Formal Ontology in Information Systems
N. Aussenac-Gilles et al. (Eds.)

doi:10.3233/FAIA231139

Ontological Modeling of Scholarly Statements: A Case Study in Literary Criticism

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Abstract. In many application domains, it is common to talk not only about the entities populating that domain, but also about *statements* (aka claims) that are expressed about those very entities. This is particularly the case in the Humanities, e.g., when scholars express their critical statements about paintings, literary texts, musical works, etc. The ontological modeling of such claims is challenging for various reasons, e.g., because one needs to capture their subjective but also public dimension, because scholars may express *contrasting* statements about the same phenomena, or because the argumentative logic of scholarly reasoning does not squarely fit into the methods of mathematical logic. Building on previous work on the treatment of *observations* and being driven by concrete case studies, we propose the first steps for an ontology to document scholarly statements and to trace critical debates in literary studies.

Keywords. observations, literary criticism, digital humanities, ontology

1. Introduction

The modeling of *statements* representing what experts (publicly) claim on their domain of interest plays a prominent role in today's research in knowledge representation [1]. For instance, consider a painting like Picasso's *Guernica*; scholars can express different statements about its historical context or what the scene in the painting stands for, just to mention an example. A particularly interesting case, which is at the focus of this investigation, is represented by literary texts, in light of the various dimensions from which they can be analyzed. For instance (and simplifying), philologists may be interested in investigating how a text changes across its written realizations; paleographers in the analysis of (ancient) writing styles; literary critics in the socio-cultural and aesthetic values of a text. In addition, scholars can express statements at different abstraction levels, refer to

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others' views, argue in favor of their claims with supporting arguments or sources, or express incompatible assertions and interpretations (these considerations can be applied to human sciences but also to natural sciences or engineering). To represent experts' statements through an ontology is therefore challenging, but it can be relevant to document them for further analysis, e.g., to compare different statements about the same entities (see [2,3]) along these lines).

Building on previous work on *observations* [4], our purpose is to present the first steps for a formal framework to model (scholarly) statements on literary texts. The overall research picture behind this contribution is to develop a modeling system through which one can (partially) document, share, and interlink critical and interpretative assertions. However, because of the variety of statements that literary scholars may express, we have decided to focus on assertions concerning two of the most important and often related elements involved in literary interpretation: literary characters and relations between texts.[2] These topics are among the most analyzed in critical studies, thus they offer a conspicuous material to ground our ontological analysis. A text is indeed a set of words that form a unit of meaning, but it is difficult – if not impossible – to conceive of it as an isolated item. Following Eco [6], when writing, as well as when reading and interpreting, we rely on our own 'encyclopaedia', i.e., on a collection of experiences, aesthetic values, critical knowledge, and other texts, and this knowledge affects how we write and read. The notion of 'character' has always been manipulated by readers and critics [7]. When delving into a narrative or dramatic text, we tend to take into account characters and their actions, which form the core of fictional literature, and to compare them to others which are already familiar to us. Literary critics are not exception.

The paper is structured as follows. Sect. 2 presents a case study based on Boccaccio's *Decameron*, a masterpiece in Medieval Italian literature. There exists a large corpus of literature about the *Decameron*, including studies about its relationships with other texts, and analysis of its characters. We will therefore use some of the scholarly statements about the final *novella* (i.e. tale) of the *Decameron* to shape the development of our framework. Sect. 3 briefly presents some core aspects of the theory of observations upon which we rely to formally represent statements. Sect. 4 introduces the notions of text and composition we refer to throughout this work. Sect. 5 presents the formal mechanism to represent the debate among scholars. We discuss its application to the case study in Sect. 6. Finally, Sect. 7 stresses the novelty of our proposal with respect to the state of the art.

2. Case study: Boccaccio's Griselda

To provide an illustration of our modeling framework, we attempt a first (and partial) formal representation of the critical interpretations concerning two fictional characters from the final tale of Boccaccio's *Decameron* (written between 1348 and 1353-55).

The tale X, 10 and its interpretations. The *Decameron* tells the story of ten young Florentines who decide to leave the plague-ridden city for the countryside, where they entertain themselves by telling each other stories. For our purposes, we focus on the last tale (X, 10) in light of its relevance for the overall meaning of the *Decameron*.

[2]There is a lively philosophical debate on the ontology of literary characters [5]. For our current purposes, we take only a weak position on their status leaving to future work a more in-depth analysis.

The last novella should deal with acts of liberality, like the others told on the last day, but its narrator declares to have chosen a tale of feral and insane behavior instead. He tells the story of Gualtieri, a nobleman who, urged by his liege-men to marry, picks as his wife the humble and poor Griselda, and makes her promise that she will always comply with his wishes. Gualtieri decides to test Griselda's self-denial in increasingly cruel ways, letting her believe that their children need to be murdered and finally disowning her, while also asking her to help organize his new wedding. Despite her suffering, Griselda accepts everything he puts her through. In the end, Gualtieri reveals her his game and they live happily ever after.

Given this controversial plot and its narrative frame, the critical debate around the novella is still open. Whereas scholars managed to retrace a clear source for the vast majority of the *Decameron*'s novellas, they still argue about the texts which likely influenced the writing of Griselda's tale. Such debate is particularly relevant because the identification of a source orients the overall interpretation of the whole text, as well as its position within the history of literature. Boccaccio's *Decameron* straddles two major historiographical categories, namely the Middle Ages and Humanism. To study and understand the hypertextual relationships between the novellas and other earlier texts can be crucial to appreciate in Boccaccio's writing those features which would place him in either one of the two cultural systems and to provide a more rich ethical and aesthetical understanding of Boccaccio's literary goals.[3]

In the attempt to illustrate this debate, we rely on three critical studies dealing with Griselda's novella with considerable implications on the interpretation of the whole *Decameron*. The first one is a text written by Branca [9], underlying the links between Boccaccio's work and Medieval culture. In commenting the tale of Griselda, Branca argues that she is inspired by the Virgin Mary on the basis of some linguistic and stylistic features, which would make Boccaccio's text reminiscent of biblical and hagiographic narratives. To defend such a proximity among the two characters means ascribing to Griselda some attributes which are not made explicit by Boccaccio's text. More generally, this similarity entails a strong connection between the *Decameron* and Christian virtues, as they were elaborated during the Middle Ages.

Over the last 30 years, this view has been challenged from different perspectives. Some scholars emphasized the relationship between the *Decameron*'s final novella and feudal society, and retraced the sources of the former back to chivalric and courtly literature. The second critical essay we selected is one of the main outcomes in this line of interpretation [10]. In this work, Picone identifies as the main source of Griselda's tale the *Lai de Fresne*, included in Marie de France's *Lais* (second half of XII cent.), and supports his argument by quoting several passages from Boccaccio's text that closely echo, in both narrative and vocabulary, the *Lai de Fresne*.

In the final essay by Candido [11], the author singles out Apuleius as a crucial source for Boccaccio's oeuvre, thus defending the idea that his posture mainly consists in a humanistic attitude of emulation of the classical sources. Candido compares Griselda's tale to the fable of *Cupid and Psyche* narrated in Apuleius' *Metamorphoses* (II cent.) –

[3] BoNHum [8], is a digital project in which some of the authors of this paper took part, tried to exploit the potentialities provided by the Digital Humanities in order to study the specific humanist features in Boccaccio's works, by means of elaborating a prosopography of characters to see how their traits are developed in some texts by Boccaccio and in their French translations.

which is also rewritten, as many scholars state, in the aforementioned *Lai de Fresne* –, and he does so by presenting several lexical and narrative parallels.

These three essays display some of the possible approaches to literary criticism developed in the last decades. They adopt different vocabularies, styles of argumentation, and critical stances; they have also enjoyed different degrees of appreciation and circulation. Although they focus on the same text, these works also contain reference to previous scholarship and meta-critical analysis, for they respond to a broader collective inquiry. For these and other reasons, the Humanities often experience a substantial dispersion of knowledge, with relevant acquisitions being ignored in favor of others that are perceived as more poignant at a given moment, or because their critical language and approach seem obsolete, or because of an unnecessary polarization of interpretations.

In such a situation, a formal framework like the one we plan on creating could prove useful for documenting the findings of scholars so that they can be more easily compared and tested. At this stage, we decided to attempt a partial formalization of the observations put forward by our three case studies based on the notion of hypertextuality.

Hypertextuality. This category is inspired by Genette [12] and is understood as 'any relationship that links a text B (hypertext) to a text A (hypotext)'. To recognize this relationship, scholars normally put forward some 'proofs', which can be intertextual, metatextual, extratextual, and architextual.

Intertextuality entails that the text B makes reference to the text A. This can happen in a variety of ways, spanning from emulation to overturning, and including re-adaptation, satirical rewriting, and other possible transformations. In our example, Candido argues that Boccaccio's novella is an emulation of Apuleius' story, whereas Picone does not specify what sort of goal Boccaccio is likely achieving through his rewriting of the *Lai de Fresne*. When supporting their argument of an intertextual relationship, scholars can put forward linguistic and stylistic proofs – like Branca does –, or can draw attention to similarities in the plot development. For instance, both Candido and Picone show that several situations and events in Griselda's tale parallel similar situations and events in its supposed hypotext, such as the different challenges the female protagonist has to endure, or the mismatch between a noble male lover and his humble female partner. Other critical interpretations might involve similarities in the plot's setting, in its narrative frame, or in the authorial stance.

Metatextual relationships, on the other hand, link a text to its commentaries, i.e. to other texts that are meant to explain it. Commentaries very often provide intertextual references to clarify the text [13]. The relationship between Boccaccio's novella and the three essays that constitute our case studies is a metatextual relationship. A text also has *architextual* relationships with the literary genres it places itself within, and which orient the reader's expectations. To establish a relationship between the tale of Griselda and the biblical narratives centered around the Virgin Mary implies to stress the proximity between Boccaccio's text and the genre of hagiographical or religious literature – which is, as we have seen, very different than highlighting its humanistic stance. Finally, scholars often rely on *extratextual* arguments to support their claims. In defending his argument on Boccaccio's rewriting of Apuleius, for example, Candido remarks that the author certainly knew the *Metamorphoses* very well, since he had a manuscript copy of said work. This last category is not inspired by Genette and, strictly speaking, it is not to be considered as an hypertext relationship. We used it to represents a contextual information supporting a textual relationship hypothesis.

3. Insights on observations

We now present a theory for observations, based on previous work by Masolo et al. [4], to formally document literary critics' claims of the sorts just seen about the *Decameron*. Due to space limitations, we cannot present the whole axiomatic treatment and will give here only some intuitions; the reader can refer to [4] for an in-depth reading.

First, we consider observations as the classification of domain entities under properties or relations on the basis of, e.g., analytic, cognitive or technical procedures. Hence, the modeling of observations allows us to take an epistemological perspective on (logical) predication because asserting that an entity satisfies a property means that it has been *attributed* with that property. It follows that observations are not necessarily veridical of the world or consistent with each other.

Second, and importantly, we assume that observations are not scholars' introspective beliefs (see Sect. 7 for a comparison with the state of the art on this specific aspect). Differently from the latter, observations can be inter-subjectively accessed and have a *public* dimension. We also assume that, at least within specific working contexts, scholars share a common vocabulary for documenting and sharing observations, i.e., what we call an *observational language* (see [14] for an example of observational language for knowledge representation in musicology). The theory of observations takes a finite set $\mathscr{P}$ of observation kinds which are taxonomically organized to represent different levels of generality. Each observation kind collects all the observations corresponding to the attribution of a given property (relation) to a (several) individual(s). For instance, the observation 'Hamlet is a Prince' is of kind 'Prince' and corresponds to the attribution of the property of *being Prince* to Hamlet. Each observation kind has an arity specifying the exact number of entities it involves. Because of the taxonomic structure, observations under the same root have the same arity.

Third, different scholars can – independently from each other – express the *same* observation even by relying on different supporting justifications. This means that observations abstract from both observers and observing acts; they represent how entities in the world are categorized and therefore attributed with properties. It is however important to keep track of provenance, because scholars are responsible for their observations and because one may wish to explicitly refer to others' observations. Hence, as we will see, our framework allows making explicit who asserted or rejected an observation.

Fourth, we indicate with $\mathbf{p}(x_1,\ldots,x_n)$ the *unique* observation o of kind `P` involving the individuals $x_1,\ldots,x_n$ (where n is the arity of `P`). More precisely, `P` is the *minimal*-kind of o, namely, `P` represents the finest granularity at which o can be described. Scholars can express observations at different abstraction levels, but an observation is always determined by its finest resolution. For instance, assume that (the observation kind) `Prince` is subsumed by `Royal_Figure`. The observation 'Hamlet is a Royal Figure' (**royal_figure**(`hamlet`)) does not say anything about the fact that Hamlet is a Prince or not. Observations with the same minimal-kind and involved entities are identical. Hence, it is not possible to have different observations with the same 'content'.

Fifth, we distinguish *basic observations*, *observations of observations*, and *complex observations*. The difference between the first two is that only the second ones involve other observations. The third ones are mereological sums of other observations (we assume a classical atomic extensional mereology closed under sum, see [4]).

Finally, following [4], observations are neither facts nor propositions. They are not facts because they do not stand for how things are in reality. They are close to proposi-

tions in that they are truth-bearers, i.e., the objects of statement making acts, and they are not coincident with agents' intentional states. However, some philosophers claim that propositions are abstract entities that exist even if they have not been entertained by any agent [15]. Differently, taking an epistemological perspective, observations exist only if they have been entertained and made public.

4. Texts, books, and compositions

We present in this section the notions of *text*, *book* and *composition*, which are useful to document some literary observations. The distinction between text and composition is due to Thomasson [16], but we revise it to meet the practices of literary scholars.

Following Thomasson, a text is an abstract sequence of words, hence it does not correspond to, e.g., the physical ink-made text which one finds in printed books. We introduce the notion of book to indicate the physical items (including digital files like e-books) that exhibit patterns of ink (or, in case of e-books, patterns of electric or magnetic charge) materializing texts. Scholars may disagree on which texts they 'see' in a book; e.g., in the case of manuscripts, they could disagree on the spelling of a word, so different texts can be associated to the same book. Realization is therefore observable and potentially controversial. We assume the empirical hypothesis that each book is observed as realizing at least a text. Compositions are, one may say, texts-in-context, namely, texts as produced by authors at certain times. In this view, if by chance two persons, living in different (or the same) epochs, produce exactly the same sequence of words and punctuation signs, they produce the same text but different compositions. This because it is only compositions' identity that is bound to their authors and epochs.

The text vs. composition distinction allows Thomasson to deal with some puzzles in the philosophical literature but, in our view, it is also useful from a literary perspective, e.g., because it makes sense of the historical dimension of compositions [17]. At the same time, Thomasson's position seems too strict in assuming that a composition *must* have an author and production date. In practical cases, this information could be only partial; e.g., scholars may be able to provide only rough ideas about the author and/or production time. Nonetheless, every time that an author and a production time are – even partially – associated to a text (observed in a book), a composition emerges.

In our approach, for the sake of simplicity, for each composition we identify a unique *reference book*, i.e., the main book where a text is realized. However, if experts disagree on the realization of texts, our approach associates different compositions to the same book. The general idea is that each composition is fully determined by its reference text, author, and period (which are individuated through empirical analyses). Axiom (a1) assures that every composition has an associated unique text while (a2) provides the identity criterion for compositions where `CMP` represents the class of compositions, and `TXO` ('text of'), `AUO` ('author of'), and `PTO` ('production time of') link a composition to its text, author, and production time, respectively. Axioms (a1) and (a2) are compatible with the cases where the author, the production time or both are not available. Also, it follows that if an agent produces the same text several times, one would have various compositions differing only because of their production time.

a1 $\texttt{CMP}(c) \rightarrow \exists!x(\texttt{TXO}(x,c))$

a2 $\texttt{CMP}(c_1) \wedge \texttt{CMP}(c_2) \wedge (\texttt{TXO}(x,c_1) \leftrightarrow \texttt{TXO}(x,c_2)) \wedge (\texttt{AUO}(a,c_1) \leftrightarrow \texttt{AUO}(a,c_2)) \wedge (\texttt{PTO}(t,c_1) \leftrightarrow \texttt{PTO}(t,c_2)) \rightarrow c_1 = c_2$

Definition (d1) introduces a notion of fragment (a subcomposition) of a composition induced by a parthood relation (P) between texts. As we will see in the next section, this notion is useful to point to a specific portion in a composition.

d1 $\texttt{FRG}(f,c) \coloneqq \exists x_f x_c(\texttt{TXO}(x_f,f) \wedge \texttt{TXO}(x_c,c) \wedge \texttt{P}(x_f,x_c)) \wedge \forall a(\texttt{AUO}(a,f) \leftrightarrow \texttt{AUO}(a,c)) \wedge \forall t(\texttt{PTO}(t,f) \leftrightarrow \texttt{PTO}(t,c))$

5. Documenting Critical Debates

Following some studies in semiotics and literature [18], we adopt a pluralist attitude according to which scholars can interpret compositions from different viewpoints. Interpretations are therefore agent-dependent and bear a subjective (often socially-driven) dimension. In this context, coherence and situated argumentation are more relevant than truth. Our approach contrasts with the idea that a literary text bears a single and fixed meaning, often identified with its author's intention (see [19] for an overview on this debate in literature). Authorial intention is indeed an important aspect of scholarly interpretation but not the only one. Our approach allows to compare different interpretations of texts with different hermeneutic goals, and to analyze whether and why they differ.

In the following we show how interpretations can be documented in terms of observations. In Sect. 5.1, the subjective interpretation of a composition is partially made explicit by the observations which each interpreter associates to the composition itself. This move allows us to explicitly introduce several characteristics of the contents of compositions and to study the different points of view of the interpreters. In Sect. 5.2, we partially account for the evidences the interpreters explicitly provide to argue in favor or against a given claim. This allows to better represent the debate among scholars.

5.1. Source

The observation-kind ASS captures observations concerning the *textual sources* of an observation, i.e., observations stating that a piece of information is 'contained' in specific compositions. The instances of ASS have the form $\textbf{ass}(c,o)$ standing for 'the composition *c asserts* the observation *o*'; e.g., $\textbf{ass}(\texttt{dec},\textbf{man}(\texttt{gua}))$ represents that the *Decameron* asserts that Gualtieri is a man. ASS-observations are non-basic because they involve another observation, what is asserted in a given composition ($\textbf{man}(\texttt{gua})$ in the example). One may have compositions containing information about the information contained in other compositions; e.g., $\textbf{ass}(\texttt{bmd},\textbf{ass}(\texttt{dec},\textbf{man}(\texttt{gua})))$ says that *Boccaccio Medievale* by Branca asserts that the *Decameron* asserts that Gualtieri is a man. This is common in essays where scholars report about others' observations.

The observation-kind REJ identifies the source of the *rejection* of a given observation, i.e., $\textbf{rej}(c,o)$ stands for 'the composition *c rejects* the observation *o*', a sort of weak form of negation. Considerations analogous to the ones done for ASS hold in the case of REJ. Note that $\textbf{rej}(c_2,\textbf{rej}(c_1,o))$ and $\textbf{ass}(c_2,\textbf{ass}(c_1,o))$ are not equivalent because by rejecting the rejection of *o*, one does not necessarily assert the assertion of *o*, for it is possible that c_1 neither asserts nor rejects *o*. Similarly in the case of $\textbf{ass}(c_2,\textbf{rej}(c_1,o))$

and $\mathbf{rej}(c_2, \mathbf{ass}(c_1, o))$, i.e., by asserting the rejection of o one does not necessarily reject the assertion of o and vice versa.[4]

ASS- and REJ-observations allow to (weakly) characterize the provenance of both basic and non-basic observations.[5] However, by requiring that every observation has a source, i.e., it is asserted in, or rejected by, at least a composition, we end up with infinite chains of ASS/REJ observations. We stop infinite chains at the level of the knowledge base we build. Technically, we reify the knowledge base into the domain of quantification as the composition kb and we assume that kb ends all the source chains. According to (a3) and (a4) the observations with form $\mathbf{ass}(\mathtt{kb}, o)$ or $\mathbf{rej}(\mathtt{kb}, o)$ are the only observations *without* a source (hence, interpretations of kb cannot be represented).[6] In this view, kb is intended to document the existing positions of literary critics, and not to express its own critical viewpoint on the analyzed compositions. The interpretative dimension of kb is however unavoidable and it is explicitly represented by $\mathbf{ass}(\mathtt{kb}, o)$ or $\mathbf{rej}(\mathtt{kb}, o)$. We further assume that kb is 'coherent', i.e., kb does not assert and refuse the same observation, see (a5).[7]

a3 $\mathtt{OBS}(o) \rightarrow \exists \bar{o}(o = \mathbf{ass}(\mathtt{kb}, \bar{o}) \vee o = \mathbf{rej}(\mathtt{kb}, \bar{o})) \vee \exists c \bar{o}(\bar{o} = \mathbf{ass}(c, o) \vee \bar{o} = \mathbf{rej}(c, o))$

a4 $(o = \mathbf{ass}(\mathtt{kb}, a) \vee o = \mathbf{rej}(\mathtt{kb}, a)) \rightarrow \neg \exists c \bar{o}(\bar{o} = \mathbf{ass}(c, o) \vee \bar{o} = \mathbf{rej}(c, o))$

a5 $\neg \exists o a b(a = \mathbf{ass}(\mathtt{kb}, o) \wedge b = \mathbf{rej}(\mathtt{kb}, o))$

Once we have collected interpreters' positions via a specifically designed observational language (see Sect. 6), we can analyze the status of some claims on the basis of explicitly defined criteria, e.g., coherence or ambiguity. In the following, we mainly adapt principles considered in *assertion logics* [20] and *argumentation frameworks* [21,22,23].

Let us start with the principle of *consistency* assumed in the assertion logic in [20]: an assertor cannot assert a proposition and its negation. First note that we do not have negations of observations, therefore this principle must be restated by considering the assertion and rejection of an observation.[8] Second, given (a3) and (a4) all the observations must appear in at least a source-chain ending at kb. Thus, the existence of the observations $\mathbf{ass}(c, o)$ and $\mathbf{rej}(c, o)$ cannot be considered as a sign of inconsistency of c because these observations can appear, for instance, only in $\mathbf{ass}(\mathtt{kb}, \mathbf{ass}(\bar{c}, \mathbf{ass}(c, o)))$ and $\mathbf{ass}(\mathtt{kb}, \mathbf{rej}(\bar{c}, \mathbf{rej}(c, o)))$ where kb is just reporting the view of $\bar{c}$ which is asserting $\mathbf{ass}(c, o)$ but rejecting $\mathbf{rej}(c, o)$. We then need to qualify the chains in which the observations appear to individuate inconsistencies (we prefer here to talk about *incoherences*).

A notion of *strong incoherence* is defined in (d2) where we have the direct interpretation of c by kb according to which c both asserts and rejects o. Definition (d3) represents the case where kb asserts that c is incoherent in the view of $\bar{c}$, a case of *reported incoherence*. (d4) weakens (d3) by considering the interpretations of c provided by the

[4] We could think in terms of intuitionistc logic, if we were to interpret the rejection as a form of negation: a proof of $\neg\neg A$ does not provide a proof of A. However, rejection is weaker than intuitionistic negation, as the assertion of A does not entail the rejection of the rejection of A.

[5] The provenance of observations could be grounded on non-textual entities, e.g., measurement devices. Measurements can be partially represented by assuming that devices produce textual (and interpretable) outputs.

[6] To keep track of who is responsible of given assertions in the knowledge base and its evolution, one may decompose kb into subcompositions produced by different agents at different times.

[7] A kb can document incoherences of other compositions, e.g., $\mathbf{ass}(\mathtt{kb}, \mathbf{ass}(c, a)) \wedge \mathbf{ass}(\mathtt{kb}, \mathbf{rej}(c, a))$.

[8] One could generalize this claim by taking into account the taxonomy of observations, i.e., by considering the assertion of an observation o and the rejection of $\bar{o}$ which has the same arguments of o but is an instance of a more general observation-kind.

(possibly different) compositions c_1 and c_2 highlighting the *ambiguity* of c with respect to o.

d2 $\texttt{sINC}(c) \coloneqq \exists o o_1 o_2 (o_1 = \mathbf{ass}(\texttt{kb}, \mathbf{ass}(c,o)) \wedge o_2 = \mathbf{ass}(\texttt{kb}, \mathbf{rej}(c,o)))$ (*strong incoherence*)

d3 $\texttt{rINC}(c) \coloneqq \exists \bar{c} o o_1 o_2 (o_1 = \mathbf{ass}(\texttt{kb}, \mathbf{ass}(\bar{c}, \mathbf{ass}(c,o))) \wedge o_2 = \mathbf{ass}(\texttt{kb}, \mathbf{ass}(\bar{c}, \mathbf{rej}(c,o))))$ (*reported incoherence*)

d4 $\texttt{AMB}(c) \coloneqq \exists c_1 c_2 o o_1 o_2 (o_1 = \mathbf{ass}(\texttt{kb}, \mathbf{ass}(c_1, \mathbf{ass}(c,o))) \wedge o_2 = \mathbf{ass}(\texttt{kb}, \mathbf{ass}(c_2, \mathbf{rej}(c,o))))$ (*ambiguity*)

These notions are not mutually exclusive, since it is possible to simultaneously have $\texttt{sINC}(c)$, $\texttt{rINC}(c)$, and $\texttt{AMB}(c)$. Furthermore, (d2) represents the fact that kb has a direct access to c, while in (d3) kb has a direct access only to $\bar{c}$ which is reporting its own interpretation of c (similarly for ambiguity). One could generalize (d3) and (d4) by considering chains of many assertions. For instance, according to $\mathbf{ass}(\texttt{kb}, \mathbf{ass}(c_2, \mathbf{ass}(c_1, \mathbf{ass}(c,o))))$, kb directly accesses c_2 which is reporting c_1's interpretation of c. Through assertion-chains, kb can be many interpretation-steps (of reports of reports) distant from the original assertion $\mathbf{ass}(c,o)$. However, these chains can still preserve information about c, for the intermediate compositions can transfer information from the direct interpreter of c to kb, especially when interpreters are veridical.[9] Vice versa, the presence of a single rejection in the chain breaks the transfer of information.

Assertion chains can be inductively defined as in the following ($\overline{\texttt{AC}}^*(a,o)$ reads 'a is an assertion chain starting from o' and $\mathscr{L}$ is the language of our theory):

1: if $a = \mathbf{ass}(c,o) \in \mathscr{L}$, then $\overline{\texttt{AC}}^*(a,o) \in \mathscr{L}$;

2: if $\overline{\texttt{AC}}^*(a,o) \in \mathscr{L}$ and $b = \mathbf{ass}(c,a) \in \mathscr{L}$, then $\overline{\texttt{AC}}^*(b,o) \in \mathscr{L}$.

This inductive definition cannot be expressed in FOL. We can however consider $\overline{\texttt{AC}}^*$ as a primitive and assume that, starting from a given set of observations, the ABox relative to $\overline{\texttt{AC}}^*$ is automatically populated via an algorithm implementing the above inductive steps. On the basis of $\overline{\texttt{AC}}^*$ we can individuate the assertion chains that start from o and end at the kb, see (d5), and then generalize (d3) and (d4) as in (d6) and (d7). Note that $\texttt{rINC}(c) \rightarrow \texttt{rINC}^*(c)$ and $\texttt{AMB}(c) \rightarrow \texttt{AMB}^*(c)$ but not vice versa, i.e., as expected, $\texttt{rINC}^*$ and $\texttt{AMB}^*$ are weaker than the original relations, still they contribute to individuate "signs" (not definitive claims) of potential incoherences and ambiguities.

d5 $\texttt{AC}^*(a,o) \coloneqq \overline{\texttt{AC}}^*(a,o) \wedge \neg \exists o_1 c (o_1 = \mathbf{ass}(c,a) \vee o_1 = \mathbf{rej}(c,a))$

d6 $\texttt{rINC}^*(c) \coloneqq \exists \bar{c} o o_1 o_2 (\texttt{AC}^*(o_1, \mathbf{ass}(\bar{c}, \mathbf{ass}(c,o))) \wedge \texttt{AC}^*(o_2, \mathbf{ass}(\bar{c}, \mathbf{rej}(c,o))))$

d7 $\texttt{AMB}^*(c) \coloneqq \exists c_1 c_2 o o_1 o_2 (\texttt{AC}^*(o_1, \mathbf{ass}(c_1, \mathbf{ass}(c,o))) \wedge \texttt{AC}^*(o_2, \mathbf{ass}(c_2, \mathbf{rej}(c,o))))$

A similar analysis can be done focusing on the *disputability* of observations rather than on the incoherence of compositions. According to (d8), an observation o is disputable when there are two sources directly accessible by kb, one asserting and one rejecting o. Following what done for rINC, (d8) can be generalized as in (d9).

d8 $\texttt{DIS}(o) \coloneqq \exists c_1 c_2 o_1 o_2 (o_1 = \mathbf{ass}(\texttt{kb}, \mathbf{ass}(c_1,o)) \wedge o_2 = \mathbf{ass}(\texttt{kb}, \mathbf{rej}(c_2,o)))$

d9 $\texttt{DIS}^*(o) \coloneqq \exists c_1 c_2 o_1 o_2 (\texttt{AC}^*(o_1, \mathbf{ass}(c_1,o)) \wedge \texttt{AC}^*(o_2, \mathbf{rej}(c_2,o)))$

[9] Assertion logics, e.g. [20, p.266] discuss the fact that each assertor in the chain is *veridical*. E.g., if "x_1 asserts that x_2 asserts that ϕ", then "x_2 asserts that ϕ", because x_1 is veridical, hence ϕ, because x_2 is veridical.

5.2. Support and Defeat

ASS- and REJ-observations allow us to track the sources of given observations, i.e., the compositions that, according to an interpreter, assert or reject these observations. However, scholars usually argue for their claims, i.e., they may base their assertions and rejections on other observations. These observations – we say evidences in this case – are not always conclusive, i.e., they may not be sufficient to infer or negate a given claim, for they just allow to specify some observations which are in favor or against such a claim. Once the evidences exhibited by different scholars to support or defeat a given claim are made explicit, following what we did in Sect. 5.1, it is possible to analyze the debates among scholars, to individuate admissible claims, etc.

To represent the debates among scholars we adapt the *bipolar argumentation framework* [22], a general theory that extends the original theory of Dung [21] by considering a set of *arguments* and two kinds of interactions between arguments: a negative interaction expressed by the *defeat* (*attack*) relation, and a positive interaction expressed by the *support* relation. Following this bipolar approach we introduce two new kinds of (binary and non-basic) observations, SUP and DEF: $\mathbf{sup}(o_1,o_2)$ is the observation that 'the observation o_1 supports the simple observation o_2', $\mathbf{def}(o_1,o_2)$ is the observation that 'the observation o_1 defeats the simple observation o_2'.[10]

The nature of arguments has been lively discussed in the field of argumentation theories. In our framework, **sup** and **def** apply to observations, i.e., they correspond to relations between pieces of information capturing the intuition that the supporting (defeating) information is intended to increase (decrease) the plausibility of the supported (defeated) information.[11] In both $\mathbf{sup}(o_1,o_2)$ and $\mathbf{def}(o_1,o_2)$, o_1 is a simple or complex observation while o_2 is a simple observation. This choice relies on a conjunctive reading of the mereological sum of observations. Thus, $\mathbf{sup}(o,o_1{+}o_2)$[12] can be reduced to $\mathbf{sup}(o,o_1)\wedge\mathbf{sup}(o,o_2)$, but $\mathbf{sup}(o_1{+}o_2,o)$ is not reducible to $\mathbf{sup}(o_1,o)\wedge\mathbf{sup}(o_2,o)$ because o_1 and o_2 alone do not support o, they need to be taken together, not independently (see, for instance (f8)). Similarly, $\mathbf{def}(o,o_1{+}o_2)$ can be reduced to $\mathbf{def}(o,o_1)\vee\mathbf{def}(o,o_2)$ while $\mathbf{def}(o_1{+}o_2,o)$ is not reducible in general.

We follow the general argumentation theory to study some properties of a given network of SUP- and DEF-observations intended to characterize relevant types of (*i*) debates; (*ii*) (complex) observations; or (*iii*) SUP/DEF-observations. Note that in the argumentation theory these relevant types are often defined referring to sets of arguments. In our framework we consider complex observations.

Intuitively, an observation o is *conflict-free* if it has no parts one defeating the other. However, as discussed for the incoherence, the simple existence of $\mathbf{def}(o_1,o_2)$ (with both o_1 and o_2 part of o) is not enough to conclude that o is conflictual: $\mathbf{def}(o_1,o_2)$ could only appear in a chain like $\mathbf{ass}(\mathtt{kb},\mathbf{rej}(c,\mathbf{def}(o_1,o_2)))$. A strong notion of conflict is introduced in (d10) (where P is the parthood relation between observations) while its usual weakening (via assertion chains) is defined in (d11). An observation o is *acceptable*

[10] In our approach, arguments, supports and defeats are in fact reified by means of observations. This view is comparable to [23], where arguments are actions in a theory based on situation calculus.

[11] $\mathbf{sup}(o_1,o_2)$ and $\mathbf{def}(o_1,o_2)$ are observations, then one may have support of support ($\mathbf{sup}(o,\mathbf{sup}(o_1,o_2))$), support of defeat ($\mathbf{sup}(o,\mathbf{def}(o_1,o_2))$), etc., sorts of *higher-order interactions*. Furthermore, bipolar argumentation theories can be extended by weighting both the arguments and the interactions between them.

[12] $o_1{+}o_2$ represents the mereological sum of o_1 and o_2.

with respect to another observation $\bar{o}$ if for all the observations o_1 defeating o there is part of $\bar{o}$ defeating o_1. (d12) and (d13) introduce the two usual versions of this notion but in this case, because of the universal quantifier, $\texttt{ACC}^*$ is stronger than ACC. An observation o is *admissible* if o is conflict-free and each *atomic part* of o (atP) is acceptable with respect to o: (d14) introduces the weaker version of admissibility.

d10 $\texttt{CON}(o) \coloneqq \exists o_1 o_2 o_3(\texttt{P}(o_1,o) \wedge \texttt{P}(o_2,o) \wedge o_3 = \mathbf{ass}(\texttt{kb}, \mathbf{def}(o_1,o_2)))$ (*strong conflict*)

d11 $\texttt{CON}^*(o) \coloneqq \exists o_1 o_2 o_3(\texttt{P}(o_1,o) \wedge \texttt{P}(o_2,o) \wedge \texttt{AC}^*(o_3, \mathbf{def}(o_1,o_2)))$ (*conflict*)

d12 $\texttt{ACC}(o,\bar{o}) \coloneqq \forall o_1 o_2(o_2 = \mathbf{ass}(\texttt{kb}, \mathbf{def}(o_1,o)) \rightarrow \exists o_3 o_4(\texttt{P}(o_3,\bar{o}) \wedge o_4 = \mathbf{ass}(\texttt{kb}, \mathbf{def}(o_3,o_1))))$ (*acceptability*)

d13 $\texttt{ACC}^*(o,\bar{o}) \coloneqq \forall o_1 o_2(\texttt{AC}^*(o_2, \mathbf{def}(o_1,o)) \rightarrow \exists o_3 o_4(\texttt{P}(o_3,\bar{o}) \wedge \texttt{AC}^*(o_4, \mathbf{def}(o_3,o_1))))$ (*strong acceptability*)

d14 $\texttt{ADM}(o) \coloneqq \neg\texttt{CON}(o) \wedge \forall\bar{o}(\texttt{atP}(\bar{o},o) \rightarrow \texttt{ACC}(\bar{o},o))$ (*weak admissibility*)

6. Literary Criticism Observations: Examples

To exemplify our framework with the case study presented in Sect. 2, we extend the observational language with the individuals and the *observation kinds* reported below.

- Authors (entities that are in a relation AUO with at least a composition): Boccaccio (boc), Apuleio (apu), Branca (bra), etc.
- Characters (fictional or historical): Gualtieri (gua), Griselda (gri), Cupid (cup), Psyche (psy), Gudrun (gud), Fresne (fre); Virgin Mary (mar).
- (Collections of) compositions: tale X,10 of the *Decameron* (tlx), *Cupid and Psyche* (cps), *Lai de Fresne* (lai), *Boccaccio umanista* (bum), *Boccaccio medievale* (bmd), *Boccaccio e la codificazione della novella* (bcn), Medieval hagiographic texts (hag).
- Observational kinds representing hypertextual relations discussed in Sect. 2:
  - three intertextual kinds: *textual correspondence* (TXTCOR), *rewriting* (REWR), and *stylistic correspondence* (STYCOR);
  - one extratextual kind: the author *knows/has read* the composition (KNOW).
- Observational kinds representing properties and relations among characters:
  - *having a high status*[13] (HSTAT) and *being patient* (PAT);
  - *similarity* (SIM).
- Observational kinds representing other properties and relations:
  - *being present in* (PRE) defined between a character and a composition;
  - *being humanist* (HUM) and *being medieval* (MED) defined on authors.

Formula (f1) establishes the author and the production time of tlx and introduces one of its fragments (the same can be easily done for the other compositions).[14]

[13] *Having high status* is a general observation which could be further specialized. For instance, Cupid has a high status in the sense of being a Godness, whereas Gualteri has a high *social* status.

[14] We note specific fragments with $\texttt{f}_{\texttt{tlx}}$, $\texttt{f}'_{\texttt{tlx}}$, $\texttt{f}_{\texttt{cps}}$, etc.

f1 $\texttt{AUO}(\texttt{boc},\texttt{tlx}) \wedge \texttt{PTO}([1349\text{-}1353],\texttt{tlx}) \wedge \texttt{FRG}(\texttt{f}_{\texttt{tlx}},\texttt{tlx})$

We now introduce the observations modeling the points of view of, and the debate among, the three critical essays on the tale X,10 of the *Decameron* presented in Sect. 2. To simplify the notation, in the following formulas we omit to indicate the kb as source, i.e., each assertion/rejection a without an explicit source must be intended as $\textbf{ass}(\texttt{kb},a)$.

First, the three essays agree on Gualtieri and Griselda being present in the tale X,10; see (f2) for Gualtieri; the extensions to Griselda and other characters can be done on the same lines. Second, the main stances of Branca and Candido are represented in (f3), that is, bmd asserts that Boccaccio is a Medieval author, whereas bum asserts that he is a Humanist author. As said in Sect. 2, these interpretations contextualize Boccaccio in different literary traditions, therefore they play a relevant role from a critical standpoint. In addition, (f3) indicates that Candido's thesis defeats (objects) Branca's thesis.

f2 $\textbf{ass}(\texttt{bum},\textbf{pre}(\texttt{gua},\texttt{tlx}));\ \textbf{ass}(\texttt{bmd},\textbf{pre}(\texttt{gua},\texttt{tlx}));\ \textbf{ass}(\texttt{bcn},\textbf{pre}(\texttt{gua},\texttt{tlx}))$

f3 $\textbf{ass}(\texttt{bmd},\textbf{med}(\texttt{boc}));\ \textbf{ass}(\texttt{bum},\textbf{hum}(\texttt{boc}));\ \textbf{ass}(\texttt{bum},\textbf{def}(\textbf{hum}(\texttt{boc}),\textbf{med}(\texttt{boc})))$

We now consider some evidences considered by Candido, Branca, and Picone in support of their interpretations.

Candido's claims. Candido supports the similarity between Gualtieri and Cupid by (i) textual correspondences between fragments involving them, see (f4) and (f5); and (ii) by their sharing similar characteristics or their playing similar roles, e.g., both having a high status, see (f6)-(f8). Analogously for the similarity between Griselda and Psyche.

f4 $\textbf{ass}(\texttt{bum},\textbf{txtcor}(\texttt{f}_{\texttt{tlx}},\texttt{f}_{\texttt{cps}}));\ \textbf{ass}(\texttt{bum},\textbf{pre}(\texttt{gua},\texttt{f}_{\texttt{tlx}}));\ \textbf{ass}(\texttt{bum},\textbf{pre}(\texttt{cup},\texttt{f}_{\texttt{cps}}))$

f5 $\textbf{ass}(\texttt{bum},\textbf{sup}(\textbf{txtcor}(\texttt{f}_{\texttt{tlx}},\texttt{f}_{\texttt{cps}}) + \textbf{pre}(\texttt{gua},\texttt{f}_{\texttt{tlx}}) + \textbf{pre}(\texttt{cup},\texttt{f}_{\texttt{cps}}),\textbf{sim}(\texttt{gua},\texttt{cup})))$

f6 $\textbf{ass}(\texttt{bum},\textbf{sim}(\texttt{gua},\texttt{cup}));\ \textbf{ass}(\texttt{bum},\textbf{sim}(\texttt{gri},\texttt{psy}))$

f7 $\textbf{ass}(\texttt{bum},\textbf{ass}(\texttt{f}'_{\texttt{tlx}},\textbf{hstat}(\texttt{gua})));\ \textbf{ass}(\texttt{bum},\textbf{ass}(\texttt{f}'_{\texttt{cps}},\textbf{hstat}(\texttt{cup})))$

f8 $\textbf{ass}(\texttt{bum},\textbf{sup}(\textbf{ass}(\texttt{f}'_{\texttt{tlx}},\textbf{hstat}(\texttt{gua})) + \textbf{ass}(\texttt{f}'_{\texttt{cps}},\textbf{hstat}(\texttt{cup})),\textbf{sim}(\texttt{gua},\texttt{cup})))$

Moreover, Candido brings some historical evidences (not represented here) to argue that Boccaccio knew *Cupid and Psyche*, thus supporting that the tale X,10 is (a partial) rewriting of *Cupid and Psyche*, see (f9) and (f10). Further evidences for $\textbf{rewr}(\texttt{tlx},\texttt{cps})$ are the similarities among characters, see (f11) and (f12), and the textual correspondence between $\texttt{f}_{\texttt{tlx}}$ and $\texttt{f}_{\texttt{cps}}$, see (f13). In its turn, the rewriting supports his thesis, see (f14). Interestingly, there is not a direct support between $\textbf{know}(\texttt{boc},\texttt{cps})$ and $\textbf{hum}(\texttt{boc})$, i.e., a case against the transitivity of **sup**. According to Candido, indeed, that $\textbf{know}(\texttt{boc},\texttt{cps})$ does not imply *per se* $\textbf{hum}(\texttt{boc})$.

f9 $\textbf{ass}(\texttt{bum},\textbf{know}(\texttt{boc},\texttt{cps}));\ \textbf{ass}(\texttt{bum},\textbf{rewr}(\texttt{tlx},\texttt{cps}))$

f10 $\textbf{ass}(\texttt{bum},\textbf{sup}(\textbf{know}(\texttt{boc},\texttt{cps}),\textbf{rewr}(\texttt{tlx},\texttt{cps})))$

f11 $\textbf{ass}(\texttt{bum},\textbf{sup}(\textbf{sim}(\texttt{gua},\texttt{cup}),\textbf{rewr}(\texttt{tlx},\texttt{cps})))$

f12 $\textbf{ass}(\texttt{bum},\textbf{sup}(\textbf{sim}(\texttt{gri},\texttt{psy}),\textbf{rewr}(\texttt{tlx},\texttt{cps})))$

f13 $\textbf{ass}(\texttt{bum},\textbf{sup}(\textbf{txtcor}(\texttt{f}_{\texttt{tlx}},\texttt{f}_{\texttt{cps}}),\textbf{rewr}(\texttt{tlx},\texttt{cps})))$

f14 $\textbf{ass}(\texttt{bum},\textbf{sup}(\textbf{rewr}(\texttt{tlx},\texttt{cps}),\textbf{hum}(\texttt{boc})))$

Branca's claims. Branca's argument is more speculative in comparison with the other scholars we considered. He mainly grounds his thesis (**med**(boc)) on (*i*) the stylistic correspondence between the tale X,10 and Medieval hagiographic texts (f15); and (*ii*) the similarity between Griselda and the Virgin Mary (f16), which is in turn supported by the fact they are both patient figures (f17)-(f18).

f15 **ass**(bmd, **stycor**(tlx, hag)); **ass**(bmd, **sup**(**stycor**(tlx, hag), **med**(boc)))

f16 **ass**(bmd, **sim**(gri, mar)); **ass**(bmd, **sup**(**sim**(gri, mar), **med**(boc)))

f17 **ass**(bmd, **ass**(tlx, **pat**(gri))); **ass**(bmd, **ass**(hag, **pat**(mar)))

f18 **ass**(bmd, **sup**(**ass**(tlx, **pat**(gri))+**ass**(hag, **pat**(mar)), **sim**(gri, mar)))

Picone's claims. Picone's argument is similar to Candido's, even though he tries to link the tale X,10 with a different literary tradition, i.e., the Medieval *Lai de Fresne* rather than the late classical *Cupid and Psyche*. He focuses on similarities between Gualtieri and Gudrun on the one hand, and between Griselda and Fresne on the other hand: (f19)-(f21) are similar to (f6)-(f8), i.e., Picone supports the similarity between Gualtieri and Gudrum by referring to their status. However, he rejects the similarity between Griselda and the Virgin Mary put forward by Branca also because such a similarity is defeated by the one between Griselda and Fresne, see (f22). Finally, Picone asserts that the *Lai de Fresne* is a (partial) rewriting of *Cupid and Psyche*, see (f23).

f19 **ass**(bcn, **sim**(gua, gud)); **ass**(bcn, **sim**(gri, fre))

f20 **ass**(bcn, **ass**($\mathtt{f}^*_{\mathtt{tlx}}$, **hstat**(gua))); **ass**(bcn, **ass**($\mathtt{f}^*_{\mathtt{lai}}$, **hstat**(gud)))

f21 **ass**(bcn, **sup**(**ass**($\mathtt{f}^*_{\mathtt{tlx}}$, **hstat**(gua))+**ass**($\mathtt{f}^*_{\mathtt{lai}}$, **hstat**(gud)), **sim**(gua, gud)))

f22 **rej**(bcn, **sim**(gri, mar)); **ass**(bcn, **def**(**sim**(gri, fre), **sim**(gri, mar)))

f23 **ass**(bcn, **rewr**(lai, cps))

The formal representation of scholars' claims is useful to explicitly represent their similarities as well as departing points. For instance, (f6), (f16), and (f19) show that even though the three commentaries rely on different literary traditions for the analysis of the tale X,10 (classic, hagiographic, and courtly), they all agree on supporting the similarity between characters through the sharing of properties. Both Candido and Picone give a crucial role to the rewriting, see (f14) and (f23). Furthermore, (f3) and (f22) show that Picone explicitly disagrees with Branca's on **sim**(gri, mar). It follows that **sim**(gri, mar) is disputable in the sense of (d8). Such disagreement is partially explained by (f22) which entails the conflictual nature, in the sense of (d11), of **sim**(gri, fre)+**sim**(gri, mar). Additionally, (f3) entails $\mathtt{CON}^*$(**hum**(boc)+**med**(boc)). Finally, from the observations, no incoherence or ambiguity of tale X,10 emerges.

7. Related Works and Concluding Remarks

We presented in the paper a formal framework for the representation and comparison of scholarly claims, and showed how the framework can be applied in literary studies. An important novelty of the proposal with respect to similar works like [8,13] is the integration in a single framework of multiple (formal, philosophical, and literary) notions for the symbolic treatment of scholarly criticism.

From a general perspective, our approach aims to provide a broader representation of interpretative practices than what Piotrowski and Neuwirth [3] consider to be the two 'native' strands developed for this purpose, especially for literary studies: textual annotation, exemplified by the use of the Text Encoding Initative (TEI), and the so called computer-assisted interpretation, i.e. stylometry and other quantitative analyses. On the one hand, differently from annotations, the use of a logic-based framework allows us to formally characterize the intended meaning of an observational language, to compare multiple observations in a precise manner, as well as to reason over observations, among others. On the other hand, differently from pure quantitative approaches, human interpretation plays a fundamental role in our system, because it is up to scholars to provide an observational language and to use it to express claims. It is relevant to stress that our aim is not to 'translate' scholars' statements into formal terms. From the perspective of criticism, this would result in a worthless effort, considering the limited expressivity of formal languages with respect to the nuances of natural language, especially when used in scholarly debates. In a sense, our system can be seen as providing a 'virtual map' of scholarly debates such that, for each statement of interest, a scholar can trace which authors claim it and in which compositions, which are the arguments or the sources used in support of the statements, etc. As said, this can be useful to track, compare, and analyze multiple scholarly claims.

With respect to related works, for a comparison between our proposal and others in ontology, the reader can refer to Masolo et al. [4], upon which we rely.

In the specific scope of research in the Digital Humanities (DH), the CIDOC-CRM ontology [24] and some of its extensions cover various elements for the representation of observations based on the work of Doerr et al. [2]. Observations are argumentation activities resulting in beliefs which have contents and belief values. Differently from this view, as said in Sect. 3, observations in our framework are pieces of information that are inter-subjectively accessible; they are not beliefs in agents' minds. Furthermore, relying on [4], our observations are ontologically characterized and provided with a clear identity criterion which takes into account their level of abstraction.

Also, CRM-based works use a pattern to document the inference of concluding observations from premises via some inference mechanisms, which remain only informally conceived. Differently from this, as said, we introduced and formally characterized ways for documenting the assertion, rejection, support, or defeat of observations by specific sources, borrowing and adapting these notions from research in assertion logics and argumentation theories. On the basis of these notions, various forms of (in-)coherence, ambiguity, disputability, conflictuality, acceptability, etc. are defined and used to classify and analyze observations and their sources in a descriptive (vs. prescriptive) perspective. In this manner we commit neither to specific truth-preserving inference mechanisms nor to strict consistency; rather, we collect multiple and possibly incompatible observations and we study whether some general (and alternative) principles apply to them. To the best of our knowledge, these aspects have not been taken into account in existing works.

Future work will address different challenges, including the further development of observational languages for literary criticism, the applicability of the general framework to other domains, the enhancement of the formal structure according to research in logic, as well as the development of our ontology in a computational language as to exploit it in digital applications. In addition, we plan to investigate the integration of our model in a

pipeline for the computational analysis of literary texts in such a way to exploit multiple mechanisms for the study of literature.

References

[1] Barabucci G, Tomasi F, Vitali F. Supporting complexity and conjectures in cultural heritage descriptions. In: Proceedings of the International Conference Collect and Connect: Archives and Collections in a Digital Age (COLCO 2020), CEUR workshop proceedings. vol. 2810; 2021. .

[2] Doerr M, Kritsotaki A, Boutsika K. Factual argumentation—a core model for assertions making. Journal on Computing and Cultural Heritage (JOCCH). 2011;3(3):1-34.

[3] Piotrowski M, Neuwirth M. Prospects for computational hermeneutics. In: Atti del IX Convegno Annuale AIUCD; 2020. .

[4] Masolo C, Botti Benevides A, Porello D. The interplay between models and observations. Applied Ontology. 2018;13(1):41-71.

[5] Voltolini A. How ficta follow fiction: A syncretistic account of fictional entities. vol. 105. Springer Science & Business Media; 2006.

[6] Eco U. Lector in fabula: la cooperazione interpretativa nei testi narrativi. Bompiani; 1979.

[7] Jannidis F. Character. In: Hühn P, et al., editors. The Living Handbook of Narratology. Hamburg University; 2014. Available from: http://www.lhn.uni-hamburg.de/article/character.

[8] Pierazzo E, Ferrara S. Boccaccio umanista e le Humanities digitali. Ling e lett. 2021:147-71.

[9] Branca V. Boccaccio medievale. G. C. Sansoni; 1956.

[10] Picone M. Boccaccio e la codificazione della novella: letture del "Decameron". Longo; 2008.

[11] Candido I. Boccaccio umanista: studi su Boccaccio e Apuleio. Longo; 2014.

[12] Genette G. Palimpsestes. La Littérature au second degré. Seuil; 1982.

[13] Bartalesi V, Pratelli N, Meghini C, Metilli D, Tomazzoli G, Livraghi LMG, et al. A formal representation of the divine comedy's primary sources: The Hypermedia Dante Network ontology. Digital Scholarship in the Humanities. 2022;37(3):630-43.

[14] Sanfilippo EM, Freedman R. Ontology for Analytic Claims in Music. In: New Trends in Database and Information Systems: ADBIS 2022 Short Papers, Doctoral Consortium and Workshops: DOING, K-GALS, MADEISD, MegaData, SWODCH, Turin, Italy, September 5–8, 2022, Proceedings. Springer; 2022. p. 559-71.

[15] McGrath M, Frank D. Propositions. In: Zalta EN, editor. The Stanford Encyclopedia of Philosophy. Winter 2020 ed. Metaphysics Research Lab, Stanford University; 2020. .

[16] Thomasson AL. Fiction and metaphysics. Cambridge University Press; 1999.

[17] Masolo C, Sanfilippo EM, Ferrario R, Pierazzo E. Texts, Compositions, and Works: A Socio-Cultural Perspective on Information Entities. In: JOWO; 2021. .

[18] Fish S. Is There a Text in This Class? The Authority of Interpretive Communities. Harvard UP; 1980.

[19] Compagnon A. Literature, theory, and common sense. Princeton University Press; 2004.

[20] Rescher N. Topics in philosophical logic. Springer Science & Business Media; 1968.

[21] Dung PM. On the acceptability of arguments and its fundamental role in nonmonotonic reasoning, logic programming and n-person games. Artificial intelligence. 1995;77(2):321-57.

[22] Cayrol C, Lagasquie-Schiex MC. Bipolarity in argumentation graphs: Towards a better understanding. International Journal of Approximate Reasoning. 2013;54(7):876-99.

[23] Brewka G. Dynamic argument systems: A formal model of argumentation processes based on situation calculus. Journal of logic and computation. 2001;11(2):257-82.

[24] Bekiari C, Bruseker G, Doerr M, Ore CE, Stead S, Velios A. Definition of the CIDOC Conceptual Reference Model (v. 7.2). ICOM/CIDOC Documentation Standards Group CIDOC CRM SIG. 2021.