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Fuori dalla torre di Babele: interoperabilità e sistemi grafici pre-moderni



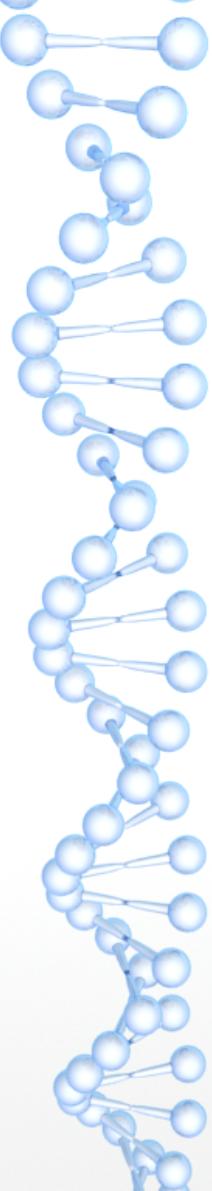
*Out of the Tower of Babel :
interoperability and pre-modern
writing systems*

December 4, 2019
[ve]dph

Venice Centre for
Digital and Public
Humanities

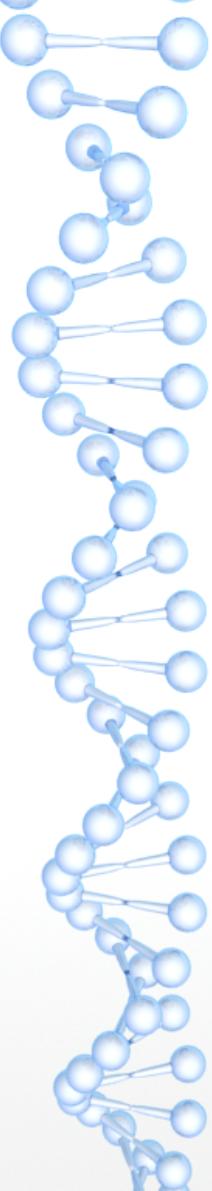


In a nutshell



In a nutshell

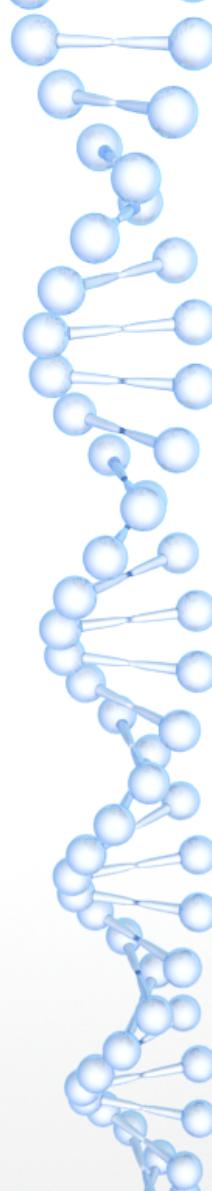
- Digital scholarly editions: diplomatic/normalized
- Hjelmslev's “analysis” as digital modelling for pre-modern writing systems
- Open issues
- Interoperability through modelling



My focus

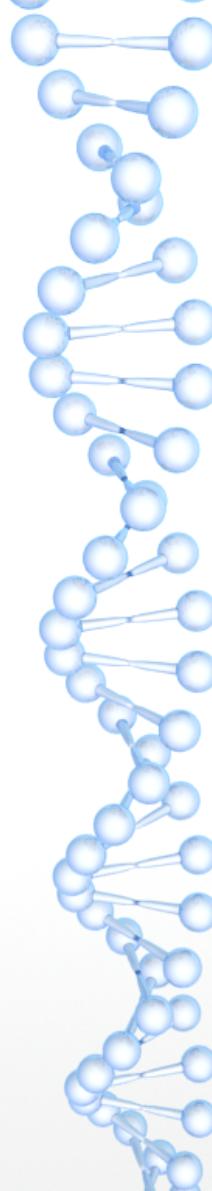
- *European Medieval handwriting*
- Pre-Gutenberg
 - Handwriting
 - Early print → imitating handwriting
- Alphabetic writing systems
 - **Latin** script (Italian, English...), Greek, Cyrillic...
 - No Cuneiform, Arabic, Chinese etc.

Diplomatic/normalized



Diplomatic/normalized

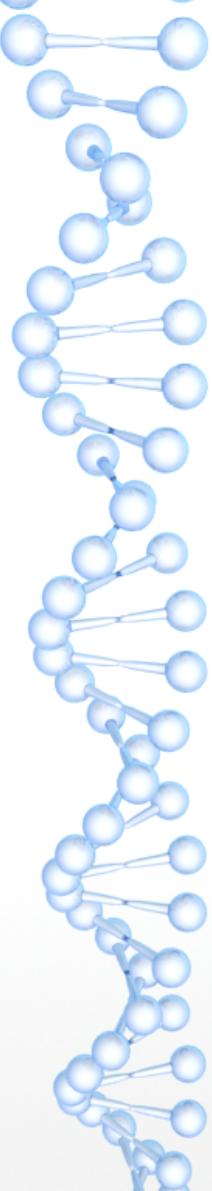
uenenū



Diplomatic/normalized

uenenū

- uenenū



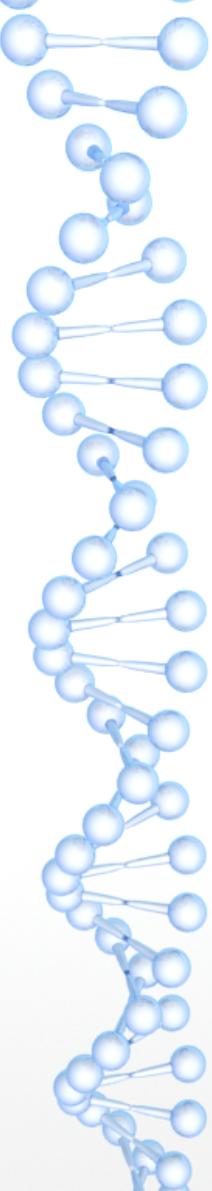
Diplomatic/normalized

uenenū

- uenenū

Diplomatic

- Historical documentation
- Visualization



Diplomatic/normalized

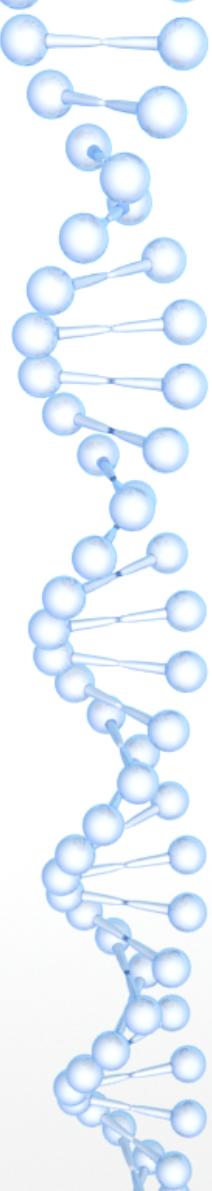
- **venenum**

uenenū

- **uenenū**

Diplomatic

- Historical documentation
- Visualization



Diplomatic/normalized

- *venenum*

Normalized

- Processing
 - Search
 - Collation
 - NLP (lemma, PoS etc.)
 - Statistics (distant reading)...

uenenū

- *uenenū*

Diplomatic

- Historical documentation
- Visualization

Diplomatic/normalized

The Digital Vercelli Book beta

Magnifier HotSpot TextLink

DOTR 104v Diplomatic

1:1 27%

7 **þ**Wæt ic swefna

7 **þ**Wæt ic swefna cýjt secgan wylle hæt mege mætte
8 to midre nihte syððan reord berend reste wunedon.
9 þuhte me hæt ic ge fawe yllicre treow onlyft
10 lædan leahtr be wunden beama beorhtoþt call hæt
11 beacen wær be gotten mid golde gimmer flodon siegere
12 æt foldan sceatum . swylce hæf fife wæron uppe
13 onfham eaxle ge fspanne be healdon þær engel dryht
14 nef calle fege þurh forð ge sceaf newarð ðærhuru
15 fracodes gealga . ȝachine hæf beheoldon halige gaſtar
16 men ofer moldan ȝeall þeof mære ge sceaf ;
17 Syllic wær je rige beam ȝic pynnū fih for wunded
18 mid wommū ge seah ic wuldref treow. wædum geweor
19 ðode wynnū scinan ge gyred mid golde gimmer hafdon
20 be wrigene weorðlice wealdes treow ; hwæðre ic
21 þurh hæt gold ongytan meahte earmra ærgewin
22 hæt hit ærest ongan swartan on ha swiðran healf

<http://vbd.humnet.unipi.it/beta/#104v>

Diplomatic/normalized

The Digital Vercelli Book beta

Magnifier HotSpot TextLink

DOTR 104v Interpretative

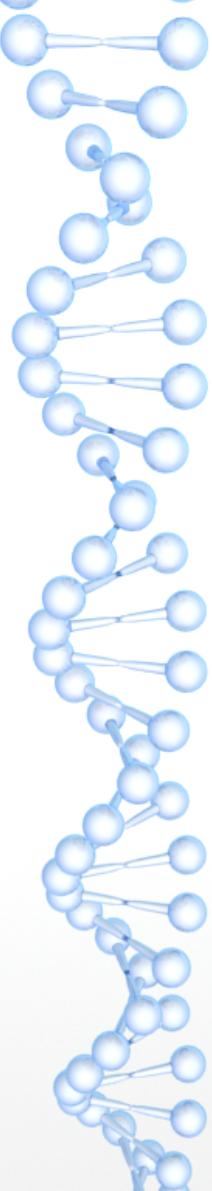
Diplomatic Interpretative

7 HWæt ic swefna cyst secgan wylle hæt me gematte
8 to midre nihte syðan reordberend reste wunedon.
9 þuhte me hæt ic gesawe syllcre treow on lyft
10 lædan leohte bewunden beama beorhtost call hæt
11 beacen was begoten mid golde gimmas stodon fægere
12 æt foldan sceatum . swylce hæf fife weron uppe
13 on þam eaxlegespanne beholdon hæf engel dryht
14 nes ealle fægere þurh forigesceaft ne was ðær huru
15 fracodes gealga . ac hine hæf beholdon halige gastas
16 men ofer moldan and eall þeos mære gesceaft .
17 Syllic was se sigebeam and ic synnum fah fwundene
18 mid wommum geseah ic wuldres treow. wædum geweor
19 ðode wynnum scinan gegyred mid golde gimmas hæfdon
20 bewrigene weorðlice wealdes treow . hwædrc ic
21 þurh hæf gold ongytan meahte earmra ærgewin
22 hæf hit ærest ongan swætan on þa swiðran healfc

1:1 27%

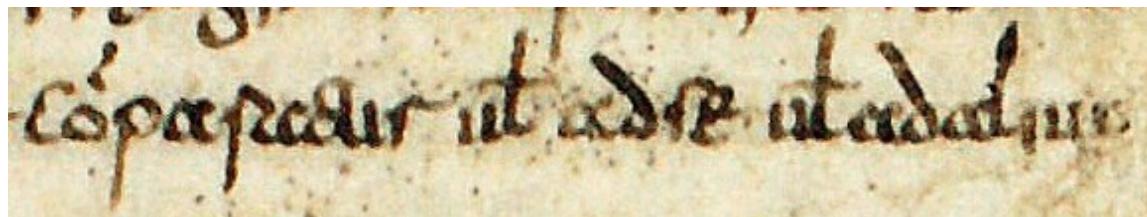
7 HWæt ic swefna

<http://vbd.humnet.unipi.it/beta/#104v>



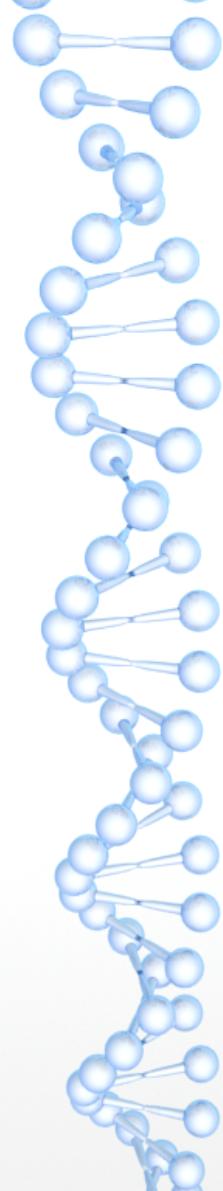
Diplomatic/normalized

- Comparatur vel ad se vel ad alium



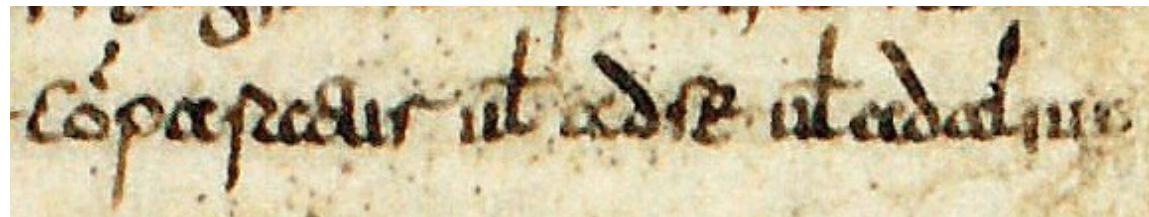
- cōparaEUR uł adfe uładalium

What's “normal”?

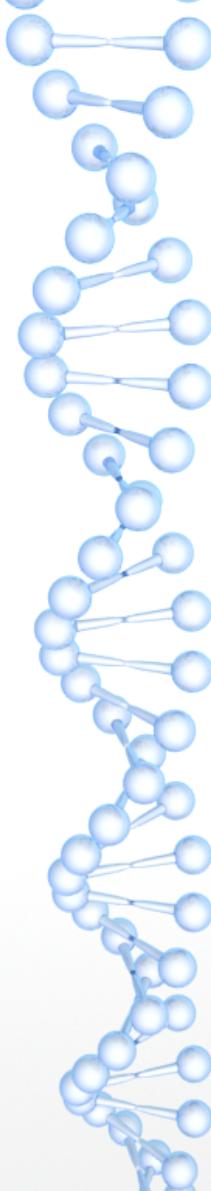


What's “normal”?

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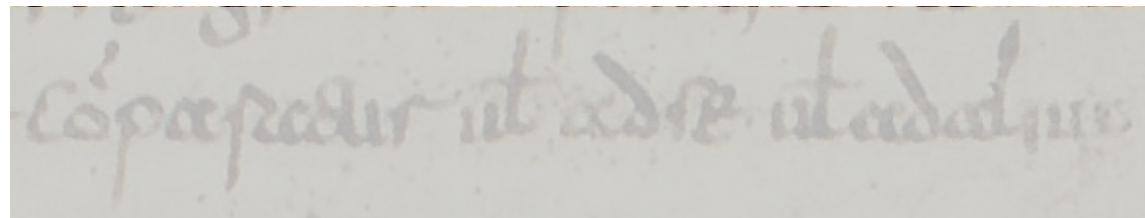


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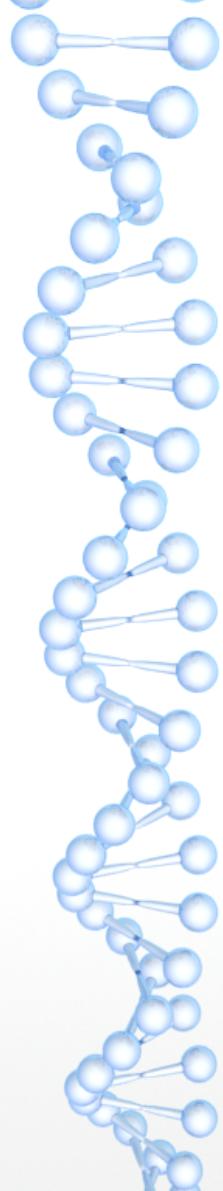


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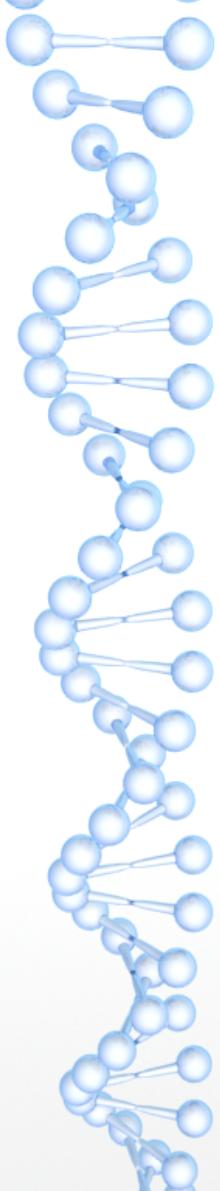


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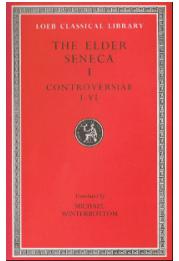
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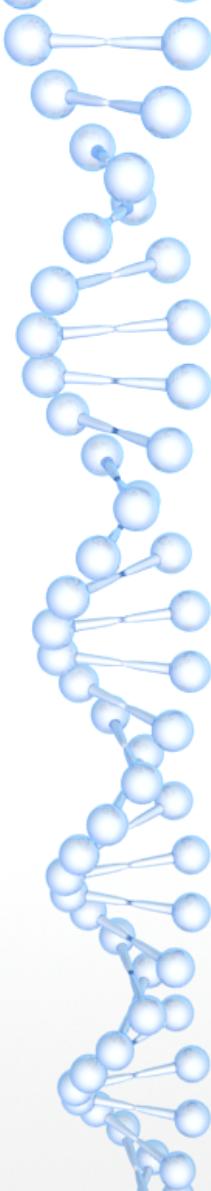
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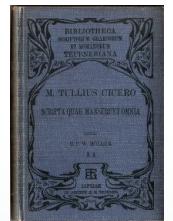
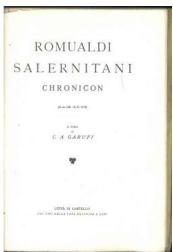
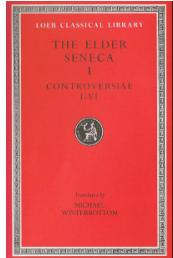
- *Vel comparatur ad se vel iam ad Valerium*

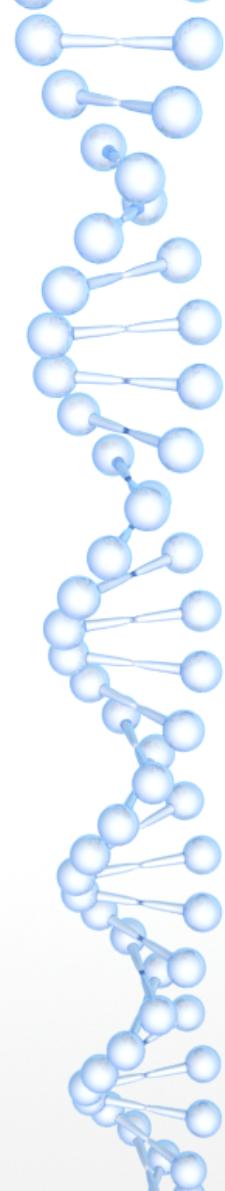




What's “normal”?

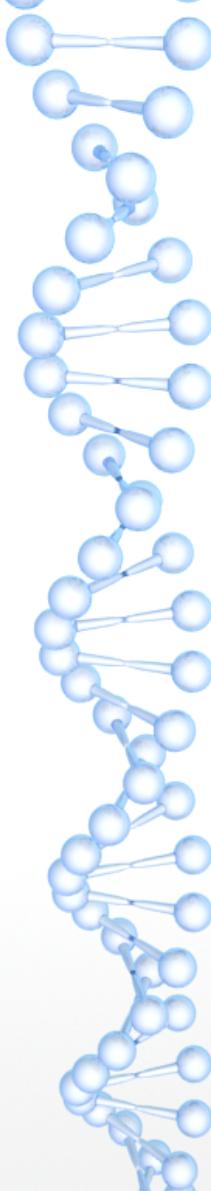
- Vel comparatur ad se vel **iam** ad Valerium
- Vel comparatur ad se vel **jam** ad Valerium
- **U**el comparatur ad se **uel** iam ad **U**alerium
- **V**el comparatur ad se **uel** iam ad **V**alerium
- **u**el comparatur ad se **uel** iam ad **V**alerium





What's “normal”?

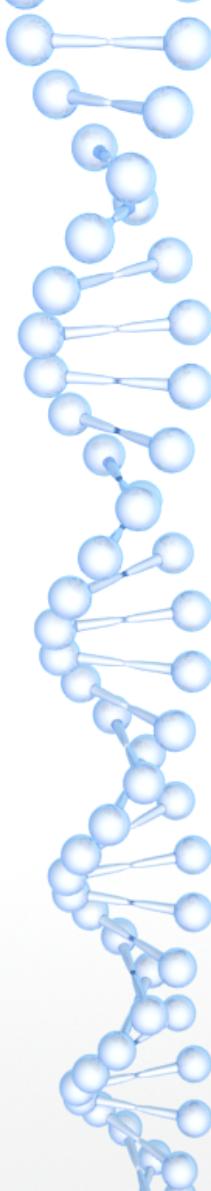
- te. Ego / te. ego
- u / v / U / V
- i / j
- Ae / æ
- Oe / œ
- bonum est / bonum'st
/ bonumst
- [punctuation]
- [macron / breve]



What's “normal”?

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- Processing
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 - Collation
 - NLP (lemma, PoS etc.)
 - Statistics (distant reading)...



What's “normal”?

- te. Ego / te. ego
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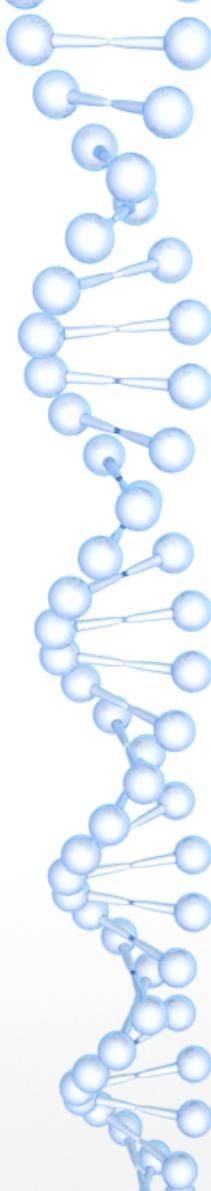
- Processing
 - Search
 - **Collation**
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"pertinet": [pertineo] Verbal, II conjug,
Active indicative, Present, III singular

pertinet

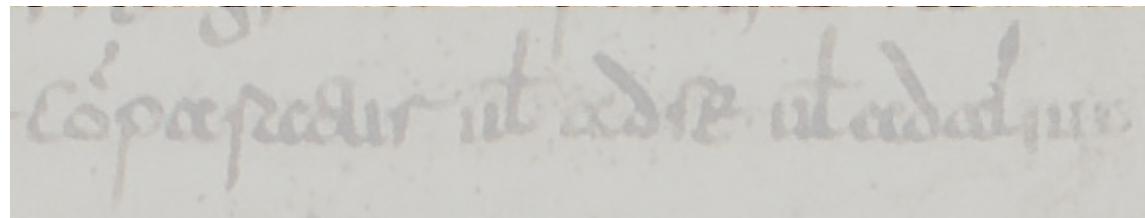
ptinet

- My Ursus edition (IX Century)
www.unipa.it/paolo.monella/ursus

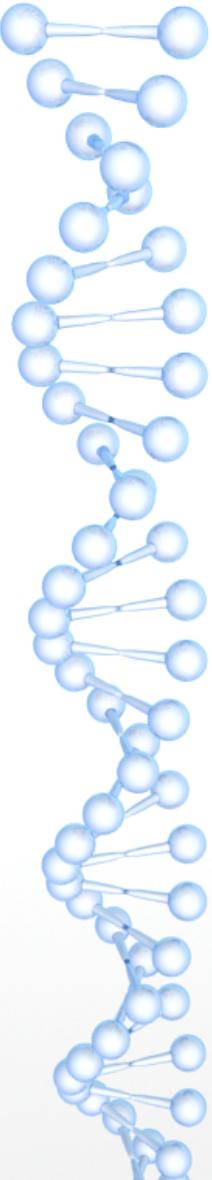


What's “normal”?

- Comparatur vel ad se vel ad alium

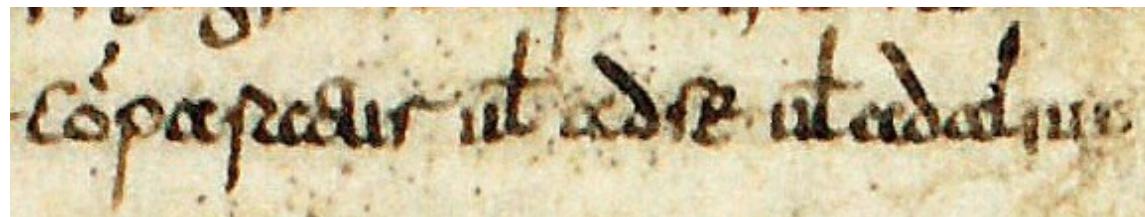


- cōparaEur uł adfe uładalium



“Diplomatic”...

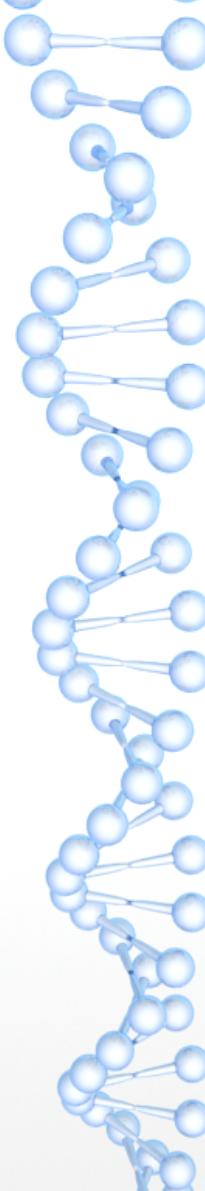
- Comparatur vel ad se vel ad alium



- cōparaEUR uł adfe uładalium

Modelling “Gutenbergian” writing systems

Modelling “Gutenbergian” writing systems



JULIO VERNE

132

Pero me parece que ahora los otros animales acuden a tomar parte en la lucha: la mariposa, la ballena, el lagarto, la tortuga; los eréneos a todo instante. Se los muestra al islandés, y éste mueve la cabeza en señal negativo.

—Tía —dice con calma.

—¡Cómó! ¡dos! Pretende que sólo dos animales...

—Y tiene mucha razón —exclama mi tío, que no aparta el ojo del grupo.

—¿Es posible?

—¡Ya lo creo! El primero de estos monstruos tiene hocicos de mariposa, cabeza de lagarto, dientes de cocodrilo, y por esto no le engañado. Es el icтиosauro, el más temible de los animales antediluvianos.

—¿Y el otro?

—El otro es una serpiente escondida bajo el caparazón de una tortuga, el plesiosaurio, implacable enemigo del primero.

Hans tiene mucha razón. Sólo dos monstruos turban de esta manera la superficie del mar, y tengo ante mis ojos dos reptiles de los primitivos océanos. Veo el ojo ensangrentado del icthiosauro, que tiene el tamaño de la cabeza de un hombre. La Naturaleza le ha dotado de un apetito óptico de extraordinario poder, capaz de resistir la presión de las capas de agua en que habita. Se le ha llamado la ballena de los saurios, porque posee su misma velocidad y tamaño. Su longitud no es inferior a cien pies, y, cuando saca del agua las aletas verticales de su cola, me hago cargo mejor de su enorme magnitud. Sus mandíbulas son enormes, según los naturalistas, no posee menos de 182 dientes.

El plesiosaurio, serpiente de tronco cilíndrico, tiene la cola corta y las patas dispuestas en forma de remos. Su cuerpo se halla todo él revestido de un enorme campacho, y su cuello, flexible como el del cinc, ergúese treinta pies sobre las olas.

Los dos animales se atan con indescriptible furia. Levantan nubes de agua que llegan hasta la balsa, y nos ponen veinte veces a punto de zozobrar. Se oyen silbidos de una intensidad prodigiosa. Las dos bestias se encuentran enlazadas, no siéndome posible distinguir la una de la otra. ¡Hay que temerlo todo de la furia del vencedor!

Transcurre una hora, dos y continúa la lucha con el mismo esfuerzo. Los monstruos se acercan a la balsa unas veces y se alejan otras, y se precipitan a la agua para devorar a los pasajeros.

VIAJE AL CENTRO DE LA TIERRA

133

Pero, de improviso, una enorme cabeza lanza fuera del agua: la colera del plesiosaurio. El monstruo está herido de muerte. No descubre su inmenso campacho. Sólo su largo cuello se yergue, se abate, se vuelve a levantar, se encorva, azota la superficie del mar como un látigo gigantesco y se retuerce como una lombriz dividida en dos pedazos. Silla el agua a considerable distancia y nos ciega materialmente; pero pronto toca a su fin la agonía del reptil; disminuyen sus movimientos, decrecen sus contorciones y su largo tronco de serpiente se extiende como una masa inerte sobre la serena superficie del mar.

En cuanto al icthiosauro, ¿ha regresado de nuevo a su caverna submarina o va a reaparecer otra vez?

XXXIV

Miércoles 19 de agosto.—El viento, por fortuna, que sopla con bastante fuerza, nos ha permitido huir rápidamente del teatro del combate. Hans sigue siempre empujando la caña del timón. Mi tío, a quien los incidentes del combate han hecho olvidar de momento sus absorbentes ideas, vuelve a examinar el mar con la misma impaciencia que antes.

El viaje recobra de nuevo su uniformidad monótona, que no deseamos interrumpida por peligros tan inminentes como el que corrimos ayer.

Jueves 20 de agosto.—Brisa NNE. Bastante desigual. Temperatura devada. Marchamos a razón de tres leguas y media por hora.

A eso de mediiodia, oyese un ruido lejano.

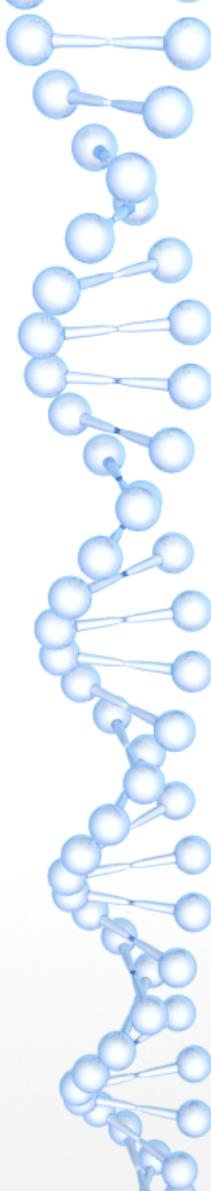
Consigno el hecho sin saber cuál pueda ser su explicación. Es un rugido continuo.

—Hay —dice el profesor—, a alguna distancia de aquí, alguna roca o islote contra el cual se estrellan las olas.

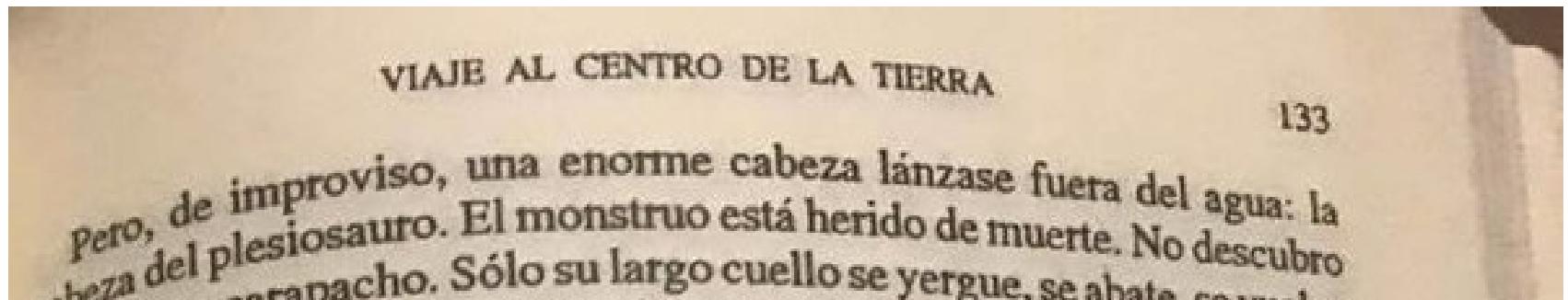
Hans sube al extremo del palo, pero no descubre ningún escollo. La superficie del mar aparece toda lisa hasta el mismo horizonte.

Así transcurren tres horas. Los rugidos parecen provenir de una catarrata lejana.

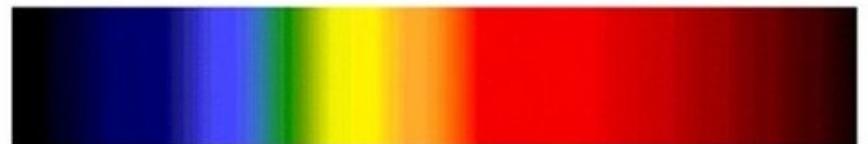
Manifesto mi opinión a mi tío, que sacude la cabeza. Esto no obstante, tengo la convicción de que no me equivoco. ¡Corremos tal vez hacia una catarrata que nos precipitará en el abismo? Es posible que este fenómeno de descenso sea del agrado del profesor, porque se acerca a la

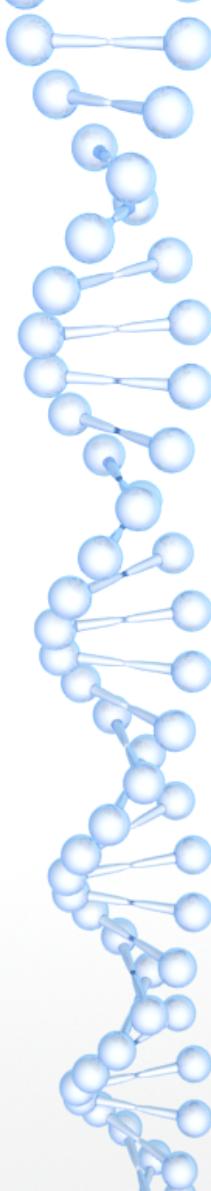


Modelling “Gutenbergian” writing systems



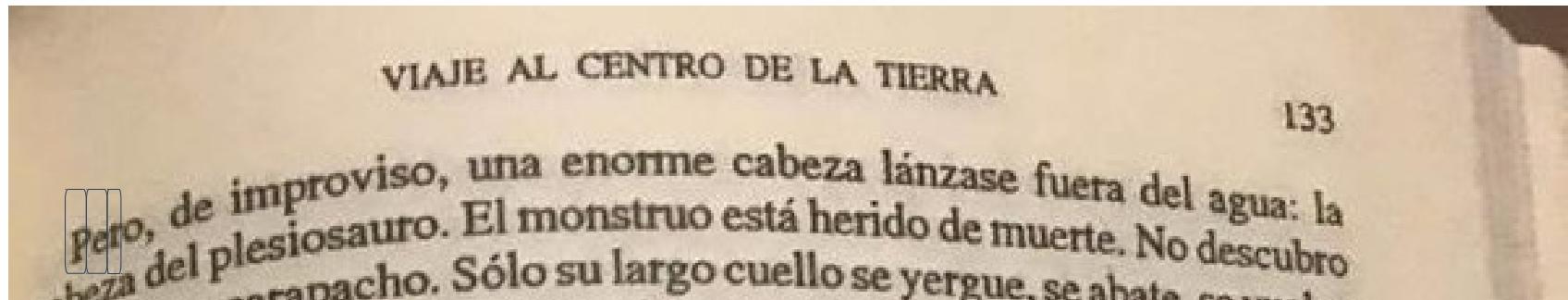
Digital modelling



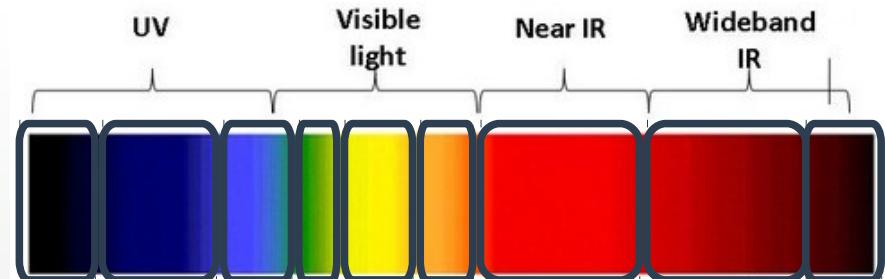


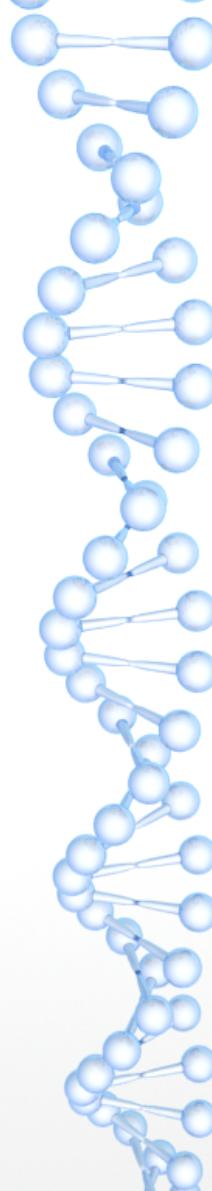
Modelling “Gutenbergian” writing systems

- Pero, de improviso, una enorme cabeza...



Digital modelling





“Gutenbergian” principles

- Pero, de improviso, una enorme cabeza...



1 \leftrightarrow 1

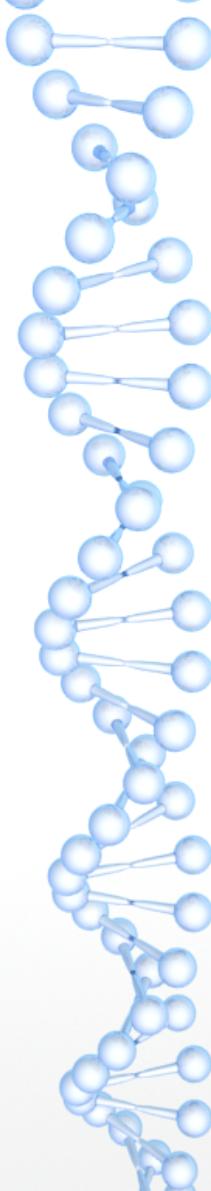


1 = 1



1, 2, 3...





“Gutenbergian” principles

- Pero, de improviso, una enorme cabeza...

1 ↔ 1

1 = 1

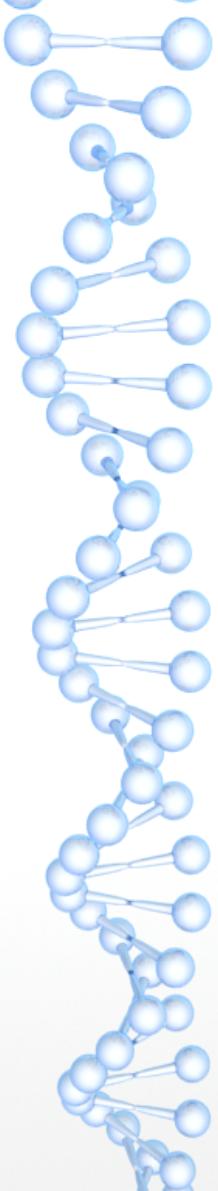
1, 2, 3...

1 mark,
1 letter

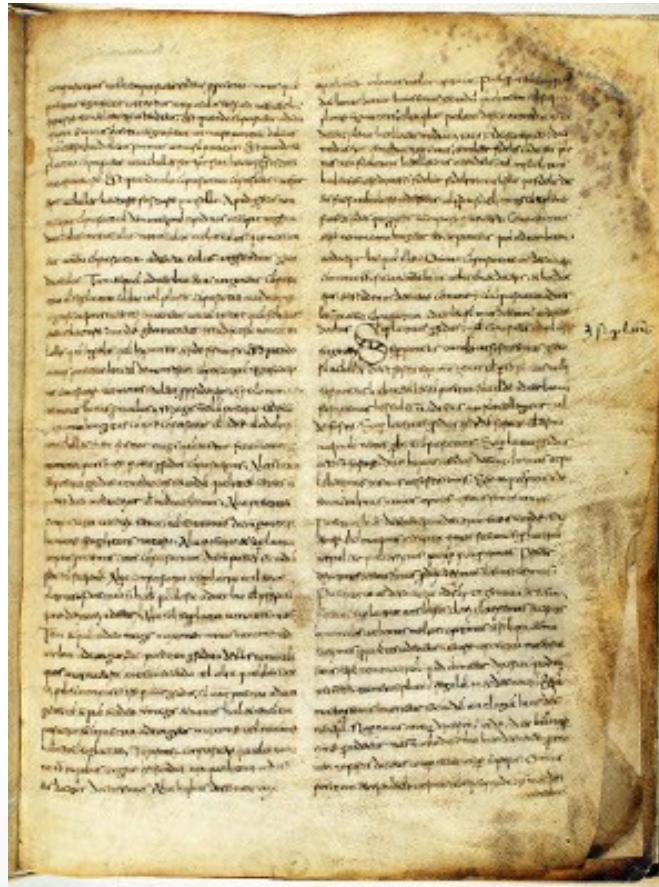
All marks
are (born)
equal

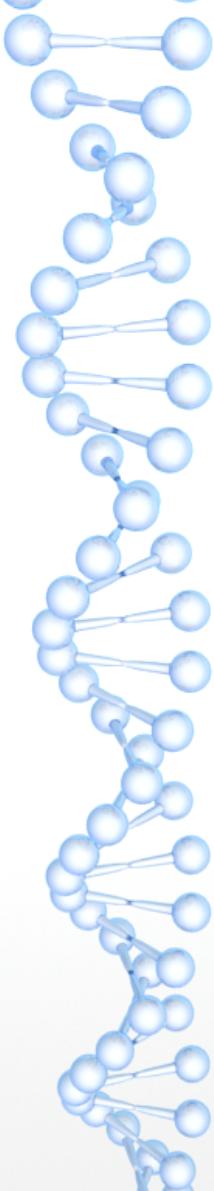
Sequence
(one dimension)

Modelling pre-modern writing systems



Modelling pre-modern writing systems





Modelling pre-modern writing systems

3 Gutenbergian principles

$1 \leftrightarrow 1$

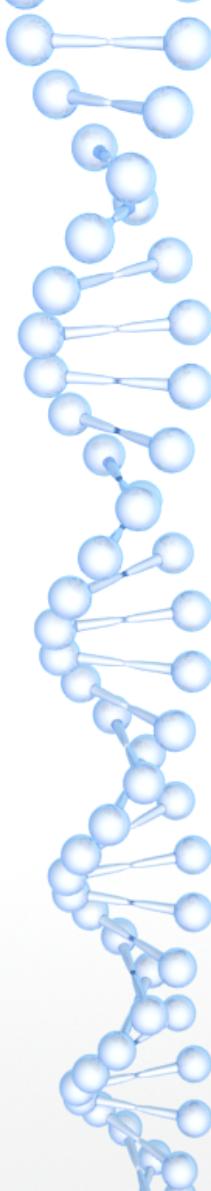
$1 = 1$

$1, 2, 3\dots$

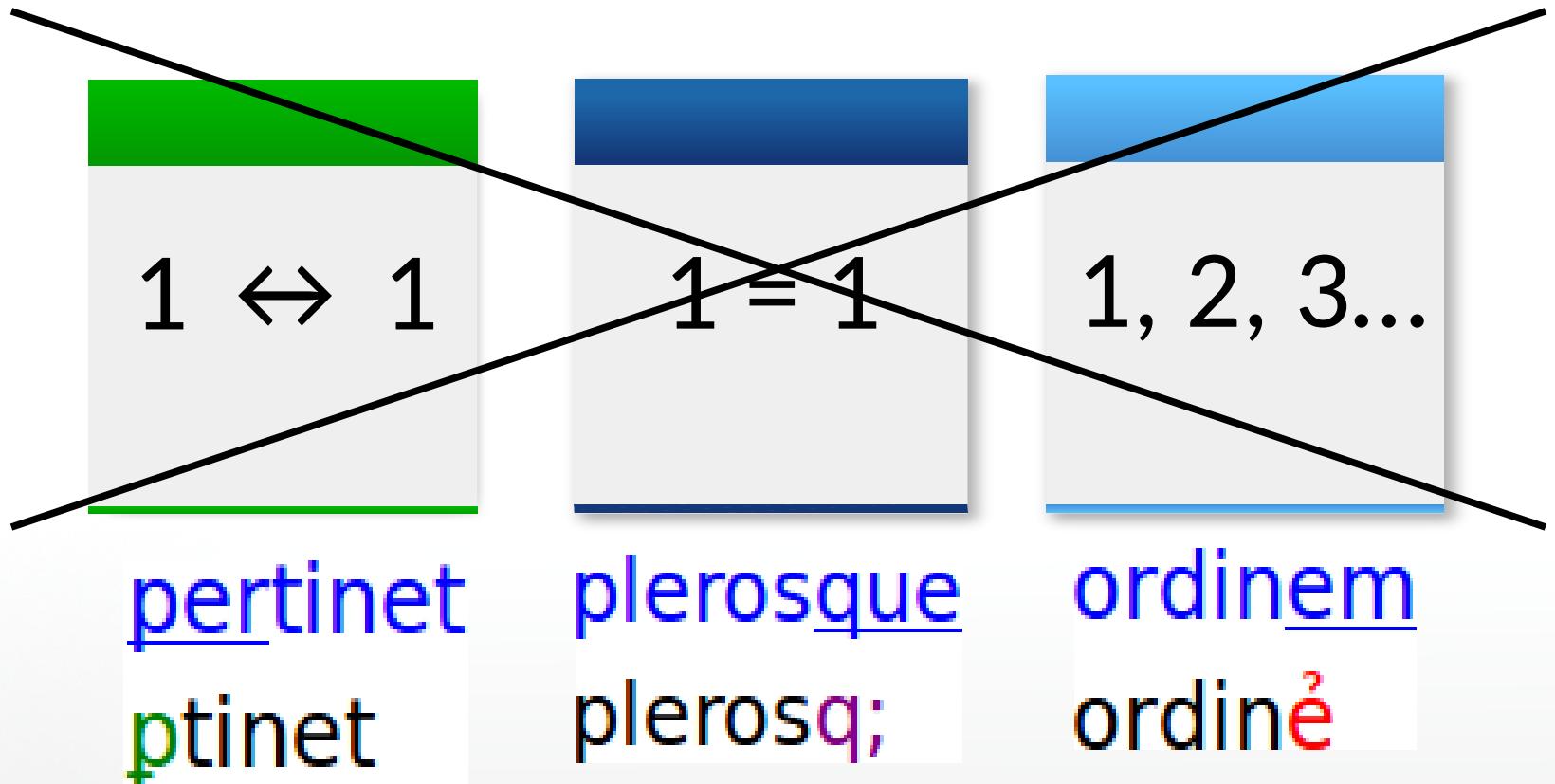
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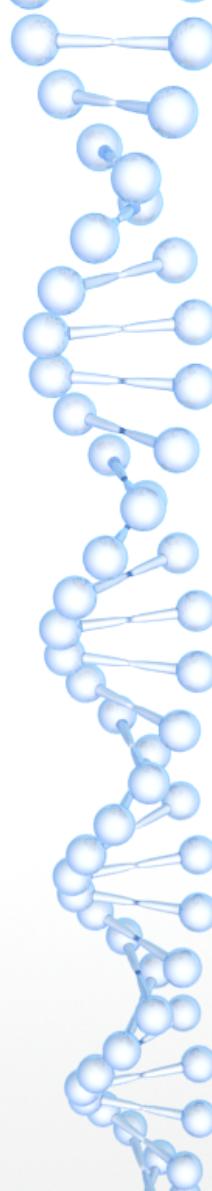
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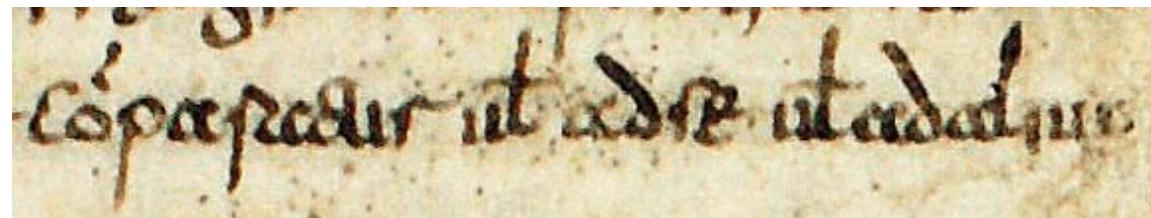


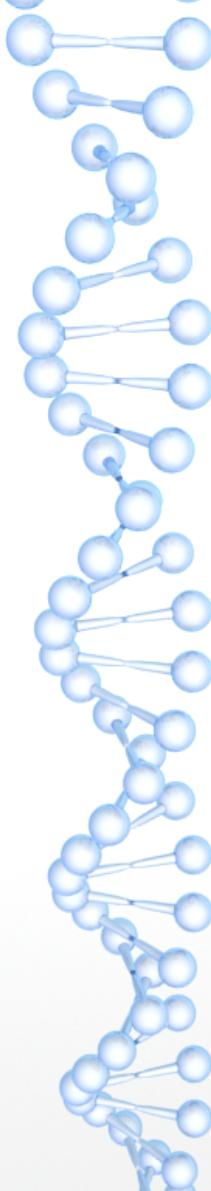
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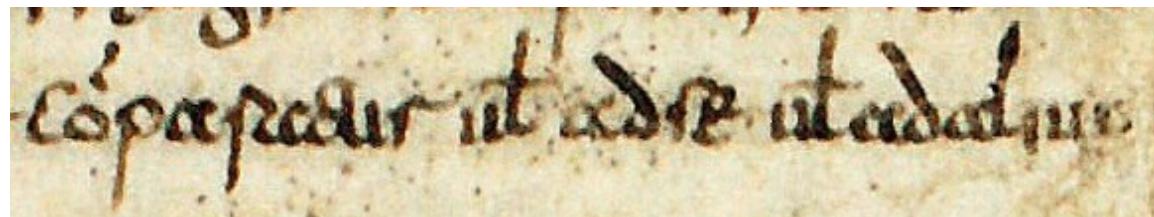


Modelling pre-modern writing systems

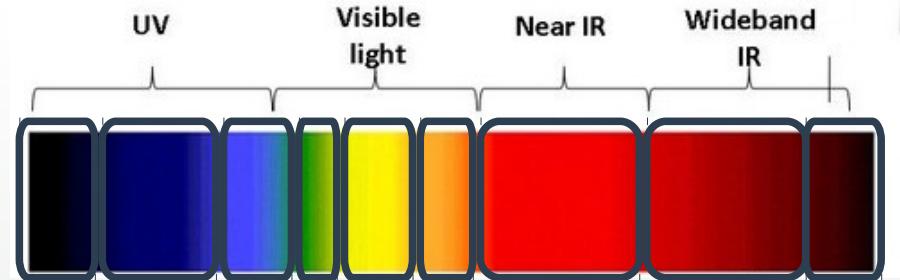


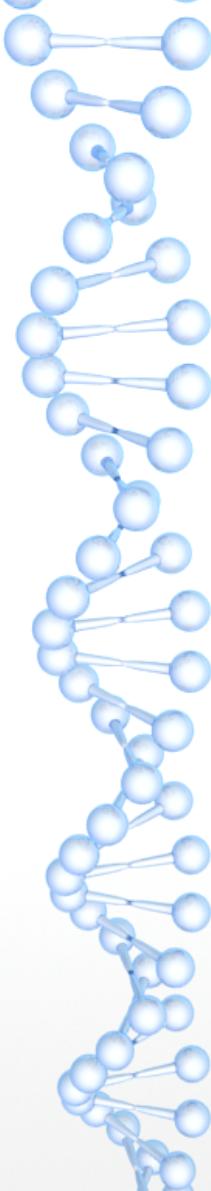


Modelling pre-modern writing systems



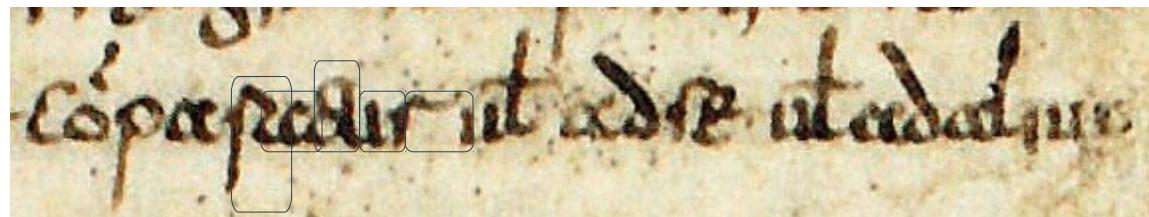
Digital modelling





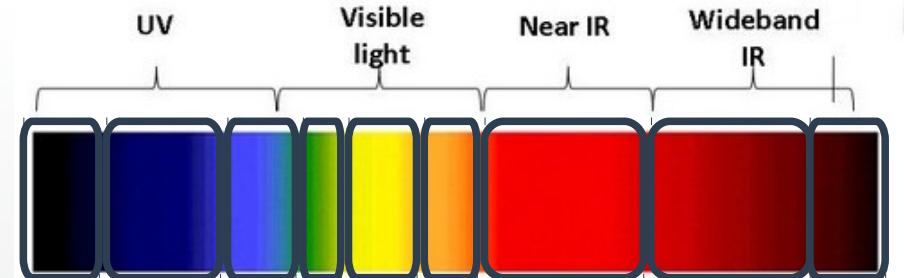
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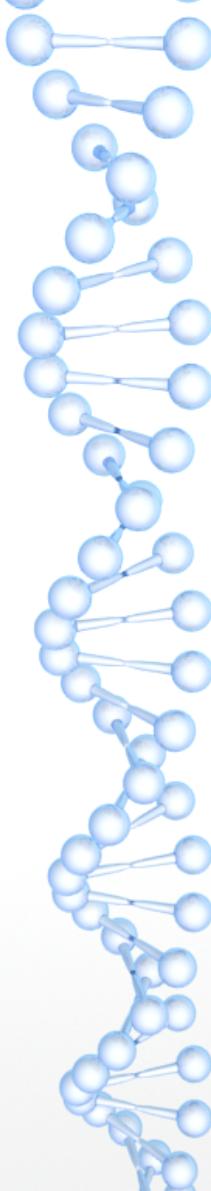
- Comparatur vel ad se vel ad alium



- cōparaEUR uł adfe uładalium

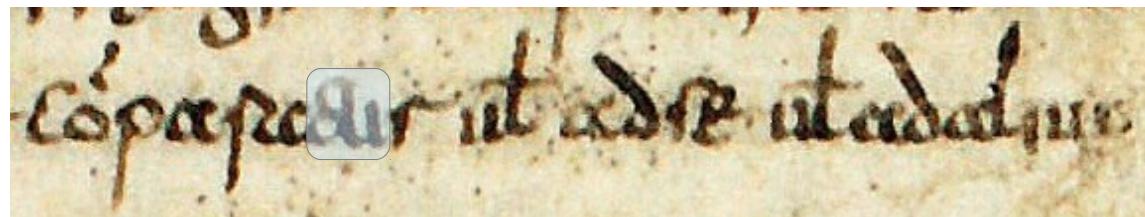
Digital modelling





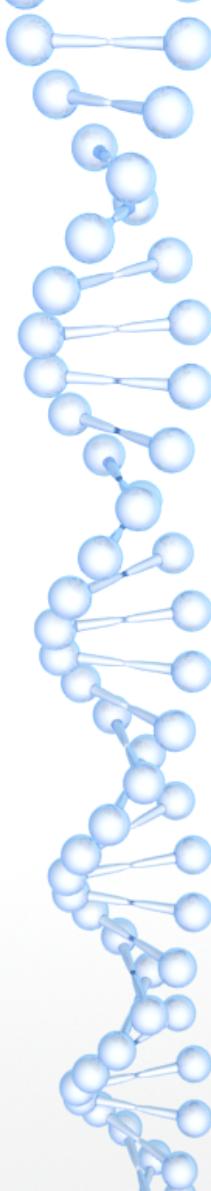
Modelling pre-modern writing systems

- Comparatur vel ad se vel ad alium



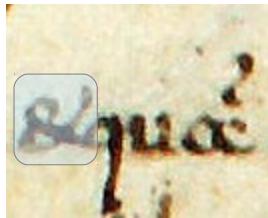
- cōparaEur uł adfe uładalium

Ligatures



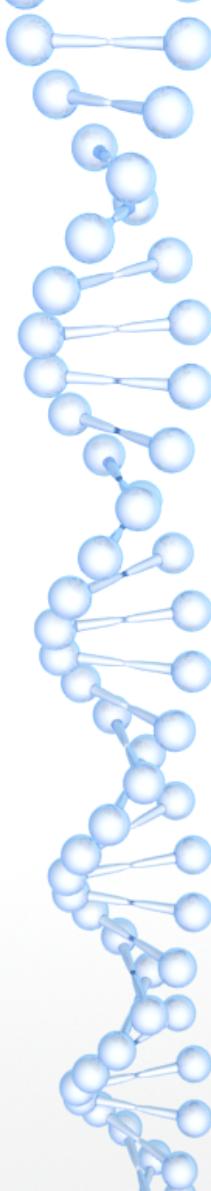
Modelling pre-modern writing systems

- et quam



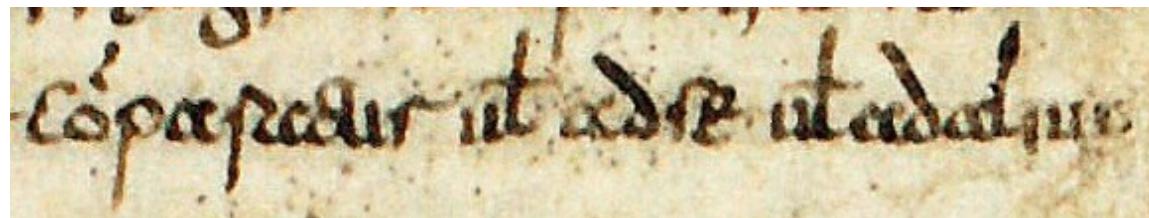
- & quam

Ligatures

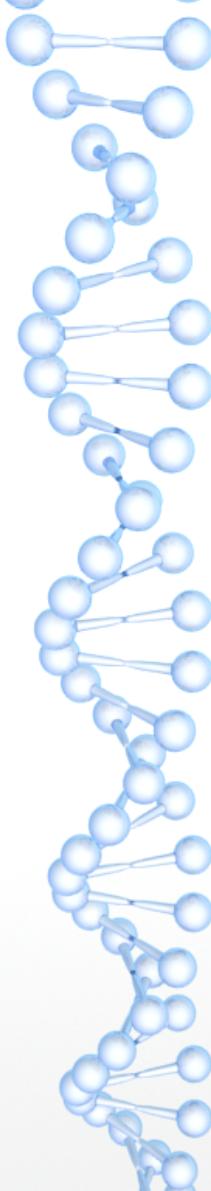


Modelling pre-modern writing systems

- Comparatur vel ad se vel ad alium

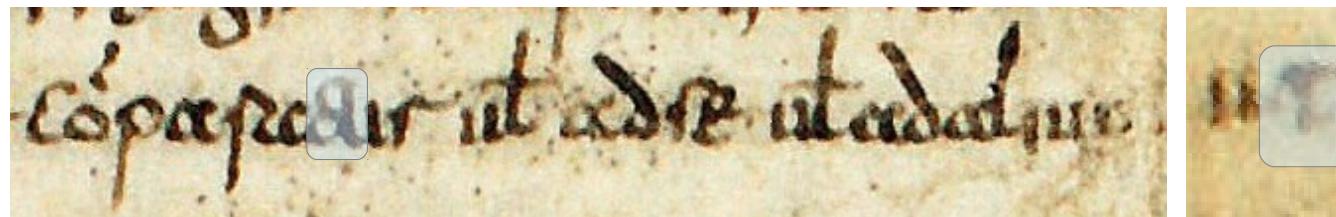


- cōparaEur uł adfe uładalium



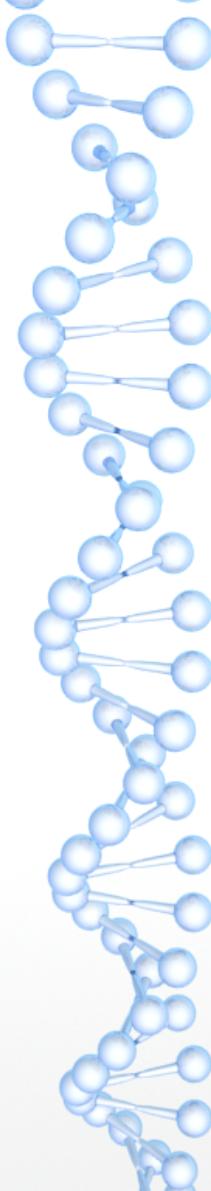
Modelling pre-modern writing systems

- Comparatur vel ad se vel ad alium ut



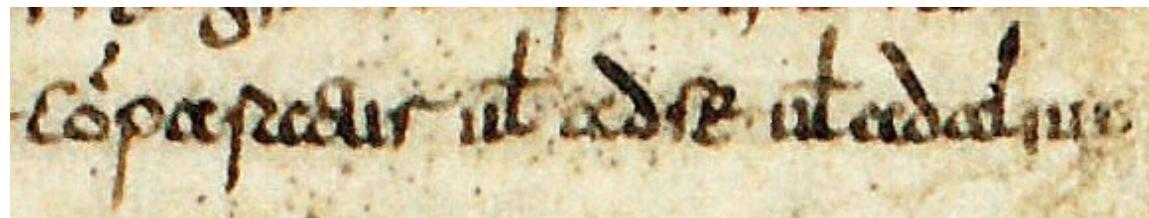
- cóparaEur uł adfe uładalium uł

Allographs

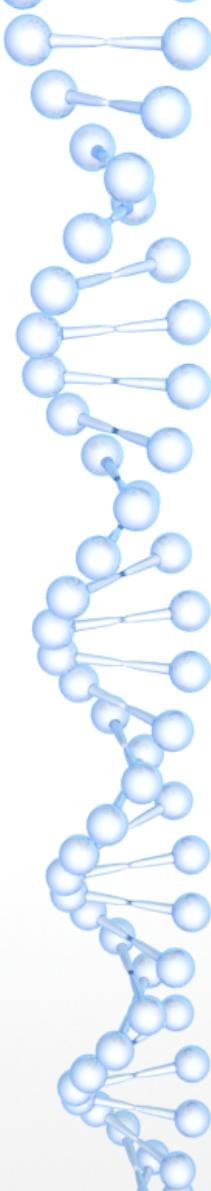


Modelling pre-modern writing systems

- Comparatur vel ad se vel ad alium

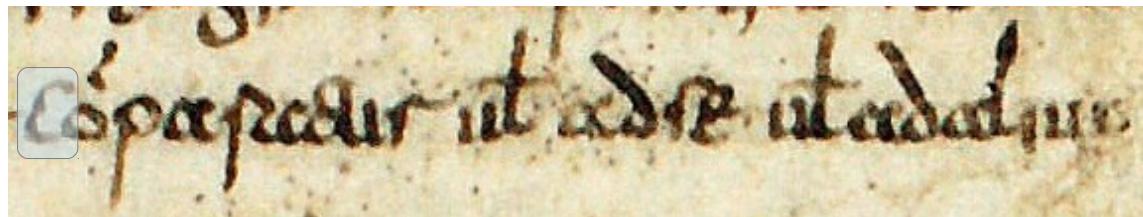


- cōparaEur uł adfe uładalium



Modelling pre-modern writing systems

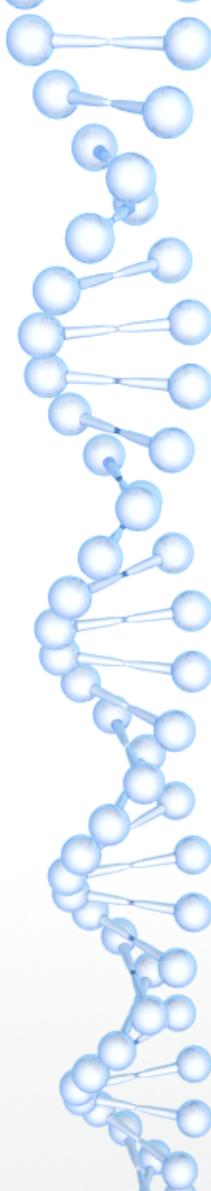
- Comparatur vel ad se vel ad alium



- cōparaEUR uł adfe uładalium

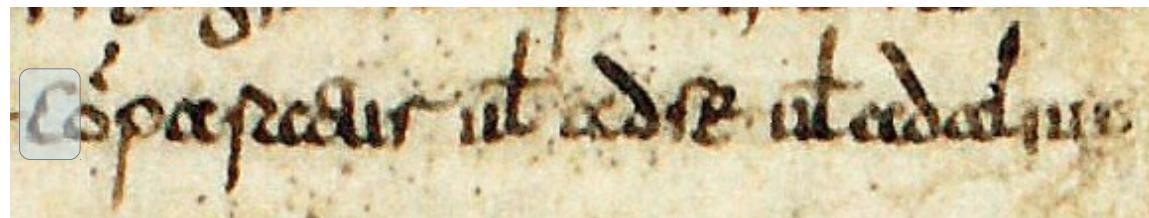
Capitalization?

Allographs



Modelling pre-modern writing systems

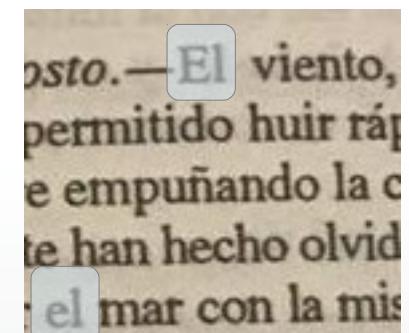
- Comparatur vel ad se vel ad alium

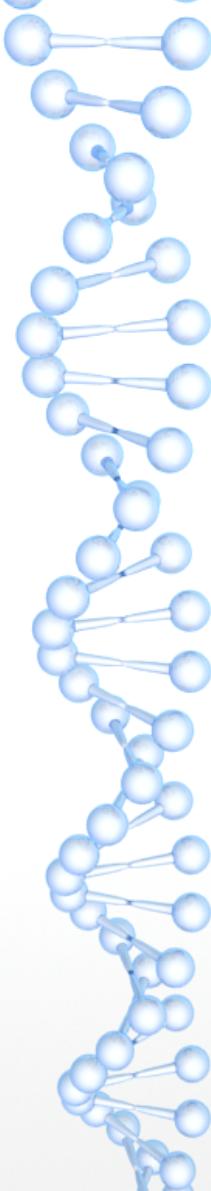


- cōparaEUR uł adfe uładalium

Capitalization?

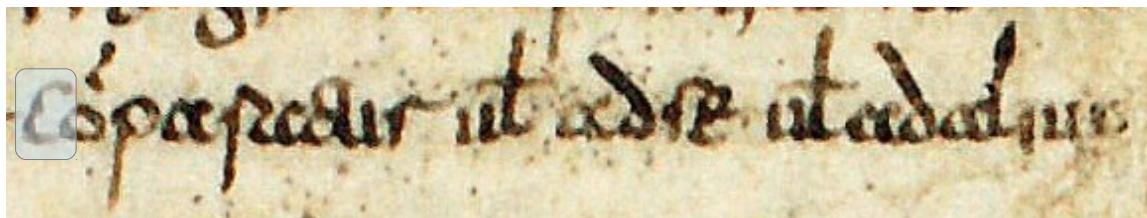
Allographs





Modelling pre-modern writing systems

- Comparatur vel ad se vel ad alium

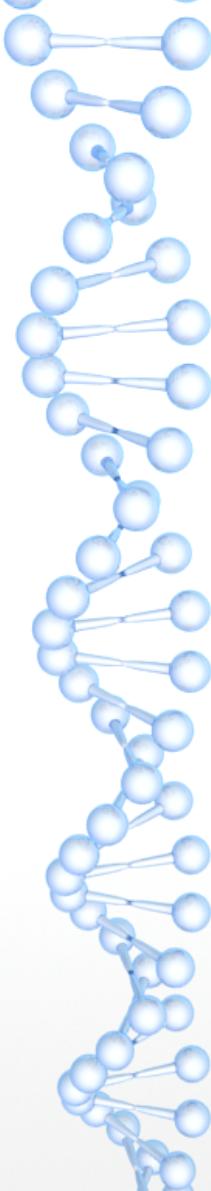


- cōparaEUR uł adfe uładalium

Capitalization?

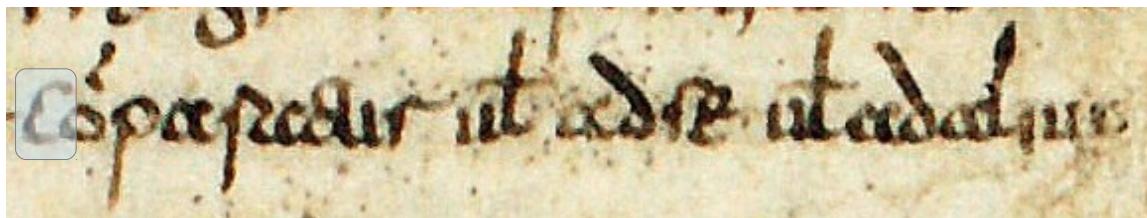
Allographs

Bari
bari



Modelling pre-modern writing systems

- Comparatur vel ad se vel ad alium

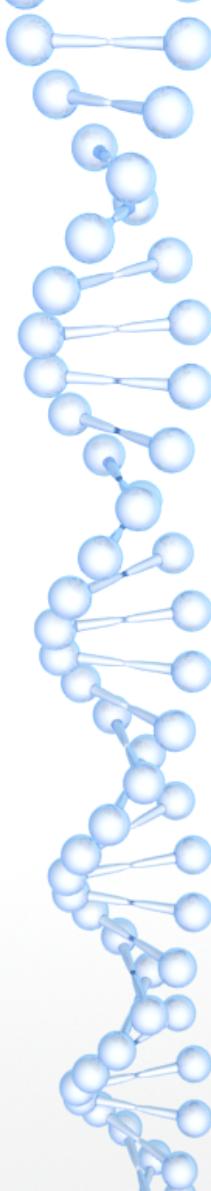


- cōparaEUR uł adfe uładalium

Capitalization?

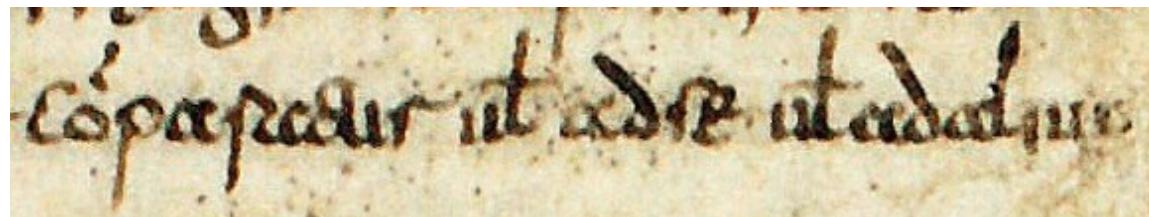
Allographs

ODD
odd

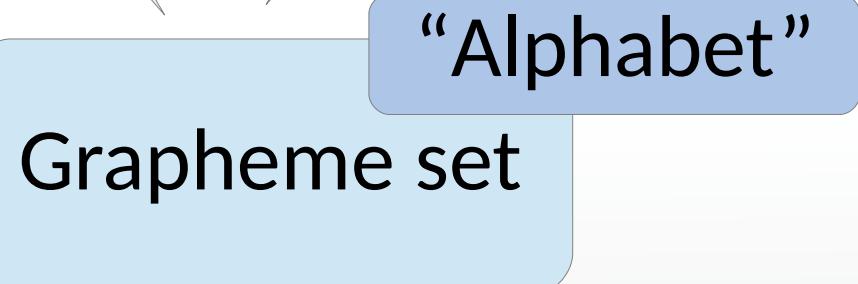


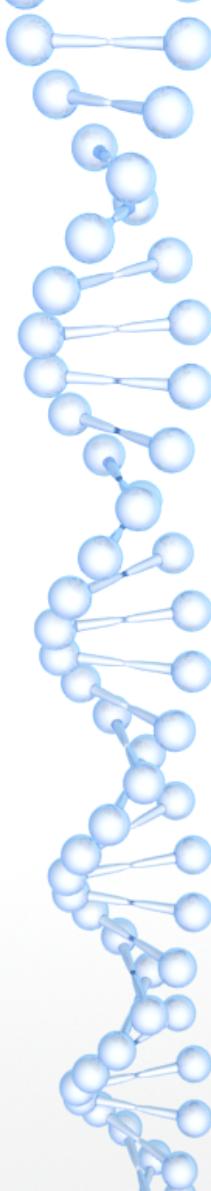
Modelling pre-modern writing systems

- Comparatur vel ad se **vel** ad alium



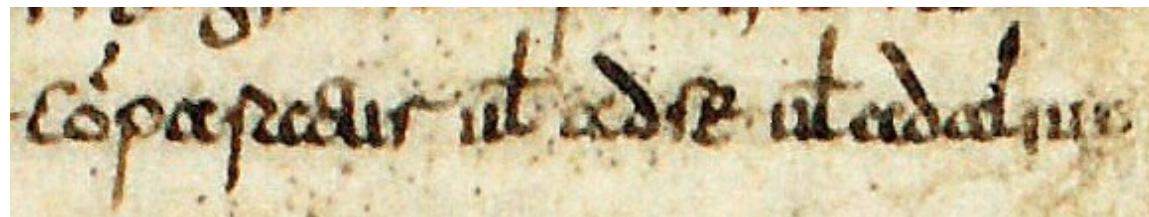
- cōparaEUR uł adfe **uładalium**





Modelling pre-modern writing systems

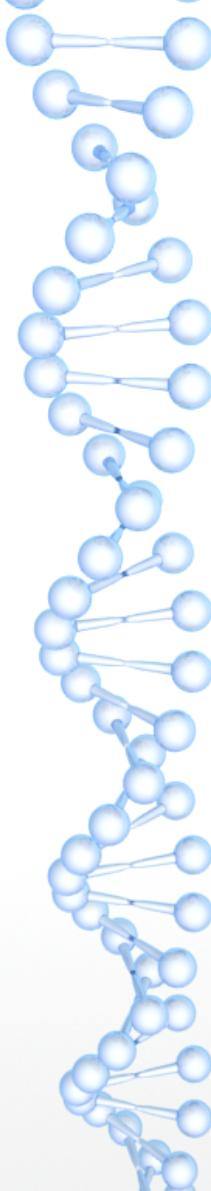
- Comparatur vel ad se vel ad alium.



- cōparaEUR uł adfe uładalium;

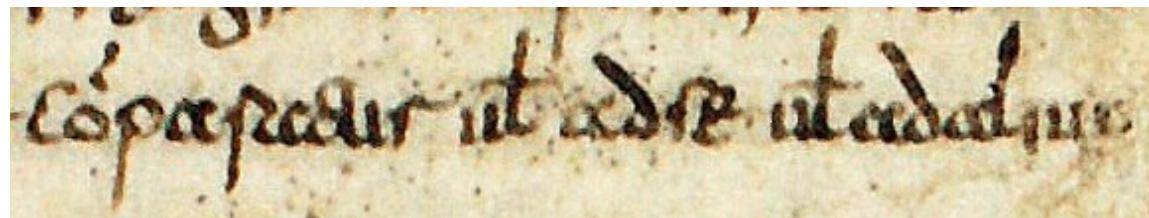
Grapheme set

Punctuation

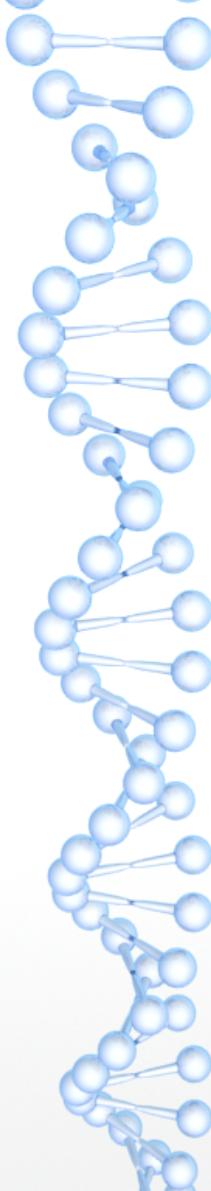


Modelling pre-modern writing systems

- Comparatur vel ad se vel ad alium

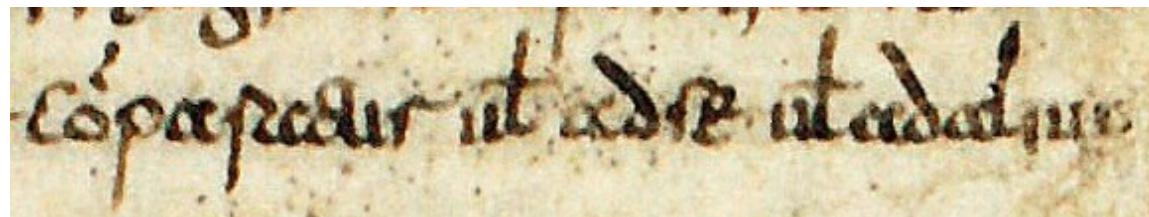


- cōparaEur uł adfe uładalium



Modelling pre-modern writing systems

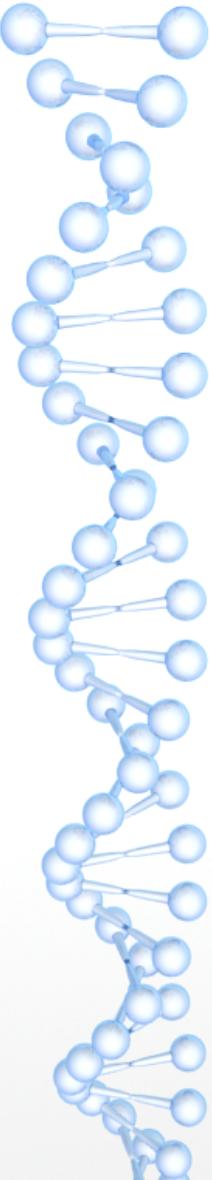
- Comparatur vel ad se vel ad alium



- coparaEUR uł adfe uładalium

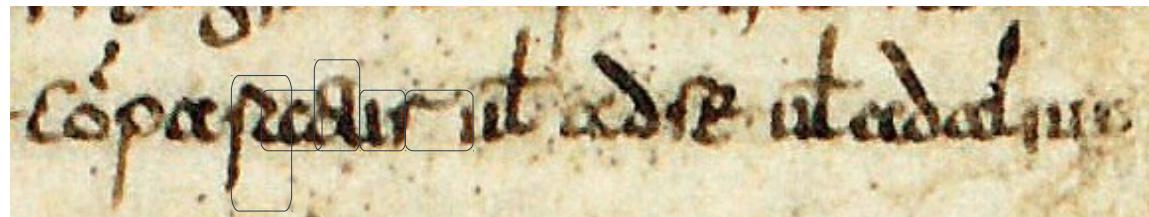
Abbreviations

Hjelmslev's “analysis”
as digital modelling for
pre-modern writing systems



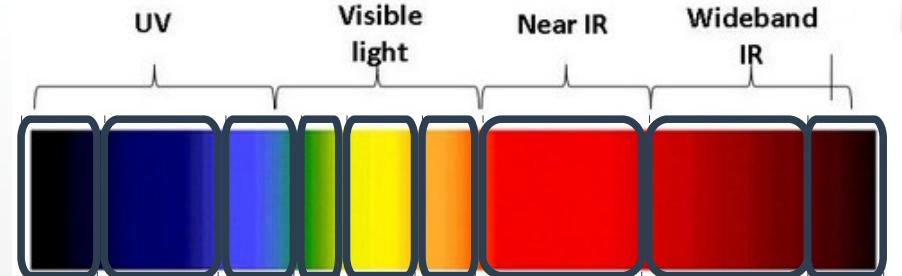
Modelling

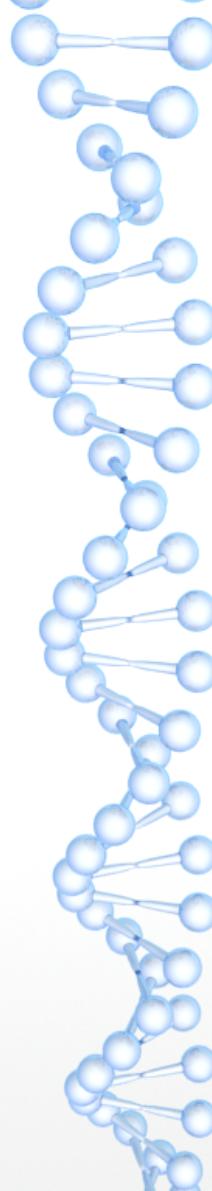
- Comparatur vel ad se vel ad alium



- cōparaEur uł adfe uładalium

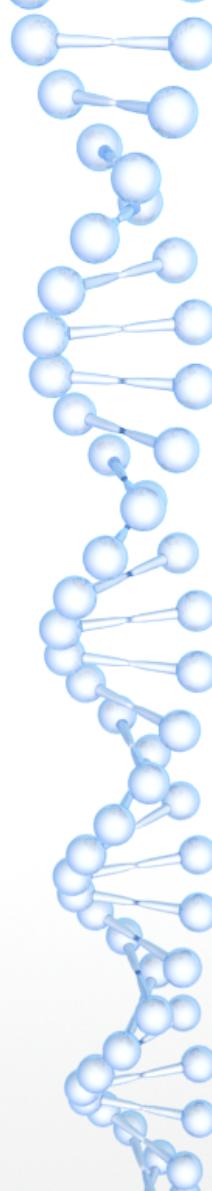
Digital modelling





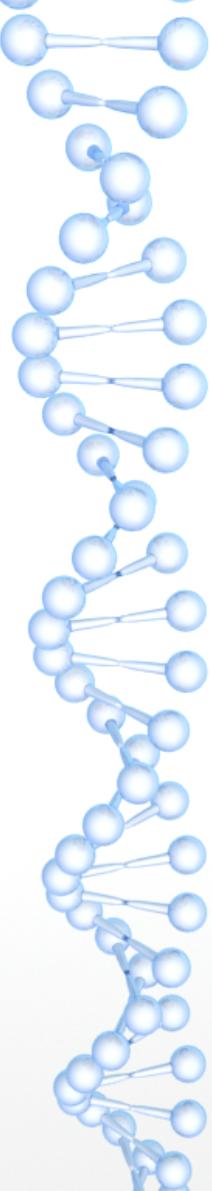
Modelling

- cóparaEur uł adfe uładarium



Modelling

- cóparaEur  adfe uładarium



System / text

- cóparaEur

Syntagmatic (text, process)

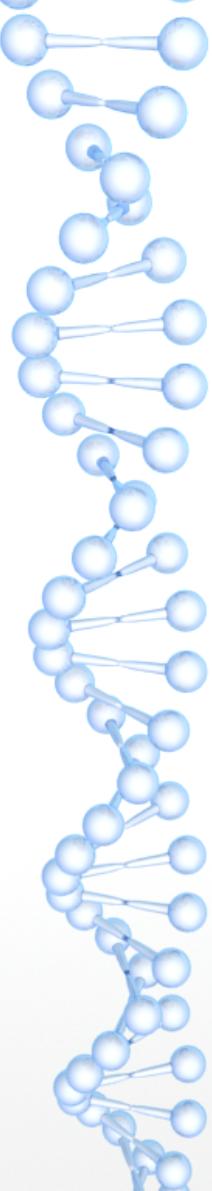
uł

adfe

uładarium

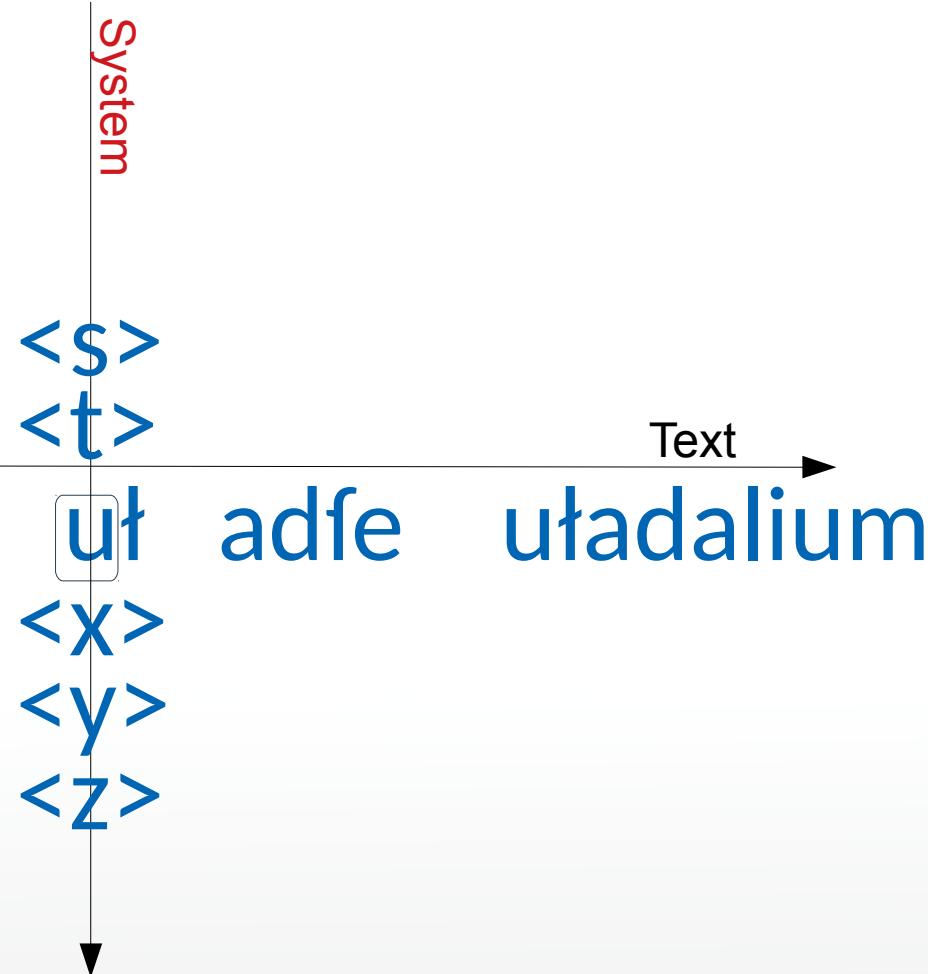
Paradigmatic

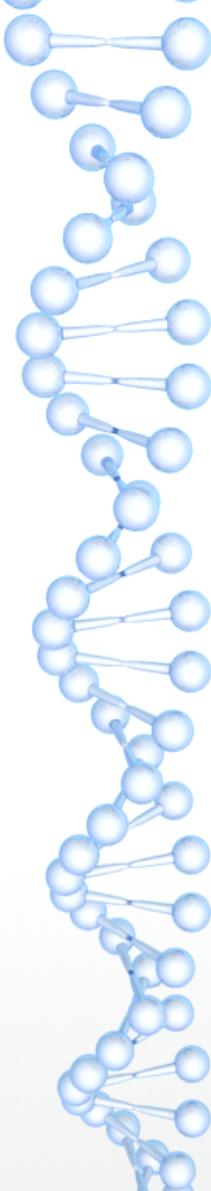
(langue, system)



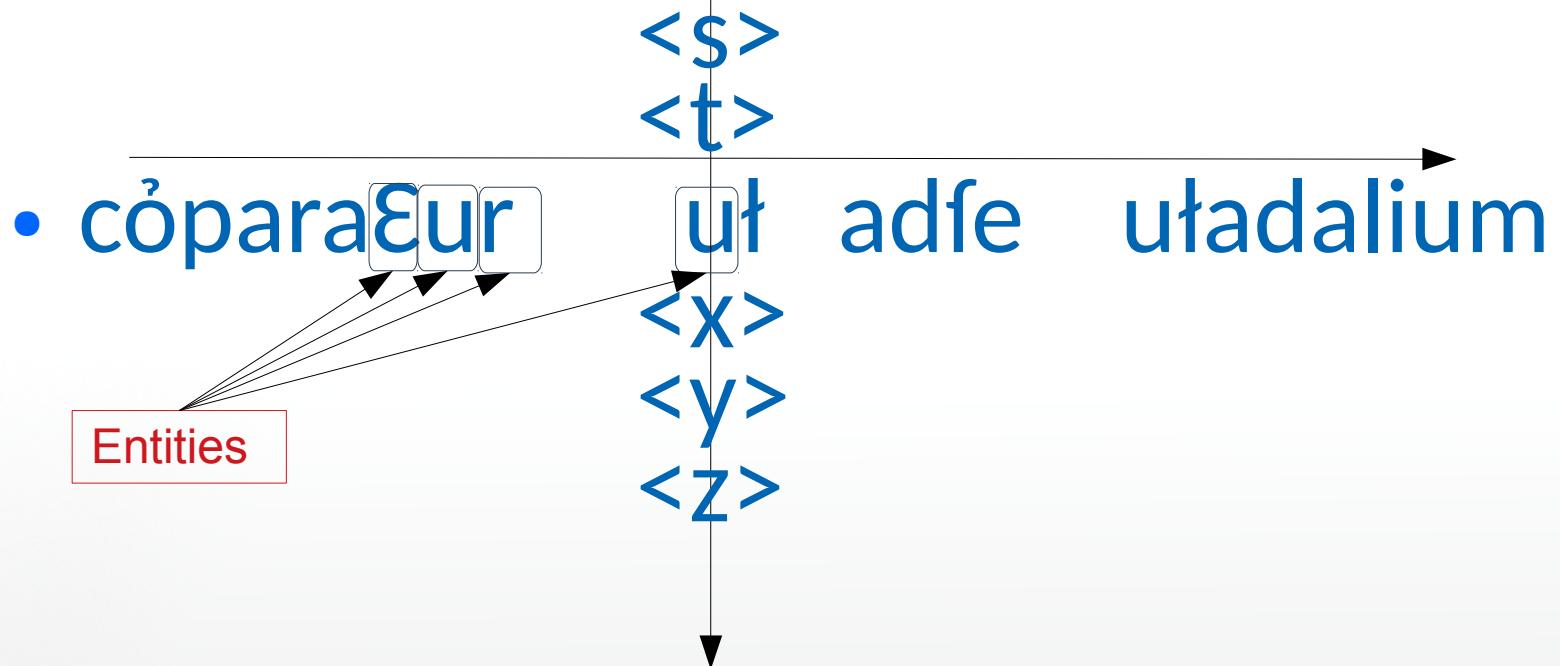
System / text

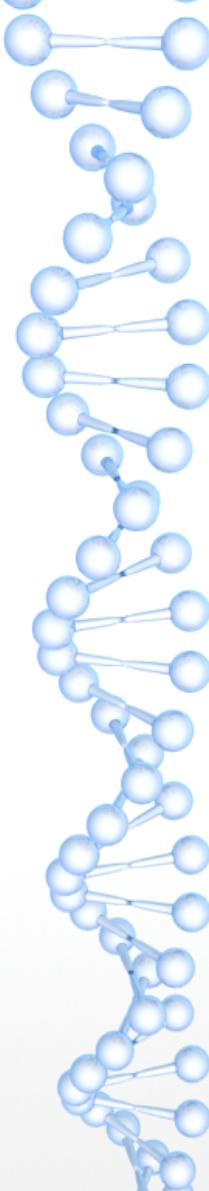
- cóparaEur



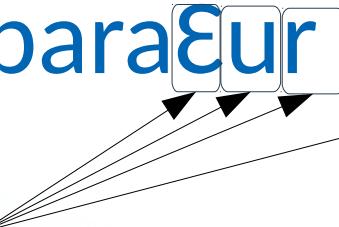


Modelling/“analysis”: entities





Modelling/“analysis”: entities

• cóparaEur  uł adfe uładalim

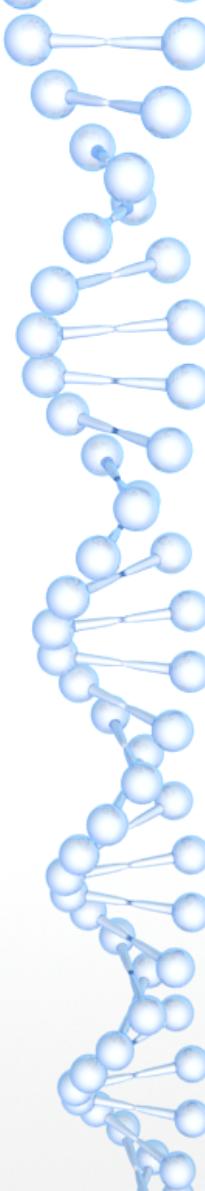
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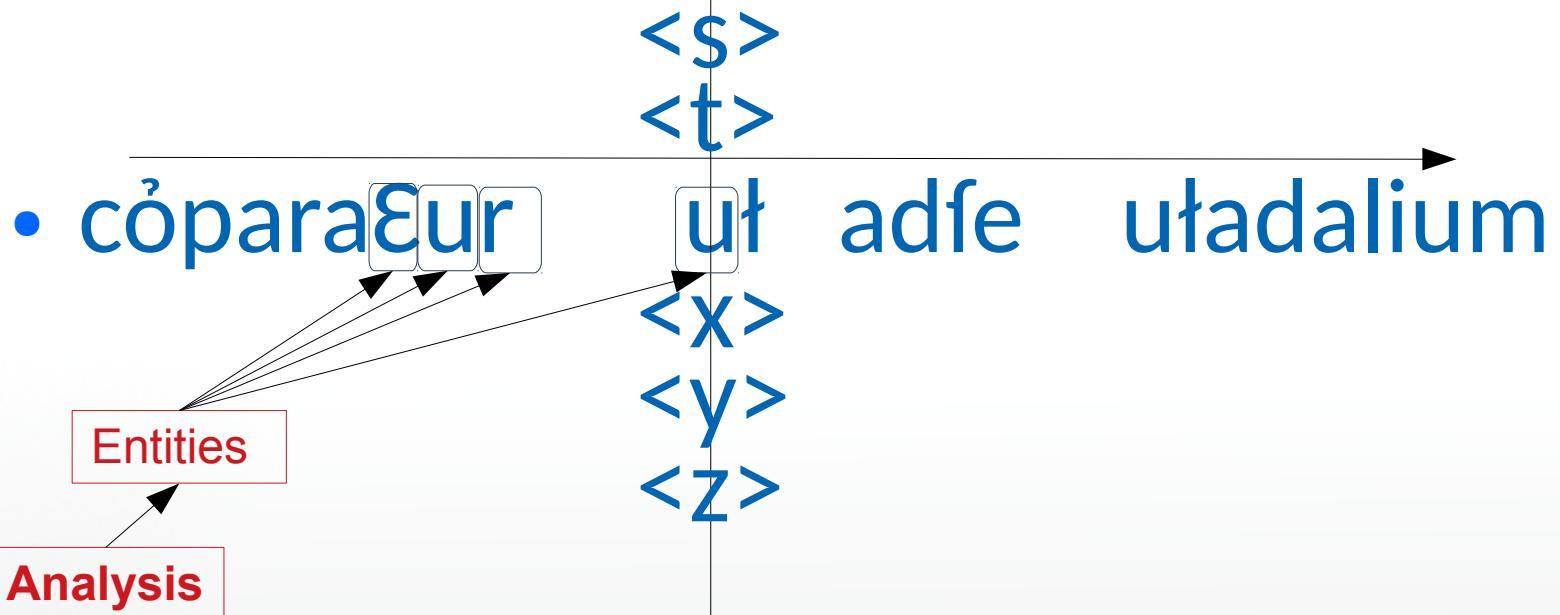
<x>
<y>
<z>

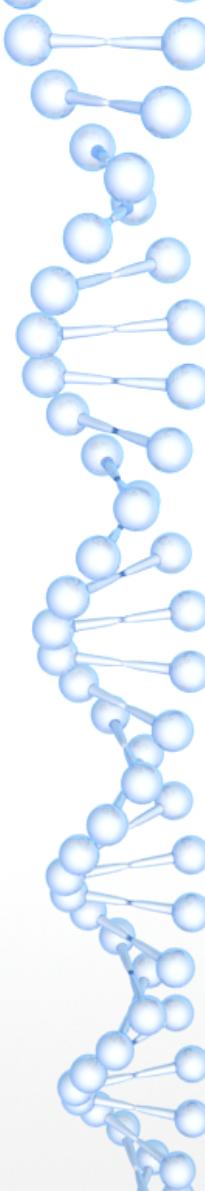


“If [we are] given anything..., it is the as yet unanalyzed *text* in its undivided and absolute integrity”
 (“**deduction**”, *Prol. Ch. 4*)

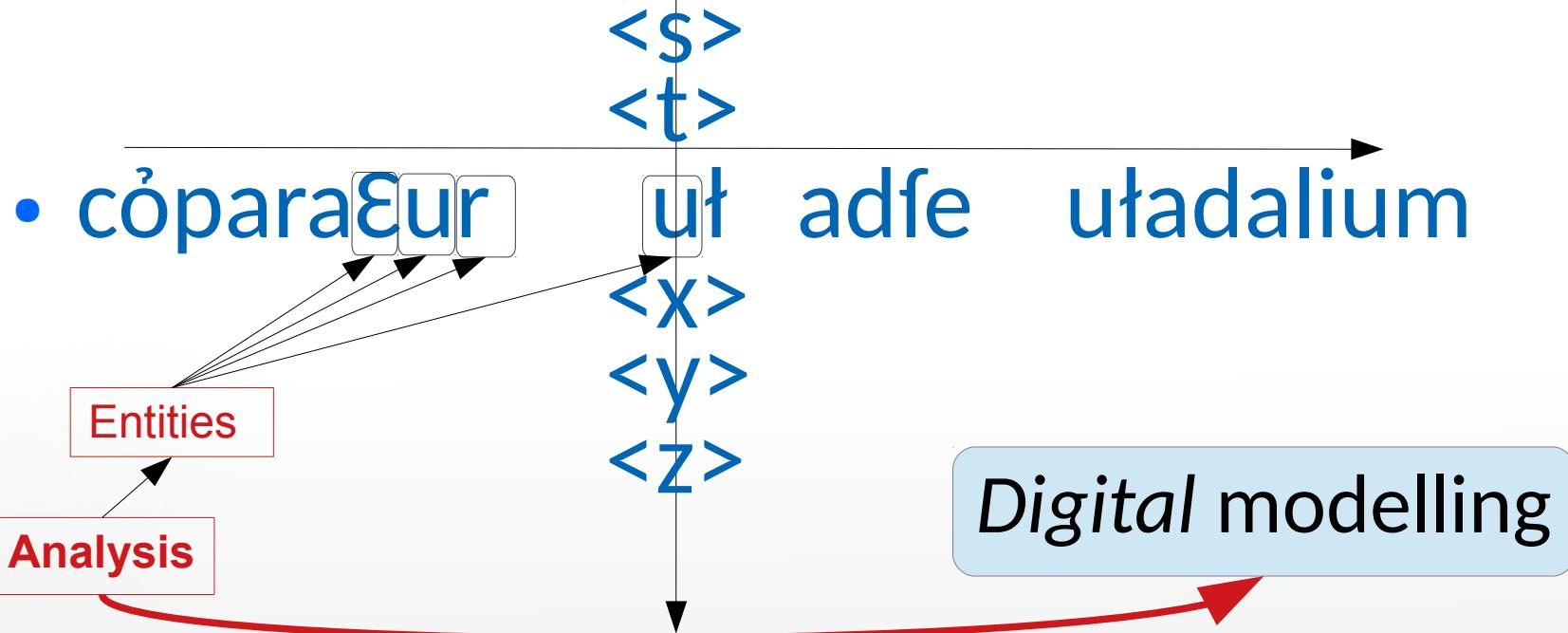


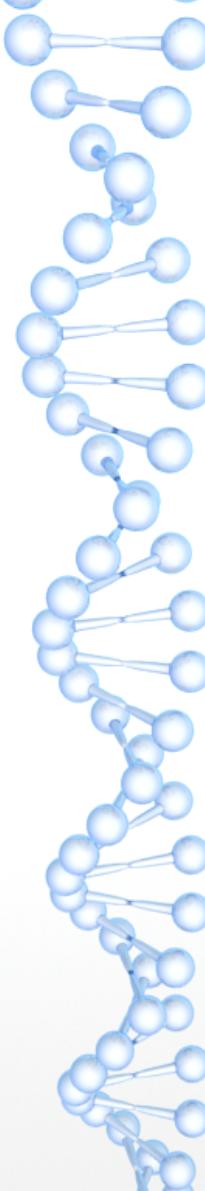
Modelling/“analysis”: entities



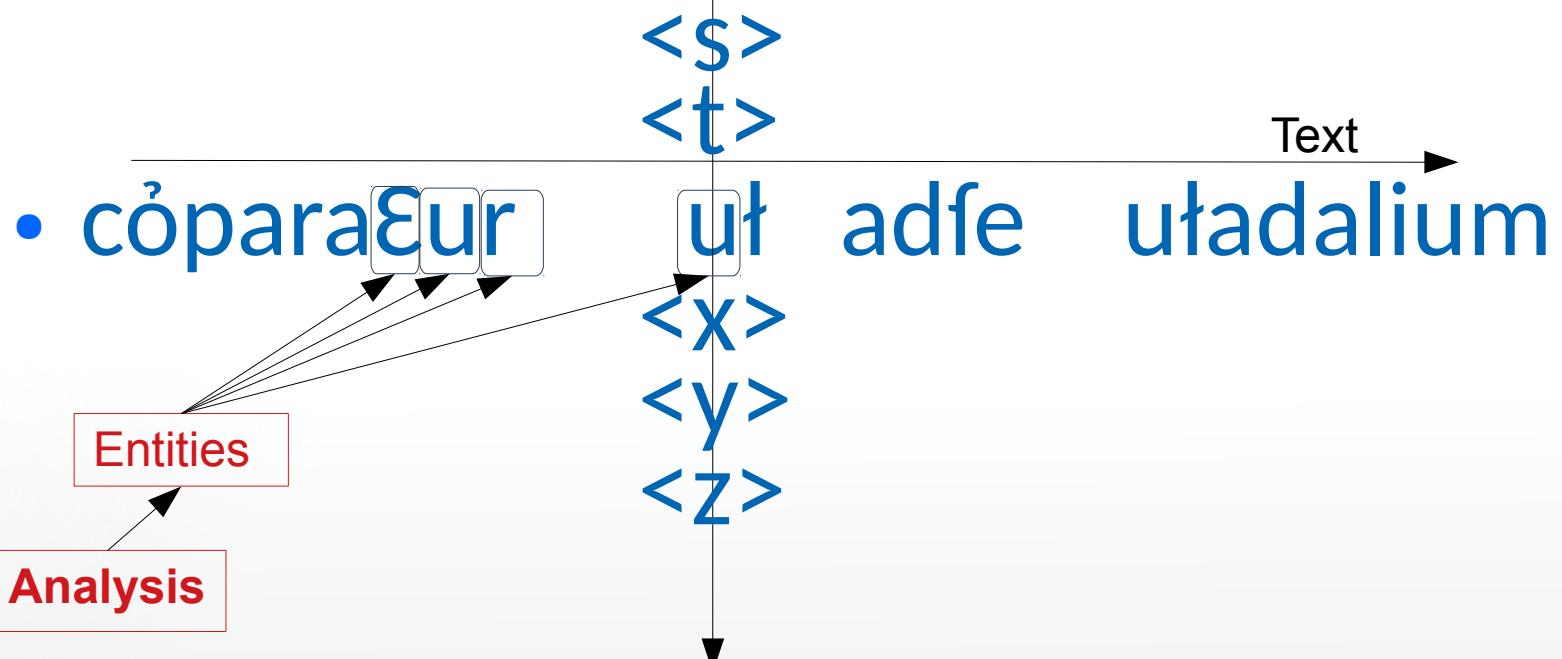


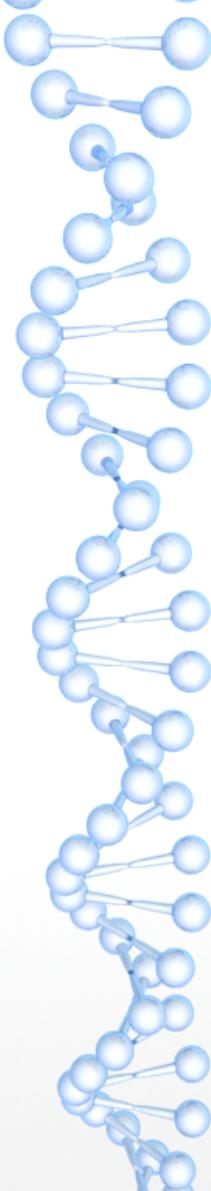
Modelling/“analysis”: entities



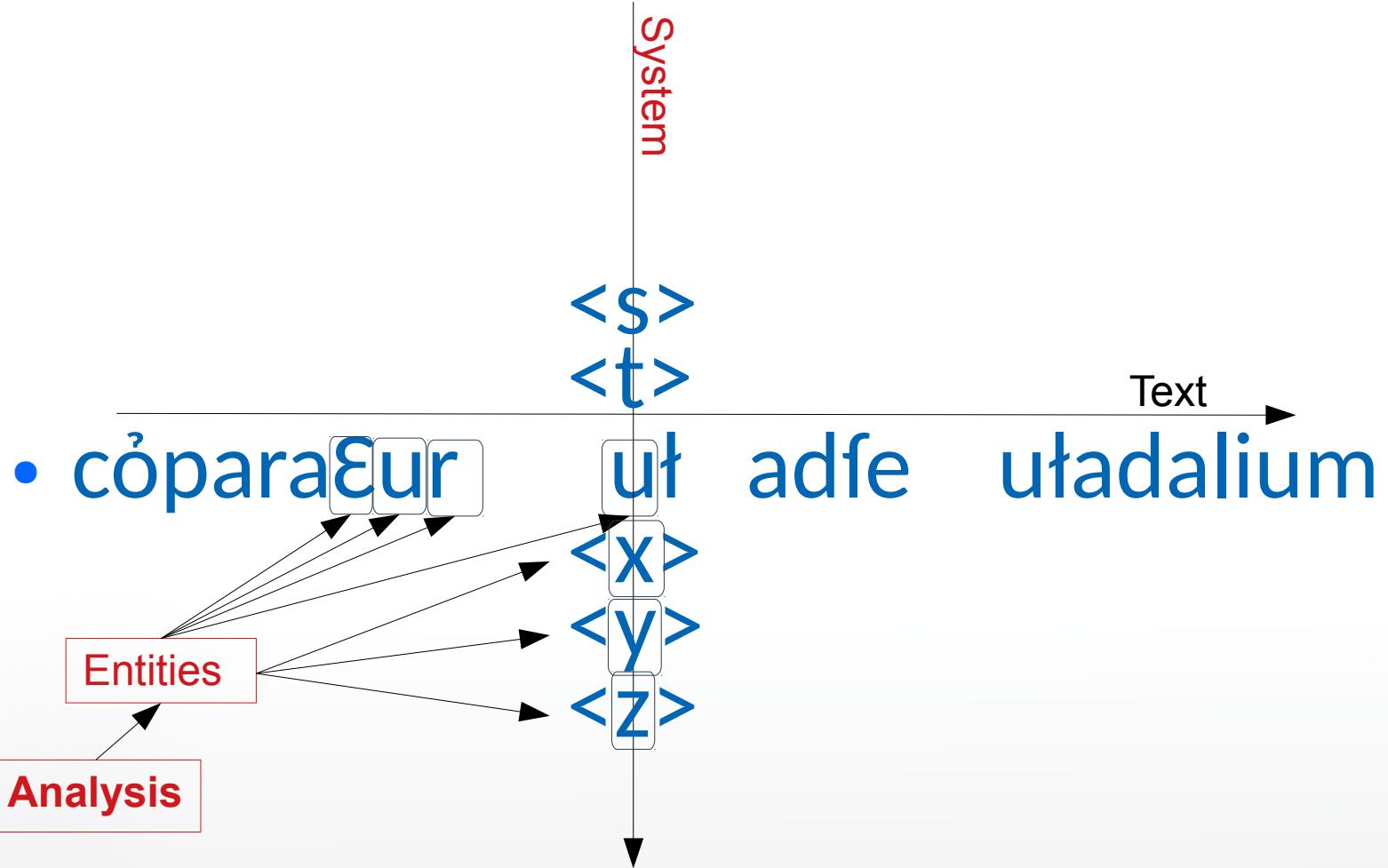


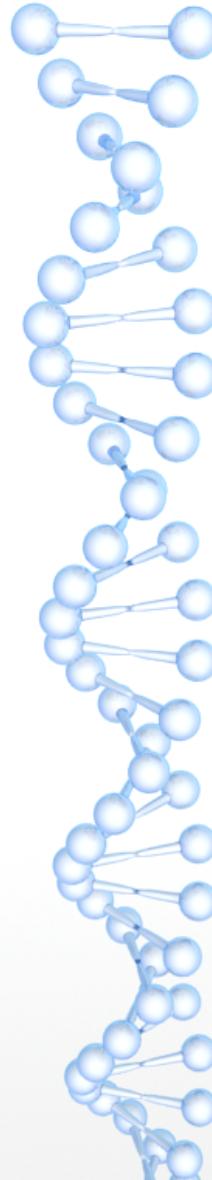
Modelling/“analysis”: entities



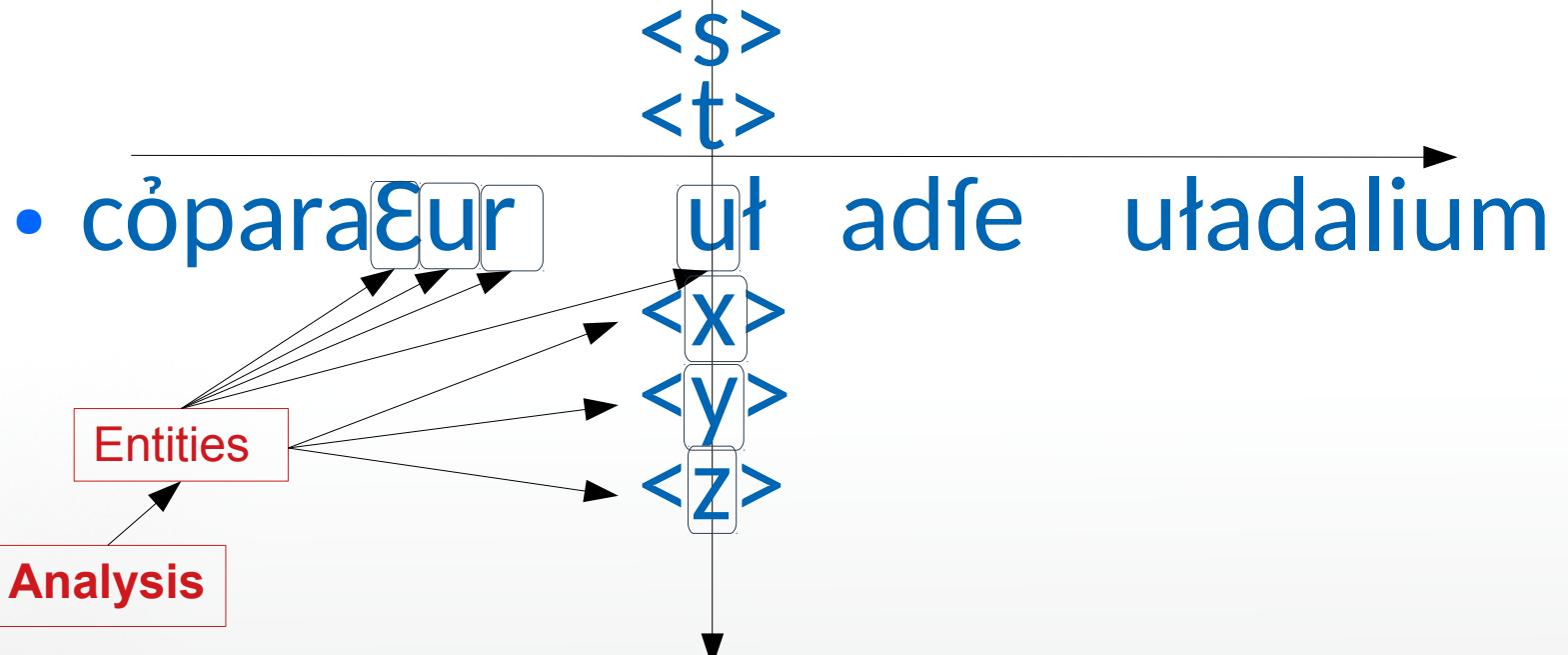


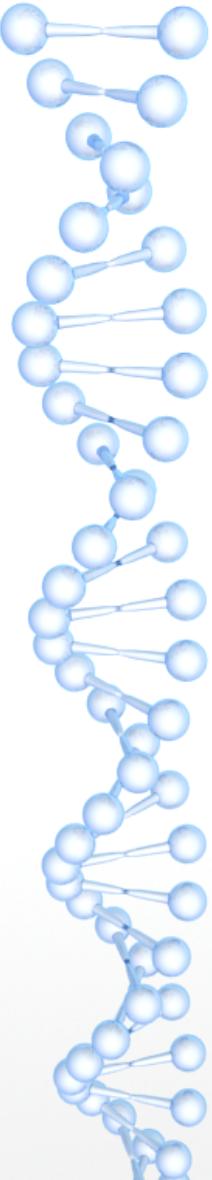
Modelling/“analysis”: entities



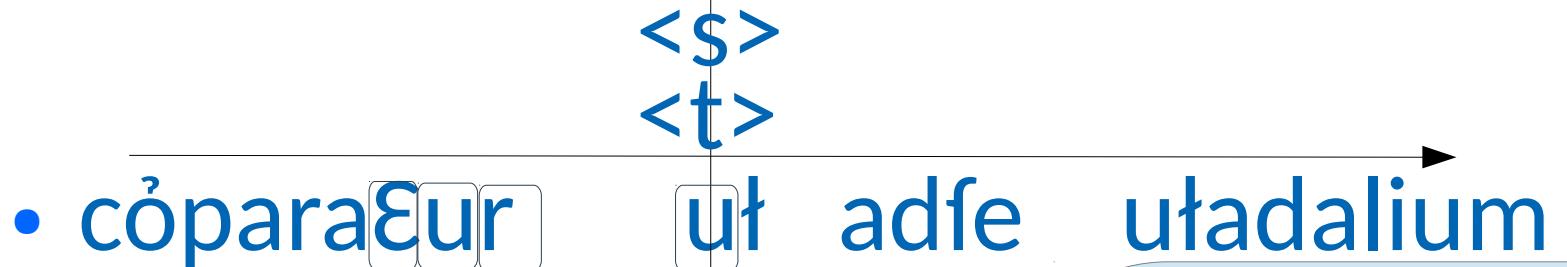


Graphemes as entities?

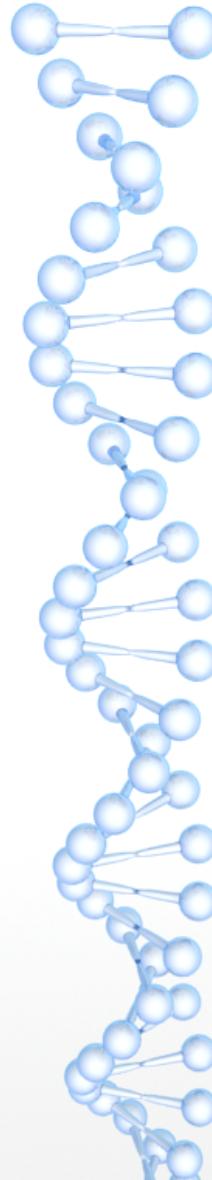




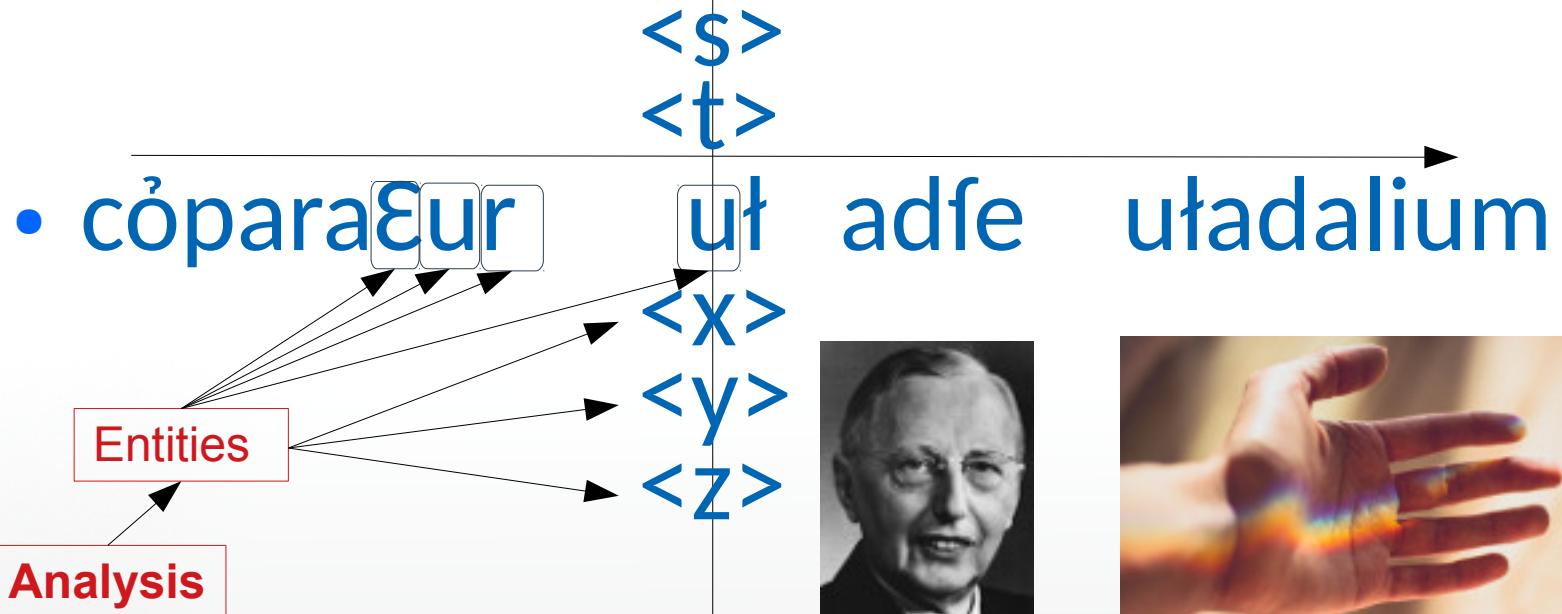
Graphemes as entities?

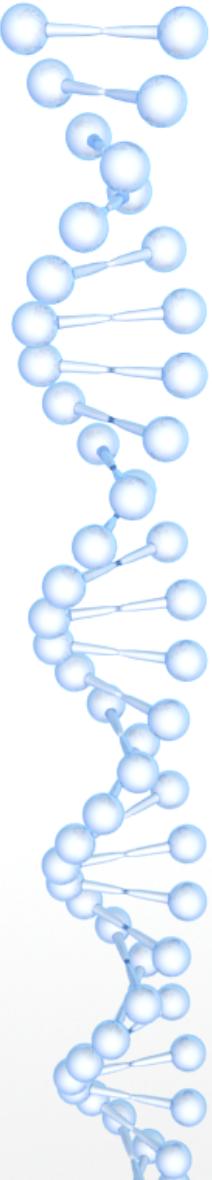


“Thus the same linguistic form may also be manifested in writing... Here is a graphic ‘substance’... Describing the actually present expression... system” (Prol. Ch. 21)



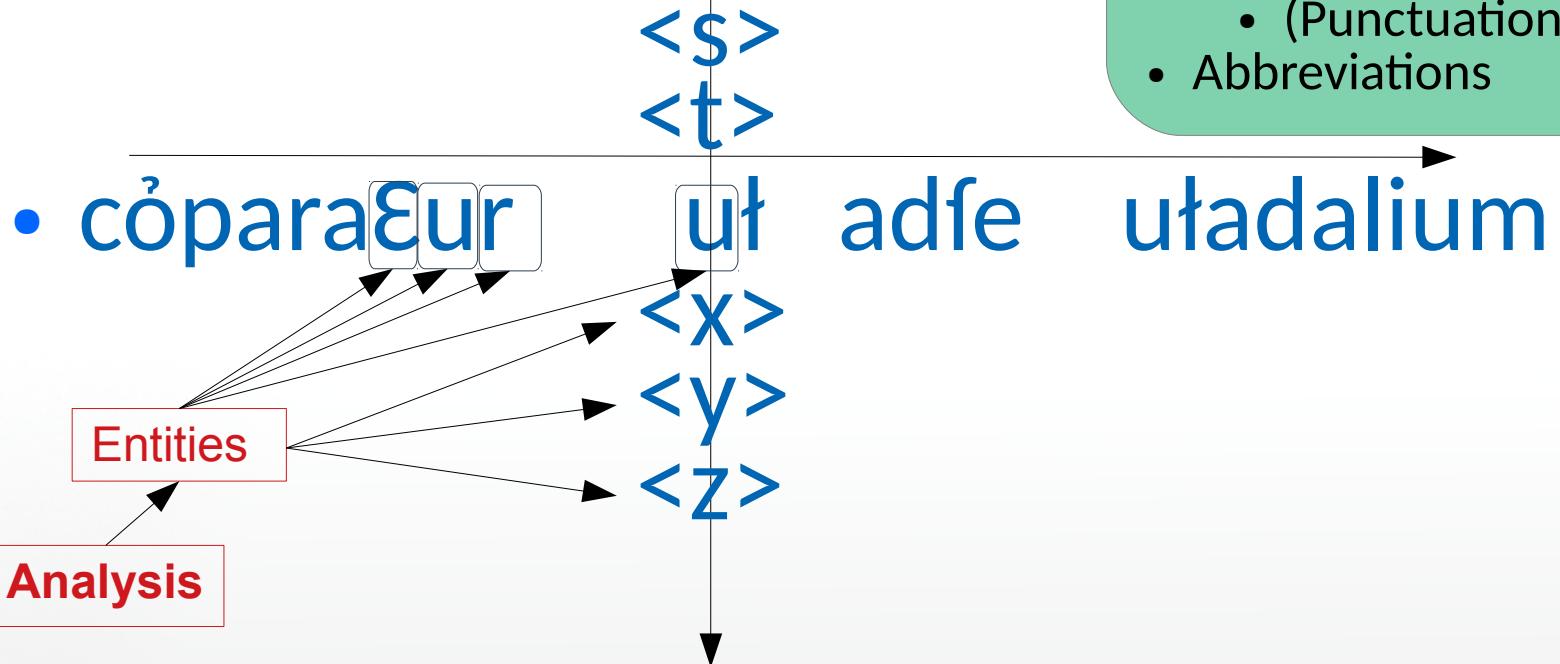
Graphemes as entities?

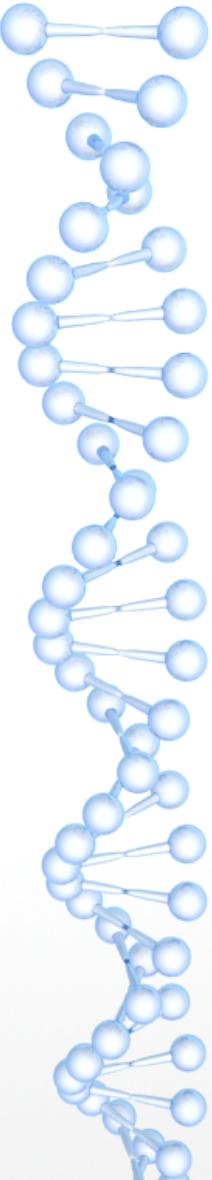




Graphemes as entities?

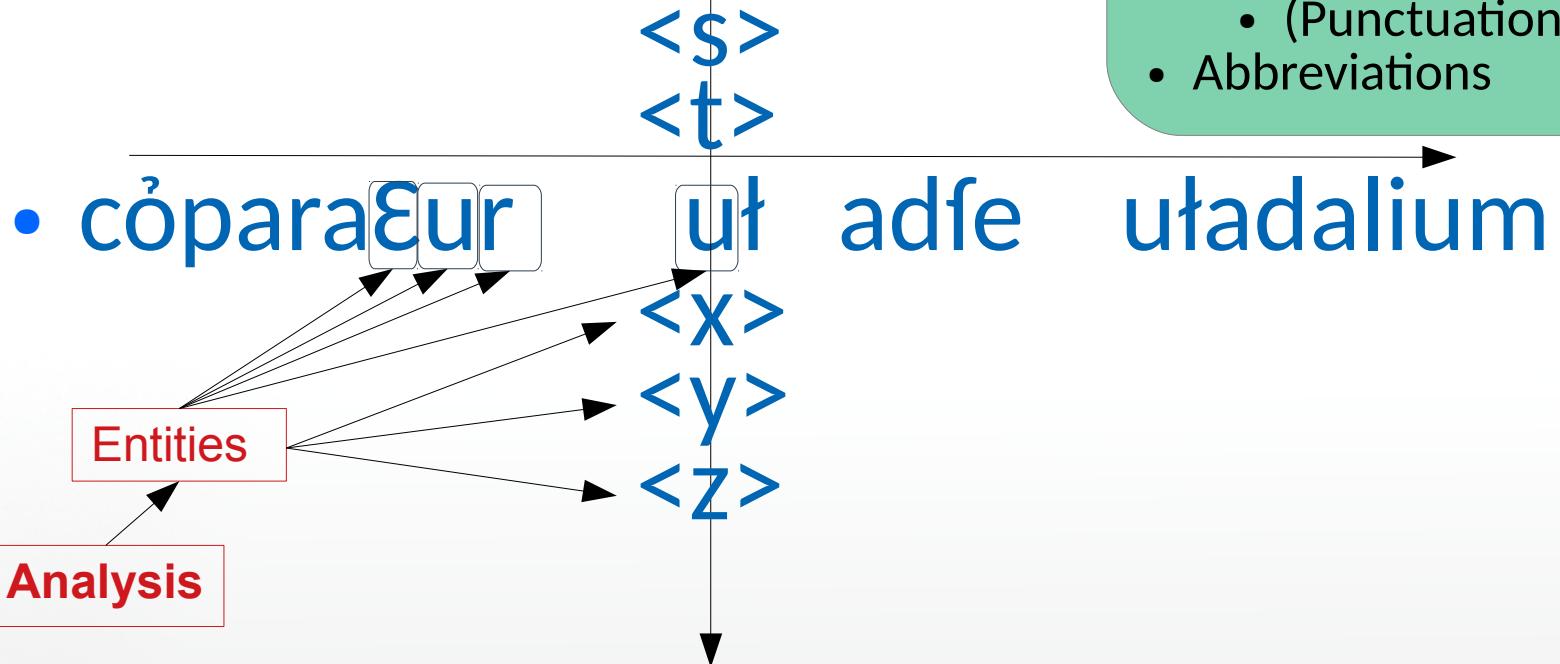
- Digital (discrete)
- Ligatures
- Allographs
 - (Capitalization)
- Grapheme set
 - (Punctuation)
- Abbreviations

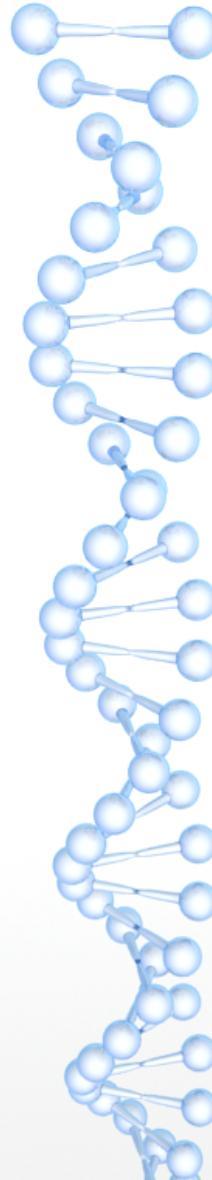




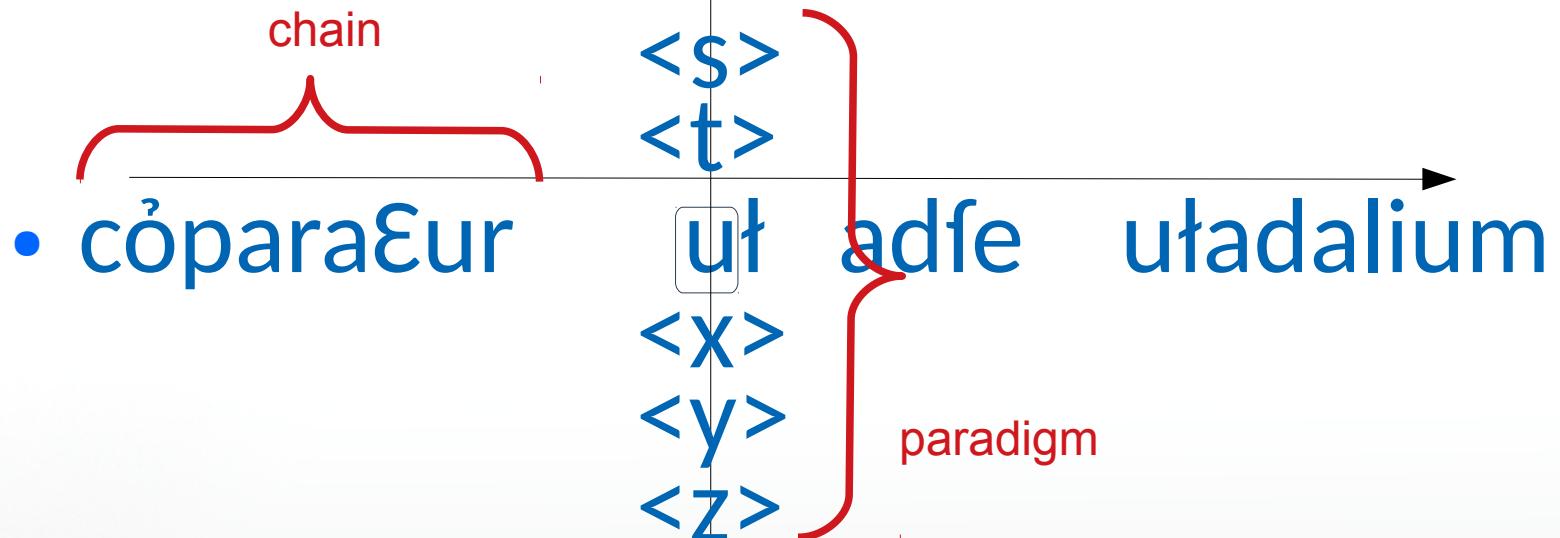
Graphemes as entities?

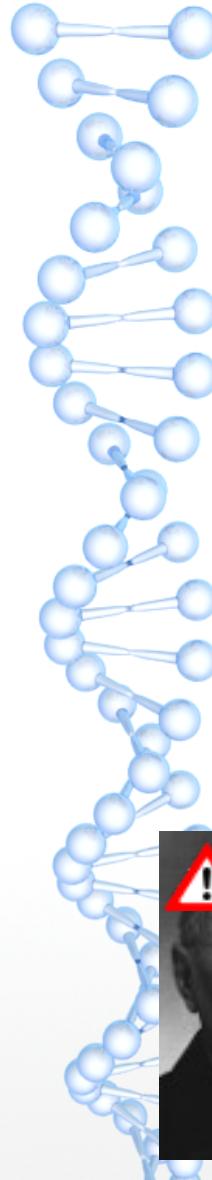
- Digital (discrete)
- Ligatures
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 - (Capitalization)
- Grapheme set
 - (Punctuation)
 - Abbreviations





Chains and paradigms

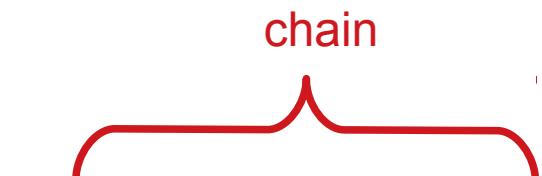




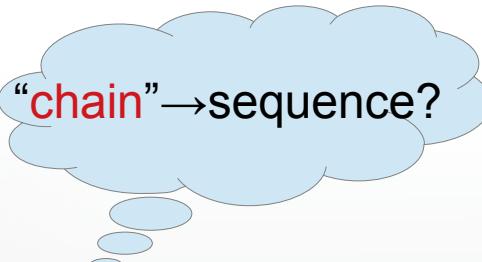
Chains and paradigms

• **cóparaEur**

chain



“chain” → sequence?



<S>
<t>

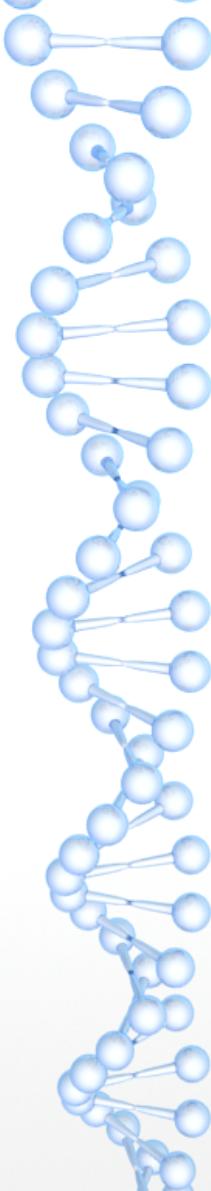
uł

<x>
<y>
<z>

adfe

paradigm

uładalium

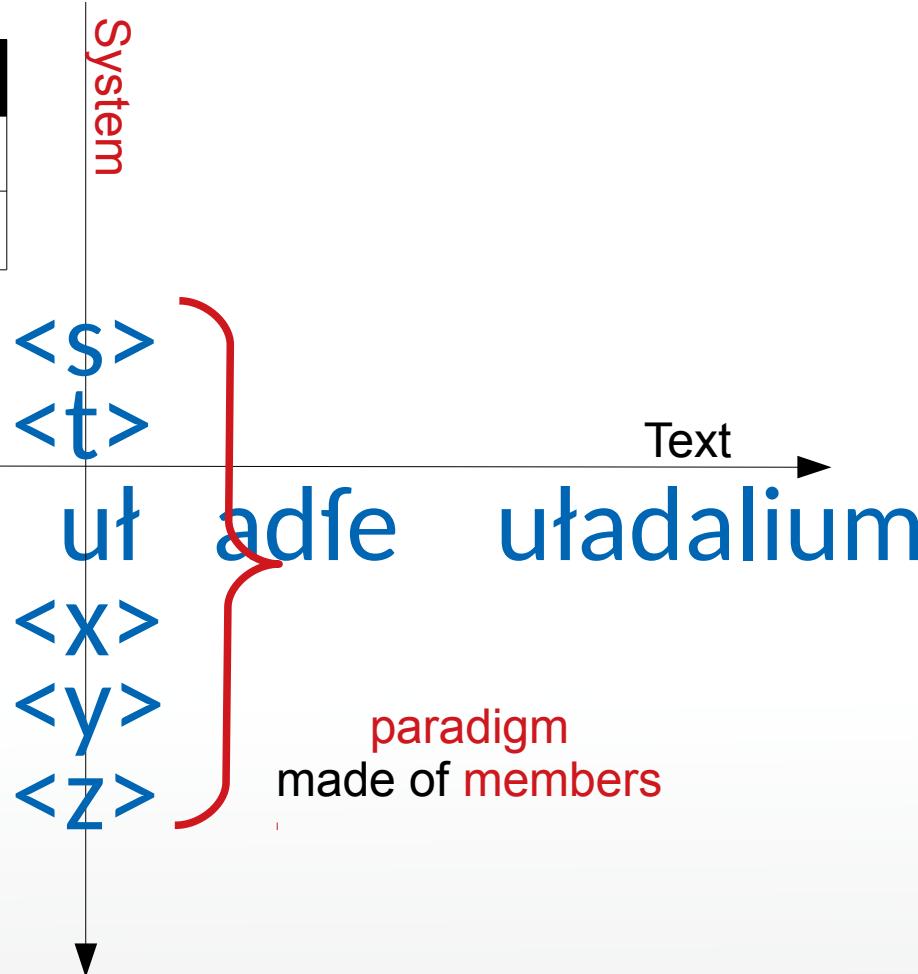


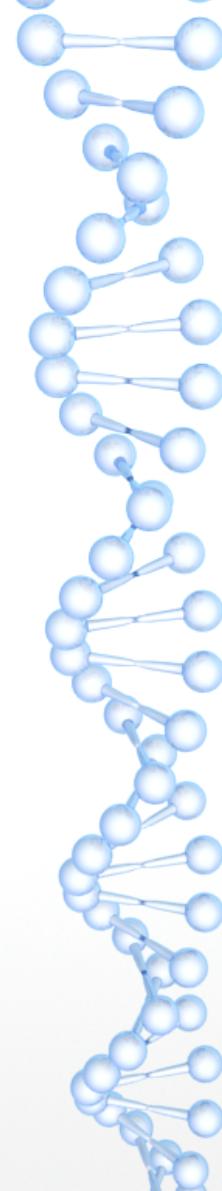
Classes: chains and paradigms

| class | components |
|----------|------------|
| chain | parts |
| paradigm | members |

- cóparaEur

chain
made of parts





Functions



- cóparaEur

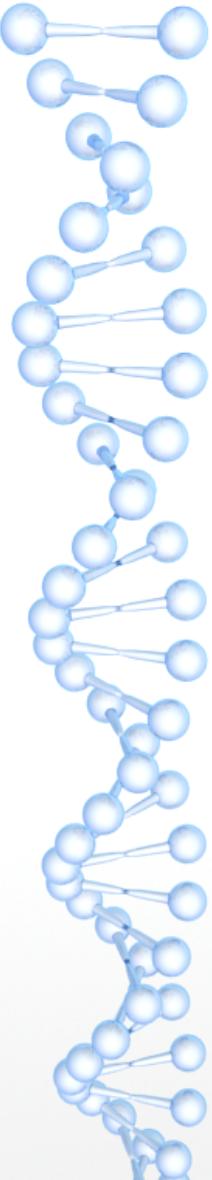
Function

<\$>
<t>

<x>
<y>
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uł adfe uładalium

Ligatures



Ligatures



- cóparaEur

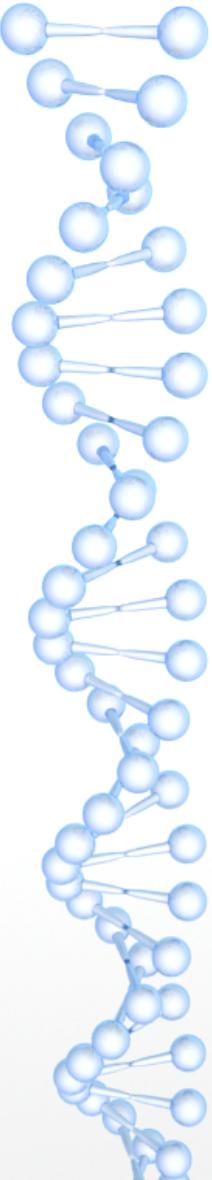
Function

“Ligature”
(entities, parts of a chain)

<\$>
<t>

<x>
<y>
<z>

uł adfe uładaliuṁ



Ligatures

Varieties

« σ »

- cóparaEUR

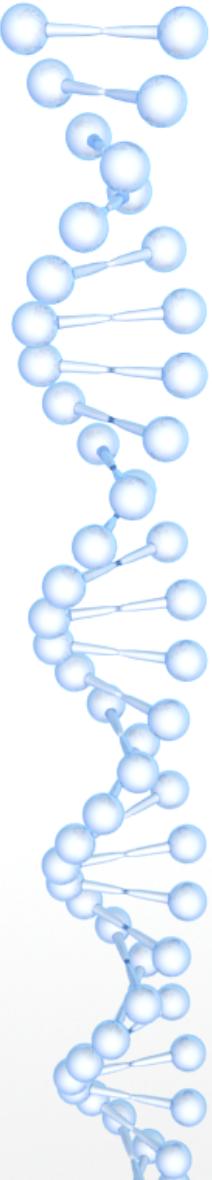
« ∇ »

$\langle \$ \rangle$
 $\langle t \rangle$

$\langle x \rangle$
 $\langle y \rangle$
 $\langle z \rangle$

uł adfe

uładalium



Ligatures

Varieties:
Solidal
variants

« σ »

- cóparaEur

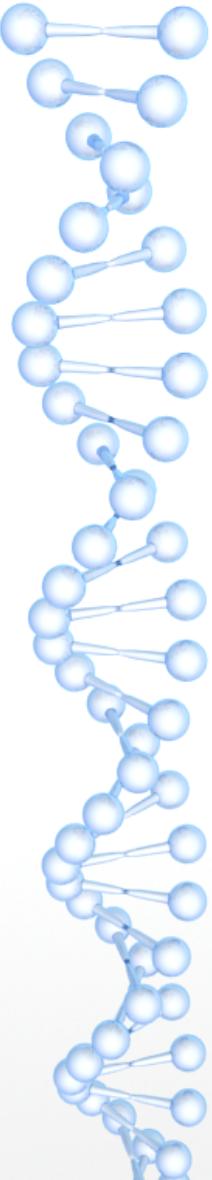
« γ »

$\langle \$ \rangle$
 $\langle t \rangle$

$\langle x \rangle$
 $\langle y \rangle$
 $\langle z \rangle$

uł adfe

uładalium



Ligatures



- Digital (discrete)
- Ligatures
- Allographs
 - (Capitalization)
- Grapheme set
 - (Punctuation)
- Abbreviations

Varieties:
Solidal
variants

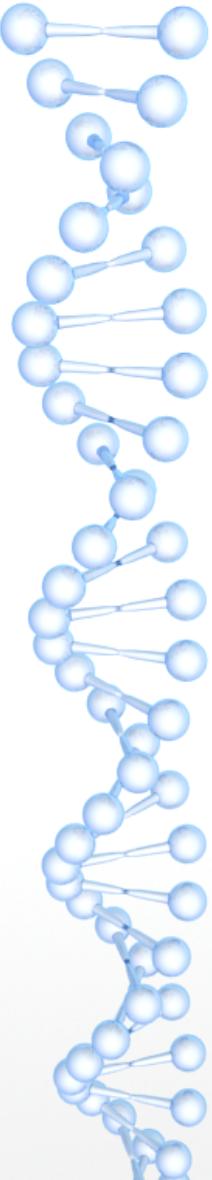
• cóparaEur

<\$>
<t>

<x>
<y>
<z>

uł adfe

uładalium



Ligatures

Varieties:
Solidal
variants

- cóparaEur

<\$>
<t>

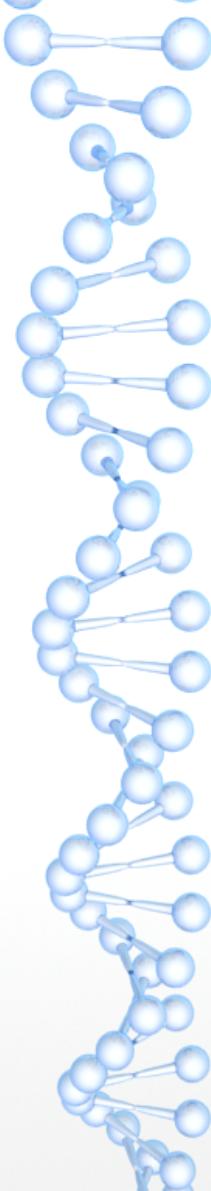
<x>
<y>
<z>

uł adfe

uładalium

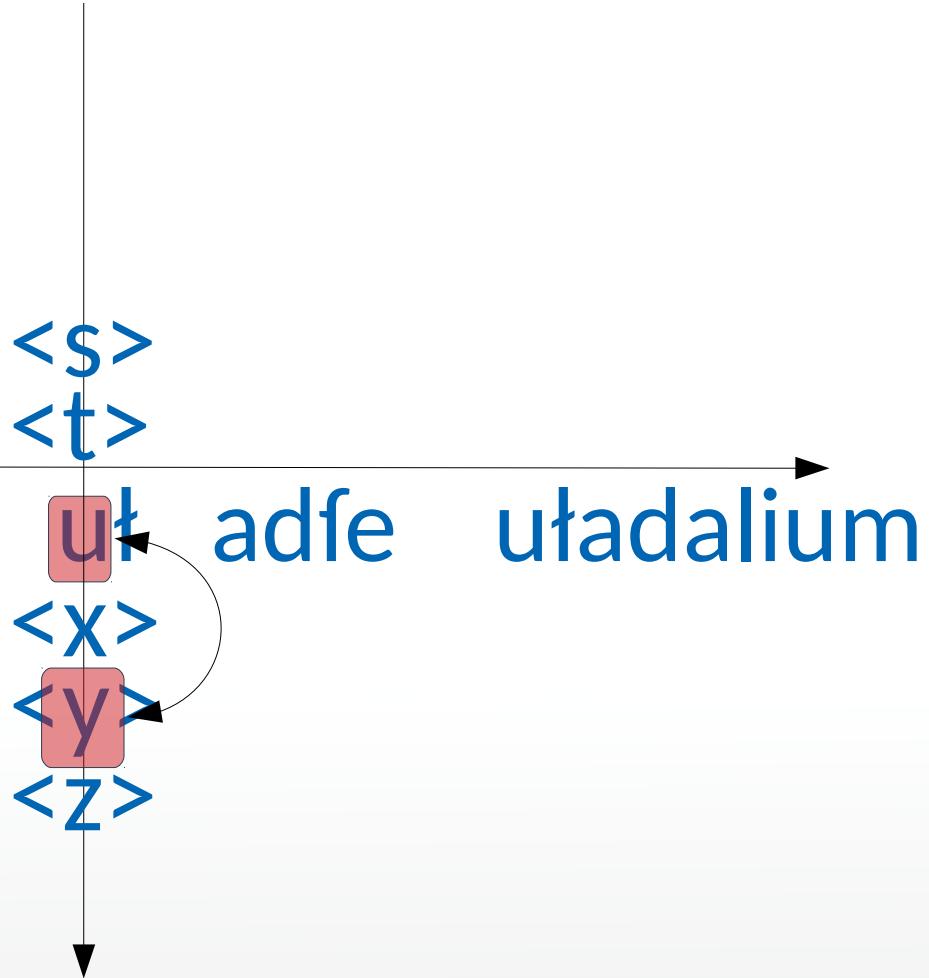
- Digital (discrete)
- Ligatures
 - Allographs
 - (Capitalization)
 - Grapheme set
 - (Punctuation)
 - Abbreviations

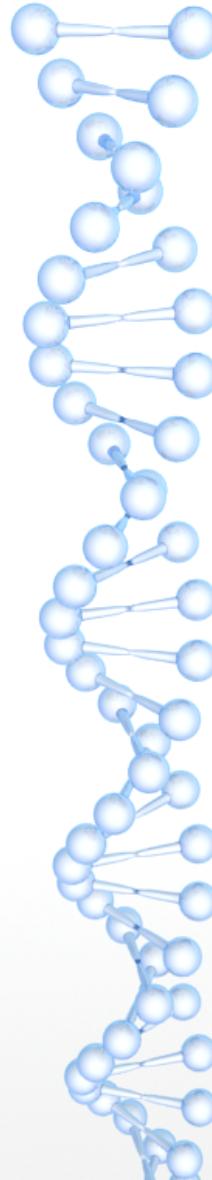
Graphemes/allographs



The commutation test

- cóparaEur



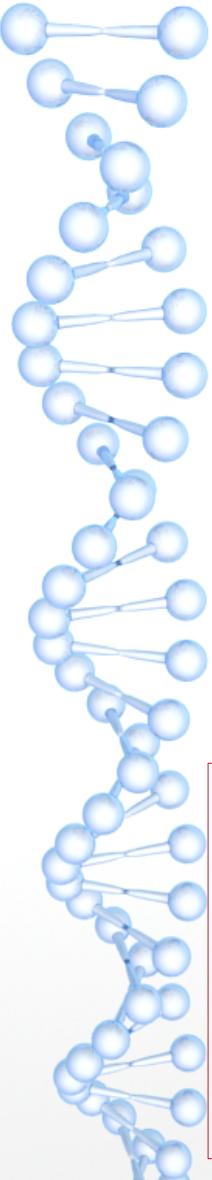


The commutation test

- cóparaEUR
 - « σ »
 - « $\sqrt{ }$ »
- $\langle \$ \rangle$
- $\langle t \rangle$
- $uł$
- $\langle x \rangle$
- y
- $\langle z \rangle$

adfe

ułdalium



The commutation test

- cóparaEur

Function

Substitution:
→ No change
in “meaning”

daEur / daσur

« σ »

«√»

$\langle \$ \rangle$
 $\langle t \rangle$

uł

$\langle x \rangle$

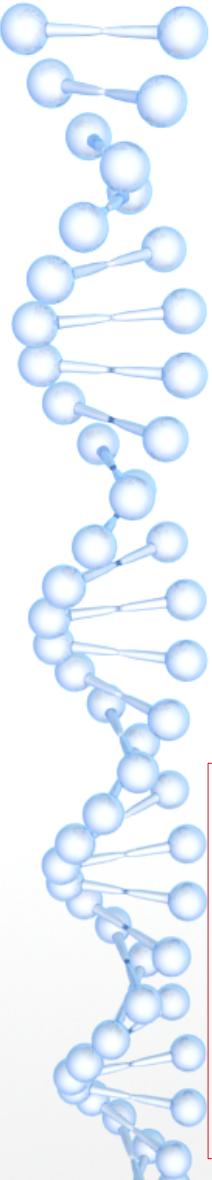
y
 $\langle z \rangle$

adfe uładalium

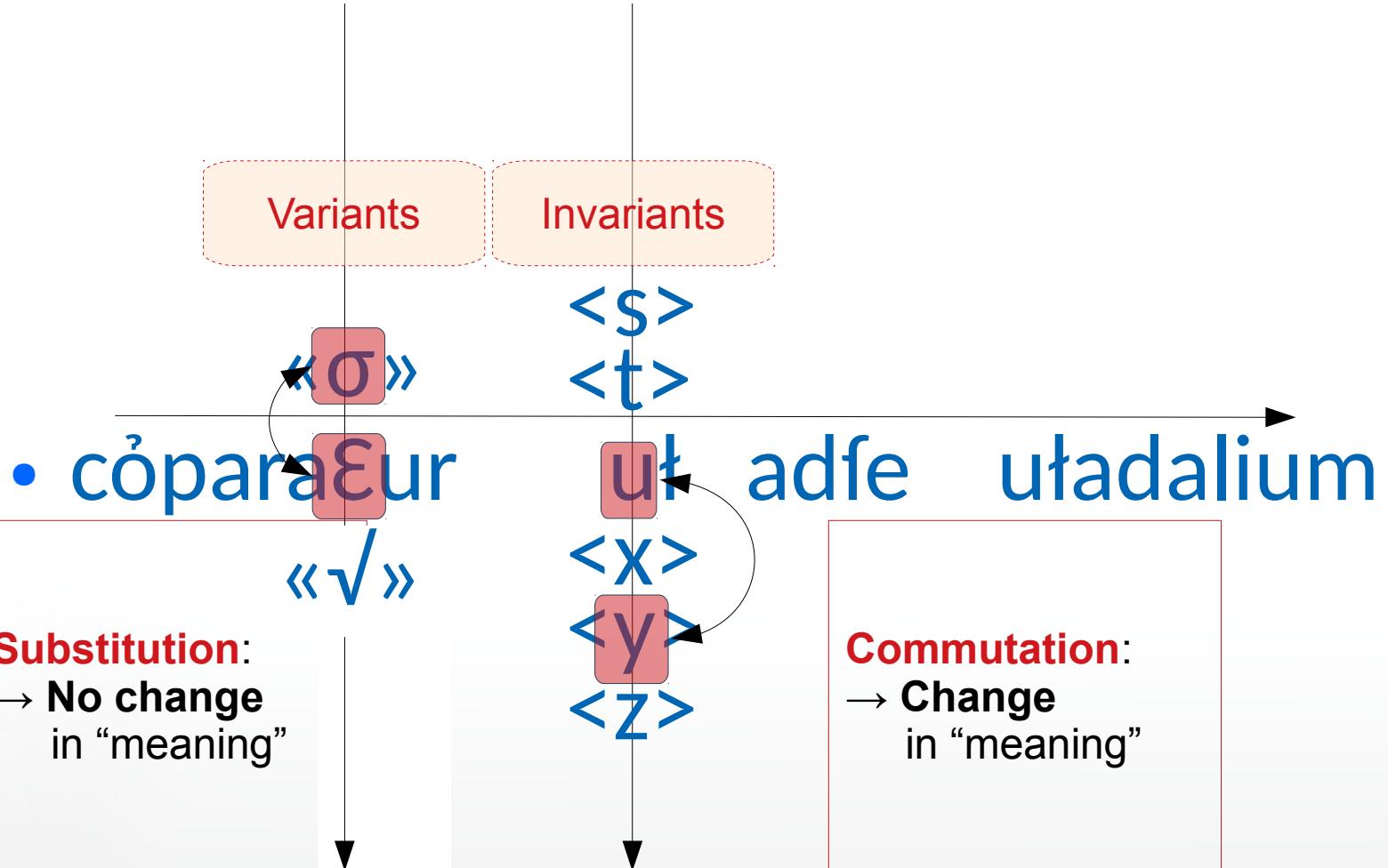
Function

Commutation:
→ Change
in “meaning”

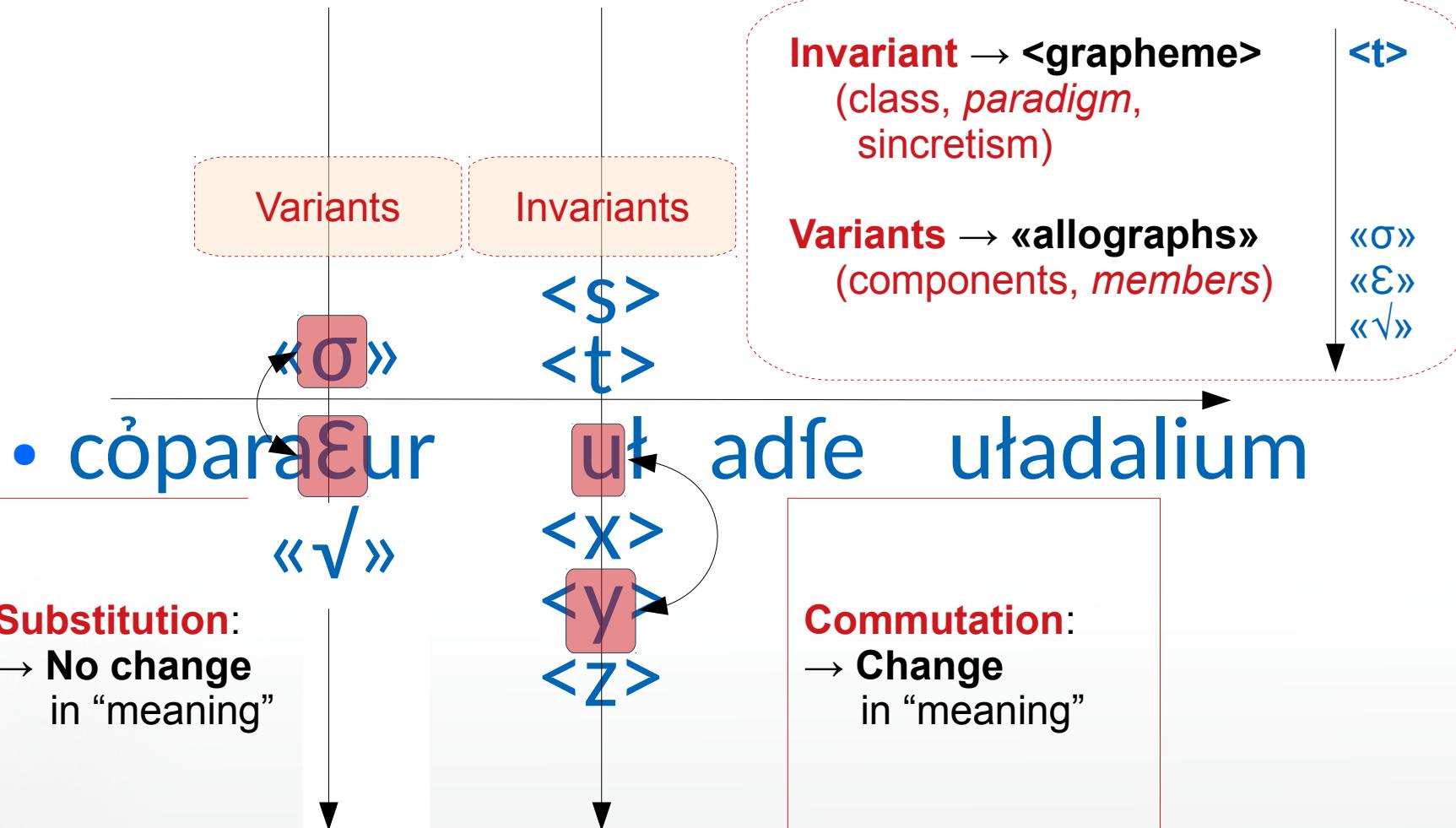
annus / annys

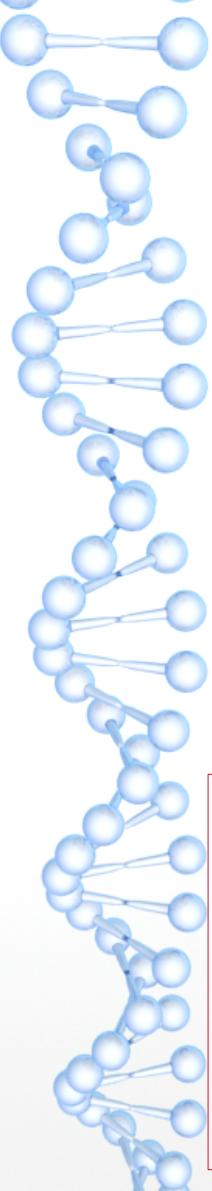


The commutation test

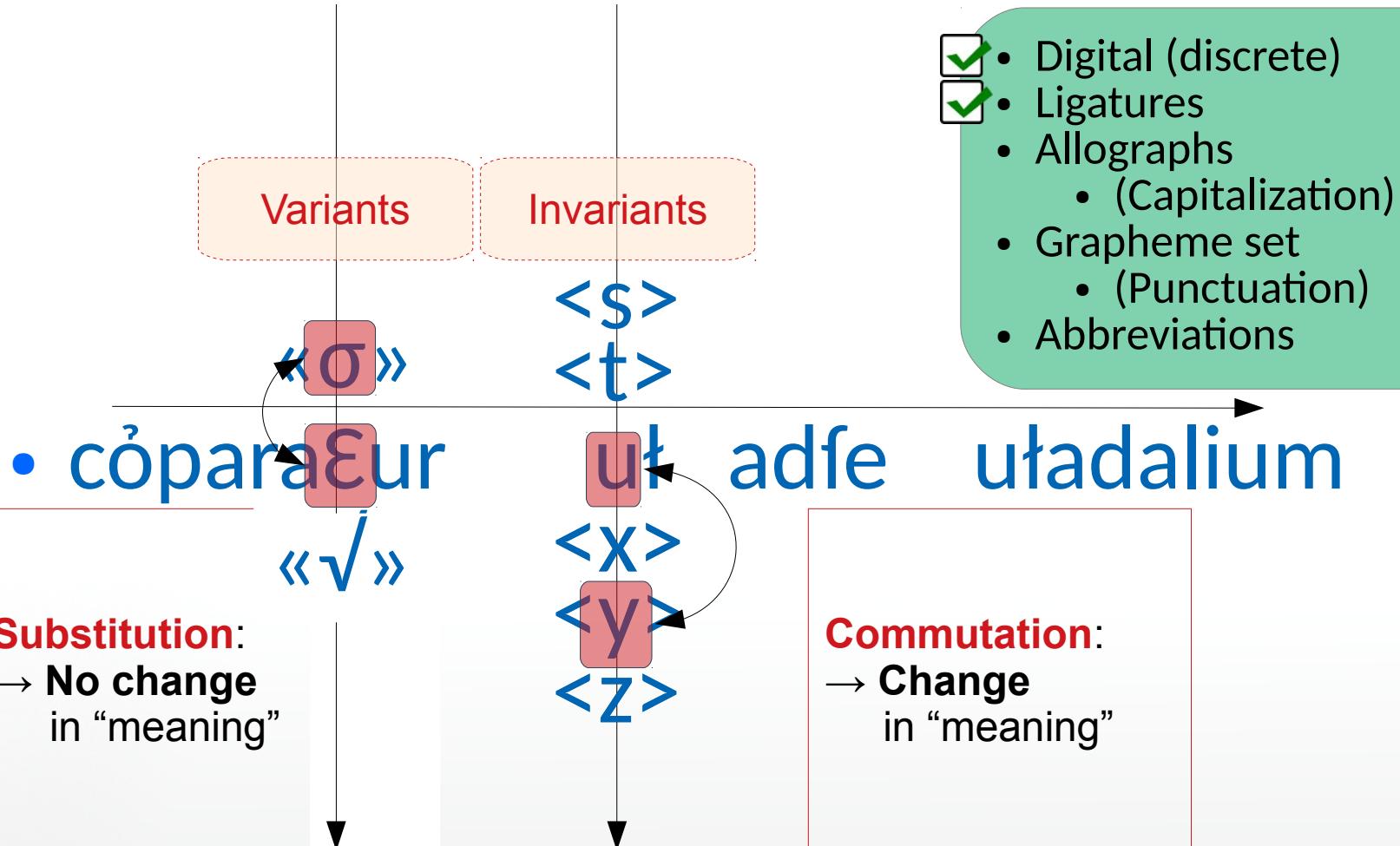


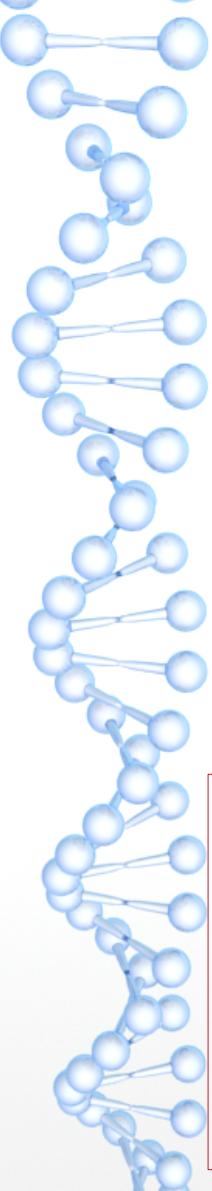
Graphemes / allographs



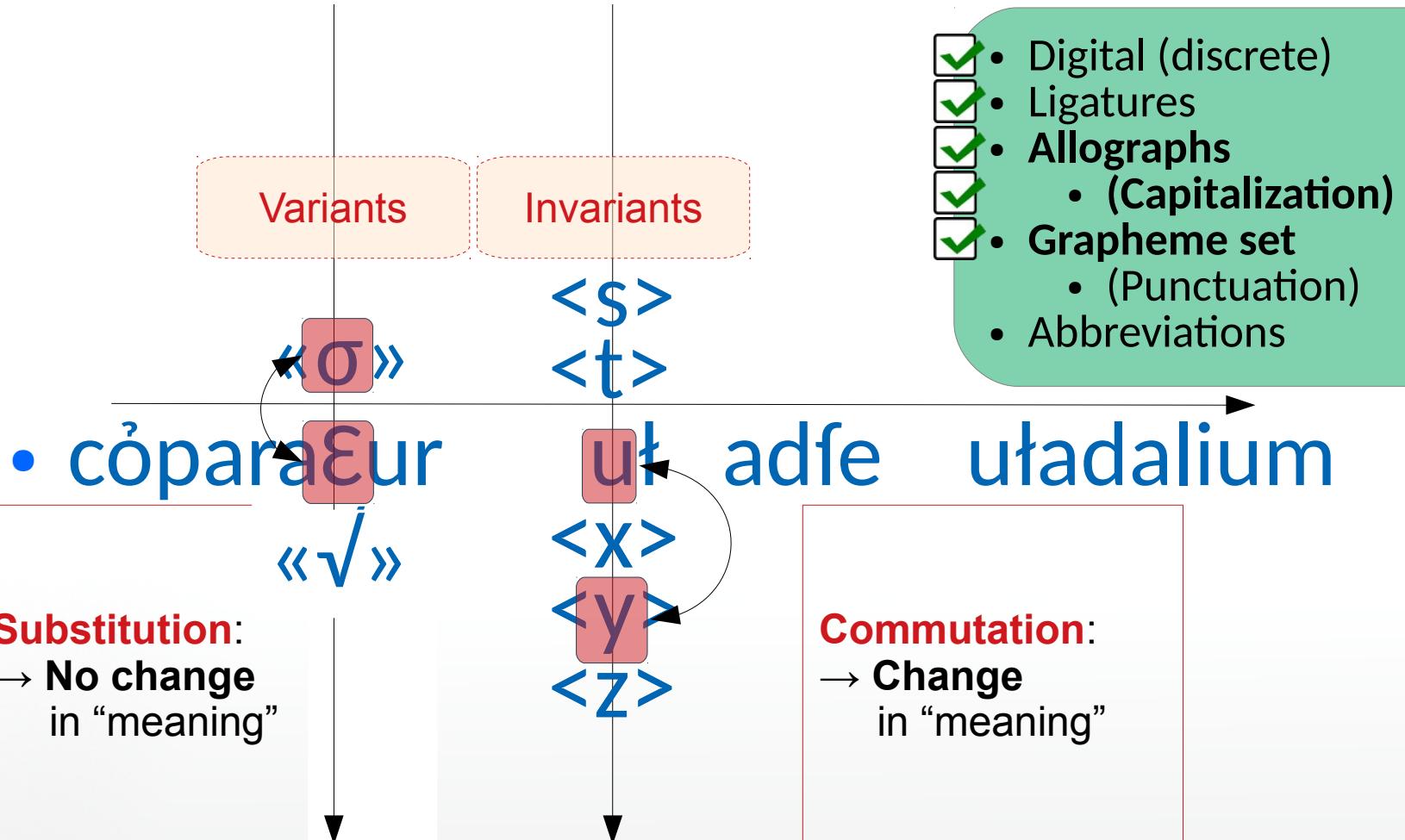


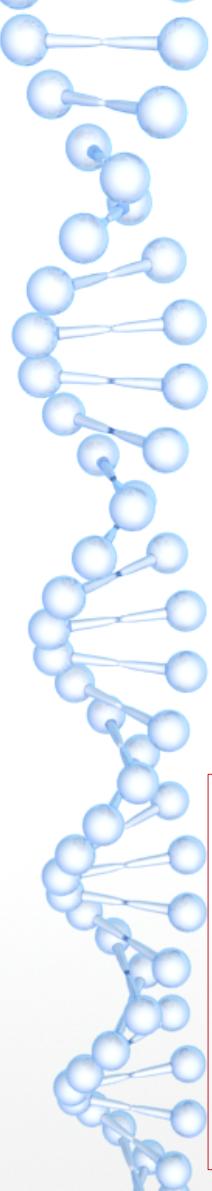
Graphemes / allographs



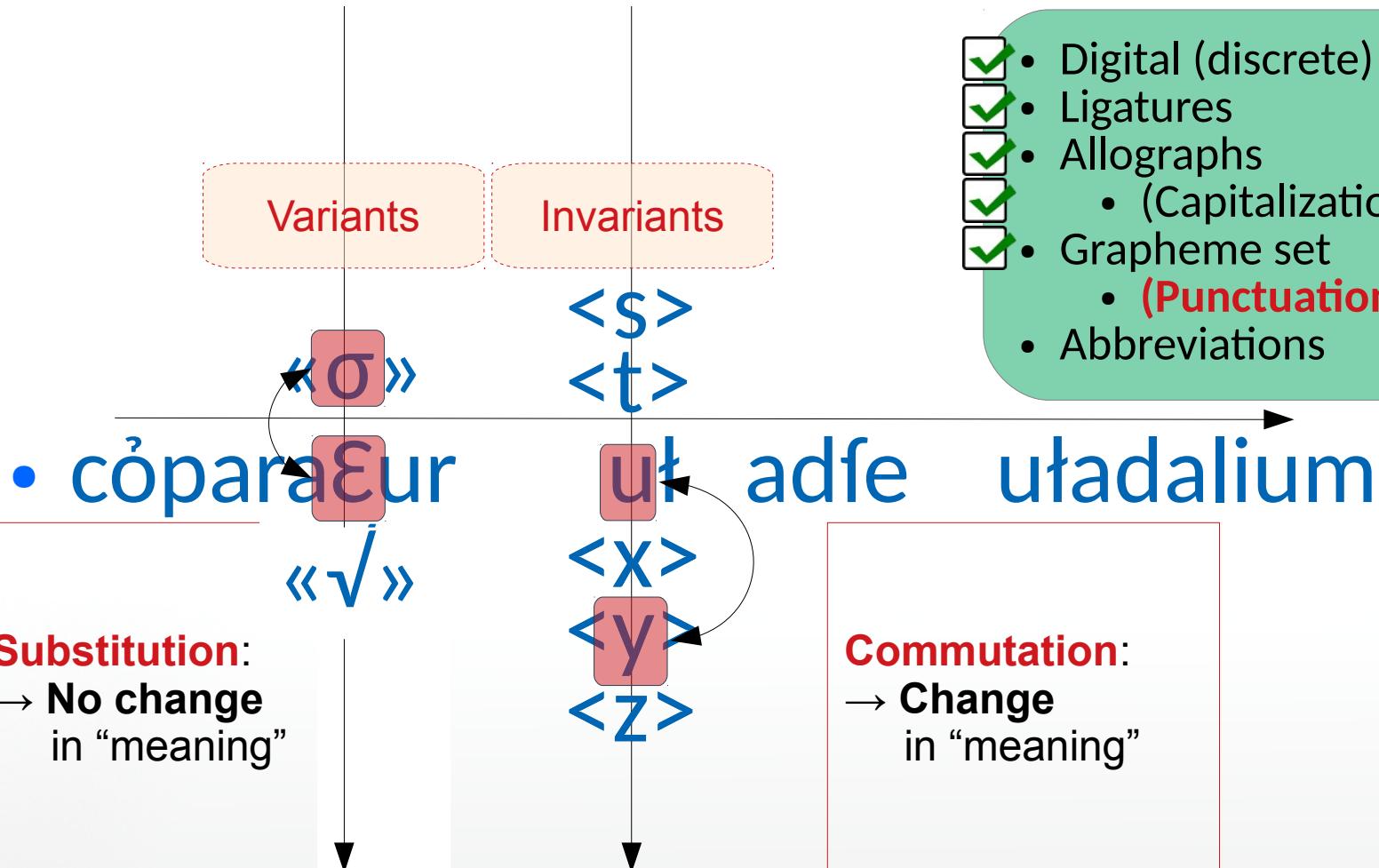


Graphemes / allographs



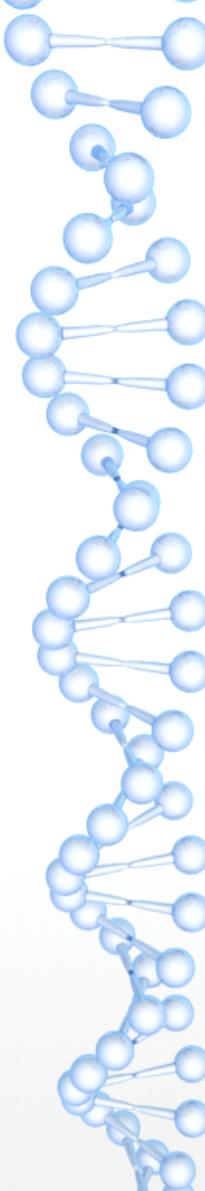


Graphemes / allographs



Punctuation

Punctuation



- cóparaEur

« σ »

«✓»

Substitution:
→ No change
in “meaning”

$\langle \$ \rangle$
 $\langle t \rangle$

uł

$\langle X \rangle$

y

$\langle Z \rangle$

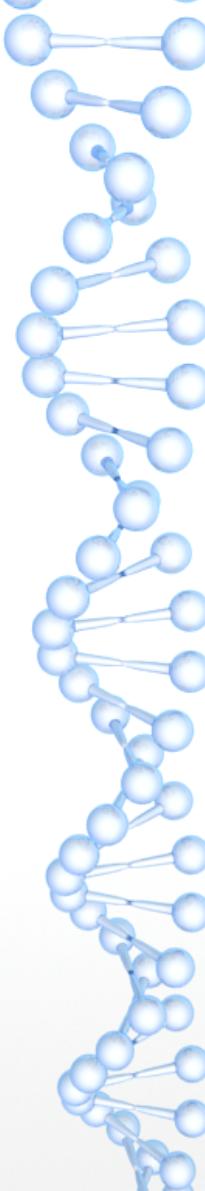
adfe uładarium



“content-form”
(Prol. Ch. 13)

Commutation:
→ Change
in “meaning”

Punctuation



• cóparaEur

« σ »

«✓»

Substitution:
→ No change
in “meaning”

<\$>
<t>

uł

<x>

y

<z>

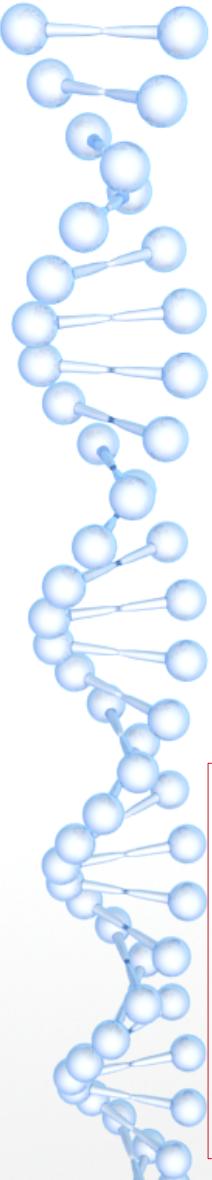
adfe uładarium



“content-form”
(Prol. Ch. 13)

Including larger units, such as sentences

Commutation:
→ Change
in “meaning”



Punctuation



“content-form”
(Prol. Ch. 13)

Including larger units, such as sentences

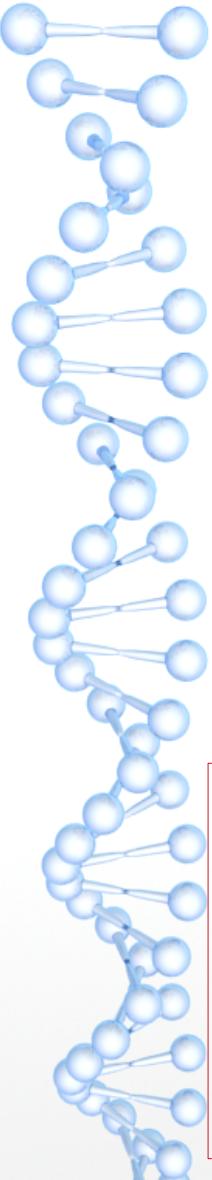
Truly I tell you, today you will be with me in paradise

Truly I tell you today, you will be with me in paradise

Substitution:
→ No change
in “meaning”

Commutation:
→ Change
in “meaning”





Punctuation



“content-form”
(Prol. Ch. 13)

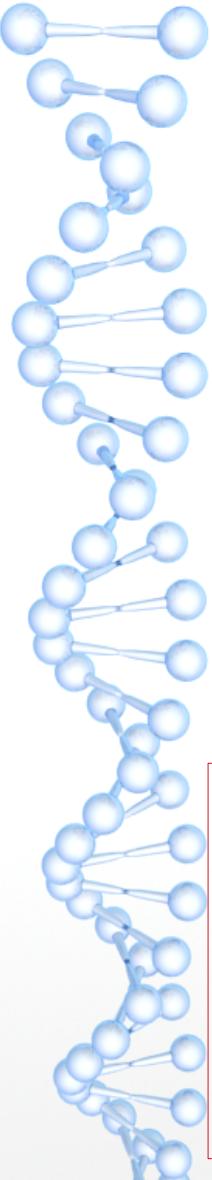
Including larger units, such as sentences

Truly I tell you, today you will be with me in paradise

Truly I tell you today, you will be with me in paradise

Substitution:
→ No change
in “meaning”

Commutation:
→ Change
in “meaning”



Punctuation

• cóparaEur

« σ »

«✓»

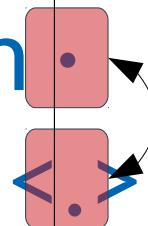
Substitution:
→ No change
in “meaning”

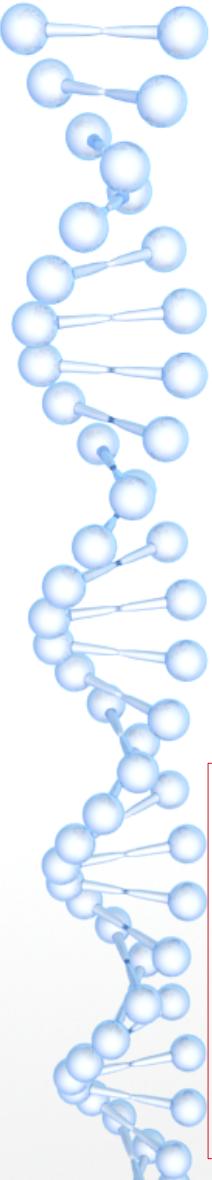
$\langle \$ \rangle$
 $\langle t \rangle$

$\langle x \rangle$
 $\langle y \rangle$
 $\langle z \rangle$

uł adfe uładaliuṁ

Commutation:
→ Change
in “meaning”





Punctuation

• cóparaEur

«σ»

«√»

Substitution:
→ No change
in “meaning”

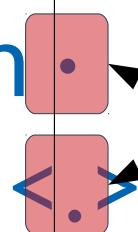
$\langle \$ \rangle$
 $\langle t \rangle$

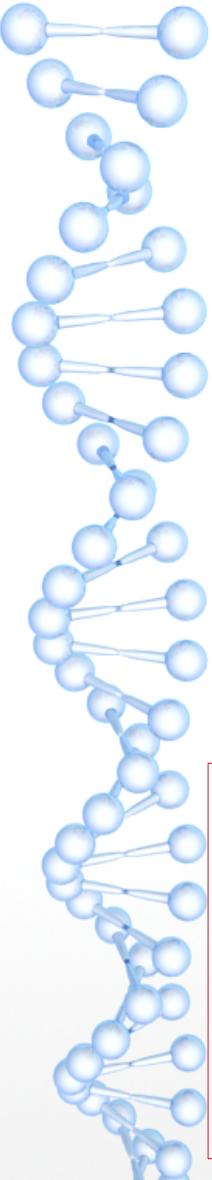
$\langle x \rangle$
 $\langle y \rangle$
 $\langle z \rangle$

uł adfe uładaliuum

- Digital (discrete)
- Ligatures
- Allographs
 - (Capitalization)
- Grapheme set
 - (Punctuation)
 - Abbreviations

Commutation:
→ Change
in “meaning”





Punctuation

• cóparaEur

«σ»

«√»

Substitution:
→ No change
in “meaning”

<S>
<t>

<x>
<y>
<z>

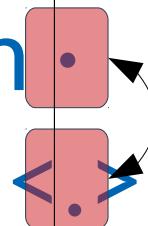
uł

adfe

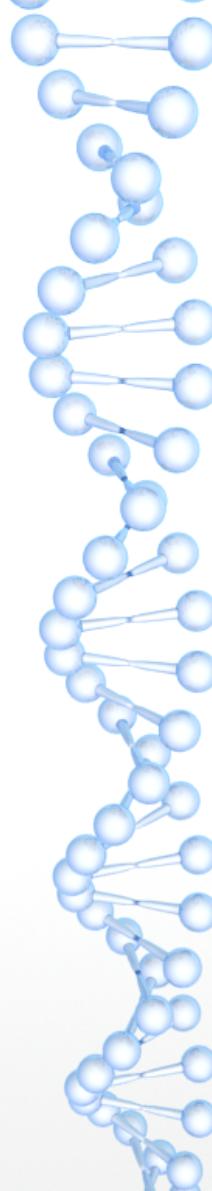
uładalium

- Digital (discrete)
- Ligatures
- Allographs
 - (Capitalization)
- Grapheme set
 - (Punctuation)
- Abbreviations

Commutation:
→ Change
in “meaning”

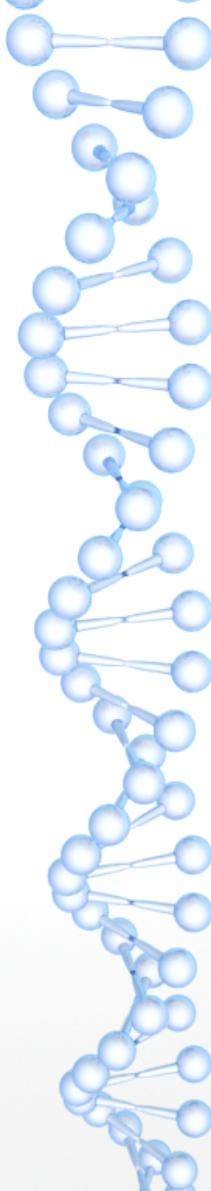


Abbreviations



Abbreviations

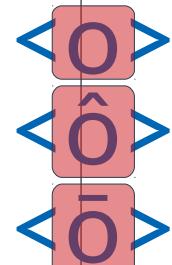
- coparaEur uł adfe uładalium



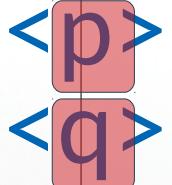
Abbreviations: one grapheme?

1. One **entity**

- Whole abbreviation = grapheme (**invariant**)

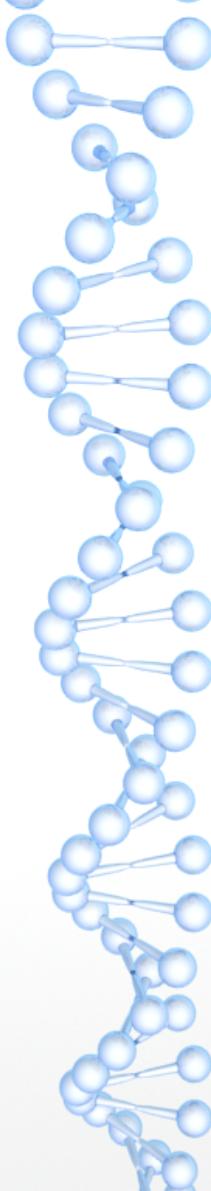


- coparaEur



uł adfe uładalium





Abbreviations: one grapheme?

- coparaEur

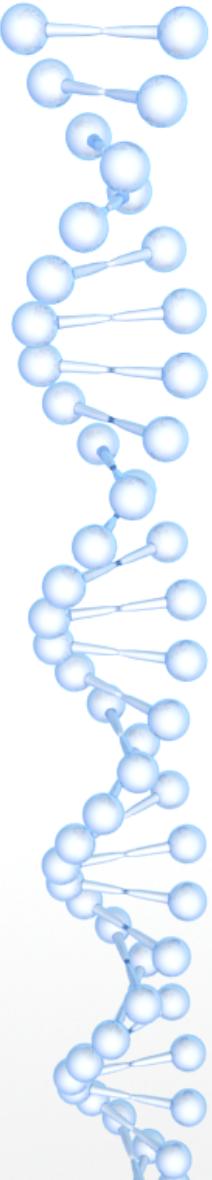
<p>
<q>



uł adfe uładalim



Principles: **simplicity**,
economy, **reduction**
(Prol. Ch. 6)
“lowest possible number
of elements” (Ch. 13)



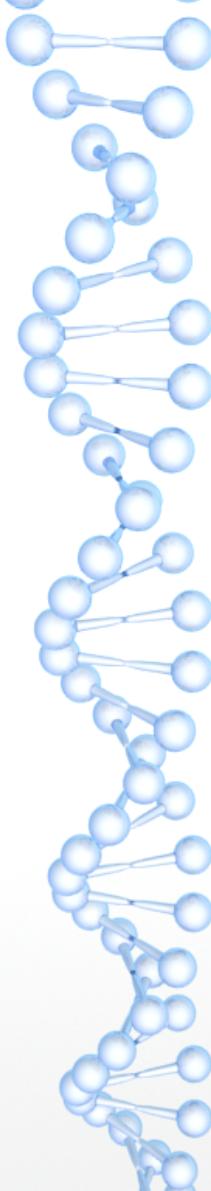
Abbreviations: function

1. One **entity**
- Whole abbreviation = grapheme (**invariant**)
2. Two **entities (function)**

• coparaEur uł adfe uładalium

Function

(entities)



Abbreviations: function → ligature?

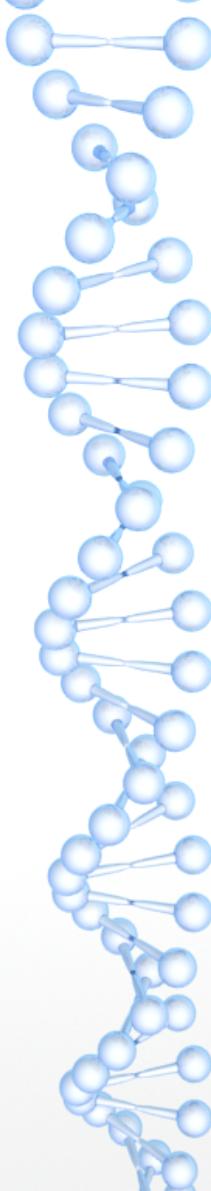
1. One **entity**
- Whole abbreviation = grapheme (**invariant**)
2. Two **entities (function)**
2A. Ligature (**solidal variants** in a chain)

• coparaEur uł adfe uładalium

Function

“Ligature”
(**Solidal variants**)





Abbreviations: function → ligature?

1. One **entity**
- Whole abbreviation = grapheme (**invariant**)
2. Two **entities (function)**
2A. Ligature (**solidal variants** in a chain)

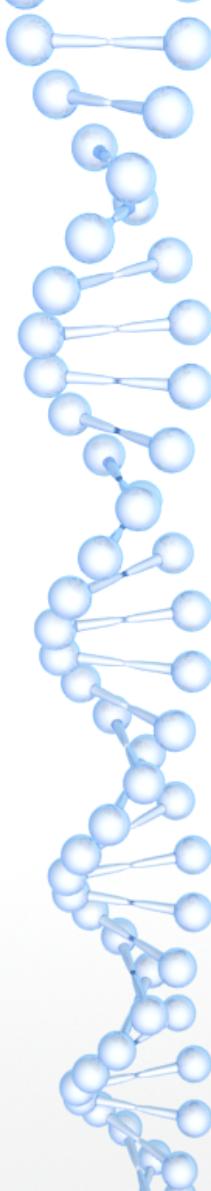
• coparaEur uł adfe uładalium

Function

“Ligature”
(**Solidal variants**)

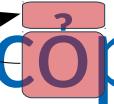


Solidal: both mandatory



Abbreviations: function → selection?

1. One **entity**
- Whole abbreviation = grapheme (**invariant**)
2. Two **entities (function)**
 - 2A. Ligature (**solidal variants in a chain**)
 - 2B. **Selection** (one governs the other)

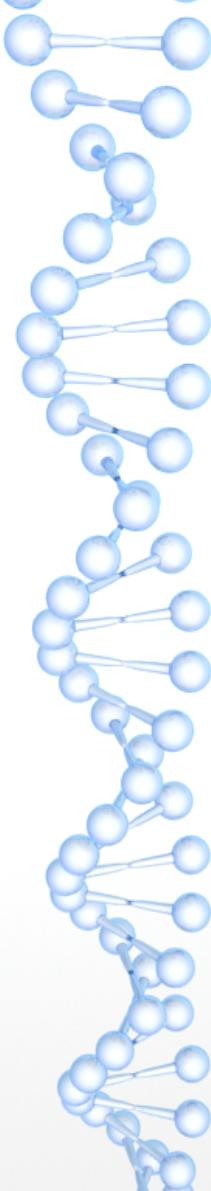
•  coparaEur uł adfe uładalium

Function

Selection:

- one is optional
- one governs the other





Abbreviations: function → selection?

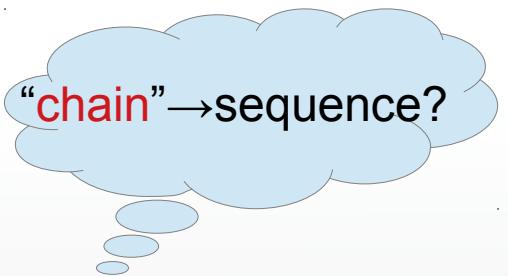
• coparaEur

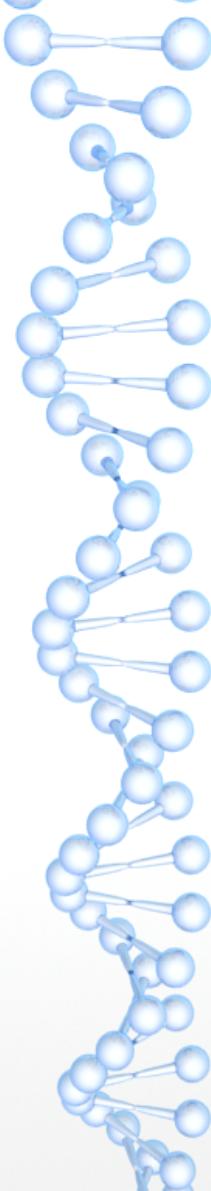
Function

Selection:

- one is optional
- one governs the other

uł adfe uładalium





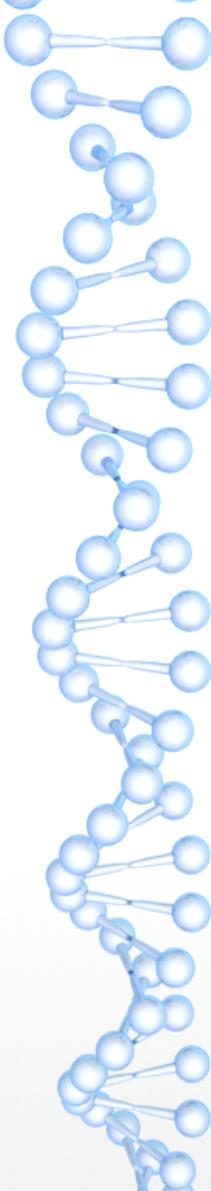
Abbreviations: function → complementarity?

1. One **entity**
- Whole abbreviation = grapheme (**invariant**)
2. Two **entities (function)**
 - 2A. Ligature (**solidal variants in a chain**)
 - 2B. **Selection** (one governs the other)
 - 2C. **Complementarity** (**interdependence**)

• coparaEur uł adfe uładalium

Function

Complementarity
(interdependence in a **system**)



Abbreviations: function → complementarity?

• coparaEur

Function

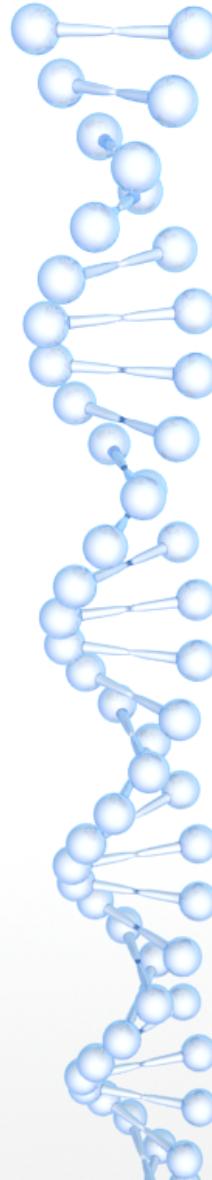
Complementarity
(interdependence in a system)

uł adfe uładalim

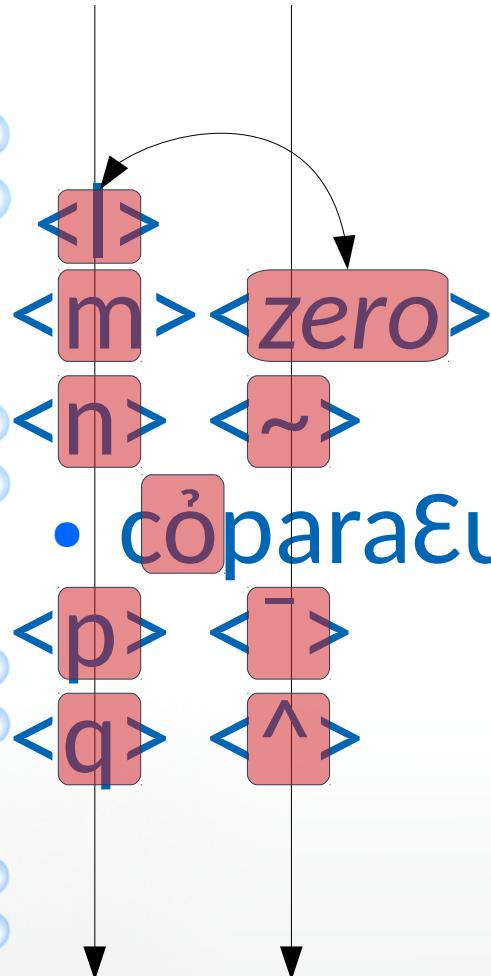
Example of
complementarity

[case + gender + number]

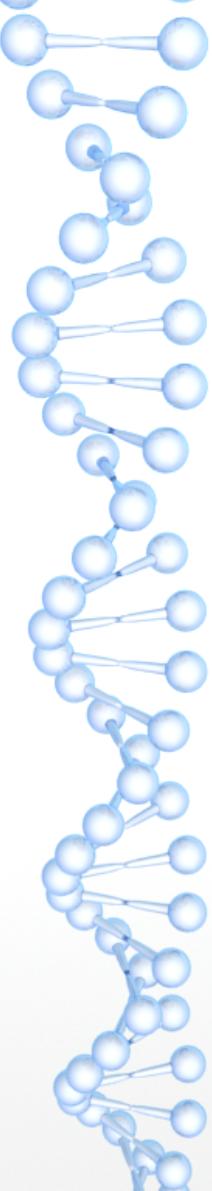
| | | |
|-------|------|----------------|
| Alt - | us | nom+masc+sing |
| Alt - | orum | gen+m/neu+plur |
| Alt - | arum | gen+fem+plur |



Abbreviations: function → complementarity?



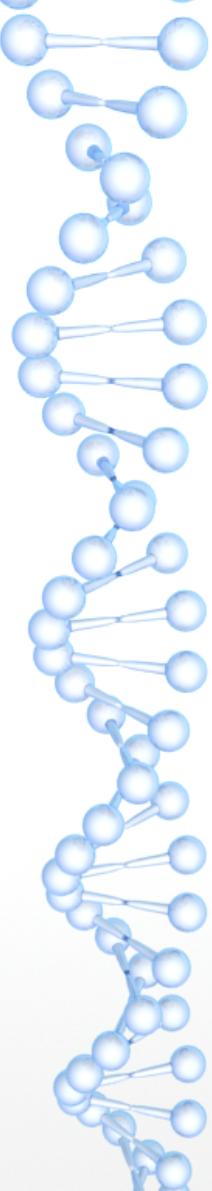
uł adfe uładarium



Abbreviations

1. One **entity**
 - Whole abbreviation = grapheme (**invariant**)
2. Two **entities (function)**
 - 2A. Ligature (**solidal variants** in a chain)
 - 2B. **Selection** (one governs the other)
 - 2C. **Complementarity** (**interdependence**)

- coparaEur uł adfe uładalium

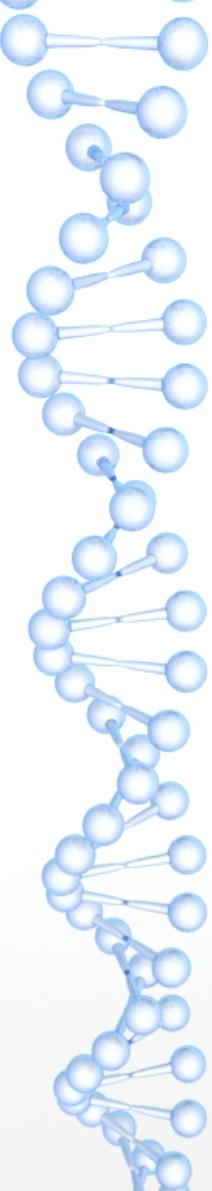


Abbreviations

- Digital (discrete)
- Ligatures
- Allographs
 - (Capitalization)
- Grapheme set
 - (Punctuation)
- Abbreviations

-  coparaEur

uł adfe uładalium



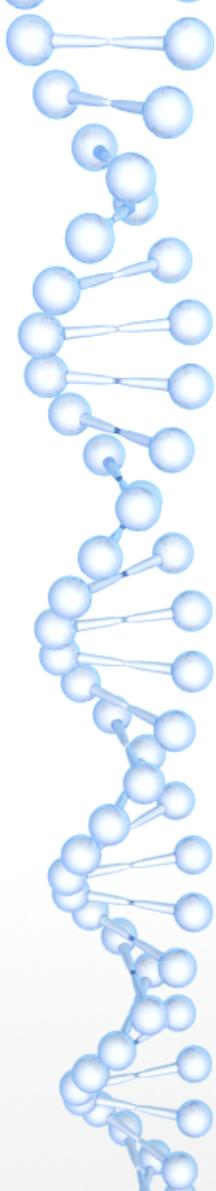
Abbreviations

- cōparaEur

uł adfe uładalium

- Digital (discrete)
- Ligatures
- Allographs
 - (Capitalization)
- Grapheme set
 - (Punctuation)
- Abbreviations

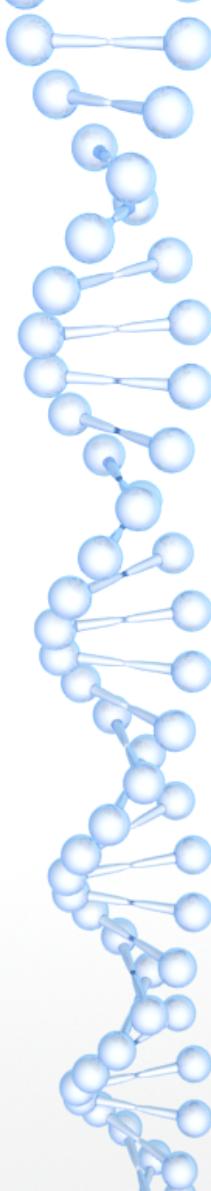
Open issues



Issues: 1. Abbreviations → functions

1. One **entity**
 - Whole abbreviation = grapheme (**invariant**)
2. Two **entities (function)**
 - 2A. Ligature (**solidal variants** in a chain)
 - 2B. **Selection** (one governs the other)
 - 2C. **Complementarity** (interdependence)

- **cóparaEur** uł adfe uładalium

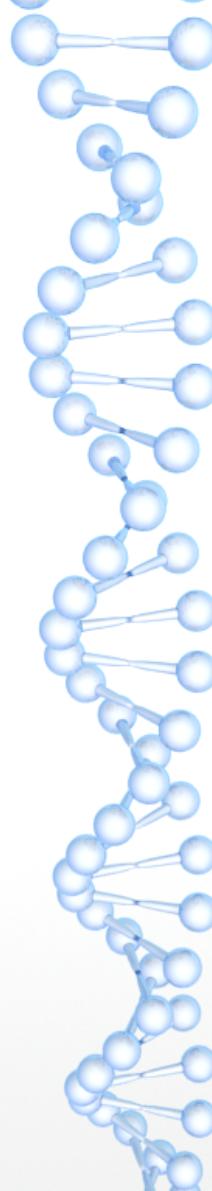


Issues: 2. Abbreviations → one:many

- cóparaσur
- cóparaΕur

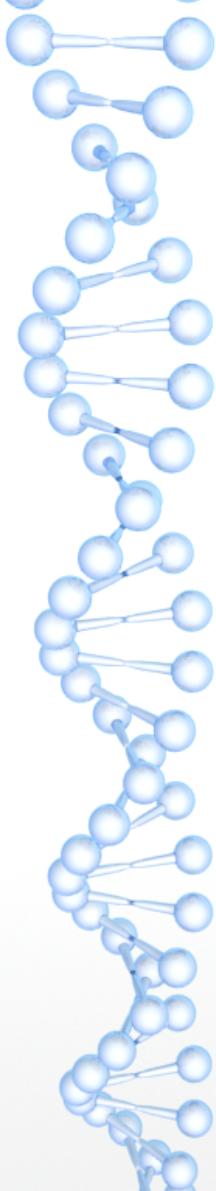


1:1



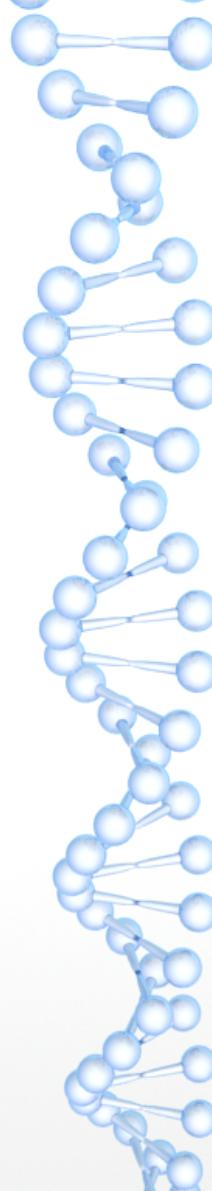
Issues: 2. Abbreviations → one:many

- **comparaσur**
 - **cóparaΕur**
- 2:2 ($2 \neq 2$)



Issues: 2. Abbreviations → one:many

- **praepositio**
 - **propositio**
- 2:4



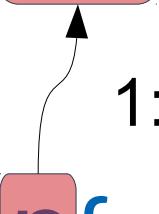
Issues: 2. Abbreviations → one:many

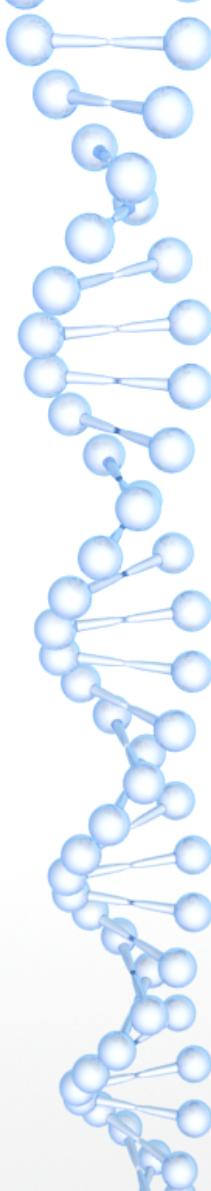
- **perfecta**
- **pfecta**

1:3

perfecta

pfecta





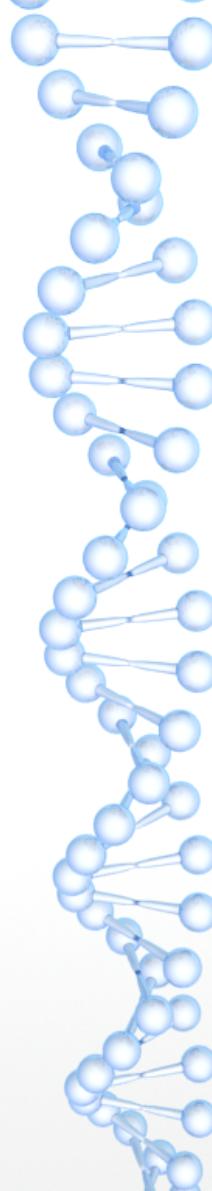
Issues: 2. Abbreviations → one:many

- **perfecta**
- **pfecta**

1:3

Alphabemes
(alphabetical letters)

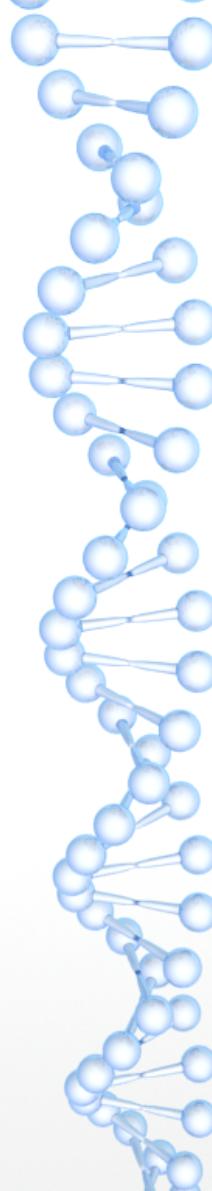
Graphemes



Issues: 3. Ligatures

(syntagmatic)





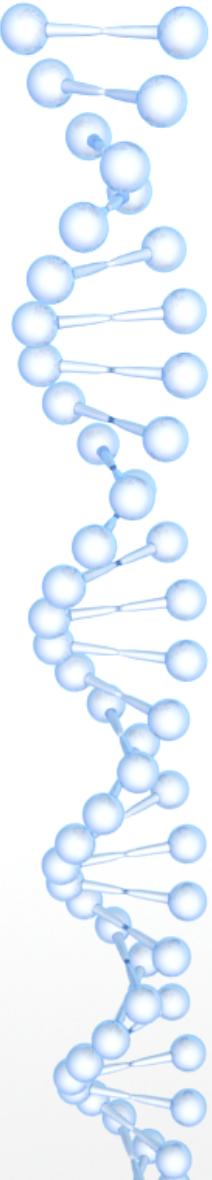
Issues: 3. Ligatures



A



& (U+0026;
ASCII 38)

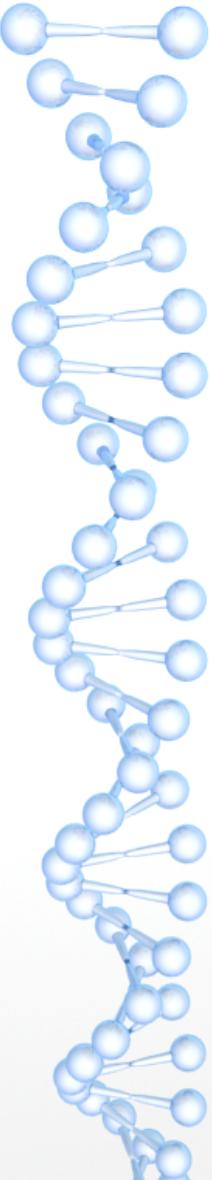


Issues: 3. Ligatures



Historical/“etymological”
considerations

& (U+0026;
ASCII 38)



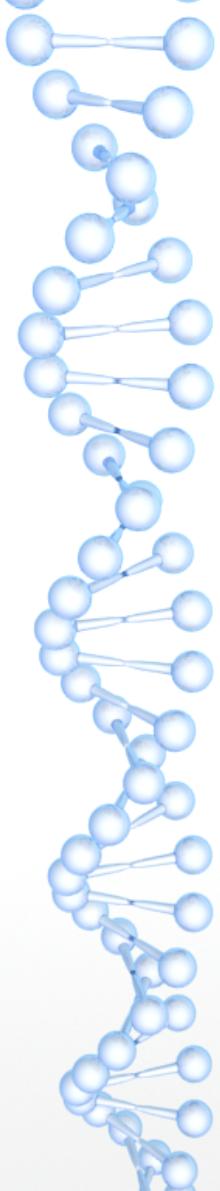
Issues: 3. Ligatures



& (U+0026;
ASCII 38)

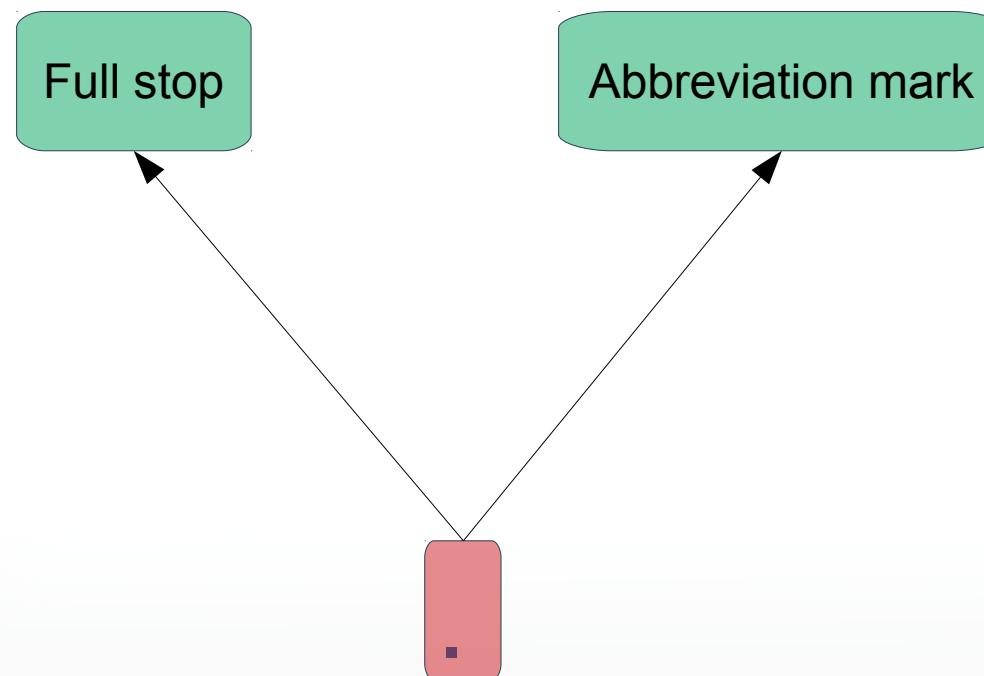
Historical/“etymological”
considerations

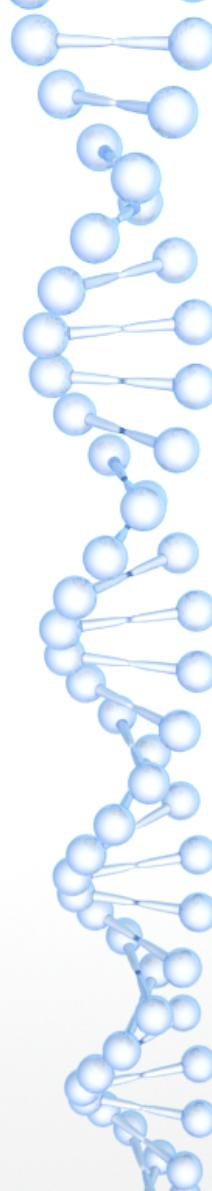




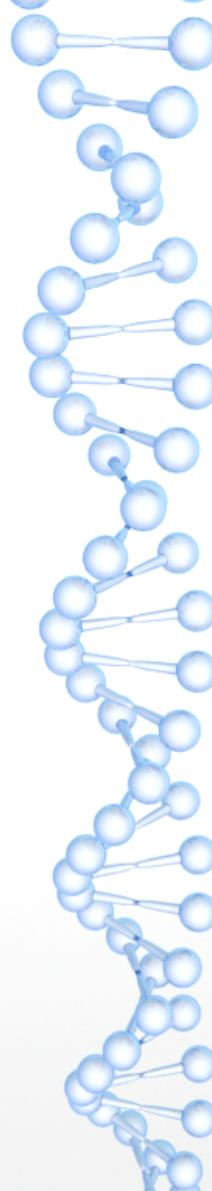
Issues: 4. Grapheme definition

(paradigmatic)

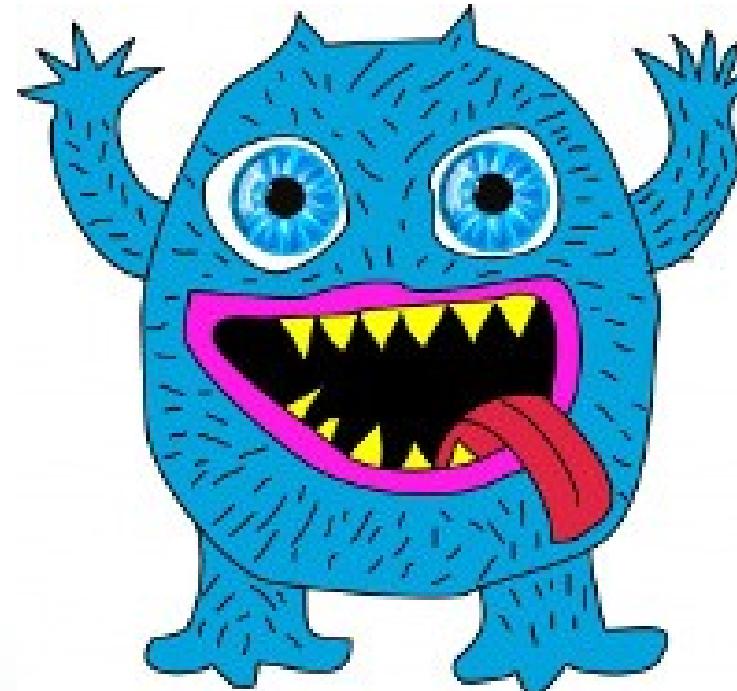


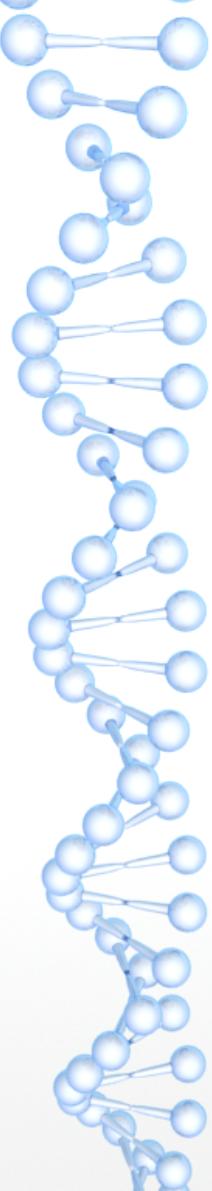


Issues: 5. Allograph definition (metasemiology)

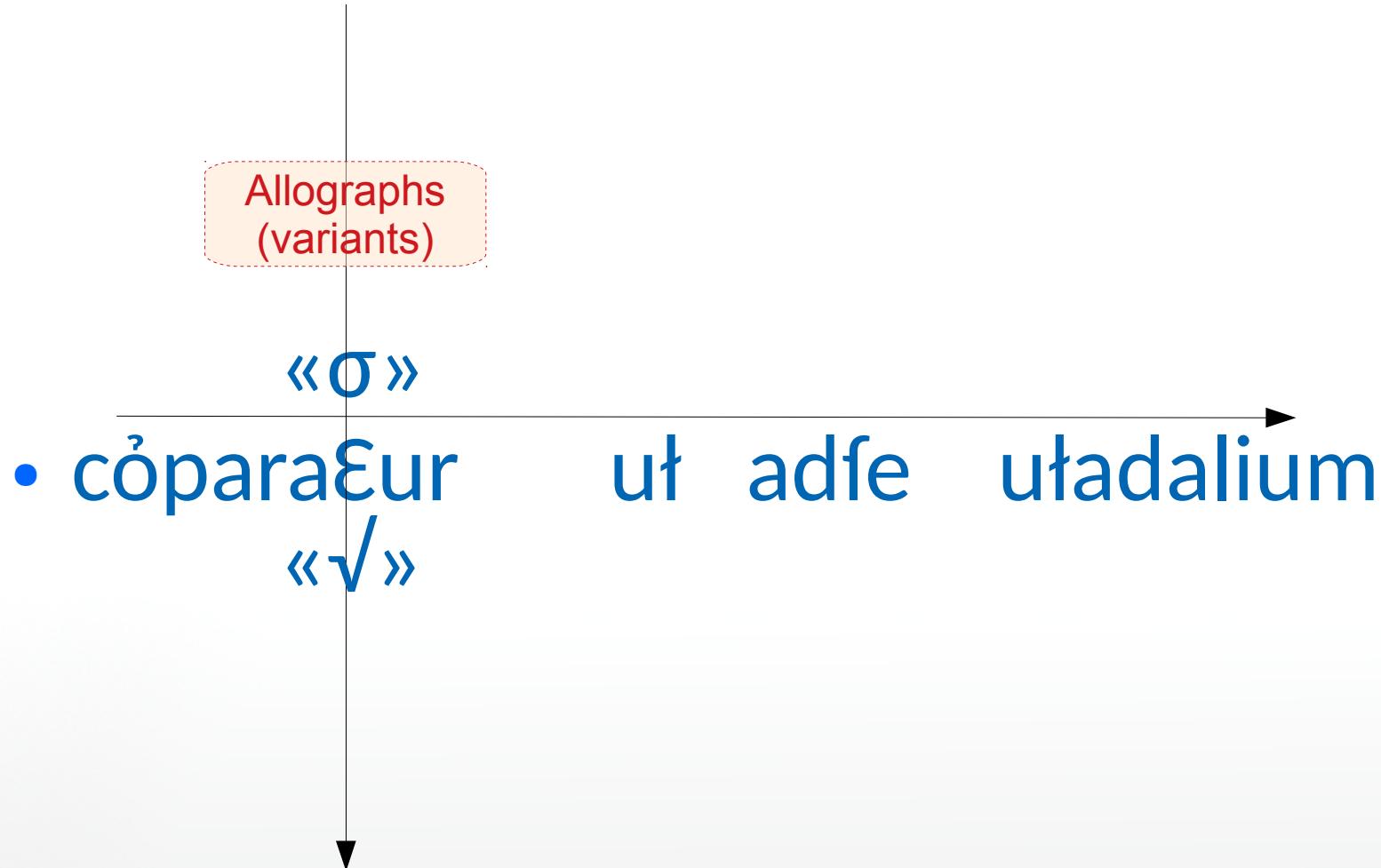


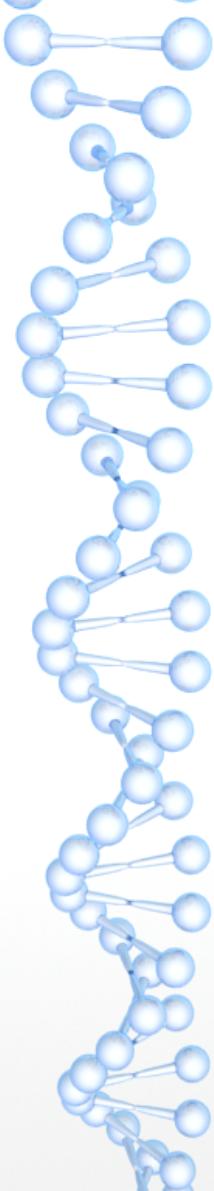
Issues: 5. Allograph definition (metasemiology)





Issues: 5. Allograph definition (metasemiology)





Issues: 5. Allograph definition (metasemiology)

« Σ »

• cóparaEur

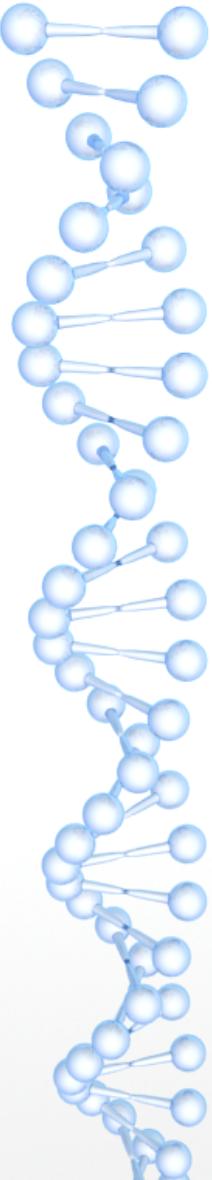
uł adfe uładalim

« \checkmark »

« \checkmark »

« \checkmark »

« \checkmark »

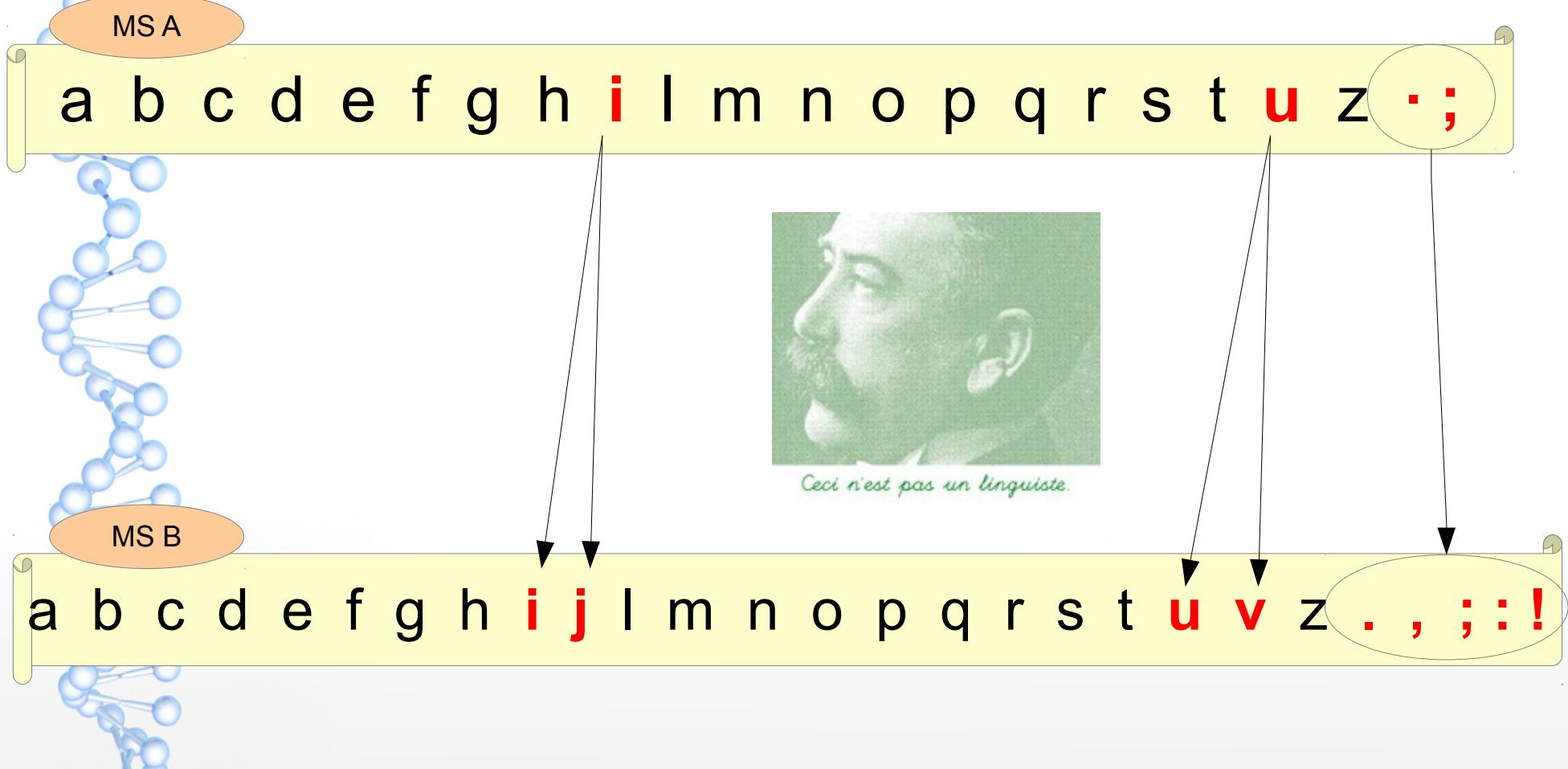


Open issues

1. Abbreviations → functions
2. Abbreviations → one:many
3. Ligatures
4. Grapheme definition
5. Allograph definition (metasemiology)

In the Tower of Babel

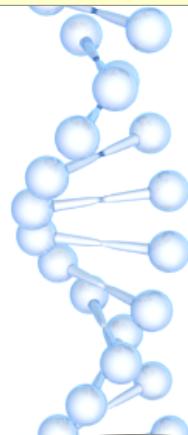
In the Tower of Babel: “diplomatic”



In the Tower of Babel: “normalized”

OCR from Teubner

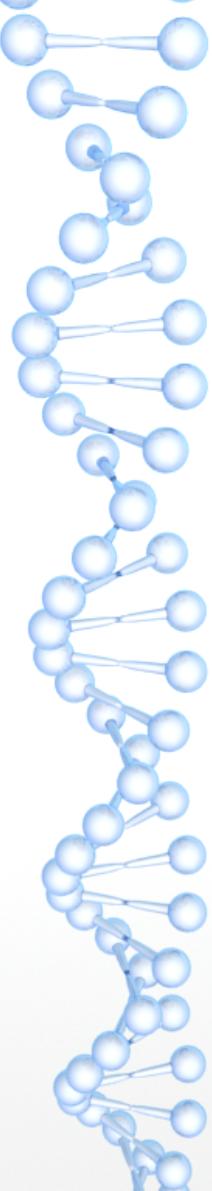
a b c d e f g h i l m n o p q r s t u z . ;



OCR from Loeb

a b c d e f g h i j l m n o p q r s t u v z . , ; !



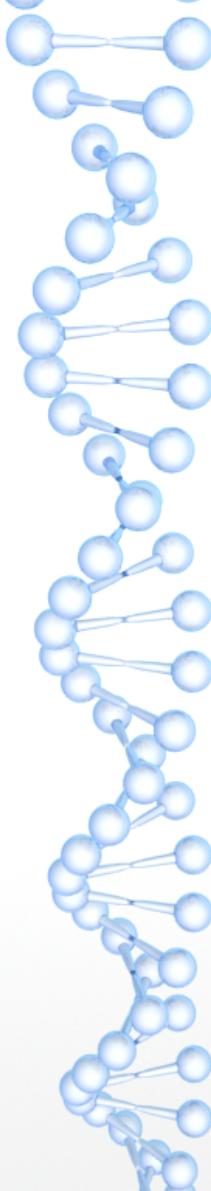


In the Tower of Babel

- Disposable home-made solutions (project-specific)
 - TEI: theory-agnostic
 - *Diplomatic*: Modelling pre-modern writing systems
 - *Normalized*: Normalization models / software



Out of the Tower



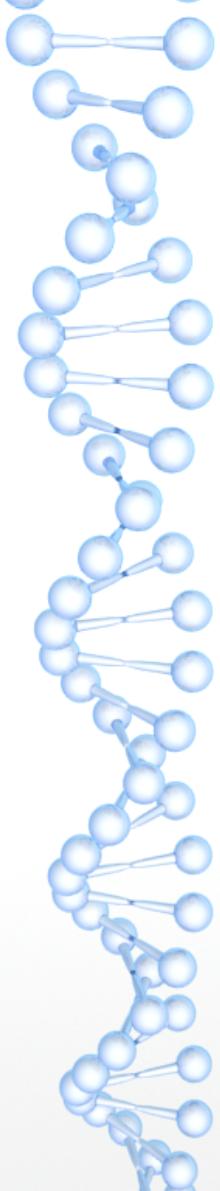
The (long) way out of the Tower



WANTED

**DEAD OR ALIVE
REWARD
\$4,000**

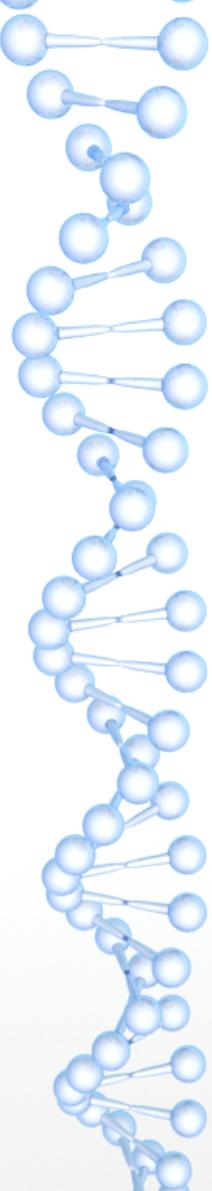
- Scholarly discussion on **modelling**
- Documentation on project-specific modelling
 - formal (data models, software code, tables)
 - prose
- Shared models
- Reusable **software** libraries



Is Unicode the short way out (as TEI says)?

- Solution for new digital texts
- Not enough for pre-modern writing systems
 - Ligatures
 - & (U+0026; ASCII 38)
 - Have I encoded that it is equivalent to “e + t” in that MS?
 - Allographs
 - ſ (U+017F) / ſ (U+0073; ASCII 115)
 - Have I encoded that they are variants of grapheme <s>?
 - Grapheme set
 - u (U+0075; ASCII 117)
 - Have I encoded whether it “covers” (or not) <u> and <v>?
 -

In a nutshell



In a nutshell

- Digital scholarly editions: diplomatic/normalized
- Hjelmslev's “analysis” as digital modelling for pre-modern writing systems
- Open issues
- Interoperability through modelling