

Towards Finding the Fundamental Unit of Narrative: A Proposal for the Narreme

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Abstract

Verb- and action-based event representations have been the cornerstone of narrative representation. However, these suffer from a lack of specificity as to the level of abstraction being discussed. For example, a single verb-based event can be elaborated *ad infinitum*, generating arbitrarily many new verb-based events. In this position paper, we present a proposal for the fundamental unit of narrative, which we call the *narreme*. Our contribution is two-fold. First, we present the structure of the narreme, which encodes the state of the narrative, not the state of the world. Second, we present the ways narremes can be combined, which gives rise to the structure of the narrative itself. These combinations have special properties which account for the causal, temporal and intentional relationships between the events that make up a narrative. Lastly, we present an interpretation of common narrative tasks within the context of the narreme.

1. Introduction

Many approaches to computational models of narrative discretize the narrative into *events* that are typically defined in terms of verbs, for the case of text, and actions, for the case of films (Riedl et al., 2003; Szilas, 2003; Chambers and Jurafsky, 2009; Elson and McKeown, 2009; Jhala and Young, 2010). While this level of abstraction is useful as an initial step toward a computational model of narrative, the distinction of what constitutes an event is arbitrary. Moreover, the flexibility of these units for incorporation into hierarchical structure presents a problem when trying to identify a suitable level of abstraction for action in a narrative. This in turn makes it difficult to compare approaches to computational models of narrative that differ in the level of abstraction used. For example, the action of walking to the store to buy milk could be decomposed *ad infinitum* into subsequences of actions. Consider one such decomposition: getting up, exiting the house, driving the car into the parking lot, entering the store, buying the milk. To help disambiguate what is meant by an event, this position paper presents a proposal for the fundamental unit of narrative, which we call the *narreme*.

2. Related Work

2.1. The History of the Narreme

The term narreme is borrowed from Dorfman (1969), who also used the term to refer to the fundamental unit narrative, similar to the phoneme in phonology or the morpheme in morphology. However, Dorfman is unclear as to how these narremes could be combined to form a narrative. Dorfman's narremes also suffer from the same ambiguity of abstraction as events.

2.2. Barthes' Narrative Units

In essence, narremes are similar to Barthes' (1966) characterization of narrative units. However, Barthes characterizes several types of narrative units, with varying degrees of importance:

- *functions* are narrative units that provide the basis of the narrative. They can be informally described as action-reaction sequences. For example, a telephone

ringing is a function which associates the telephone ring to someone picking the phone up.

- *indices* are narrative units that expand upon the functions by providing detailed descriptions of the actions that take place. If a telephone was ringing softly, then the adjective "softly" is an index on the function of the telephone ringing.

Barthes indicates that these narrative units are combined hierarchically and sequentially, but makes no commitment as to how this combination would work. Barthes' theory has led to successful efforts to computationally model certain types of narratives (Cavazza et al., 2001). Despite this success, Barthes' approach conflates the distinction narratologists (e.g. (Bal, 1997)) make between a narrative's *fabula*, or the story behind the telling, and the narrative's *discourse*, or the telling itself. This distinction is important for decoupling the modeling of aspects that relate to the story (e.g. the actual interactions of the characters (Szilas, 2003) or the narrative's conflict (Ware and Young, 2010)) and the modeling of aspects that relate to the telling (e.g. the communicative intent of the story's author (Young, 2007)). Our definition of narremes operates at the level of *fabula*.

2.3. Narrative Change

The narratologist Rimmon-Kenan (2002) defines a useful notion of events that we build off to define the narreme:

To make this a bit more useful for the purpose of the present study, one might add that when something happens, the situation usually changes. An event, then, may be said to be a change from one state of affairs to another.

Our definition uses a similar notion of change as a criterion for distinguishing narremes from each other.

3. The Narreme

One of the fundamental properties of narrative is the concept of change. An individual narreme encodes the state of the narrative, along one or several dimensions in narrative space. This dimension is known as a *narrative axis*.

Definition 1 (Narrative Axis) A narrative axis is a dimension which captures changes between world states. The dimension can be any measure that allows for quantization in categorical or numeric units other than world time.

The world time represents the true total ordering of events relative to the story world. It is the “clock time” related as the story moves forward. This is contrasted with *narrative time*.

Definition 2 (Narrative Time) Narrative time is the relative time to the Point of View character(s) in the narrative. Narrative time is monotonically increasing through the development of the fabula.

While both narrative time and world time are often aligned, it is possible for one to depart from the other. Consider as an example a time travel narrative. Narrative time progresses forward from the point of view of those characters, while they experience different segments of world time. Given the previous definitions, we define the narreme as follows:

Definition 3 (Narreme) A narreme is the basic unit of narrative structure. It encodes the state of the narrative, rather than the state of world in which the narrative takes place. A narreme is atomic along one or more narrative axes over narrative time.

Narremes do not necessarily exclude the notion of verb-based event representations; it is possible for a verb-based representation to encode a unit of change along a narrative axis. Narremes make a commitment to a level of abstraction insofar as a particular narrative axis defines one. A narrative axis is, in essence, a criterion for determining a level of abstraction. For example, the narratologist Hogan (2011) claims that a narrative is composed of minimal units of emotional temporality. These minimal affective units could be one of several dimensions that narremes describe. The combination of narremes gives rise to the narrative’s structure.

4. The Narrative Structure

The narrative structure is made up of connections between narremes. These connections form a graph structure with the narremes as nodes. An edge exists between two nodes, exactly when there is a change along at least one narrative axis. These edges have several properties which are important to consider:

- *There are no self loops.* Since a pair of narremes are connected when there is a change along a narrative axis, there cannot exist a link between a narreme and itself.
- *The edges are directed.* Two narremes are connected when there is a change along at least one narrative axis. A narrative axis is defined by changes over narrative time. Since narrative time is monotonic, these connections imply an ordering, which means the edge must be directed.
- *The graph is acyclic.* Because edges exist over narrative time, and narrative time is monotonic, there cannot be a loop in the graph.

These properties reveal that the edges induce a directed acyclic graph structure over narremes. These properties are necessary, but not sufficient in our definition of narrative. Narratologists (e.g. Bal (1997)) consider that the key ingredients in a fabula are the causal, temporal, and intentional relationships between the events that make up the narrative. Therefore, we must be able to reconstruct these relationships from our graph structure:

- *Temporal relationships* follow from the definition of narrative time.
- *Causal relationships* occur between sets of edges between narremes. A narreme causally relates subsets of incoming edges to subsets of outgoing edges.
- *Intentional relationships* occur between an incoming edge along a narrative axis and a subset of the causally related outgoing edges. An empty intentional relationship denotes unintentionality between this narreme and the preceding one.

Finally, multiple narremes may be connected to the same narreme, along different axes. Every narrative axis is independent of the others when forming edges between narremes. Put simply, a single narreme can affect several future ones, though not all in the same way.

5. Final Thoughts

Our definition of narreme is not inconsistent with current computational models of narrative. Rather it simply allows to specify the level of abstraction that these models should operate at. This representation allows a basis of comparison for different approaches to common narrative tasks, including comprehension, generation and inclusion in an interactive system.

Comprehension can be modeled as the reconstruction of the sequence of narremes. Gernsbacher (1990) described a narrative as a set of instructions which allow you to reconstruct a situation. Comprehension is then the mental process of creating a graph between the various narremes described in the discourse.

Generation can operate over the narrative space by simply searching the space of narremes until a suitable narrative is found. Given their atomicity, narremes can be exchanged indiscriminately, allowing evolutionary approaches to narrative generation.

Interactivity can accommodate narratives by allowing users to act freely within the scope of a single narreme. An interactive narrative system would then concern itself with transitioning the user from one narreme to the next, focusing on maintaining the story structure, while allowing the user a space of interactions within a narreme.

Although we have defined a formal approach the identifying the fundamental unit of narrative, future work is necessary. For instance, identifying the dimensionality of the narrative space (i.e. number of narrative axes available for the narremes) is paramount. However, we hope that future models will capitalize on the definitions that we have presented here and that our work will help focus the search for a common encoding of computational models of narrative.

6. References

- M. Bal. 1997. *Narratology: Introduction to the theory of narrative*. Univ. of Toronto Press.
- Roland Barthes. 1966. Introduction à l'analyse structurale des récits. *Communications*, 8(1):1–27.
- Marc Cavazza, Fred Charles, and Steven J. Mead. 2001. Characters-based Interactive Storytelling. *IEEE Intelligent System, special issue on AI in Interactive Entertainment*, pages 17–24.
- Nathaneal Chambers and Dan Jurafsky. 2009. Un-supervised Learning of Narrative Schemas and their Participants. *Proceedings of the Joint Conference of the 47th Annual Meeting of the ACL and the 4th International Joint Conference on Natural Language Processing of the AFNLP*, 2:602–610.
- Eugene Dorfman. 1969. *The narreme in the medieval Romance epic: An introduction to narrative structure*. Univ. of Toronto Press.
- David K. Elson and Kathleen R. McKeown. 2009. Extending and Evaluating a Platform for Story Understanding. In *AAAI 2009 Spring Symposium on Intelligent Narrative Technologies II*, pages 32–35.
- Morton A. Gernsbacher. 1990. *Language comprehension as structure building*. Erlbaum, Hillsdale, NJ.
- Patrick C. Hogan. 2011. *Affective Narratology: The Emotional Structure of Stories*. Univ. of Nebraska Press.
- Arnav Jhala and R. Michael Young. 2010. Cinematic Visual Discourse: Representation, Generation, and Evaluation. *IEEE Transactions on Computational Intelligence and AI in Games*, 2(2):69–81, June.
- Mark O. Riedl, C.J. Saretto, and R. Michael Young. 2003. Managing Interaction Between Users and Agents in a Multi-agent Storytelling Environment. In *Proceedings of the Second International Joint Conference on Autonomous Agents and Multi-Agent Systems*, volume 34, pages 741–748.
- Shlomith Rimmon-Kenan. 2002. *Narrative Fiction: Contemporary Poetics*. Routledge.
- Nicolas Szilas. 2003. IDtension: a narrative engine for Interactive Drama. *Proceedings of the 1st International Conference on Technologies for Interactive Digital Storytelling and Entertainment Conference*, pages 187–203.
- Stephen G. Ware and R. Michael Young. 2010. Modeling Narrative Conflict to Generate Interesting Stories. In *Proceedings of the Sixth Artificial Intelligence and Interactive Digital Entertainment Conference*, pages 210–215.
- R. Michael Young. 2007. Story and discourse: A bipartite model of narrative generation in virtual worlds. *Interaction Studies: Social Behaviour and Communication in Biological and Artificial Systems*, 8:177–208.