

Assessing the expressivity of IconClass to embody emotional features in classical iconography

Alessandro Adamou¹ and Davide Picca²

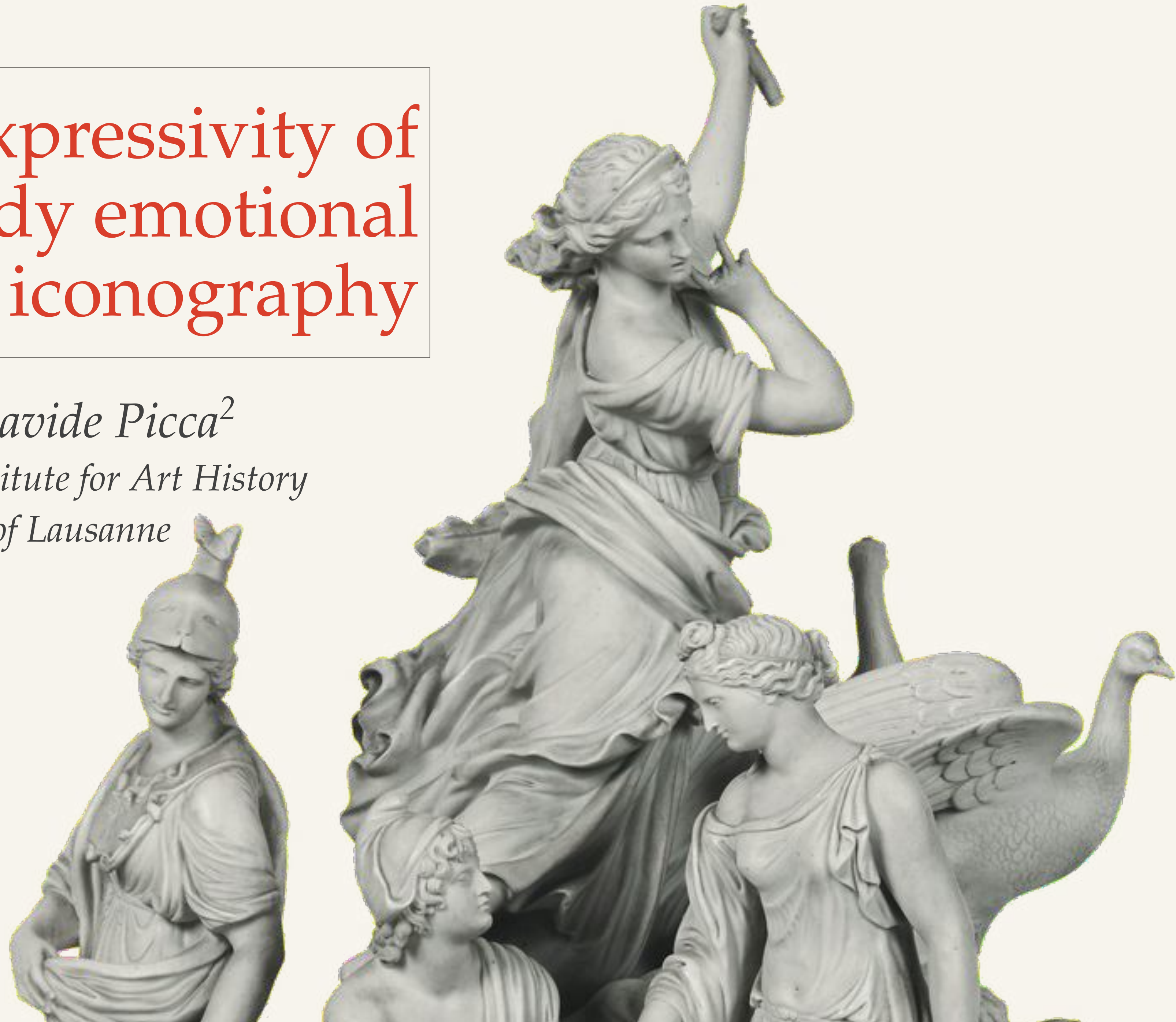
¹ *Bibliotheca Hertziana - Max Planck Institute for Art History*

² *Faculté des lettres, University of Lausanne*

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October 30, 2024

Filippo Tagliolini, "The Judgement of Paris", Naples,
Real Fabbrica Ferdinanda, ca. 1800-1806.



- The complexity of the artist's view of a scene in Classical myth can be captured only so far by *a priori* knowledge organisation systems.
- RQ: To what extent are existing nomenclatures suitable for representing different levels of interpretation of visual art?
- Iconography → Iconology (cf. Panofsky, Warburg)

📄 94F 📄 the tenth year of the Trojan war (part I); the wrath of Achilles: from the quarrel about Briseis to the death of Patroclus

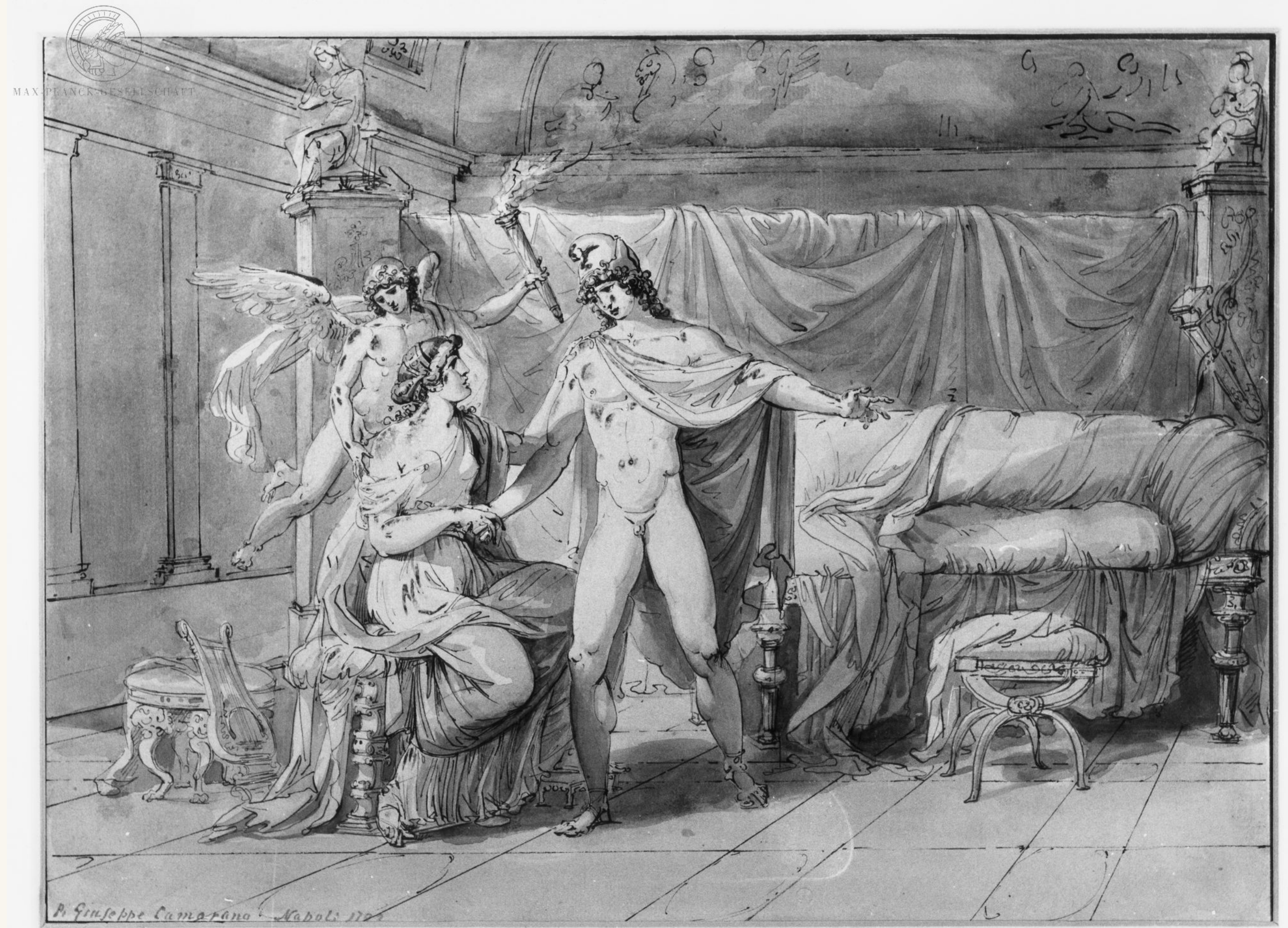
Search with these related keywords:

classical antiquity, history, Troy, mythology, legend, Greek legend, heroic legend, **anger**, ancient history, Trojan war, Homer, Iliad, hero

📄 94F322 📄 Helen scorns Paris

Search with these related keywords:

legend, mythology, Homer, Iliad 03, Paris, Trojan war, truce, Greek legend, **contempt**, cloud, Homer, Iliad, history, classical antiquity, Helen, **anger**, leading, intervening, ancient history, heroic legend, hero, Troy, Venus

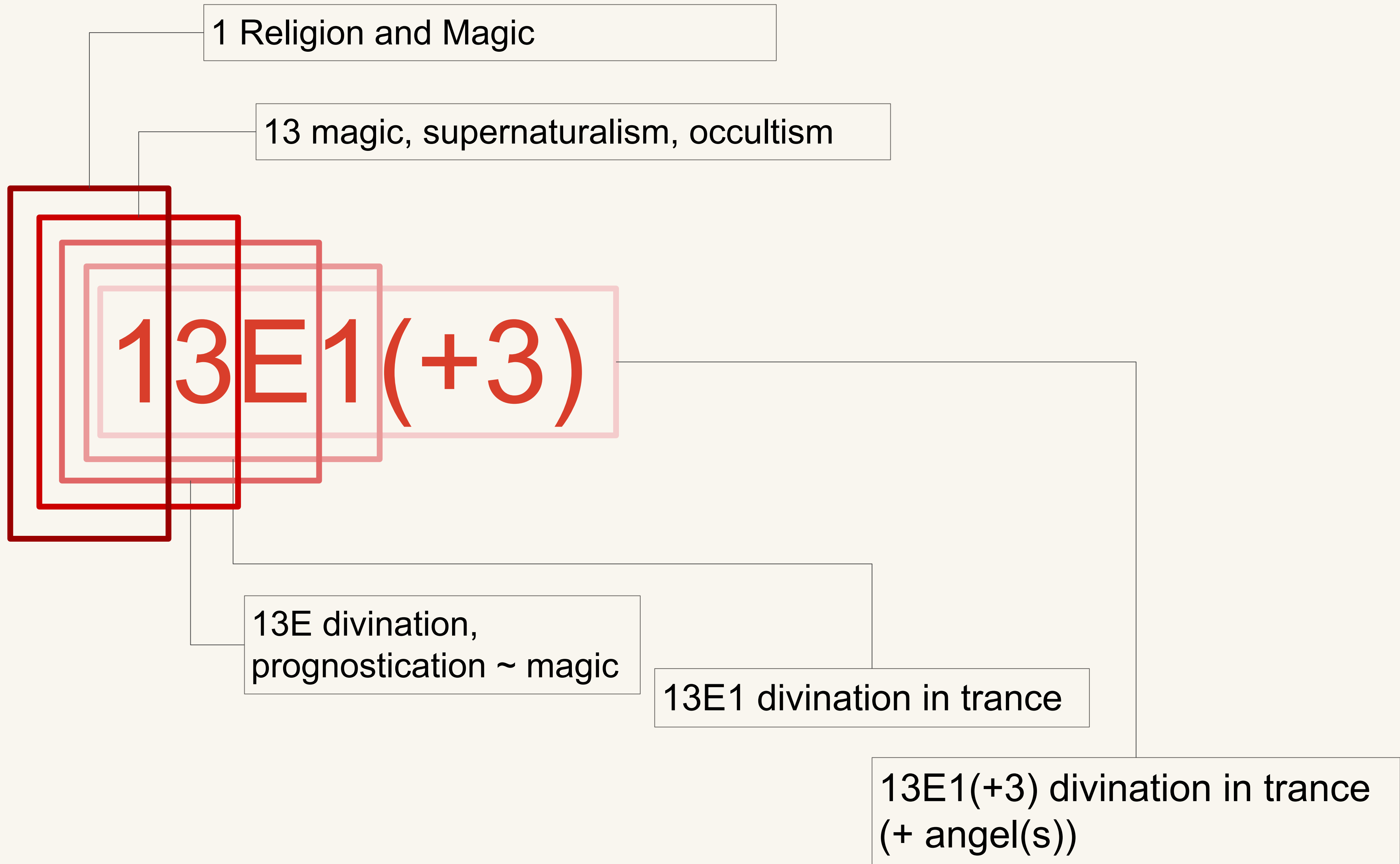


Giuseppe Cammarano, "Paris and Helen, with Hymen", drawing, 1782 or 1792.
Corpus Gernsheim, CC BY-NC 4.0. <https://foto.biblhertz.it/document/obj/08123696>

IconClass

<https://iconclass.org>

- Arguably the most widely used knowledge organisation system for visual art
- Heavily taxonomic, reflects in signature codification
- Also published in RDF using SKOS
- Largely used to inform iconographical studies
 - To what extent *iconological* ones as well?

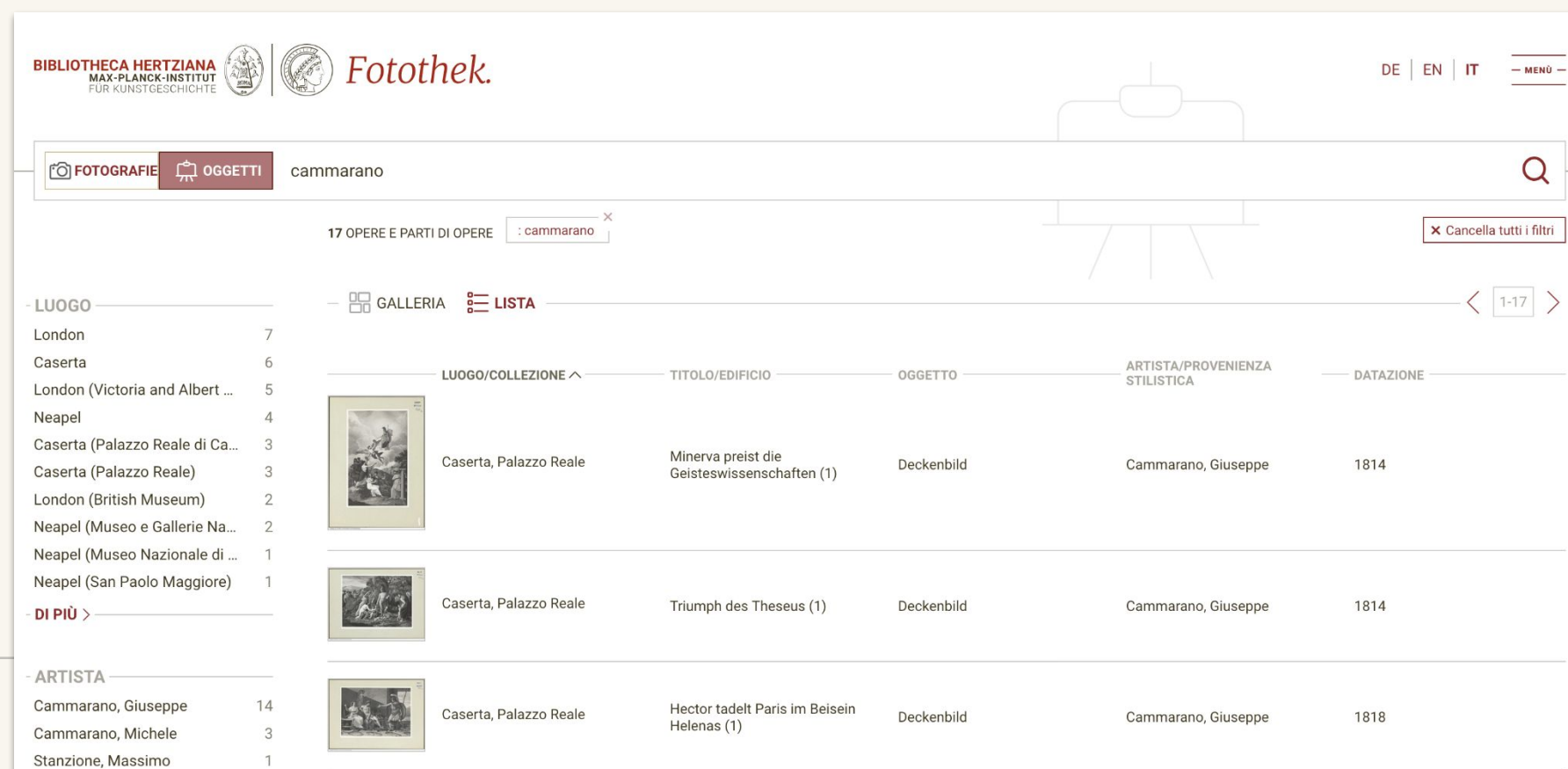


- **Focus of this study:** emotion mining in depictions of Trojan War mythology.
 - A prominent manifestation of tragedy in the Ancient World.
 - Continuously and systematically depicted in art.
 - Paves the way to comparative text + iconographical analysis.
- Specific event-driven IconClasses:
 - **94[C-K]***: events in the War or its aftermath (e.g. **94F82** - Death of Patroclus)
 - **95(Name)***: characters in Greek mythology and their lives (e.g. **95B(CIRCE)2** - The love affairs of Circe)

Bibliotheca Hertziana Photographic Collection (Fotothek)

- Located in Rome.
- Over 1,500,000 individual photos of works of art from the Renaissance onwards, including but not limited to Italian and German art.
- Almost completely digitised, images served in IIF.
- <https://foto.biblherz.it>





Structure of an entry

- Encoded in MIDAS format
- Stored in APS XML
- Most string values are in German
- IconClass assigned to *Aspekt* **a5500**
- IC Codes assigned during digitisation campaigns

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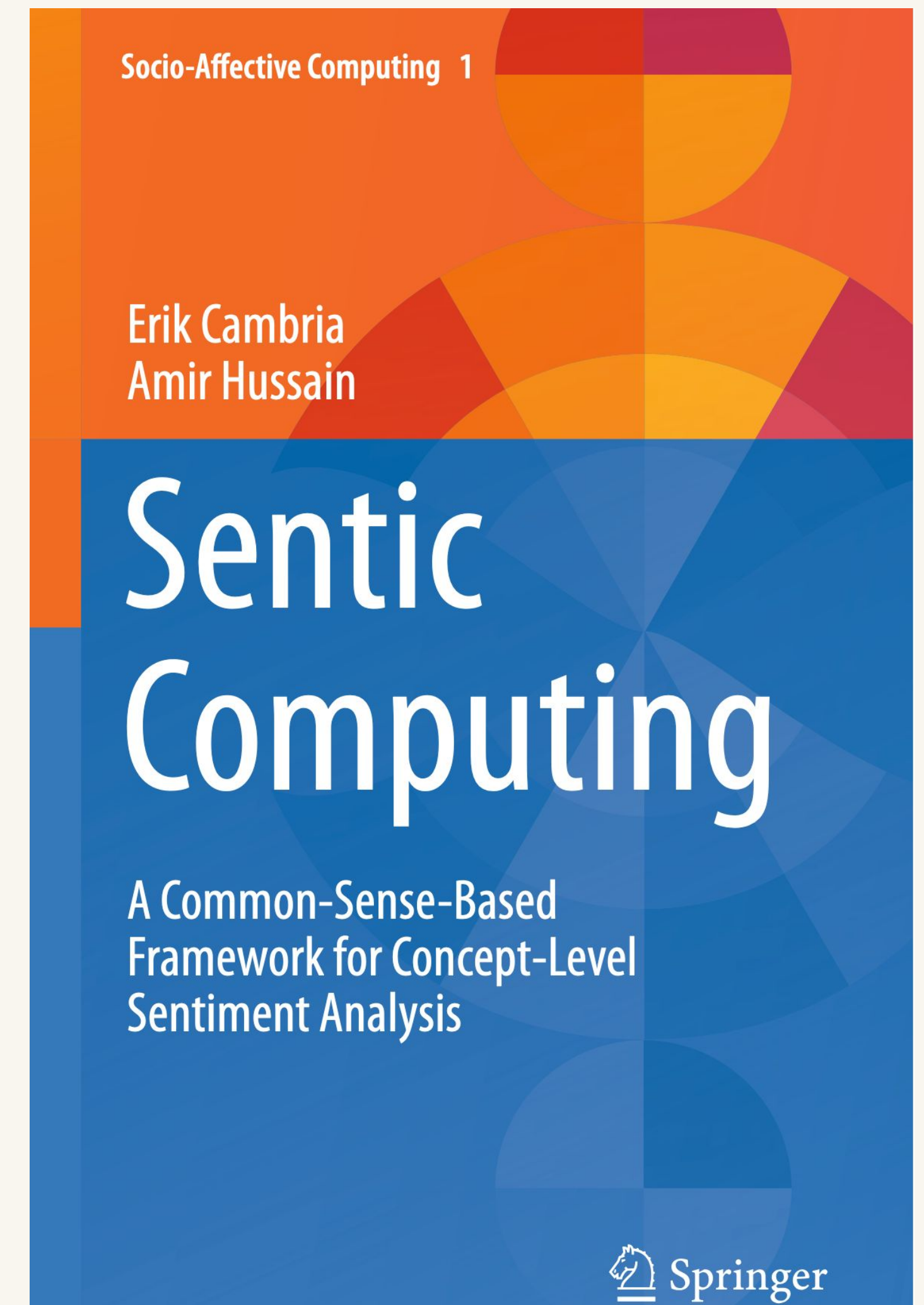
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Methodology

1. Create **image corpus** from the Hertziana Photographic Collection
 - a. ~ 300 items matching IconClass 94* and 95* (for characters in Trojan War myth)
2. Automatically **extract emotional features** based on IconClass keywords
3. Independently **annotate** the corpus according to the same features
4. Treat as rating, measure **agreement**, give interpretations

SenticNet

- Set of tools, data and techniques for combined sentiment analysis.
- Predicated on the notion of **sentic computing**, which aims to bridge the gap between statistical NLP and many other disciplines that are necessary for understanding human language.
- Features a **controlled vocabulary** of 24 emotions and an annotated English (Python) dictionary with primary and secondary emotions, polarity and indicators of introspection, temper, attitude and sensitivity.

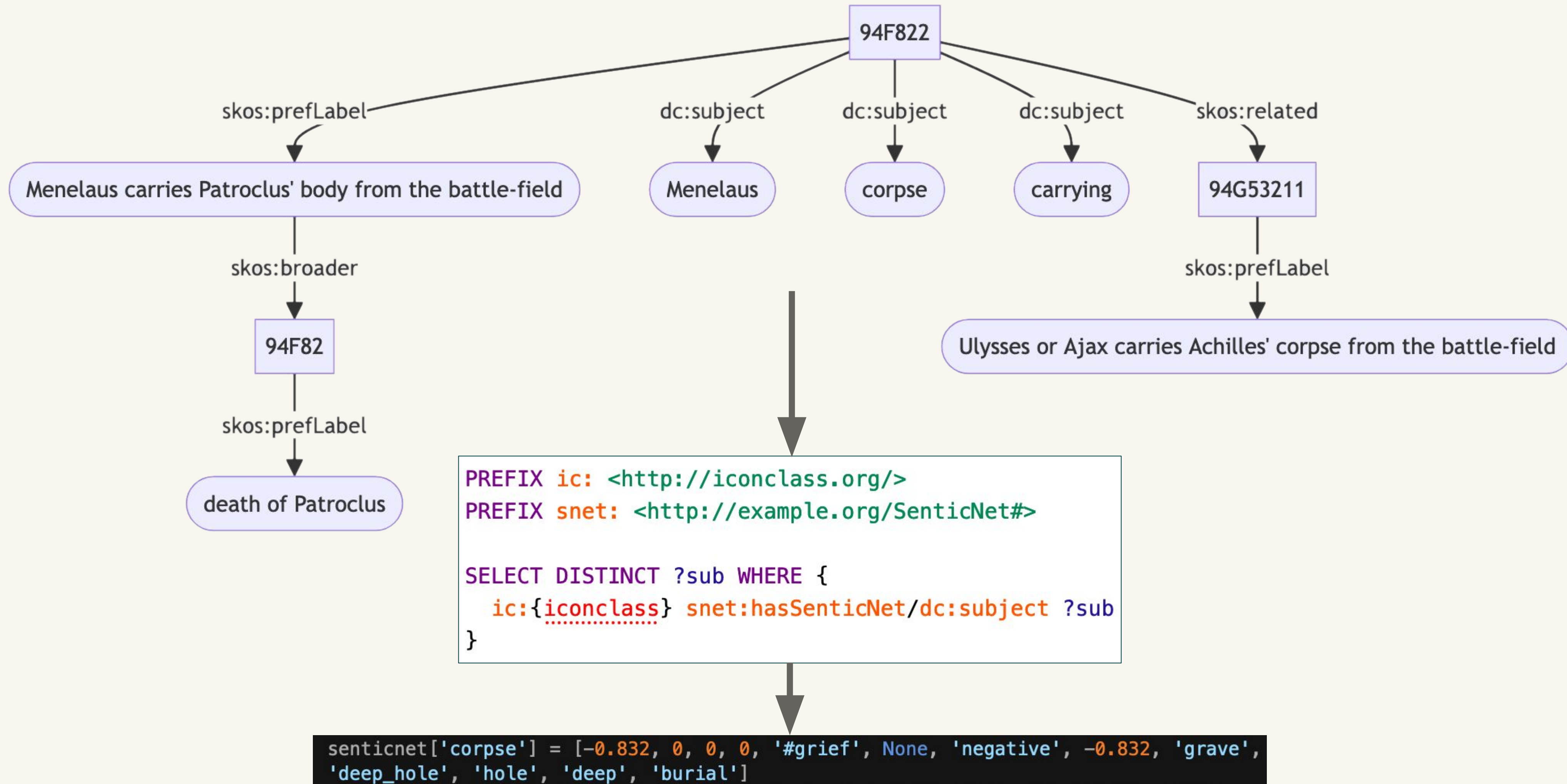


(1) Corpus construction

- Fotothek APS query for IconClass matches 94* and 95*
- Exclude 95* categories for characters not related to the Trojan War and its aftermath
- Harvester for freely distributable images (*freigegeben* or CC BY)
 - Use IIIF manifests and bypass image API
 - May imply degraded image quality

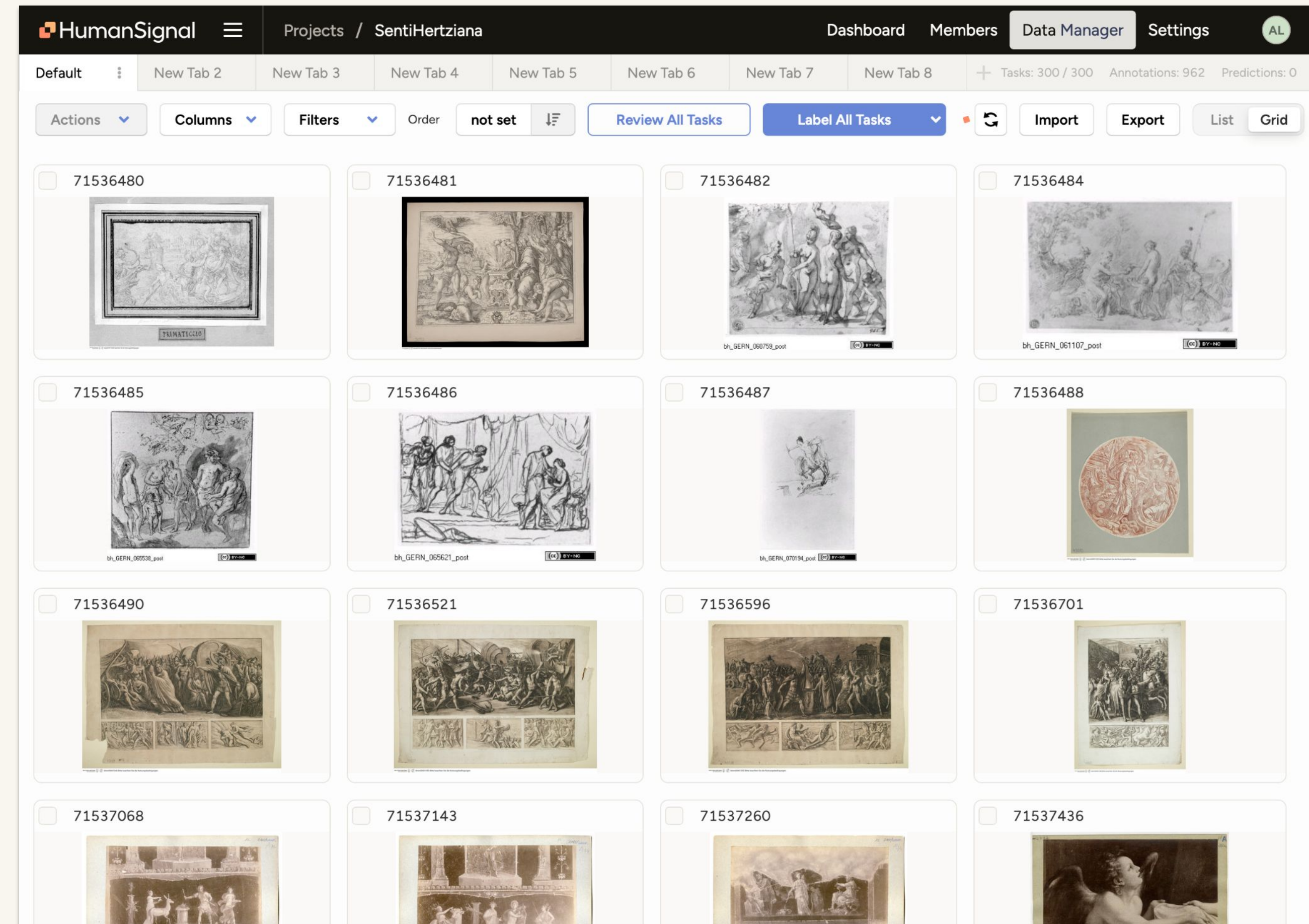
```
50 for idx,row in enumerate(hdata):
51
52     if idx < offset:
53         continue
54
55     print(row)
56     iiif_url = 'https://gn.biblhertz.it/fotothek/api/iiif/3/werk/obj{}/manifest'.format(row[0])
57     response = requests.get(iiif_url)
58     try:
59         manifest = response.json()
60         if 'structures' in manifest and manifest['structures']:
61             directory = 'img/'+row[0]
62
63             regex = r"^https://\./gn.biblhertz.it/iiif/3/(\w+)\./Canvas/(\w+)$"
64             for it in manifest['structures'][0]['items']:
65                 result = re.search(regex, it['id'])
66                 if result is not None:
67                     filename = result.group(1)
68                     img_url = 'https://fotothek.biblhertz.it/bh/2048px/{}.jpg'.format(filename)
69                     process_image(img_url, directory, filename+'.jpg')
70             else:
71                 print(f'[WARN] structures field is IIIF manifest is present but empty for {iiif_u
72         else:
73             pass
74     except requests.exceptions.JSONDecodeError:
75         print(f'IIIF manifest parsing failed for {iiif_url}')
```

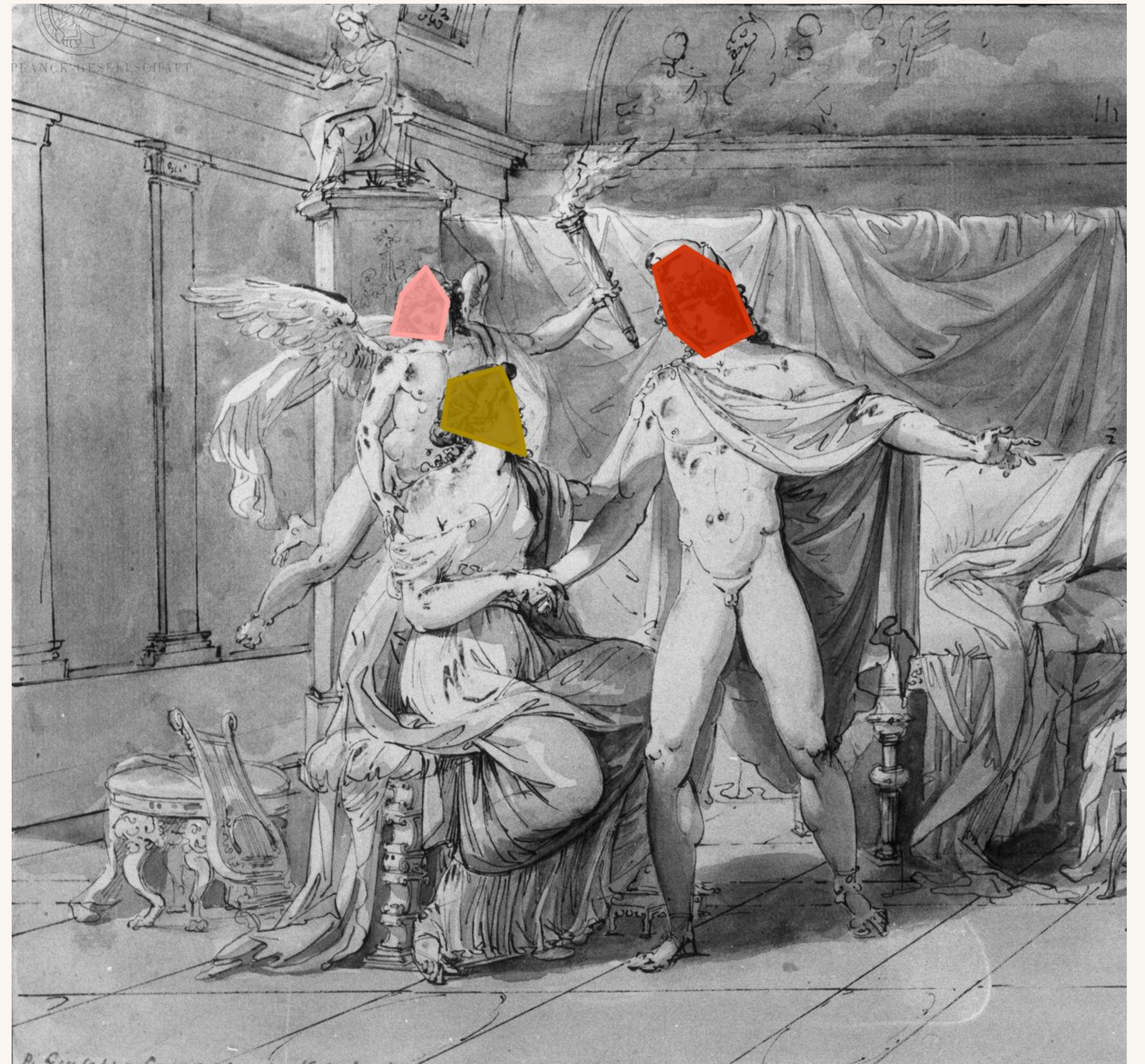
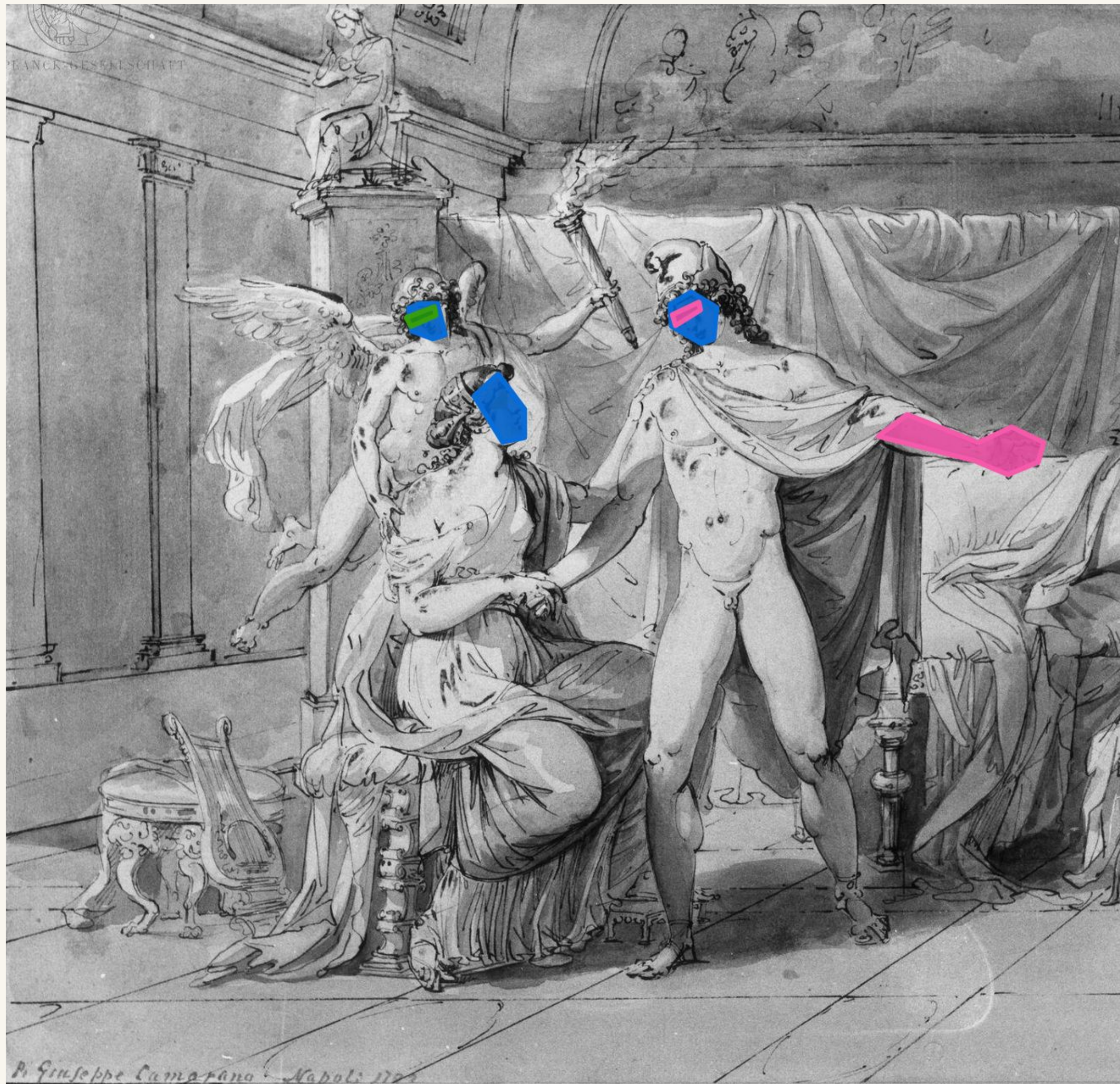
(2) SenticNet extraction



(3) Independent human annotation

- Assumption: Even a non-expert in classical subject matter is(/should be) able to detect nuances in the emotions evoked from the depicted scene.
- 20 non-experts in art history, given the freedom to select arbitrary regions to be annotated with SenticNet terms.
- No information given on depicted scene to abate scholarly bias.
- LabelStudio used as crowdsourcing tool.





● enthusiasm ● anxiety ● delight ● eagerness ● calm ● neutral

Rater agreement measures

- ~~Cohen's and Fleiss' Kappa~~: not suitable as expect the same total # ratings per item.
- **Krippendorff's Alpha**: Supports different # ratings per item, incl. no rating.

$$\alpha = 1 - \frac{D_o}{D_e}$$

where D_o is the observed disagreement among values assigned to units of analysis:

$$D_o = \frac{1}{n} \sum_c \sum_k o_{ck \text{ metric}} \delta_{ck}^2$$

and D_e is the disagreement one would expect when the coding of units is attributable to chance rather than to the properties of these units:

$$D_e = \frac{1}{n(n-1)} \sum_c n_c \sum_k n_{k \text{ metric}} \delta_{ck}^2$$

Rater agreement measure (Krippendorff's Alpha)

Emotion	Nominal-Zeroes	Nominal-Nozeroes
acceptance	-0.0193617	-0.125
anger	-0.115232	1
annoyance	-0.134902	nan
anxiety	-0.145026	-0.166667
bliss	0.015383	nan
calmness	-0.199496	0
contentment	-0.0678976	nan
delight	-0.00684346	-0.222222
disgust	-0.0108114	0.0909091
dislike	-0.122693	-0.241379
eagerness	-0.148272	0
ecstasy	-0.0330886	-0.0714286
enthusiasm	-0.015207	nan
fear	-0.194793	0
grief	0.0335808	-0.08
joy	-0.0757661	nan
loathing	-0.0587389	nan
melancholy	-0.110695	nan
pleasantness	-0.0369912	0
rage	-0.0403408	nan
responsiveness	-0.167896	nan
sadness	-0.133246	0
serenity	-0.101346	-0.0769231
terror	-0.0172082	0.25

Results

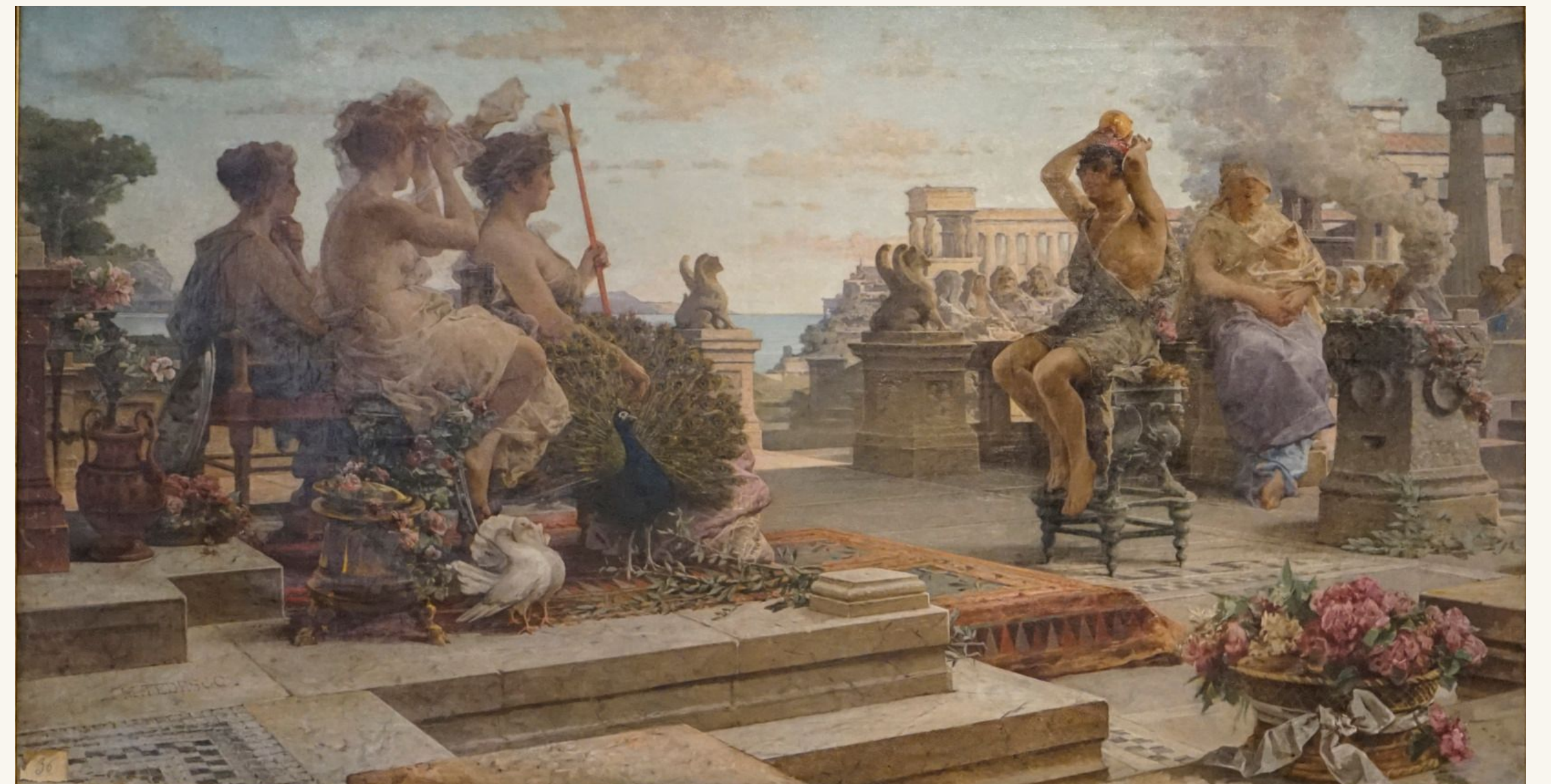
Automatic extraction yielded no ratings for 'annoyance' and 'responsiveness'.

In general, ratings for one value not being provided results in a divide-by-zero (nan) if zeroes are treated as missing hence irrelevant values.

Disagreement is largely in favor of the human annotators, whose interpretations were apparently more nuanced.

Rater agreement measure (Krippendorff's Alpha)					
IconClass	Nominal-Zeroes				
94C	-0.179211	94F73	-0.171554	94I1831	-0.063786
94C1	-0.24649	94F742	-0.0994152	94I21	-0.122867
94C111	-0.104027	94F821	-0.0538117	94I221	-0.0659794
94C112	-0.0681818	94F822	-0.224313	94I222	-0.106884
94C113	-0.243959	94F8311	-0.19323	94I23	-0.0681818
94C1131	-0.321516	94F8321	-0.149144	94I233	-0.167219
94C131	-0.124402	94F8322	-0.180365	94I234	-0.23888
94C133	-0.212903	94G	-0.104439	94I2341	-0.144348
94C14	-0.119048	94G411	-0.0502793	94I323(+0)	-0.205128
94C21	0.00704225	94G51	0.0491329	94I3411	0.00704225
94C22	-0.228223	94G51(+0)	-0.0751634	94I52	-0.205128
94C22(+0)	-0.228758	94G533	0.163205	94I531	-0.107744
94D132	-0.289976	94G6	-0.156415	94I561	-0.104027
94D1321	-0.115065	94G62	-0.0770833	94I6	-0.275194
94D22	0	94G63	0.0669975	94I62	-0.0829493
94F	-0.130584	94G631	0.113208	94I65	-0.207339
94F112	-0.19323	94H14	-0.131016	94K31	-0.163366
94F113	-0.122867	94H151	-0.27208	94L122	-0.0846154
94F12	-0.222367	94H213	-0.0870748	94L3221	-0.254317
94F121	-0.0966667	94H22	-0.146341	94L7	-0.152958
94F31	-0.27027	94H23	-0.189873	94O2121	-0.230366
94F32	-0.198658	94H231	-0.0633484	94P211	0.150602
94F321	-0.223958	94H232	-0.0641509		
94F321(+0)	-0.201022	94H243	-0.273399		
94F322	-0.186869	94H2452	0.197952		
94F41	-0.261745	94I	-0.13253		
94F4221	-0.240469	94I13	-0.175		
94F42221	-0.228758	94I133	-0.0854503		
94F54	-0.221837	94I134	0.208754		
94F61	-0.219847	94I136	-0.0291971		
94F621	-0.193995	94I16	-0.205128		
		94I161	-0.16732		
		94I163(+0)	-0.0423387		
		94I18	0		
		94I183	-0.0444444		

Rater agreement measure (Krippendorff's Alpha)					
IconClass	Nominal-Zeroes				
94C	-0.179211	94F73	-0.171554	94I1831	-0.063786
94C1	-0.24649	94F742	-0.0994152	94I21	-0.122867
94C111	-0.104027	94F821	-0.0538117	94I221	-0.0659794
94C112	-0.0681818	94F822	-0.224313	94I222	-0.106884
The judgement of Paris	-0.243959	94F8311	-0.19323	94I23	-0.0681818
94C131	-0.124402	94F8321	-0.149144	94I233	-0.167219
94C133	-0.212903	94F8322	-0.180365	94I234	-0.23888
94C14	-0.119048	94G	-0.104439	94I2341	-0.144348
94C21	0.00704225	94G411	-0.0502793	94I323(+0)	-0.205128
94C22	-0.228223	94G51	0.0491329	94I3411	0.00704225
the sacrifice of Iphigenia	-0.228758	94G51(+0)	-0.0751634	94I52	-0.205128
94D1321	-0.115065	Thetis mourning Achilles	0.163205	94I531	-0.107744
94D22	0	94G6	-0.156415	the end of the suitors	-0.104027
94F	-0.130584	94G62	-0.0770833	94I62	-0.0829493
94F112	-0.19323	Teucer finds the dead Ajax	0.0669975	94I65	-0.207339
94F113	-0.122867	94H14	0.113208	94K31	-0.163366
94F12	-0.222367	The Trojan horse	-0.131016	94L122	-0.0846154
Paris and Menelaus dueling	0.096667	94H22	-0.27208	94L3221	-0.254317
94F32	-0.198658	94H23	-0.0870748	94L7	-0.152958
94F321	-0.223958	94H231	-0.146341	94O2121	-0.230366
94F321(+0)	-0.201022	94H232	-0.189873	94P211	0.150602
the truce is broken by Pandarus	0.097027	Hecuba finds her dead son Polydorus	-0.0633484		
94F4221	-0.240469	94I	-0.0641509		
94F42221	-0.228758	94I13	-0.13253		
94F54	-0.221837	Polyphemus is blinded	-0.175		
94F61	-0.219847	94I136	-0.0854503		
94F621	-0.193995	94I16	0.208754		
		94I161	-0.0291971		
		94I163(+0)	-0.205128		
		94I18	-0.16732		
		94I183	-0.0423387		
			0		
			-0.0444444		



Above: Domenico Corvi, "Sacrifice of Polyxena", ca. 1790
Top-right: Domenichino, "Sacrifice of Iphigenia", drawing
Bottom-right: Michele Tedesco, "Judgement of Paris", 1896



IconClass emotion category (56)

- Exists, but...
 - Marginally more articulated than SenticNet
 - Seldom used in the Fotothek, only when explicit in title
 - Very rarely associated to IconClasses in Greek myth
- Move from entire image to regions or to events?

📄 **31D162** 📄 ugly old man

Search with these related keywords:

human being, life, ugly, biology, age, old man

📄 **56E2** 📄 Rage, Anger

Search with these related keywords:

personification, emotion, idea, anger, allegory, abstract idea

Antonio Bonazza, "The old man in love, enraged at his extinguished libido", 1742. Bagnoli di Sopra (PD), Villa Widmann-Borletti, garden.

Photo: Matteo De Fina, 2005, Fondazione Giorgio Cini onlus.

Future Work

1. Investigate course of action for **integrating** emotional data with IconClass.
2. Extend to **iconology** by involving art historians both as raters and in the analysis.
3. Comparative study with related **texts** (Homer, Virgil +)
 - a. Phenomenology as a common ground
 - b. Initial work underway at UniL on using LLMs to extract events from Iliad.
 - c. → MITE!

Thank You



alessandro.adamou@biblhertz.it
davide.picca@unil.ch