Computational Narrative
and what we can learn from narratology

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Introduction

storytelling is a fundamental and universal form of communication

- how are narratives different from non-narratives?
- what do narratives tell us about authors and audiences?
- can we generate narratives automatically?
Outline

where did we come from?
  ▶ literary and linguistic studies of narrative

where are we now?
  ▶ the current state of computational narrative research

where are we going?
  ▶ how emotion detection can and should help us improve computational narrative
Propp (1928)

- there is a limited set of functions that are the building blocks of a fairy tale
- the sequence of functions is always the same in every fairy tale

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some functions are more specific than others

not all functions are equally important

Todorov (1969)

- the structural approach to narrative seeks an abstract theory of the structure of literary discourse such that all existing works are particular realized instances of that structure
- the minimal complete plot is a shift from one *equilibirum* state to another

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Barthes (1975)

- there must exist a common narrative structure, otherwise narratives are just random sequences of events
- we can reliably produce and recognize narratives, so they cannot be random

Barthes (1975)
three levels of analysis
- functions

functions
→
events
states

causal
temporal

what are the decision points of a narrative?

Barthes (1975): three levels of analysis
- functions
- characters

Characters are defined by actions:
- have perspectives on sequences of actions
- participate in relationships
- form subject/object, giver/recipient, and assistant/opposer pairs

Barthes (1975)
three levels of analysis
- functions
- characters
- narration

the discourse of the narrative
- who is the narrator?
  - the author
  - an omniscient observer
  - a character
- who is the reader?

the story so far –

- narrative has two parts
  - surface form (narration/discourse)
  - deep structure (functions/characters)
- every existing narrative is a realization of a deep structure
  - eg. *Hamlet* and *The Lion King* are two realizations of the same deep structure

this is the **structuralist** position
but wait –

▶ even if the deep structure is the same, the surface realization is very different
▶ even if the surface realization is the same, the reader’s interpretation can be very different


this is the **contextualist** position
Narratology

Structuralism

- Propp
- Todorov
- Barthes

Contextualism

- Smith

Smith (1980)

- narratives are not just structures, but also acts
- a narrative has a narrator and reader, both of whom must be interested in the narrative
  - what does the narrator want to convey?
  - what does the reader take away from the narrative?

Polanyi (1981)

- a narrative must be **tellable**
- the **durative-descriptive structure** shows the sociocultural context
- **evaluation devices** indicate important material that forms an **adequate paraphrase** of the story
Polanyi (1981)

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- **evaluation devices** indicate important material that forms an **adequate paraphrase** of the story

**the surface realization indicates the teller’s intended deep structure**

L. Polanyi (1981). What stories can tell us about their teller’s world.
the lay of the land –

**Structuralism**
- literature
- functions and actions

**Contextualism**
- personal narrative
- discourse and context
Chatman (1990)

- contextualists assume a real author/real audience relationship, which does not apply to literature

the theory might not apply to literature, but this does not make it less true in its intended domain

S. Chatman (1990). What can we learn from contextualist narratology?
Chatman (1990)

- there is less variety and innovation of the form by amateur storytellers than by literary authors

this makes amateur stories more suitable for defining a general structure for narrative

S. Chatman (1990). What can we learn from contextualist narratology?
Chatman (1990)

- personal narratives do not distinguish between the surface realization and the deep structure

this makes them perfect for studying deep structure

S. Chatman (1990). What can we learn from contextualist narratology?
Labov (2013)

abstract
orientation
complicating action
most reportable event
evaluation
resolution
coda

Outline

**Structuralism**
- Propp
- Todorov
- Barthes
- Chatman

**Contextualism**
- Smith
- Polanyi
- Labov

**Narratology**
- structuralism: literature, functions, character actions
- contextualism: personal narrative, discourse, context

**Computational Narrative**
- coming up next

**Emotion Detection**
- later
Lehnert (1981)

plot units
- vertices: affect states
- edges: causal links

Elson (2012)

Story Intention Graph (SIG)
- three layers of annotation
  - textual $\leftrightarrow$ narration
  - timeline $\leftrightarrow$ function
  - interpretive $\leftrightarrow$ character
- annotators felt there were multiple interpretations for some narratives

D. Elson (2012). DramaBank: annotating agency in narrative discourse.
Elson (2012)

Story Intention Graph (SIG)
- three layers of annotation
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$\Rightarrow$ Barthes’s layers of analysis
$\Rightarrow$ Contextualism
Halpin, Moore, and Robertson (2004)

- 103 stories rewritten by children
- does the pupil understand the point of the story and emphasize important links and details?
- extract and compare the events of the rewritten story with exemplar

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⇒ contextualist question

Halpin, Moore, and Robertson (2004)

- 103 stories rewritten by children
- does the pupil understand the point of the story and emphasize important links and details? ⇐
- extract and compare the events of the rewritten story with exemplar ⇐

⇒ contextualist question
⇒ structuralist answer
Chambers and Jurafsky (2008)
narrative chain
  ▶ partially ordered set of events with a common protagonist
⇒ Barthes: characters are defined by their actions

Chambers and Jurafsky (2008) 
narrative chain

- partially ordered set of events with a common **protagonist**

⇒ **Barthes**: characters are defined by their actions

<table>
<thead>
<tr>
<th>system</th>
<th>average rank</th>
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<tr>
<td>verb co-occurrence</td>
<td>1826</td>
</tr>
<tr>
<td>protagonist</td>
<td>1160</td>
</tr>
</tbody>
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but is this good performance? how to interpret these numbers?

McIntyre and Lapata (2009)

- construct DAG from event chains (Chambers and Jurafsky)
- generate narratives by walking the DAG

The giant guards the child. The child rescues the son from the power. The child begs the son for a pardon. The giant cries that the son laughs the happiness out of death. The child hears if the happiness tells a story.

Reidl and Young (2010)

- **Intent-Driven Partial Order Causal Link** planning problem
- for a plan to be complete, it must not contain any character actions that are not part of a frame of commitment

The genie has a frightening appearance. The genie appears threatening to Aladdin. Aladdin wants the genie to die.

### Computational Narrative

**the story so far –**

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<tr>
<th>work</th>
<th>data</th>
<th>task</th>
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structuralist
Montfort (2011)

- interactive fiction system that supports several models of narration
  - reverse chronological order
  - flashback and flashforward
- tense generated automatically based on an internal state time of narration and the time of the event

Gordon and Swanson (2009)

- ICWSM 2009 Spinn3r dataset
- annotated 5002 posts
  - 240 stories (4.8%)
- simple unigrams normalized by frequency
  - POS tags and title text not statistically significant
- created dataset of 960,098 stories (precision = 0.75)

⇒ narratives of personal experience

Swanson et al (2014)

▸ identify **orientation**, **complicating action**, and **evaluation**

▸ several rounds of annotation to achieve agreement

▸ problematic clause types
  ▸ clauses containing of multiple elements
  ▸ implied actions
  ▸ stative descriptions resulting from local action
  ▸ subjective language

Narratology

- structuralism: literature, functions, character actions
- contextualism: personal narrative, discourse, context

Computational Narrative

- previous work has focused on structuralist approaches
- contextualist approaches are needed

Emotion Detection

- coming up next

- six basic emotions: happy, sad, anger, fear, disgust, surprise
  - Ekman (1993)
- evaluation
  - email client that illustrates sentences with faces
  - faces generated by emotion system rated more interactive and intelligent than random faces

Emotion Detection


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  - email client that illustrates sentences with faces
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what was the rating scale?


- Circumplex Theory of Affect (Watson and Tellegen 1985)
  - positive affect axis (active, elated v. drowsy, dull)
  - negative affect axis (distressed, fearful v. calm, placid)

unintuitive axes

too much overlap among labels in the same octant
Emotion Detection

Mishne (2005)

- top 40 LiveJournal moods (eg. amused, excited, contemplative, sick, anxious, ecstatic)

too much subjectivity in self-reported moods

Emotion Detection

Tokuhisa, Inui, and Matsumoto (2008)

- happiness, pleasantness, relief, fear, sadness, disappointment, unpleasantness, loneliness, anxiety, anger

- fatal v. non-fatal errors

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Emotion Detection

Chaumartin (2007)

- fine- v. coarse-grain evaluation
- WordNet Affect and SentiWordNet scores weighted by syntactic role of word
- high accuracy, moderate precision, low recall

Fine-grained control of emotion is possible

Strapparava and Mihalcea (2008)

- LSA representation of WordNet Affect
  - outperformed by Chaumartin on fine-grained evaluation
  - performs best on coarse-grained evaluation
  - strict WN keyword has best precision (38.28)
  - synset augmented WN has best recall (90.22)
Alm, Roth, and Sproat (2005)

- 185 children’s stories
- emotions in adjacent sentences can affect the current sentence
- strongest feature group included thematic story type
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different types of stories should be told in different ways
Emotion Detection

Calix et al (2010)

▶ mutual information between words and emotions
▶ learned list of words outperformed hand-crafted word lists
▶ performance varied by author

Emotion Detection

Calix et al (2010)

- mutual information between words and emotions
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- performance varied by author

authors express emotions in different ways

Conclusion

structuralist narratology examines functions and character actions in literature; contextualist narratology examines discourse and context in personal narrative

most work in computational narrative has focused on structuralist approaches, but contextualist approaches should be explored, especially with the amount of online data now available

in particular, work on emotion in text can help in computational narrative tasks by uncovering authors’ intents and opinions
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questions?