Challenging new views on familiar plotlines: A discussion of the use of XML in the development of a scholarly tool for literary pedagogy

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Abstract

This article describes PlotVisML, a simple, flexible XML schema for encoding literary narratives that was developed by an interdisciplinary team of researchers in literary studies, interface design, computing studies, and education as part of a research project on reading, writing, and teaching complex literary narrative. PlotVisML is a simple, adaptable schema consisting of five key elements: <action>, <dialogue>, and <narration> (tags for marking up narrative events), and <character> and <object> (tags for encoding narrative objects). Fictional narratives that have been marked up using PlotVisML can be visualized in PlotVis, a digital scholarly tool that allows users to model and interact with literary narratives in three dimensions. Both PlotVis, an interactive visualization tool, and PlotVisML, our custom XML schema for encoding literary narratives, were designed to permit challenging new views on familiar plotlines and, more importantly, to depart from conventional ways of modeling narrative in literary instruction. In discussing the process of developing PlotVisML, we contribute to the ongoing discussion of text encoding as a form of close reading (e.g., Liepert, 2009).

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1 Introduction

This article discusses the use of Extensible Markup Language (XML) to encode fiction by an interdisciplinary team of researchers in literary studies, interface design, computing studies, and education as part of a larger research project on reading, writing, and teaching literary narrative at the secondary and postsecondary levels. One goal of the project was to generate a digital scholarly resource that would allow users to model and interact with literary narratives in three dimensions (see Fig. 1), thus permitting different, unique perspectives on fictional plots and, more importantly, departing from ways of modeling narrative that have traditionally relied on the Cartesian graph, such as those described by Sterne (1847), Freytag (1863/1983), and Vonnegut (1973), wherein time is plotted on the x axis and the fortunes of the hero or the disposition of the action (whether it is 'rising' or 'falling') is plotted on the y axis.

Elsewhere (Dobson *et al.*, 2011), we discuss the theory and design of our pilot model, PlotVis, an interactive scholarly tool that visualizes XML-encoded narratives that can then be 'customized by the teachers and students in order to accommodate various interpretations of a single piece of fiction' (p. 170). In that article, we also review different models of plot visualization, and explore the theory, or theories, of narrative implicit in each one. For example, as we discuss there, in contrast to interpretations of fiction prescribed by Freytag's static model, the perspective of which keeps readers' focus primarily on the linear development of narrative action, PlotVis displays stories semantically encoded in XML and includes features that allow users to select, manipulate, highlight, and rearrange significant features of a story, encoded as XML elements that represented characters, objects, and various narrative events. Users may visualize stories in one of five designs, which emphasize different features of narrative, such as sequence and structural complexity, and which allow users to explore and examine the myriad, multifaceted relationships between the narrative elements that comprise a work of fiction (e.g. between character and action).

In this article, we describe the development of PlotVisML, a custom XML schema that can be used to encode fictional narratives so that they may be visualized in PlotVis. We also give examples of PlotVisML taken from an encoded version of the title story of Munro's (1998) *The Love of a Good Woman*. PlotVisML was designed to provide users of PlotVis, many of whom may be new to XML, with a simple, adaptable schema for encoding fiction that could be applied to a wide range of fictional texts and that marks up five key elements of narrative: action, character, dialogue, narration, and objects. The schema was also developed to test pilot models of the scholarly tool; present iterations of PlotVis, however, allow users to visualize stories encoded using custom XML schemas. Narrative features marked up as XML elements, whether using PlotVisML or a user-designed schema, are then represented, in PlotVis, as the features, or 'building blocks', of one of five different possible structures.

The goal of this article is to discuss the experiences of and challenges faced when using XML to encode fiction, and to consider the implications of these insights for future work in digital humanities (DH) involving digital encoding of fiction and, further, for current literary pedagogy.

2 Coming to Terms With Encoding Fiction in XML

Encoding fictional texts in this project involved coming to terms with the idiosyncrasies of literature and literary analysis and thinking about semantic encoding as part of the process of literary interpretation—even when, at times, the rules of semantic encoding seemed at odds with habitual methods of closely reading a story. Fiormonte *et al.* (2010) observe, in their discussion of the use of XML in encoding autographic literary texts, that 'any transformation from paper to bits, apart from leading to certain developments, all potentially ''intrusive'' for the document, is no ordinary event, nor is it technically neutral'. The authors add, 'in the moment in which a text is transcribed through the selection and use of markup this creates meaning itself'. We, too, found that the encoding process generated

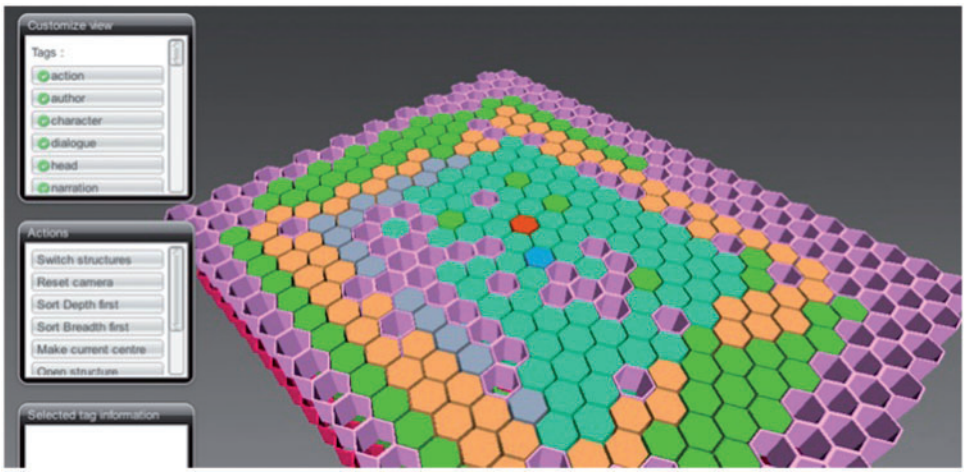

Fig. 1 PlotVis (Dobson et al., 2010a).

meaningful observations about the relationships between textual markup and literary analysis comparable with those cited by Liepert (2009) and Flanders (2011), among many others.

As noted previously, we focused our encoding efforts on the title story from Munro's (1998) *The Love of a Good Woman*, the results of which were to be visualized in the first iteration of PlotVis. We selected this story, 89 pages long and >25,000 words, because it is demonstrative of Munro's theory of narrative as having a 'soul' around which all other elements are layered (Ross, 2002), a view that informs the design of one of our visualization prototypes (Dobson *et al.*, 2010b), which, based on a Fibonacci series, allows users to organize all encoded elements of a story around one central element, as selected by them. Using PlotVis's 'sort' function, users can also arrange elements so that their relation to the central element reflects either proximity in time or else proximity in the story (Dobson *et al.*, 2010b, p. 4). That Munro's theory of narrative was influential to the PlotVis prototype made it a relevant text to use in the development of PlotVisML (see, e.g., Fig. 3).

As we developed PlotVis, we used Munro's text as a case study to determine which aspects of a literary narrative might be represented as elements in an XML schema, to consider how such elements might relate to one another at the markup stage, and to discuss the implications, both for literary pedagogy and digital visualization, of using semantic encoding to highlight these features as significant. In other words, PlotVisML is not the only XML schema that can be used to visualize literary narratives in PlotVis, nor is it intended to showcase the many possibilities for representing narrative structure using textual markup. Rather, PlotVisML was the result of our efforts to create a simple, easy-to-use resource for users of PlotVis who may be new to semantic encoding. Coming up with a schema for encoding literary texts to be visualized in PlotVis was also fundamental to testing our three-dimensional (3D) visualization system—it was part of the process of refining the design of the interface and determining how it might be used in literary analysis and literary instruction.[1]

Establishing which aspects of narrative would become the elements of PlotVisML was a process of trial and error—of looking for ways to encode story data in ways that were meaningful in terms of literary criticism and that would facilitate valid XML. A review of existing scholarship at the time we began the encoding stage of our project, in 2010, yielded only two other projects using XML to encode fictional narratives: Proppian Fairy Tale Markup Language (PftML; Malec, 2001; Lendvai *et al.*, 2010) and StoryML (Hu, 2003). PftML is used in encoding fairy and folk tales, and its tags mark up the 31 generic narratemes, or narrative

functions, identified by formalist scholar Vladimir Propp in his extensive study of Russian folk tales (Propp, 1968). StoryML, which was designed for scripting interactive narratives to be presented in a digital environment, points to the role XML can play in the writing of complex fiction. Such projects highlight the range of methods and applications for semantic encoding of fictional texts.

More than fourteen versions of Munro's text were encoded, section by section, by two graduate research assistant members of the research team over a period of ~6 months (the story is composed of four long sections and an introduction). Both encoders had strong backgrounds in literary criticism and literary instruction, yet, as is the case in many funded DH projects that employ student researchers, both had minimal experience with semantic encoding at the time they began the project. These researchers were first trained in different methods of textual markup and semantic encoding and then instructed to use their knowledge of literary criticism to determine which aspects of Munro's story should be marked up and how. The process of development of PlotVisML, then, was inductive and iterative; once each section of the text had been encoded in this way by both researchers, separately, the project team met to review and compare the encoded sections of Munro's text and determine which tags developed by the encoders would be included in PlotVisML and why. Such decisions were made on the basis of the following criteria: similarities between encoder's textual markup (i.e. both encoders chose to mark up characters, and both also chose to use tags to distinguish between narrative action and passages of narration); the frequency of use of certain tags; and the implications of the tags as perceived by the team for facilitating visualization in a three-dimensional model.

3 PlotVisML Elements and Attributes

PlotVisML is a simple, adaptable schema consisting of five tags: <action>, <dialogue>, and <narration>, tags for marking up *narrative events*; and <character> and <object>, tags for encoding *narrative agents*. Fig. 2 is a diagram of the five narrative elements that make up PlotVisML, as well as attributes that can be used, in encoding a literary narrative, to represent additional (and sometimes implicit) story information—for example, to specify which character is the speaker of the content of the element, <dialogue>, or to indicate the story location of a narrative action.

PlotVisML is meant to structure, store, and transport narrative information and, consonant with the goals of XML, emphasizes simplicity, generality, and usability in encoding literary narratives. Although the five elements that make up the schema are flat and can therefore be nested within one another in many different ways, in encoded versions of 'The Love of a Good Woman', encoders frequently found that narrative-agent tags, <character> and <object>, typically branched out from the three narrative-event tags, <action>, <dialogue>, and <narration>, as in the following examples:

<action agent="Enid" patient="notebook" type="record" location="insideQuinn House" keywords="glomerulonephritis, MrsQuinn">"GLOMERULONEPHRITIS," <character reg="Enid">Enid</character> wrote in <character reg="Enid">her </character><object reg="noteBook1">notebook</object>.</action>

<dialogue speaker="MrsGreen" location="insideQuinnHouse" keywords="death,illness">"How do <character reg="you">you </character> contract that kind of a disease anyhow?" said <character reg="Mrs Quinn">Mrs. Quinn's </character><character reg="MrsGreen">sister-in-law</character>. <character reg="MrsGreen">Her</character> name was <character reg="MrsGreen">Mrs. Green</character>. <character reg="MrsGreen">Olive Green</character>.</dialogue>

<narration narrator="Munro" reporter="Munro" type="description" location="FernsHouse" keywords="CeceFerns,domestic,female,food">When the heat was more to <character reg="CeceFerns">his</

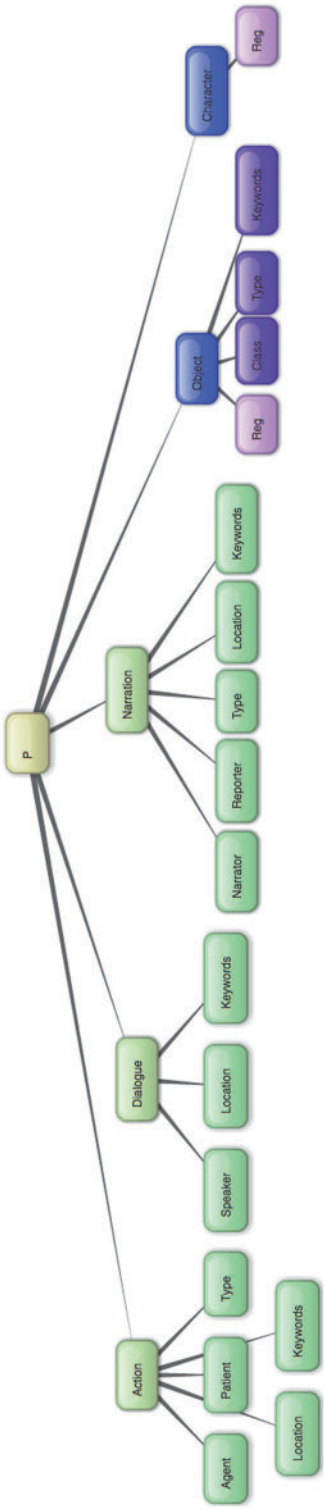

Fig. 2 PlotVisML elements and attributes.

character> liking, <character reg="Cece Ferns">he</character> put the <object class="tool" type="domestic" keywords="care,food,danger">pan</object> down and coaxed the <object class="food" type="eggs" keywords="bodypart,female,reproduction, violence">lacy edges of the eggs</object> into tidy circles. <character reg="CeceFerns">He</character> found a <object class="tool" type="domestic" keywords="care,illness">clean spoon</object> and dribbled a little <object class="food" type="fresh" keywords="heat">hot fat</object> over the <object class="food" type="eggs" keywords="bodypart,female,reproduction,violence">yolks</object> to set them. <character reg="CeceFerns">He</character> and <character reg="Cece Ferns">his</character><character reg="MrsFerns"> mother</character> liked <character reg="CeceFerns,MrsFerns">their</character> <object class="food" type="eggs" keywords="bodypart,female,reproduction,violence">eggs</object> cooked this way, but <character reg="CeceFerns">his</character><character reg="MrsFerns"> mother</character> often couldn't manage it right. <character reg="CeceFerns">His</character><character reg="MrFerns"> father</character> liked <character reg="MrFerns">his</character><object class="food" type="eggs" keywords="bodypart,female,reproduction,violence"> eggs</object> turned over and flattened out like <object class="food">pancakes</object>, cooked hard as <object class="food,clothing" type="eggs,male">shoe leather</object> and blackened with pepper. <character reg="CeceFerns">Cece</character> could cook <object class="food" type="eggs" keywords="bodypart,female,reproduction,violence">them</object> the way <character reg="MrFerns">he</character> wanted, too.</narration>

Attending to nesting rules in XML therefore often drew encoders' attention to patterns in the relationships between narrative elements, reinforcing our

perception of semantic encoding as comparable with the act of closely reading a text.[2]

Although observing nesting rules heightened our team's awareness of associations between elements that comprise literary narratives, the process of developing a custom XML schema for encoding fiction also raised questions about the influence of hierarchical arrangement on a reader's understanding and interpretation of a work of fiction. Team researchers from literature, especially, struggled in the early stages with the potential implications, for literary analysis, of the hierarchical relationship between elements in XML documents. Fiormonte *et al.* (2010), similarly, note that the ''well-formedness'' of XML, the requirement that every element, except for the document root, must be contained within some other element, gives the text an explicit and unambiguous structure', a principle of this method of semantic encoding 'in contrast with what Buzetti (2002) defines as the ''dynamic instability of literary texts'''. Our study of secondary students' approaches to XML encoding of literary narratives (Grue *et al.*, in press) revealed that, 'Although in principle, XML tags are binary and hierarchical, in practice they are not'. Students more familiar with literary criticism than semantic encoding were often unable to produce valid XML in their experiments; however, their inability to follow this rule often revealed serious engagement with the question of how different elements of narrative may constitute a text's meanings. The insight we drew from that study and our experiences in developing PlotVisML led us to see these experiences as presenting new opportunities for critical inquiry.

For example, the perception, among some team researchers, that XML encoding imposed or overemphasized a hierarchical relationship between narrative elements eventually led to an altered view of the process of close reading. By marking certain elements of a story as 'significant', such as the protagonist (the perceived main character of a story) or the climax (the most important event, as suggested by Freytag), close reading similarly asserts narrative to be constituted by a hierarchy, rather than, perhaps, an ecology of agents and events. The use of traditional close reading to raise certain elements to a new level of distinction is in fact held in check in the act of marking up a story in PlotVisML, and semantic encoding generally, which requires that *all* narrative agents and events be encoded, not only those that appear most important to the critic based on customary models such as Freytag's Pyramid. XML schemas such as PlotVisML can thus be used to test how meaning in fictional narrative is produced—to figure out, for example, what is meant by evaluations of a fictional narrative as 'character-driven' or 'action-driven'.[3]

Indeed, approaching literary text encoding as an act of close reading and a method of theorizing narrative led to strenuous questioning by team members of the level at which meaning was made in fiction: could a word in a story constitute a reader's idea of the significance of an object to the plot as a whole? If not, how much additional information could be supplied by way of attributes? How might relationships between elements be expressed? What are these relationships? Ultimately, it was decided that although the design of PlotVisML does suggest a theory of what constitutes narrative fiction, these fundamental questions of meaning in literature might be better inferred from its application to text rather than prescribed by its structure—if PlotVisML's purpose is to facilitate visualization in PlotVis and critique more traditional visualizations of narrative relying on entrenched assumptions, we might question our own assumptions as to not overly constrain its application. This influenced the development of PlotVisML as a minimal, rather than complex, schema that would produce valid XML and complex renderings of semantically encoded texts but also allow for some degree of freedom in its use.

Further, as earlier mentioned, texts encoded using the five flat tags that comprise PlotVisML are represented, in the PlotVis interface, as the 'building blocks' of a story that can be rearranged into different structures and viewed from multiple perspectives. The interface also facilitates the examination of narrative elements in relation to one another, as in the study of ecology: users can, for example, highlight an element, such as 'character', and see how often this element is associated with 'dialogue' in the encoded text. Thus,

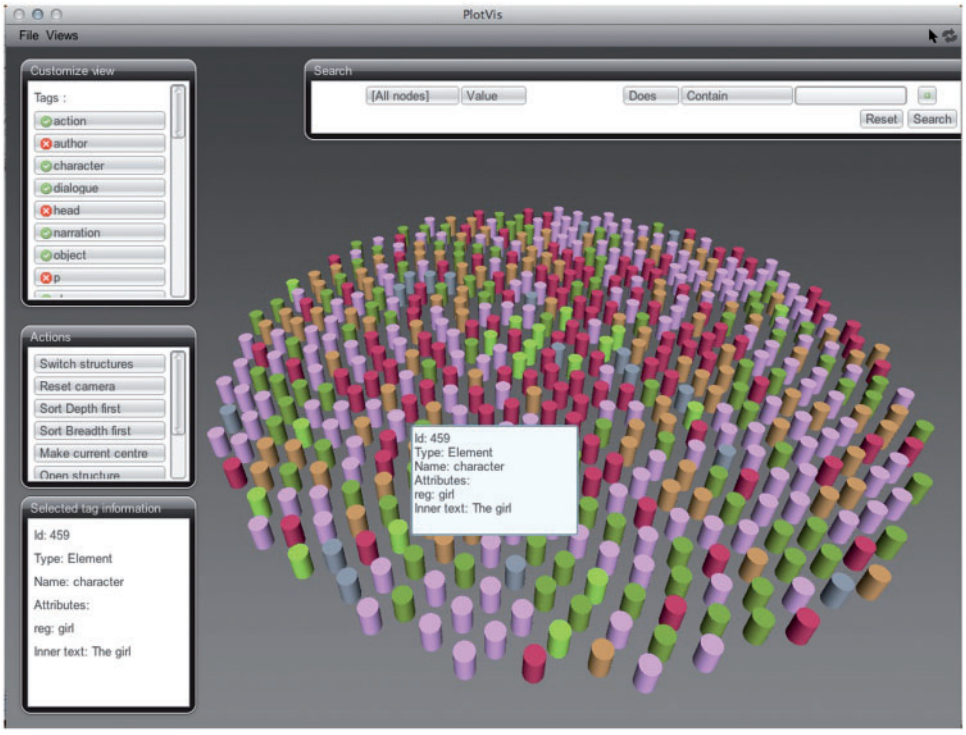

Fig. 3 Displaying elements and attributes in PlotVis.

even texts that have been encoded, or analyzed, in a manner that emphasizes hierarchy can be explored, in PlotVis, apart from the connotations such associations may imply at the level of encoding.

Attributes are provisional to PlotVisML, but may become more important in the resultant visualization, depending on whether text encoders will also be using the PlotVis interface to analyze and interpret this text. PlotVis displays each encoded narrative element individually; users can mouse over an element and read the value of its attributes. The information provided in attributes therefore helps users situate unique elements both in the context of the original story and within the new view permitted by the 3D visualization (see Fig. 3).

For example, 'reg', an attribute of the <character> tag, can be used to supply the proper name of a character referenced within a story, a function that is especially helpful in fictional narratives, which frequently contain pronominal references, as in the following case, in which the attribute 'reg' makes it possible to assign to the pronoun, 'they', the names of three separate characters being discussed by the narrator:

> At least, <character reg="CeceFerns,BudSalter,JimmyBox">they</character> would call it swimming; <character reg="CeceFerns,BudSalter,JimmyBox">they</character> would go back to town and say that <character reg="CeceFerns,BudSalter,JimmyBox">they</character> had been swimming at Jutland before the snow was off the ground.

Furthermore, attributes allow for the association of the narrative-event tags—<action>, <narration>, and <dialogue>—with characters directly involved in these events. For example, <action> can be associated with characters using the attributes 'agent' and 'patient', as can <dialogue> using the attribute 'speaker':[4]

> <action agent="Enid" patient="Lois,Mrs Quinn,Sylvie" type="demonstration,instruction" location="outsideQuinnHouse,inside

QuinnHouse'' keywords=''female,girls,playthings,MrsQuinn''>On a Saturday morning, <character reg=''Enid''>Enid</character> called <character reg=''Louis''>Lois</character> and <character reg=''Sylvie''>Sylvie</character> from <character reg=''Louise, Sylvie''>their</character> games under the porch, to come and see <character reg=''Louise,Sylvie''>their </character> <character reg=''MrsQuinn''>mother</character> looking pretty.</action>

dialogue speaker=''MrsQuinn'' location=''insideQuinnHouse'' keywords=''anger, domestic,Enid,girls''><character reg=''Mrs Quinn''>Mrs. Quinn</character> said, ''Keep <character reg=''Louise,Sylvie''> them</character> off of <character reg=''MrsQuinn''>my</character> bed, <character reg=''Louise,Sylvie''>they're</character> filthy."</dialogue>

The event-tag, <narration>, includes the attributes 'narrator' and 'reporter', which make it possible to distinguish, through encoding, between different levels and styles of narrative points of view:

<narration narrator=''Enid'' reporter=''Munro'' type=''record'' location=''inside QuinnHouse'' keywords=''death,food,illness, MrsQuinn,notebook''>''JULY. Rain early a.m. <character reg=''Louis''>L.</character> and <character reg=''Sylvie''>S.</character> playing under porch. <object class=''appliance'' type=''fan'' keywords=''wind''>Fan</object> off and on, complains noise. Half cup <object class=''food,drink'' keywords=''egg,illness,childhood,care,healthcare, profession,female''>eggnog</object><object class=''cutlery''> spoon</object> at a time. B.P. up, pulse rapid, no complaints pain. Rain didn't cool off much. R.Q. in evening. Hay finished.</narration>

In this example, the attribute 'narrator' is used to assign a passage of narration to a character, Enid, from whose perspective that passage is being told. The attribute, 'reporter', is used to indicate another level of narration; in this case, it distinguishes the author, Alice Munro, as the reporter of the narration itself. The distinction between narrator and reporter, although optional in PlotVisML, allows the encoder to account for the layers of narration that often comprise the effect of more experimental literary narratives, such as 'The Love of a Good Woman'.

Thus, in some instances, attributes serve a practical purpose in PlotVisML: they make it possible for encoders to include information that could not be inferred by users of PlotVis, as they interact with story elements within the interface. However, attributes can also be used to provide metadata that may be relevant to literary analysis. Users interested in exploring the layers of narration that make up Munro's story can, for example, use PlotVis's search functions to isolate 'narration' elements according to attribute metadata.

4 Text Analysis, Literary Analysis

Digital humanities scholars have examined the role, purpose, and implications of the computer in textual analysis (e.g., Rockwell, 2003; Renear, 2004). Existing scholarship models, and critiques, a range of methodologies for engaging digital technology in textual criticism. Some of this scholarship addresses the applications of digital technology in literary analysis in particular. Projects such as Clement's (2008) distant reading of Gertrude Stein's *The Making of Americans* illustrate the use of textual encoding and text-analysis tools to challenge and augment long-standing interpretations of canonical works of fiction founded in conventional, print-based methods of literary criticism. Yet, whether applied in the analysis of canonical or emergent fictional texts, or of print-based or digital-born narratives, digitally augmented methods of literary scholarship unsettle the fundamental customs of the discipline. Such methods emphasize the role and function of the critic as much as of the computer screen, and challenge literary critics to be aware of and transparent in regards to what they pay attention to when reading and interpreting a literary text.[5]

Developing a method for semantically encoding texts for use in PlotVis—and, more generally, experimenting with ways of translating aspects of literary criticism into digital media—afforded further insight into the view of text encoding as a form of close reading and encouraged us to adapt our understanding of the process of literary analysis. The iterative process of PlotVisML's development contrasted not only multiple versions of prospective schemas but also multiple readings of text, motivating the desire for a design that expresses the subjectivity of the encoder while keeping it accountable to the material of narrative fiction—as well as the relationships therein. This process therefore relied on a recursive strategy of design and use, essentially an experimental probing of narrative to reveal its secrets. That this process was productively iterative—sometimes the encoding of narrative defied expectations of the schema's use—further motivates our inquiry into new views on schema development and the text they encode.

More information about PlotVis, including a video demonstration of the 3D visualization system, can be found at http://blogs.ubc.ca/plotviz/.

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Notes

1 Earlier versions of this article discussed the rationale for PlotVisML with reference to the TEI's P5 Guidelines for Electronic Text Encoding and Interchange, which was an important resource used by our research team, as we sought a method for encoding fictional text to be visualized in PlotVis. Indeed, TEI was an option we considered in the early stages of this project, and the decision to create a custom XML schema to use with PlotVis was made not on the basis of perceived shortcomings of using TEI so much as on an interest in coming up with tags that would be familiar to novice literary critics (e.g. students at the secondary and post-secondary levels) who would be using PlotVis, many of whom, we expected, would have little to no previous experience of semantic encoding. We also wanted tags to reflect, as much as possible, the concepts expert literary critics use to guide their analyses of fictional texts. In this way, our visualization tool is not unlike University of Miami's poetry visualization tool, Myopia (Chaturverdi *et al.*, 2012), in which, 'Even though one schema is used, a schema extended from the TEI schema, the elements of a poem that are interesting to literary scholars have been formalized as tags and attributes based on XML standards'. Adopting XML does not rule out the future use of TEI in this project. As one reviewer pointed out to us, 'For data of this kind (with such specific applications and such a small/task-specific tag set), TEI seems useful chiefly as an interchange format, and it would be perfectly straightforward to export/convert [this] data to TEI if necessary for sharing or archiving'. That is, although texts encoded using PlotVisML can be exported to TEI if necessary, the choice to use a simple, custom XML schema was a matter of practicality: creating custom tags was less time-consuming than creating a TEI customization and, more importantly, has resulted in a tag set that reflects the interests of literary critics and that may be used by those with little or no previous semantic encoding experience.

2 Once encoded texts have been visualized in PlotVis, relationships between narrative elements noticed at the encoding stage can be further examined.

3 The possibility of representing the five narrative elements in a non-hierarchical encoding structure, such as the Resource Description Framework data model, was also discussed as a potentially more flexible method of encoding the overlapping and often asymmetrical relationships between narrative elements. This approach is presently being explored by our research team. We have also experimented with uses of PlotVisML that incorporate 'Ographies', such as personographies, placeographies, and, due to the significance of objects in narrative fiction, objectographies. These structures offer different methods of associating narrative elements and including thematic and interpretative information in an encoded text.

4 It has been suggested that, as the element, <action>, carries attributes for 'agent' and 'patient', the attribute <dialogue> might similarly carry both 'speaker' and 'auditor'. Not only can PlotVis easily accommodate changes and additions to PlotVisML, the attribute 'auditor' is a perfect example of an addition that could be made to make the schema suit the story—for instance, in a short story such as Hemingway's (1926/1991) 'A Clean, Well-Lighted Place', in which long passages of dialogue may make it difficult for readers to keep track of who is speaking and who listening.

5 Rommel (2004), for example, describes literary computing as a method of substantiating literary interpretations by making possible 'the identification of strings and patterns in electronic [or digitized] texts', thereby legitimating the subjectivity of the literary critic: in other words, confirming literary interpretation to be a disciplinary and, to an extent, empirical process.