Linguistic Structure, Narrative Structure and Emotional Intensity

Tibor Pólya\textsuperscript{1} and Kata Gábor\textsuperscript{2}

\textsuperscript{1}Institute for Psychology, HAS
\textsuperscript{2}Linguistics Institute, HAS
Structure of the Presentation

- Structural analogy between emotion experiences and narrative structure
- Corpus
- Automated analysis
- Empirical study
Role of Narratives in Emotion Research

• Narratives provide definition for emotions
  – Hogan (2004): e.g. „X feels sad = X feels as one does when one thinks that what one has desired to happen has not happened and will not happen”

• Narratives describe emotional responses
  – E.g. Stein, Trabasso, Folkman, Richards (1997)

• Narratives generate emotions in readers
  – Oatley (1999): stories simulate emotions

• Narratives are tools for reliving and sharing emotional experiences
Structural Analogy

• Emotion experiences and narratives have analog structure:
  – Evaluation
  – Temporal unfolding
  – Consciousness
Structural Analogy 1.

- Emotion experience: Events are appraised
- Narrative: Events are evaluated
Structural Analogy 2.

Temporal unfolding

- Emotion experience: Dynamic
- Narrative: Temporal contour
Structural Analogy 3.

Consciousness

- Emotion experience: Nonreflective and reflective forms
- Narrative: Spatio-temporal perspective
Linguistic Analysis

Automated identification of relevant facets of narrative structure → quantitative analysis

Creation of a corpus annotated on these 3 levels + tools to perform automatic analysis
Annotation

representation
data

Emotional intensity
Narrative structure
Linguistic analysis

TEXT CORPUS
Corpus

- recorded Hungarian speech data
- written transcription: 36,000 words
- 60 healthy adult people aged between 18 and 45 years (M=29.2 SD=6.3)
- psychophysiological channels: Blood Volume Pulse, Abdominal Respiration and Skin Conductance
- a cue word paradigm was used to elicit autobiographical memories regarding emotional episodes
- cue words: pride, relief, sadness and fear
- 7,000 words subcorpus manually annotated for narrative structure
Different Methods for Text Analysis

• Several tools for (psychological) content analysis (e.g. LIWC)
• They usually perform word-level analysis: lemmatize, compare frequencies, output lists of keywords etc.

• We use deeper linguistic analysis: constituent parsing, CF grammars, structured lexicons
Corpus Annotation Tool

• NooJ - functions

  • corpus annotation (automatic or semi-automatic)
  • query, conconrdances
  • grammar development
  • linguistic processing

• FS basis: fast and robust
• XML compliant
• user-friendly interface: easy to handle, develop, share and re-use grammars
Corpus Annotation Tool

• Linguistic aspects

• FS basis → enhanced with additional functions:
  – variables
  – lexical constraints → feature unification
  – embedded grammars

• Grammars represented as graphs, edited via the graphical interface

• Philosophy: to produce highly lexicalized linguistic descriptions

→ Lexicon plays a central role, morphosyntactic and semantic features combined
Linguistic Preprocessing I.

- Hungarian linguistic resources for NooJ (Váradi, Gábor, 2004):
  - Hungarian tool chain
    - tokenization (built-in NooJ module)
    - sentence splitting
    - lemmatization, morphology (Vajda et al., 2006): inflectional dictionary for 60,000 lemmata + lookup: frequent word forms from the HNC
    - to achieve better coverage, the output of the NooJ-internal morphology was completed with the Humor morphological analyzer (Prószéky, 1995)
  - rule-based syntactic parser included in the Hungarian NooJ module Váradi (2003), (Gábor, 2007).
Linguistic Preprocessing II.

• Syntactic analysis:
  – Phrase chunker (NPs, APs, AdvPs)
    1) Basic chunks
    2) Top-level constituents (recursive NPs)
    3) Coordinated phrases
    4) Feature percolation: case, morphology, semantics
       → handle agreement phenomena
  – Dependency annotator (aux+V, prefix+V)
  – Segmentation into clauses
Mapping between narrative structure and linguistic structure

We are not looking for keywords but for syntactic structures to delimit the scope of each category

E.g. embedding of evaluation:

É11  de akkor éreztem először,
     *But then I felt for the first time*

É11  hogy fú,
     *that wow!

É11  én most tényleg büszke vagyok magamra,
     *now I am actually proud of myself*

É11  és hogy megérdemelten lehetek büszke.
     *and that I have a reason to be proud.*
Mapping between narrative structure and linguistic structure

- Creating grammars in NooJ to recognize relevant narrative structural units
  - Find *markers* associated to narrative structural categories
  - Examine the linguistic behavior of markers
  - Create grammars to delimit the scope of units
Markers

- Retrieve category-specific keywords by tf-idf scores:
- Embedded evaluation – perception

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<th>TF</th>
<th>IDF</th>
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</table>

→ markers: feel, proud, fear, feeling, sad, sadness, relief, be-happy …

~ 50 markers for each (sub)category
Grammars
Empirical Study

• Hypothesis
  – If a story has an elaborated narrative structure the intensity of an emotional experience during narration is higher than the story has a default narrative structure

• 108 narratives from 18 participants
Automatically Analysed Structural Features

• Narrative Evaluation
  – (Core narrative clauses)
  – Quantifiers
  – Qualifications
  – Negated events

• Temporal Contour
  – Perfect verb aspect
  – Continuous verb aspect
  – Specific temporal adverbs

• Spatio-temporal Perspective Forms
  – Retrospective
  – Experiencing
  – Metanarrative
Baseline Physiological Measures, 2 mins
HR, RESP, SC

Affective Grid: Baseline

Cue Word: Pride, Excitement, Relief, Fear, Sadness, Embarrassment

Narration and Continuous Physiological Measures:
HR, RESP, SC

Affective Grid: Past

Affective Grid: Present
Narrative Structure and Affective Grid

Strong negative correlations

\[ r_{\text{Pride}} = -0.62 \quad p < 0.01 \]
\[ r_{\text{Fear}} = -0.65 \quad p < 0.01 \]
\[ r_{\text{Excitement}} = -0.67 \quad p < 0.01 \]
Narrative Evaluation and Physiological Measures

Strong, but reverse correlations

$r_{\text{Proud}} = 0.70 \ p<0.01$  
$r_{\text{Fear}} = -0.66 \ p<0.01$
Temporal Contour and Physiological Measures

Pride stories

Strong, but reverse correlations

$r_{\text{Excitement}} = 0.70 \ p<0.01$

$r_{\text{Fear}} = -0.68 \ p<0.01$
Perspective and Physiological Measures

Pride stories

Heart Rate Mean vs. Rel. Experiencing form

$r = -0.70$ $p < 0.01$

Pride stories

Resp. Rate Mean vs. Rel. Experiencing form

$r = -0.60$ $p < 0.01$
Perspective and Physiological Measures

Embarrassment stories

![Graph showing relationship between Heart Rate Amplitude and Relative Experiencing form for Embarrassment stories.](image)

\[ r = 0.63 \ p < 0.01 \]

Excitement stories

![Graph showing relationship between Resp. Rate Mean and Relative Experiencing form for Excitement stories.](image)

\[ r = -0.64 \ p < 0.01 \]
Conclusions

• It is the default narrative structure which indicates higher emotional intensity, mainly in terms of valence
• There is a structural analogy between emotion experiences and narratives
• Narratives are proper tools for reliving and sharing emotion experiences
• A new and a non-invasive way for studying rather elusive emotion experiences
• It is promising to use deep linguistic description to analyse narrative structure
Further work

• Analysis of
  – A whole Corpus
  – More linguistic markers
  – Patterns of narrative structure, not simply relative frequencies

• English corpus
Thank you!

- Bea Ehmann
- Piroska Kabai
- Norbert Kollárszky
- Ildikó Kovács
- János László
- Anthony Marcel
- Tamás Nagy
- Erika Nánási

- Hungarian Scientific Research Fund
- Bolyai Research Scheme

- polya@mtapi.hu
- gkata@nytud.hu