Category changing and argument changing operations in derivational morphology

Dieter Wunderlich (Düsseldorf)

1. The LDG framework

Lexical Decompositional Grammar (LDG) provides a principled account for phenomena in which predicates and/or arguments are added to a base verb (or noun). LDG assumes four levels of representation, each having its own structural properties:

- Conceptual Structure (CS),
- Semantic Form (SF),
- Theta Structure (TS), and
- Morphology/ Syntax (MS),

and a set of principles that constrain the mappings between these levels.

This four-level architecture of LDG is illustrated in (2), representing the ditransitive verb *geben* 'give', which is canonically realized by the pattern in (1b).

(1) a. (als) der Torwart dem Jungen den Ball gab
(when) the goal-keeper the boy the ball gave
b. [DP^x_{NOM} [DP^y_{DAT} [DP^z_{ACC} *geb*-AGR^x]]]

(2)

TS				SF
λz	λy	λx	λs	{ACT(x) & BEC POSS(y,z)}(s)
+hr	+hr	–hr		
–lr	+lr	+lr		

↕ ↕ ↕

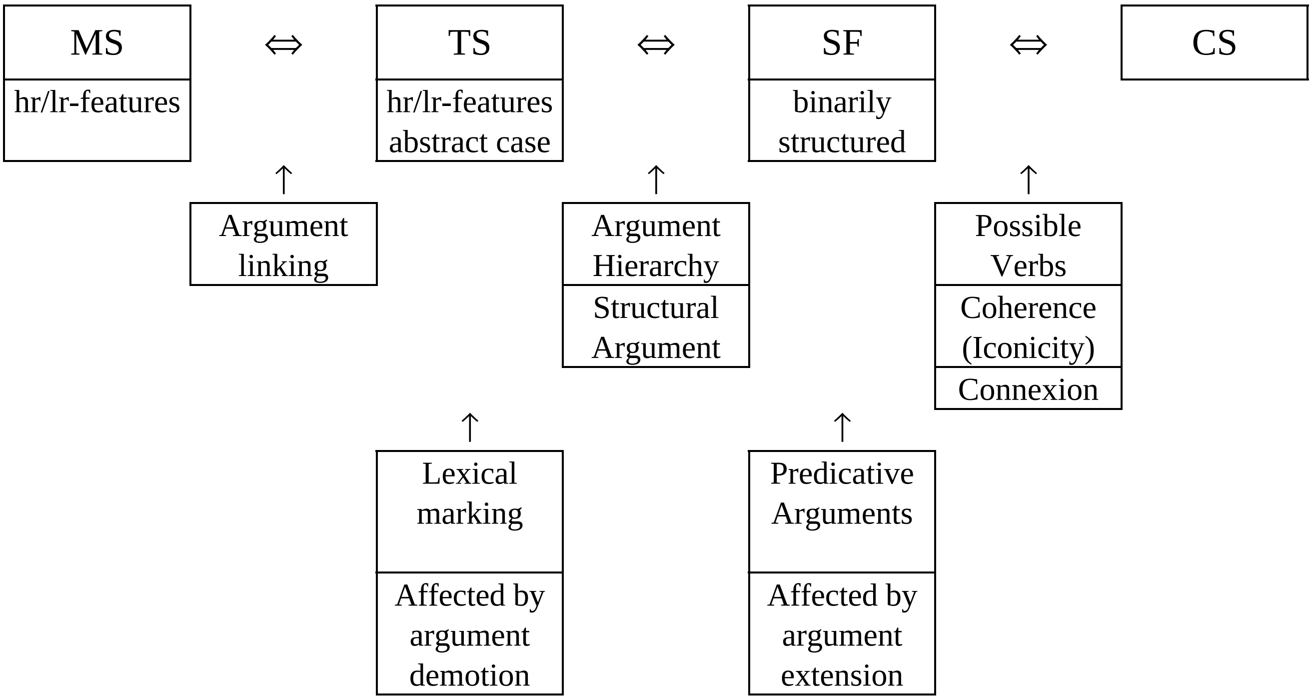
		AGR
ACC	DAT	NOM
MS		

CS
x=Agent or Controller
y=Recipient
z=Patient or Affected
Causal event: ACT(x)(s_1)
Result state: POSS(y,z)(s_2)

The motivation to assume SF as a separate level of representation is minimality (Wunderlich 1996), but also the possibility to express generalizations for the mappings between semantic and morphological/syntactic structure.

- The SF of a lexical item is a partial (minimal) semantic representation, formulated by means of a binary syntax for logical types (with the bracketing [A [& B]] for the conjunction &).
- SF is part of grammar insofar as it determines morphological and syntactic aspects of clause structure; for this reason SF may involve partial decomposition into more atomic predicates.
- All predicates used in SF can be explicated by means of conceptual conditions in CS.
- Everything that can be inferred by general means is not part of SF itself, although it may be incorporated in CS, a more elaborated semantic representation. Notions such as implicit argument, subevent, thematic or eventive roles do not belong to SF itself, but rather to CS.

(3) The four-level architecture of LDG:
Levels of representation and interface constraints



SF-CS interface constraints

(4) POSSIBLE VERBS. In a decomposed SF representation of a verb, every more deeply embedded predicate must specify the higher predicate or sortal properties activated by the higher predicate. (Kaufmann 1995)

(5) CONNEXION. In a decomposed SF structure, each predicate must share at least one argument with another predicate, either explicitly or implicitly.

(6) COHERENCE. Subevents encoded by the predicates of a decomposed SF structure must be contemporaneously or causally connected.

SF-TS interface constraints

(7) ARGUMENT HIERARCHY. The list of λ-abstractors in TS corresponds to the depth of embedding in SF, with the lowest argument to the left (first subjected to Functional Application), and the highest argument to the right. Correspondingly, the lowest argument (of a multi-valent verb) is designated as [+hr,–lr], and the highest argument as [–hr,+lr], whereas all medial arguments are designated as [+hr,+lr].

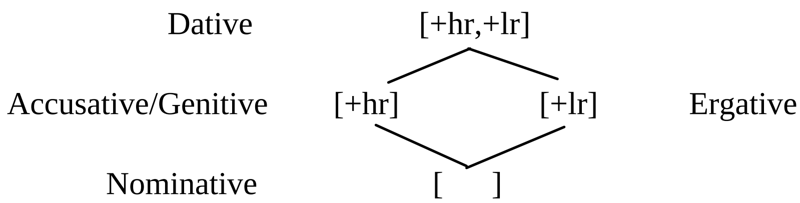
(8) STRUCTURAL ARGUMENT. An argument is structural only if it is either the lowest argument or (each of its occurrences) L(exically)-commands the lowest argument; so every internal (non-highest) argument of a nonfinal predicate in SF is nonstructural.
L-command is defined for the nodes in SF, which represent logical types, as follows: α L-commands β if the node γ, which either directly dominates α or dominates α via a chain of nodes type-identical with γ, also dominates β.

TS is considered an independent level of representation for two reasons:

- The default designations on the basis of ARGUMENT HIERARCHY can be lexically overridden, which happens in all instances of quirky case or dative experiencers.
- Again lexically determined, it is possible that improper theta roles (expletive arguments) appear, which do not have a thematic correspondent in SF although they participate in morphological case.

TS-MS interface constraints
- in a correspondence-theoretic perspective: TS is the input, and MS the output.

All possible structural linkers (agreement affixes, pronominal affixes, and clitics on the head, as well as morphological case on the dependent) are encoded by means of the abstract case features [+hr] and [+lr], and, possibly, by additional semantic features (such as animate, control). Semantic case (which adds some predicate) is encoded purely by means of morpho-semantic features.



Linking may be performed in two steps: (i) on the head, and (ii) by case on the dependent.

Faithfulness constraints:

- MAX(+hr/+lr/ϕ-feature) Every feature in the input has a correspondent in the output.
- DEP(+hr/+lr/ϕ-feature) Every feature in the output has a correspondent in the input. (generally high-ranked)
- IDENT(+hr/+lr, ϕ-feature) Every combination of case features and ϕ-features on a theta role in the input is preserved in the output.

MS-constraints

- Alignment
- Markedness

LDG is a strictly lexical account: The appearance of additional arguments (such as possessors, beneficiaries, or affected objects) is only licensed by a predicate that is added to the base SF.

Referential arguments

Verbs have a situational referential argument that is modified and bound by functional categories of the verb. It does not count in the hierarchy of arguments.	Nouns have a referential argument that counts in the hierarchy of arguments. In DPs it is modified and bound by functional categories of the noun, while in predicative nouns it is realized in the syntax.

Verbs have a richer argument structure than nouns.

All category changing operations and argument changing operations can be marked morphologically, but can also be unmarked. Generally, these operations are more restricted if they are unmarked (invisible).

2. Category changing operations

Invisible: conversions
Marked: several types of nominalization (V→N) and verbalization (N→V)

(9) The principal asymmetry of V→N vs. N→V conversion

		conversion	morphologically marked
V→N nominalization	Event nominalization: SF remains the same	deverbal noun	nominal affix
N→V derivation	A more complex SF incorporates a noun	denominal verb = abstract verb plus noun incorporation	verbal affix or independent verb plus noun incorporation

(10) Event nominals formed from verbs
a. Verb: *jump*$_V$: λP λx λs {JUMP(x) & P(x)}(s)
s is the situational argument of verbs
(*John jumped into the pool many times*.)
b. Noun: *jump*$_N$: λP λx λs {JUMP(x) & P(x)}(s)
s is the referential argument of nouns
(*many of John's jumps into the pool*)
Event nominals can also be formed morphologically by suffixing -*ing*, etc.

(11) Denominal verbs
a. Noun: *jail*$_N$: λu JAIL(u)
(*many jails*)
b. Verb: *jail*$_V$: λy λx λs ∃z {ACT(x) & BECOME LOC(y, INT(z)) & JAIL(z)}(s)
(*John jailed the insurgents*.)
c. Hungarian has a verbalizing suffix -Vz, together with a preverb:
be-börtön-öz 'to jail'
IN-jail-put

(12) Semantic templates for denominal verbs
Example Location verbs:
λN λy λx λs ∃z {ACT(x) & BECOME LOC(y, R(z)) & N(z)}(s)
N = variable over nouns of a relevant sort (noun incorporation)
R = variable over neighborship regions (related to *in*, *on*)

3. Argument changing operations

Argument demotion	Argument shifting	Argument extension
passive, antipassive, reflexive, middle	locative alternation, dative alternation	causative, resultative, applicative
	not considered here	

Argument demotions operate on TS:

- Passive binds the highest theta role existentially.
- Antipassive binds the lowest theta role existentially.
- Reflexive/Reciprocal binds a lower theta role to the highest one.
- Middle demotes the highest argument, and can, therefore, also affect SF.

(13) In Basque, all argument demotions are unmarked: passive and reflexive apply to all transitive verbs, whereas the middle is restricted to a few verbs.

hil ‘kill’	λy λx λs {ACT(x) & DIE(y)}(s)

	Itziar hil da Itziar.NOM kill be.3NOM	
Passive	‘Someone has killed Itziar = Itziar has been killed’	λy ∃x λs {ACT(x) & DIE(y)}(s)
Reflexive	‘Itziar has killed herself’	λy^{i} λx^{i} λs {ACT(x) & DIE(y)}(s) = λx λs {ACT(x) & DIE(x)}(s)
Middle	‘Itziar has died’	λy λs DIE(y)(s)

(14) In Yucatec, passive, antipassive, and middle are marked: passive by glottal stop + vowel lengthening, antipassive by vowel lengthening + low tone, middle by vowel lengthening.

a. k=in hek^{ʔ} -ik
INCOMPL=1 break-IMPF
‘I am breaking it/something’
λy λx λs {ACT(x) & BREAK(y)}(s)

b. k=u héek^{ʔ} -el
INCOMPL=3 break.MID-IMPF
‘it is breaking’
λy λs BREAK(y)(s); inherently perfective

c. héʔek^{ʔ}
break.PASS
‘it has been broken’
λy ∃x λs {ACT(x) & BREAK(y)}(s); inherently perfective

d. k=u héʔek^{ʔ} -el
INCOMPL=3 break.PASS-IMPF
‘it is being broken’

e. k=in hèek^{ʔ}
INCOMPL=1 break.ANTIP
‘I am breaking’
∃y λx λs {ACT(x) & BREAK(y)}(s); inherently imperfective

f. hèek^{ʔ} -n-ah-en
break.ANTIP-N-PERF-1
‘I have broken’

Argument extensions operate on SF:

- Causative, Assistive (Quechua), Affective (Basque) add a highest argument
- Resultative, Affected Object (Yucatec), Applicative (Bantu), Possessor extension add lower arguments

(15) Argument demotion and argument extension are fully symmetric (and productive) in Yucatec (Krämer & Wunderlich 1999)

argument extension	inherently perfective verbs (nom) become transitive by means of **causative** (suffix -*s*)	inherently imperfective verbs (erg) become transitive by means of **affected object** (suffix -*t*)
argument demotion	transitive verbs (erg-nom) become inherently perfective verbs (nom) by means of **passive**	transitive verbs (erg-nom) become inherently imperfective verbs (erg) by means of **antipassive** or noun incorporation

argument extension	Causative: λy λs AFFECTED(y)(s) → λy λx λs {ACT(x) & AFFECTED(y)}(s)	Affected Object: λx λs ACT(x)(s) → λy λx λs {ACT(x) & AFFECTED(y)}(s)
argument demotion	Passive: λy λx λs {ACT(x) & AFFECTED(y)}(s) → λy ∃x λs {ACT(x) & AFFECTED(y)}(s)	Antipassive: λy λx λs {ACT(x) & AFFECTED(y)}(s) → ∃y λx λs {ACT(x) & AFFECTED(y)}(s)
		Noun Incorporation: λy λx λs {ACT(x) & AFFECTED(y)}(s) → ∃y λx λs {ACT(x) & AFFECTED(y) & NOUN(y)}(s)

Iteration of argument demotion and argument extension is possible; Yucatec does not allow more than two structural arguments.

(16) Yucatec

a. kíin-s -áʔabˀ- en tumèen letiʔ
die-CAUS-PASS.PERF-1 PREP PRON.3.SG
'I was killed by him.'
λy λs ∃x {ACT(x) & DIE(y)}(s)

b. k=a kˀóoy -t -áʔal
INCOMPL=2 dig -AFF.OBJ-PASS.IMPF
'It gets dug (up).'
λy λs ∃x {DIG(x) & AFFECTED(y)}(s)

c. k=u káʔan -s -áʔal
INCOMPL=3 learn.PASS-CAUS-PASS.IMPF
'it is being taught'
λz λs ∃x {ACT(x) & ∃y LEARN(y,z)}(s)

d. taan=u kon-lol -t -ik -etʃ
INCOMPL=3 sell-flower-AFF.OBJ-IMPF-2
'He's selling you flowers.' (lit. 'he's flower-selling you')
λy λx λs {∃z (SELL(x,z) & FLOWER(z)) & AFFECTED(y)}(s)

Causative unmarked (in most languages severely restricted):

(17) a. John galloped the horse
λy λx λs {ACT(x) & GALLOP(y)}(s)

b. Chinese:

Nei-ping	jiu	zui-dao-le	Lisi.
that-CL	wine	inebriate-fall-PERF	Lisi

'That bottle of wine inebriated Lisi such that he fell down'
λy λx λs {CAUSER(x) & INEBRIATE(y) & FALL(y)}(s)

Resultative unmarked (in most languages severely restricted):

(18) a. The children ran the lawn flat.
λQ λz λx λs {RUN(x) & BECOME Q(z)}(s) Q(z) = FLAT(x)

b. The guests drank the wine cellar empty.
λQ λz λx λs {DRINK(x,y) & BECOME Q(z)}(s) Q(z) = EMPTY(x)
y is nonstructural

c. John ran himself tired.
λQ λz λx λs {RUN(x) & BECOME Q(z)}(s) Q(z) = TIRED(x)

Causative marked (in many languages rather unrestricted):

(19) a. Japanese (accusative language):

John ga	Mary ni	sakana o	tabe-**sase**-ta.
John NOM	Mary DAT	fish ACC	eat-CAUS-PAST

'John let Mary eat the fish'

b. Basque (ergative language):

Ama-k	haurr-a-ri	zopa	jan-**eraz**-i	dio.
mother-ERG	child-DET-DAT	soup.NOM	eat-CAUS-PERF	have.3N.3sgD.3sgE

'Mother let the child eat the soup'
λz λy λx λs {ACT(x) & EAT(y,z)}(s)

Resultative marked (in Chinese rather unrestricted):

(20) Chinese *de*-construction (*de* derived from a former verb 'obtain')

a.

Ta	ku-**de**	shoujuan	quan shi	le.
he	cry-DE	handkerchief	all wet	FIN

'He cried such that the handkerchief got all wet'

b.

Lisi	zhui-**de**	Zhangsan	hen lei.
L	chase-DE	Z	very tired

'Lisi chased somebody [by default: Zhangsan] and [as a result] Zhangsan got very tired'

4. A typology of argument extension operations

- Derivational morphemes are morphological heads.
- The functor in a derivation contributes the highest argument.

(21) The principal asymmetry between operations that introduce a higher argument and those that introduce a lower argument

A higher argument is added to the verb.	A lower argument is added to the verb.
The derivational morpheme is the functor that takes the verb.	The derivational morpheme cannot be the functor. Hence, the verb itself is the functor. It undergoes ARG in order to incorporate a further predicate.
Invisible derivations should be rare.	Visible derivations should be rare because they induce a morphology-semantics mismatch. However, derivations often become visible by the incorporated predicate, being the nonhead.

Prediction: There are more languages that have a causative morpheme than a resultative or applicative morpheme (except that mismatches are generally tolerated).

(22) The causative is head + functor:
Functional composition with a ditransitive verb V: all arguments of V are inherited.

a. Causative: λV λu λs {ACT(u) & ∃s' V(s')}(s)
b. Turkish:
Biz-e mektub-u Hasan-a göster-t-ti-ler.
we-DAT letter-ACC Hasan-DAT show-CAUS-PAST-PL
'They made us show the letter to Hasan'
c. *göster*: **λz λy λx** λs SHOW(x,y,z)(s)
d. *göster-t*: **λz λy λx** λu λs {ACT(u) & ∃s' SHOW(x,y,z)(s')}(s)

(23) ARG(verb) = Argument extension on verbs:
... λs VERB(...)(s) ⇒ λP ... λs{VERB(...)(s) & P(s)}
which can be rewritten as {VERB(...) & P}(s)

The predicate P can be instantiated by a non-head morpheme (particle, prefix, verb in verbal compounds, adjective or possessor in nominal phrases). All further arguments of P are inherited to the verb by functional composition; they become lower arguments.

(24) The resultative is the nonhead, the verb is the functor:
Functional composition of a ditransitive verb that has undergone ARG-extension with an (invisible) resultative: all arguments of the resultative are inherited.

a. Resultative: **λ Q λz** BEC Q(z)
b. Max stellte den Keller voll.
'Max put the cellar full'
c. *stellen*: λP λy λx λs {ACT(x) & BEC STAND(y) & P(y)}(s)
d. ARG(*stellen*): λR λx λs {{ACT(x) & BEC STAND(y) & P(y)} & R(s)}
A predicative argument must be the lowest one, so P cannot be mapped into MS.
e. Res(*stellen*): **λQ λz** λx λs {{ACT(x) & BEC STAND(y) & P(y)} & BEC Q(z)}(s)

Morphology-semantics mismatches: The nonhead element is the functor in applicative constructions and right-headed verbal compounds

(25) a. No mismatch

German prefix or particle verbs	
prefix	verb
	head + functor

Chinese left-headed V-V compounds	
verb	verb
head + functor	

b. Mismatches

Bantu applicatives	
verb	applicative suffix
functor	head

Japanese right-headed V-V compounds	
verb	verb
functor	head

(26) Attributive constructions

Persian Ezafe	
noun	adjective
head + marked as functor	

some Australian languages	
adjective	noun
marked as functor	head

(27) German prefix verbs (Stiebels 1996)

a. Sie erschrieb sich den Pulitzer-Preis.
She **er**-wrote herself the Pulitzer price.
'She won the Pulitzer price by her writing'

b. λv λu λx λs ∃y {WRITE(x,y) & BECOME POSS(u,v)} (s)
y becomes nonstructural

(28) Chinese verb compounds

a. Lisi ku-shi-le hao ji-kauai shoujuan.
Lisi cry-get.wet-LE well some-CL handkerchief
'Lisi cried and as a result some handkerchiefs got wet'

b. Argument extension on the head (the left element)
ARG(*ku*): λP λx λs {CRY(x) & P} (s)
ku-shi: λy λx λs {CRY(x) & BECOME WET(y)} (s)

(29) Japanese verb compounds (Gamerschlag 1999)

a. Tarô ga hasiri-tukare-ta.
Taro NOM run-get.tired-PAST
'Taro got tired from running'

b. Argument extension on the nonhead (the left element)
ARG(*hasiri*): λP λx λs {RUN(x) & P} (s)
hasiri-tukare: λy λs {RUN(x) & BECOME TIRED(y)} (s)

x=y because of SUBJECT HEAD: the head must contribute the highest theta role.
That Taro ran the lawn flat cannot be said in this way.

c. Hitobito ga sibahu o humi-narasi-ta.
people NOM lawn ACC stamp-make.flat-PAST
'The people trampled the lawn flat'
(lit. The people flattened the lawn by stamping it)

5. Order of derivation

Many languages provide evidence that argument changing operations can be combined rather freely, though they may be subject to some sequential constraints.

(30) Chichewa: V-APPL-REC-CAUS. The symbol ⊕ indicates the reciprocal relationship between the two occurrences of the variable.

a. M-lenje a-na-mang-**ir** **-an** **-its** -a a-tsikana nkhuni.
1-hunter 1-PAST-tie-**APPL-REC-CAUS**-FV 2-girl firewood
'The hunter caused the girls to tie firewood for each other'

b. *mang*: $\lambda y\, \lambda x\, \lambda s\ \text{TIE}(x,y)(s)$
mang-ir: $\lambda y\, \lambda \mathbf{z}\, \lambda x\, \lambda s\ \{\text{TIE}(x,y)\ \&\ \text{BEC POSS}(\mathbf{z},y)\}(s)$ ***Benefactive-Appl***.
mang-ir-an: $\lambda y\, \lambda \mathbf{x}^{\oplus}\, \lambda s\ \{\text{TIE}(\mathbf{x},y)\ \&\ \text{BEC POSS}(\mathbf{x},y)\}(s)$ ***Reciprocal***
mang-ir-an-its: $\lambda y\, \lambda x^{\oplus}\, \lambda \mathbf{u}\, \lambda s\ \{\text{ACT}(u)\ \&\ \exists s'\{\text{TIE}(x,y)\ \&\ \text{BEC POSS}(x,y)\}(s')\}(s)$ ***Causative***

One can easily see that any other order of affixes would yield a different interpretation:

- REC-CAUS-APPL: 'The hunter caused the girls to tie each other at the firewood';
- CAUS-REC-APPL: 'The hunters caused each other to tie firewood for the girls'.

However, some surface orders of suffixes are forbidden: The causative suffix -*its* may not appear after the applicative suffix -*ir* or the passive suffix -*idw*.

(31) Surface alignment constraints in Chichewa (Hyman & Mchombo 1992)
a. *-ir-its (-APPL-CAUS)
b. *-idw-its (-PASS-CAUS)

In order to realize 'tie-PASS-CAUS', the causative suffix *its* is realized in its second-to-best position, i.e. by infixation, which, however, induces ambiguity.

(32) Both TIE-PASS-CAUS 'u causes y to be tied'
and TIE-CAUS-PASS 'x is caused to tie y'
are mapped onto the same surface string ***mang-its-idw-a***.

For the hearer, the default option is the transparent reading in which the order of suffixes reflects the order of semantic operations; only if there is a strong bias from the context the other reading is accepted.

(33) Chichewa:

a. A-tsikana a-na-mang-**an** **-its** **-idw** **-ir** -*an* -a m-nkhalango.
2-girl 2-PAST-tie-**REC-CAUS-PASS-APPL**-(REC)-FV LOC-forest
'The girls were caused to tie each other in the forest'

b. *mang*: $\lambda y\, \lambda x\, \lambda s\ \text{TIE}(x,y)(s)$
mang-an: $\lambda x^{\oplus}\, \lambda s\ \text{TIE}(x,x)(s)$ **Reciprocal**
mang-an-its: $\lambda x^{\oplus}\, \lambda u\, \lambda s\ \{\text{ACT}(u)\ \&\ \exists s'\text{TIE}(x,x)(s')\}(s)$ **Causative**
mang-an-its-idw: $\lambda x^{\oplus}\, \lambda s\ \exists u\ \{\text{ACT}(u)\ \&\ \exists s'\text{TIE}(x,x)(s')\}(s)$ **Passive**
mang-an-its-idw-ir: $\lambda z\ \lambda x^{\oplus}\, \lambda s\ \exists u\ \{\text{ACT}(u)\ \&\ \exists s'\text{TIE}(x,x)(s')\ \&\ \text{LOC}(\text{INT}(z))\}(s)$ **Loc-Appl.**

For some reason, the reciprocal suffix -*an* must be repeated after the applicative suffix -*ir*. Since it is not possible to repeat the semantic operation REC in the same domain of a single TS, the second occurrence of -*an* must be ignored, and no ambiguity is induced.

Many more studies (e.g., Muysken and van de Kerke on Quechua) have established the insight that the order of affixes reflects the order of semantic composition in most instances, but unfortunately, not in all. Surface alignment constraints partially destroy the ideal picture.

For each suffix (contributing a phonological form and a semantic operation), the phonological output and the morpho-syntactic output are separately computed. Differences between the input and output in PF (forced by higher-ranked constraints) do not affect the output in MS. The derivation only fails if one of the computations yields a zero output.

(34)

Input:	PF	TS-SF	
	mang	λy λx λs TIE(x,y)(s)	
	mang-idw	λy λs ∃x TIE(x,y)(s)	**Passive**
	mang-idw-its	λy λu λs ∃x {ACT(u) & ∃s'TIE(x,y)(s')}(s)	**Causative**
↓			
Output:	*mang-its-idw*	MS	

All underlying predicates, together with all of their arguments, are in the scope of the following morphological operation. Different orders such as **CAUS-REC** vs. R**EC-CAUS** can generate different readings only if they manipulate on argument *variables*; the arguments must be scope-internal independent of any DP movement. If, in contrast, argument changing operations are phrasal, they would have to operate on VPs (rather than Vs), in which some arguments are already saturated, and DP movement could easily extract the DP from the relevant scope.

(35) **Morphologically determined scope relations are immune against DP movement, syntactically determined scope relations are not**.

Consider data from Wechsler (1989): Only direct arguments and not PPs are included in the scope of a bound morpheme:

(36) Chichewa repetitives

a. Mu-lembe=nso chimangirizo [ndi nthenga]$_{\textbf{PP}}$
you-write=again essay with feather
'you write the essay again, with a quill (this time)'

b. Mu-lembe-*re*=nso nthenga chimangirizo.
you-write-**APPL**=again feather essay
'you write the essay with a quill again'

(37) English repetitives

a. John **re**entered the forest.
b. *John **re**ran to the forest.
c. John ran to the forest **again**.

A PP can be included in the scope of a free adverb but not in that of a bound morpheme.

- Affix order reflects semantic composition transparently but may also be subject to unexpected alignment constraints.
- Affixes include direct arguments in their scope.
- Morphology differs from syntax in its scopal properties.

6. Conclusions

All kinds of derivations - category changing, argument demotion and argument extension - can be visible (triggered by morphological affixes), or invisible. However, invisible derivations mostly become visible by their effects on argument structure. (Evidently, invisible derivations may be more restricted than visible ones.)

- Category changing does not need to add arguments, but N→V derivations often do. In any case, these derivations add an argument referring to a situation (like a copula does). Invisible N→V derivations are described by an abstract verb that incorporates a noun predicatively, hence, they constitute a subcase of complex predicate formation.
- Argument demotions only apply on Theta Structure. With the exception of the middle, they bind some argument (existentially or anaphorically).
- Argument extensions necessarily add a predicate, predicating of the additional argument. In some instances this predicate itself becomes visible, in other instances it does not. In any case, argument extension <u>is</u> complex predicate formation.

Both argument demotion and argument extension only concern the highest argument or the lowest arguments (possibly two); they never concern the middle argument. (The only exceptions are argument shifting operations - locative or dative alternation, not considered here). This suggests a monotonic approach, in which only the highest or the lowest argument is affectable.

LDG provides a framework that allows us to study all these derivations in a unified account:

- by means of lexical operations (defined on X^0 categories),
- in considering both the semantic and the morpho-syntactic results,
- compositionally in the semantics, and
- predictively with respect to argument realization (some original arguments become suppressed, or altered in their realization).

The composition of predicates is described by conservative means, developed in Categorial Grammar: one element is the functor, and the other its argument. All additional arguments of the non-functor element are inherited to the result by Functional Composition; they form a sublist on the lower (the left) side of the result TS. This leads us to the typology of argument extension operations outlined above:

- If a higher argument is added, there must be a functor that takes the verb as its argument; all further arguments of the verb form a sublist on the lower side of TS.
- If a lower argument is added, the verb itself must be the functor. It can take further predicative arguments by means of ARG; all further arguments of the added predicate form a sublist on the lower side of TS. This opens the possibility of semantics-morphology mismatches. If the verb is not the morphological head, it nevertheless must be the functor.

Finally, it has been shown that derivations may be subject to further alignment constraints. This suggests a correspondence-theoretic account: both the phonological and the semantic part of a derivation have to undergo an input-output checking.

For the kind of phenomena considered here, the sketched scenario is optimal (even if it is incomplete). At the same time, it is minimal in its assumption of levels, categories, and invisible entities/derivations.