Theorien der Morphologie 5

Modul 006-1006: Grammatiktheorie, SoSe 2019

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Paradigm Function Morphology

Gereon Müller (Universität Leipzig)

1. Background: Inferential-Realizational Morphology

Hintergrund
Stump (2001) entwirft eine Taxonomie der Flexionstheorien.

(1) *Stumps Einteilung der Flexionstheorien*:

inkrementell	realisational
lexikalisch	inferentiell

1. *Inkrementelle Analyse*:
   Flexionsmarker tragen morpho-syntaktische Merkmale bei, die ansonsten nicht da sind.
2. *Realisationale Analyse*:
   Flexionsmarker tragen keine morpho-syntaktischen Merkmale bei; alle morpho-syntaktische Information ist unabhängig vorhanden.
3. *Lexikalische Analyse*:
   Flexionsmarker sind korreliert mit (möglicherweise abstrakten) Morphemen, die als eigenständige Objekte im Lexikon existieren.
4. *Inferentielle Analyse*:
   Flexionsmarker haben keinen Morphemstatus und existieren nicht als unabhängige Objekte.

(2) *Einige Theorien*:

a. lexikalisch-inkrementell:
   Lieber (1992), Wunderlich (1996; 1997) (Minimalistische Morphologie)
b. lexikalisch-realisational:
   Halle & Marantz (1993; 1994) (Distribuierte Morphologie)
c. inferentiell-inkrementell:
   kaum attestiert
d. inferentiell-realisational:
   Matthews (1991), Anderson (1992), Corbett & Fraser (1993), Aronoff (1994), Stump (2001), Blevins (2004) (Wort-(Stamm-)und-Paradigma-Ansätze)

Empirische Evidenz für realisationale Theorien 1: Erweiterte Exponenz

(3) *Erweiterte Exponenz*:
Die morphosyntaktischen Eigenschaften, die mit einem flektierten Wort (einer Wortform) assoziiert sind, können durch mehr als einen Exponenten in der Morphologie des Wortes ausgedrückt werden.

(4) *Pluralbildung bei Diminutiva im Bretonischen*:

a. bagig ‘kleines Boot’
b. bagoùigoù ‘kleine Boote’

(5) *Negative Präteritumformen im Swahili*:

a. tu-li-taka ‘wir wollten’
b. ha-tu-ku-taka ‘wir wollten nicht’
   ku = neg.prät, ha = neg.

(6) *Partizip 2 im Deutschen*:

a. sprechen
b. ge-sproch-en (3 Exponenten)

Empirische Evidenz für realisationale Theorien 2: Unterdeterminierung

(7) *Unterdeterminierung*:
Die morphosyntaktischen Eigenschaften, die mit einem flektierten Wort (einer Wortform) assoziiert sind, können die Eigenschaften, die mit dem Wort als Ganzem assoziiert sind, unterdeterminieren.

(8) *Imperfekt und Aorist im Bulgarischen: krad (‘stehlen’)*:

	Imperfekt	Aorist
1sg	krad-’á-x	krád-o-x
2sg	krad-é-š-e	krád-e
3sg	krad-é-š-e	krád-e
1pl	krad-’á-x-me	krád-o-x-me
2pl	krad-’á-x-te	krád-o-x-te
3pl	krad-’á-x-a	krád-o-x-a

Problem:
Was stellt in einem inkrementellen Ansatz sicher, dass eine Form wie *krad-’á-x* mit der morphosyntaktischen Eigenschaft 1.Pers.Sg.-Kongruenz assoziiert wird?

Standardlösung:
Ein leeres Suffix tut dies (bzw. eine Regel, die keine Formveränderung bewirkt).
Konzeptuelle Evidenz für realisationale Theorien: Inhalt vs. Kontext

Unerwünschte Ambiguität:
Ist eine morphosyntaktische Eigenschaft eines Flexionsmarkers eine Eigenschaft seines *Inhalts* oder eine Eigenschaft seines *Kontexts*?

Evidenz:
Im Bulgarischen gibt es eine Klasse von Verben, die ein besonderes Suffix *m* in der 1.Pers.Sg.Präs. haben: *dávam* (‘ich gebe’).

Entscheidungsproblem für die Analyse:
(i) Ist *m* ein Suffix mit den Merkmalen 1.Pers.Sg., das einen Präsens-Stamm subkategorisiert?

(ii) Ist *m* ein Suffix mit den Merkmalen 1.Pers.Sg.Präs.?

Ausweg:
Kein Problem in inferentiell-realisationalen Theorien, denn:

(9) Exponenz ist die einzige Art der Assoziierung von Flexionsmarkierung und morphosyntaktischen Eigenschaften.

2. Die Morphologie-Syntax-Schnittstelle

(10) *Nullhypothese*:
Ein flektiertes Wort X der Kategorie Y, das mit einer Menge σ von morphosyntaktischen Eigenschaften assoziiert ist, wird als Kopf einer Phrase YP in der Syntax eingesetzt, deren morphosyntaktische Eigenschaften nicht von σ distinkt sind.

Beobachtung:
Es gibt vier mögliche Herausforderungen für diese Sichtweise:
(i) Randeigenschaften
(ii) Formalternationen
(iii) Superlexeme
(iv) Periphrase

2.1. Randeigenschaften

(11) Wenn X mit einer Randeigenschaft (rechts oder links) p assoziiert ist, dann wird X am (rechten oder linken) Rand einer Phrase eingesetzt, die p trägt.

Beispiel:
Ein Wort wie *children's* muss (a) wg. (11) am rechten Rand einer possessiven NP eingesetzt werden, und (b) wg. (10) als Kopf einer Plural-NP eingesetzt werden.

2.2. Formalternationen

(12) *Phonologisch bedingte Alternation beim indefiniten Artikel im Englischen*:
a. a bird
b. an apple

(13) *Bretonische Väter*:
a. ho tad 'euer Vater'
b. e dad 'sein Vater'
c. va zad 'mein Vater'

(14) *Regeln*:
a. Die Form *zad* wird eingesetzt nach einem Spirantisierungsauslöser wie *va*.
b. Die Form *dad* wird eingesetzt nach einem Lenisierungsauslöser wie *e*.
c. Die Form *tad* ist der elsewhere case.

2.3. Superlexeme

Generalisierung:
Eine morphologische Realisierung, mehrere (adjazente) syntaktische Positionen und morphosyntaktische Eigenschaften.

(15) *Verschmelzungsformen*:
a. zu der, zu dem
b. zur, zum
c. I would
d. I'd

(16) *Klammerparadoxe im Sanskrit*:
amhór uru-cákrih 'causing relief from distress'
amhór 'distress'(abl.sg.)
uru- 'relief'
cákrih 'causing'
a. *Syntaktische Struktur*:
[AP [NP [NP amhór] [N uru-]] cákrih]
b. *Morphologische Struktur*:
[N amhór] [A [N uru-] [A cákrih]]

(17) *Klammerparadoxe im Deutschen*:
a. gekochte Schinkenplatte
b. Genschers Beliebtheitskurve bei den Wählern

(18) *Klammerparadoxe im Englischen*:
a. *[un [happy] -er]*
b. *[ditransitive [person-role] constraint]*

2.4. Periphrase

Es gibt in (synthetischen) Paradigmen oft Lücken, die systematisch durch analytische Formen aufgefüllt werden. Hier gilt:

Generalisierung:
Mehrere morphologische Realisierungen, ein morphosyntaktisches Merkmalsbündel (eine syntaktische Position?).

(19) *Lateinische Verbflexion*:
a. amat Präsens Aktiv: 'Er liebt'
b. amatur Präsens Passiv: 'Er wird geliebt'
c. amavit Perfekt Aktiv: 'Er hat geliebt '
d. amatus est Perfekt Passiv: 'Er ist geliebt worden'

Vorschlag (Bonami (2015)):
Selektionsmerkmale ("reverse selection") können Flexionsexponenten sein!

3. Basic Assumptions

Ref.: Stump (2001)

(20) *Basic assumption*:
The concatenation of a word with a certain set of morpho-syntactic properties determines

a chain of rule applications that determine the inflected form of a word. (Note: This is speaking metaphorically – in reality, the theory is strictly declarative, and we are talking about functions.)

(21) Traditional terminology:

a. *word* ('Word', 'Lexeme'): e.g. BUCH ('book'); words have paradigms.
b. *word form* ('inflected form of a word'): e.g., *Buch-es* ('book$_{\text{gen.sg}}$'); word forms are parts of paradigms and occupy cells there.

(22) *Paradigm* (claim):
Paradigms are not epiphenomena; rather, "they constitute a central principle of morphological organization". (Really? An abstract concept in grammatical theory is normally not an epiphenomenon if it is crucially required in some building block of the grammar.) Paradigms arise by applying *paradigm functions*.

(23) Three kinds of morphological expressions:

a. *Root*: the "ultimative default form" of a lexeme (word).
b. *Stem*: an expression to which inflectional exponents can be attached (every root is a stem, not every stem is a root).
c. *Word* ('word form'): a free, fully inflected form that occupies a paradigm cell.

(24) *Realization rules*:
Paradigm functions are defined by more specific realization rules.

(25) Informal example:
Der value of the paradigm function (<*Mutter*-,{dative,plural}>) ('mother) follows from the results of the application of two realization rules – one that chooses the umlauted version of the stem, and one that adds the suffix *-n* suffigiert: *Müttern*.

Terminology:
<*Mutter*-,{dativ,plural}> is an *FPSP* ('form/property-set pairing').

(26) *Rule blocks*:

a. The realization rules of a language are assigned to blocks.
b. Rules in the same block compete; only the most specific rule can apply (Panini's Principle; cf. Subset Principle in DM).
c. Rules in different blocks do not compete; this way different inflectional exponents can co-occur in a single word.

Note:
The inflectional exponents enter words via rules; they do not have a separate status and are not listed in a lexicon. In this sense, the theory qualifies as *amorphous* (vgl. Anderson (1992)).
Slogan: *Paradigm functions are static wellformedness conditions for paradigm cells.*

(27) *Well-formed set of morpho-syntactic features*:
A set τ of morpho-syntactic properties for a lexeme of category C is well formed in a language L only if τ satisfies the following conditions in L.

a. For each property F:v$\in\tau$: F:v is accessible for lexemes of category C, and v is a legitimate value for F.
b. For each morpho-syntactic feature F that has v_1, v_2 as possible values: If $v_1 \neq v_2$ and F:$v_1\in\tau$, then F:$v_2\notin\tau$.

(28) *Extension*:
If σ and τ are well-formed sets of morpho-syntactic features, then σ is an extension of τ iff (a) and (b) hold.

a. For each atom-valued feature F and every legitimate value v for F: If F:v$\in\tau$, then F:v$\in\sigma$.
b. For every set-valued feature F and every legitimate value p for F: If F:p$\in\tau$, then F:p$'\in\tau$, where p$'$ is an extension of p.

(29) *Unification*:
If σ and τ are well-formed sets of morpho-syntactic features, the unification ρ of σ and τ is the smallest well-formed set of morpho-syntactic features, such that ρ is an extension both of σ and τ.

(30) a. {TNS:pres,AGR:{PER:1,NUM:pl}} is an extension of {AGR:{PER:1,NUM:pl}}, {AGR:{NUM:pl}}, { }, etc.
b. {TNS:pres,MOOD:ind,AGR:{PER:1,NUM:pl}} is the unification of {TNS:pres,AGR:{PER:1}} and {TNS:pres,MOOD:ind,AGR:{NUM:pl}}

(31) *Feature co-occurrence restrictions* (Bulgarian verb forms):
A set τ of morpho-syntactic properties for a lexeme of category V is well formed only if τ has a well-formed extension σ, such that:

a. σ is an extension of {VFORM:fin} iff for a legitimate α: σ is an extension of {MOOD:α}. (If finiteness, then mood (Ind or Conj))
b. If σ is an Extension {MOOD:impv}, then σ is an extension of {AGR:{PER:2}. (If imperative, then 2. person)
c. For each legitimate α: σ is an extension of {TNS:α} iff σ is an extension of {MOOD:indic} or of {VFORM:pple}. (V has tense if it is indicative or a participle)
d. For each legitimate α: σ is an extension of {AGR:{GEN:α}} iff σ is an extension of {VFORM:pple}, and σ is an extension of {AGR:{PERS:α}} iff σ is an extension of {VFORM:fin}. (If gender, then participle; if person, then finiteness)

(32) *Completeness* of sets of morpho-syntactic features:
A set σ of morpho-syntactic features for a lexeme of a given category is complete iff (a) and (b) hold:

a. σ is well formed.
b. For each set of morpho-syntactic properties τ (such that σ is not an extension of τ): The unification of τ and σ is not well formed.

Paradigm functions:
A paradigm function is a function in the set of FPSPs which applies on a *root pair* <X,σ> (where X is the root of a lexeme L and σ is a complete set of morpho-syntactic properties for L) and yields a σ-cell <Y,σ> in the paradigm of L.

(33) *Form of paradigm functions*:
PF(<X,σ>) = <Y,σ>

Realization rules ('rules of exponence'):
A realization rule is a function in the set of FPSPs. Unlike a paradigm function, the argument

in the domain does not have to be a root pair, and the value in the range does not have to be a paradigm cell.

(34) *Form of realization rules*:
$RR_{n,\tau,C}(<X,\sigma>) = <Y',\sigma>$

Terminology:

- n: block index
- τ: property set index (the well-formed set of morpho-syntactic properties that the rule realizes by its application; σ has to be an extension of $\tau \rightarrow$ *underspecification*)
- C: class index (class of lexemes whose paradigms the rule can contribute to definiing)
- Y′: by default Y, but there is the option of overwriting by morpho-phonological rules

3.1. Bulgarian verb inflection

(35) *Four imperfective verbs in Bulgarian*:

a. KRAD ('steal'): 1.St. = *krad*, 2.St. = *krád*
b. IGRÁJ ('play'): 1.St. = *igráj*, 2.St. = *igrá*
c. KOVA ('forge'): 1.St. = *kov*, 2.St. = *kova*
d. DÁVA ('give'): 1.St. = *dáva*, 2.St. = *dáva*

Two stems:
1. stem: present, imperfect
2. stem: aorist

Two binary inflection class features: [±t(runcating)], [±c(onsonantal)]:
[–t]: 1./2. stem: identical to the root
[+t]: 1. stem: C, 2. stem: V
The inflection class features are referred to in realization rules and morpho-phonological rules (also via underspecification → transparadigmatic syncretism).

(36) a. KRAD ('steal'): [–t,+c]
b. IGRÁJ ('play'): [+t,+c]
c. KOVA ('forge'): [+t,–c]
d. DÁVA ('give'): [–t,–c]

3.2. Paradigms of Bulgarian verb inflection

(37) *Abstract indicative paradigms without morpho-phonological rules*:

Conjugation		KRAD [–t,+c]	DÁVA [–t,–c]	IGRÁJ [+t,+c]	KOVA [+t,–c]
Present	1sg	*krad-e-ə*	*dáva-e-m*	*igráj-e-ə*	*kov-e-ə*
	2sg	*krad-e-š*	*dáva-e-š*	*igráj-e-š*	*kov-e-š*
	3sg	*krad-e–e*	*dáva-e-e*	*igráj-e-e*	*kov-e-e*
	1pl	*krad-e-m*	*dáva-e-me*	*igráj-e-m*	*kov-e-m*
	2pl	*krad-e-te*	*dáva-e-te*	*igráj-e-te*	*kov-e-te*
	3pl	*krad-e-ət*	*dáva-e-ət*	*igráj-e-ət*	*kov-e-ət*
Imperfect	1sg	*krad-A-x*	*dáva-A-x*	*igráj-A-x*	*kov-A-x*
	2sg	*krad-A-x-e*	*dáva-A-x-e*	*igráj-A-x-e*	*kov-A-x-e*
	3sg	*krad-A-x-e*	*dáva-A-x-e*	*igráj-A-x-e*	*kov-A-x-e*
	1pl	*krad-A-x-me*	*dáva-A-x-me*	*igráj-A-x-me*	*kov-A-x-me*
	2pl	*krad-A-x-te*	*dáva-A-x-te*	*igráj-A-x-te*	*kov-A-x-te*
	3pl	*krad-A-x-a*	*dáva-A-x-a*	*igráj-A-x-a*	*kov-A-x-a*
Aorist	1sg	*krád-o-x*	*dáva-o-x*	*igrá-o-x*	*kova-o-x*
	2sg	*krád-e*	*dáva-e*	*igrá-e*	*kova-e*
	3sg	*krád-e*	*dáva-e*	*igrá-e*	*kova-e*
	1pl	*krád-o-x-me*	*dáva-o-x-me*	*igrá-o-x-me*	*kova-o-x-me*
	2pl	*krád-o-x-te*	*dáva-o-x-te*	*igrá-o-x-te*	*kova-o-x-te*
	3pl	*krád-o-x-a*	*dáva-o-x-a*	*igrá-o-x-a*	*kova-o-x-a*

3.3. Realization rules

(38) a. *Block A*:
A1 $RR_{A,\{TNS:aor\},V}(<X,\sigma>) =_{def} <Y',\sigma>$, where Y is the 2. stem of X.
A2 $RR_{A,\{\ \},V}(<X,\sigma>) =_{def} <Y',\sigma>$, where Y is the 1. stem of X.

b. *Block B & Block C*:
B1 $RR_{B,\{TNS:pres\},V}(<X,\sigma>) =_{def} <Xe',\sigma>$
B2 $RR_{B,\{TNS:impf\},V}(<X,\sigma>) =_{def} <XA',\sigma>$
B3 $RR_{B,\{TNS:aor,PRET:yes\},V}(<X,\sigma>) =_{def} <Xo',\sigma>$
B4/C1 If $n =$ **B** or **C**:
$RR_{n,\{TNS:aor,PRET:yes,AGR:\{PER:3,NUM:sg\}\},V}(<X,\sigma>) =_{def} <X',\sigma>$
C2 $RR_{C,\{PRET:yes\},V}(<X,\sigma>) =_{def} <Xx',\sigma>$

c. *Block D*:
D1 $RR_{D,\{TNS:pres,AGR:\{PER:1,NUM:sg\}\},V}(<X,\sigma>) =_{def} <Xə',\sigma>$
D2 $RR_{D,\{TNS:pres,AGR:\{PER:1,NUM:sg\}\},[CONJ:-T,-C]}(<X,\sigma>) =_{def} <Xm',\sigma>$
D3 $RR_{D,\{TNS:pres,AGR:\{PER:2,NUM:sg\}\},V}(<X,\sigma>) =_{def} <Xš',\sigma>$
D4 $RR_{D,\{AGR:\{PER:3,NUM:sg\}\}}(<X,\sigma>) =_{def} <Xe',\sigma>$
D5 $RR_{D,\{TNS:pres,AGR:\{PER:1,NUM:pl\}\},([CONJ:+T]\cup[CONJ:+C])}(<X,\sigma>) =_{def} <Xm',\sigma>$
D6 $RR_{D,\{AGR:\{PER:1,NUM:pl\}\},V}(<X,\sigma>) =_{def} <Xme',\sigma>$
D7 $RR_{D,\{AGR:\{PER:2,NUM:pl\}\},V}(<X,\sigma>) =_{def} <Xte',\sigma>$
D8 $RR_{D,\{TNS:pres,AGR:\{PER:3,NUM:pl\}\},V}(<X,\sigma>) =_{def} <Xət',\sigma>$
D9 $RR_{D,\{AGR:\{PER:3,NUM:pl\}\},V}(<X,\sigma>) =_{def} <Xa',\sigma>$

(39) *Rule of referral* (informal version):
In preterite environments (aorist and imperfect) the 2.Pers.Sg. follows the 3.Pers.Sg.

3.4. Rule application: Specificity

(40) *Panini's Principle*:
Suppose that σ is a complete set of morpho-syntactic properties for lexemes of category V. Then $PF(<X,\sigma>) =_{def} Nar_D(Nar_C(Nar_B(Nar_A(<X,\sigma>))))$

(41) *Nar_n notation*:
If $RR_{n,\tau,C}$ is the **narrowest** rule in block n that **can be applied** to $<X,\sigma>$, then '$Nar_n(<X,\sigma>)$' represents the result of the application of $RR_{n,\tau,C}$ to $<X,\sigma>$.

(42) *Narrowness and applicability* (simplified):

a. $RR_{n,\sigma,C}$ is narrower than $RR_{n,\tau,C}$ iff σ is an extension of τ and $\sigma \neq \tau$.
b. $RR_{n,\tau,C}$ can be applied to $<X,\sigma>$ iff $RR_{n\tau,C}(<X,\sigma>$ is defined.

(43) *Rule argument coherence*:
$RR_{n\tau,C}(<X,\sigma>$ is defined iff (a) σ is an extension of τ (see above); (b) L-Index(X) $\in$ C; and (c) σ is a well-formed set of morpho-syntactic properties for L-Index(X).

3.5. Rule application: Identity function

(44) *Identity function default*:
$\boxed{RR_{n,\{\ \},U}(<X,\sigma>) =_{def} <X,\sigma>}$

Note:
This is a bit like a zero elsewhere marker. It is a minimally specific rule that is available in each block (n is a variable over all rule blocks, and U is a variable over all lexeme classes). This ensures that the derivation does not accidentally stop in a block if there is no suitable exponent.

(45) Example:

a. σ = {VFORM:fin, VCE:act, TNS:pres, PRET:no, MOOD:indic, AGR:{PER:1,NUM:pl}}
b. $Nar_C(<kradé,\sigma>) = RR_{C,\{\ \},U}(<kradé,\sigma>) = <kradé,\sigma>$

3.6. Rule application: Rules of referral and syncretism

Some syncretisms can in principle be derived via *underspecification*, also with respect to . *abstract morpho-syntactic features* (see, e.g., [pret:yes/no]); or by complete underspecification with respect to some grammatical categorization (cf. the syncretism in 3.Pers.Pl. aorist and imperfect contexts: D9 vs. D8). However, there are other kinds of syncretism where Stump adopts a different approach: rules of referral. (39) is repeated in (46).

(46) *Rule of referral* (informal version):
In preterite environments (aorist and imperfect) the 2.Pers.Sg. follows the 3.Pers.Sg.

Now the rule can be given a more precise characterization.

(47) *Rule of referral* (proper version):
Suppose that (a)–(c) hold:

a. τ is some complete extension of {PRET:yes, AGR:{PERS:2,NUM:sg}}.
b. n is some rule block in A-D.
c. $\sigma' = \sigma/$ {AGR:{PER:3}}. (I.e.: σ modified by {AGR:{PER:3}})

Then:
$RR_{n,\tau,V}(<X,\sigma>) =_{def} <Y,\sigma>$, where $Nar_n(<X,\sigma'>) = <Y,\sigma'>$

(48) *Concrete indicative paradigms incl. morpho-phonology*

Conjugation		KRAD [–t,+c]	DÁVA [–t,–c]	IGRÁJ [+t,+c]	KOVA [+t,–c]
Present	1sg	*krad-ɔ́*	*dáva-m*	*igráj-ə*	*kov-ɔ́*
	2sg	*krad-é-š*	*dáva-š*	*igrá-e-š*	*kov-é-š*
	3sg	*krad-é*	*dáva*	*igrá-e*	*kov-é*
	1pl	*krad-é-m*	*dáva-me*	*igrá-e-m*	*kov-é-m*
	2pl	*krad-é-te*	*dáva-te*	*igrá-e-te*	*kov-é-te*
	3pl	*krad-ɔ́t*	*dáva-t*	*igráj-ət*	*kov-ɔ́t*
Imperfect	1sg	*krad-'á-x*	*dáva-x*	*igrá–ex*	*kov-'á-x*
	2sg	*krad-é-š-e*	*dáva-š-e*	*igrá-e-š-e*	*kov-é-š-e*
	3sg	*krad-é-š-e*	*dáva-š-e*	*igrá-e-š-e*	*kov-é-š-e*
	1pl	*krad-'á-x-me*	*dáva-x-me*	*igrá-e-x-me*	*kov-'á-x-me*
	2pl	*krad-'á-x-te*	*dáva-x-te*	*igrá-e-x-te*	*kov-'á-x-te*
	3pl	*krad-'á-x-a*	*dáva-x-a*	*igrá-e-x-a*	*kov-'á-x-a*
Aorist	1sg	*krád-o-x*	*dáva-x*	*igrá-x*	*ková-x*
	2sg	*krád-e*	*dáva*	*igrá*	*ková*
	3sg	*krád-e*	*dáva*	*igrá*	*ková*
	1pl	*krád-o-x-me*	*dáva-x-me*	*igrá-x-me*	*ková-x-me*
	2pl	*krád-o-x-te*	*dáva-x-te*	*igrá-x-te*	*ková-x-te*
	3pl	*krád-o-x-a*	*dáva-x-a*	*igrá-x-a*	*ková-x-a*

Assumption:
For each realization rule, there is an unordered set Φ_R of morpho-phonological rules that restrict the evaluation of the realization rule during each application.

3.7. Morpho-phonological rules and metageneralizations

(49) *Rules* (Φ_R): If $RR_{n,\tau,C}(<X,\sigma>) =_{def} <Y',\sigma>$, then:

a. If the L-Index(X) $\in$ [CONJ:–T,–C] and Y = X[vowel]Z, then [vowel] is absent from Y′.
b. If X = W[$vowel_1$] and Y = X[$vowel_2$]Z, then [$vowel_1$] is absend from Y′, and [$vowel_2$] is stressed in Y′ iff [$vowel_1$] is stressed in Y.
c. If X = W[$vowel_1$] and Y = X[$vowel_2$]Z, then [$vowel_2$] is absent from Y′.
d. If Y is unstressed, then Y′ is stressed on its final syllable.
e. If X = WC (C a velar with Č as its alveopalatal counterpart), Y = XVZ, and V a front vowel, then Y′ has Č instead of C.
f. If Y = WĂZ, then Y′ has an *e* instead of Ă.
g. If Y = WÁC_1VZ and V is a front vowel, then Y′ has an *é* instead of *Á*.
h. If Y = WÁZ, then Y′ has *á* (with palatalization of an immediately preceding consonant) instead of *Á*.

(50) *Metageneralization*:

a. For each rule R in block **B**, **C** or **D**: (49-ae) $\in \Phi_R$.

b. For each rule R in block **B**, **C** or **D**: (49-b) $\in \Phi_R$ iff R realizes an extension of {TNS:pres}; otherwise: (49-c) $\in \Phi_R$.
c. If R is in block **B**: (49-d) $\in \Phi_R$.
d. If R is in block **D**: (49-fh) $\in \Phi_R$.
e. (49-g) $\in \Phi_{\mathbf{D4}}$, $\Phi_{\mathbf{B1}}$.

3.8. Competition

Argument encoding in Georgian
Where we are so far:
The competition between realization rules within a given block is resolved in favour of the most specific (narrowest) rule (Panini's Principle). However, it turns out that this may give rise to problems, so additional assumptions must be made.

Example:
Realization rules for argument-encoding prefixes in Georgian in (51) (Stump (2001, 70)). (The system of argument encoding in Georgian is notoriously complex; we only look at a very small part of it here.)

(51) a. $\mathrm{RR}_{\mathrm{pref},\{AGR(su):\{PER:1\}\},\mathrm{V}}(<\mathrm{X},\sigma>) =_{def} <v\mathrm{X}',\sigma>$
b. $\mathrm{RR}_{\mathrm{pref},\{\mathrm{AGR(ob)}:\{\mathrm{PER:1}\}\},\mathrm{V}}(<\mathrm{X},\sigma>) =_{def} <m\mathrm{X}',\sigma>$
c. $\mathrm{RR}_{\mathrm{pref},\{\mathrm{AGR(ob)}:\{\mathrm{PER:1,NUM:pl}\}\},\mathrm{V}}(<\mathrm{X},\sigma>) =_{def} <gv\mathrm{X}',\sigma>$
d. $\mathrm{RR}_{\mathrm{pref},\{AGR(ob):\{PER:2\}\},\mathrm{V}}(<\mathrm{X},\sigma>) =_{def} <g\mathrm{X}',\sigma>$

Problem:
What is the correct V realization for "I will kill you"? The problem is that the morpho-syntactic feature sets of (51-a) and (51-d) are not in an extension relation with one another; therefore, both should be ok. However, empirically, there is only one correct interaction: (51-d) is used, and thereby blocks (51-a).

(52)

Preverb	Prefix	Stem	Suffix	
mo-	g-	klav		'I will kill you$_{sg}$'
*mo-	v-	klav		'I will kill you$_{sg}$'
mo-	g-	klav	-t	'I will kill you$_{pl}$'

Solutions for the dilemma

(53) *Extrinsic ordering* (Anderson (1992)):
By stipulation, rule (51-d) applies before rule (51-a).

(54) *Expanded mode* (Stump (2001)):
Rules can be blown up and are then maximally specific.

(55) *Rule modes*:
a. Unexpanded mode:
$\mathrm{RR}_{n,\tau,C}(<\mathrm{X},\sigma> =_{def} <\mathrm{Y}',\sigma>$
b. Expanded mode:
$\mathrm{RR}_{n,\leftarrow\tau\rightarrow,C}(<\mathrm{X},\sigma> =_{def} <\mathrm{Y}',\sigma>$

"$\leftarrow \tau \rightarrow$" essentially means that τ is maximally extended.

Conclusion: Rule (51-d) in Georgian functions in the extended mode:

(56) $\mathrm{RR}_{\mathrm{pref},\leftarrow\{AGR(ob):\{PER:2\}\}\rightarrow,\mathrm{V}}(<\mathrm{X},\sigma>) =_{def} <g\mathrm{X}',\sigma>$

3.9. Syncretism

3.9.1. Types of syncretism

A first dichotomy:
Whole word syncretism vs. *Block syncretism*. Both kinds of syncretism are to be derived (but cf. Baerman et al. (2005)).
A second dichotomy:

- unidirectional syncretism — rule of referral
- bidirectional syncretism — Bidirectional Referral Principle
- unstipulated syncretism — underspecification
- stipulated syncretism (e.g., symmetrical syncretism) — metarules for symmetrical syncretism

3.9.2. Unidirectional syncretism

The syncretism in 2./3.Pers.Sg. Pret (aorist and imperfect) in Bulgarian is unidirectional:

- 3.Pers.Sg. forms can have an ending *-e* in all tenses.
- 2.Pers.Sg. forms can have an ending *-e* only in preterite tenses.

(57) *Rule of referral* (in expanded mode):
If n is an arbitrary rule block in A-D, then:
$\mathrm{RR}_{n,\leftarrow\{pret:yes,agr:\{per:2,num:sg\}\}\rightarrow,V}(<\mathrm{X},\sigma>) =_{def} <\mathrm{Y},\sigma>$, where $\mathrm{Nar}_n(<\mathrm{X},\sigma/\{\textsc{agr}:\{\textsc{per}:3\}\}>) = <\mathrm{Y},\sigma//\{\textsc{agr}:\{\textsc{per}:3\}\}>$

3.9.3. Bidirectional syncretism

Romanian verb inflection:

- Everywhere except 1. conjugation: 1.Sg. = 3.Pl. in indicative paradigms.
- Sometimes 3.Pl. is the dependent part: *a umplea*, *a şti*. (The *u*-form only shows up in 1.Sg. contexts in the 1. conjugation.)
- Sometimes 1.Sg. is the dependent part: *a fi*. (The stem *sínt* shows up elsewhere in the plural.)

(58) Present indicative forms of some Romanian verbs:

	a invita	*a sufla*	*a umplea*	*a şti*	*a fi*
	invite	breathe	fill	know	be
Conjugation:	1	1	2	4	4
1sg	invít	súfl-u	úmpl-u	ştí-u	sínt
2sg	invíţ-i	súfl-i	úmpl-i	ştí-i	èţt-i
3sg	invít-a	súfl-a	úmpl-e	ştí-e	éţt-e
1pl	invitá-m	suflá-m	úmple-m	ştí-m	sínte-m
2pl	invitá-ţi	suflá-ţi	úmple-ţi	ştí-ţi	sínte-ţi
3pl	invít-a	súfl-a	úmpl-u	ştí-u	sínt

Assumptions:

- Every rule of referral $RR_{n,\tau,C}$ has a *referral domain* D, where C is a subset of D.
- The existence of a rule of referral implies the existence of an inverse rule of referral, according to (59).

(59) *Bidirectional Referral Principle*:
The existence of a rule of referral '$RR_{n,\tau,C}(<X,\sigma>) =_{def} <Y,\sigma>$, where $Nar_n(<X,\sigma/\rho>) = <Y,\sigma/\rho>$' with referral domain D implies the existence of a second rule of referral '$RR_{n,\tau/\rho,D-C}(<X,\sigma>) =_{def} <Y,\sigma>$, where $Nar_n(<X,\sigma/\tau>) = <Y,\sigma/\tau>$' with referral domain D.

(If a rule has C as its referral domain – this is the normal state of affairs –, then the inverse rule is not interesting because it has to refer to an empty set of expressions.)

(60) First rule of referral:
If $n = 0$ or 1: $RR_{n,\{agr(su):\{per:1,num:sg\}\},a\ fi}(<X,\sigma>) =_{def} <Y,\sigma>$, where $Nar_n(<X,\sigma/\{AGR(su):\{PER:3,NUM:pl\}\}>) = <Y,\sigma/\{agr(su):\{per:3,num:pl\}\}>$
Referral domain: V

(61) Implied rule of referral:
If $n = 0$ or 1: $RR_{n,\{agr(su):\{per:3,num:pl\}\},V-a\ fi}(<X,\sigma>) =_{def} <Y,\sigma>$, where $Nar_n(<X,\sigma/\{AGR(su):\{PER:1,NUM:sg\}\}>) = <Y,\sigma/\{AGR(su):\{PER:1,NUM:sg\}\}>$
Referral domain: V

3.9.4. Symmetrical Syncretism

Verb inflection in Hua (aka Yagaria; New Guinea):
2.Sg. and 1.Pl. forms always have the same ending (a block syncretism, not a whole word syncretism), in all tenses and moods. These two environments do not form a natural class. Also, the syncretism is not directional.

(62) *Metarule for symmetrical syncretism*:
$RR_{n,\tau,C}(<X,\sigma>) =_{def} <Y,\sigma> \leftrightarrow RR_{n,\tau/\rho,C}(<X,\sigma>) =_{def} <Y,\sigma>$

(63) *Metarule for Hua*:
Suppose that τ is an extension of $\{AGR(su):\{PER:2,NUM:sg\}\}$. Then: $RR_{II,\tau,V}(<X,\sigma>) =_{def} <Y,\sigma> \leftrightarrow RR_{II,\tau/\{agr(su):\{per:1,num:pl\}\},V}(<X,\sigma>) =_{def} <Y,\sigma>$

Alternative (Chomsky (1965), Chomsky & Halle (1968)): α-notation: Variables ranging over feature values.

(64) a. [+1,–2],[+pl]
b. [–1,+2],[–pl]
c. α-notation: [α1,–α2],[αpl]

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