Computational and Cognitive Aspects of Narratives

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Abstract

Narrative, a distinctly cognitive phenomenon, has long been of interest to the disciplines that comprise cognitive science. The past decade has seen a resurgence of work using computational methods to understand, manipulate, generate, and leverage narratives. This symposium, which is held in association with the Fourth International Workshop on Computational Models of Narrative (CMN'13), a satellite event of CogSci 2013, will focus on aspects of the scientific and computational understanding of narrative that intersect with cognitive science. The speakers and moderators are drawn from diverse fields including cognitive psychology, artificial intelligence, cognitive science, computational linguistics, and the humanities, and they will focus on a variety of topics including: narrative and its role in analogy, education, and persuasion; challenges in the representation of syntax, discourse, and semantics of narrative; psychological and neuropsychological aspects of narrative; and the growing integration of computational models of narrative in humanities research.

Keywords: Computational Models of Narrative

Narratives are ubiquitous in human experience. We use them to communicate, convince, explain, and entertain. As far as we know, every society in the world has narratives, which suggests they are rooted in our psychology and serve an important cognitive function. It is becoming increasingly clear that, to truly understand and explain human intelligence, beliefs, and behaviors, we will have to understand why narrative is universal and explain the function it serves.

Cognitive science has long recognized the importance of narrative as an activity that engages diverse and important cognitive facilities, as well as a phenomenon that is worthy of study in its own right. After a long period of dormancy, the past decade has seen a resurgence of interest in the formal understanding and computational modeling of of narrative, as well as a more recent boom in cognitive, psychological, and neuroscientific studies relating to narrative. This symposium is an attempt to catalyze the interaction between the research community working on computation-compatible approaches to narrative with cognitive science community proper.

The Computational Models of Narrative Workshop Series

The research community in question aims to advance the scientific understanding of narrative through progress across a wide range of fields including cognitive science, psychology, computer science, artificial intelligence, sociology, anthropology, linguistics, logic, and philosophy. To foster and encourage this community, the *Computational Models of Narrative*[1] (CMN) workshop series was founded in 2009. The series was so titled because we believe that a true science of narrative must adhere to the principle espoused by Herbert Simon in his book *The Sciences of the Artificial*: that without computational modeling the science of a complex human phenomenon such as narrative will never be successful, and that computational models are the proper *lingua franca* of such a diverse, inter-disciplinary community.

Because the workshop series is relatively new, and the research community is still growing and developing, it was decided to embed the early workshops in the conferences of different intersecting communities, in order to promote cross-fertilization and a more diverse membership. In 2010, the second workshop was hosted by the Association for the Advancement of Artificial Intelligence (AAAI) as one of its Fall Symposia. In 2012, the third workshop was hosted by the Language Resources and Evaluation Conference (LREC), which is a part of the computational linguistics community.

In 2013, the Fourth Workshop on Computational Models of Narrative will be held in Hamburg, Germany, directly after CogSci 2013 as a satellite event. The symposium described here is the on-site event associated with the workshop, and is intended to highlight the intersection between cognitive science and the topics covered in the workshop.

Speakers

The symposium will be moderated jointly by the workshop co-chairs, **Mark Finlayson** and **Benedikt Löwe**. Our speakers and moderators span multiple fields, highlighting the inter-disciplinarity of this symposium. The moderators bring expertise in artificial intelligence, computer science, philosophy, and mathematical logic. Among the speakers, **Jeffrey Loewenstein** and **Dedre Gentner** represent cognitive science proper, and they will discuss applying work on analogy to advance our understanding of business practice and psychol-

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[1] http://narrative.csail.mit.edu/

ogy, a field where narratives (cases) are of great importance. **Richard Gerrig** is a cognitive psychologist who has written extensively on human subject experiments regarding people's experiences on reading narrative. **Inderjeet Mani** is a computational linguist by training, and an expert in corpus annotation and linguistic representations for capturing narratives. **Jan Christoph Meister** is a humanist who seeks to apply the many advances in computational modeling of narrative to scholarly advances of relevance to his field. **Michael Young** is a computer scientist who pursues the scientific understanding of narrative to advance the state of the art in digital games.

Each subsection that follows outlines the topic which will be discussed by each speaker. The symposium is structured to leave time for a general discussion that includes the moderators and the audience.

Loewenstein & Gentner: Narrative Knowledge and "Repetition-Break" Plot Structures

Narratives convey causal, temporal, and other kinds of relational knowledge, the sort of knowledge that comprises expertise. Comparing narratives is one of the quickest and most powerful ways to develop expert knowledge, as indicated by the analogy literature. Analogy provides a means for identifying commonalities, and in particular, structural commonalities, and so provides a basis for revealing narrative structure. A further insight is the pairing of repetition with contrast to form a plot structure that serves as a recipe for surprise. Folktales (e.g., the three billy goats gruff), jokes (e.g., *three guys walk into a bar. . .*), advertisements (e.g., MasterCard's *priceless* campaign), and other types of narratives frequently make use of these "repetition-break" plots. The repetition in the narrative structure leads audiences to draw comparisons, perhaps learning something, and forming expectations that more similar items will follow. The break or contrast in the narrative structure surprises audiences by deviating from their expectations. Narratives with repetition-break plots are prevalent, often well-liked, often socially-selected both by popular attention and expert judges, and capable of influencing audiences towards adopting the narrative's views. This is just one example of the potential for narrative structure to yield significant returns.

Gerrig: Readers' Participation in Narrative Experiences

Gerrig will outline a participatory perspective on readers' experiences of narratives. He proposes that readers encode types of mental contents (called participatory responses) that fall beyond the ordinary scope of computational models of narrative. Readers, for example, encode responses toward characters actions and preferences for particular outcomes. Those participatory responses vary from reader to reader and structure their individual experiences toward narratives.

Mani: Naturalness and Computability in Computational Narrative Representations

Humans have an astonishing ability to infer different facets of narrative structure from a description of events. These facets include the representation of the temporal order of events as well as the motivation behind the actions and reactions of agents based on their goals and beliefs. Computational representations of narrative time and plot can be assessed in terms of their naturalness for humans to infer as well as their computability. Such an assessment suggests a number of psychological investigations that could help provide constraints on formal aspects of these representations.

Meister: Statistical vs. Intelligent Modelling of Human Narrative Processing

The former Google CEO's Eric Schmidt's dictum "In God we trust—all others bring data" epitomizes the neo-positivist underpinning of 'big data' approaches to complex phenomena. Search engine algorithms aim at representing such phenomena in terms of mathematical and statistical phenomena which by-pass human intelligence. Meister's talk will aim to reinterpret what looks like a purely methodological decision as an ethically problematic choice that is based on a reductionist concept of intelligent behavior. Meister will use examples from narrative to illustrate and emphasize his points.

Young: Cognition as the Decider: Comprehension and the Next Steps to Plan-Based Narrative Generation

A range of methods for the automatic construction of narratives have been developed in the last 10 years, many of them based on automatic planning methods drawn from AI. While these techniques have benefited from extensions to the standard knowledge representations that target interesting aspects of narrative structure, they often leave out the role of narrative at the discourse level. These models speak to only part of the functional properties of narrative as a result. In this talk, Young will point to these limitations in his own work and describe new models being developed that focus on narrative as a means to prompt comprehension on the part of the reader/viewer/player. These new models attempt to produce narrative story and discourse in text, video and video games that create experiences for their users rather than focus solely on the creation of appropriate narrative structural elements.

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