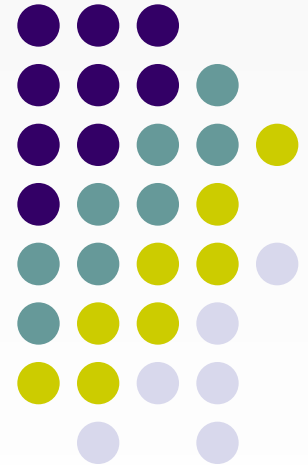


# The Ramses Project:

## Exploring Ancient Egyptian linguistic data using a richly annotated corpus

St. Polis (F.R.S.-FNRS – ULg) & J. Winand (ULg)



# 1. Introduction

## Outline of the talk



- The Ramses project
  - Background information & history of the project
  - Goals
- Structure and capabilities of Ramses
  - Progress (encoding of texts and annotation)
  - Current state of the IT developments
- Three case studies
  - Graphemics and argument structure
  - Morphological variation: diaphasic and diachronic dimensions
  - Macro-syntax: clause chaining
- Conclusions

# 1. Introduction

## The Ramses project: Background information



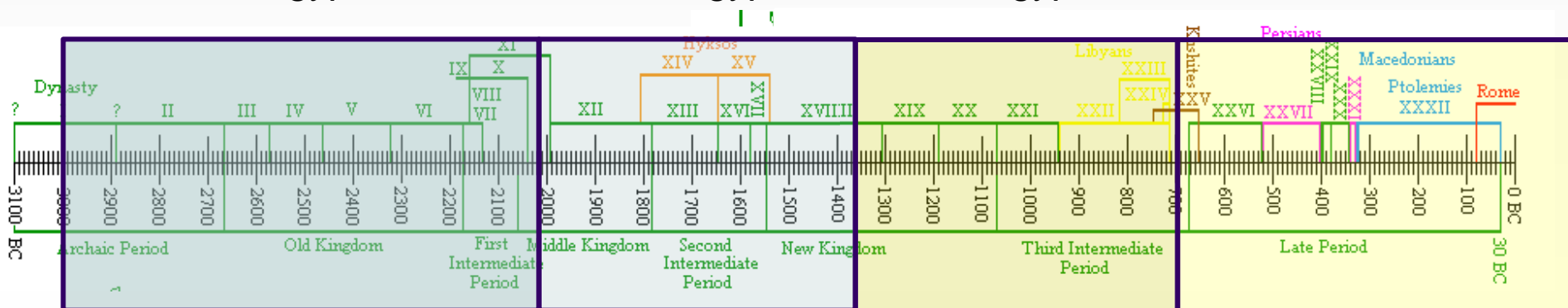
*Building a richly annotated historical corpus of all Late Egyptian texts*

Old Egyptian

Middle Egyptian

Late Egyptian

Demotic



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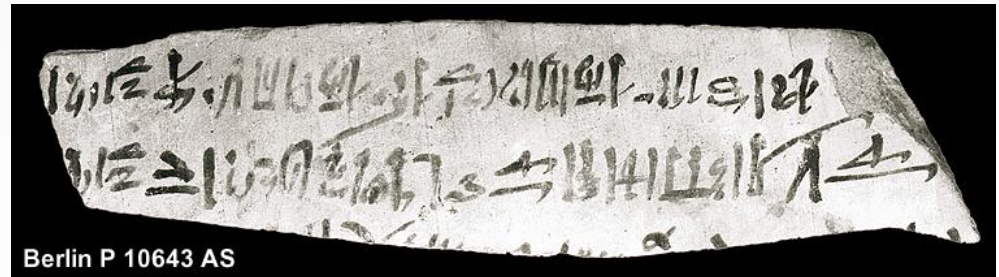


# 1. Introduction

## The Ramses project: Background information



*Building a richly annotated historical corpus of all Late Egyptian texts*



# 1. Introduction

## The Ramses project: Background information



*Building a richly annotated historical corpus of all Late Egyptian texts*



F35-I9:D21-W:y-G41-A-V30:n:t\*y-i-W-A1-D21-D&d-t\*W:f

# 1. Introduction

## The Ramses project: Background information



- 2006: Start
  - Jean Winand (head of the project); Stéphane Polis (co-director); Serge Rosmorduc (Paris; IT development and database conception)
- 2007: First funding (University of Liège)
  - PhD student: Laurence Neven
- 2008: Second funding (National Fund for Scientific Research - Belgium)
  - PhD students: Stéphanie Gohy & Anne-Claude-Honnay
- 2008-2013: Third funding (“Action de recherche concertée”)
  - Post-docs: Dominique Lefèvre, Eitan Grossman, Todd Gillen
  - PhD students in Egyptology: Guillaume Lescuyer, Jill Raimondo, Nathalie Sojic, Alessandro Stella
  - PhD students in computer sciences: Benjamin Martin Leon
  - Collaborations with other institutions and laboratories: École Pratique des Hautes Études (Paris); Laboratoire d’Analyse Statistique des Données Textuelles (Liège); NotaBene (Nicolas Mazziotta); etc.
- 2013-....: Online access



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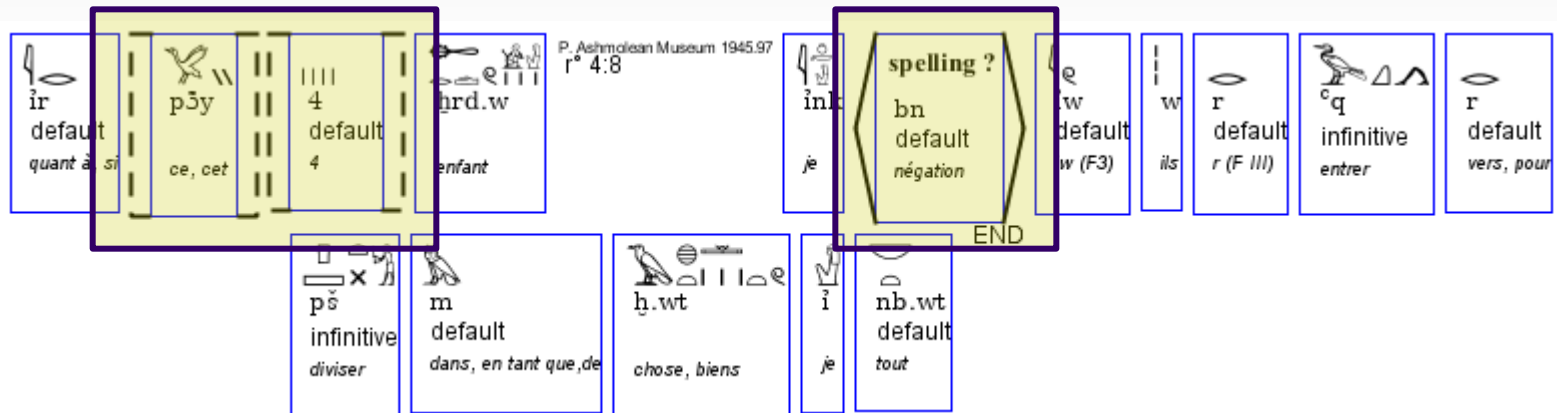
# 1. Introduction

## The Ramses project: Goal

*An efficient tool in philology and linguistics*

The corpus supports:

- Ecdotic descriptors (textual criticism is fully integrated)





# 1. Introduction

## The Ramses project: Goal

*An efficient tool in philology and linguistics*

The corpus supports:

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- Graphemic level (hieroglyphic transcription)

Brief, pBM 10419, Brief des Djehuti-mesu an Hafy

[detailed information for text] [position in hierarchical tree of objects and texts]

(display at beginning of text)

[1] zXA(,w)- DHw,tj-ms,w -n-pA-xr-aA-Sps,j n zXA(,w) HAFy n pr jmn-raw nswt-nTr,(Pl.) [2] [m]  
[anx-wDA].<sup>l</sup>s(nb)<sup>l</sup> Hz(w,t) nTr =k Sps,j <sup>l</sup>b<sup>l</sup>mn-raw nswt-nTr,(Pl.) bA wr-Sf,yt [3] (j)tm,w xnt,j-jp,t=f  
(Kartusche)HqA-wAs,t<[Kartusche]> wr jwn,w jty-tA-Sma,w [4] nbw,ty xnt,j-nb-r-Dr nTr-aA-n-zp-tp,j nb  
jmi n =k anx-wDA-s(nb) [5] aHa,w qA jAw,t aA.t nfr.t Hzw,t m-bAH jmn pA ptr =[j]<k> <sup>(C)</sup> [6] raw-nb  
zp-2

Der Schreiber Djehuti-mesu von der großen und prächtigen Königsnekropole an den Schreiber des Tempel des Amun-Re, des Königs der Götter: In Leben-Heil-und-Gesundheit und in der Gunst deines prächtigen Gottes, des Königs der Götter und, des Ba, der groß an Ansehen ist und des Atum, der vor seinem Heiligtum ist, des Herrschers von Theben, des Großen, des Heliopolitaners, des Souveräns von Oberägypten, dessen, der von Ombos und der vor dem Allhern ist (Seth), dem große Gott des ersten Males, ...?...: Gegeben sei dir Leben-Heil-und-Gesundheit, eine lange Lebenszeit, ein erhabenes und vollkommene Alter, Gunst vor Amun, dem der dich sieht - wirklich jeden Tag.

*Thesaurus Linguae Aegyptiae* (<http://aaew.bbaw.de/tla/>)



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















# 1. Introduction

## The Ramses project: Goal

*An efficient tool in philology and linguistics*

The corpus supports:

- Ecdotic descriptors (textual criticism is fully integrated)
- Graphemic level (hieroglyphic transcription)

 ir	 p3y	 4	 hrd.w	 r° 4:8	 ink	spelling ? bn	 iw	 w	 r	 c q	 r
default quant à, si	ce, cet	default 4	enfant		je	default négation	default iw (F3)	ils	default r (F III)	infinitive entrer	default vers, pour
END											
 pš	 m	 h.wt	 i	 nb.wt							
infinitive diviser	default dans, en tant que, de	chose, biens	je	default tout							

# 1. Introduction

## The Ramses project: Goal



*An efficient tool in philology and linguistics*

The corpus supports:

- Ecdotic descriptors (textual criticism is fully integrated)
- Graphemic level (hieroglyphic transcription)
- Morpho-syntactic analysis
- Meta-data (with description and categorization of the texts)
- Bibliographical references

*with an evolutionary database design*



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# 2. Structure and capabilities of Ramses

## Current state of the project



*IT viewpoint*

→ a relational database in SQL where the texts are represented and stored in XML



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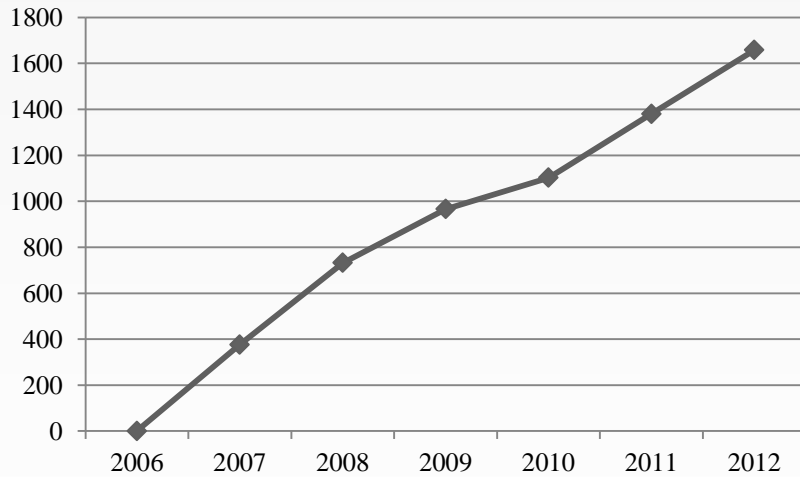


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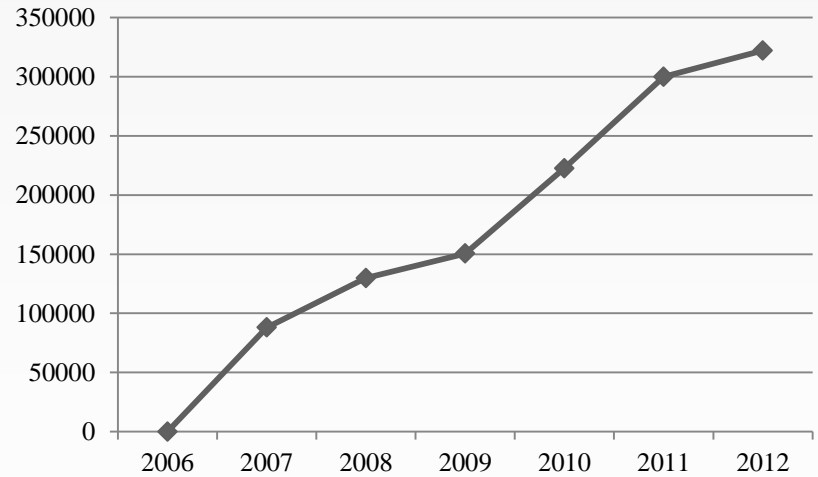


# 2. Structure and capabilities of Ramses

## Progress in the encoding and annotation



Number of texts



Number of tokens (words)



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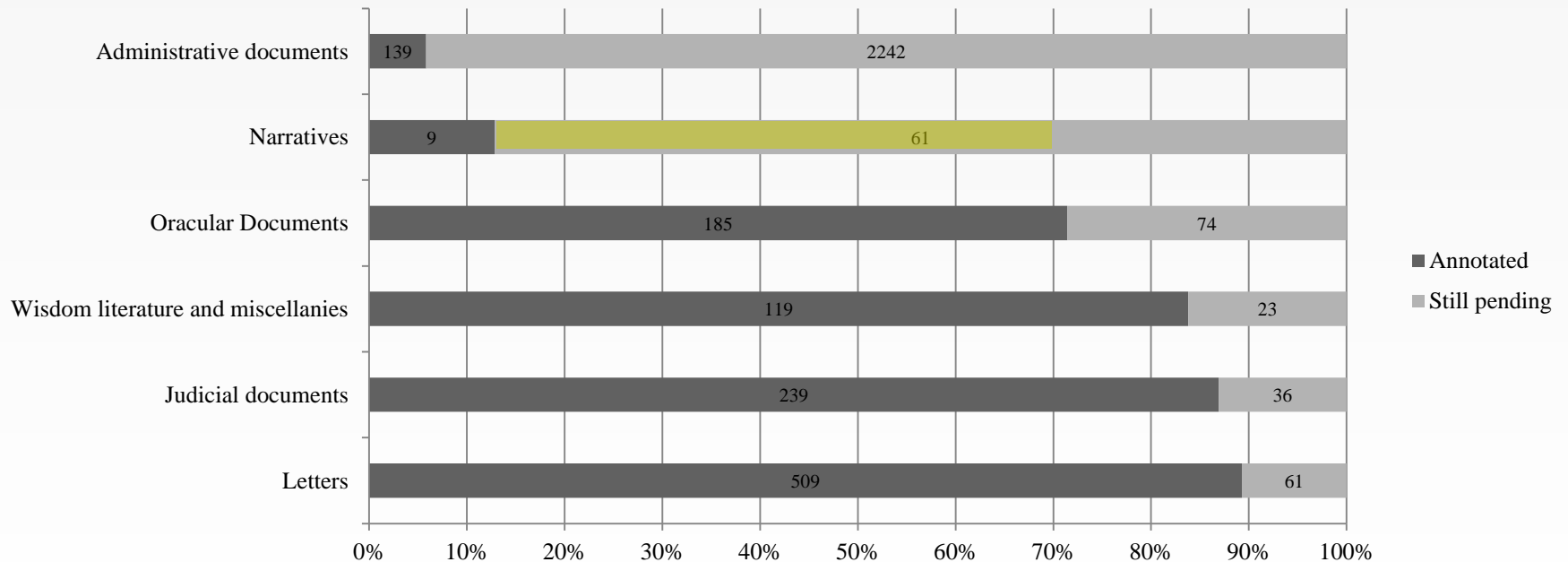


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# 2. Structure and capabilities of Ramses

## Progress in the encoding and annotation



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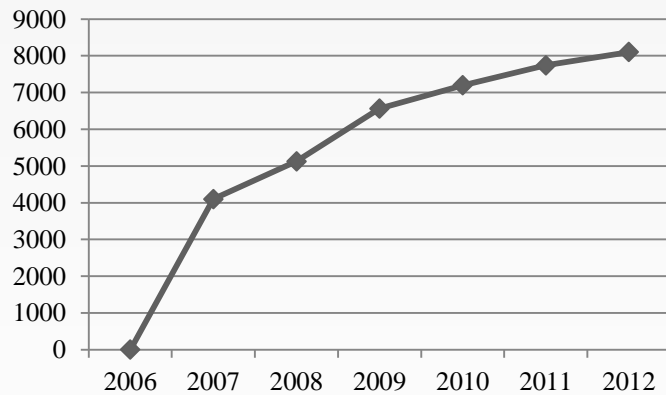


# 2. Structure and capabilities of Ramses

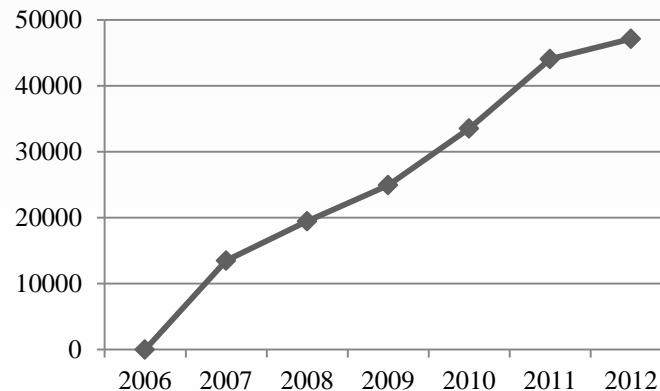
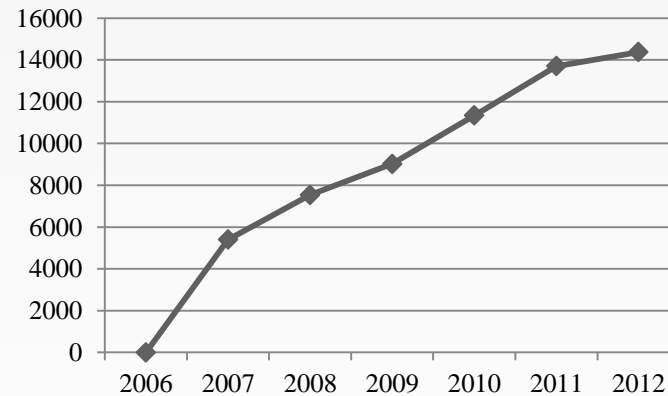
## Progress in the encoding and annotation



Number of lemmata



Number of inflexions



Number of spellings

# 2. Structure and capabilities of Ramses

## Structure of the database & software ergonomics



Two basic requirements:

- From the annotator's point of view, the editing software had to be user-friendly and to meet the criteria of speed and consistency of annotation.
- From the user's point of view, no loss of information should happen because of the process of encoding and annotating a text

## 2. Structure and capabilities of Ramses

### Structure of the database & software ergonomics





## 2. Structure and capabilities of Ramses

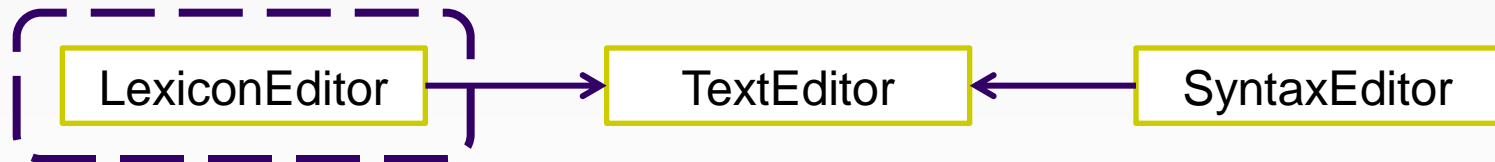
### Structure of the database & software ergonomics





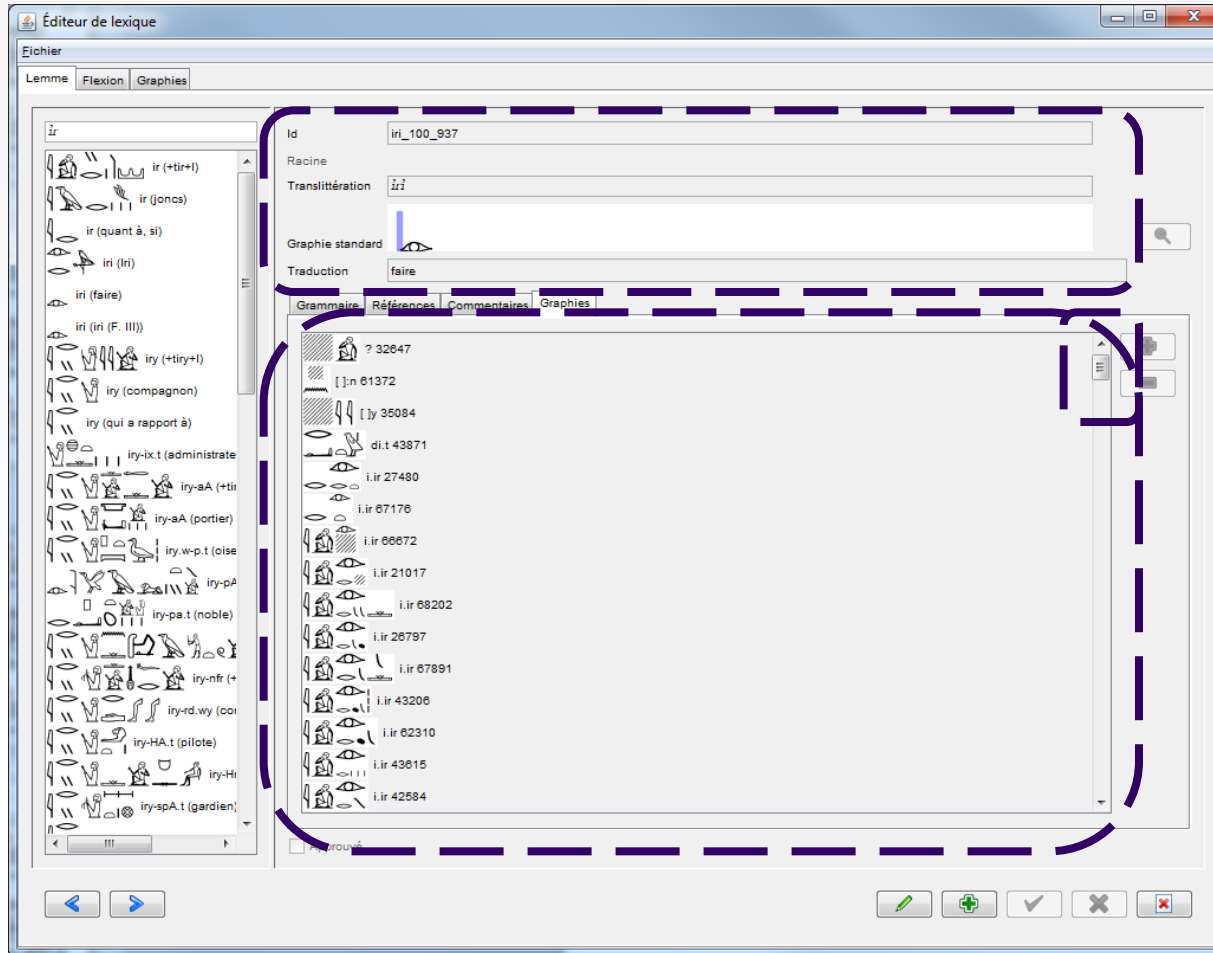
## 2. Structure and capabilities of Ramses

### Structure of the database & software ergonomics



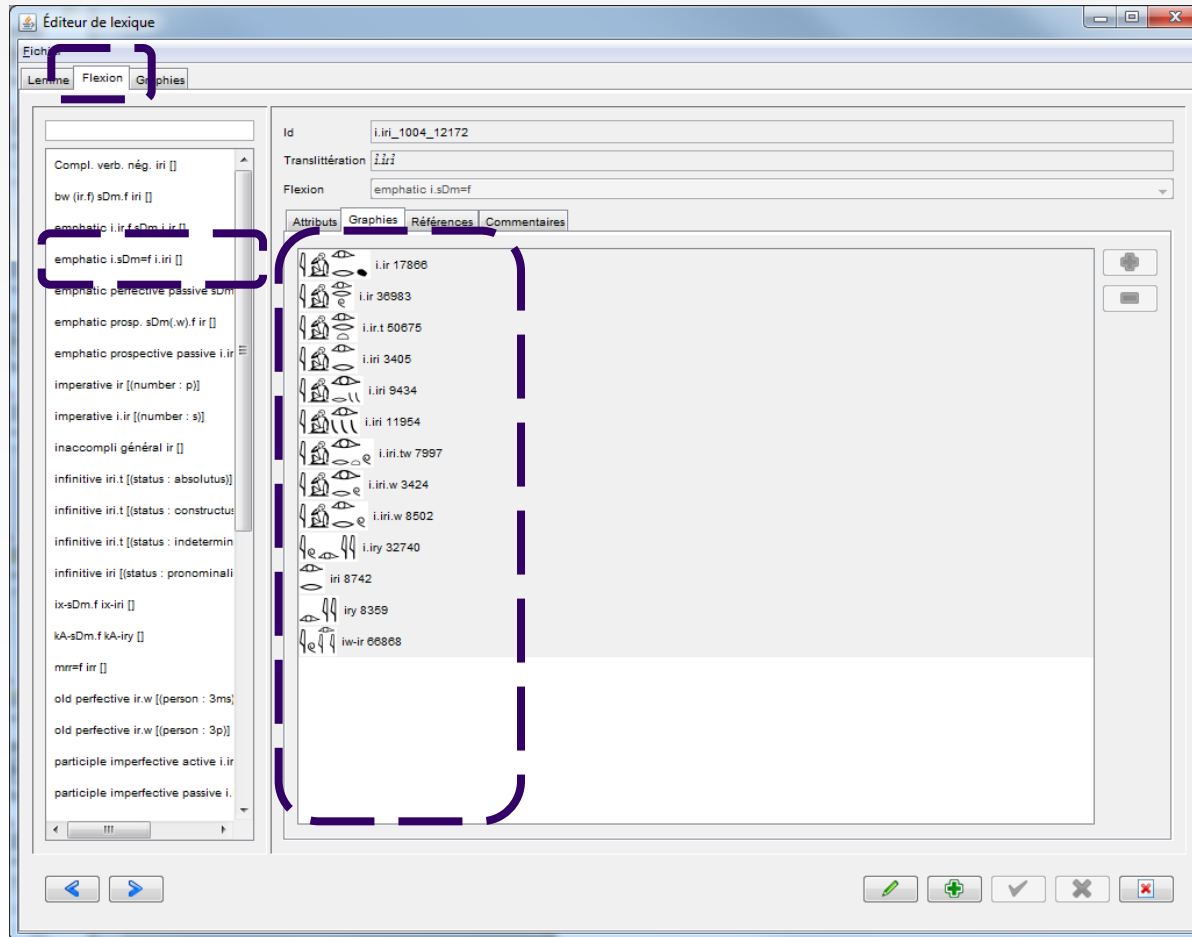
# 2. Structure and capabilities of Ramses

## Structure of the database & software ergonomics



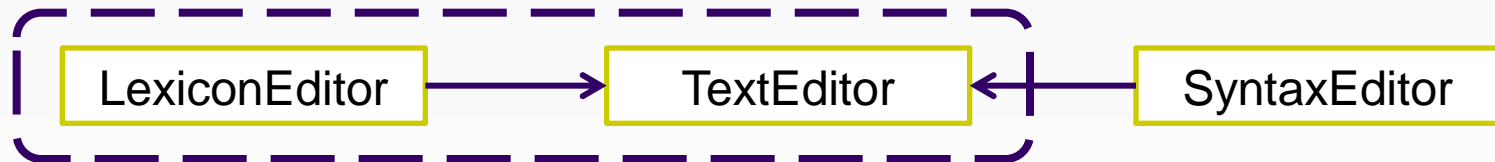
# 2. Structure and capabilities of Ramses

## Structure of the database & software ergonomics



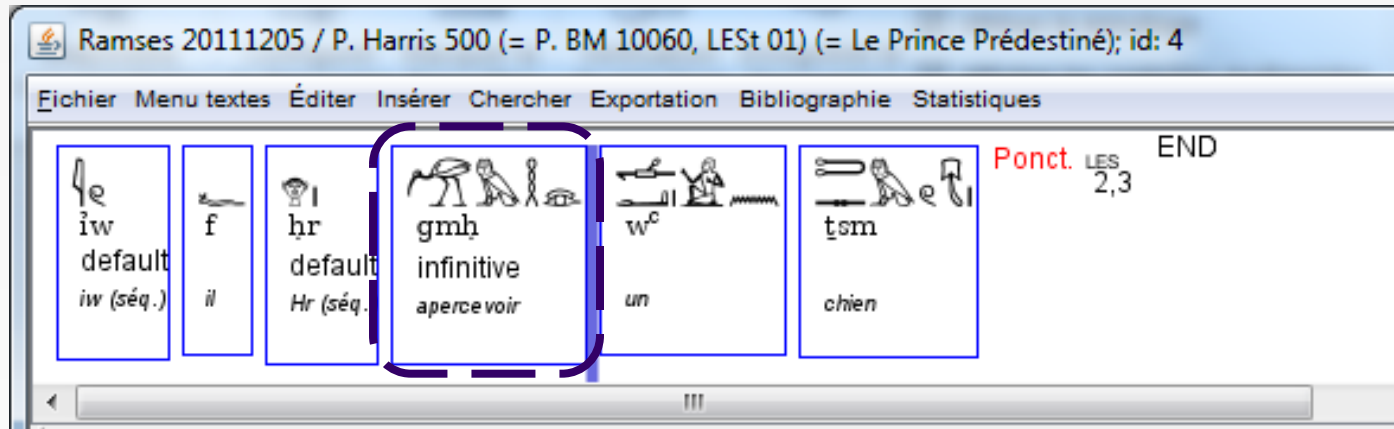
## 2. Structure and capabilities of Ramses

### Structure of the database & software ergonomics



# 2. Structure and capabilities of Ramses

## Structure of the database & software ergonomics



Translittération

Graphie standard

Traduction

Grammaire

Partie du discours

attribute	value
morphological class	3-lit.
transitivity	transitive

Id

Translittération

Flexion

Attributs

- gmH 5781
- gmH 8253
- gmH 83419
- gmHw 83249

inaccompli passif sDm.tw=f gmH.tw []

infinitive gmH [(status : absolutus)]

infinitive gmH [(status : constructus)]

infinitive gmH [(status : indeterminate)]

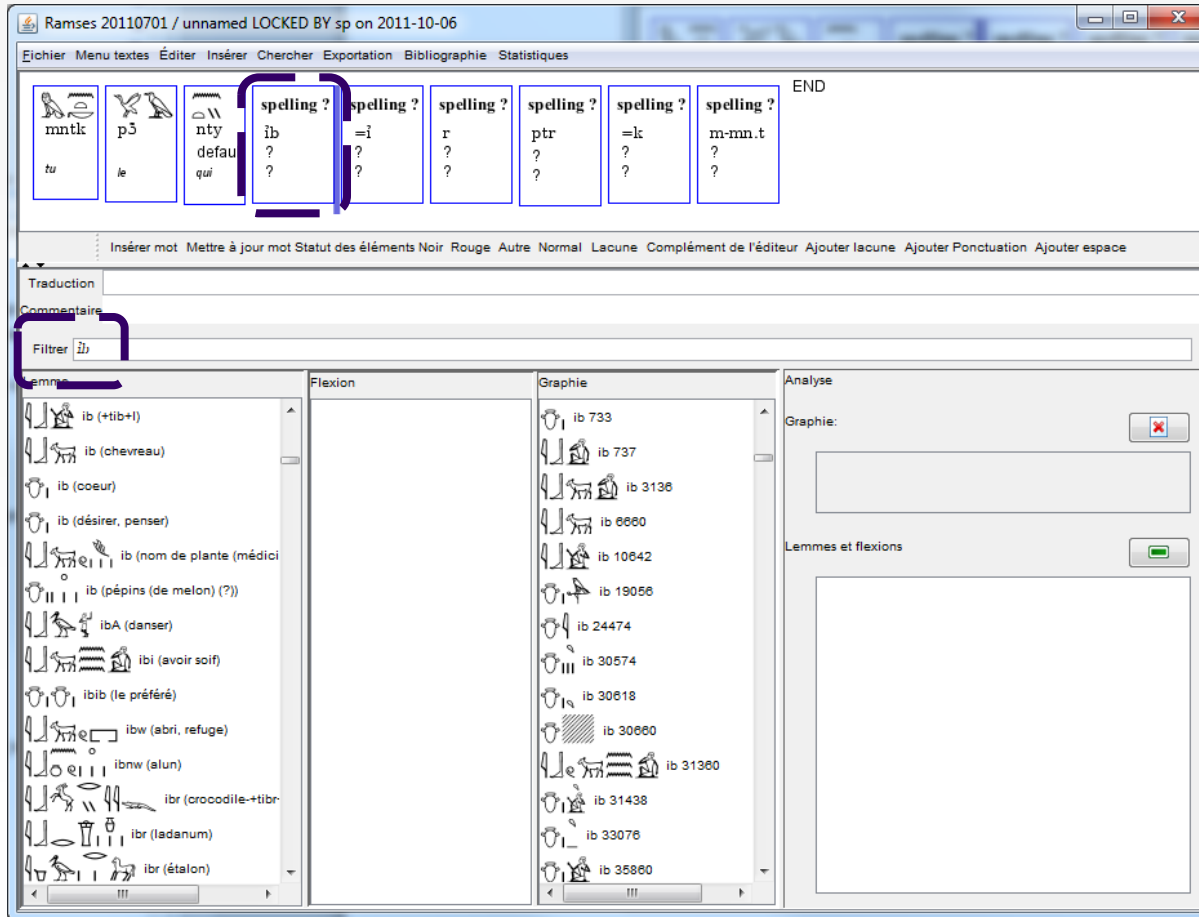
infinitive gmH [(status : pronominalis)]

participle imperfective active gmH []

participle perfective active gmH []

# 2. Structure and capabilities of Ramses

## Structure of the database & software ergonomics





# 2. Structure and capabilities of Ramses

## Structure of the database & software ergonomics



The screenshot displays the Ramses software interface. At the top, a menu bar includes 'Fichier', 'Menu textes', 'Éditer', 'Insérer', 'Chercher', 'Exportation', 'Bibliographie', and 'Statistiques'. Below the menu is a table with columns labeled 'spelling ?' and rows containing words like 'mntk', 'p3', 'nty', 'defau', 'qui', 'ib', '=i', 'r', 'ptr', '=k', 'm-mn.t', and question marks. Three red boxes highlight the first three columns of this table.

The interface is divided into three main panels:

- Lemme:** A list of words with their corresponding icons. The word 'ib (coeur)' is highlighted with a red box.
- Flexion:** A list of grammatical forms for the word 'ib'. The first two entries are highlighted with red boxes: 'ib [status: absolutus,number: singular,gender: masculin]' and 'ib [status: constructus,number: singular,gender: masculin]'. The third entry, 'ib.w [status: absolutus,number: plural,gender: masculin]', is also highlighted.
- Analyse:** A panel showing the analysis of the selected word 'ib(coeur)'. It displays the word and its grammatical information: 'ib [status: pronominalis,number: singular,gender: masculine]'. A red box highlights this entry.

Below the main panels, there are three smaller panels showing additional word entries: 'ibr (crocodile-tibr)', 'ibr (ladanum)', 'ibr (étalon)', 'ib 31438', 'ib 33076', and 'ib 35860'.

# 2. Structure and capabilities of Ramses

## Structure of the database & software ergonomics



The screenshot shows the Ramses software interface. At the top, the title bar reads "Ramses 20111205 / unnamed LOCKED BY ramses on 2011-12-05". Below it is a menu bar with options: "Fichier", "Menu textes", "Éditer", "Insérer", "Chercher", "Exportation", "Bibliographie", "Statistiques".

The main workspace contains a list of words and their morphological information. The words are: "mntlc", "p5", "nty", "def:ult", "ib", "coeur", "spelling?", "spelling?", "spelling?", "spelling?", "spelling?". The word "ib" is highlighted with a purple box, and a purple arrow points from it to the "Analyse" window.

The "Analyse" window is open and shows the following information:

- Graphie:** A box containing the word "ib".
- Lemmes et flexions:** A box containing the word "ib(coeur)" and its morphological information: "ib [status: pronominalis,number: singular,gender: masculin]".

Other panels in the interface include "Traduction", "Commentaire", "Filtrer" (set to "ib"), "Lemme" (listing "ib (désirer, penser)", "ib (coeur)", "swDA-ib (rendre heureux)", "Hr-ib (au milieu de)", "Hry-ib (qui est dans)"), "Flexion", and "Graphie".

# 2. Structure and capabilities of Ramses

## Structure of the database & software ergonomics



Two basic requirements:

- From the annotator's point of view, the editing software had to be user-friendly and to meet the criteria of speed and consistency of annotation.
- From the user's point of view, no loss of information should happen in the process of encoding and annotating a text
  - Unanalyzed chunks of graphemes



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# 2. Structure and capabilities of Ramses

## Structure of the database & software ergonomics



The screenshot shows the Ramses software interface with a title bar: "Ramses 20111205 / P. BN 199, 5-9+196, V+198, IV (= LRL 03) (= P. BN 199, 5-9+196, V+198, IV); id: 87". The menu bar includes: "Fichier", "Menu textes", "Éditer", "Insérer", "Chercher", "Exportation", "Bibliographie", "Statistiques". The main workspace contains a grid of boxes representing linguistic data. Each box typically includes a small icon, a label (e.g., "iw default", "hr default", "t3i.t", "r default", "p3y.i", "m-di default", "bt3", "m-b3h default", "p3y.i", "hry"), and a description (e.g., "iw (séqu.)", "Hr (séqu.)", "infinitive", "à, pour", "je", "bière", "quotidiennement", "prendre", "vers, pour", "mon", "avec", "faute", "en présence de", "mon", "supérieur"). Some boxes are highlighted with blue dashed lines, and others with red dashed lines. The interface also shows a status bar at the bottom with the text: "men Noir Rouge Autre Normal Lacune Complément de l'éditeur".



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# 2. Structure and capabilities of Ramses

## Structure of the database & software ergonomics



Two basic requirements:

- From the annotator's point of view, the editing software had to be user-friendly and to meet the criteria of speed and consistency of annotation.
- From the user's point of view, no loss of information should happen because of the process of encoding and annotating a text
  - Unanalyzed chunks of graphemes
  - Coding of ambiguities

# 2. Structure and capabilities of Ramses

## Structure of the database & software ergonomics



The screenshot displays the Ramses 20110330-SNAPSHOT interface. The main window shows a morphological analysis of the word 'donner' (gloss: donner). The analysis is presented in a grid of boxes, each containing a morpheme icon, its label, and its gloss. The word 'donner' is highlighted in blue, and its analysis is shown in a larger, detailed view on the right. The analysis shows the word 'donner' is composed of the root 'rdi' (gloss: donner) and the suffix 'di' (gloss: <AMBIGUOUS>). The suffix 'di' is further analyzed as 'perfective sDm=f di' and 'subjunctive sDm=f di'. The interface also shows a translation window with the text 'Vois, je vous ai envoyé/promets de vous envoyer 100 Khafs de grains de mon entrepôt.' and a list of lemmas and flexions.



# 2. Structure and capabilities of Ramses

## Structure of the database & software ergonomics

The screenshot displays the Ramses software interface. The main window title is "Ramses 20110330-SNAPSHOT / P. Bertin 14424a + 14433a-i (= P. Bertin 3040a) (= P. Bertin 14424a + 14433a-i); id: 896". The menu bar includes "Fichier", "Menu textes", "Éditer", "Insérer", "Chercher", "Exportation", "Bibliographie", and "Statistiques". The main editing area contains a grid of icons and text boxes, some of which are highlighted with blue boxes and purple dashed lines. A purple dashed line also highlights a specific analysis panel in the bottom right. The analysis panel, titled "Analyse", shows a "Graphie:" section with a small icon and a "Lemmes et flexions" section with a green status indicator. The "Lemmes et flexions" section lists:

- bAk(travailler)
  - infinitive bAk [status: absolutus]
- bAk(w(travail)
  - bAk [status: absolutus,number: singular,gender: masculine]

## 2. Structure and capabilities of Ramses

### Structure of the database & software ergonomics





# 2. Structure and capabilities of Ramses

## Structure of the database & software ergonomics



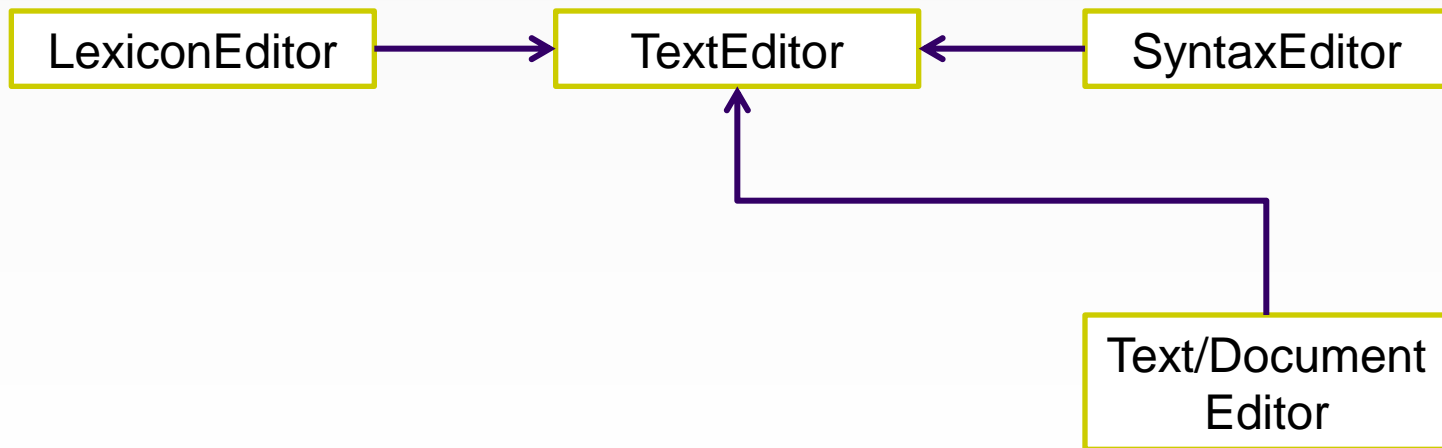
Fig9 - Ramses syntax editor

Fichier Édition View Fenêtre ?

bn négation	iw iw (F3)	=i je	d(i).t donner	aq entrer	pAy ce, cet	rmT homme	r vers, pour	v° 13:26	pAy.i mon	pr maison, domaine
				verbalPhrase function predicate	nounPhrase function subject	adverbialPhrase function argument				
negation	verbalPhrase function predicate	nounPhrase function subject		verbalPred function object						
verbalPred										

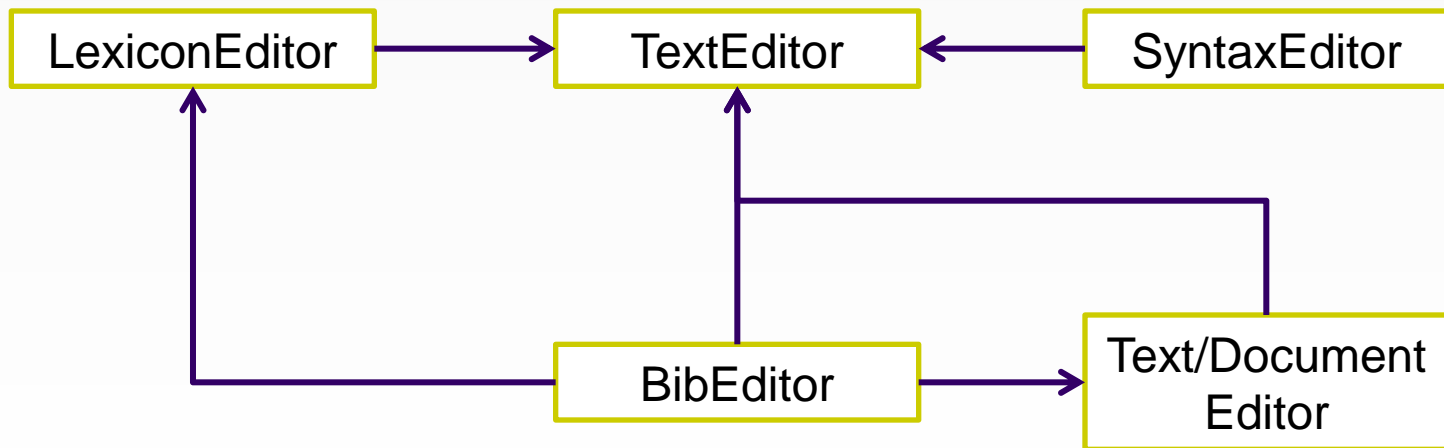
# 2. Structure and capabilities of Ramses

## Encoding of metadata



# 2. Structure and capabilities of Ramses

## Encoding of metadata



# 2. Structure and capabilities of Ramses

## Encoding of metadata



The screenshot shows a window titled 'Éditeur de lexique' with a menu bar (Fichier, Lemme, Flexion, Graphies) and a search field containing 'ib'. Below the search field, there are tabs for 'Grammaire', 'Références', 'Commentaires', and 'Graphies'. The 'Références' tab is active, displaying a list of references. A dashed purple box highlights the first two entries:

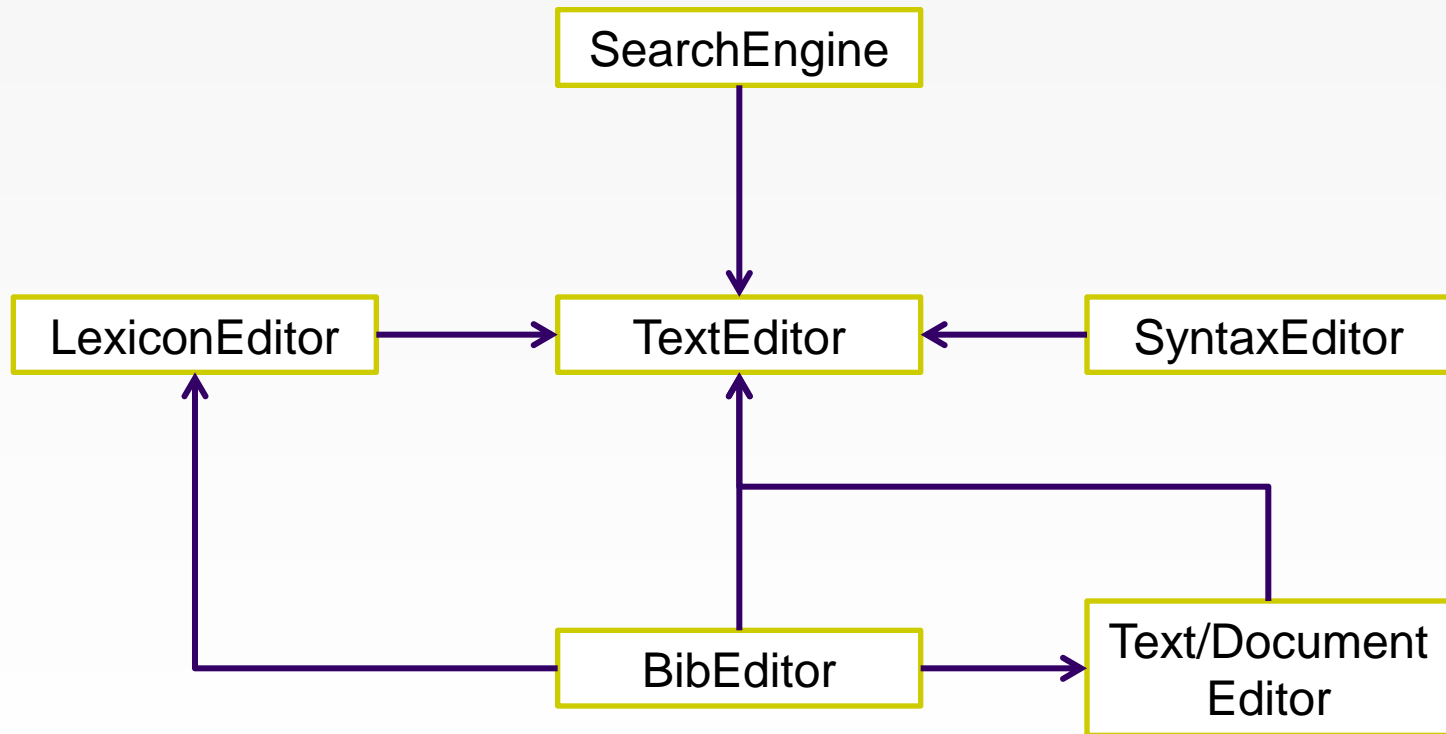
- [DICI] Erman, Adolf & Grapow, Hermann, Wörterbuch der ägyptischen Sprache, Leipzig, 1926, pp.59, 10-60, 11
- [URL:TLA] <http://aeaw.bbaw.de/ta/servlet/GetWcnDetails?u=ramses&f=0&i=0&wn=23290&db=0>

The remaining references in the list are:

- [REF] Barbotin, Christophe, Le papyrus Chassinat III (Planches I-XIII), RdÉ, 50, 1999, pp.13  
Sur l'expression *ib=i r Sm*
- [REF] Lorton, David, The Invocation Hymn at the Temple of Hibis, SAK, 21, 1994, pp.175, n. 1  
*ib en collocation avec HAty avec biblio ant.*
- [REF] Jansen-Winkel, Karl, Exozentrische Komposita als Relativphrasen im älteren Ägyptisch. Zum Verständnis der Konstruktion *nfr Hr* "mit s  
sur l'expression *nDm ib* "satisfait"
- [REF] Navailles, Robert & Neveu, François, Une ténébreuse affaire: P. Bankes I, GM, 103, 1988, pp.58, n. w  
Sur l'expression *Hr ib* "de bon coeur, gratis"
- [REF] Wiebach, Silvia, Die Begegnung von Lebenden und Verstorbenen im Rahmen des thebanischen Talfestes, SAK, 13, 1986, pp.282  
*ib en collocation*
- [REF] Perdu, Olivier, Le monument de Samtoutefnakht à Naples (première partie), RdÉ, 36, 1985, pp.101, n. b  
Sur l'expression *ib Hr mw* "être fidèle à"
- [REF] Roccati, Alessandro Giacomo, Su un passo di Hardjedef, JEA, 68, 1982, pp.16-19  
Sur l'expression *ib=k pxA*
- [REF] Andreu, Guillemette & Cauville, Sylvie, Vocabulaire absent du Wörterbuch (II), RdÉ, 30, 1978, pp.11  
*ib r=k* "fais attention"
- [REF] Meltzer, Edmund S., "Heart", *ib* or \**inb* in Egyptian?, JNES, 36, 1977, pp.149-151

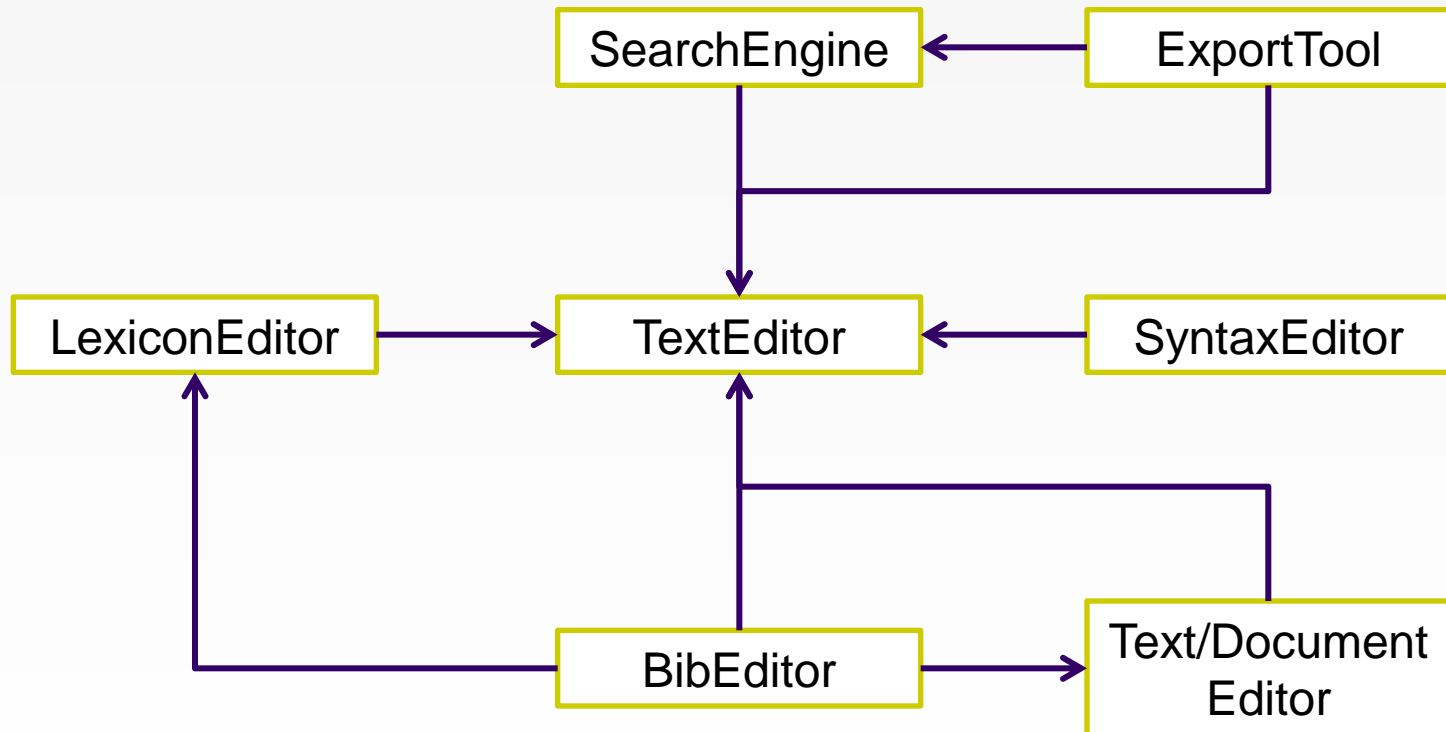
# 2. Structure and capabilities of Ramses

## End-user modules



## 2. Structure and capabilities of Ramses

### End-user modules



# 2. Structure and capabilities of Ramses

## End-user modules



ir	p3	nty	nb	iw	f	r	thi.t	rmt	m	sn		rđi.t	r	k.t	s.t
ptcl	det	rlt	quant	gram	pron	gram	verb	sbst	rlt	pron	Kanais, 18	verb	rlt	quant	sbst
null	art.def	-	quant	VerbP	suff	VerbP	ABi/tr	anim/count	prep	suff		anom/tr	prep	quant	inan/count
-	m.sg	-	-/m.sg	-	3sg.m	-	inf/constr	m.sg/abs	-	3pl		inf/abs	-	-/f.sg	f.sg/abs
quant à, si	le	qui	tout	iw (F3)	il	r (F III)	attaquer ; transgresser	homme	dans, en tant que,de	ils (pr. suf.)		donner	vers, pour	autre	endroit, place, siège
2	TRADUCTION : Quant à quiconque attaquerait une personne parmi eux, et qui (les) replacerait vers un autre lieu,														

# 3. New avenues for linguistic research

## Introduction



### Description of the SearchEngine

- Defining the corpus
  - Whole corpus
  - Sub-corpora (filters on the metadata about genres, date, provenance, writing support, writing system, etc.)



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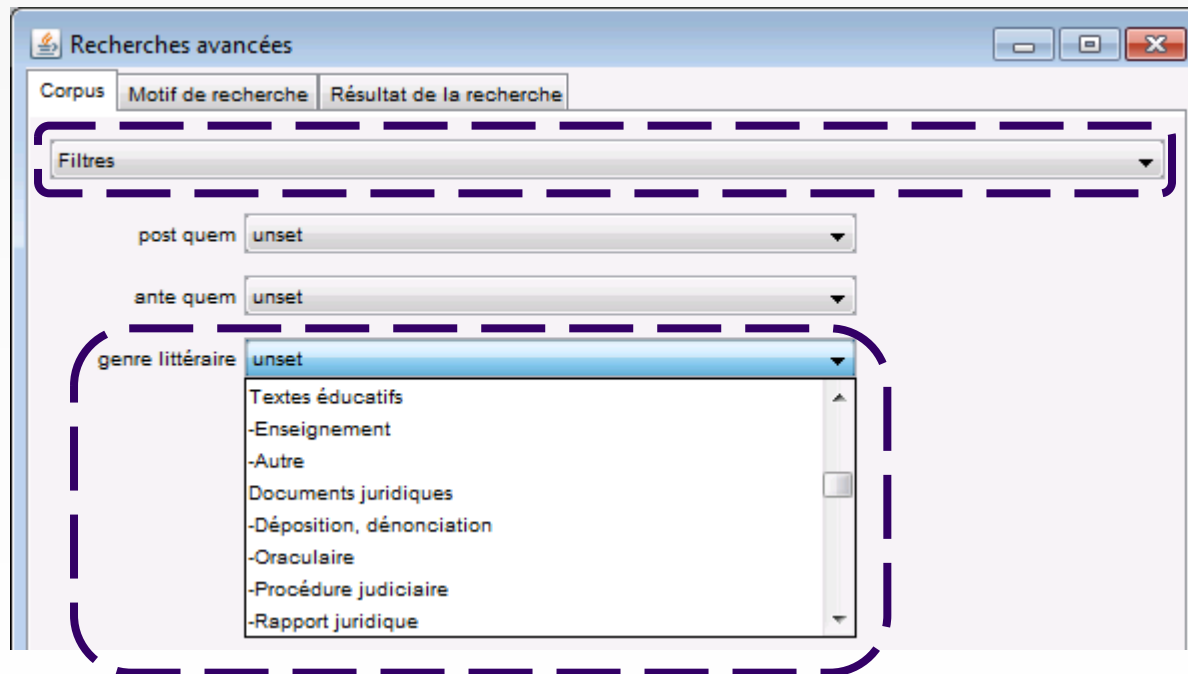


# 3. New avenues for linguistic research

## Introduction



### Description of the SearchEngine



# 3. New avenues for linguistic research

## Introduction



### Description of the SearchEngine

- Defining the corpus
  - Whole corpus
  - Sub-corpora (filters on the metadata about genres, date, provenance, writing support, writing system, etc.)
- Queries build step by step



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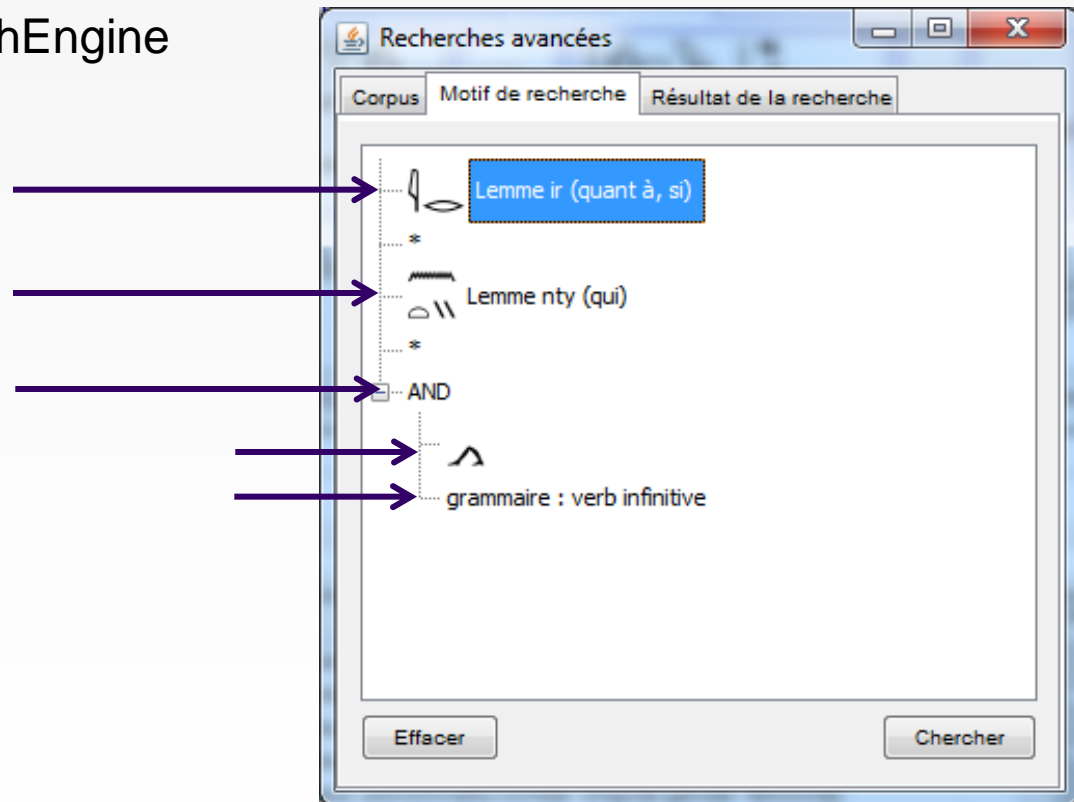


# 3. New avenues for linguistic research

## Introduction



### Description of the SearchEngine



# 3. New avenues for linguistic research

## Introduction



### Description of the SearchEngine

- Defining the corpus
  - Whole corpus
  - Sub-corpora (filters on the metadata about genres, date, provenance, writing support, writing system, etc.)
- Queries build step by step
- Results
  - Sorting facilities
  - Visualization and export

# 3. New avenues for linguistic research

## Introduction



Recherches avancées

Corpus Motif de recherche Résultat de la recherche

Rechercher :  Suivant Précédent

Texte	date	word 0 s...	word 1 s...	word 1 l...	word 1 i...	word 2 sp...	word 3 s...	word 3 l...	word 3 in...	word 4 sp...	word 4 le...	word 4 i...
O. IFAO 884 (= O. IFAO 884); id:	unknown			iH (boeuf)	iH.w [stat...			Hr (Hr (P1))	default Hr		wxA (cher...	infinitive ...
P. Caire CGC 58054 (= P. Caire ...	-Amenho...			nb (tout)	default nb...			r (r (F III))	default r		whi (éviter)	infinitive ...
Stèle Caire 34162 (= Décret d'Ho...	-Horemheb			kyky (singe)	kyky.w [st...			Hr (Hr (P1))	default Hr		Smi (s'en ...	infinitive ...
Stèle Caire 34162 (= Décret d'Ho...	-Horemheb			pr-xnr (har...	pr-xnr [sta...			Hr (Hr (P1))	default Hr		Smi (s'en ...	infinitive ...
P. Harris 500 (= Le Prince Prédes...	19e dyna...			pA (le)	pA [numb...			r (r (F III))	default r		pH (attein...	infinitive ...
P. Harris 500 (= Le Prince Prédes...	19e dyna...			pA (le)	pA [numb...			r (r (F III))	default r		pH (attein...	infinitive ...
Décret de Nauri (= décret de Sét...	-Séthyl er4			kS (Koush)	kS [status...			r (r (F III))	default r		Sna (renv...	infinitive ...
Décret de Nauri (= décret de Sét...	-Séthyl er4			nb (tout)	default nb...			r (vers, p...	default r		smnmn (fa...	infinitive ...
Décret de Nauri (= décret de Sét...	-Séthyl er4			pA (le)	pA [numb...			r (r (F III))	default r		thi (attaqu...	infinitive t...
Kanais, temple de Séthy 1er, Wa...	-Séthyl er9			nb (tout)	default nb...			r (r (F III))	default r		spr (attein...	infinitive ...
Kanais, temple de Séthy 1er, Wa...	-Séthyl er9			nb (tout)	default nb...			r (r (F III))	default r		stkn (laisse...	infinitive ...
Kanais, temple de Séthy 1er, Wa...	-Séthyl er9			pA (le)	pA [numb...			r (r (F III))	default r		thi (attaqu...	infinitive t...
P. Anastasi 8 (= P. Anastasi 8); id...	-Ramsès II			wxs (barq...	wxs [statu...			Hr (Hr (P1))	default Hr		Smi (s'en ...	infinitive ...
Qadech, poème (K1) (= Qadech, ...	-Ramsès II			pA (le)	pA [numb...			Hr (Hr (P1))	default Hr		Smi (s'en ...	infinitive ...
Qadech, poème (L1) (= Qadech, ...	-Ramsès II			pA (le)	pA [numb...			Hr (Hr (P1))	default Hr		Smi (s'en ...	infinitive ...
Qadech, poème (L2) (= Qadech, ...	-Ramsès II			pA (le)	pA [numb...			Hr (Hr (P1))	default Hr		Smi (s'en ...	infinitive ...
P. Raifé-Sallier 3 (= Qadech, poè...	-Ramsès II			pA (le)	pA [numb...			Hr (Hr (P1))	default Hr		Smi (s'en ...	infinitive ...
P. Berlin P.3047 (= P. Berlin P.3...	-Ramsès I...			AH.t (cha...	AH.wt [sta...			r (r (F III))	default r		hAi (desce...	infinitive ...
P. Orbiney (= Les Deux Frères); id...	-Séthyl II			pA (le)	pA [numb...			pAy.i (m...	pAy.k [nu...		iwi (venir)	infinitive i...

27 matches

Information à exporter Répertoire d'exportation Exporter Export as JSesh

# 3. New avenues for linguistic research

## Case study 1: Graphemics and argument structure



### Verbs of motion in Late Egyptian

- Specific morphological and constructional behavior
  - Excluded from some inflectional patterns, like the so-called perfective, which is limited to transitive verbs (complementary constructions are used instead)
  - Some aspectual oppositions are expressed in a different way if compared with other verbal semantic classes

*sw*    *ḥr*            *ir.t*            *f*  
he    on            do\INF        It  
“he is doing It / he does”

*sw*            *ḥr*            *iy.t*  
he            on            come\INF  
“he comes”

*sw*            *m*            *iy.t*  
he            in            come\INF  
“he is coming”

- A typical narrative construction (“And then he went to ...”, lit. “It is going to ... what he did”) appears to be compatible only with verbs of motion

# 3. New avenues for linguistic research

## Case study 1: Graphemics and argument structure



### Verbs of motion in Late Egyptian

- Specific morphological and constructional behavior
  - Excluded from some inflectional patterns, like the so-called perfective (complementary constructions are used)
  - Some aspectual oppositions are expressed in a different way with respect to other verbal semantic classes
  - A narrative construction (“And then he went to ...”, lit. “It is going to ... what he did”) appears to be compatible only with such verbs of motion
- Possible research questions
  - Do all the verbs belonging to this category behave the same way?
  - What kinds of variation in terms of argument structure are attested in the material for this semantic class (transitivity alternation, types of prepositional phrase, etc.)?
- Desiderata
  - Need to identify the verbs belonging to the semantic class “verbs of motion”



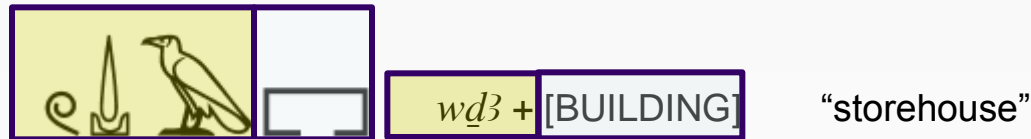
# 3. New avenues for linguistic research

## Case study 1: Graphemics and argument structure

How can we identify the semantic class “Verbs of Motion” thanks to Ramses?

- Graphemic classifiers:

- What is a graphemic classifier? A graphic morpheme, always appearing at the end of a word, having a categorizing or classifying function; see e.g.:



- Classifiers referring to [MOTION]:





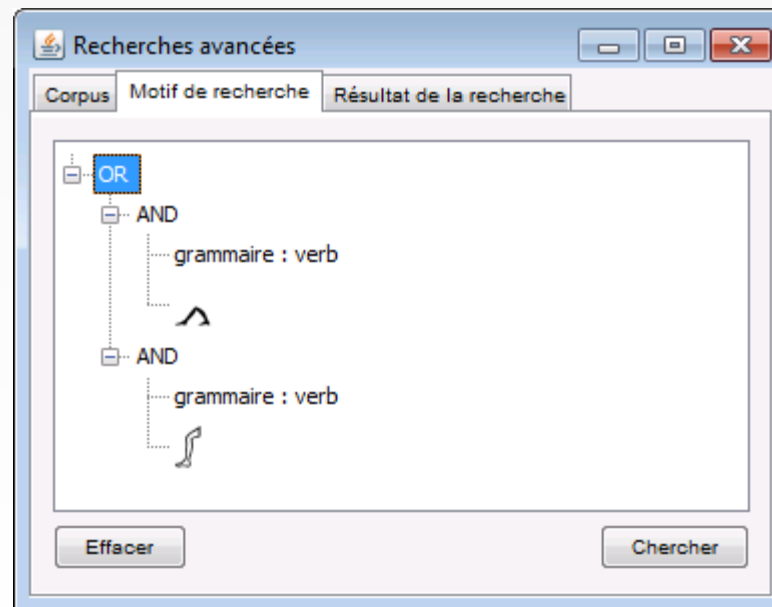
# 3. New avenues for linguistic research

## Case study 1: Graphemics and argument structure



How can we identify the semantic class “Verbs of Motion” thanks to Ramses

- Building the query in the SearchEngine



# 3. New avenues for linguistic research

## Case study 1: Graphemics and argument structure



How can we identify the semantic class “Verbs of Motion” thanks to Ramses

- Building the query in the SearchEngine
- Results of the first query
  - Verbs of motion [MOTION = subject], as e.g.



▪ *prî* “to go out”

- Verbs of transfer, etc. [MOTION = object], as e.g.



*h3b* “to send”

# 3. New avenues for linguistic research

## Case study 1: Graphemics and argument structure



How can we identify the semantic class “Verbs of Motion” thanks to Ramses

- Building the query in the SearchEngine
- Results of the first query
- Refining the query:

The screenshot shows a hierarchical query tree on the left with 'OR', 'AND', and 'AND' nodes. The main interface features a search engine with the following components:

- Partie du discours:** A dropdown menu set to 'verb'. Below it is a table with columns 'A' and 'B'.

A	B
transitivity	transitive
	transitive
	intransitive
- Flexion:** A dropdown menu set to 'Any'. Below it is an empty table with columns 'A' and 'B'.

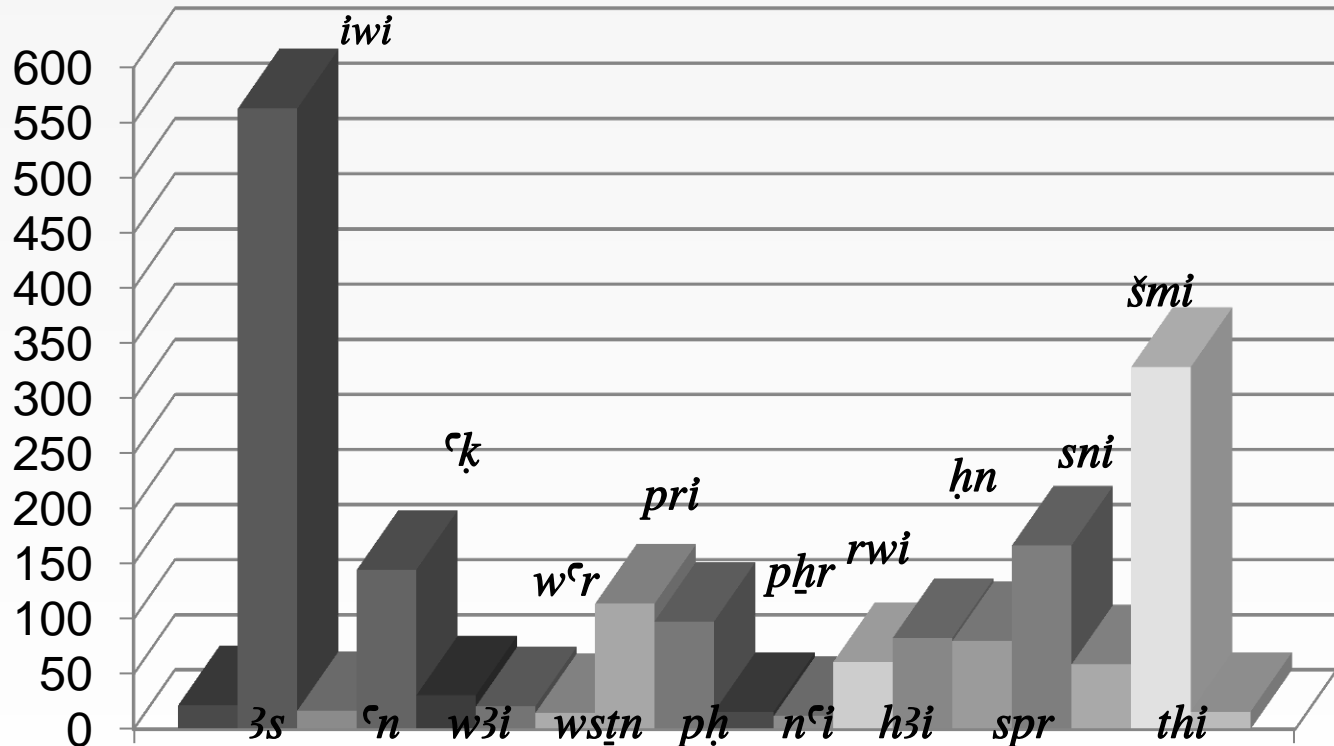
At the bottom of the interface are three buttons: a refresh button (circular arrow), a delete button (red X), and a confirm button (green checkmark).

# 3. New avenues for linguistic research

## Case study 1: Graphemics and argument structure



Results:



- A list of all verbs of motion attested in Late Egyptian is automatically produced, which allows to test the research question raised above

# 3. New avenues for linguistic research

## Case study 2: Variation between 3rd pl. suffix pronouns



### Status quaestionis

- In LEg, there is a shift in the expression of the 3rd pl. suff. pr.
  - From OEG onwards down to the 18th dyn., the pronoun is uniformly written *-sn*
  - By the end of the 20th dyn., the change to a new suff. pr. *-w* has been made fully effective
- From a linguistic point of view, it is interesting to study how *-sn* was gradually superseded by *-w*

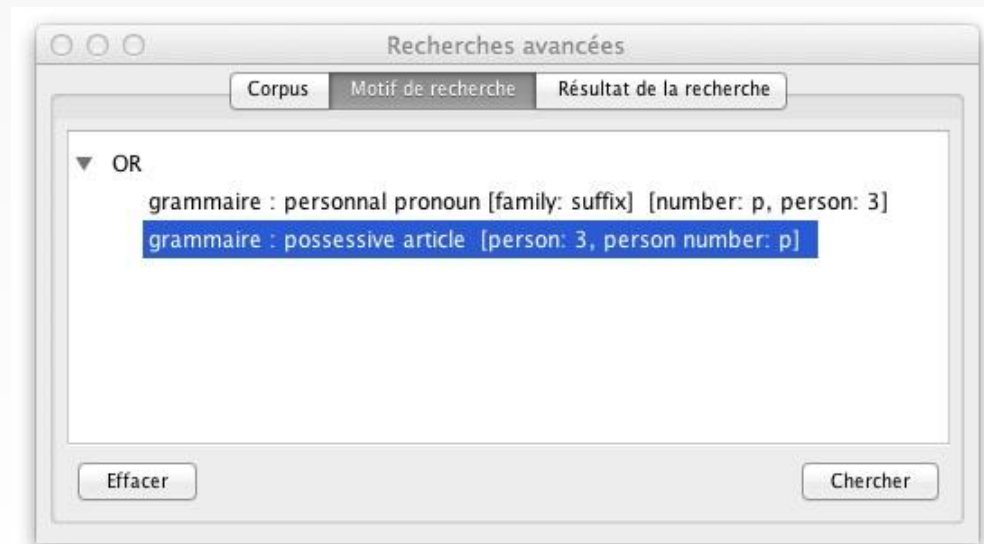
# 3. New avenues for linguistic research

## Case study 2: Variation between 3rd pl. suffix pronouns



### Methodology

- Looking for 3<sup>rd</sup> pl. suff. pronouns **and** poss. article with 3<sup>rd</sup> pl. possessor





# 3. New avenues for linguistic research

## Case study 2: Variation between 3rd pl. suffix pronouns

### Results

Texte	pos	date	word 0 spelling	word 0 lemma	word 0 inflexion
Stèle juridique d'Amara...	1	unknown		sn (ils (pr. suf.))	sn (person: 3,number: p)
Stèle Caire 30770 (= Stè...	9	17e dynastie		sn (ils (pr. suf.))	sn (person: 3,number: p)
O. Berlin P 10616+O. C...	v* 1	18e dynastie		sn (ils (pr. suf.))	sn (person: 3,number: p)
P. BN 202 + P. Amherst...	P. Amherst 9, 1,x+1	18e dynastie		sn (ils (pr. suf.))	sn (person: 3,number: p)
P. BN 202 + P. Amherst...	P. Amherst 9, 1,x+1	18e dynastie		sn (ils (pr. suf.))	sn (person: 3,number: p)
O. Berlin P 10614 (= O...	v* 3	18e-19e dynastie		sn (ils (pr. suf.))	sn (person: 3,number: p)
T. Vienne 3924 (= T. Vie...	r* 4	18e-19e dynastie		sn (ils (pr. suf.))	sn (person: 3,number: p)
Stèle Caire CG 34001, JE...	12	-Amosis (lahmès)		sn (ils (pr. suf.))	sn (person: 3,number: p)
Stèle Caire CG 34001, JE...	17, 9	-Amosis (lahmès)		sn (ils (pr. suf.))	sn (person: 3,number: p)
Stèle Caire CG 34001, JE...	18, 1	-Amosis (lahmès)		sn (ils (pr. suf.))	sn (person: 3,number: p)
Stèle Caire CG 34001, JE...	18, 2	-Amosis (lahmès)		sn (ils (pr. suf.))	sn (person: 3,number: p)
Stèle Caire CG 34001, JE...	18, 8	-Amosis (lahmès)		sn (ils (pr. suf.))	sn (person: 3,number: p)
Deir el-Bahari, terrasse...	309, 8	-Hatshepsout		sn (ils (pr. suf.))	sn (person: 3,number: p)
Deir el-Bahari, terrasse...	309, 9	-Hatshepsout		sn (ils (pr. suf.))	sn (person: 3,number: p)
Deir el-Bahari, terrasse...	309, 10	-Hatshepsout		sn (ils (pr. suf.))	sn (person: 3,number: p)
Deir el-Bahari, terrasse...	309, 13	-Hatshepsout		sn (ils (pr. suf.))	sn (person: 3,number: p)
Karnak, entre les 4ème...	356, 15	-Hatshepsout		sn (ils (pr. suf.))	sn (person: 3,number: p)
Obélisque nord d'Hatch...	362, 12	-Hatshepsout		sn (ils (pr. suf.))	sn (person: 3,number: p)
Obélisque nord d'Hatch...	362, 14	-Hatshepsout		sn (ils (pr. suf.))	sn (person: 3,number: p)
Obélisque nord d'Hatch...	364, 12	-Hatshepsout		sn (ils (pr. suf.))	sn (person: 3,number: p)
Obélisque nord d'Hatch...	364, 13	-Hatshepsout		sn (ils (pr. suf.))	sn (person: 3,number: p)
Obélisque nord d'Hatch...	364, 14	-Hatshepsout		sn (ils (pr. suf.))	sn (person: 3,number: p)
Obélisque nord d'Hatch...	364, 15	-Hatshepsout		sn (ils (pr. suf.))	sn (person: 3,number: p)
Obélisque nord d'Hatch...	365, 2	-Hatshepsout		sn (ils (pr. suf.))	sn (person: 3,number: p)
Obélisque nord d'Hatch...	365, 8	-Hatshepsout		sn (ils (pr. suf.))	sn (person: 3,number: p)

5529 matches

- The results can be sorted out according to morphology (-sn vs. -w) and chronology
- The results are quite numerically important (more than 5500 occ.)
- There is a sharp contrast between the data dating from the beginning of the NK (18<sup>th</sup> dyn) and ...





# 3. New avenues for linguistic research

## Case study 2: Variation between 3rd pl. suffix pronouns

### Results

Recherches avancées

Corpus Motif de recherche Résultat de la recherche

Rechercher :  Suivant Précédent

Texte	pos	date	word 0 spelling	word 0 lemma	word 0 inflexion
P. BN 198 III (= P. BN 19...	7	-Ramsès XI 12		w (ils )	w [person: 3,number: p]
P. BN 198 III (= P. BN 19...	12	-Ramsès XI 12		w (ils )	w [person: 3,number: p]
P. BN 198 III (= P. BN 19...	v° 2	-Ramsès XI 12		w (ils )	w [person: 3,number: p]
P. BN 198 III (= P. BN 19...	v° 6	-Ramsès XI 12		w (ils )	w [person: 3,number: p]
P. BN 198 III (= P. BN 19...	v° 7	-Ramsès XI 12		w (ils )	w [person: 3,number: p]
P. BN 198 III (= P. BN 19...	v° 7	-Ramsès XI 12		w (ils )	w [person: 3,number: p]
P. Turin 1895+2006 (=...	r° 1,8	-Ramsès XI 12		w (ils )	w [person: 3,number: p]
P. Turin 1895+2006 (=...	r° 3,13	-Ramsès XI 12		w (ils )	w [person: 3,number: p]
P. Turin 1895+2006 (=...	r° 3,13	-Ramsès XI 12		w (ils )	w [person: 3,number: p]
P. Turin 1895+2006 (=...	r° 3,15	-Ramsès XI 12		w (ils )	w [person: 3,number: p]
P. Turin 1895+2006 (=...	r° 3,15	-Ramsès XI 12		w (ils )	w [person: 3,number: p]
P. Turin 1888 (= P. Turin...	1,9	-Ramsès XI 17		w (ils )	w [person: 3,number: p]
P. Turin 1888 (= P. Turin...	1,12	-Ramsès XI 17		w (ils )	w [person: 3,number: p]
P. Turin 1888 (= P. Turin...	2,2	-Ramsès XI 17		w (ils )	w [person: 3,number: p]
P. Turin 1888 (= P. Turin...	2,14	-Ramsès XI 17		w (ils )	w [person: 3,number: p]
P. Turin 1888 (= P. Turin...	2,14	-Ramsès XI 17		w (ils )	w [person: 3,number: p]
KL 69, oracle de Nesam...	col. 22	-Ramsès XI 25		w (ils )	w [person: 3,number: p]
Décret oraculaire pour...		21e dynastie		w (ils )	w [person: 3,number: p]
Décret oraculaire pour...		21e dynastie		w (ils )	w [person: 3,number: p]
Décret oraculaire pour...		21e dynastie		w (ils )	w [person: 3,number: p]
Décret oraculaire pour...		21e dynastie		w (ils )	w [person: 3,number: p]
Décret oraculaire pour...		21e dynastie		w (ils )	w [person: 3,number: p]
Décret oraculaire pour...		21e dynastie		w (ils )	w [person: 3,number: p]
Décret oraculaire pour...		21e dynastie		w (ils )	w [person: 3,number: p]
Décret oraculaire pour...		21e dynastie		w (ils )	w [person: 3,number: p]
Décret oraculaire pour...		21e dynastie		w (ils )	w [person: 3,number: p]

5529 matches Information à exporter Répertoire d'exportation Exporter Export as JSesh



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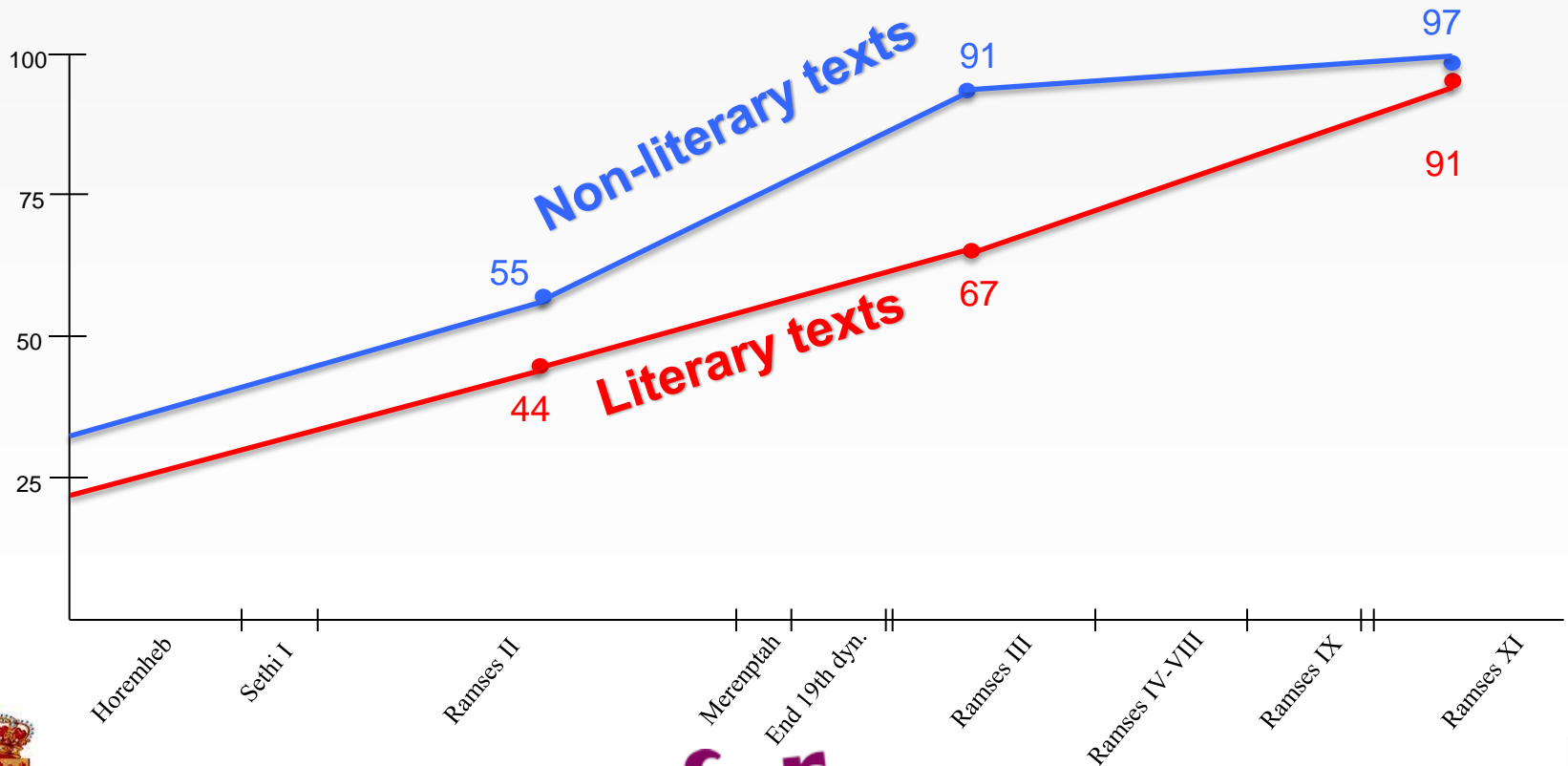


# 3. New avenues for linguistic research

## Case study 2: Variation between 3rd pl. suffix pronouns



The data sorted out by dynasties/reigns and according to text genres



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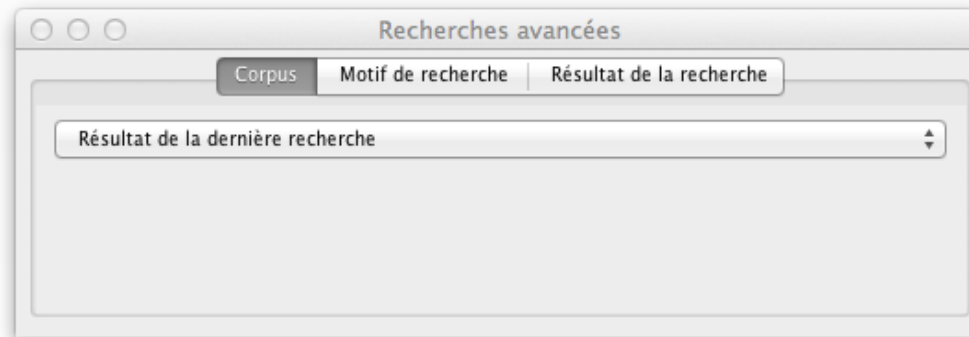
# 3. New avenues for linguistic research

## Case study 2: Variation between 3rd pl. suffix pronouns



### Methodology

- Looking for 3<sup>rd</sup> pl. suff. pronouns **and** poss. article with 3<sup>rd</sup> pl. possessor
- Looking for docs that have both *-sn* and *-w*
  - looking for the 3<sup>rd</sup> pl. suff. pron. with the form *-sn*
  - taking as research corpus the set of texts that have the suff. pron. *-sn*, and looking for *-w*



# 3. New avenues for linguistic research

## Case study 2: Variation between 3rd pl. suffix pronouns



The screenshot displays a complex linguistic research interface. On the left, a window titled 'Recherches avancées' shows a table of search results with columns for 'Texte', 'pos', 'date', and 'word 0 spelli'. A red box highlights a specific entry: 'Stèle JE 67377 (= S... 2) -Touthmosis III'. The main window shows a detailed view of a text fragment from 'Ramses 20111209 / Stèle JE 67377'. It features a grid of morphological analysis tools and a 'Recherche d'occurrences simples' window. The search results window shows a list of occurrences for the word 'w' (ils) in the text 'Stèle JE 67377 (= Stèle du temple de Montou, Armant, de Thoutmosis 3); id.: 92'. The text fragment shows the 3rd pl. suff. pronoun 'w' in two different forms: 'w (ils)' and 'w (ils)'. A red box highlights the 'w (ils)' form in the morphological analysis grid.

An example of a text showing both forms of the 3<sup>rd</sup> pl. suff. pronoun



# 3. New avenues for linguistic research

## Case study 2: Variation between 3rd pl. suffix pronouns

The reign of R. III seems to be a turning point

- For instance, pTurin 1880 (aka Turin Strike papyrus) displays the following results:
  - -sn : 18 occ. (mainly with prepositions)
  - -w : 22 occ.

P. Turin 1880 (= P. Turin 1880); id: 453	v° 7, 4	-Rams...	ye	n (à, p... defau...	sn (... sn...
P. Turin 1880 (= P. Turin 1880); id: 453	v° 7, 6	-Rams...		n (à, p... defau...	sn (... sn...
P. Turin 1880 (= P. Turin 1880); id: 453	r° 1, 2	-Rams...	ye	iw (iw (... defau...	sn (... sn...
P. Turin 1880 (= P. Turin 1880); id: 453	r° 1, 4	-Rams...		n (à, p... defau...	sn (... sn...
P. Turin 1880 (= P. Turin 1880); id: 453	r° 2, 2	-Rams...		n (à, p... defau...	sn (... sn...
P. Turin 1880 (= P. Turin 1880); id: 453	r° 2, 4	-Rams...	Hr (sur... defau...		sn (... sn...
P. Turin 1880 (= P. Turin 1880); id: 453	r° 2, 5	-Rams...		n (à, p... defau...	sn (... sn...
P. Turin 1880 (= P. Turin 1880); id: 453	r° 2, 17	-Rams...	in (dit... Form...		sn (... sn...
P. Turin 1880 (= P. Turin 1880); id: 453	r° 3, 4	-Rams...		n (à, p... defau...	sn (... sn...
P. Turin 1880 (= P. Turin 1880); id: 453	r° 3, 9	-Rams...		n (à, p... defau...	sn (... sn...
P. Turin 1880 (= P. Turin 1880); id: 453	r° 3, 10	-Rams...		n (à, p... defau...	sn (... sn...
P. Turin 1880 (= P. Turin 1880); id: 453	r° 3, 11	-Rams...		n (à, p... defau...	sn (... sn...
P. Turin 1880 (= P. Turin 1880); id: 453	r° 3, 16	-Rams...		n (à, p... defau...	sn (... sn...
P. Turin 1880 (= P. Turin 1880); id: 453	r° 3, 16	-Rams...		n (à, p... defau...	sn (... sn...
P. Turin 1880 (= P. Turin 1880); id: 453	r° 4, 15	-Rams...		n (à, p... defau...	sn (... sn...

# 3. New avenues for linguistic research

## Case study 2: Variation between 3rd pl. suffix pronouns



The reign of R. III seems to be a turning point

- For instance, pTurin 1880 (aka Turin Strike papyrus) displays the following results:
  - *-sn* : 18 occ. (mainly with prepositions)
  - *-w* : 22 occ.

At the end of the 20th dyn., *-w* is used almost exclusively in non-literary texts

- For instance, pLéopold II-Amherst, a text that gives the proceedings of a trial involving robbers of royal tombs, displays the following results:
  - *-sn* : only 2 occ. (always with prep. *im*)
  - *-w* : 23 occ.

# 3. New avenues for linguistic research

## Case study 2: Variation between 3rd pl. suffix pronouns



### Methodology

- Looking for 3<sup>rd</sup> pl. suff. pronouns **and** poss. article with 3<sup>rd</sup> pl. possessor
- Looking for docs that have both *-sn* and *-w*
- We are thus prompted to look for syntactic environments
  - In LEg, the suff. pron. can be used in the following environments:
    - Subject of some inflected forms (perfective, subjunctive, etc.)
    - Subject of some verbal auxiliaries (*iw*, *wn.in*, *mtw*, etc.)
    - Object of infinitives
    - Possessor (with a substantive)
    - After prepositions
    - Component of possessive articles (*p3y.sn*, etc.)
- In what follows, we restricted the scope to the reign of R. III

# 3. New avenues for linguistic research

## Case study 2: Variation between 3rd pl. suffix pronouns



Recherches avancées

Corpus Motif de recherche Résultat de la recherche

Filtres

post quem -Ramsès III

anté quem -Ramsès III

genre littéraire unset

Recherches avancées

Corpus Motif de recherche Résultat de la recherche

▼ OR

Lemme sn (ils (pr. suf.))

Lemme w (ils )

Effacer Chercher



# 3. New avenues for linguistic research

## Case study 2: Variation between 3rd pl. suffix pronouns



Results sorted out according to the preceding word

Temple de Medinet Habou... 60,12	-Ramsès III		HA (derrière)	default HA		sn (ils (pr. su... sn (person...
O. DeM 00973 (= O. DeM... 5	-Ramsès III		Hr (sur, au suj...	default Hr		sn (ils (pr. su... sn (person...
O. Gardiner 0177 (= O. Ga... r° 2	-Ramsès III		Hr (sur, au suj...	default Hr		sn (ils (pr. su... sn (person...
O. Gardiner 0177 (= O. Ga... r° 5	-Ramsès III		Hr (sur, au suj...	default Hr		sn (ils (pr. su... sn (person...
P. Lee (= P. Lee); id: 1616 1:5	-Ramsès III		Hr (sur, au suj...	default Hr		w (ils) w (person...
P. Lee (= P. Lee); id: 1616 2:2	-Ramsès III		Hr (sur, au suj...	default Hr		w (ils) w (person...
Temple de Medinet Habou... 21,15	-Ramsès III		Hr (sur, au suj...	default Hr		sn (ils (pr. su... sn (person...
Temple de Medinet Habou... 77,1	-Ramsès III		Hr (sur, au suj...	default Hr		w (ils) w (person...
Temple de Medinet Habou... 62,2	-Ramsès III		Hr (sur, au suj...	default Hr		sn (ils (pr. su... sn (person...
Temple de Medinet Habou... 63,9	-Ramsès III		Hr (sur, au suj...	default Hr		w (ils) w (person...
Temple de Medinet Habou... 69,9	-Ramsès III		Hr (sur, au suj...	default Hr		w (ils) w (person...
Temple de Medinet Habou... 69,15	-Ramsès III		Hr (sur, au suj...	default Hr		w (ils) w (person...
P. Turin 1880 (= P. Turin 1... v° 6, 5	-Ramsès III 29		Hr (sur, au suj...	default Hr		w (ils) w (person...
P. Turin 1880 (= P. Turin 1... r° 2, 4	-Ramsès III 29		Hr (sur, au suj...	default Hr		sn (ils (pr. su... sn (person...
Temple de Medinet Habou... 40,13	-Ramsès III		Hr-HA.t-n (de...	default Hr-H...		sn (ils (pr. su... sn (person...
Temple de Medinet Habou... 69,3	-Ramsès III		Hr-tp (sur)	default Hr-tp		sn (ils (pr. su... sn (person...
Temple de Medinet Habou... 70,6	-Ramsès III		Hr-tp (sur)	default Hr-tp		sn (ils (pr. su... sn (person...
O. Ashmolean Museum 01... r° 4	-Ramsès III		iw (iw (F3))	default iw		w (ils) w (person...
O. Ashmolean Museum 06... 4	-Ramsès III		iw (iw (séq.))	default iw		w (ils) w (person...
O. BM EA 05637 (= O. BM... r° 3	-Ramsès III		iw (iw (séq.))	default iw		w (ils) w (person...
O. BM EA 05637 (= O. BM... r° 3	-Ramsès III		iw (iw (séq.))	default iw		w (ils) w (person...
O. BM EA 05637 (= O. BM... r° 4	-Ramsès III		iw (iw (séq.))	default iw		w (ils) w (person...
O. BM EA 05637 (= O. BM... r° 5	-Ramsès III		iw (iw (séq.))	default iw		w (ils) w (person...
O. BM EA 05637 (= O. BM... r° 5	-Ramsès III		iw (iw (séq.))	default iw		w (ils) w (person...
O. BM EA 05637 (= O. BM... r° 6	-Ramsès III		iw (iw (séq.))	default iw		w (ils) w (person...
O. BM EA 05637 (= O. BM... r° 7	-Ramsès III		iw (iw (séq.))	default iw		w (ils) w (person...
O. BM EA 05637 (= O. BM... r° 9	-Ramsès III		iw (iw (séq.))	default iw		w (ils) w (person...
O. BM EA 05637 (= O. BM... v° 1	-Ramsès III		iw (iw (séq.))	default iw		w (ils) w (person...
O. BM EA 05637 (= O. BM... v° 3	-Ramsès III		iw (iw (séq.))	default iw		w (ils) w (person...
O. BM EA 50734 + O. Ash... v° 2	-Ramsès III		iw (iw (séq.))	default iw		w (ils) w (person...
O. Berlin P 10655 (= O. Be... 4	-Ramsès III		iw (iw (F3))	default iw		w (ils) w (person...



# 3. New avenues for linguistic research

## Case study 2: Variation between 3rd pl. suffix pronouns



We then eliminated literary texts in order to have a homogeneous corpus. We also decided to consider only the material coming from Thebes in order to avoid possible dialectal interferences

The data have been transferred on a Excel sheet for processing

	noun	infinitive	preposition	poss. article	infl. verbs	conj. bases
- <i>sn</i>	0	1	18	1	0	4
- <i>w</i>	20	47	36	10	16	80

# 3. New avenues for linguistic research

## Case study 2: Variation between 3rd pl. suffix pronouns



### Zooming in to single texts

<i>-sn</i>	<i>-sn</i> and <i>-w</i>	<i>-w</i>
O. DeM 603 P. Louvre E 27151	O. DeM 973	O. BM 50734+O. Gardiner 99+O. Caire CG 25673
	P. DeM 26 (16) P. Boulaq 10 (8) P. Turin 1880 (29)	O. Ashmolean HO 655 O. BM 5637 O. Berlin P. 10629 O. Caire CG 25553 (12) O. DeM 569 O. DeM 580 O. DeM 592 O. Florence 2621 (21) O. Gardiner 103 O. OIC 110 P. Berlin P. 10496 (21) P. Rifaud A,B,C (30) P. Rollin (30) P. Turin 1875 (30)

This opens up new perspectives in scribal practices



# 3. New avenues for linguistic research

## Case study 3: sequence of verbal forms expressing orders and injunctions

Status quaestionis

- Two possibilities in Late Egyptian:
  - repeating the verbal form, in this case, the imperative,
  - or using a form that is specialized in expressing sequentiality
- For the last option, there are in LEg two patterns:
  - The so-called “Sequential” *iw.f hr sdm*, mainly confined to narrative,
  - The conjunctive *mtw.f sdm*, which is mainly use in discourse

Ex. *i.šm*  
*i.wn p3 mhr*

“go, open the storehouse!” (pOrbiney 3,1-2)

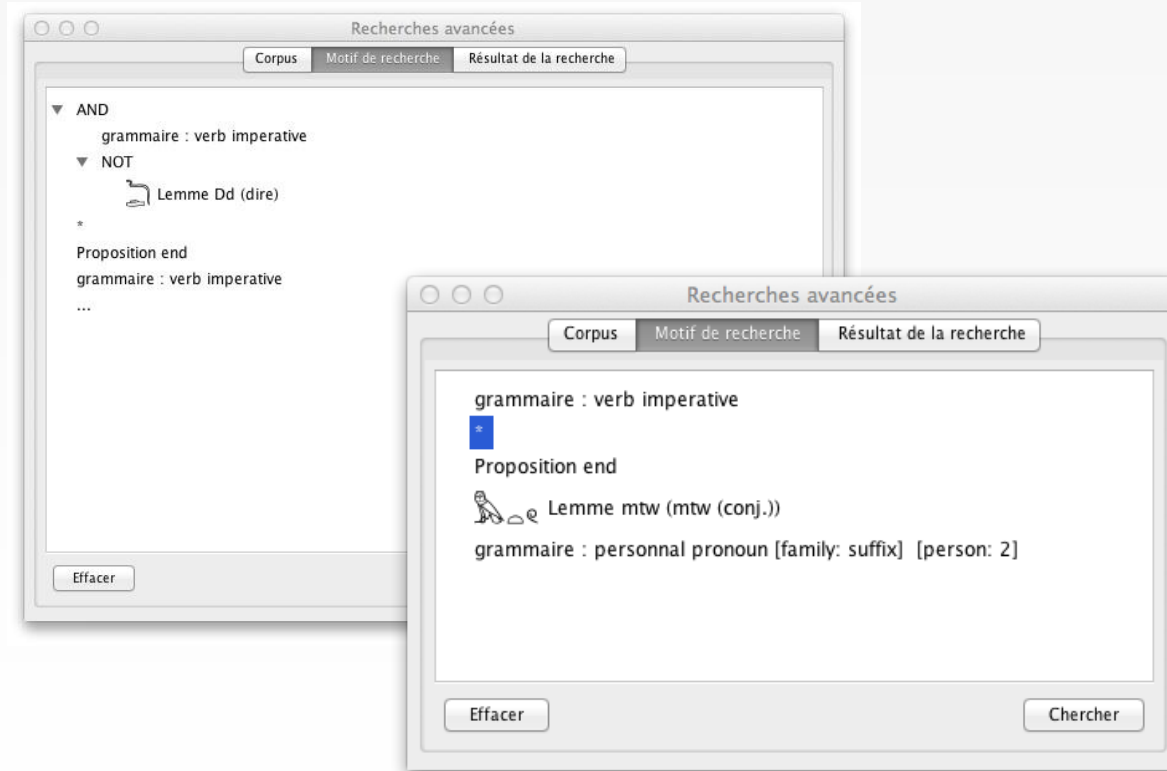
Ex. *i.šm r-hry*  
*mtw.tn nwy n3y.tn h<sup>c</sup>w*

“go uphill and fetch your tools” (pTurin 1880, r° 4,19-20)



# 3. New avenues for linguistic research

## Case study 3: sequence of verbal forms expressing orders and injunctions



### Methodology

- looking for sequences of imperatives (excluding the verb *dd* “say” as first imperative)
- looking for the sequence imperative + conjunctive (limited to 2<sup>nd</sup> pers.)



# 3. New avenues for linguistic research

## Case study 3: sequence of verbal forms expressing orders and injunctions

For practical reasons,

- the data are limited to 20th and 21st dynasties
- only non-literary texts have been considered (with the exception of fictional tales)

	Imperative + Imperative	Imperative + Conjunctive
occurrences	86	62
nb of texts	62	51

Starting from this sub corpus, it is possible to test different criteria that can explain the distribution:

- chronology,
- phraseology,
- textual genres,
- scribal traditions, etc.



# 3. New avenues for linguistic research

## Case study 3: sequence of verbal forms expressing orders and injunctions

	Imperative + Imperative	Imperative + Conjunctive
occurrences	86	62
nb of texts	62	51
<i>rdi + rdi</i>	59	9
texts having both constr.	15	

*rdi + rdi* : phraseology in letters (well wishes)

Ex. (I say everyday to the gods)  
*imy n.tn ʿnh-wd3-snb ʿhʿ k3 i3w.t ʿ3.t nfr.t*  
*imy n.tn hsw.t knw*  
*imy iw.i*

« give them life, prosperity, health, a long life and a beautiful old age  
give them numerous honors let me come (back) » (pTurin 1972)



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# 3. New avenues for linguistic research

## Case study 3: sequence of verbal forms expressing orders and injunctions



In the *Wenamun*, for instance,

- the sequence imperative + imperative is attested 5 times (1,23; 1,39; 2,7; 2,14; 2,52)
- the sequence imperative + conjunctive is attested 2 times (2,49 and 2,73)

In the second scheme, the conjunctive has a semantic value of consequence (an evolution that is above all perceptible in the first person and will grow in Coptic), whereas the first scheme mainly expresses the sequence of two orders

