choose’  (all L tone)

b. ku-on-a  ki-révu ‘to see a beard’  /-ón-/  ‘see’  (shift of H to penult)

N.B. No other phonological feature or property has this ability to “wander” across words!

“... anyone who is interested in the outer limits of what is possible in phonology would thus be well-served to understand how tone systems work.” (Hyman 2007:2)

(3) The questions I would like to address here are

a. Is tonal morphology like segmental morphology in every way?

b. If tonal morphology can do everything that segmental morphology can do, can it do more?

c. What counts as tonal morphology? morphology?

d. Can tonal morphology help determine “the outer limits of what is possible in morphology”?

(4) Dispelling three misconceptions about tone

a. Tone cannot be studied the same way as other phonological phenomena

b. Tone is expendable

c. Tone cannot mark certain things

Past presidential address at the LSA: “No language uses tone to mark case.”


<table>
<thead>
<tr>
<th>class I</th>
<th>nominative</th>
<th>accusative</th>
<th>nom. vs. acc. tone patterns</th>
</tr>
</thead>
<tbody>
<tr>
<td>èlòkonyá</td>
<td>èlòkonyá</td>
<td>‘head’</td>
<td>L^6-H vs. L-H^6</td>
</tr>
<tr>
<td>èncómátá</td>
<td>èncómátá</td>
<td>‘horse’</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>class II</th>
<th>èndéroní</th>
<th>èndéroní</th>
<th>H on σ₁ vs. σ₂</th>
</tr>
</thead>
<tbody>
<tr>
<td>ènkółpá</td>
<td>ènkółpá</td>
<td>‘centipede’</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>class III</th>
<th>òlméregesh</th>
<th>òlméregesh</th>
<th>H on σ₂ &amp; σ₃ vs. on σ₂ only</th>
</tr>
</thead>
<tbody>
<tr>
<td>ólósówuán</td>
<td>ólósówuán</td>
<td>‘buffalo’</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>class IV</th>
<th>òmótònyì</th>
<th>òmótònyì</th>
<th>identical tones</th>
</tr>
</thead>
<tbody>
<tr>
<td>òsinkirì</td>
<td>òsinkirì</td>
<td>‘fish’</td>
<td></td>
</tr>
</tbody>
</table>

“tonal morphology... exhibits essentially the same range of morphological properties as in all of segmental morphology” (Hyman & Leben 2000:588).

i.e. if tone can be a morpheme, it can do everything that a morpheme can do!
Some of the complexities derive from the fact that tone (and hence tonal morphology) can be
a. extremely paradigmatic
b. extremely syntagmatic
c. extremely ambiguous (analytically open-ended)
d. extremely opaque (significant differences between inputs and outputs)

The 8 tone patterns of Iau [Indonesia: Papua] are phonologically paradigmatic on nouns, morphologically paradigmatic on verbs (Bateman 1990:35-36) \( (\upsilon) = \text{a super-high tone} \)

<table>
<thead>
<tr>
<th>Tone</th>
<th>Nouns</th>
<th>Verbs</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>bé</td>
<td>bá</td>
</tr>
<tr>
<td>M</td>
<td>bë'</td>
<td>bâ</td>
</tr>
<tr>
<td>H' H</td>
<td>bë'</td>
<td>bâ'</td>
</tr>
<tr>
<td>LM</td>
<td>bë'</td>
<td>bâ</td>
</tr>
<tr>
<td>HL</td>
<td>bë</td>
<td>bâ</td>
</tr>
<tr>
<td>HM</td>
<td>bë</td>
<td>bâ</td>
</tr>
<tr>
<td>ML</td>
<td>bë</td>
<td>bâ</td>
</tr>
<tr>
<td>HLM</td>
<td>bë'</td>
<td>bâ</td>
</tr>
</tbody>
</table>

Syntagmatic final vs. penultimate H tone in Chimwiini (Kisseberth 2009)

a. grammatical tone only (no tone contrasts on lexical morphemes, e.g. noun stems, verb roots)
b. H tone limited to last two moras: final H = morphologically conditioned; penult H = default
c. 1st & 2nd person subjects condition final H tone vs. 3rd person default penultimate H

d. the only difference between the 2nd and 3rd person singular [noun class 1] is tonal

Ambiguous: paradigmatic vs. syntagmatic marking of number on Kunama [Eritrea] “possessive determiners” (Connell, Hayward & Ashkaba 2000:17)

<table>
<thead>
<tr>
<th>paradigmatic</th>
<th>person-number</th>
<th>number-person</th>
<th>cf. Hakha Lai</th>
</tr>
</thead>
<tbody>
<tr>
<td>sg. pl.</td>
<td>sg. pl.</td>
<td>sg. pl.</td>
<td>sg. pl.</td>
</tr>
<tr>
<td>1st pers. (excl.) -áá-</td>
<td>-áá-</td>
<td>-áá-</td>
<td>-áá-</td>
</tr>
<tr>
<td>2nd pers.    -éy-</td>
<td>-éy-</td>
<td>-éy-</td>
<td>-éy-</td>
</tr>
<tr>
<td>3rd pers.    -iy-</td>
<td>-iy-</td>
<td>-iy-</td>
<td>-iy-</td>
</tr>
<tr>
<td>1st pers. incl. -́η-</td>
<td>-́η-</td>
<td>-́η-</td>
<td>-́η-</td>
</tr>
</tbody>
</table>

While segmental morphology is canonically concatenative, tone is often hard to “segment”; vs. plural -n in Hakha Lai [Myanmar, NE India] proclitics (toneless in singular, falling tone in pl.)

Why is this important? If you can’t segment tone unambiguously, how does this affect generalizations such as Trommer (2003:284):

a. number agreement should be maximally rightwards (cf. Mayer 2009)
b. person agreement should be maximally leftwards


Recall Chimwiini, where it turns out that 1st/2nd final H vs. 3rd person penultimate H tone is a property of the phonological phrase — hence, person marking occurs way to the right!
a. jile: namá  ‘you sg. ate meat’  jile ma-tnádá  ‘you sg. ate fruit’
b. jile: náma  ‘s/he ate meat’  jile ma-túndá  ‘s/he ate fruit’

(12) Chimwiini reflects an original tonal difference on subject prefixes; cf. Cahi dialect of Kirimi
a. /û-kw-túng-a/  →  ô-kw-túng-á  ‘s/he is tying’  /û/-  ‘2nd pers. sg.’
b. /û-kw-túng-a/  →  ô-kw-’túng-á  ‘you sg. are tying’  /û/-  ‘3rd pers. sg. [class 1]’

(13) 1st/2nd vs. 3rd person tone is marked at the end of each (nested) phonological phrase ( )
b. Ø-va-tindjile w-áana ] náma ] ka: chi-su ]  ‘s/he cut for the children meat with a knife’

(14) Implementation of the Chimwiini facts (in the spirit, at least, of Kisseberth 2009)
a. 1st and 2nd person subject markers have an underlying /H/ tone
b. this H tone links to the last syllable of the phonological phrase (cf. Giryama in (2b))
c. any phonological phrase lacking a H tone receives one on its penult

Although person marking is “late” in outputs, since the 1st/2nd person /H/ is attributed to the subject prefix “slot” underlingly, it is “early” in inputs, where the generalizations should probably be stated.

(15) Question: What is this?
a. morphology?  (property of [+1st pers.] and [+2nd pers.] subject prefixes)
b. phonology?  (property of the phonological phrase—H is semi-demarcative)
c. syntax?  (property of the syntactic configurations which define the P-phrases)
d. intonation?  (not likely—who ever heard of a 1st/2nd vs. 3rd person intonation?)

Should the penult/final H be viewed as phrasal morphology? Not exactly like English -’s

(16) What counts as tonal morphology? morphology?

“... morphology refers to... the branch of linguistics that deals with words, their internal structure, and how they are formed.” (Aronoff & Fudeman 2005:1-2)

“Morphology is the study of systematic covariation in the form and meaning of words.” (Haspelmath 2002:2)

“This book is about morphology, that is, the structure of words.... Morphology is unusual amongst the subdisciplines of linguistics, in that much of the interest of the subject derives not so much from the facts of morphology themselves, but from the way that morphology interacts with and relates to other branches of linguistics, such as phonology and syntax.” (Spencer 1991:xii)

(17) Three ways in which tone can be a morphological exponent
a. tone = the only exponent  (e.g. 2sg. vs. 3sg. subject prefixes in Chimwiini)
b. tone = a consistent exponent  (e.g. 1st/2nd vs. 3rd person marking in Chimwiini)
c. tone = an incidental exponent  (e.g. 2sg. /û/- vs. 3sg. /û/- subject prefixes in Kirimi)

(18) Limiting attention to (17a,b), tonal morphology can be completely analogous to segmental morphology or may diverge in (i) what it marks; (ii) how it marks it. I’ll start with relatively canonical tonal morphology, then consider these two divergences.

(19) The tonal patterns on lau verbs in (7) lend themselves to a featural, paradigmatic display—the portmanteau tone patterns do not appear to be further segmentable (you’re welcome to try!)
(20) Other systems are clearly segmentable, e.g. person marking in Modo [Sudan] (Nougayrol 2006)

<table>
<thead>
<tr>
<th></th>
<th>telic</th>
<th>totality of action</th>
<th>resultative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Punctual</td>
<td>HL</td>
<td>H</td>
<td>LM</td>
</tr>
<tr>
<td>Durative</td>
<td>HLM</td>
<td>ML</td>
<td>M</td>
</tr>
<tr>
<td>Incompletive</td>
<td>HM</td>
<td>H^H</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>/ata, H/ ‘be bitter’</th>
<th>/uba, L/ ‘sing’</th>
</tr>
</thead>
<tbody>
<tr>
<td>1sg, 2sg, 2pl</td>
<td>H-H ‘you are bitter’</td>
<td>H-L ‘you sing’</td>
</tr>
<tr>
<td>3sg. 1pl (excl &amp; incl), 3pl</td>
<td>L-L ‘it is bitter’</td>
<td>L-L ‘s/he sings’</td>
</tr>
</tbody>
</table>

(21) Tone (and other prosodic features) show the familiar sensitivity to internal morphological structure, e.g. the “tonal layers” of Dinka (Andersen 1992-4:61):

“The morphological layers are simultaneous but ‘vertically’ ordered, with the root as the ‘deepest’ layer, optionally followed by the derivational layer, followed by an inflectional layer.”

\[\text{wécc} \text{ ‘kick it hither!’} \text{ [kick.CENTRIPETAL..2sg]}\]

\[
\begin{array}{ccc}
\text{voice} & \text{length} & \text{tone} \\
\text{inflectional layer (2sg)} & \text{—} & \text{—} & \text{H} \\
\text{derivational layer (CP)} & \text{[+breathy]} & +1 & \text{L} \\
\text{root layer (‘kick’)} & \text{—} & \text{1} & \text{F}
\end{array}
\]

cf. Pulleyblank (1986)

for cyclic tonology

(22) Instead of “layers” (strata), paradigmatic conflicts may require a ranking of the tonal spell-outs by inflectional features, e.g. Leggbó [Nigeria] root+suffix tones (Hyman et al 2002:407).

<table>
<thead>
<tr>
<th></th>
<th>MCA/ORA</th>
<th>SRA</th>
<th>NEG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Root tone:</td>
<td>/L/</td>
<td>/M/</td>
<td>/L/</td>
</tr>
<tr>
<td>Habitual</td>
<td>L-L</td>
<td>M-L</td>
<td>L-L</td>
</tr>
<tr>
<td>Irrealis</td>
<td>L-L</td>
<td>M-L</td>
<td>L-L</td>
</tr>
</tbody>
</table>

Irrealis > Other (“irrealis” = future/conditional)

L-L/M-L | H-M/M-M | L-L/M-L


Future >> {MCA, Imperfective} >> Lexical (default)

H | LH | H vs. L

In both Leggbó and Dagbani, future tense ~ irrealis mood are “higher” (further out) than aspect, as per Bybee’s (1985) “Relevance Hierarchy”. Such disjunctive tone patterns vie for the same “slot”.

(24) Kikuria [Tanzania, Kenya] assigns a H tone to different moras of the verb stem, depending on the tense (Marlo & Mwita 2009:2) (the H then spreads to the penult; [ = stem-initial boundary)

\[\mu_1\text{ n-to-o- [ hóótóótér-a ‘we have reassured’ } \text{ Past}\]
\[\mu_2\text{ n-to-o- [ hóótóótér-a ‘we have been reassuring’ } \text{ Past progressive}\]
\[\mu_3\text{ n-to-re- [ hootótér-a ‘we will reassure’ } \text{ Future}\]
\[\mu_4\text{ to-ra- [ hoototér-a ‘we are about to reassure’ } \text{ Inceptive}\]

(25) When the stem is one mora short, a rising tone is obtained; when two moras short, the L^o = level

\[\mu_4\text{ to-ra- [ karaaang-ã ‘we are about to fry’ } \text{ H tone assignment:}\]
\[\mu_4\text{ to-ra- [ sukur-ã ‘we are about to rub’ } \text{ sukur-ã ú}\]
\[\mu_4\text{ to-ra- [ ñun-a ‘we are about to break’ } \text{ ñun-a ñ ú}\]
\[\mu_4\text{ to-ra- [ ry-a ‘we are about to eat’ } \text{ ry-a ñ ñ ú}\]
(26) When the following word is underlyingly toneless, its moras are counted + spreading to penult

a. \( \mu_4 \) to-ra- \([\text{karaa}g\acute{\text{a}}\ \text{éyét55kē}] \) ‘we are about to fry a banana’

b. \( \mu_4 \) to-ra- \([\text{sukur-a} \ \text{éyét55kē}] \) ‘we are about to rub a banana’

c. \( \mu_4 \) to-ra- \([\beta\text{un-a} \ \text{éyét55kē}] \) ‘we are about to break a banana’

d. \( \mu_4 \) to-ra- \([\text{ry-a} \ \text{éyét55kē}] \) ‘we are about to eat a banana’

(27) So-called “tone cases” in (South-) Western Bantu are interesting both for what they mark and how they do it, e.g. Giphende (based on joint work with Mwatha Ngalasso)

5 “cases”:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Citation, subject, left dislocation, object of neg. infinitive</td>
<td>L-L.L</td>
<td>L-L.L.L</td>
<td>L-L.H</td>
<td>L-L.H.L</td>
<td>L-H.L</td>
<td>L-H.H.L</td>
<td>L-H.H.H</td>
</tr>
<tr>
<td>Object after aff. verb or na ‘with’</td>
<td>H-H.L</td>
<td>H-H.H.L</td>
<td>H-H.( ^{1} )H</td>
<td>H-H.( ^{1} )H.L</td>
<td>H-( ^{1} )H.L</td>
<td>H-( ^{1} )H.H.L</td>
<td>H-( ^{1} )H.H.H</td>
</tr>
</tbody>
</table>


(28) Two issues concerning the above tonal alternations in Giphende

a. morphological: is this case?

“Case is a system of marking dependent nouns for the type of relationship they bear to their heads.” (Blake 2001:1)

b. phonological: how do we implement the above differences?

i. Giphende and related languages are analyzed with an underlying /H/ vs. /Ø/ contrast

ii. all but the first row of forms involve H tones coming in from the left

iii. how can these H tones be differentiated synchronically? by strata? prefix vs. clitic vs. pseudo-word? (Van de Velde 2009)

iv. what else is like this? German Umlaut? Buch/Bücher vs. dumm/dummer (cf. gross/grösser)

(29) Barasana possessive pronoun “case”? (Gomez-Impert & Kenstowicz 2000:438-9)

~kúbú (H) ‘shaman’  ~bídì (HL) ‘pet’  ~ = nasal prosody

~báđí (H) ‘our’  ~báđí ~kúbú  ~báđí ~bídì

~ídā (HL) ‘their’  ~ídā ~kúbú  ~ídā ~bídì

Possessors can impose case on their “head” noun (Nikolaeva & Spencer 2009:13-14), but this is a phonological “agreement”, not a morphological one. But whether the above tonal agreement is phonology or morphology, nothing else can do this!

(30) The moral: Once tone is involved, tonal morphology can take on a life of its own!

a. it surpasses the capability of other featural prosodies, stress, length, and segmental morphology in general

b. it therefore is often exempted from claimed universals or typological generalizations
Theories of floating features have required... feature-specific constraints; often these are proposed to deal with mutation (tone is a bit different).” (de Lacy 2008:2)

“The Tautomorphemicity Principle: Avoid feet or syllables containing concatenative morpheme boundaries.... The principle does not apply to abstract morphemes that one might posit in accounting for tone patterns or stem alternations.” (Bickel 2003:90-91)

(31) Two ways for tonal morphemes not to align with syllables (+ marks heteromorphemicity):
   a. many to one
   b. one to many
   c. both, via spreading + contouring

(32) An example of each
   a. Higi [Nigeria]: /yè + ’/ \[yê\] ‘you pl.’ (subject, [+CPL])
      cf. [yê] ‘you pl.’ (subject, [-CPL])
      (Mohrlang 1974:118)
   b. Tucano [Brazil]: /apó + bi~/ \[apó-bi~\] ‘he repaired’
      (Ramirez 1997:73)
   c. Kuki-Thaadow [NE India]: /hùon + thúm/ \[hùon thú\] ‘three gardens’
      (Hyman, in press)

(33) Non-concatenative “replacive” tones (Welmers 1973:132-3) also produce heteromorphemicity
   a. V \[N\] (H\L) in Standard Mandarin [China] (Wang 1972:489) [tone marking changed]
      shán ‘to fan’ → shân ‘fan’
      lián ‘to connect’ → lián ‘chain’
      shù ‘to count’ → shû ‘number’
      bìkó ‘cloud’ → bìkó ‘cloudy’
      sò̂?ò ‘ear’ → sò̂?ò ‘deaf’
      ká?bà ‘filth’ → ká?bà ‘dirty’
   c. A \[V\] (L) in Lulubo [Sudan] (Andersen 1987:51)
      òsù ‘good’ → Òsù ‘to become good’
      ìkèlì ‘red’ → ìkèlì ‘to become red’
      áførò ‘yellow’ → áførò ‘to become yellow’

(34) Tones may correlate with form classes or functions
   a. Mpi [Thailand]: nouns and verbs are characterized by three non-intersecting tone patterns
      i. sì ‘four’ ii. sì ‘to roll’ (Matisoff 1978)
      iii. sì ‘a color’ sì ‘to be putrid’
      sì ‘blood’ sì ‘to die’
   b. Mundang [Chad]: only grammatical morphemes give full /H, M, L/ contrasts (Elders 2000:73)

(35) Tautomorphemicity interfaces with two criteria often invoked in tone system typology
   a. presence vs. absence of tonal “perturbations” (morphotonemics)
“In general, the inherent tone of each syllable is maintained regularly and there are very few perturbations either phonologically or morphologically conditioned, apart from the intonational features...” (Higi [Nigeria]; Mohrlang 1974:118)

“Verb stem tones are perturbed only through affixation, whereas noun stem tones may also be perturbed by association with other word bases.” (Gadsup [Papua New Guinea]; SIL:6)

b. presence vs. absence of tonal morphology, broadly conceived

“These tones on the syllable serve to distinguish vocabulary items, but they do not serve to distinguish the grammatical categories of the language.” (Gude [Nigeria]; Hoskison 1983:17)

Tangkhul Naga [NE India] has /H, M, L/ and no tonal morphology and tones stay put on their own syllables: páay ‘defecate’, páay ‘be cheap, able’, páay ‘jump’ (from 2002-3 field methods class) vs. only grammatical tone in Chimwiini (cf. (8)) and Kuni-Boazi [Papua New Guinea] (Fumey 2006:5)

“Kuni has contrastive grammatical tone, which plays a very important role on clause level. More than 30 grammatically distinct tone patterns have been found. No lexical tone contrasts have been found, however.”

(36) Ratliff’s (1992a) typology “organized around how tonal contrasts are used” (Ratliff 1992b:134)

a. Type A, e.g. White Hmong [China, northern SE Asia]
   i. lexical
   ii. minor morphological uses of tone (expressive, reduplication, compound formation...)

b. Type B, e.g. Kanuri [Nigeria, Chad, Cameroon]
   i. lexical
   ii. major morphological uses of tone (all type A functions + derivation, inflection...)

(37) An attempted idealization in terms of two extreme types (“canonical”? —cf. Corbett 2007)

a. Type A: Lethargic. Tones are stable, domesticated (they stay home), isolated, uninteresting (they are so well-behaved you wouldn’t even know they were “autosegmental”!)

b. Type B: Restless. Tones wander all over the place, wreak havoc on all parts of the grammar (they’re so wanderlustig you sometimes can’t figure out where they belong!)

(38) Some final observations and questions

a. two unambiguous situations of (non-incidental) tonal morphology: (i) concatenative tonal morphemes; (ii) derivational/inflectional tonal alternations conditioned at the word level

b. although common, tonal morphology is non-canonical as there is apparently no language which uses tone and nothing else for morphological purposes

“There is an overall tendency cross-linguistically for morphology to be expressed by affixes rather than by changes of the form of the root (root allomorphy) or changes in stress, tone, and so on. In general, if a language makes use of, say, ablaut to signal a morphological property, then it will also make use of affixation.” (Spencer 2006:115).

“If a tone language makes significant use of segmental morphology (either affixal or ablaut), it will make grammatical use of tone.” (Ratliff 1992b:143)

(39) To conclude, recalling Chimwiini, the division between tonal morphology, phrasal tonology, and intonational phonology may not always be clear


<table>
<thead>
<tr>
<th>Intoneme</th>
<th>Meaning</th>
<th>Intoneme</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>L%</td>
<td>“colorless finality”</td>
<td>MH%</td>
<td>“surprise”</td>
</tr>
<tr>
<td>H%</td>
<td>“is that what you said/mean?”</td>
<td>ML%</td>
<td>“anger, disgust”</td>
</tr>
<tr>
<td>M%</td>
<td>“something is expected to follow”</td>
<td>H:L%</td>
<td>“calling, shouting”</td>
</tr>
</tbody>
</table>

“The pitches of all syllables which do not immediately precede word space are those of the tonemic system. The pitch of any syllable immediately preceding word space is part of the intonemic system.”
b. Kuni-Boazi [Papua New Guinea] (Fumey 2006:5) (cf. (34b) above)
“There is tone contrast between Future tense and Past tense, Intensive and Non-Intensive, Declarative and Interrogative, Affirmative and Negative, ‘only’ and ‘not’, Subordinate and main clause, Attention Drawing and Existential, subordinateive purpose future and subordinate purpose past.”
In some cases what may be morphemes is not morphology.

References
Bateman, Janet. 1990. Iau segmental and tonal phonology. Miscellaneous Studies of Indonesian and Other Languages in Indonesia 10.29-42.
Corbett, Greville G. 2007. *Canonical typology, suppletion and possible words*. *Language* 83.8-42


Morphology and Linguistics. Morphology is the study of morphemes, which are the smallest significant units of grammar. According to Bloomfield, it is the study of the constructions in which sound forms appear among the constituents. Dorfman defines morphology as the study of the ways and methods of grouping sounds into sound-complexes or words. Morphology is a level of structure between the phonological and the syntactic. It is complementary to syntax. Morphology is the grammar of words; syntax is the grammar of sentences. One accounts for the internal structure or form of words; the other des In linguistics, morphology (/mˈɛrəˈfɒlədʒi/) is the study of words, how they are formed, and their relationship to other words in the same language. It analyzes the structure of words and parts of words, such as stems, root words, prefixes, and suffixes. Morphology also looks at parts of speech, intonation and stress, and the ways context can change a word's pronunciation and meaning. Morphology differs from morphological typology, which is the classification of languages based on their use of words.