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[ParadigMo 2017 – First Workshop on Paradigmatic Word Formation Modeling Toulouse, 19 - 20 June 2017]

- A. Derivational paradigms vs inflectional paradigms
- B. Missing links in derivational paradigms
- C. Independent motivation for the principle of rule conflation
 - Rule A's domain of application in the context of rule B
 - Rule A's productivity in the context of rule B
 - The content expressed by rule A in the context of rule B
 - Rule A's usefulness in the context of rule B
 - The processing of rule A in the context of rule B
 - Rule A's dual function in the context of rule B
- D. Conclusion

Outline

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A fundamental architectural difference between inflectional paradigms and derivational paradigms is one of hierarchy.

The inflectional paradigm of a lexeme L may be seen as a set of cells, where each cell is the pairing $\langle w, \sigma \rangle$ of a word form w with a morphosyntactic property set σ .

Indicative				Subjunctive				
	Present	Imperfect	Simple past	Future	Conditional	Present	Imperfect	Imperative
ısg	invente	inventais	inventai	inventerai	inventerais	invente	inventasse	
2sg	inventes	inventais	inventas	inventeras	inventerais	inventes	inventasses	invente
3sg	invente	inventait	inventa	inventera	inventerait	invente	inventât	
ıpl	inventons	inventions	inventâmes	inventerons	inventerions	inventions	inventassions	inventons
2pl	inventez	inventiez	inventâtes	inventerez	inventeriez	inventiez	inventassiez	inventez
3pl	inventent	inventaient	inventèrent	inventeront	inventeraient	inventent	inventassent	

The synthetic inflectional paradigm of French INVENTER 'invent'

Infinitive: *inventer*

Dorticiples	Present:	inventant	
Participies	Past:	inventé	

(inventons, {1st plural present indicative})

The synthetic inflectional paradigm of French INVENTER 'invent'

_	Indicative				Subjunctive			
	Present	Imperfect	Simple past	Future	Conditional	Present	Imperfect	Imperative
1Sg	invente	inventais	inventai	inventerai	inventerais	invente	inventasse	
2Sg	inventes	inventais	inventas	inventeras	inventerais	inventes	inventasses	invente
3sg	invente	inventait	inventa	inventera	inventerait	invente	inventât	
ıpl	inventons	inventions	inventâmes	inventerons	inventerions	inventions	inventassions	inventons
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TITITICI V CI	

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By contrast, the derivational paradigm of a lexeme L has a hierarchical structure dominated by L: each node in this structure is a lexeme that derives from the nodes that dominate it.



The derivational paradigm of French INVENTER 'invent'

Here, I discuss a canonical property of derivational paradigms and one kind of apparent deviation from this property.

I will say that a derivational paradigm P is canonical with respect to the property of RULE-BASED HIERARCHY if and only if it satisfies the following criterion:

For any two lexemes L_1 and L_2 that stand in a mother-daughter relation in P, there is a rule of derivation R such that $R(L_1) = L_2$. That is, R determines both the morphological form and the syntacticosemantic properties of L_2 from those of L_1 .

The canonical structure of the paradigm of French INVENTER 'invent'



There are various ways in which a derivational paradigm might deviate from the canonical property of rule-based hierarchy.

There are various ways in which a derivational paradigm might deviate from the canonical property of rule-based hierarchy. For example:

A puzzle in the derivational paradigm of English OPERATE 'perform surgery'



My focus here will be on a different sort of apparent deviation from canonical rule-based hierarchy: the fact that in some derivational paradigms, the mother-daughter relation between two lexemes is seemingly mediated by two rules rather than one.

Some derivational paradigms seem to have a "missing link" between base and derivative:

A missing link in the derivational paradigm of WHIMSY



A MISSING LINK is a nonactual lexeme whose stem seemingly participates in defining the morphology of an actual lexeme's stem.

A missing link in the derivational paradigm of WHIMSY



Should missing links be seen as evidence that the lexicon of a language includes virtual as well as actual lexemes?

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- The one approach would seem to entail that the lexicon contains more virtual words than actual words;
- the other requires that we invent criteria for deciding which nonactual but well-formed words are virtual and which are not.

Here, I present a solution to the problem of derivational missing links that is more concrete (and less ontologically suspect).

My essential claim is that two rules of derivation may combine to form a single, complex rule.

Some simple and complex rules of affixation in English

	Simple rules of affixation				Complex rules of affixation
a.	-ic	+	-al	\rightarrow	-ical
	-ist	+	-ic	\rightarrow	-istic
	-at	+	-ion	\rightarrow	-ation
b			-ize	+	-ation \rightarrow -ization

Cf. Bauer 1988, Bochner 1992, Raffelsiefen 1992, Luís & Spencer 2005.

How do rules combine?

One possibility: Rule composition

Rule B composes with rule A to produce the composed rule (B \circ A), whose application to a lexeme L is the result of applying B to the result of applying A to L.

Another possibility: Rule conflation

	Rule B	Rule A	Conflation of B with A (= [B © A])	the application of [B © A] to stem X
i. ii. iii.	suffixes -b suffixes -b prefixes b-	suffixes - <i>a</i> prefixes <i>a</i> - suffixes - <i>a</i>	suffixes - <i>ab</i> prefixes <i>ab</i> - suffixes - <i>ba</i>	$Xab [= (B \circ A)(X)]$ $abX [\neq (B \circ A)(X), i.e. aXb]$ $Xba [\neq (B \circ A)(X), i.e. bXa]$ $baX = [-(B \circ A)(X)]$
1V.	prefixes <i>b</i> -	prefixes <i>a</i> -	prefixes <i>ba</i> -	$baX [= (B \circ A)(X)]$

Four formal patterns of rule conflation

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	Rule B	Rule A	Conflation of B with A (= [B © A])	the application of [B © A] to stem X
i.	suffixes -b	suffixes - <i>a</i>	suffixes - <i>ab</i>	$Xab [= (B \circ A)(X)]$
ii.	suffixes - <i>b</i>	prefixes <i>a</i> -	prefixes <i>ab</i> -	$abX [\neq (B \circ A)(X), i.e. aXb]$
iii.	prefixes b -	suffixes - <i>a</i>	suffixes - <i>ba</i>	$Xba [\neq (B \circ A)(X), i.e. bXa]$
iv.	prefixes b -	prefixes <i>a</i> -	prefixes <i>ba</i> -	$baX [= (B \circ A)(X)]$

Four formal patterns of rule conflation

Nevertheless, the default content expressed by $[B \odot A]$ is the composition of B's content with that of A.

Rule conflation reconciles the mother-daughter pair WHIMSY – WHIMSICAL with the canonical property of rule-based hierarchy.

No missing link in the derivational paradigm of WHIMSY



Two important points:
Missing links in derivational paradigms

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• The existence of a complex rule conflating rule B with rule A does not, in itself, exclude the possibility that these rules might apply independently, in their unconflated forms. Thus, while the derivational relation between the lexemes WHIMSY and WHIMSICAL is mediated by a conflation of the *-al* rule with the *-ic* rule, these two rules nevertheless apply independently in licensing the derivatives HISTORIC and HISTORICAL.

Missing links in derivational paradigms

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- The properties of a conflated rule are, in the **default** case, deducible from the properties of the individual rules that it comprises; nevertheless, a conflated rule does take on the status of an independent rule, and its properties may therefore **deviate** from the default properties inferrable from its component rules.

6-19-17

- a. The domain of rule A may depend on whether it applies in combination with rule B.
- b. The productivity of rules A and B may depend on whether they apply in combination.
- c. The content expressed by the combination of rules A and B may differ from the content of A combined with the content of B.
- d. Rule A may be more useful in combination with rule B than it is alone
- e. Words involving the combination of rule A with rule B may be processed faster than words with other rule combinations.
- f. Rule A may have two different functions in the context of rule B.

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It is reasonable to assume that a derivational rule A maintains the same domain of application no matter what rule applies after it.

Yet, this assumption is widely disconfirmed.

Some adjectives are defined by the successive application of the two rules, first the *-ic* rule, then the *-al* rule.

Derivatives in *-ic* and *-ical*

	Stem	Adjective in- <i>ic</i>	Adjective in- <i>ic-al</i>
a.	history	historic	historical
	cycle	cyclic	cyclical

There are also adjectives derived by means of the *-ic* rule that do not serve as stems for the *-al* rule.

Derivatives in *-ic* and *-ical*

	Stem	Adjective in- <i>ic</i>	Adjective in- <i>ic-al</i>
a.	history	historic	historical
	cycle	cyclic	cyclical
b.	ion	ionic	*ionical
	base	basic	*basical

But in the definition of still other words, the application of the *-ic* rule requires the subsequent application of the *-al* rule. This third group seems to involve missing links, i.e. a sort of inward conditioning.

	Stem	Adjective in- <i>ic</i>	Adjective in- <i>ic-al</i>
a.	history	historic	historical
	cycle	cyclic	cyclical
b.	ion	ionic	*ionical
	base	basic	*basical
C.	whimsy	*whimsic (missing link)	whimsical
	nonsense	*nonsensic (missing link)	nonsensical

Derivatives in *-ic* and *-ical*

This third group is not small:

Some adjective types in *-ical* with more than 50 tokens in COCA which lack any corresponding adjective in *-ic*

physical	70068	eschatological	489	narratological	236	philological	111
radical	14186	nonsensical	468	farcical	207	pneumatological	99
identical	9128	genealogical	443	teleological	195	soteriological	95
vertical	7699	cylindrical	865	etymological	190	commonsensical	94
surgical	6151	nautical	856	ecclesiological	184	ornithological	93
biblical	6000	cortical	392	lackadaisical	167	archetypical	87
pharmaceutical	4213	zoological	379	typological	150	terminological	86
cervical	1511	quizzical	372	indexical	135	tautological	70
whimsical	1169	inimical	290	helical	133	museological	58
impractical	1141	christological	260	oratorical	118	tropological	58
lexical	938	pontifical	259	catechetical	111	ototopical	54

The principle of rule conflation provides an alternative to postulating missing links or inward conditioning in the derivational paradigms of all these words.

This alternative is to say that the domain of the conflated *-ical* rule includes forms that aren't in the domain of the simple *-ic* rule.

It reasonable to assume that the productivity of words involving the joint application of rule A and rule B is in general calculable from the productivity of rule A and that of rule B.

Yet, one can easily find cases in which the joint application of rules A and B has significantly greater productivity than the application of either A or B individually.

Productivity* of the *-ize* rule in COCA: 0.0028

*The category-conditioned productivity of a morphological rule M (Baayen 1993):

number of hapax legomena exhibiting M total number of tokens exhibiting M

Productivity* of the *-ize* rule in COCA: 0.0028 Productivity* of the *-ation* rule in COCA: 0.0021

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Productivity* of *-ize* and *-ation* rules applying together in COCA: 0.0047

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Productivity* of the *-ize* rule in COCA: 0.0028 Productivity* of the *-ation* rule in COCA: 0.0021

Productivity* of *-ize* and *-ation* rules applying together in COCA: 0.0047

A rule may enhance the applicability of a subsequent rule; in the terminology of Williams (1981), the first rule "potentiates" the second one.

Here, the *-ize* rule might be seen as potentiating the *-ation* rule, since verbs in *-ize* generally belong to the *-ation* rule's domain of application.

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Productivity* of *-ize* and *-ation* rules applying together in COCA: 0.0047

Aronoff (1976) proposes to account for potentiation in the formulation of the potentiated rule, by means of a "positive constraint" stipulating that its domain of application generally includes stems derived by means of the potentiating rule.

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Aronoff (1976) proposes to account for potentiation in the formulation of the potentiated rule, by means of a "positive constraint" stipulating that its domain of application generally includes stems derived by means of the potentiating rule.

On this approach, the formulation of the *-ation* rule stipulates that verbs in *-ize* are in general in its domain of application.

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Productivity* of *-ize* and *-ation* rules applying together in COCA: 0.0047

But this same approach can't account for the fact that the productivity of the *-ize* rule is also apparently enhanced by the subsequent application of the *-ation* rule.

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But this same approach can't account for the fact that the productivity of the *-ize* rule is also apparently enhanced by the subsequent application of the *-ation* rule.

In COCA, this fact is reflected in the existence of nouns in *-ization* whose corresponding verb in *-ize* is absent—

Tokens of nouns in *-ization* in COCA for which forms of the corresponding verb in *-ize* are absent from the corpus

adjectivalization	1	Bavarianization	7	cantonization	8	condo-ization	1	cyclization	1
amateurization	4	Beirutization	1	capillarization	1	condomization	1	Dagwoodization	1
amorphization	4	bipolarization	5	Carolinization	1	confessionalization	4	Daimlerization	2
androgenization	3	Bolivianization	1	carryization	1	continentalization	1	villagization	15
Angelesization	3	bosonization	2	centaurization	1	contractorization	1	vulgatization	1
angelicization	1	briberizations	1	chaptalization	1	corporalization	1	Wal-martization	2
angelization	5	Brusselization	1	Chileanization	1	corporativization	1	Walmartization	3
Asianization	5	buffetization	1	Christmasization	1	cosmopolitization	1	Washingtonization	1
Aspenization	4	Bulgarization	2	CNN-ization	1	cretinization	2	worldization	1
Australianization	1	bunkerization	1	coca-colaization	1	criticalization	1	wristonization	1
automization	1	Cajunization	10	coca-colonization	4	Cubanization	1	Zairianization	9
Bahrainization	1	California-ization	1	Colombianization	2	culturization	1	Zairization	1
Balinization	2	Californization	1	commodization	1	curarization	1	Zionization	1
Bantustanization	2	Cancunization	1	compromization	1	customerization	2	Zuckerization	1

Tokens of nouns in *-ization* in COCA for which forms

of th	e		1					
	-	The <i>-ize</i> rule se	ems to be su					
adjectivalization		inward conditi	oning such t					
amateurization			1. 11.					
amorphization		cases, it is only	applicable i					
androgenization	I	applies subseq	uently.					
Angelesization			J					
angelicization								
angelization	I	The enhancem	ent of the -i					
Asianization	I	productivity by the <i>-ation</i>						
Aspenization		nortraved as a	nositive con					
Australianization		portrayed as a						
automization	L	stems to which	the <i>-ize</i> rule					
Bahrainization	1		1 Colombianizatio					
Balinization	2		1 commodization					
Bantustanization	2	Cancunization	1 compromization					

b be subject to a kind of such that in some cable if the *-ation* rule

the *-ize* rule's *ation* rule cannot be ve constraint on the *ze* rule applies.

1

1 customerization

C	0	14	n	11	C
	U	н.	Ρ	u	D

yclization	1
Dagwoodization	1
Daimlerization	2
illagization	15
ulgatization	1
Val-martization	2
Valmartization	3
Vashingtonization	1
vorldization	1
vristonization	1
Lairianization	9
Zairization	1
Zionization	1
Zuckerization	1

Tokens of nouns in -ization in COCA for which forms

ofthe

4

1

1

2

1 Cajunization

2 Cancunization

adjectivalization amateurization amorphization androgenization Angelesization angelicization angelization Asianization Aspenization Australianization Bahrainization Balinization The principle of rule conflation allows the conflation of the *-ation* rule with the *-ize* rule to have the status of an independent rule whose productivity is in principle independent of that of its component rules taken individually.

CNN-ization

coca-colaization

commodization

1 compromization

Colombianization 2

Christmasization 1 cosmopolitization

10 coca-colonization 4 Cubanization

1 cretinization

1 criticalization

1 curarization

1 customerization

corpus

	yclization	1
	Dagwoodization	1
	Daimlerization	2
	rillagization	15
	ulgatization	1
	Val-martization	2
	Valmartization	3
	Washingtonization	1
	worldization	1
1	wristonization	1
1	Zairianization	9
1	Zairization	1
1	Zionization	1
2	Zuckerization	1

Ordinarily, the content expressed by the application of rules A and B is, in some sense, a function of the content realized by A together with that realized by B.

Yet there are clear cases in which this is not so.

Derived adjectives in *-istic* ← nouns in *-ist*

Nouns in *-ist* generally have human reference, denoting specialists in or devotees of X or Xism. Yet, the interpretation of an adjective in *-ist-ic* generally isn't a function of the class of people denoted by the corresponding noun in *-ist*.

a linguistic phenomenon a futuristic landscape etc.

Moreover, there are adjectives in *-ist-ic* for which there is no corresponding noun in *-ist*.

anachronistic	567	euphemistic	92	solipsistic	99
animalistic	104	heuristic	506	Spinozistic	10
autistic	1045	hubristic	51	sultanistic	8
carnivalistic	11	logistic	1689	syllogistic	57
characteristic	7675	oligopolistic	31	synchronistic	30
cladistic	12	paralinguistic	15	triumphalistic	9
co-artistic	18	patristic	279	veristic	9
communalistic	8	Rousseauistic	9	warrioristic	9
ethno-linguistic	13	shamanistic	70	wholistic	28

Adjectives in *-istic* with 8 or more tokens in COCA lacking any corresponding noun in *-ist*

The principle of rule conflation makes it possible to avoid assuming that these adjectives belong to derivational paradigms that include some missing nominal links.

As an independent rule, the conflation of the *-ic* rule with the *-ist* rule deviates from a conflated rule's default semantics, deriving adjectives whose interpretation is not a function of the interpretation of the corresponding *-ist* noun (if one even exists).

In many cases, the interpretation of adjectives in *-istic* is very much like that of adjectives in *-ic*, as though *-ist* has been bleached of any content.

Cf. the near-synonyms

cabalisticesotercannibalisticanthrnarcissisticegocerealisticpragnsynergisticsynergistic

esoteric anthropophagic egocentric pragmatic synergic

Rule A may be more useful in combination with rule B than it is alone.
It's reasonable to assume that a particular class of derivational bases is just as useful as any class of derivatives to which it gives rise.

Yet, evidence abounds of derivatives that fail to conform to this assumption. Recall—

Tokens of nouns in *-ization* in COCA for which forms of the corresponding verb in *-ize* are absent from the corpus

adjectivalization	1	Bavarianization	7	cantonization	8	condo-ization	1	cyclization	1
amateurization	4	Beirutization	1	capillarization	1	condomization	1	Dagwoodization	1
amorphization	4	bipolarization	5	Carolinization	1	confessionalization	4	Daimlerization	2
androgenization	3	Bolivianization	1	carryization	1	continentalization	1	villagization	15
Angelesization	3	bosonization	2	centaurization	1	contractorization	1	vulgatization	1
angelicization	1	briberizations	1	chaptalization	1	corporalization	1	Wal-martization	2
angelization	5	Brusselization	1	Chileanization	1	corporativization	1	Walmartization	3
Asianization	5	buffetization	1	Christmasization	1	cosmopolitization	1	Washingtonization	1
Aspenization	4	Bulgarization	2	CNN-ization	1	cretinization	2	worldization	1
Australianization	1	bunkerization	1	coca-colaization	1	criticalization	1	wristonization	1
automization	1	Cajunization	10	coca-colonization	4	Cubanization	1	Zairianization	9
Bahrainization	1	California-ization	1	Colombianization	2	culturization	1	Zairization	1
Balinization	2	Californization	1	commodization	1	curarization	1	Zionization	1
Bantustanization	2	Cancunization	1	compromization	1	customerization	2	Zuckerization	1

Nouns in *-ization* with 10 or more tokens in COCA which outnumber the corresponding verb in *-ize* by at least 10 to 1

(N = -*ization* noun tokens; V = -*ize* verb tokens)

	Ν	V	N+V	N/(N+V)		Ν	V	N+V	N/(N+V)
self-actualization	213	1	214	0.995	globalization	4683	294	4977	0.941
self-realization	140	1	141	0.993	tabloidization	15	1	16	0.938
civilization	10526	175	10701	0.984	barbarization	13	1	14	0.929
Finlandization	56	1	57	0.982	Kafkatization	13	1	14	0.929
factorization	133	3	136	0.978	renormalization	64	5	69	0.928
self-categorization	40	1	41	0.976	Arabization	25	2	27	0.926
Islamization	173	5	178	0.972	decimalization	12	1	13	0.923
desalinization	62	2	64	0.969	geovisualization	12	1	13	0.923
neovascularization	27	1	28	0.964	microneutralization	12	1	13	0.923
Vietnamization	27	1	28	0.964	embolization	117	10	127	0.921
marketization	103	5	108	0.954	principalization	11	1	12	0.917
isomerization	20	1	21	0.952	Talibanization	22	2	24	0.917
hyalinization	18	1	19	0.947	cross-fertilization	87	8	95	0.916
salinization	89	5	94	0.947	McDonaldization	10	1	11	0.909
re-epithelialization	16	1	17	0.941	overcapitalization	10	1	11	0.909
self-dramatization	16	1	17	0.941					

The disparity of these token frequencies suggests that the nouns in these tables are, in some sense, more useful than the corresponding verbs.

Usefulness is a multifaceted concept. First, word X may be more useful than word Y with respect to its semantic content—that is, the denotation of X may be more important than that of Y.

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Usefulness is a multifaceted concept. First, word X may be more useful than word Y with respect to its semantic content—that is, the denotation of X may be more important than that of Y.

The noun *Cajunization* appears ten times in COCA, the verb *Cajunize* not at all; by contrast, the noun *pasteurization* appears 123 times, and forms of the verb *pasteurize* appear 122 times. This difference likely has a semantic explanation: the meaning of *pasteurization* is based a well-defined process, but the meaning Cajunization is based on the well-defined outcome of a vague and heterogenerous set of factors.

Second, word X may be more useful than word Y with respect to the lexicon, since word Y might be blocked by an existing lexical item while word X is not.

For instance, nominalizations in *-ic-ity* generally correspond to adjectives in *-ic* (*authenticity*, *elasticity*, *specificity*, *toxicity*, etc.) but *multiplicity* and *simplicity* are exceptions; this is presumably because **multiplic* and **simplic* are lexically blocked by the existence of *multiple* and *simple*.

Third, word X may be more useful than word Y because it better satisfies an output condition.

For instance, *Hermanator* (a blend of *Herman*—media personality Herman Cain—and *Terminator*) has six tokens in COCA, but no token of any form of the putative verb **Hermanate*. *Hermanator* works well as a blend of *Terminator*, but **Hermanate* does not.

The principle of rule conflation makes it possible to avoid assuming that nouns like *Cajunization*, *simplicity*, and *Hermanator* occupy derivational paradigms in which **Cajunize*, **simplic* and **Hermanate* appear as missing links.

In each case, this principle makes it possible to assume that a conflated rule $[B \odot A]$ defines derivatives that are more useful than those defined by rule A.

Experimental evidence shows that formulaic combinations of words are stored and accessed as wholes and are therefore processed more quickly than nonformulaic word combinations that are otherwise comparable (Wray 2002; Underwood et al. 2004; Conklin & Schmitt 2012).

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Various factors contribute to formulaicity: formulaic word combinations

- are very frequent (*down the street*, *just what I wanted*),
- are idiomatic (*over the hill*, *sure as shooting*) or
- are simply the conventionally accepted way of expressing something (*please accept our condolences, take a walk*).

Research on formulaic language has mostly focused on formulaic combinations of words. But logically, combinations of affixes could also become formulaic (Frauenfelder & Schreuder 1992: 180).

Durrant (2013) shows that in Turkish, certain affixes appear adjacently with very high frequency, and are therefore good candidates for formulaicity. For example, 99.74% of the tokens of the 3rd-person singular possessive suffix *-sIn* in his sample appeared in one of three combinations:

-dIk-	-sIn	[subordinator – 3sg possessive]
-mA	-sIn	[subordinator – 3sg possessive]
-yAcAK	-sIn	[subordinator – 3sg possessive]

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Moreover, one or another of these three combinations appeared in 20.51% of all of the verb-form tokens in the sample.

If frequency contributes to formulaicity, combinations of these sorts should become formulaic.

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Words involving the combination of rule A with rule B may be processed faster than words with other rule combinations.

Bilgin (2016) confirmed this experimentally.

In a word recognition task, Bilgin presented subjects with inflected nouns, some with high-frequency suffix sequences, e.g.

gergedan-laş-tır-dı rhino-BECOME-CAUS-PAST caused to become a rhino

—and others with low-frequency suffix sequences, e.g.

antilop-laş-tır-ıp antelope-BECOME-CAUS-GERUND having caused to become an antelope,

controlling for the relative frequency of noun stems, of stem+suffix sequence combinations, and of the individual suffixes.

Subjects' response times were faster for high-frequency suffix sequences than for low-frequency sequences.

This suggests that the high-frequency sequences are processed as stored units rather than by the successive retrieval of individual suffixes.

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Rule conflation is precisely the principle that allows highfrequency affix combinations to be stored and accessed as units.

English derivational morphology exhibits a striking pattern of polyfunctionality involving the rules that introduce the suffixes *-ion*, *-ation* and *-ate*.

The history of -ion and -ation

Latin nominalization:

perfect passive participial stem + $-i\bar{o}(n)$ = third-declension noun

Declension of Latin *incīsiō* 'incision'

Declension of Latin *aliēnātiō* 'separation'

	Singular	Plural		Singular	Plural
Nom	incīsiō	incīsiōnēs	Nom	aliēnātiō	aliēnātiōnēs
Gen	incīsiōnis	incīsiōnum	Gen	aliēnātiōnis	aliēnātiōnum
Dat	incīsiōnī	incīsiōnibus	Dat	aliēnātiōnī	aliēnātiōnibus
Acc	incīsiōnem	incīsiōnēs	Acc	aliēnātiōnem	aliēnātiōnēs
Abl	incīsiōne	incīsiōnibus	Abl	aliēnātiōne	aliēnātiōnibus
Voc	incīsiō	incīsiōnēs	Voc	aliēnātiō	aliēnātiōnēs

The history of -ate

Many Latin verbs were first borrowed into English in the perfect passive participial form.

This subsequently served as the basis for their integration into the system of English verb morphology (Marchand 1966: 199ff). Every form in the paradigms of English *incise* and *alienate* reflect this participial origin:

incīs-: perfect passive participial stem of *incīdere* 'to cut open' *aliēnāt-*: perfect passive participial stem of *aliēnāre* 'to transfer'

The history of -ate

Verbs from the Latin first conjugation therefore turn up in English with a final *-ate*. This was subsequently reanalyzed as a verb-deriving suffix.

Because verbs in *-ate* often existed alongside nouns in *-ation* —originally the nominalizations of first-conjugation verbs—the suffix *-ation* in these nouns was in turn reanalyzed as involving the verb-forming suffix *-ate* followed by the nominalizing suffix *-ion*.

Noun or Adjective	<i>-ate</i> verb	<i>-ion</i> noun
active	activ-ate	activ-at-ion
alien	alien-ate	alien-at-ion
assassin	assassin-ate	assassin-at-ion
captive	captiv-ate	captiv-at-ion
liquid	liquid-ate	liquid-at-ion
motive	motiv-ate	motiv-at-ion
note	not-ate	not-at-ion
oxygen	oxygen-ate	oxygen-at-ion
pulse	puls-ate	puls-at-ion
saliva	saliv-ate	saliv-at-ion
sublime	sublim-ate	sublim-at-ion
ulcer	ulcer-ate	ulcer-at-ion
vaccine	vaccin-ate	vaccin-at-ion
valid	valid-ate	valid-at-ion

Some *-ation* nouns have

parallel -ate verbs

But there were nouns in *-ation* that did not have parallel verbs in *-ate*. Many were nominalizations whose verbal counterparts were borrowed from Latin (or Old French) in their root form rather than in their perfect passive participial form.

E.g. the noun *accusation* (Latin *accusātiō*, acc. *accusātiōnem*) corresponds to the verb *accuse* (Latin *accusāre*) rather than to **accusate*.

Some *-ation* nouns do not have parallel *-ate* verbs

Verb	*- <i>ate</i> verb	<i>-ation</i> noun
accuse	*accus-ate	accus-ation
cease	*cess-ate	cess-ation
consult	*consult-ate	consult-ation
declare	*declar-ate	declar-ation
deport	*deport-ate	deport-ation
evoke	*evoc-ate	evoc-ation
examine	*examin-ate	examin-ation
expect	*expect-ate	expect-ation
form	*form-ate	form-ation
manifest	*manifest-ate	manifest-ation
represent	*represent-ate	represent-ation
reveal	*revel-ate	revel-ation
usurp	*usurp-ate	usurp-ation
visit	*visit-ate	visit-ation

This difference has led some to assume that the morphology of nouns like *validation* is different from that of nouns like *accusation*—that *validation* is derived by means of two rules while *accusation* is derived by means of a single rule.

a. -ate rule -ion rule valid \rightarrow validate \rightarrow validation b. -ation rule accuse \rightarrow accusation

Moreover, some have argued that the suffixes *-ion* and *-ation* are allomorphs.

Aronoff (1976: 104), for example, proposes the following rule to derive one from the other.

+Ation
$$\rightarrow \{ +ion \\ +tion \} /X \{ +cor \\ -cor \} ,$$

where X α cor is one of a set of specified latinate roots

But could *validation* and *accusation* actually be alike in their morphology?

From a purely etymological point of view, they are.

And although modern English *-at-* serves a function in *validation* that it doesn't serve in *accusation*, the same can be said of *-ist* in *futurist* and *futuristic*.

Moreover. there are at least three considerations that suggest that *-at-* is the same formative in *accusation* as in *validation*.

First, some English nominalizations in *-ation* for which verbal counterparts in *-ate* were never borrowed acquired them subsequently by back-formation.

Noun in <i>-ation</i>	1 st attestation	Verb in <i>-ate</i>	1 st attestation
constipation	C14 00	constipate	1541
cremation	1623	cremate	1874
dedication	1382	dedicate	1530
equation	1393	equate	1530
granulation	1617	granulate	1666
incarnation	1297	incarnate	1533
mitigation	1382	mitigate	1425
mutation	1398	mutate	1796
oration	C144 0	orate	c 1600
pagination	1794	paginate	1858
termination	1395	terminate	1425

Verbs in *-ate* likely derived from nouns in *-ation* by back-formation

Second, the *-at-* in *-ate* and the *-at-* in *-ation* are mutually exclusive. That is, we don't find nominalizations such as the following, which result from applying the *-ation* rule to a verb in *-ate*.

> *alienatation *salivatation *validatation

Third, *-at*- appears with suffixes other than *-ion*. The pattern in Row (a) below is paralleled by those in Rows (b)-(d).

The parallel morphology of -ion, -ive, -or and -ory

		without - <i>at</i> -	with <i>-at-</i>	verb	in -ate?
				yes	no
(a)	Nouns in <i>-ion</i>	rebellion	hyphenation	hyphenate	
			explanation		*explanate
(b)	Adjectives in -ive	explosive	operative	operate	
			conservative		*conservate
(c)	Nouns in <i>-or</i>	governor	activator	activate	
			commentator		*commentate
(d)	Adjectives in -ory	sensory	obligatory	obligate	
			explanatory		*explanate

corresponding

The identification of *-at-* as the same suffix in all four of these classes is independently motivated in at least two ways.

(i) Many verbs ending in -(*i*)*fy* have an alternate stem ending in -(*i*)*fic* whose use is conditioned by certain suffixes.

Vowel-initial suffixes don't always condition this alternation (*signifier*, *pacifist*, *classifiable*), but it is invariably conditioned by the suffixes -ation, -ative, -ator and -atory:

This fact seems coincidental unless one assumes that the alternation is conditioned by the suffix *-at-* and that this is a shared component of each of *-ation*, *-ative*, *-ator* and *-atory*.

(ii) Some derivatives in *-ation*, *-ative*, *-ator* and *-atory* derive from a verb in *-ate*, while others do not. Whether or not they do, they exhibit the same accentual patterns:

suffix-initial			stem	-final	stem-penultimate	
-ation	valid-átion explan-átion	(válidate) (*explanate)				
-ative			interróg-ative consérv-ative	(intérrogate) (*conservate)	óper-ative signífic-ative	(óperate) (*significate)
-ator	cre-átor lev-átor ¹	(creáte) (*levate)	cúr-ator idól-ator	(cúrate) (*idolate)	áctiv-ator cómment-ator	(áctivate) (*commentate)
-atory			compéns-atory explán-atory	r (cómpensate) (*explanate)	discrímin-atory impróvis-atory	(discríminate) (*improvisate)

Accentuation of *-ation*, *-ative*, *-ator* and *-atory*

1. a muscle that raises a body part (med.)

Rule A may have two different functions in the context of rule B. This suggests that they are alike in their morphology:

- (a) hyphen-at-ion accus-at-ion
- (c) *activ-at-or comment-at-or*
- (b) *ulcer-at-ive conserv-at-ive*
- (d) respir-at-ory accus-at-ory

Rule A may have two different functions in the context of rule B. This suggests that they are alike in their morphology:

(a)	hyphen-at-ion	(b)	ulcer-at-ive
	accus-at-ion		conserv-at-ive
(c)	activ-at-or	(d)	respir-at-ory
	comment-at-or		accus-at-ory

Despite this likeness of morphological form, the *-at-* rule is clearly performing two functions here:
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	accus-at-ion		conserv-at-ive
(c)	activ-at-or	(d)	respir-at-ory
	comment-at-or		accus-at-ory

Despite this likeness of morphological form, the *-at-* rule is clearly performing two functions here:

• in the derivation of *hyphenation*, *ulcerative*, *activator* and *respiratory*, it serves as a verb-deriving rule whose output is nominalized by the *-ion* and *-or* rules and adjectivalized by the *-ive* and *-ory* rules;

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	comment-at-or		accus-at-ory

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- in the derivation of *hyphenation*, *ulcerative*, *activator* and *respiratory*, it serves as a verb-deriving rule whose output is nominalized by the *-ion* and *-or* rules and adjectivalized by the *-ive* and *-ory* rules;
- in the derivation of *accusation*, *conservative*, *commentator* and *accusatory*, by contrast, it joins with the *-ion* and *-or* rules to form rules of deverbal nominalization and with the *-ive* and *-ory* rules to form rules of deverbal adjectivalization.

Rule conflation affords a simple account of the dual function of *-at-* in English nominalizations in *-ation*. This account has three main characteristics.

First, it distinguishes two subclasses of verbs:

Class I: Verbs that nominalize by means of *-ion*, including verbs in *-ate* (Examples: *govern*, *rebel*, *repulse*, *sense*, *hyphenate*, *validate*)
Class II: Verbs that nominalize by means of *-ation* and lack any corresponding verb in *-ate* (Examples: *accuse*, *examine*, *expect*, *explain*, *conserve*, *comment*)

Second, it has simple rules that introduce the basic derivational affixes. Each rule includes the specification of a stem operation, a domain of application, and the category of the resulting derivative.

The verbs defined by rule (<u>ate</u>) belong to Class I, and rules (<u>ion</u>)–(<u>ory</u>) have verbs of Class I as their domain of application.

Rule name	Stem operation	Domain	Range	Examples
(<u>ate</u>)	$X \rightarrow Xate$	N or A	V, Class I	hyphen \rightarrow hyphenate, valid \rightarrow validate
(<u>ion</u>)	$X \rightarrow Xion$	V, Class 1	Ν	$rebel \rightarrow rebellion$
(<u>ive</u>)	$X \rightarrow Xive$	V, Class I	A	$repulse \rightarrow repulsive$
(<u>or</u>)	$X \rightarrow Xor$	V, Class 1	Ν	govern ightarrow governor
(ory)	$X \rightarrow Xory$	V, Class 1	А	sense \rightarrow sensory

Basic rules of derivation for a fragment of English

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Rule A may have two different functions in the context of rule B.

Third, the model specifies how the basic rules conflate. The rule below licenses the conflation of each of rules (ion)-(ory) with rule (ate).

In the default case, a conflated rule [B © A] has the same domain of application as A; but the conflated rules defined here deviate from this default pattern, since their domain of application consists of verbs belonging to Class II (rather than nouns and adjectives).

For each rule $R \in \{(\underline{ion}), (\underline{ive}), (\underline{or}), (\underline{ory})\}, [R @ (\underline{ate})]$ is a rule whose domain is [V, Class II].

Examples: $[(\underline{ion}) \odot (\underline{ate})]$: $[(\underline{ive}) \odot (\underline{ate})]$: $[(\underline{or}) \odot (\underline{ate})]$: $[(\underline{ory}) \odot (\underline{ate})]$:

 $accuse \rightarrow accus-at-ion$ $conserve \rightarrow conserv-at-ive$ $comment \rightarrow comment-at-or$ $accuse \rightarrow accus-at-ory$

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Rule A may have two different functions in the context of rule B.

Derivational paradigms defined by means of these rules do not have have missing links such as *ACCUSATE and are, to that extent, canonical with respect to the property of rule-based hierarchy.

Branches in the derivational paradigms of REBEL, VALID, and ACCUSE



Here, I have focused on the dual function of the *-ate* rule in the context of the *-ion* rule. But other rules also seem to exhibit this sort of dual function.

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Verb	-ion	-ation	-tion	-ition
commune	commun-ion			
educate	educat-ion			
present		present-ation		
realize		realiz-ation		
intervene			interven-tion	
resume			resump-tion	
repeat				repet-ition
expose				expos-ition

Action nominalizations of eight English verbs

Here, I have focused on the dual function of the *-ate* rule in the context of the *-ion* rule. But other rules also seem to exhibit this sort of dual function.

	Rules	Derivations	Example	Missing link?
a.	<i>-ate</i> rule, <i>-ion</i> rule conflated <i>-at-ion</i> rule	$A \rightarrow V \rightarrow action N$ $V \rightarrow action N$	$valid \rightarrow validate \rightarrow validation$ accuse \rightarrow accusation	*accusate
b.	<i>-t</i> rule, <i>-ion</i> rule conflated <i>-t-ion</i> rule	$V \rightarrow patient N \rightarrow action N$ $V \rightarrow action N$	$produce \rightarrow product \rightarrow production$ $seduce \rightarrow seduction$	*seduct
c.	<i>-ite</i> rule, <i>-ion</i> rule conflated <i>-it-ion</i> rule	$V \rightarrow A \rightarrow action N$ $V \rightarrow action N$	define \rightarrow definite \rightarrow definition add \rightarrow addition	*addite

Three parallel patterns of rule conflation in English nominalizations

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Conclusion

A great deal of work in morphology has been dedicated to explaining form/content mismatches, incuding such mismatches as

- syncretism
- deponency
- morphomic categories
- overabundance
- underdetermination

etc.

Conclusion

The evidence discussed here reveals another domain of form/content mismatch, that of morphological rules that take on unpredicted properties when they apply together.

The principle of rule conflation affords a formal model of this sort of mismatch, one in which the conflation [B ©A]

- has a domain different from that of A
- is more productive than A or B
- expresses content that is not directly deducible from that of rules A and B
- is more useful that rule A on its own
- is processed more quickly than other rule combinations
- allows rule A to function in more than one way in the context of rule B.

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Rule conflation in inflection

The position of an affix depends on the presence or absence of another affix.

- a. vitabu a-vi-soma-vyo Hamisi
 books.CL.8 SBJ:CL.1-OBJ:CL.8-read-REL:CL.8 Hamisi.CL.1
 'the books which Hamisi reads'
- b. *vitabu* a-na-vyo-vi-soma Hamisi
 books.CL.8 SBJ:CL.1-TNS-REL:CL.8-OBJ:CL.8-read Hamisi.CL.1
 'the books which Hamisi is reading'
- c. *vitabu a-si-vyo-vi-soma Hamisi* books.CL.8 SBJ:CL.1-NEG-REL:CL.8-OBJ:CL.8-read Hamisi.CL.1 'the books which Hamisi doesn't read'

Rule conflation in inflection

Swahili relative concord



Rule conflation in inflection The agent suffixes *-y* and *-m* in the positive nonpreterite paradigm of the Limbu verb HU?MA? 'teach'

An affix may be dependent, in the sense that it only appears in the presence of an adjacent "carrier" affix.

	agent	prefix		atam	suffix								
	→ patient	1a	ıb	stem	1	4	5	7	8	9	10		
a.	$1S \rightarrow 2S$			hu?	пе								
b.	$1S \rightarrow 2d$			hu?	пе				ci1	ŋ			
с.	$1S \rightarrow 2p$			hu?	$n(\varepsilon)$				i	ŋ			
d.	$1S \rightarrow 3S$			hu?r		и	ŋ						
e.	$1s \rightarrow 3ns$			hu?r		и	ŋ		si	ŋ			
f.	ıpi → 3s	а		hu?r		и	т						
g.	1pi → 3ns	a		hu?r		и	т		si	m			
h.	1pe → 2			hu?	пе			ci			ge		
i.	1pe → 3s			hu?r		и	т				be		
j.	1pe → 3ns			hu?r		и	т		si	т	be		
k.	$2 \rightarrow 1$	a	$g\varepsilon$	hu?									
l.	$2p \rightarrow 3s$		kε	hu?r		и	т						
m.	$2p \rightarrow 3ns$		kε	hu?r		и	т		si	т			

Rule conflation in inflection

A simple affix apparently stands in paradigmatic opposition to a sequence of affixes.

Singular personal forms of Swahili KUSOMA 'read' in three tenses ('I am reading it', etc.)

		Present					Past					Future				
		-iv	—iii	-ii	-i	stem	-iv	-iii	-ii	-i	stem	-iv	—iii	-ii	-i	stem
Pos	ısg		ni-	na-	ki-	soma		ni-	li-	ki-	soma		ni-	ta-	ki-	soma
	2sg		U-	na-	ki-	soma		U-	li-	ki-	soma		U-	ta-	ki-	soma
	3sg		а-	na-	ki-	soma		а-	li-	ki-	soma		а-	ta-	ki-	soma
Neg	ısg	si-		na-	ki-	soma	si-		ku-	ki-	soma	si-		ta-	ki-	soma
	2sg	ha-	U-	na-	ki-	soma	ku-	U-	ku-	ki-	soma	ha-	U-	ta-	ki-	soma
	3sg	ha-	а-	na-	ki-	soma	ku-	а-	ku-	ki-	soma	ha-	а-	ta-	ki-	soma