

# Modeling Image Interpretation

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## Abstract

Digital art historical interpretation is possible in ATP if we model the Renaissance form of art contemplation, which associates depictions with classical texts, directly. Though recognition is abductive and requires HOL for inference to the best explanation, much progress on modeling and model checking is possible in FOL already—our focus here. Merely formalizing visual elements and narratives can already challenge accepted interpretations and lead to new insights, as we demonstrate for Albrecht Altdorfer’s *Alexanderschlacht* (<https://bit.ly/3snYmMC>).

## 1 Introduction

Renaissance painters worked for a literate and sophisticated audience. Patrons appreciated art by contemplating the relationship between classical texts and artistic presentations. Painters manipulated two layers of meaning: the representational layer of recognizable objects—people, houses, animals, activities, geographies—and the cultural layer of canonical narratives: religious stories, tales from Antiquity, and famous biographies.<sup>1</sup>

Digital art history that leverages ATP should recapitulate this strategy, juxtaposing depictions with text in formal logic. Recognizing such an alignment—an interpretation—is, per C.S. Peirce, a problem of abduction and requires HOL qua inference to the best explanation. However, patrons will not buy what they no longer recognize. In a closed canon of classical texts, the problem often reduces to one of deductive matching and model checking.

It is this FOL aspect of the problem that we describe in our modeling approach for image interpretations. We discuss representing the recognizable objects in FOL, classical narratives as Davidsonian events, and the mediating interpretations as an association between depictions and narrative. We then illustrate our modeling approach, once again,<sup>2</sup> using Albrecht Altdorfer’s *Alexanderschlacht* of 1529. We focus on the problem of the battle’s location: Issos or Gaugamela. We are excited to report that our FOL work immediately raised interesting problems for the *opinio communis* interpretations of the painting. We close with a vista of the border to HOL, where narrative and object recognition become co-dependent.

## 2 Formal Modeling Elements

We introduce an explicit term for the interpretation. Through this term, we relate a shape in the image to an individual. We draw representational inspiration from the Text Encoding Initiative

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<sup>1</sup>We discussed the modeling problem of symbolism in our AITP 2019 contribution.

<sup>2</sup>We used the *Alexanderschlacht* (<https://bit.ly/3snYmMC>) to discuss TMS problems in Humanities research in our AITP 2020 contribution (<https://bit.ly/3M1ceUR>). COVID-19 prevented our presenting at Aussoi.

(<https://tei-c.org/>) standard for describing illustrations in Medieval texts. We capture the individual using FOL sentences in common sense vocabulary: a rider or a charioteer, a bow or a scythe chariot. This acknowledges the visual perception without forcing an immediate identification.

Next, we relate the interpretation and that individual to a role in a Davidsonian scene of the narrative. Such relating “recognizes” the rider as Alexander the Great, or the battle as Issos (333 bc). The description of the narrative itself follows classic Davidsonian practices: event hierarchies annotated with roles, actors and props.

Tying interpretations back to the sources without HOL constructs is difficult. In FOL, it is easiest to use different events for different narratives, even if these terms are meant to represent the same event “in the real world”. For our investigations, this helps spotting narrative collages quickly, whenever artists drew inspiration from multiple sources for their painting.

### 3 Locating the Alexanderschlacht

Early 20<sup>th</sup> century art historians agreed that the Alexanderschlacht depicted the final battle between Alexander and Darius III at Gaugamela. In 1937, Peter Strieder noted that the presence of Oxathres, the brother of Darius III, as well as the fleeing women (assumed to be the mother, wife, and children of Darius) in the painting argued for Issos, per Q.C. Rufus classical text, *Historia Alexandri Magni*. The battle statistics on the flags, which follow Q.C. Rufus, and the Mediterranean landscape—Issos lies on a gulf, Gaugamela is land-locked—strengthen this interpretation. We know of no challenge to this localization since 1937.

However, ontologizing Strieder’s argument quickly runs into difficulties. First, Oxathres is not clearly depicted; there is merely a flag that carries his name above a throng of harnished cavalry. We thus cannot model his presentation as a rider. Given Q.C. Rufus’ heroic description of Oxathres and his cavalry defending Darius III at Issos, that is most noteworthy.

Secondly, Darius’ family was, *contra* Strieder, also present at Gaugamela, as hostages in Alexander’s baggage train. There was even an attempt to free them. The painting either depicts their fleeing at Issos or the faltering rescue attempt at Gaugamela.

Most importantly, Darius III rides a chariot in the Alexanderschlacht as described in Q.C. Rufus for Gaugamela, not Issos: an elevated platform for Darius, forward-facing spears to augment the scythes, and a chariot driver pierced by a lance. Though FOL cannot adjudicate between these interpretations, it can highlight that both have the support of the same source, Q.C. Rufus: the name of Oxathres indicates Issos, while the lanced chariot driver fits only for Gaugamela.

### 4 On the border to Higher Order

FOL suffices when image description matches the sources. But recognizing objects in a bustling painting is complex. Take the chariot driver: His prostate position shows his mortal wound, but the rod piercing his body is ambiguous. Some art historians see an arrow; Q.C. Rufus tells us it is a spear. Similarly with the women’s demeanor or the geographical setting of the painting: The narrative in the source now informs the reading of the depiction. If the ontological engineer sees an arrow and not a spear, Rufus’ narrative cannot match, and a sourced scene becomes artistic invention. Complex competing interpretations such as Gaugamela *versus* Issos eventually require HOL operations such as ranking possible worlds. The FOL representations we describe here are a good point of departure for this future research.



Figure 1: Albrecht Altdorfer, Die Alexanderschlacht (1529), now in the Pinakothek in Munich.