

# *Editing a XVth century political treatise using the computer: a back-and-forth between meaning and information*

Matthias GILLE LEVENSON

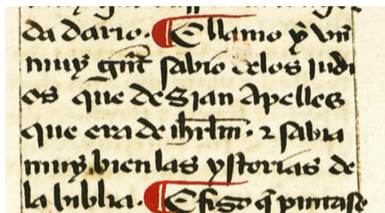
PhD student, École Normale Supérieure de Lyon

*Iberian Connections seminar*

November 12, 2019

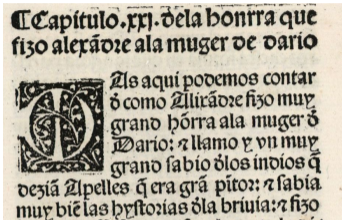


# Information and meaning



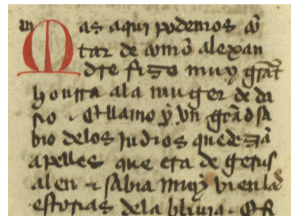
da dario. **E**llamo y vn  
muy grãt sabio de los judi  
os que desian Apelles  
que era de iherlm. 2 sabia  
muy bien las ystorias de  
la liblia. **E**fizo q pintase

Ms. 2097, University of Salamanca  
fol. 436r



**C**apítulo .xxj. dela honrra que  
fizo alexãdre ala muger de dario  
**D**es aqui podemos contar  
d como Alexãdre hizo muy  
grand hõrra ala muger d  
Dario: 2 llamo y vn muy  
grand sabio d los indios q  
deziã Apelles q era grã pitor: 2 sabia  
muy biẽ las hystorias d la briuta: 2 fizo

Inc/901, National Library, Madrid  
fol. 244v



**D**es aqui podemos a  
tar de armã alexan  
dre fizo muy grãt  
honrra ala muger de da  
rio. **E**llamo y vn grãt sa  
bio de los judios que desia  
apelles que era de gerus  
alen 2 sabia muy bien la  
estoras de la libria. **E**f

Ms. II/215, Real Biblioteca, Madrid  
fol. 453r

4 contar JRZG | notar Q 4 muy JQZG | om. R 5 muy JZ | om. RQG 5 judios JRQG | indios Z 5 era de Jherusalém J | era de Iherusalem R era de Iherusalém Q era gran pintor Z era de Gerusalén G 5-6 las ystorias de JR | las estorias de Q las hystorias de Z om. G 6-7 E fizo que pintase sobre la sepultura de la dicha Reyna

Acquiring the information: the transcription. To OCR (HTR?) or not to OCR

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- **Advantages:**
  - Gain of time for large corpuses
  - Conservation of graphical features made easier

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- **Method:**

1. Make a conservative transcription of some folios of the witness;
2. Feed the program with the transcription = train a model with Ocropy [Breuel 2008];
3. Predict new text, correct, re-train, and so on until a given error rate is reached;
4. Use the best model on new folios.

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- **Results:**

- Low error rate with incunabulas ( $\approx 5\%$ );
- Less accurate with manuscript writing, but it is improving: Kraken [Kiessling 2019];
- The main issue is the line segmentation.

# Structuring the information: the TEI



```
<div type="sdoc"><!--INFO ABOUT SUBJECT OF INQUISITION-->
  <head>
    <name type="person" role="soi"><name type="forename">HUGH</name> <name type="surname">STRANGE</name></name>
  </head>
  <div type="wholeDoc" xml:id="CIPM-INQ-22-1">
    <!--WRIT-->
    <div type="writ" n="Westminster" subtype="man">
      <head>
        <num type="docNum">1</num>
        <rs type="writType">Writ mandamus</rs>. <rs type="dorse" n="en">†</rs>
        <date type="writDate" when="1423-05-03">3 May 1423</date>. [<name type="person" role="writ[lerk]">Thorlby</name>]
        Regarding lands held of <name type="forename">Henry</name> V.</head>
      </div><!--INQ HEAD-->
      <div type="doc" subtype="inq">
        <head>
          <name type="county">CITY OF YORK</name>. <rs type="entType">Inquisition</rs>.
          <name type="place" role="inqLoc">York</name>. <date type="inqDate" when="1423-05-19">19 May 1423</date>. [<name type="person" role="escheator">Esyngwald</name>]</head>
          <!--JURORS-->
          <div type="jurors"> [14 lines]
          <!--HOLDINGS-->
          <div type="holdings">
            <ab>He held 13 messuages and 6 selions in <name type="place">Bootham</name> in
              the suburbs in his demesne as of fee of <name type="person"> <name type="forename">Henry</name> <name type="surname">IV</name></name>
              in burgage tenure as the whole of the city is held, annual value 8 marks.</ab>
          </div>
          <!--DEATH and HEIRS-->
          <div type="deathHeirs">
            <ab>He died on <date type="death" when="1406-12-27">27 December 1406</date>.
              <name type="person" role="heir"><name type="forename">Roger</name> <name type="surname">Strange</name></name> is his son and heir,
              <measure type="age">aged 38 years</measure> and more.</ab>
          </div>
          <div type="occupiers">
            <ab>Since his death the messuages and selions have been successively occupied,
              and the issues taken, by <name type="person"><name type="forename">William</name> <nameLink>de</nameLink> <name type="surname">Bowes</name></name> and
              <name type="person"><name type="forename">John</name> <name type="surname">Petyt</name></name> until <date when="1410-02-03">3 February 1410</date>,
              <name type="person"><name type="forename">John</name> <name type="surname">Waterton</name></name> until his own death, and then <rs type="person">Richard</rs> Watertc
          </div>
          <div type="classMarks">
            <ab type="classMark">C 139/1/1 mm.1-2</ab>
          </div>
        </div>
      </div>
    </div>
  </div>
```

# Structuring the information: the TEI

What are the interests of a community driven standard ? [Burnard 2015]



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- It's a standard !
- And it's community driven.

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What are the interests of a community driven standard ? [Burnard 2015]

- It's a standard !
- And it's community driven.
- An *ontology on the structure of texts*<sup>1</sup>, a “conceptual model of textuality” [Ciotti 2018].

---

<sup>1</sup>N.B.: It is **not** an informatical ontology! See [Ciotti and Tomasi 2016]

# Enriching the information: lemmatisation and POStagging

Take *aver*, *auer*, *haver*:

WORK IN PROGRESS

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- Three different graphies. FORM: *aver* | *auer* | *haver*

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WORK IN PROGRESS

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- Three forms of the verb *haber*. LEMMA: *haber* | *haber* | *haber*
- Three infinitives. PART OF SPEECH: *VMN000* | *VMN000* | *VMN000* [EAGLES / FREELING]

WORK IN PROGRESS

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FORM	⇒	LEMMA	PoS
<i>aver, auer, haver</i>	⇒	HABER	VMN000



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FORM	⇒	LEMMA	POS
<i>aver, auer, haver</i>	⇒	HABER	VMN000

This grammatical information is added to the TEI encoding, to be processed after.

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FORM	⇒	LEMMA	POS
<i>aver</i> , <i>auer</i> , <i>haver</i>	⇒	HABER	VMN000

This grammatical information is added to the TEI encoding, to be processed after.



```
<w lemma="haber" pos="VMN000">aver</w>  
<w lemma="caballero" pos="NCMP000">cavalleros</w>  
<w lemma="muy" pos="RG">muy</w>
```

I'm using the dictionary created by Sánchez Marco for her PhD dissertation [Sánchez Marco 2012].

# What is the *collatio*?

“La colación o cotejo de todos los testimonios entre sí para determinar las lecciones variae o variantes”.

[Blecua 1983]

Can we simulate it with a computer ? Let's highlight the two steps of the *collatio*:

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1. Finding the portion of text to be compared in each witness
2. Making the comparison

# What is the *collatio*?

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Can we simulate it with a computer ? Let's highlight the two steps of the *collatio*:

1. Finding the portion of text to be compared in each witness
2. Making the comparison

The human mind **does not dissociate** these two steps, but the computer needs this distinction.

# Comparing it and eliminating the redundance I: the alignment

Alignment (= search for similar groups of words) on the forms with CollateX [Dekker and Middell 2011]

1. “quáles e cuántas cosas deuen auer los buenos lidiadores”: base sentence
2. “quáles e cuántas cosas deven *aver* los buenos lidiadores”: 2 differences
3. “quáles e cuántas cosas deven *haver* los buenos lidiadores”: 2 differences

## Comparing it and eliminating the redundance I: the alignment

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**Result:**

quáles e cuántas cosas	deuen auer	<i>omisit</i>	los buenos lidiadores
quáles e cuántas cosas	deven	aver	los buenos lidiadores
quáles e cuántas cosas	deven	haver	los buenos lidiadores

# Comparing it and eliminating the redundance I: the alignment

## Alignment on the lemmas with CollateX

1. cual + y + quanto + cosa + deber + haber + el + buen + lidiador : base sentence represented as lemmas
2. cual + y + quanto + cosa + deber + haber + el + buen + lidiador: no difference
3. cual + y + quanto + cosa + deber + haber + el + buen + lidiador: no difference

### Result:

quáles e cuántas cosas	deuen	auer los buenos lidiadores p
quáles e cuántas cosas	deven	aver los buenos lidiadores p
quáles e cuántas cosas	deven	haver los buenos lidiadores



# Comparing it and eliminating the redundance II: the comparison

Comparing aligned groups of words: is there a variation?

For each aligned group:

1. If the strings (= the characters) are the same, it is not a variant: no apparatus entry
2. If the strings are different, we have a variant.

We are talking about **strings** here, not about words ! It is pure information. Can we go further ? What can we do with the variants ?

# Comparing it and eliminating the redundance II: the comparison

Improving the accuracy of the apparatus: graphical variants identification

FORM	$\implies$	LEMMA	POS
<i>aver, auer, haver</i>	$\implies$	HABER	VMN000

# Comparing it and eliminating the redundance II: the comparison

Improving the accuracy of the apparatus: graphical variants identification

FORM	⇒	LEMMA	POS
<i>aver, auer, haver</i>	⇒	HABER	VMN000

## MEANING

“*Aver, auer, haver* are the same word...”



“When you have a graphical variant,  
do this” (**Method**)

## INFORMATION

“These three tokens have different strings,  
the same lemma and the same POS”



“If the strings are not equal **AND** their lemma is the same  
**AND** so is the POS: *do this*” (**Algorithm**)

# Comparing it and eliminating the redundance: the *collatio*

## To sum up

1. Align...
  - 1.1 Alignment on the lemmas
2. ... And compare. **Algorithm: for each aligned token or group of token:**
  - 2.1 if all strings are strictly equal, we haven't got a variant.
  - 2.2 if the strings are different, it is a variant.  
But this is not enough:
    - 2.2.1 if the words have the same lemma and the same POS, we have a graphical variant ! (> 25%)
    - 2.2.2 if the lemma (or the POS) differ, we have a "real" variation.

The result of the process will be encoded in TEI, and will be injected to the individual transcriptions.

# Going back and forth

```
razones avía para castigar los malos. Ca o los castigavan por que se
emendasen e fusen mejores, e <add place="above">por que</add> non
menospresciasen la justia, así que el que mal fazia o viesse su
pena, o que por temor de pena fuesen buenos e escusasen toda
torpedat.</p>
</div>
</div>
<div type="chapitre" xml:id="Mad_6_3_3_21" n="21">
<head>Capítulo xxi°, de la honrra que fizo Alexander a la muger de
Dario.</head>
<div type="traduction"/>
<div type="glose">
<!-- Fol 453r-->
<p n="RXfFyLoBTu"><hi rend="lettre_attente">m</hi><hi rend="lettrine"
>M</hi>as aquí podemos contar de cómo Alexandre fizo muy grant
honrra a la muger de Dario: et llamó y un grand sabio de los judíos
que dezían Apelles, que era de Gerusalén, e sabía muy bien la
Blivia.</p>
...</div>
```

Figure 1. Human-readable, consistent, standard information

# Going back and forth

```
  "id": "Mad_G",
  "tokens": [{"t": "Mas ", "n": "mas", "pos": "NCMP000", "xml:id": "waxZ4AL"}, {"t": "aquí ", "n": "aquí", "pos": "RG", "xml:id": "fYodlad"}, {"t": "podemos ", "n": "podar",
, "pos": "VMM01P0", "xml:id": "hSqbl0j"}, {"t": "contar ", "n": "contar", "pos": "VMP005M", "xml:id": "lhpJTI6"}, {"t": "de ", "n": "de", "pos": "NCF5000", "xml:id": "mGkwhzN"}, {"t":
, "pos": "cómmo ", "n": "cómo", "pos": "PT00000", "xml:id": "eqSNTSQ"}, {"t": "Alexandre ", "n": "alexandre", "pos": "NP000P0", "xml:id": "daGicLj"}, {"t": "fizo ", "n": "hacer", "pos":
"VMIS350", "xml:id": "bxMOuXm"}, {"t": "muy ", "n": "muy", "pos": "RG", "xml:id": "hQLUzA4"}, {"t": "grant ", "n": "gran", "pos": "AQ0CS00", "xml:id": "c4rCHBK"}, {"t": "honrra ", "n":
"honra", "pos": "NCF5000", "xml:id": "a7fi92x"}, {"t": "a ", "n": "a", "pos": "NCF5000", "xml:id": "hQBli9E"}, {"t": "la ", "n": "la", "pos": "NCMP000", "xml:id": "rXDLyKd"}, {"t":
"muger ", "n": "mujer", "pos": "NCF5000", "xml:id": "mdCgSml"}, {"t": "de ", "n": "de", "pos": "NCF5000", "xml:id": "xNxM9w7"}, {"t": "Dario ", "n": "dario", "pos": "NP000P0", "xml:id":
"bsiJUKz"}, {"t": "et ", "n": "e", "pos": "CC", "xml:id": "fBpXzKW"}, {"t": "llamó ", "n": "llamar", "pos": "VMIP150", "xml:id": "nBtg8g4"}, {"t": "y ", "n": "y", "pos": "RG",
, "xml:id": "eCmuJNn"}, {"t": "un ", "n": "uno", "pos": "PI0MS00", "xml:id": "mvxgMQP"}, {"t": "grand ", "n": "gran", "pos": "AQ0CS00", "xml:id": "gEouc9H"}, {"t": "sabio ", "n":
"sabio", "pos": "AQ0MS00", "xml:id": "g3UebZl"}, {"t": "de ", "n": "de", "pos": "NCF5000", "xml:id": "mq0gbk4"}, {"t": "los ", "n": "los", "pos": "DA0MP0", "xml:id": "yjkl5Lu6"}, {"t":
"judíos ", "n": "judío", "pos": "AQ0MP00", "xml:id": "jmMIqRH"}, {"t": "que ", "n": "que", "pos": "CS", "xml:id": "zh12B15"}, {"t": "dezian ", "n": "decir", "pos": "VMII3P0", "xml:id":
"v6QVz0R"}, {"t": "Apelles ", "n": "apelles", "pos": "NP000P0", "xml:id": "d0SRmZW"}, {"t": "que ", "n": "que", "pos": "CS", "xml:id": "nILpH2i"}, {"t": "era ", "n": "ser", "pos":
"VAII3P50", "xml:id": "w6bX7K2"}, {"t": "de ", "n": "de", "pos": "NCF5000", "xml:id": "mDGpby"}, {"t": "Gerusalén ", "n": "jerusalem", "pos": "NP000G0", "xml:id": "cbHbMKR"}, {"t":
"e ", "n": "e", "pos": "CC", "xml:id": "bxvDdhc"}, {"t": "sabia ", "n": "saber", "pos": "VMII350", "xml:id": "yCZjb7V"}, {"t": "muy ", "n": "muy", "pos": "RG", "xml:id":
"zo25Dj8"}, {"t": "bien ", "n": "bien", "pos": "NCMS000", "xml:id": "x0xltfq"}, {"t": "la ", "n": "la", "pos": "NCMP000", "xml:id": "d0XxzX4"}, {"t": "Blivia ", "n": "biblia", "pos":
"NP000P0", "xml:id": "uKzJzSk"}, {"t": "et ", "n": "et", "pos": "CC", "xml:id": "yl35Hnx"}, {"t": "fizo ", "n": "hacer", "pos": "VMIS350", "xml:id": "uYu95as"}, {"t": "que ", "n":
"que", "pos": "CS", "xml:id": "qyA26Yl"}, {"t": "pintase ", "n": "pintar", "pos": "VMSI150", "xml:id": "rY2hm3X"}, {"t": "sobre ", "n": "sobre", "pos": "NCMS000", "xml:id":
"sHePE9E"}, {"t": "la ", "n": "la", "pos": "NCMP000", "xml:id": "slcyiVm"}, {"t": "sepultura ", "n": "sepultura", "pos": "NCF5000", "xml:id": "udh0tto"}, {"t": "de ", "n": "de", "pos":
"NCF5000", "xml:id": "cwYCOLb"}, {"t": "la ", "n": "la", "pos": "NCMP000", "xml:id": "zzyGEMl"}, {"t": "dicha ", "n": "dicha", "pos": "NCF5000", "xml:id": "qTiZCxu"}, {"t": "Reyna
", "n": "reina", "pos": "NCF5000", "xml:id": "eaoMexc"}, {"t": "todos ", "n": "todo", "pos": "NCMP000", "xml:id": "zN2dHjd"}, {"t": "los ", "n": "los", "pos": "DA0MP0", "xml:id":
"nvaú5d"}, {"t": "fechos ", "n": "hacer", "pos": "VMP005P", "xml:id": "m238ISx"}, {"t": "granados ", "n": "granado", "pos": "AQ0MP00", "xml:id": "p74RR7z"}, {"t": "que ", "n": "que",
, "pos": "CS", "xml:id": "nbsNskf"}, {"t": "conçteran ", "xml:id": "mXK2Ep7"}]]
}
```

Figure 2. Human-unreadable information

# Going back and forth

```
-<p n="RXfFyLoBTu">
-<w xml:id="waxZ4Al">
  <hi rend="lettre_attente">m</hi>
  <hi rend="lettrine">M</hi>
  as
</w>
<w xml:id="fYodlad">aquí</w>
<w xml:id="hSqblOj">podemos</w>
-<app type="variante">
-<rdg wit="#Sal_J #Sev_R #Sev_Z #Mad_G">
  <w xml:id="lhpJTl6">contar</w>
  </rdg>
-<rdg wit="#Esc_Q">
  <w xml:id="dhSuJek">notar</w>
  </rdg>
</app>
-<app type="graphique">
-<rdg wit="#Sal_J #Mad_G">
  <w xml:id="mGkwhzN">de</w>
  <w xml:id="eqSNTSQ">cómo</w>
  <w xml:id="daGlclj">Alexandre</w>
  <w xml:id="bxMOuXm">fizo</w>
  </rdg>
-<rdg wit="#Sev_R">
  <w xml:id="xzCLkBl">de</w>
  <w xml:id="kf4C3vg">cómo</w>
  <w xml:id="yjjMpZc">Alixander</w>
  <w xml:id="iYrsMkZ">fizo</w>
  </rdg>
```

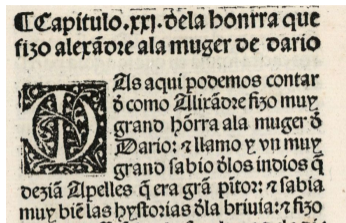
Figure 3. Human-readable, consistent, standard information

# Translating the information: the output document. *The meaning?*

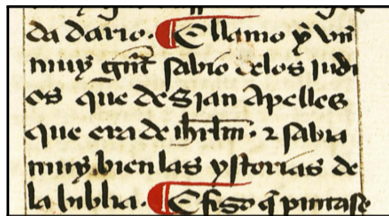
Transformation of the XML into  $\text{\LaTeX}$  or to a web-based interface.



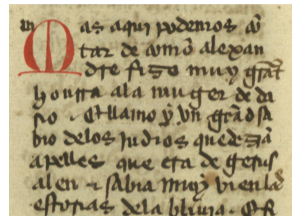
# Results



Inc/901, National Library, Madrid  
fol. 244v



Ms. 2097, University of Salamanca  
fol. 436r



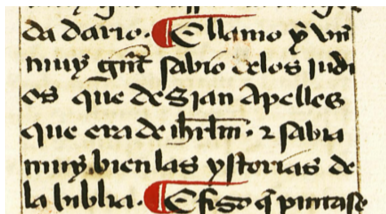
Ms. II/215, Real Biblioteca, Madrid  
fol. 453r



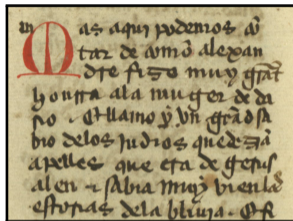
- Mas aquí podemos contar de cómo Alexandre fizo muy grant onrra a la muger de Darío. E llamó
- 5 y un muy grant sabio de los judíos que dezían Apelles, que era de Jherusalém, e sabía muy bien las ystorias de la biblia. E fizo que pintase sobre la sepultura de la dicha Reyna todos los fechos granados

4 contar *JRZG* | notar *Q* 4 muy *JQZG* | *om. R* 5 muy *JZ* | *om. RQG* 5 judios *JRQG* | indios *Z* 5 era de Jherusalém, *J* | era de Iherusalem *R* era de Iherusalém *Q* era gran pintor *Z* era de Gerusalén *G* 6 *EJ* | *om. RQ* e *Z* e *G* 6-7 fizo que pintase sobre la sepultura de la dicha Reyna todos los fechos granados que *JG* | *om. RQ* fizo que pintase

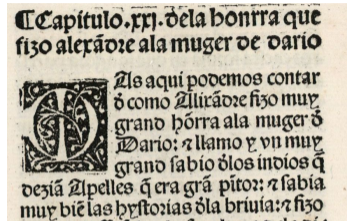
# Results



Ms. 2097, University of Salamanca  
fol. 436r



Ms. II/215, Real Biblioteca, Madrid  
fol. 453r



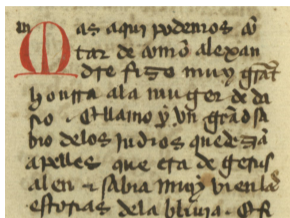
Inc/901, National Library, Madrid  
fol. 244v



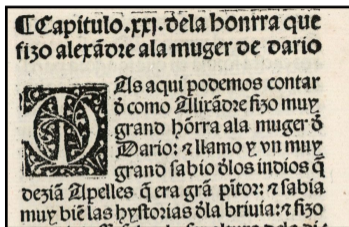
- Mas aquí podemos contar de cómo Alexandre hizo muy grant honrra a la muger de Darío: et
- 5 llamó y un grand sabio de los judíos que dezían Apelles, que era de Gerusalén, e sabía muy bien las estorias de la Blivia; et fizo que pintase sobre la sepultura de la dicha Reyna todos los fechos

4 contar JRZG | notar Q 4 muy JQZG | om. R 5 judios JRQG | indios Z 5 era de Gerusalén, G | era de Jherusalém J era de Iherusalem R era de Iherusalém Q era gran pitor Z 6 et G | E J om. RQ e Z 6-7 fizo que pintase sobre la sepultura de la dicha Reyna todos los fechos granados que JG | om. RQ fizo que pintase sobre la sepultura de la

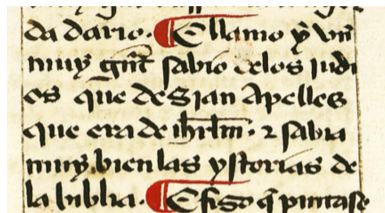
# Results



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fol. 453r



Inc/901, National Library, Madrid  
fol. 244v



Ms. 2097, University of Salamanca  
fol. 436r

Mas aquí podemos contar de como Alixandre fizo muy grand honrra a la muger de Darío: ꝓ llamo y un muy grand sabio de los indios que dezian Apelles que era gran pintor: ꝓ sabia muy bien  
5 las hystorias de la brivia: ꝓ fizo que pintasse sobre la sepoltura de la dicha reyna: todos los fechos

3 contar JRZG | notar Q 3 muy JQZG | om. R 4 muy JZ | om. RQG 4 indios Z | judíos JRQG 4 era gran pintor: Z | era de Jherusalém J era de Iherusalem R era de Iherusalém Q era de Gerusalén G 5 ꝓ Z | EJ om. RQ et G 5-6 fizo que pintasse sobre la sepoltura de la dicha reyna: todos los fechos granados que Z | fizo que pintase sobre la

# Conclusions

Correction of the text, silencing of the Jewish heritage, or a bit of both ?

# What comes next ?

Since we cannot avoid considering the text as information...

- **Accessibility:** DTS, a IIIF-like standard API for texts.
- **Citability:** What to do with the revisions of a digital work ?
- **Identification of passages:** When we cite a passage, do we have to cite the page or its identifier ?
- **Perennity:** web-based interfaces are really hard to maintain over the time [Pierazzo 2015, pp. 173-179]

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