




## Interpreting Ancient Documents: Of Avatars, Uncertainty and Knowledge Creation

Ségolène M. Tarte

*ESF Exploratory Workshop on Digital Palaeography*  
 22nd July 2011  
 University of Würzburg, Germany









## Papyrology: an interpretative practice


Historical  
Linguistic  
Palaeographical

Intentions  
Expectations  
Skilled Vision






[Youtie, 1963]  
[Terras, 2006]  
[Bagnall, 2009]



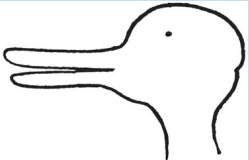
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## Kinaesthetic approach to interpretation


Historical  
Linguistic  
Palaeographical

Intentions  
Expectations  
Skilled Vision




- Embodied cognition: drawing as a way of knowing
- Text-as-shape vs. text-as-meaning
- Seeing *that* vs. seeing *as*

[Vollgraff, 1917]  
[Bowman et al., 2009]  
[Tarte, 2011]




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## Cruciverbalistic approach to interpretation




Historical  
Linguistic  
Palaeographical


Intentions  
Expectations  
Skilled Vision




- Connectionism: word superiority effect
- Papyrological crossword puzzle solving
- Aspect shifting

[Tarte, 2011]

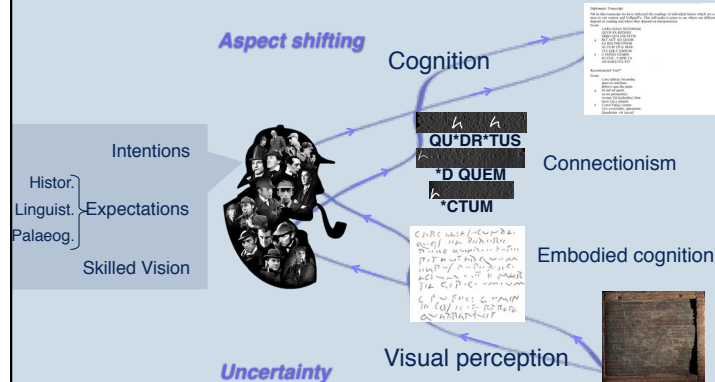
	Vowel	After Q
 QU*DR*TUS	E	Vowel; Read so in 1917
	A	Vowel; makes a known name
 *D QUEM	L	Read so in 1917
	A	Occurs in legal documents
 *CTUM	L	Read so in 1917
	A	Occurs in legal documents



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## Papyrology: an interpretative practice



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## Digital papyrology

- Importance of visual perception and cognition
  - Intrinsically intertwined
  - At all stages, and in particular when digitizing the artefact
- Digitization is not neutral, it's performed by an agent:
  - Discretization
  - Labelling
  - Modelling
  - Implicit expectations
  - Intention

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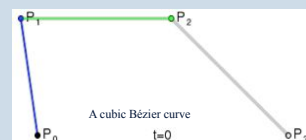
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## What is digitization?

- Translation of an analogue signal into a digital (discrete) signal - sampling
  - Always uses a prior model: not neutral!
    - With assumptions (implicit and explicit) – simulations and models of the real are more real than the real [Baudrillard, 1981]
    - To capture the information of interest
    - To render the information of interest



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## Then, what is a digital/ized artefact?

- Traditionally called a *digital surrogate*, but:
  - It **can't** replace the artefact entirely in its originally intended function
- In fact, it's rather an *avatar* or a *salmu* of the artefact, i.e., a visual representation that:
  - Is **encoded**
    - Numerically/computationally
  - Is **embedded** into the real
    - Has presence and function
  - Influences** the real
    - Participates in the interpretation of the artefact

[Bahrani, 2003]

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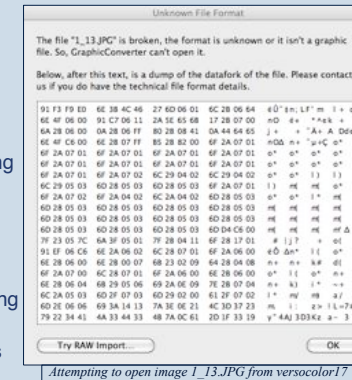
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## A Digital Artefact is Encoded

- Numerically
  - Binary code (sometimes encrypted!)
  - To each small area on the document corresponds one pixel with 3 values describing its colour (RGB)
- Culturally
  - Encapsulates implicit assumptions about:
    - Validity of near-IR imaging
    - Images as “neutral-enough” representations



## A Digital Artefact is Embedded into the Real

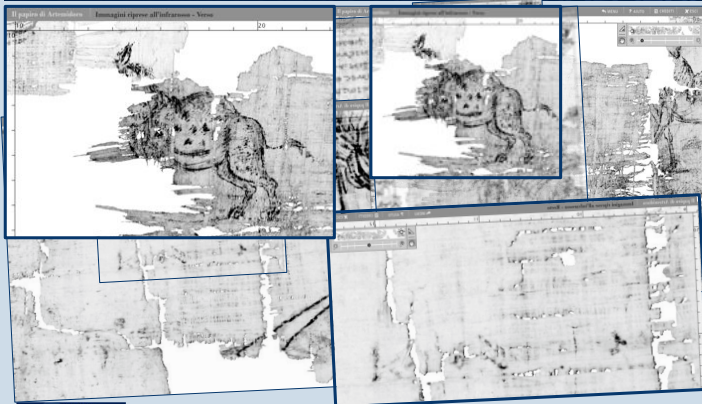
- Takes advantage of physical properties
  - Multi-modal imaging
  - Laser scanning
- Print-out of the digital images
  - 1:1 prints
  - Physical manipulation
- Its “virtuality” opens the realm of new/different ways of interaction
  - Digital enhancement
  - Virtual manipulation (rotation, mirroring, rolling, transparencies...)
- **Re-materialization of the artefact** [Latour and Lowe 2011] with a specific (mostly implicit) presence and function

## A Digital Artefact influences the Real

- Reunion of dispersed
  - Corpora
  - Fragments
- Virtual repatriation, recontextualization
- Development of interpretations, understanding



## Example of the Artemidorus Papyrus



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## Impact on scholarly practice

- Digitized versions of artefacts are *avatars/salmu-s* of the artefact
  - Expression of a certain form of presence of the artefact (re-materialization)
  - Contingent on the intention of the act of digitization
  - Expected performative value
- New types of data serving as evidence in the interpretative workflow
  - Role of uncertainty?
  - Transformation of knowledge creation?

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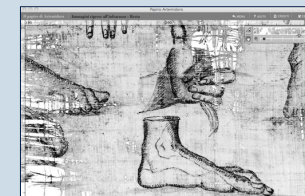
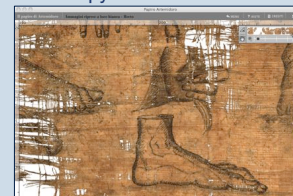
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## Avatars and Uncertainty: encoding

- Issues of ekphrasis: double translations
- Add uncertainty whilst resolving uncertainty
  - Shadows vs. darkening?
  - Papyrus texture vs. strokes/lines?



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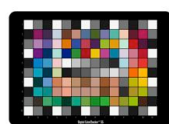
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## Where uncertainty can intervene(1/2)

- Image capture:
  - Ink-bearing documents *are* 3D artefacts, digital photography flattens
    - Use of various illumination conditions when photographing –even in the near-IR domain– can help capture 3D information (e.g. shadows)
  - Colour calibration charts/checkers (also used to calibrate PC monitors!)
  - Resolution File formats & compression

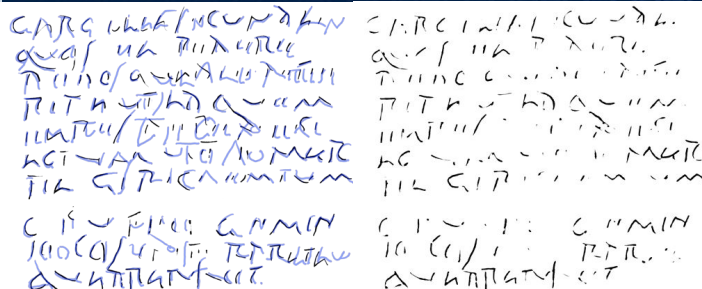
[Terras 2011]



## Where uncertainty can intervene (2/2)

- Image processing
  - Conversion between file formats, resolutions, mosaicking, stitching can create “artefacts” (= noise)
  - Brightness, contrast, thresholding redistribute the colour values by modifying the histogram
  - Sharpening filters, Gaussian filters act in the frequency domain: meaning that the on the image, it is local behaviour of the image that informs the operator
    - Sharpening filters (aka unsharp masks) look for high frequency areas, i.e., places where edges are located to make them more salient – so they can make noise more salient too
    - Gaussian filters (aka blurring) smooth noise by averaging pixel values for small neighbourhoods – so they smooth edges too
- Can trigger the seeing-*that* seeing-*as* oscillations!

## Illustrating uncertainty



Tracings of the text on the front of the tablet; in blue, the 1917 tracing; in black, the 2009 tracing.

[Vollgraff 1917; Bowman *et al.* 2009]

Commonality (strict overlap) between the 1917 and 2009 tracings of the front of the tablet. It consists in 45.3% of the 1917 tracing, and in 60.6% of the 2009 tracing.

## Illustrating uncertainty

1917 transcription	2009 transcription
GAI GILIUS SECUNDUS N(omina)	CARO IULIA SECUNDAE
CXV A S(T)EL(O) RIIPERII	Q(ua) OS EA REDERE
BE ESO VILA LOPETEI	DEBO QUA DIE PETIE
RITE UTI L(ocus) BOVEM	RET AUT AD QUEM
EMI TESTE CESDIO C(ontentio)	EA RES PERTINEBI
LEG(atus) V(ice) M(ag)istro ADI(ut)ETO	ACTUM VII K(al) MAR
C(onsuetudo) L(eg)is(atus) F(idei) L(ib)er(atus) I(ul)ia C(icilia) A(lexandra) EMTUM	TIA GIBALEMUM
EFFUTIO GN MIN	C FUFEO GEMIN
ICIO COS V (ID)C(S) S(E)PTEMBRES R(egnum) P(restant) R(ectus)	IO COS .T.IPR.TA
LILUS	
DUERRETUS VET(eranus)	QUADRATUS VIT

Levenshtein distance between the two transcripts: 103 (strings of length respectively 200 and 163, including spaces).

Proportion of characters in common (excluding spaces) consists in 43.6% of the characters in the 1917 reading and in 55.5% of the characters in the 2009 reading.

## Avatars and Knowledge Creation

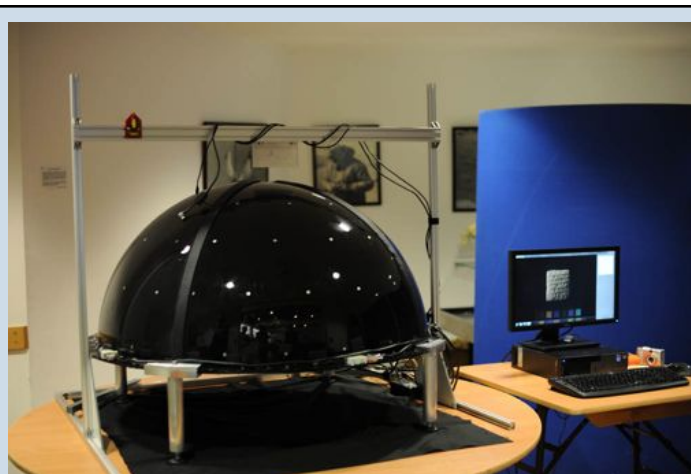
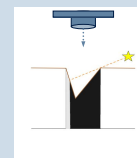
- A good digitization
  - Conserve the creative empowering uncertainty
  - Encapsulate (explicitly) strategies of seeing and knowing
- Goodness of evidence conditioned by documentation of provenance and intervention/interaction/processing
- Document not only the data and the data collection but also the *processes* that prompt interpretation(s)

## A digitization that empowers cognitive processes

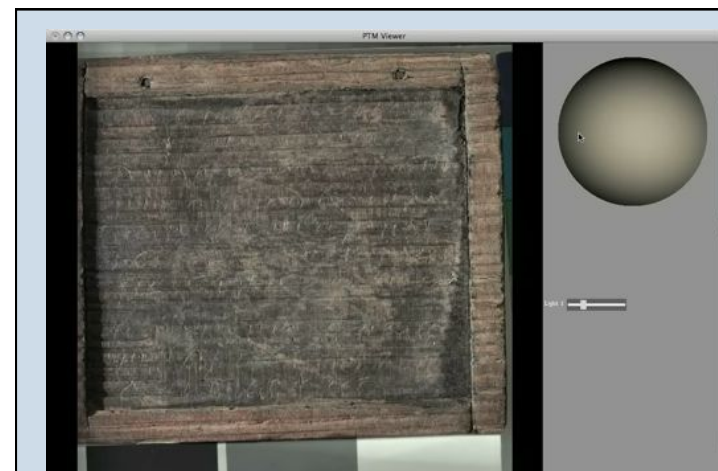
- Allow procedural mimesis at the digitization stage
  - Capture the physical characteristics of the artefact that power the sense-making process
    - Rely on properties of the visual system
    - Mimic a physical-world interpretation strategy

### Pitch-and-yaw motion in raking light

- Exaggeration of highlights and shadows
- Visual system extracts (interpolates) volumetric information
- An aspect of materiality



[RTISAD project Southampton/Oxford]



## Documenting the *process* of interpretation

- Goodness of evidence
  - Degrees of favourableness
  - Degrees of independent security
  - Degrees of comprehensiveness
- Schemes and critical questions:
  - Defeasible inferences
  - Beyond 1<sup>st</sup> order logics?
  - What is creativity?
    - Mapping and matching, induction as inference?

[Haack 1993]

[Ganascia 2011]

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## Clash of expectations: match and map



ORC 'A'  
1st cent. AD



Frisian tablet 'A'  
29 AD



NRC 'A'  
3rd/4th cent. AD

“ It’s only a late looking A because we *think* it’s a late looking ‘A’ ”

Intentionality vs. serendipity

Expectations & habitus vs. perception & cognition

Mutation of the comprehensiveness criterion:  
reinforces the justification for reading an A

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## To summarize

- Digital/ized artefacts are *avatars/salmu-s*, **a form of presence** of the artefact:
  - encoded;
  - embedded into the real;
  - influencing the real.
- Uncertainty:
  - Can be resolved or introduced at all stages by the act of digitization
  - Is not always a hindrance but can also provide space for creativity
- Tracking the *process* of knowledge creation (including digitization processing and analysis) would enable to make the knowledge:
  - Repeatable
  - Verifiable
  - Understandable

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<http://charades.hypotheses.org>

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Etsuko Ichikawa: *Kokoro InBetween*, 2008.  
Glass pyrograph on paper; 22 x 45-1/2 inches.

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