UNIVERZA V LJUBLJANI

FAKULTETA ZA DRUŽBENE VEDE

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OMREŽNI PRISTOP K ANALIZI PRIPOVEDI (NETWORK APPROACH TO NARRATIVE ANALYSIS)

Magistrsko delo

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ZAHVALA

Zahvaljujem se profesorici Anuški Ferligoj in profesorju Vladu Batagelju za vložen trud in pomoč, ter seveda staršema, ki sta mi študij omogočila in mi nudila materialno in duhovno podporo. Nenazadnje se zahvaljujem Matjažu Erčulju za potrpežljivost in ljubezen.

TABLE OF CONTENTS:

1. INTRODUCTION

The main goal of this master’s degree thesis is to review all possible approaches to narrative analysis with the emphasis on the network analysis approach. We will look at different representations of narratives as networks and discuss possible approaches to analysis of those networks.

In the introduction there is a short description of the structure of the thesis and which subjects are in each of the chapters

In the second chapter some basic concepts are defined that are present throughout the thesis. One of those basic concepts is a narrative. We discuss narratology, a theory of narratives that provides a clear definition of narrative and its related terms. As our attention is mainly on the network approach of narrative analysis, the basic terms related to it are introduced.

In the third chapter a review and brief description of different approaches to narrative analysis is given.

In the fourth chapter these approaches from the third chapter, which represent narratives as networks, are discussed in detail. What method they use for transforming narratives into networks is described, and what kind of analysis they recommend. Also, some examples of network analysis of narratives are presented.

In the fifth chapter the Kansas Event Data System project is described and its approach towards analysis of political news. We will try to show in an example that network analysis of the data the project uses is also possible, and that it could be one of the useful methods for predicting political change.

The last chapter discusses in brief the methods for narrative analysis that have been introduced and proposes the future work on narrative analysis.

The working hypotheses are:

1. Narratives can be presented as networks.

2. There are several approaches towards network representation of narratives.

3. The analysis of narratives represented as networks is also possible, and the information it provides differs from that obtained from other methods.

For the presentation and analysis of networks the Pajek program is used because it enables:

- presentation and analysis of large networks;
- presentation and analysis of temporal networks;
- usage, presentation and analysis of multiple relations among units.

2. BASIC CONCEPTS

2.1 Narratology

2.1.1 Definition

Narratology is a part of the literary theory that has developed on the theoretical basis of structuralism (Štuhec, 2000). The term was introduced by Tzvetan Todorov in Grammaire du Décaméron (1969), whose work followed the ideas of Claude Lévi-Strauss (1958) and Vladimir Propp (1928). He has defined narratology as a science about narrative text (Prince, 1997). Narratology is a theory of the structures of narrative (Jahn, 2003). It examines what all narratives have in common, as well as what enables them to differ from one another, and it aims to describe the narrative-specific system of rules presiding over narrative production and processing (Prince, 1997). "Narratology is the theory of narratives, narrative texts, images, spectacles, events; cultural artefacts that 'tell a story'. Such a theory helps to understand, analyse and evaluate narratives," (Bal, 1997: 3). Some theorists, among them Gerard Genette (1988), restrict narratives to verbally narrated texts, while others (Barthes, Chatman, Pavel, Bal) argue that narrative is anything that tells a story (Jahn, 2003).

2.1.2 Narration

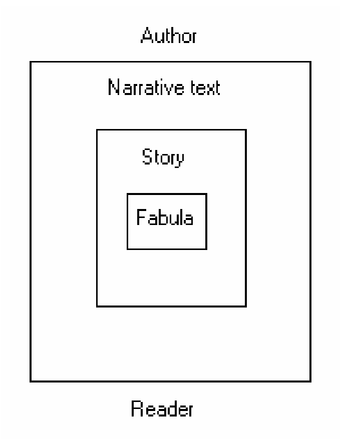
Narration is one of the main creative procedures in literature. Based on this, several kinds of narrative texts are formed. As regards theory, there are three kinds of narration: oratory, historical and literary. The difference between the last and the other two is in the creation of imaginative events. Literary narration is a narrator's perception of the world (Štuhec, 2000).

There are two ways of **forming** a narrative text: *description* and *dialog*. They were distinguished in antic poetics, where they were called *mimesis* and *diegesis*. What Plato called diegesis, means in today's theory, narrator's speech. Mimesis, on the other hand, means a person's direct speech (monolog, dialog, polilog). It allows the reader to experience more directly what is going on in the narrative. Gerard Genette has understood diegesis as a superior term and mimesis as a subordinate term. According to him, every mimesis is in fact diegesis that only hides its diegetic content.

2.1.3 Narrative

"A *narrative* is the semiotic representation of a series of events meaningfully connected in a temporal and causal way," (Onega and Garcia Landa, 1996: 3). H. Porter Abbott (2002; Ryan, 2004) and Tzvetan Todorov (1966; in Barthes, 1977; in Biti, 1992) among others, say that narrative is a combination of *story* and *discourse*. A story is an *event* or a *sequence of events*. It comprises logic of actions and 'syntax' of characters. Discourse is the way of presenting events. It comprises the tenses, aspects and modes of the narrative. The truth is that almost all theories of narrative distinguish between **what** is narrated (the story) and **how** it is narrated (the discourse). There is a difference, however, in the **number of layers** of the narrative these theories distinguish in the analysis. Some, like Tomashevski, talk about two, while others, like Bal, talk about three layers. Tomashevski, for example, distinguishes between *fabula*, which is defined as the chronological or chronological-causal sequence of motifs[1], and *sujet*, which is the disposition and articulation of narrative motifs in the particular finished product (Sternberg, 1978). Bal, on the other hand, talks about a three-layer distinction of narrative: text, story and fabula. The *text* is a finite, structured whole composed of language signs. A *narrative text* is a text in which an agent relates a story in a particular medium, such as language, imagery, sound, buildings, or a combination thereof. A *story* is a fabula presented in a certain way, while the *fabula* "is a series of logically and chronologically related events that are caused or experienced by actors" (Bal, 1997: 5). It constitutes events, actors, time and location and has no temporal or spatial distortions (Onega and Garcia Landa, 1996). Three levels of analysis according to Bal can be represented in the following diagram (Figure 2.1).

Figure 2.1: Mieke Bal's levels of analysis of narratives.



Source: Bal, Mieke (1997): Narratology. Introduction to the Theory of Narrative. Torornto: University of Toronto Press.

[1] Motifs are basically actions and events.

The three layers referred to above do not exist independently of one another, but can be analysed separately despite this fact. When we analyse a text we take into consideration narrator, non-narrative comments, description, and levels of narration (embedded stories). Analysis of a story consists of time analysis, analysis of characters, place, and focalization. Analysis of a fabula consists of analysis of events, actors, space and time. The three agents function at three levels: the narrator, the focalizer and the actor (Bal, 1997).

Ryan's definition of narrative does not distinguish between these levels clearly. He defines narrative as anything that presents or tells a story, be it by text, picture, performance, or a combination of these. A story is a sequence of events involving characters. Events include natural and non-natural happenings. Characters get involved by being agents, patients or beneficiaries of these events. Besides the story and characters, narratives have a storyteller (Jahn, 2003; Ryan, 2003).

Text

Narrator

A *narrator* is an agent who establishes communicative contact with the addressee and who manages the exposition, deciding what is to be told, how it is to be told (from what point of view and in what sequence), and what is to be left out (Jahn, 2003). Štuhec (2000) defines a narrator as an outer text picture who narrates epic text and through this takes responsibility for all happenings, denotations and connotations that the narrative structure causes. Although we cannot see or hear the narrator, the text contains a number of elements that project *narrator's voice*. Some textual elements that project narrative voice are:

- *content matter*: there are appropriate voices for sad and happy, comic and tragic subjects;
- *subjective expressions*: expressions indicating the narrator's education, beliefs, convictions, interests, values, political and ideological orientation, attitude towards people, events, and things;
- *pragmatic signals*: expressions that signal both the narrator's awareness of the reader and orientation towards them.

Although the text projects narrative voice, the text's *author* is temporally, spatially and ontologically **distant** from us. The last expression means that the author belongs to a different, fictional world. In the process of narrating, the author develops three relationships: towards the narrative object, the reader, and themselves (Štuhec, 2000). The standard **structure** of **fictional narrative communication** can be shown in a so-called Chinese boxes model comprised of the three levels of communication. The communicative contact is possible between (Jahn, 2003):

- author and reader at the level of nonfictional communication;
- narrator and addressee at the level of fictional mediation;
- characters at the level of action.

The level of nonfictional communication is the 'extratextual level', while the other two are 'intratextual levels'. Usually when a reader talks about the author, they actually mean the *implied author*. The implied author is a "construct" from the text. The reader rarely knows the author as a person. More commonly they build a construct of what the author is like from the works they have read. Usually an author has general concern about specific things and those concerns are common to all the author's works. Dickens, for example, is concerned with the mistreatment of the working class during the Industrial Revolution in England. Although the real and the implied author may begin to come closer when studying the works the author has written and finding out his general concerns, the reader cannot ever be certain that they are the same (Sharpe, 1999c). Besides the implied author, there is also the *implied reader*. An author expects a certain kind of reader, with a certain intellectual level, familiarity with cultural elements and certain emotions. As time passes and the text continues to be read, the real reader and implied reader begin to differ substantially from one another. The real reader is the actual person reading the text at any given time (Sharpe, 1999a).

According to Chatman (1978; Jahn, 2003) we can divide narrators into overt and covert. *Covert* narrators fade into the background, camouflage themselves, and do not attract attention towards themselves. They avoid using the first-person pronoun, pragmatic markers, and they do not express strong views. They do not interfere, but let the story events unfold in their natural sequence and tempo. It is also possible that they are hiding behind someone i.e. a person in the story. On the other hand, *overt* narrators use the first-person pronoun, address the narratee, offer reader-friendly exposition whenever it is needed, and express their views and opinions about characters and events. They also intrude into the story in order to pass philosophical or metanarrative comments. Both expressions are relative; that is to say narrators can be both overt and covert to varying degrees.

When the narrator is **present** or **absent** from the story, we can talk about their **relationship to the story**. Genette (1980) makes a categorical distinction between two principal types, homodiegetic[2] and heterodiegetic narrators and narratives. In a *homodiegetic* narrative, the story is told by a narrator who is present as a character in the story. A type of homodiegetic narration is *autodiegetic* narration, in which the narrator is also the protagonist of their story. In a *heterodiegetic* narrative, the narrator is not present as a character in the story. Usually a homodiegetic narrative is written in the first person, while a heterodiegetic narrative is written in the third person. However, in some cases this is not true. For example, overt heterodiegetic narrators refer to themselves in the first person.

Stanzel Franz (1955; Jahn, 2003; Dolgan, 1979) distinguishes between three **types of narrative situations**:

- *An authorial narrative*: a narrative told by a narrator who is **absent** from the story, i.e. does not appear as a character in the story. They see the story from an outsider's position, often a position of **absolute authority** that allows the narrator to know everything about the story's world and its characters;
- *A first-person narrative* is a narrative in which the narrator is **present** as one of the characters in the story. The story is the result of **personal experience**. As such, it is restricted to a largely personal, subjective, and limited point of view. Typical subgenres of the first-person narration are: fictional autobiography, story of initiation, skaz[3] narrative. The latter is the story telling situation in which speaker tells a story to a present audience;
- *A figural narrative*: the narrator is heterodiegetic and covert. They are **hiding** behind a **character** in the story. This way the reader has a feeling of directness, they are drawn into the story and invited to co-experience what it is like to be a participant in the unfolding events. The technique of presenting something from the story-internal character's point of view is called *internal focalization*. Although focalization is part of the analysis of the story and not text, we can mention it here because it is highly

[2] diegetic-pertaining to narrating; homo-of the same nature
[3] Skaz means speech in Russian.

related to a figural narrative. An *internal focalizer* is a character through whose eyes the action[4] is presented. They focus their attention and perception on something. Four main **forms** of focalization can be distinguished:

- *fixed*: narrative events are presented from a constant, single character's point of view;
- *variable*: narrative events are presented from several focalizers' points of view;
- *multiple*: an episode is presented repeatedly from different focalizers' points of view;
- *collective*: focalization through plural narrators (»we narrative«) or a group of characters.

Some authors (Štuhec, 2000) have argued that by introduction of the term internal focalization and narrative system (narrator plus focalizer), conception of figural narrative is no longer needed. They claim that the distinction between authorial and figural narration is not in narration itself but in focalization. There is a change in focalization from external to internal.

External focalization according to Bal (1997) means that an **anonymous agent**, situated outside the fabula, is functioning as focalizer. Between the focalizer and the object of narration exists spatial, temporal, behavioural, experiential, and intellectual distance. Besides internal and external, Genette (1980) mentions also *zero focalization*. In the case of zero focalization, the **narrator's perception** of the object of narration takes precedence over all other possible perceptual positions.

Bal also distinguishes between *perceptible* and *non-perceptible objects of focalization*. The criterion to distinguish between the two categories is that within the fabula there must be another character present who can also perceive the object. The object is then perceptible. Objects like a character's thoughts, dreams, fantasies, and feelings can be categorized as non-perceptible (Bal, 1997).

Bal (1997) also distinguishes between different **focalization levels**. He talks about *embedded focalization*. An example of such focalization is when a character in the story remembers an

[4] Action is a sequence of acts and events; the sum of events constituting a "story line" on a narrative's level of action.

event they witnessed. At the first level of focalization there is this character and their memory of the event, which is non-perceptible. At the second level there is the same character and their seeing of the event, which is perceptible.

Besides the three standard **narrative situations**, there are four **peripheral categories**:

- *we - narrative*: the homodiegetic narrator who is experiencing that the narrator belongs to a group of collective internal focalizers;
- *you narrative / second person narrative*: the protagonist is referred to in the second person;
- *simultaneous narration*: the homodiegetic narrator, who tells a story that unfolds as they tell it;
- *camera-eye narration*: the text that reads like a transcription of a recording made by a camera.

Sometimes the narrator changes the narrative situation, because there is a shift in the story or because it becomes difficult to reconcile a present mode of presentation with the general frame. Genette (1980) calls this *alteration*. There are two main types of alteration: *paralepsis* and *paralipsis*. In the first case, the narrator is assuming a level of competence they do not have. In the second case, the narrator is omitting crucial information.

Styles of discourse representation

Narrative discourse is a spoken or written text produced by an act of narrating.

Styles of discourse representation:

- *direct discourse*: a direct quotation of a character's speech or thought. For example: Mary said:"What on earth shall I do now?"
- *free indirect discourse*: a representation of a character's words or verbalized thoughts which is indirect in the sense that pronouns and tenses of the quoted discourse are aligned with the pronoun/tense structure of the current narrative situation, and free to the extent that the discourse quoted appears in the form of a non-subordinate clause. It changes and shifts some words of the original utterance but still retains subjective constructions and expressions. There are more details in what is said than is necessary for the course of the fabula. For example: What on earth should she do now?

- *indirect discourse*: a representation of a character's words or thoughts which uses a reporting clause. For example: Mary wondered what she should do.

Presenting the **mental processes** of characters, their thoughts and perceptions, their memories, dreams, and emotions is called a *stream of consciousness*.

Techniques for presenting a character's thoughts are:

- *interior monologue*: an extended passage of »direct thought«;
- *soliloquy*: direct presentation of a character's thoughts.

Non-Narrative Comments

In narratives there are also non-narrative comments. Those argumentative textual passages do not refer to an element of the fabula, but an **external topic**. Sometimes it is difficult to distinguish between opinions and facts. That is why we call every statement that refers to something of general knowledge outside the fabula argumentative. An example of non-narrative comment would be a paragraph expressing ideology.

Description

Description is a part of focalization and has a strong influence on the ideological and aesthetic effect of the text. A general premise exists that descriptions interrupt the line of the fabula. They characterize, however, the rhetorical strategy of the narrator. In a realistic narrative, description necessitates **motivation**. There are three types of motivation: motivation via speaking, looking, or acting. The most frequent form is motivation via looking. A character sees an object and has time, lighting, and reason for looking at and describing the object. Motivation is making the relationship between elements explicit. Because these relationships are not self-evident in fictional texts, they can never be motivated enough. Descriptions consist of a **theme** (bedroom), which is an object described, and **sub - themes**, which are the components of the object (bed, closet, table, chair, etc.).

Levels of narration

As a way of decomposing a narrative into levels, we can mention a *matrix narrative*. It is a narrative containing an **embedded** or hyponarrative. A character in the story begins to tell their story, creating a narrative within a narrative, or a tale within a tale. Schlomit Rimmon-Kenan (1983) talks about:

- *a first-degree narrative*: a narrative that is not embedded in any other narrative;
- *a second-degree narrative*: a narrative embedded in a first-degree narrative;
- *a third-degree narrative*: a narrative embedded in a second-degree narrative;
- and further levels of embedded narratives.

There are several functions of embedded narratives: they are an important element in the fabula of matrix narrative, they provide information about events that lie outside the primary action line of the matrix narrative, they distract the reader, suspend the continuation of the matrix narrative, or are used as an analogy to the matrix narrative.

Story

Time analysis

When we analyse the story, we work on a story time line so that all the main events can be placed in the proper sequence. We make a time-line model that helps us visualize events that are presented in detail, as opposed to events that are merely reported. It also shows significant discrepancies between story time and discourse time (Jahn, 2003). We can look at the example of a time-line and action-unit model of Sillitoe's "The Fishing Boat Picture".

Figure 2.2: A time-line model of Stilltoe's The Fishing Boat Picture (Jahn, 2003).

Story	Unit	Textual detail
prehistory	A	various references to Harry's youth
primary story line	B	Harry's and Kathy's walk up Snakey Wood Harry aged 24; Kathy is 30
	C	married life (six years)
	D	book-burning incident Kathy leaves Harry (Harry aged 30)
	E	10 years pass; very few references to Harry's single life
	F	Kathy comes back for occasional meetings picture is pawned several times
	G	Kathy is run over by a lorry Kathy's funeral
after-history	H	life after Kathy's death (six years)
discourse-NOW		1951; "Why had I lived, I wonder."

Source: Jahn, Manfred. (2003). Narratology: A Guide to the Theory of Narrative. Part III of Poems, Plays, and Prose: A Guide to the Theory of Literary Genres. English Department, University of Cologne.

William Labov and Joshua Waletzky (1967) introduced a linguistic approach towards analysis of time in a narrative. A narrative, according to them, must contain at least one *temporal juncture*. "Two clauses are separated by a temporal juncture if a reversal of their order results in a change in the listener's interpretation of the order of the events described" (Labov, 1997). They distinguish between a *narrative clause* and a *free clause*. A narrative clause is a temporally ordered clause, while a free clause holds no temporal information (Franzosi, 1998). The condition of a free clause holds true during the entire narrative (Labov, 1997). By identifying narrative clauses and free clauses in a narrative, a clearer picture about the sequential order of events is formed.

Time analysis is concerned with three questions: when, how long, and how often. So we are interested in order, duration, speed or tempo, and frequency.

Duration

We can distinguish between *story time* and *discourse time*. Discourse time is the time it takes an average reader to read a passage, or, more globally, the whole text. This can be measured in the number of words, lines, or pages of a text. A rule of thumb is that one line of text equals 1.5 seconds. The story time is fictional time, which we try to estimate by several clues from the context (Jahn, 2003).

Order

By order we mean **sequential ordering**. Russian formalists have used for the non-chronological presenting of events the term siuzhet, and for the chronological sequence of events the term fabula (Striedter, 1969; Dolgan, 1983). In general, when the story follows a natural flow of events, we talk about a chronological sequence of events. When it does not do this, we talk about chronological deviations or *anachronies*. The two main types are called *flash-forward* or anticipation and *flash-back* or *retroversion* (Bal, 1997). Bal distinguishes between *subjective* and *objective anachrony*. When a character remembers past events, this is called subjective anachrony. There is no jump into the past, as in objective anachrony, but only recollection of the past events. An event presented in anachrony is separated by an interval, large or small, from the 'present'. Retroversion that takes place outside the time span of the primary fabula, is called *external analepsis* or *external retroversion*. We can distinguish it from the internal and mixed. External retroversion supplies information about the past of actors who are relevant for the interpretation of events. We can also distinguish between *incomplete* and *complete anachrony*. A retroversion, for example, is incomplete, if after a short span a forward jump is made once again. Disconnected information is thus given about a section of the past (Bal, 1997). We can define anachrony as punctual and durative. A *punctual anachrony* recalls a brief but significant event, while *durative* means that a somewhat longer period is involved. There is also *achrony*, which is a sequence of temporally wholly unordered events (Gennete, 1980). It can consist of undated events or events without indication whether they are part of the past or future.

Speed or tempo

In the time analysis we also can be interested in the speed or tempo with which the various events are presented. The narrator pays more **attention** to some events than others. It means that the description of events that happened in a shorter time period is sometimes more detailed than of those that happened in a longer time period. The narrator's attention is expressed through *narrative mode*, which is consequently strongly connected with the tempo of events. We distinguish two main narrative modes (Jahn, 2003):

- *scene / scenic presentation*: a showing mode (little or no narrational mediation, overtness) which presents a continuous stream of detailed action events;

- *summary*: a telling mode (the narrator is in overt control of action presentation) in which the narrator condenses a sequence of action events into a thematically focused and orderly account. Durational aspect is sped up;

and there are two minor or supportive modes[5]:

- description: a telling mode in which the narrator introduces a character or describes the setting;
- comment: a telling mode in which the narrator comments on characters, development of the action, etc.

If we compare the story time and the discourse time, there are several **ways of presentation** (Jahn, 2003):

- the *isochronous presentation*: almost equal duration of story and discourse (i.e. dialogue);
- speed-up / *acceleration*: the discourse time is considerably shorter than the story time;
- slow down / *deceleration*: the discourse time is considerably longer than the story time;
- *pause*: the discourse time continues when a description or comment is made, while the story time stops;
- *ellipsis* / cut / omission: a stretch of the story time which is not textually represented at all.

Mieke Bal (1997) talks about similar ways of presentation. She distinguishes them on the basis of comparison between the story time and the fabula time. She distinguishes:

- *summary*: the fabula time is longer than the story time;
- *scene*: the fabula time is shorter or almost the same as the story time;
- *slow-down*: the fabula time is shorter than the story time;
- *pause*: the fabula time is shorter or infinite in comparison with the story time;
- *ellipsis*: omission of a part of the fabula; the fabula time is longer or infinite in comparison with the story time.

[5] Already described in the chapter Text.

Although the concepts presented above use almost the same expressions, they differ in their basic definitions of how to evaluate the tempo of events. This is due to the fact that they differ in levels of analysis of narrative that they distinguish. Jahn's concept distinguishes between story and discourse, while the Bal's concept distinguishes between text, story, and fabula.

Frequency

Frequency is understood by Genette (1980) as being the numerical relationship between the events in the fabula and those in the story.

There are three main **frequential modes**:

- *singulative telling*: recounting once what happened once;
- *repetitive telling*: recounting several times what happened once;
- *iterative telling*: recounting once what happened n times.

Frequential modes according to Bal (1997):

- 1F (fabula) / 1S (story): *singular*: one event, one presentation;
- mF / nS: *plurisingular*: various events, various presentations, unequal in number;
- nF / mS: *varisingular*: various events, various presentations, unequal in number;
- 1F / nS: *repetitive*: one event, various presentations;
- nF / 1S: *iterative*: various events, one presentation.

Literary space

We distinguish between *space* and place. Space is an element of the story, and place an element of the fabula according to Bal. Place is related to the physical, mathematically measurable shape of spatial dimensions. Places are also linked to certain points of perception. When places are seen in relation to their perception they are called space (Bal, 1997).

Jahn (2003) understands literary space as the environment in which objects and characters are situated; more specifically, the environment in which characters move or live. It includes landscapes as well as climatic conditions, cities as well as gardens and rooms. Chatman

(1978) distinguishes a *story space* and a *discourse space*. A story space is the spatial environment or setting of any of the story's action episodes[6]. A discourse space is the narrator's current spatial environment. We can also talk about *story-here* and *discourse-here*. Story-here is the current point in space in the story, while discourse-here is the current point in discourse space (Jahn, 2003).

The relationship between time and space is very important for the tempo of the narrative. When the space is presented in detail, this presentation inevitably interrupts the time sequence. This can be avoided though if the perception of the space takes place in time and can be regarded as an event.

Analysis of characters

We can distinguish between *actors* at the fabula level and *characters* at the story level. Actor is an abstract term; characters are endowed with distinctive human characteristics (Bal, 1997). Relevant characteristics are quite often repeated. This **repetition** has an important role in the construction of the image of a character. The image also becomes clearer by accumulation of characteristics, describing **relations** with other characters, and **changes** or transformations which a character undergoes. Any character can be described using three vectors: **knowledge**, **morality**, and **fortune**. As the narrative progresses, a character may change along one or more of these three vectors. The vector of knowledge is the most important of all. Usually a character's knowledge changes when the narrative progresses. This knowledge may be about themselves, others, the nature of people, the nature of the world, and the character's view of the world, or a combination of these. The character may change morally. We can distinguish between four "moral codes": of the fictional world, of the character, of the narrator, and of the reader. The vector of fortune is least important of all three. It is the state of the protagonist's physical environment along several continua: comfort – discomfort, wealth – poverty, safety – danger, love – antipathy, etc. (Sharpe, 2000a).

Characterization analysis focuses on three basic parameters:

- *narratorial* versus *figural* characterization: a character either characterizes themselves, or they are described by the narrator;

[6] Episode is a group of action units consisting of three parts: an exposition, a complication, and a resolution (Kintsch, 1976; Jahn, 2003).

- *explicit* vs. *implicit* characterization: in the case of explicit characterization, a trait or property is attributed to the character. It consists of descriptive statements made by a described character or some other character. Implicit characterization is when no direct traits are attributed to the character. Traits can be attributed to the character through their behaviour and looks. Moreover, a character can do something to another that qualifies the latter. For example, a detective calls somebody a murderer;
- *self*-characterization vs. *altero*-characterization: the character describes themselves or is described by another person.

E. M. Forster (1976; Jahn, 2003) distinguishes between *flat* and *round* characters. The first are one-dimensional, characterized by a very restricted range of speech and action patterns. The latter are three-dimensional, characterized by many, often conflicting properties.

Functionally determined character types:

- *confidant*: somebody a protagonist can speak to, exchange views with, confide in;
- *foil character*: a minor character highlighting certain features of a major character, usually through contrast;
- *chorus character*: an uninvolved character commenting on characters or events, typically speaking philosophically or in clichés.

To determine what a character's relevant characteristics are, we can select relevant *semantic axes*. Semantic axes are pairs of **contrary meaning**, for example rich – poor, men – women, strong - weak. The selection of relevant semantic axes involves focusing only on those axes that determine the image of the largest possible number of characters. If there are only one or very few characters, we select semantic axes that are strong or are related to an important event. Using those axes we can map out the similarities and oppositions between the characters. With the help of this information we can determine what qualification a character has. *Qualification* is comprehensive information about an appearance, psychology, motivation, and past of the character. Some qualifications are connected with a social or a family role, for instance father, son, farmer. We can also set up a hierarchy of strongly and weakly marked characters and characters with the same content (synonymous characters). We can determine whether a difference of **degree** and **modality** is evident within each qualification. The scale for the degree can be: very strong, reasonably strong, not strong enough, somewhat weak, very weak. Modality can be expressed as: certainly, probably, perhaps, probably not. Further examination can be made to find out whether there is a connection between certain characteristics.

The hero in the story can be determined by (Bal, 1997):

- qualification**;**
- *distribution*: the hero is present in the story very often and in important parts of the fabula;
- *independence*: the hero can appear alone and holds monologues;
- *function*: certain actions are those of the hero alone;
- *relations*: the hero maintains relations with the majority of characters.

Fabula

Events

Event is a **transition** from one state to another state, **caused** or **experienced** by **actors** (Bal, 1997). Rimmon - Kenan (1983) says that it is a change of one state of affairs to another. An event is therefore a process, an alteration, which deals with the occurrence of **change** (Talib, 2004). There are two **types** of events (Chatman, 1978; Sharpe, 1999b):

- *kernel event*: an event which cannot be left out of the plot[7] sequence without destroying the narrative;
- *satellite event*: the opposite of a kernel event – it is not crucial to the fabula.

To establish, however, which sentences in the text represent an event is not easy. There are three **criteria,** each of which limits the number of events to be investigated (Bal, 1997):

- *change***:** sentences that express change or an activity that interrupts another activity represent an event;
- *choice***:** Barthes (1977) distinguishes between functional and non-functional events. Functional events open a choice between two possibilities, realize this choice, or reveal the results of this choice;
- *confrontation***:** this criterion was suggested by Hendricks (1973). He further refined Barthes' method so that the number of functional events was further reduced. According to him, the structure of the fabula can be determined by confrontation. Two

[7] Defined on page 21.

actors or a group of actors are confronted with each other. Every functional event consists of three components: two actors and one action. Linguistically this could be expressed as two nominal and one verbal component. The structure of the sentence including functional event would be: subject – predicate – (direct) object. Subject and object must be actors, agents of action.

Three phases can be distinguished in every fabula: the **possibility**, the **event**, and the **result** of the process. The selected events can be related to each other in different ways. They can be grouped on the basis of the identity of the actors involved, or on the nature of the confrontation, or according to time interval – some events happen at the same time, or on the basis of location.

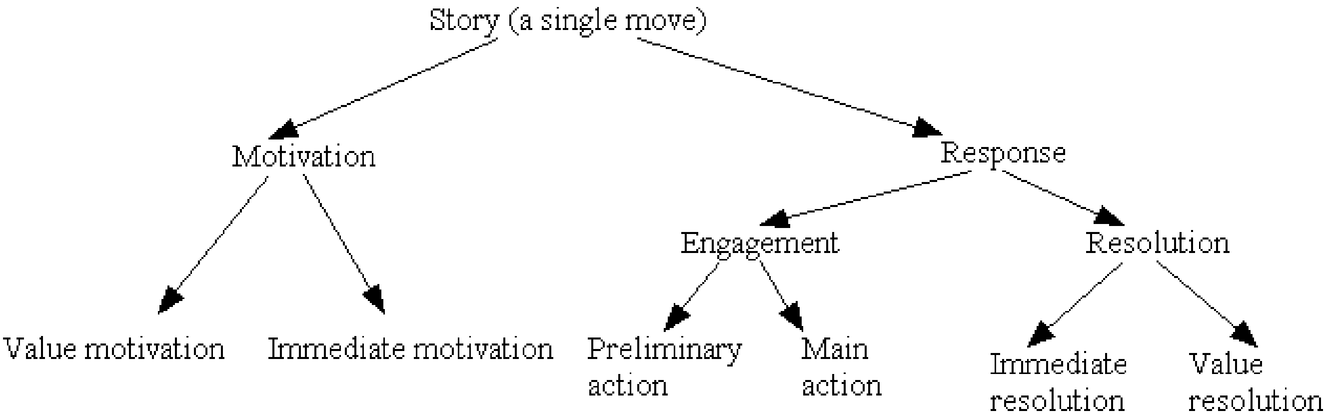
Actors

When we start an analysis, we have to decide which actors must be taken into consideration and which not. In some fabulas there are actors that do not cause or undergo functional events. Those actors can be left out of the consideration. It is important for the understanding of the fabula to divide its actors into **classes**. After analysing Russian fairy tales, Vladimir Propp developed a **typology** of seven basic roles assumed by characters (Herman, 2000; Prince, 1997; Manjali, 1997). Those roles are: the hero, the villain, the princess and her father, the dispatcher, the donor, the helper, and the false hero. They perform 31 functions. A function is an act of a character, defined from the point of view of its significance for the course of the action. Functions can be grouped together in *spheres of action*. Propp also discovered that functions in Russian fairy tales appear in the **same order**. Benjamin Colby (1973) has come to similar conclusions on the basis of Eskimo folktales. However, he uses the term *eidon*[8] instead of function and claims that eidons (there are 42 of them) follow eidochronic rules determining their selection and sequencing (Colby, 1973; Colby, 1978). He defines eidon as "a cognitive chunk coded in a way that, if not entirely "pictorial", is close to what might be called pictorial imagery in the brain" (Colby and Colby, 1981: 170). Some of the eidons he identified are the same as Propp's functions, but there are others that are different. In contrast to Propp, he argues that eidons are governed by higher-level categories and rules as shown in Figure 2.3. Each of the lowest categories in the picture is comprised of several eidons. Colby

[8] Eidos – image, idea.

also investigated Mayan stories and found the same structure at the higher level as in the case of Eskimo folktales.

Figure 2.3: Higher level categories of eidochronic elements



Source: Colby Benjamin N., Colby Lore M. (1981): The Daykeeper. The Life and Discourse of an Ixil Diviner. Cambridge: Harvard University Press.

Greimas further refined Propp's typology and formed the *actantial model*, comprising six actants (Prince, 1997; Bal, 1997). *Actants* can be defined as fundamental roles at a level of narrative deep structure (Herman, 2000). Actors in the same class (actant) **share** a certain characteristic quality. The members of actants have the same relationship regarding the telos[9], which constitutes the principle of the fabula. This relationship is the same as in Propp's model, which he calls the function, for example she wants to get married, he wants to find, she is trying to avoid. The most important relation is between an actor who follows a goal or aim and the aim itself. The first two actants are therefore *subject* and *object*. An object is not always a person; it can be power for example. The intention of the subject to reach the object is not enough. There are powers that allow or prevent it to reach its aim. We can distinguish between two actants: *power* and *receiver*. Greimas uses for actant power the word *sender* (Greimas, 1983). The receiver is to whom the object is given. It is often the same person as the subject. Another two classes of actors are *helper* and *opponent*. Those actants are not in direct relation to the object, but to the function that connects subject to object. It is often difficult to identify a difference between the helper and the sender. Let us mention some points of difference. The sender has power over the whole enterprise, while any assistance the helper gives is non-intentional. The sender is often abstract, while the helper is concrete. The sender also remains in the background and is usually only one.

[9] Telos means teleology of the fabula.

There might be different subjects in the fabula that are in opposition. So we have an *anti-subject*, who is not an opponent. They pursue their own object and at certain moments are in the way of pursuing of the first subject.

We can specify actants also according to **competence**. Greimas (1973; Bal, 1997) subdivides competence into three categories: as the determination or will of the subject to take action, the power or opportunity, and the knowledge or skill necessary to execute such action.

Actants can also be specified by **true value**. This means the 'reality' of the actants within the actantial structure. We can distinguish between possible positions of actors in regard to 'truth'. Truth means what actors appear to be like and what they are like. According to this criteria, they can be true (an actor is what they appear to be), secret (they hide who they are), non-existent (they neither appear to be what they are, nor do they hide who they are), lie (they appear to be what they are not).

Just as Propp, who found that the order of functions in fairy tales is the same, Labov has formed a model of a structure of narrative. He distinguishes between six distinct **functional parts** in a narrative: abstract, orientation, complicating action, evaluation, result or resolution, coda (Franzosi, 1998; Labov, 1997).

Plot

Besides story and fabula we can also introduce another action-related term: plot. A plot is the logical and **causal** structure of the fabula (Jahn, 2003).

Film narrative

As we have already mentioned, Mieke Bal distinguishes three layers in narrative texts. Two of these three layers, the story, and the fabula, can be shared by several narrative texts expressed through different media. Only at the level of the text does the analysis vary, depending on the language signs of which it is composed. In a film, the narrator is a symbolic activity: the activity of narration, sometimes called *narrative instance* (Branigan and Deleyto, 1991). A film is at a textual level, a mixture of narration and representation. Narration is performed by a voice-over or onscreen explicit narrator or as metaphoric activity whose origin is the camera. Representation is the story represented by means of actors and a dramatic space, with a certain relationship with the audience. Representation and narration, however, do not cover all the textual activities that appear in a film. Deleyto proposes also focalization, which covers the textual area that had been left empty by the restriction of the role of the narrator. The role which is performed by the narrator in a novel is, in the film text, carried out by both the narrator and focalizer. Focalization and narration, therefore, exist at the same level in the film. Deleyto argues that in the film several internal and external focalizers can appear simultaneously at different points inside or outside the frame, all contributing to the development of the narrative and to the creation of a permanent tension between subjectivity and objectivity.

As we have already mentioned, focalization in a film can be internal or external. External focalization is more common than a character bound focalization in a film compared to the novel. Cases in which the external focalizer disappears are point of view shots or subjective shots, and in cases showing a character's dreams, fantasies and flashbacks. In a typical point of view shot, we have a character looking offscreen and a cut to what they are looking at, taken from the exact position they are looking from. There seem to be four **textual codes** that establish internal focalization without making the external focalizer disappear. They are (Deleyto, 1991):

- *editing*: the two most important techniques in continuity editing are the eyeline match and the shot/reverse shot. The eyeline match relates two shots by means of the gaze of one or several characters. The first shot focalizes externally on the character looking offscreen, while the second shot shows what the character is looking at from a position which is not the one occupied by the character (unlike the subjective shot). The shot/reverse shot is used frequently in dialogues. It directs the spectator's attention to one or another part of the film space;
- *movements of the camera*: internal focalization can be presented textually by cutting from A to B, by including both in the frame and by emphasizing A's gaze, or by tracking, panning, and tilting from A to B;
- *framing*: the focalizer and the focalized may appear simultaneously onscreen, while the external focalizer occupies a position different from theirs, for example the shot from behind including the character and the object of his gaze. The general rule is that the most active internal focalization corresponds to the character framed closest to the camera;

- *mise-en-scene* (staging of the events in front of the camera): sometimes what is important is the relationship between the pictures in the film space and the importance of the gaze of one or several of them.

Summary

In this section we have introduced narratology and ways of dealing with narrative analysis. As we have seen, the analysis is mainly qualitative, but there have also been some steps made in the direction of quantitative analysis. Propp, Colby and Greimas found a certain number of basic characters (actors) and roles they perform. They also claimed those roles follow a certain order. From the point of view of this thesis, these are the most important findings established by narratologists, because they provide certain evidence that narratives, at least those with similar content, follow a basic structure. This basic structure is independent of the author of the narrative. We can understand it as the reflection of the world we are living in. If structure can be found in fairytales for which we know are products of the authors' imaginations, then it should be even more easily found in narratives expressing realistic events, for example, the relationships between two countries through a certain time period.

2.2 NETWORK ANALYSIS

Social network analysis focuses on relationships among social entities, and on the patterns and implications of these relationships. "The social network perspective encompasses theories, models, and applications that are expressed in terms of relational concepts or processes. That is, relations defined by linkages among units are a fundamental component of network theories" (Wasserman and Faust, 1994: 4).

Network is composed of two main components: the set of *vertices* that represent selected units and the set of *lines* (links, ties) that represent relationships between units. Those two sets determine a graph. Lines can be directed or undirected. Additional information about lines and vertices can be given. These are so-called properties or attributes (Batagelj and Ferligoj, 2003).

Fundamental concepts in social network analysis (Wasserman and Faust., 1994):

- Actor: actors are the social entities with which network analysis is concerned. They can be individuals, corporate units, or collective social units;
- Relational tie: relational tie is the linkage or social relationship between actors;
- Dyad: a dyad is a linkage or relationship between two actors;
- Triad: a triad is a linkage or relationship between three actors. Balance theory has motivated many triadic analyses. We are interested whether the triad is transitive (actor i likes j and j likes k, than also i likes k) and balanced (if two actors like each other, then they should be similar in the evaluation of the third actor and vice versa);
- Subgroup: a subgroup is any subset of actors and all ties between them;
- Group: a group is the set of all actors on which ties are to be measured;
- Relation: relation is the set of ties of a specific kind among members of a group;
- Social Network: a social network is composed of a finite set or sets of actors and the relation or relations that exist among them.

"The main goal of social network analysis is detecting and interpreting patterns of social relationships between actors", (de Nooy et al., 2005).

Examples of networks:

- Social networks:
    - Relations between people (i.e. friends);
    - Relations between political parties;
    - Trading between organizations and countries;
    - Genealogies;
    - Reference networks (i.e. citation networks);
    - Computer networks;
    - Networks of telephone calls;
- Flowcharts of computer systems in computer businesses;
- Petri networks;
- Organic molecules in chemistry;
- Word association networks;
- Networks of transport connections.

2.2.1 Graph theory

Reasons for using graph theory in social network analysis (Wasserman and Faust, 1994):

- it provides vocabulary to label and denote many social structural properties;
- it provides mathematical operations and ideas with which many of the properties can be quantified and measured;
- through vocabulary and mathematics provided by graph theory many theorems about graphs and, hence, about representations of social structure can be proved.

Some definitions:

- *graph*: a graph is an ordered triple G=(*V, E, A)*. The set *V* is the *vertex* set of the graph G; *E* is the set of *edges* (undirected lines), and *A* is the set of *arcs* (directed lines) of G: *V*, *E,* and *A* are pairwise disjoint sets. If *A*=Ø, the graph G is *undirected*. A graph is *directed* if *E*= Ø (Batagelj et al., 2005). Directed graph is called *digraph*. Sometimes we use G= (*V,L*) as a shorthand for a graph, where *L*=*E* U *A.* To each line *p* belongs a pair of vertices – its *endpoints*. In the case of an edge we denote this by *e*(*u: v*) or equivalently by *e(v: u),* where $e \in E$ and in the case of an arc by *a(u, v)*, where $a \in A$. The later means that *u* is *initial* and *v* *terminal* vertex of the arc *a.* When both ends of a line are the same, we call it *a loop*. If the vertex is not an end of any line it is an *isolated vertex*.

  Abbreviation

  $u\mathrm{L}v := \exists\, p \in L : p(u, v)$

  denotes adjacency relation. Elements *u* and *v* are *adjacent* if *p(u,v)* belongs to *L.* A graph G is finite only if the sets *V* and *L* are finite. The number of vertices in graph *G* is denoted by *n* and the number of lines by *m.*

  A graph that contains only one vertex is *trivial*. A graph that contains *n* vertices and no lines is *empty* (Wasserman and Faust, 1994). A graph is *simple* if for each pair of vertices $u,v \in V$ the following holds (Batagelj et al., 2005):

  - either they are not endpoints of the same line; or
  - $u = v$ and there is exactly one directed loop at *u*; or
  - $u \neq v$ and there is exactly one edge and no arc with *u, v* as endpoints; or

- u ≠ v and there is at most one arc in each direction and no edge with u, v as endpoints.

- *subgraph*: a graph G_s is a subgraph of G if the set of vertices of G_s is a subset of the set of vertices of G, and the set of lines in G_s is a subset of lines in the graph G. A subgraph G_s is induced by a set of vertices V_s if G_s has vertex set V_s, and line set L_s, that includes exactly all lines from L that have both endpoints in V_s. A subgraph G_s is induced by set of lines, L_s, if G_s has line set L_s, and node set V_s, that consist exactly of all endpoints of lines from L_s;

- *bipartite graph*: a graph is bipartite if vertex set can be partitioned into two disjoint sets U and V such that each line has its endpoints in both sets. A bipartite graph is a complete bipartite graph if each vertex in U is linked to each vertex in V. If U has n elements and V has m, then we denote the resulting complete bipartite graph by $K_{n,m}$;

- *complete graph*: a complete graph with n vertices (denoted K_n) is a graph with n vertices in which each vertex is linked to each of the others (with one edge between each pair of vertices);

- *walk*: a walk is a **sequence** of consecutive lines in a graph and the **length** of the walk is the number of lines traversed. More formal definition (Batagelj et al., 2005: 107): a finite sequence of vertices and lines of a graph $G= (V, L)$,

$S= v_0, s_1, v_1, s_2, v_2, \ldots\ldots, s_k, v_k,$

is a walk from v to v_k on G if

$$\bigwedge_{i=1}^{k} s_i(v_{i-1}, v_i)..$$

The number k is the length of the walk S, denoted also as $|S| = k$. Vertex v_0 is the initial and vertex v_k the terminal vertex of the walk S. The walk is *closed* and called a *circuit* when $v_0 = v_k$. A walk is *elementary* if all its vertices (except the initial and terminal vertices) are different.

In digraphs walk can be made only in the direction of the arcs. Special types of walks are: trails, paths, tours, and cycles;

- *trail*: a trail is a walk also called a simple walk in which all of the lines are distinct, though some vertices may be included more than once (Wasserman and Faust, 1994);

- *path*: a path is a walk containing different vertices and different lines (Batagelj, 2003);

- *cycle*: a cycle is a closed walk of at least three vertices with different inner vertices and lines (Batagelj, 2003). In a digraph a cycle (directed cycle) is a closed directed walk of at least three vertices in which all vertices except the first and the last are distinct.

- *tour*: a tour is a walk in which each line in the graph is used at least once (Wasserman and Faust, 1994);

- *Eulerian trail*: a trail that includes all of the lines from L is called Eulerian trail.

- *chain or semiwalk*: a chain or a semiwalk is a walk in which directions of arcs are ignored (Batagelj, 2003). The definition of a *semicycle* is the same as that of the cycle except for the part of directions of arcs. In semicycle a direction of arcs is ignored (Wasserman and Faust, 1996);

- *connected graph*: a graph is (weakly) connected if there is a chain connecting every pair of vertices. A graph that is not connected can be divided into connected *components* (disjoint connected subgraphs). When each vertex inside the component can be reached from any other vertex by two different chains we talk about a *bicomponent*. Removal of any of the vertex inside the bicomponent does not cause disconnectedness of a given subgraph;

- *strongly connected graph*: a graph is strongly connected if there is a path between each pair of vertices (Jesenko and Šifrer, 1998);

- *complement graph*: the complement $\overline{G}$ of a graph has the same set of vertices; a line is present between an ordered or unordered pair of vertices in $\overline{G}$ if the ordered or unordered pair is not in the set of lines G, and a line is not present in $\overline{G}$ if it is present in G;

- *semiforest*: semiforest is a graph containing no semicycle as a subgraph. If it is also connected we call it a *semitree*. An undirected semitree is a *tree*.

- *degree*: the degree of a vertex is the number of lines that are incident with it or the number of nodes it is adjacent to (Borgatti, 1994). We can calculate the mean vertex degree, $\overline{\deg}$:

$$\overline{\deg} = \frac{1}{n}\sum_{v\in V}\deg(v) = \frac{2m}{n};$$

- *in-degree*: the in-degree of a vertex v is the number of arcs with v as their terminal vertex. A mean in-degree is computed as:

$$\overline{in\deg} = \frac{\sum_{v\in V} in\deg(v)}{n};$$

- *out-degree*: the out-degree of a vertex v is the number of arcs with v as their initial vertex. A mean out-degree is computed as:

$$\overline{\text{out deg}} = \frac{\sum_{\text{v}\in\text{V}} \text{out deg(v)}}{\text{n}};$$

- *density of graphs*: the density of a graph is the proportion of lines in the graph as a whole. It is the ratio between the number of lines present to the maximum possible and can be for simple undirected graphs computed as:

$$\gamma = \frac{m}{\frac{n(n-1)}{2}} = \frac{2m}{n(n-1)}$$

In a simple directed graph without loops, arc is an ordered pair of vertices, so there are n(n-1) possible arcs. The density is hence computed by:

$$\gamma = \frac{m}{n(n-1)};$$

- *cut vertex or cut point*: a cut vertex is a vertex that if removed (along with all lines incident with it) produces a graph with more connected components than the original graph;

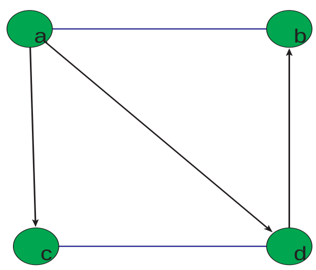
- *bridge*: a bridge is a line that is critical to the connectedness of the graph. If it is removed, it produces a graph with more connected components than the original graph.

Graph description

There are at least three ways of describing a graph:

- **general** description: graph is defined by a set of vertices, a set of pairs of vertices connected by arcs, and a set of pairs of vertices connected by edges. Lines are the union of arcs and edges.

  Example 1:

  The description of the graph from Example 1 is the following:

  ```
  V= {a, b, c, d}
  A= {(a, c), (a, d), (d, b)}
  E= {(a, b), (c, d)}
  G= {V, A, E}
  L= {A, E};
  ```

- neighbours: we can describe a graph by assigning sets of neighbours linked by arcs or edges to each vertex. To each vertex we assign sets of neighbours corresponding to the links that start in that vertex.

The description of the graph from Example 1 is the following:

```
V= {a, b, c, d}
NA(a)= {c, d}
NA(d)= {b}
NE(a)= {b}
NE(c)= {d};
```

- matrix: we can describe a graph also by a matrix. The matrix has elements x_{ij} equal to 1 if there is an arc from the (row) vertex v_i to the (column) vertex v_j, and 0 otherwise. We can describe an edge as consisting of two arcs directed in both directions. Only 0 and 1 are in the matrix when graph *G* is binary. Values in the matrix that are higher than 1 represent a multiplicity of links. The graph from example 1 in the matrix form is

	A	b	c	d
a	0	1	1	1
b	1	0	0	0
c	0	0	0	1
d	0	1	1	0

Properties of Graphs, Relations, and Matrices

Let $R \in \mathrm{Rel}(A, A)$. This can also be viewed as the relational graph G = (*A*, *R*).

1. Reflexivity

The relation *R* is said to be reflexive if and only if

$$\forall x \in A : xRx \qquad I \in R .$$

The relational graph has a loop at every vertex. In a matrix form this means that all elements along the main diagonal, x_{ii} for all *i*, equal 1.

2. Symmetry

A relation is symmetric if and only if

$$\forall x, y \in A : (xRy \Rightarrow yRx \qquad R = R^{-1} .$$

A nondirectional relation is always symmetric. All arcs in the relational graph are in reciprocating pairs. If the matrix is symmetric, it is identical to its transpose.

3. Transitivity

A relation is transitive if and only if

$\forall x, y, z \in A : (xRy \wedge yRz \Rightarrow xRz) \qquad R^2 \subseteq R$.

If in the relational graph we can reach a vertex from another vertex in two steps, we can reach it also in one step. In a matrix a transitive relation means that ties present in $\boldsymbol{X}^2$ are a subset of ties present in $\boldsymbol{X}$.

Now that some basic terms and properties of graphs have been introduced, we can define a network as **a graph** with **additional information** about vertices and or lines $N = (V, L, P, W)$. Attributes of vertices P and lines W can be measured in different scales: numerical, ordinal and nominal. They can be input as data or computed from the network. *Temporal network* $N_T = (V, L, P, W, T)$ is obtained if the time T is attached to an ordinary network. T is a set of linearly ordered time points $t \in T$. In temporal networks vertices $v \in V$ and lines $l \in L$ are **not necessarily present** or active in all time points. If a line $l(u,v)$ is active in time point t then also its endpoints u and v should be active in time t. We can call a network consisting of lines and vertices active in time $t \in T$ the *time slice* in time point t. *Multiple or multirelational networks* on the same set of vertices can also be defined. A network is multirelational when several different relationships between a pair of vertices exist.

Summary

Some basic terms of graph theory have been introduced. We have defined a graph as a set of vertices V and a set of lines L. Vertices represent units while lines represent relationships between units (actions). Those basic terms have to be introduced because they will be used in this text. We will try to represent narratives in terms of network theory. When introducing narratology, we mentioned three ways of event definition. One of those definitions included confrontation as the basic characteristic of an event. According to this definition, a functional event consists of two units or actors and one action. Knowing also the definition of network, a functional event is described as a dyad: two vertices (actors) are connected by a relational tie (action).

3. REVIEW OF POSSIBLE APPROACHES TO NARRATIVE ANALYSIS

Narratives are present in our everyday lives. News through a certain time period, historical events, our favourite television series, films and novels, among others, constitute narratives. There are several approaches to narrative analysis.

We have already quite thoroughly described *narratology*, the theory, which has developed its own tools for narrative analysis. It uses mostly a **qualitative** approach, which enables **comparison** between narratives. Some steps in the direction of discovering the basic, chronological structure of narratives have been made by narratologists. Here we must mention Propp's and Colby's findings that functions or eidons in a narrative have a certain chronological order, Labov's model of a certain **order** of functional parts in a narrative, and Freytag's and Tilley's model of the so called plot structure (Sharpe, 2000b). Attempts have been made to form a **typology** of actors in narratives.

3.1 Brief description of some approaches to analysis of narratives composed of numerical data

Narratology, however, is only one of the possible approaches towards narrative analysis. Also other approaches must be mentioned, but which are not necessarily qualitative. Narratives, in fact, can be composed of **numerical** data. For example, mortality or the number of live born children in a chosen country in a certain time period is a narrative. For analysis of that kind of numerical data we can use the *time series method*. By finding predictors for the dependent variable in question, we can understand and also predict the behaviour of that variable. When the variable of interest is **categorical**, we can try to fit sequences of categories by estimating transition **probabilities** step by step. In this case we use *Markovian analysis* because it gives good predictions in the case of stationary processes, although is practical only when the models involve just one previous time period and a fairly small state space (Abbott, 1995). When we are interested in transitions from only **one** particular prior **category** and the issue is time till transition, we can use *event history analysis*, also called survival analysis in biostatistics. It is comprised of methods for analysing data that consists of life histories of individuals (Broström, 2001). It allows analysis of factors which influence the time when a single event, repeated events or multiple types of events will happen (Raftery, 2000). It has been used, for example, for the analysis of interviewer and respondent survey behaviour

(Lepkowski et al., 2000), for studying women's employment and fertility histories interdependence (Budig, 2003), for investigating the effects of local conditions on city-level hazard rates of rioting (Myers, 1997), and for the analysis of permanent employment in Japan (Yamaguchi, 1992).

3.2 Content analysis

One of the techniques employed for narrative analysis is *content analysis*. It can be defined as a method for systematic, objective and quantitative analysis of **message characteristics** (Neuendorf, 2002). We use it when we want to change qualitative data into quantitative data, in order to make statistical analysis on that data possible. It enables conclusions about the characteristics of outer linguistic phenomena: source, recipient and social environments that are in a certain relationship with messages (Splichal, 1990). While some definitions narrow the usage of content analysis to written or transcribed words, others claim that it can be conducted on written text, transcribed speech, verbal interactions, visual images, characterizations, nonverbal behaviour, sound events, or any other message type (Neuendorf, 2002). In the thesis we will limit the application of content analysis to linguistic means of expression. In this case, the method is called text rather than content analysis. In general, we can distinguish between a thematic, semantic, and network approach to text analysis (Popping, 2000).

The **thematic approach** to text analysis is comprised of the **classification** of words into different meaning categories, which are then summarized in the **matrix** containing **frequencies** of those meaning categories. **Coding** of words can be done by hand or by computer. It is understood as a measurement procedure and is comprised of the classification of words into meaning categories. When it is done by hand, objectivity is gained by the training and supervising of coders. The result of the coding is the matrix of frequencies that enables statistical analysis of the data (Roberts, 1989; Popping, 2000; Splichal, 1990).

The alternative to thematic text analysis is **semantic** text analysis, which besides words or concepts, considers also **relations** among concepts. In sentences, concepts are related and those grammatical relations are denoted by a verb. Therefore, grammar can be represented as a semantic **triplet** (Subject, Verb, Object) (Popping, 2000). Semantic grammar has the (Subject, Modal auxiliary verb, Verb, Object) form used in *linguistic content analysis*

(Roberts, 1989). This method codes each clause according to the meaning that it was intended to convey (as a description or a judgment of a process or of a state-of-affairs). After the **meaning** of a sentence is established, the following **attributes** of a clause are coded: the type of clause, the tense, whether or not a clause is a question, the valence, the speaker, the audience, the semantic subject of the verb, the modal auxiliary of the verb, the semantic object of the verb and the modifier of the object. Codes for these attributes are given in a matrix that can be afterwards statistically analysed (Popping, 2000). Franzosi (1989; 1997; 1998), on the other hand, uses the (Subject, Verb, Object) or what he calls (Subject, Action, Object) form of coding in his *story grammar* or semantic grammar technique. The basic structure of his technique links **social actors** around specific **spheres of action**. It associates subject, action and object and further makes it possible to analyse narrative information statistically or as Franzosi says: "It translates words to numbers". It also enables the use of network models on the coded data. If we compare Franzosi's approach to Propp's, Greimas's and Colby's approach to narrative analysis, we can see that there are some similarities. Franzosi has studied articles about labour movements in Italy through a certain time period. He has counted the occurrences of actors, objects and actions and found out that the number of actors and actions performed by actors is limited. This finding is quite similar to Propp's, Greimas's and Colby's, who have also discovered a limited number of actors and functions (or eidons) in their study of folk tales. Franzosi, contrary to Propp and Greimas, uses a computer program for the analysis of data, and therefore a more complicated analysis of that data is possible. The computer program he uses is called PC-ACE. Another program that uses syntax grammar (Subject, Action, Object) is the Kansas Event Data System (KEDS) (Schrodt and Gerner, 1994; Popping, 2000). It codes journalistic descriptions of international interactions as who has done what to whom and when. It also allows statistical analysis of the coded data.

The semantic approach with its description of narrative texts has made its first steps towards network analysis of coded data. It has described data as dyads composed of subject and object, and the relationship between the two. **Network** approaches that have been developed as an alternative and contribution to thematic and semantic text analysis are: cognitive mapping, network evaluation process, centering resonance analysis.

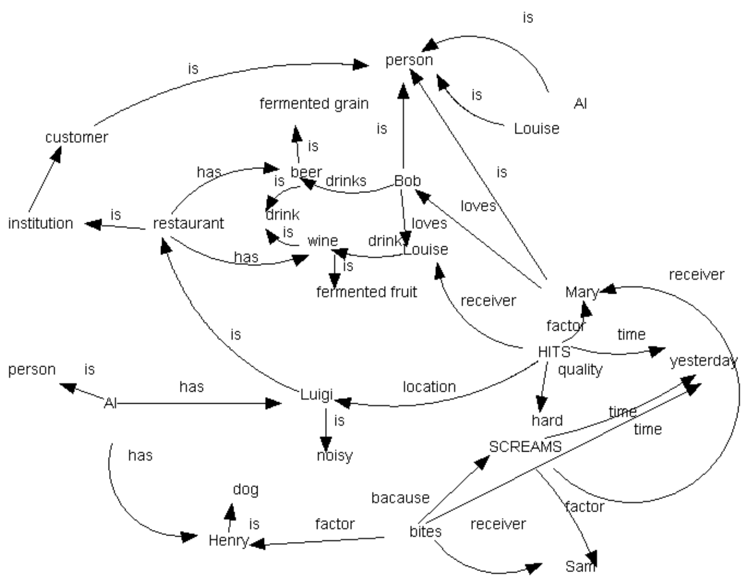
The *cognitive mapping approach* represents narratives as mental models. The main characteristics of mental models are (Carley and Palmquist, 1992):

- they are internal representations;
- the key to their understanding is language;
- they can be represented as networks; one of the examples for this is Sowa's conceptual graph theory (Moulin, 1997);
- the meaning of the concept for an individual is embedded in its relationships to other concepts of the individual's mental model;
- the social meaning of a concept is not defined in a universal sense, but through intersection of individuals' mental models.

Essentially, mental models are represented as a network of concepts and the relationships between them. While *concepts* are symbols that have meanings dependent on their use, relationships are ties that link concepts together and can have directionality, strength, sign and meaning.

The researchers who used the implications on the storing of information in a network of associative concepts for advising how to improve learning and reading were Tony Buzan (1980) and Peter Russell (1986). The figure below is a so-called semantic net, which shows a part of the interactions between Bob, Louise, Mary, Al, Henry and Sam at Luigi's. The people and objects in the interaction are connected with lines that show the ties between them.

Figure 3.4: Semantic net.



Source: Russell, Peter (1986): Knjiga o možganih. Državna založba Slovenije, Ljubljana.

One of the methods that uses a cognitive mapping approach is Kathleen Carley's map analysis. Her approach enables comparisons among cognitive maps of individuals. A *map*, according to her, is defined as a network constituted of concepts and relationships among them, which are at the higher level called *statements*. She uses a computer program for text coding, graphical display and analysis of cognitive maps (Carley and Palmquist, 1992).

The network evaluation approach starts from the position that each language has three kinds of words: common meaning terms (evaluative meaning is fixed), attitude objects (evaluative meaning is not fixed), and verbal connectors (words that indicate the association or disassociation of attitude objects with common meaning terms or with other attitude objects) (Osgood, 1956; Popping, 2000). The text is parsed into so-called *nuclear sentences* in which the three word-types can be found. After that, nuclear sentences are recombined in a way that reveals structure in the text. The result is a **valued** network of concepts and connections between them. From it, we can see the **attitude** of the (implied) author towards the objects, and also the author's mental map of attitudes of those actors towards each other (Van der Berg and Van Der Veer, 2000).

Centering resonance analysis (CRA) is a method that uses linguistic analysis to identify **important** words in utterances and link these into a network (Corman et al. 2002). The basic proposition behind the method is that competent writers and speakers deploy words strategically to create a sensible, **coherent** message (Brandes and Corman, 2003). CRA identifies all words from noun phrases (nouns and adjectives) that are considered **linked** if they **co-occur** in noun phrases or occur sequentially in the same sentence. Words and lines between them constitute a CRA network, which can be further analysed.

3.3 Sequence analysis

Andrew Abbott (1995; 2000) uses the term *sequence analysis*. Sequence is, according to him, an **ordered** list of elements[10]. Elements of a **sequence** are events drawn from a set of all possible events. The **properties** of sequences are:

- events in a sequence can be unique (non-recurrent events), or can repeat (recurrent events);
- sequences can have dependence between their states;

[10] Temporal sequence is mathematically an order in one dimension.

- there can be varying degrees of dependence between various whole sequences (occurrence of an event in any one sequence prevents that occurrence in any other);
- sequence can be investigated on its own (patterns in a collection of sequences), as independent variables (how a prior event sequence affects the immediate future), or dependent variables (what accounts for different sequences of behaviour).

Sequence data sets can be, according to Abbott (1995), approached using several methods. He calls these methods (Markovian analysis, time series, event structure analysis) **step-by-step** methods. They are the opposite to **whole** sequence methods, under which he assigns the optimal matching method, event structure analysis and theory of comparative narratives (Abbott, 1995). What all three methods have in common is that the data for their use must be coded and that sequences entering the analysis are recurrent.

For analysing narratives, Andrew Abbott introduced the *optimal matching technique*, supported by a computer program called OPTIMIZE (Abbott, 2000). Optimal matching method works on coded sequential data. **Distances** between sequences are computed on the basis of the minimum combination of **replacements**, **insertion**, and **deletion** (costs) required to **transform** one of a pair of sequences into another. The result is a matrix of distances between all pairs of sequences. Distance matrix is further analysed by cluster analysis or multidimensional scaling (Abbott, 2000). With these methods, groups of **similar** sequences are obtained, which are used for the explanation and generalization of data.

The optimal matching method has been used, for instance, for searching the career patterns of executive women in finance (Blair-Loy, 1999), for the modelling of the transformation of the career system in a large British bank (Stovel et al., 1996), and for analysing movement patterns in infants and toddlers with or without motor delays (Miller and Roid, 1993). Studies conducted by others which used the optimal matching technique as a tool for the analysis are enumerated in Abbot and Tsay's article (2000) about the sequence analysis and optimal matching method in sociology. The critical review of the method is given by Wu (2000).

The other two whole sequence methods are described later because their result is a so-called story graph containing also time dimension.

3.4 Narratives represented as networks containing time dimension

A narrative can be transformed into a story graph constituted of a set of vertices representing events $V = \{v_1, v_2, ..., v_n\}$ and a set of lines $L = \{l_1, l_2, \ldots, l_m\}$ connecting one event to another.

A story graph is a directed acyclic graph G =(V, L), where events V are ordered in levels. Each level represents a different time moment of a story.

Two events are connected if there is a relationship between them. A relationship between two events exists when the event v_2 is a consequence of the event v_1. That means that actualisation of an event v_2 is conditioned on actualisation of event v_1. We can say that there is a causal relationship between the events.

$$v_1 R v_2 \Leftrightarrow \{(v_1, v_2); v_1 \in V \wedge v_2 \in V \wedge P(v_2 / v_1) = \frac{P(v_1 \cap v_2)}{P(v_1)} \}$$

All nodes at one level of story graph G are not adjacent to all nodes at the sequential level of the graph. The graph is weakly connected and acyclic, because events that happened later cannot condition events that happened earlier in a story time.

The result of the *event structure analysis (ESA)* is the description of a narrative described above. It has been developed by David Heise (1988; 1989) and is accompanied by a computer program called ETHNO (Griffin, 1993). ESA views social processes as a successive **series** of events. An event is understood as a distinguishable happening, one with some pattern or theme that sets it apart from the others, and one that involves changes taking place within a delimited amount of time (Conkin and Stromberg, 1989; Griffin, 1993). As we can see, the definition of the event is similar to the one of Mieke Bal's, which sees an event as a change in the direction of the fabula. When conducting ESA, the researcher must first **list** all the events from the narrative they wish to analyse and also presume a **chronological** order of chosen events. After that the researcher enters events into the ETHNO program. The program then asks the researcher several questions about the causal **connectedness** of events. Answering those questions requires the researcher's expert judgment or **knowledge** about causal connections of events. The responses to ETHNO's questions result in a directed or causal diagram of the **logical structure** or action underlying the event's narrative or chronology (Griffin, 1993). **Generalization** of narrative structure is also possible and leads to the discovery of other narratives that have the same primitive structure.

Heise's method therefore helps the researcher to select the so-called kernel events and through the process this method reveals a plot that is common to several different stories. It has been used empirically for studying cultural routines and the subjective representations of reality (Heise, 1989), understanding the structure of gossip (Eder and Enke, 1991), understanding the lynching of African – Americans in Mississippi (Griffin, 1993), understanding organizational life histories (Hager, 1998), and understanding planned social change (Stevenson et al., 2003).

After the ETHNO program, Heise developed a new computer program for the coding of events called the Connections. The coding is done by a so-called Event Frame that is constituted of several categories for describing an event: agent, action, object, instrument, alignment, setting, product and beneficiary (Heise, 1995; Heise and During, 1997). The program does the coding automatically, after which the statistical analysis of the coded events is possible. For example, one can study how many times a certain object is a part of described events or what kind of functions a certain object in the narrative has. The program also conducts ESA and is therefore an improved version of the ETHNO program (Abell, 2004).

Peter Abell's *theory of comparative narratives* also deals with narrative structure, but slightly differently from ESA. The main idea of the theory is the same, that is, it tries to find the abstraction of a narrative structure and enable the comparison between narratives (Abell, 2001). Abell's method, however, focuses more on the formal **graphical structure** of narratives. It tries to reduce a narrative to a minimal **homomorphic** representation. Through formalisms used (digraphs, semi-groups, homomorphisms), it tries to answer the question whether two or more narratives are sufficiently **similar** to permit the assumption that the "same" generative mechanisms are at work (Abell, 2000). Let's take a look at the presentation of a narrative path using Coleman's diagram (Figure 3.5).

Figure 3.5: A narrative path, derivative of independent Coleman diagram.

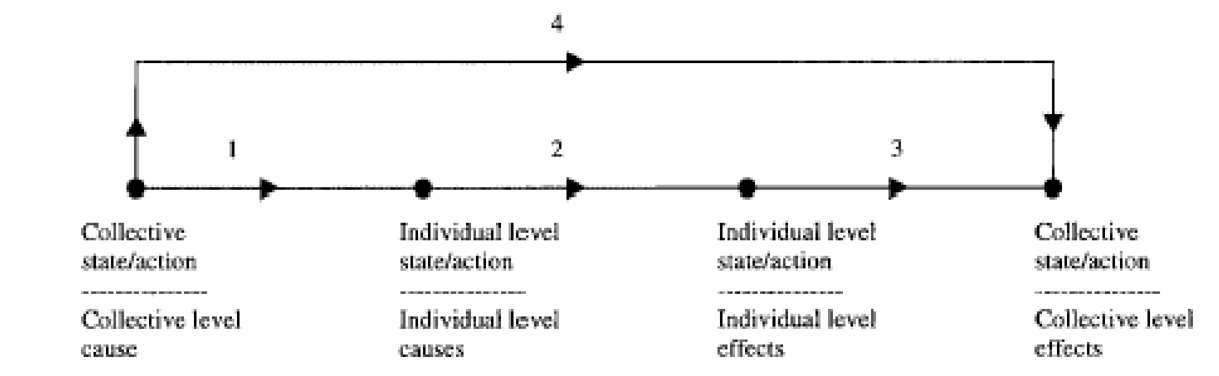
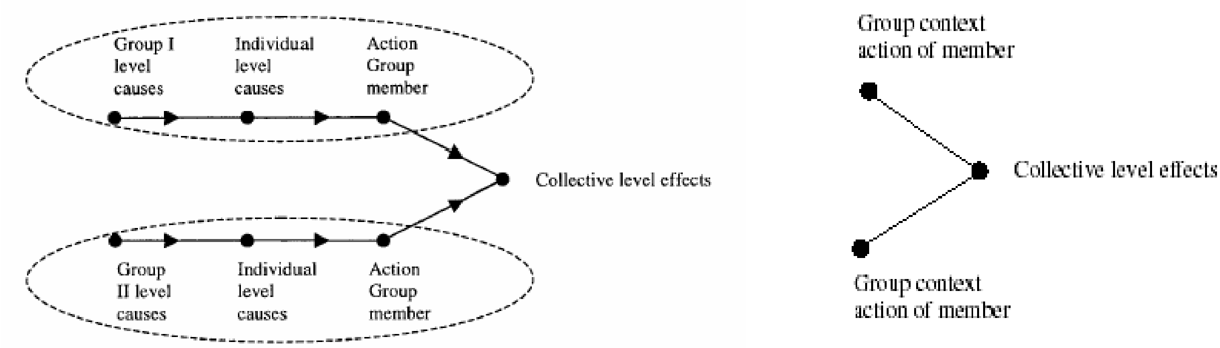


Figure 3.5 shows the narrative **path**. The points in the diagram represent **actions** or states of specified actors. Time passes from left to right. The numbers above lines are different **causal** relationships. The relationship of type 4 should be reduced to the conjunction of types 1, 2, and 3. If we have a narrative derivative of a Two-Path independent Coleman diagram (left hand side of Figure 3.6), we can apply a homomorphic reduction / **abstraction** to it (right hand side of Figure 3.6).

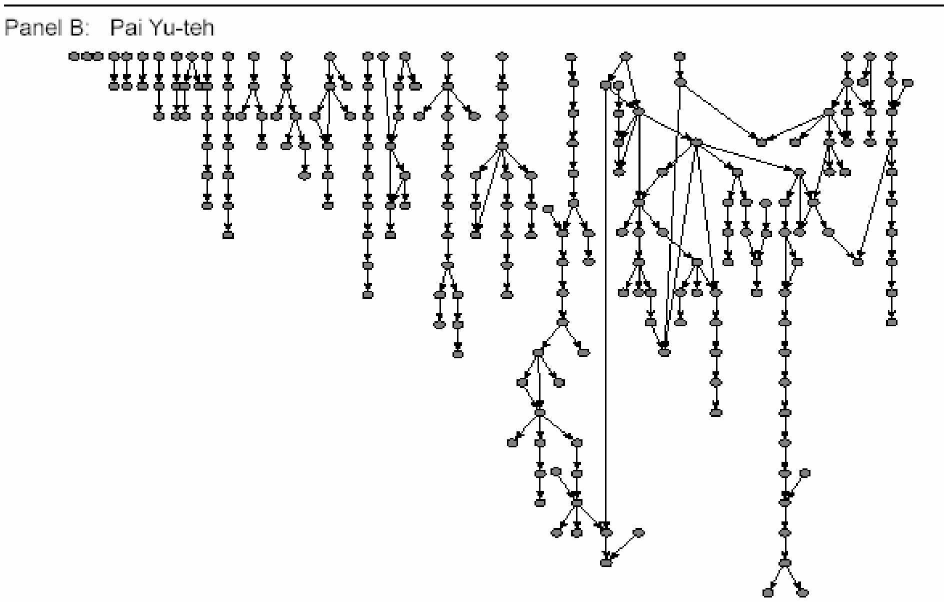
Figure 3.6: A Narrative Derivative of a Two-Path Independent Coleman Diagram and its possible homomorphic reduction / abstraction.



We have abstracted type 1, 2, and 3 causality to type 4. This example depicts that narrative structures are open to p-homomorphic abstraction and generalization, which are explained in detail in Abell 's book (1987).

The result of ESA and the theory of comparative narratives is a network presentation of a narrative including time dimension. To obtain a network presentation, these methods use different techniques. None of them use network analysis for obtaining a basic structure of a narrative. Peter Bearman, James Moody and Robert Faris (2003), however, used *network analysis* for the study of narratives. They were dealing with *casing*, which bounds the beginning and end of event sequences. On the basis of 14 stories about a revolution in one Chinese village, they made a graphical representation constituted of events as nodes, and causal and logical connections between them as arcs. The linguistic way to describe connections is that they are **narrative clauses**. One of the stories is shown in the figure below. The narrative **time** moves from top to bottom. The right-left axis is not interpretable. Events on the left side are not tied to the events on the right side of the figure.

Figure 3.7: The story from Pai Yu-teh, one of the villagers.



Source: Bearman S. Peter, Moody James, Faris Robert (2003): “Networks and History”. Complexity, 8, 1, pp. 61-71.

From 14 stories researchers formed a **population** of events. By knowing the relationships between events, they drew a graph similar to the one in Figure 3.7, but containing all the mentioned events.

To get a **basic** structure of a narrative or what they call a case, they first identified a **major component** on the graph and then also a **bicomponent**. An entirely connected graph was obtained with this approach in which nodes were connected to each other by at least two different chains and were hence more **stable** (Bearman et al., 1999).

We have described one way of how narratives can be presented as networks including time dimension. In the way the nodes represent events, relationships represent causal connection and time has flowed from the top to the bottom of the network. There are, however, also other ways of narrative visualization, including time component. Narratives can be presented as *temporal networks* including **changes** in relationships among actors through **time**. Temporal networks are in fact dynamic graphs – network changing over time. In such networks, the presence of a vertex and the activity of a line can change through time (Batagelj, 2005). In general, visualization of social networks has become important since Moreno’s introduction of the sociogram (Freeman, 2000). Actors (for example classmates) are represented as nodes and relationships (for example friendships) among actors are represented by lines, with relational direction indicated by arrows (Moody et al., 2003). Over time the need for a representation of change in networks has become popular. Two common **visualization** approaches have developed. The first plots network summary statistics as **line-graphs** over time, and the second separates **images** of the network at each point in time – *time slices* (Moody et al., 2003). The second approach can be divided into two major classes: *static flip books* where node position remains constant, but edges cumulate over time and *dynamic movies* where nodes move as a function of changes in relationships (Moody et al., 2003).

Temporal reasoning is an approach to narrative analysis that is interested more in the time dimension of a given narrative. Usually we are interested in the chronology of a story that can be put together on the basis of temporal information of actions, like dates and times and other temporal clues given by words such as before and after. A graph theoretic model can be made to help reason about events. The model is called an **interval** graph, which has nodes that represent time intervals of events. Two nodes are connected by an edge if time intervals of events that they represent **intersect**. An interval graph has no chordless 4-cycle and its complement is transitively orientable (Golumbic, 1998). When we have only qualitative information about the duration and sequence of events, we can use qualitative temporal reasoning for building a **consistent** scenario. *Scenario* means mapping events onto the time line and is consistent if all relationships are logical. This means that events, which happen at the same time as regards the scenario, can happen at the same time in reality. Various algorithms are used for checking the consistency of a given scenario (Golumbic, 1998; van Beek, 1990).

Summary

There are several approaches to narrative analysis. Mostly researchers are interested in discovering so-called functional events and the temporal order of them. When this basic structure (we can call it a plot) is discovered, they compare it to the structure of some other narrative to get a kind of structure generalization. We have shown in this chapter that there is a lot of empirical evidence that the basic structure of a group of narratives can be discovered (for example Griffin's article on lynching). Therefore, by calling a sequence of events a pattern, we can conclude that there is the possibility of predicting the other parts of the pattern if one small part of it is discovered.

4. POSSIBLE PRESENTATIONS OF NARRATIVES AS NETWORKS AND THEIR ANALYSIS

In the previous chapter we presented approaches to narrative analysis. Some of them transform narratives into networks. Among those, we have mentioned approaches that transform narratives into a story graph. Their main goal is to obtain a representation of a narrative as a sequence of logically and causally connected events. Something similar applies also to the temporal reasoning technique of narrative analysis. When a logical sequence of events is established no further analysis is carried out. In contrast to story graph approaches, some approaches exist that analyse narratives represented as networks still further. In this chapter we deal with these approaches. A description of how networks are formed from narratives is given and also what kind of analysis can be applied to them. Some examples of such kinds of analysis are also given.

4.1 Map analysis

We have already mentioned that mental models are actually networks. They are composed of concepts, which are connected together by relationships. We start narrative analysis by **identifying concepts**, which a given narrative contains. To do this, we can follow an exploratory or confirmatory approach. In the first case, words are drawn from texts[11] themselves, while in the second they are specified beforehand, independently of the narrative in question. Usually, a confirmatory approach is chosen when we deal with a well-defined domain.

When drawing concepts from the text, we can use non-automated through highly automated techniques. In the first case, we define concepts ourselves on the basis of a small but representative sample of text, while in the second we use a text analysis program to do the same thing. When concepts are defined, we can categorize them. If we do not do that, then it is assumed that only one category exists (Carley and Palmquist, 1992).

After defining the concepts, we have to define also the **relationships** between them. Relationships, as we have already mentioned, can have strength, sign, directionality, and meaning. When we derive relationships between concepts, we have to decide how all those

[11] This is true in the case when we have narratives given in textual form.

relationship's characteristics will be used. *Strength* is defined as presence, degree or valence of the relationship between two concepts and is graphically presented as a **number on** the **line**. The strength can be used to denote (Carley and Palmquist, 1992):

- existence: whether a statement is in the text;
- existence plus valence: a positive or negative relationship between concepts;
- either the certainty of the coder's judgment that the relationship exists between two concepts, or the emphasis in the text given to this relationship by the speaker or writer;
- the level of usage (the number of occurrences of a statement).

Sign can be either positive or negative. When concepts are defined as positive terms (fits in, goes to the library), a negative relationship is needed to distinguish, for example, Mary goes to the store from Mary does not go to the store. When concepts are defined as positive or negative, then all relationships may be positive.

Direction is usually graphically presented as an **arrow** and is used to distinguish the direction of a relationship. We can decide that all relationships are unidirectional or all are bidirectional, or that some are bi and some unidirectional.

Meaning of the relationship is defined by the type of relationship. We can distinguish the relationship, for example, 'loves' from 'works with'.

After the concepts are defined and it is decided how strength, sign, directionality and meaning will be used, we can start to **extract** statements. Usually we extract one statement at a time. We locate two concepts and specify the relationship between them (Carley and Palmquist, 1992). Concepts are linked if they are placed together in a text. How close they have to be in order to make a connection between them is up to the researcher to determine. When using a confirmatory approach, we assumed all possible statements beforehand and have to determine whether a pre-established relationship occurs between each pair of concepts. On the other hand, when an exploratory approach is used, we attempt to determine the nature of relationships that we make between concepts.

There are several programs available for carrying out the map analysis. The most recent is called Automap (Diesner and Carley, 2004). When using Automap, we have to decide about text **pre-processing** (the deletion of concepts without content and generalization of concepts) and statement formation **rules**. Usually, we are interested in similarities and differences in concepts and statements across networks (Popping, 2000). With Automap it is possible to extract the network and number of concepts that are present in at least one network (the union), or the network and number of concepts that are present in each of the given networks (the intersection), or even the network and number of concepts that are part of only one network (the union minus intersection). For further analysis of networks we have to use an appropriate program for network analysis. Most commonly, we apply **centrality** analysis to study the importance of concepts. Importance is determined according to the position and the relatedness of a concept to other concepts. Carley distinguishes between three dimensions of centrality on the basis of which she has formed taxonomy of concepts. Those dimensions are *density* (number of adjacent concepts to a concept in question), *conductivity* (the number of twostep paths through a given concept), and *intensity* (the proportion of statements with a greater than average strength, which contain a concept) (Popping, 2000). Using map analysis, we obtain answers to questions such as which concepts people use, how concepts are connected, whether people share similar knowledge, and how similar the analysed narratives are (Diesner and Carley., 2004). Through network analysis conducted on maps, we can, for example, identify concepts that are central in studied texts or in a given narrative, or group of concepts in which connections are stronger than outside (so called islands), or conduct a path analysis on a given map to consider relatedness of concepts.

4.2 Centering Resonance Analysis (CRA)

CRA identifies **important** words (noun phrases) that are potential centres in the utterance – usually a sentence. When we speak, we produce a stream of words comprising **centres** in a strategic way, creating a semantic structure of words (Corman et al., 2002). CRA has four **steps**:

1. *Selection*

Noun phrases in an utterance are determined. Noun phrases are composed of a noun and zero or more additional nouns and/or **adjectives**. Determiners like the, an, a, etc. are dropped.

2. *Linking*

Words are grouped into noun phrases and **stringed** together by verbs, pronouns, determiners etc. Two words are linked if they **form** a noun phrase or if they are **adjacent** in a sentence.

This means that if a noun phrase has three words, all three words will be connected to each other. It also means that if one noun phrase follows another in the same sentence, they will be linked. Therefore, we put a link between two noun phrases if they are adjacent. CRA network is a **valued** network in which values on lines represent the number of times two words were linked together in a text.

3. *Indexing*

The *influence* of each node is determined. Usually the measure is Freeman's betweenness centrality (1978). It is described as "the frequency of location of a concept on the most direct paths between pairs of other concepts. It indicates the potential to withhold or distort information in a communication network" (Popping, 2000: 107). Also resonance of a given network is determined. *Resonance* is the extent to which other texts or utterances deploy words in the same way as a given network (Corman et al., 2002).

4. *Application*

An indexed network is used for some analysis task.

An **example** of a CRA network is a network that has been created on the basis of Reuter's texts about the **terrorist** attack on the United States that took place on 11 September 2001. The network is composed of 13,332 words and 243,448 lines. We have computed the clustering coefficient $CC_1(v) = \frac{2|E(G_1(v))|}{\deg(v) \cdot (\deg(v) - 1)}$ on each vertex, where *deg(v)* denotes degree of a vertex *v*, and $|E(G_1(v))|$ the number of lines among vertices in 1-neighborhood of vertex *v*. According to the formula, the clustering coefficient can take values from 0 to 1, where 1 means the maximum connection between a given vertex and between its 1-neighbouring vertices. It thus defines dense parts of a network. Its disadvantage, though, is that it assigns great value to points with very low degree. A point connected to two other points that are also connected to each other has a value of CC one, for example. There are a lot of these kinds of points in a network, but their importance is very low. To compensate for this, we can calculate the corrected clustering coefficient, which assigns the largest values only to points belonging to the largest isolated cliques: $CC_1^{'}(v) = \frac{\deg(v)}{MaxDeg} CC_1(v)$, where *MaxDeg* means maximum degree of vertex in a network. In Pajek the result is a vector of coefficients, which can be transformed in partition with classes including a certain range of values of clustering coefficients. We **partitioned** the corrected clustering coefficients and extracted the cluster with the maximum values of coefficients (73 vertices). In this subnetwork we computed **islands**, which partition vertices of a network with line values in cohesive clusters (weights inside clusters are larger than weights on lines connecting these clusters to the neighbouring ones). We created islands with a minimum size 5 and maximum size 10. This way we obtained **two islands** between which lines were removed. The islands are shown in Figure 4.8.

Figure 4.8: Islands acquired from the cluster with the largest clustering coefficients.

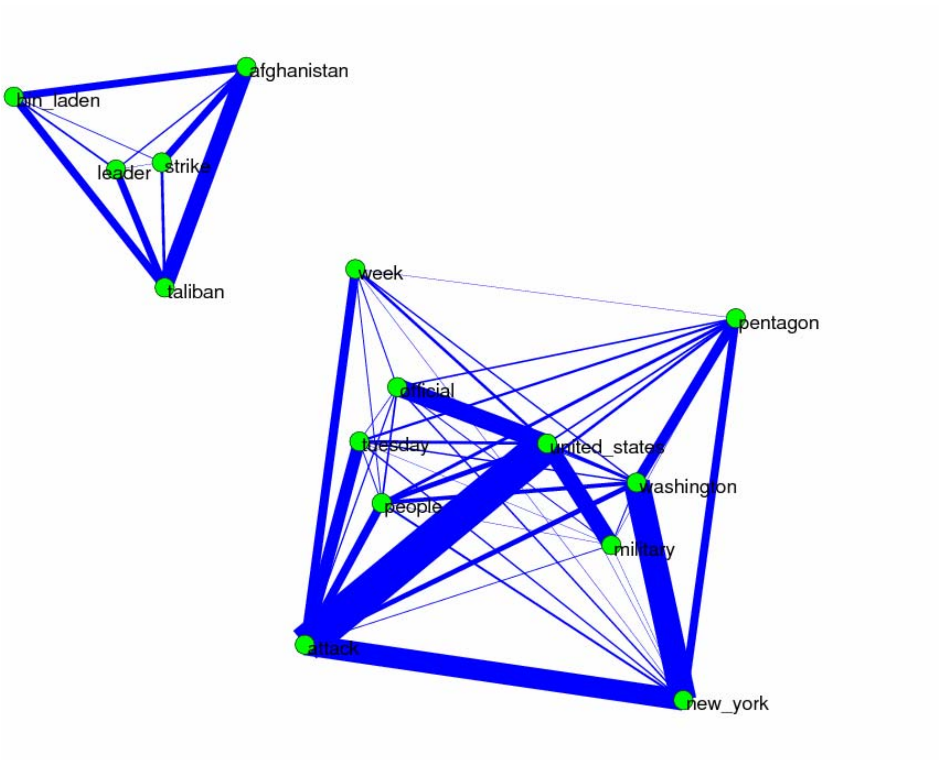


Figure 4.8 shows two cliques or groups of words, which often[12] appeared in a text together. In a way we obtained words that were central for communication. It is interesting that one group refers to words describing attackers and the other the objects of their attack.

4.3 Network Analysis of Evaluative Texts (NET)

The NET approach breaks texts into (Subject, Predicate, Object) triples called *nuclear sentences* (van Atteveldt et al., 2004). Objects and subjects can be actors, variables or the reserved objects Ideal and Reality. *Actors* are the people or institutions that can do things, make decisions, i.e. commit actions. *Variables* are entities such as divorce, inflation, and the like, that can only influence or be influenced by other objects, but cannot consciously act (van

[12] That means more often than with words from the other cluster.

Atteveldt and van Harmelen, 2001). *Ideal* and *Reality* are abstract concepts. We encode a statement as a positive or negative evaluation of a concept by relating it to the abstract concept "Ideal". By connecting a concept to the concept Reality, we affirm that a concept's referent exists or does not exist (Popping, 2000). After we have chosen the subject and object in a nuclear sentence, we also choose a predicate or verb connector of the subject and object. According to the meaning of the verb, we define a **type** of connection. We can choose among 15 types of connections, which can be further categorized into four **meaning classes**: similarity, causal, affective and association relations. *Similarity* connections denote that the subject and object are similar. *Causal* relations imply that a certain subject causes a certain object. *Affective* connections denote a judgment of the object by the subject. Finally, *associative* connections are those that cannot be placed in the other three categories. When the type of relationship has been determined, we decide upon the *valence* (the positive or negative relationship between the subject and object) of the verb and we assign four quantities to it: base ($0 \leq b \leq 1$), quality ($-1 \leq q \leq 1$), ambivalence ($0 \leq a \leq 1$) and divergence ($0 \leq d \leq 1$) (Popping, 2000; van Atteveldt and van Harmelen 2001). *Base* tells us how **important** a particular arrow is viewed in the light of the whole text. It is defined as $b = f / \sum f_i$, where f is the importance (frequency) of the connection, and f_i is the out-degree of the subject, i.e. the sum of all frequencies. *Quality* is the most important characteristic of a relationship. It denotes the **strength** and **valence** of association between the subject and object. It is a product of the predicate and the probability operator (van Atteveldt and van Harmelen, 2001). The predicate has certain strength, while chance operators such as 'maybe' decrease the certainty of the connection, and thus quality is determined by both, predicate strength and probability operators. The other two characteristics of the relationship are *ambivalence* and *divergence*. The ambivalence a_i represents the semantic ambivalence of the predicate and is decided by the coder or by semantic analysis. The divergence d_i of a connection is by definition zero.

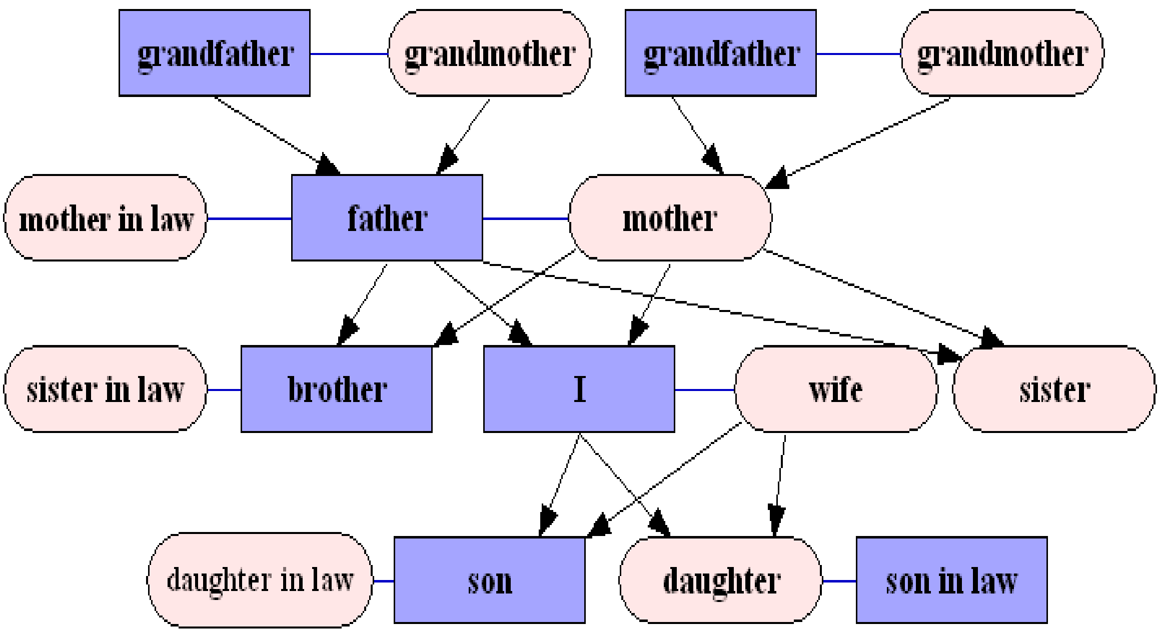
After we have defined the type, valence and quality of connections, we can draw a **valued digraph** of concepts and relationships between them. However, further **abstractions** on connections can be made. Multiple arrows between the subject and object can be replaced by one arrow called a *link*. All direct or indirect paths between two objects form *chains*. Finally, all distinct chains between two objects together form a *bundle*. These abstractions can be made on the basis of the path algebra, which allows join and multiplication operations. Links are formed by addition of all connections between the subject and object. They are assumed to be transitive and form chains by the multiplication of links. Chains between two concepts can form a bundle, which is a summary of all direct and indirect connections between those concepts (van Atteveldt and van Harmelen, 2001). There are computation formulas for the base, quality, ambivalence and divergence given at each level of abstraction. There is a scheme including all types of bundled or chained connection.

The program used for network evaluative text analysis is called CETA. It is used for analysing the evaluation of political and social actors in general.

4.4 Genealogies – a version of a story graph

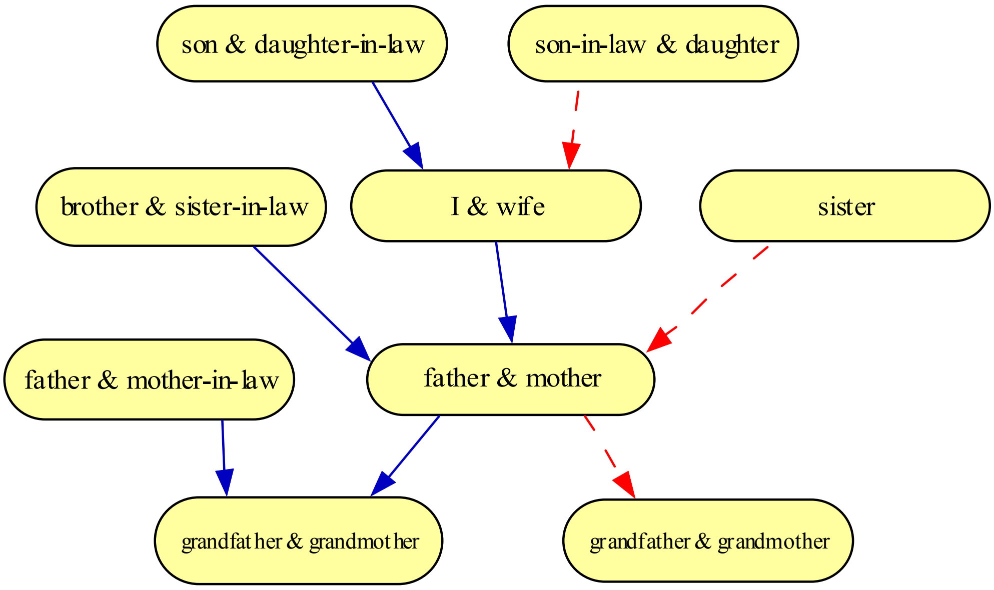
Genealogy can be represented as an ore graph, p-graph and bipartite p-graph. In an *ore graph* every person is a vertex, marriages are represented as edges and a relationship is a parent of as arcs pointing from each of the parents to their children (Batagelj and Ferligoj., 2003).

Figure 4.9: An example of an ore graph.



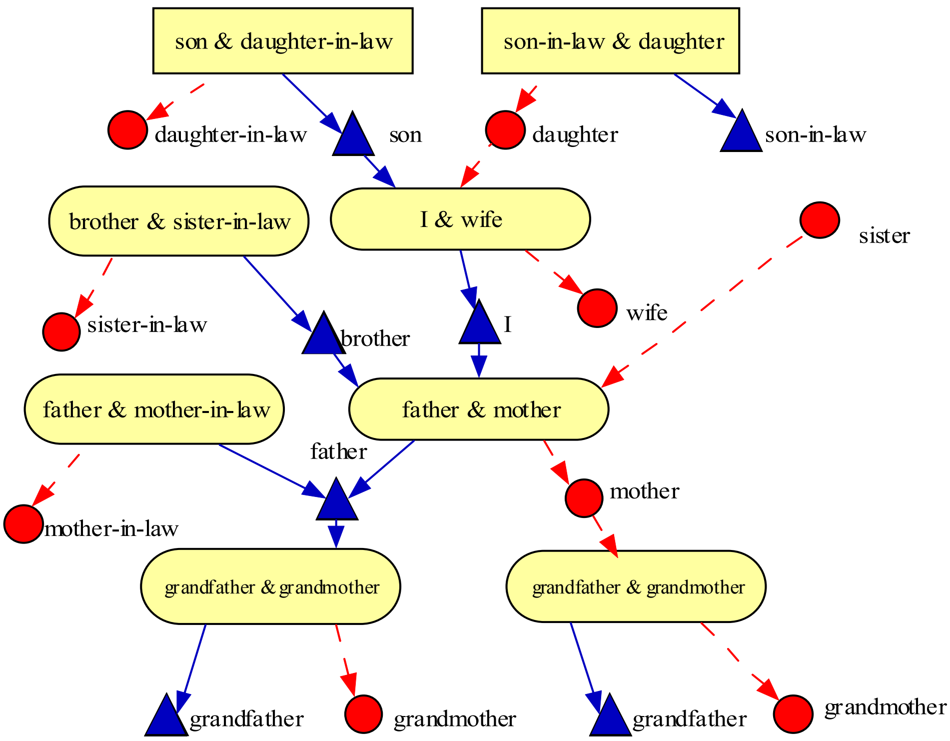
In a *p-graph* or parentage graph a vertex represents a couple or an individual person if not married. A p-graph is a digraph in which arcs point from children to their parents.

Figure 4.10: Example of a p-graph.



A *bi-partite p-graph* has two types of vertices, one representing couples (rectangles) and the other representing individuals (circles for women and triangles for men). Arcs point from children to their parents.

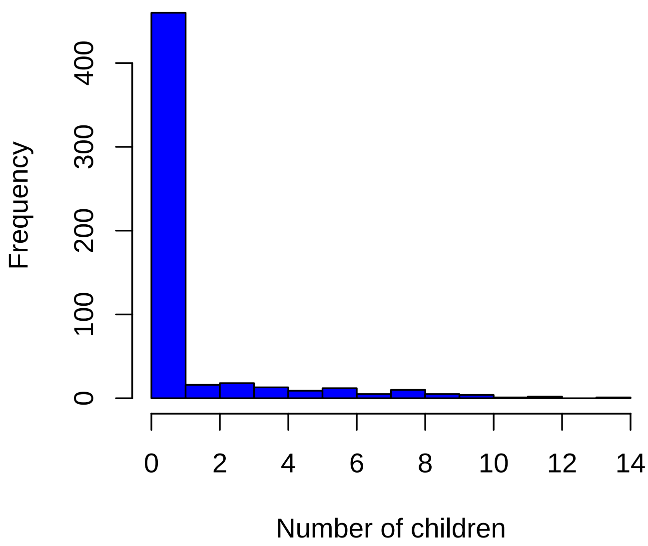
Figure 4.11: Example of a bi-partite p-graph.



Genealogies represent narratives. They tell us, among other things, who married whom and how many children there were in a certain family. When genealogies are represented as p-graphs, they are very **similar** to the **story graphs** mentioned in the previous chapter. Nodes represent a couple or individual if not married, and arcs represent the relationship: is a child of. We can say that the graph shows a logical and causal sequence of events: marriages. It is directed and acyclic. The only difference between a p-graph and a story graph is that in a p-graph lines are **two-relational** according to the child's gender, while a story graph is not a two-relational graph.

Through conducting network analysis on a p-graph, several findings about a certain family can be established. Let's look at the example of a network of descendants of John Corteen that we have found on the Internet page http://www.isle-of-man.com/interests/genealogy/gedcom/index.htm. The network contains 556 vertices and 544 arcs. Using the Pajek program we made an **in-degree partition** of vertices. This way we obtained clusters containing vertices with the same in-degree. As mentioned, in a p-graph arcs point from children to their parents. The in-degree of a certain vertex thus tells us the number of children that a chosen couple had. Let's look at the histogram of the number of children in the Corteen family.

Figure 4.12: The histogram of in-degree partition clusters.



From Figure 4.12 we can see that most couples or individuals in the Corteen family did not have children at all. The maximum number of children was 14. We can **extract the vertex** representing the couple with the largest number of children along with vertices representing their children.

Figure 4.13: The couple in the Corteen family with the largest number of children.

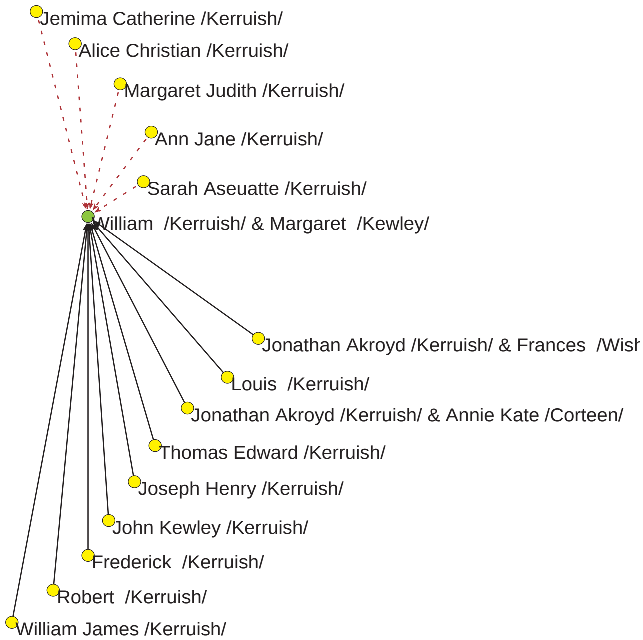
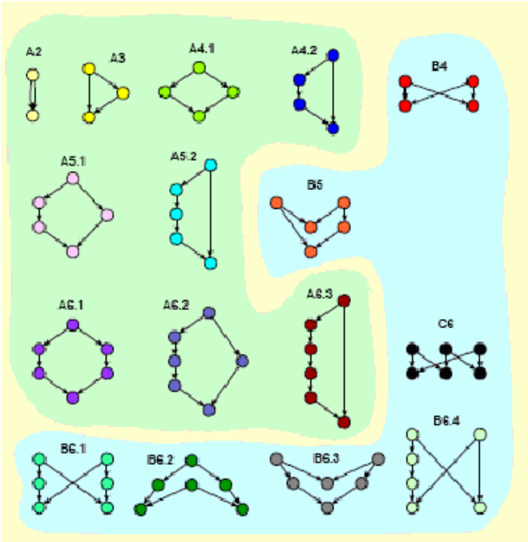


Figure 4.13 shows the vertex representing William and Margaret Kerruish and its 1-input neighbours representing the children. We can see that William and Margaret had five daughters and nine sons.

By extracting the **largest bicomponent** from the graph we obtain structural relinking between families. Structural relinking refers to the phenomenon that families intermarry more than once (de Nooy et al., 2005). There are two kinds of **structural relinking**: inter marriage and blood marriage. In a p-graph structural relinking can be found by identification of certain patterns inside the bicomponent. Figure 4.14 shows examples of such patterns.

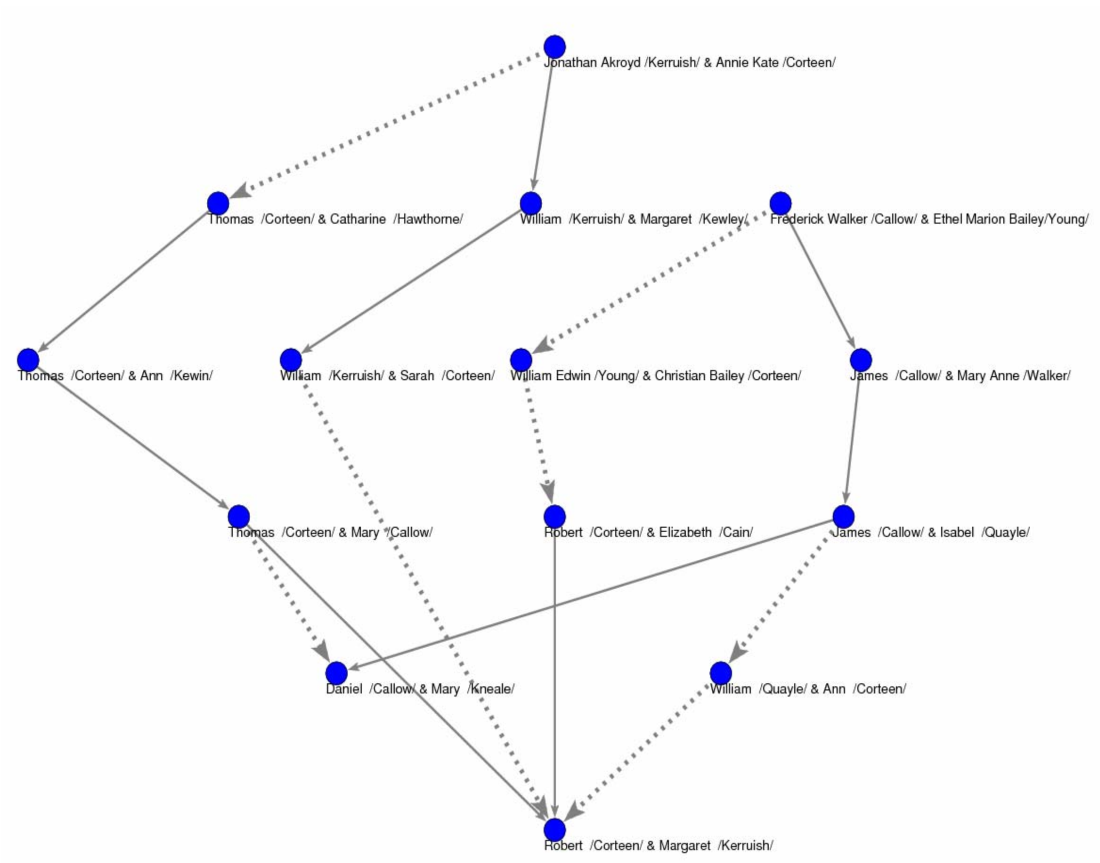
Figure 4.14: Patterns showing blood or inter marriage between families.



Source: Mrvar, Andrej (2004): Analiza omrežij s programom Pajek. URL: [http://mrvar.fdv.uni-lj.si/sola/info4/uvod/mrvar1.pdf].

We can extract the largest bicomponent from the network of John Corteen's descendants and look for patterns.

Figure 4.15: The largest bicomponent in the network.



From Figure 4.15 we can see both types of structural relinking. There is an endogamy between the Corteen and Callow families. Both the son and granddaughter of Robert Corteen married members of the Callow family. Blood marriages were not uncommon. At the top there is the marriage of the granddaughter of Robert Corteen, Ethel Marion, and his great grandson, Frederick. Jonathan and Annie Kate were also relatives.

This is just a fraction of a network analysis that can be made on narratives represented as p-graphs. Several other findings can be determined by further analysis. Network analysis can therefore be very useful. Bearman et al. limited analysis to the extraction of the largest bicomponent because by this they found the solution to the problem they were dealing with (casing). Other problems, though, can also be solved by network analysis.

4.5 Franzosi’s story grammar

Story grammar specifies a set of functional **categories** and provides the **rewrite rules** that specify the linear and hierarchical **ordering** of the categories in a narrative structure (Franzosi, 1997). Therefore, semantic **triplets** (Subject, Action, Object) with their modifiers form a horizontal relational structure, which can be vertically aggregated into events and disputes. Disputes can be rewritten (→) as a set of one or more (indicated by curly brackets “{}”) events, and the event can be rewritten as one or more semantic triplets, that is, the set of subject, action and object (Franzosi, 2004). The non-terminal symbols subject, action, and object, indicated by angular brackets, can be rewritten to capture relevant **attributes** of actors and actions. Square brackets “[]” around the object make the object optional, while circle brackets “()” indicate terminal symbol. Subject can be therefore rewritten as:

<subject> → <actor> [{actor modifier}]

<actor> → (management, workers,…)

<actor modifiers> → [{<number>} {<type>}] [{<organization>}]

<number> → ()

<type> → (male/young…)

<organization> → ()

Actions can be rewritten as:

<action> → <action phrase> [{action modifier}]

<action phrase> → (strike/demonstrate…)

<action modifiers> → [{type}] [{<instrument>}] [{<reason>}] [{<outcome>}] [{<space>}] [{<time>}] [{<duration>}]
<type> → (general/sit-down…)
<instrument> → (baton/tear gas…)
<reason> → (wages/working…)
<outcome> → (positive/negative…)
<space> → (Turkey/Greece…)
<time> → (March/April…)
<duration> → (8 hours/indefinite…).
Object is rewritten as subject or inanimate noun (factory, road…).

To sum up, we can say that there are **three** steps of the coding process. The first step is to code **article keys** of all qualifying articles, the second is to combine articles into **disputes,** and the third is to produce **categories** of story grammar. However, coding is not enough; it does not produce numerical data. Franzosi says that **set theory** provides tools for going from words to numbers (the cardinal number) and for analysing a set of relationships. It serves as the mathematical foundation of relational database systems (RDBMS). The latter provide models of computer data organization and storage. Information is organized into separate but interconnected files called tables. Relationships between tables are established by the presence of at least one overlapping field across tables. To access the database, structured query language is used. It is composed of general commands allowing users to search and retrieve information (Franzosi, 2004; Franzosi, 1997). This way we can get information about the frequency distribution of certain entities within each of the aggregation levels specified by the grammar: semantic triplet, event, and dispute. We can also link information across tables.

In story grammar, **actors** are **connected** to other actors via a set of **actions**. This organization helps us to extract **networks** of social **relationships**. We can define semantic triplets of any story as a set T which is made of a set of subjects S, a set of actions A, and a set of objects O. While a set of **subjects** is constituted merely of **social** actors, a set of objects O is constituted of subsets of social actors O_1 and **inanimate objects** O_2. The set S and subset O_1 form a set of social actors. The set of actions A can be aggregated into broader **spheres of action**. An action operates as a relationship between actors, and therefore if a tie between two actors is present, we get an ordered pair. Each relation has a corresponding set of **arcs** containing ordered pairs of actors as elements. Those elements can be represented graphically by drawing a line from the first actor to the second one. For **each** sphere of action a **separate** graph can be drawn and **analyzed**. Franzosi has analysed graphs representing a certain sphere of action (for example conflict) through different **time periods**. His opinion is that network models allow us to exploit more fully the relational characteristics of data and trace more systematically the interactions among social actors (Franzosi, 2004).

To summarize, we can say that Franzosi has introduced network models derived from story grammar. He has also used **temporal networks** to describe how a certain relationship among social actors has been changing through time. He has, however, been satisfied with only the graphical representation of networks, and has not conducted any further network analysis on them. On the other hand, the networks he presented were small, n<10, and therefore the interpretation was possible without the use of methods for network analysis. The main characteristics of the networks were quite obvious without any global analysis.

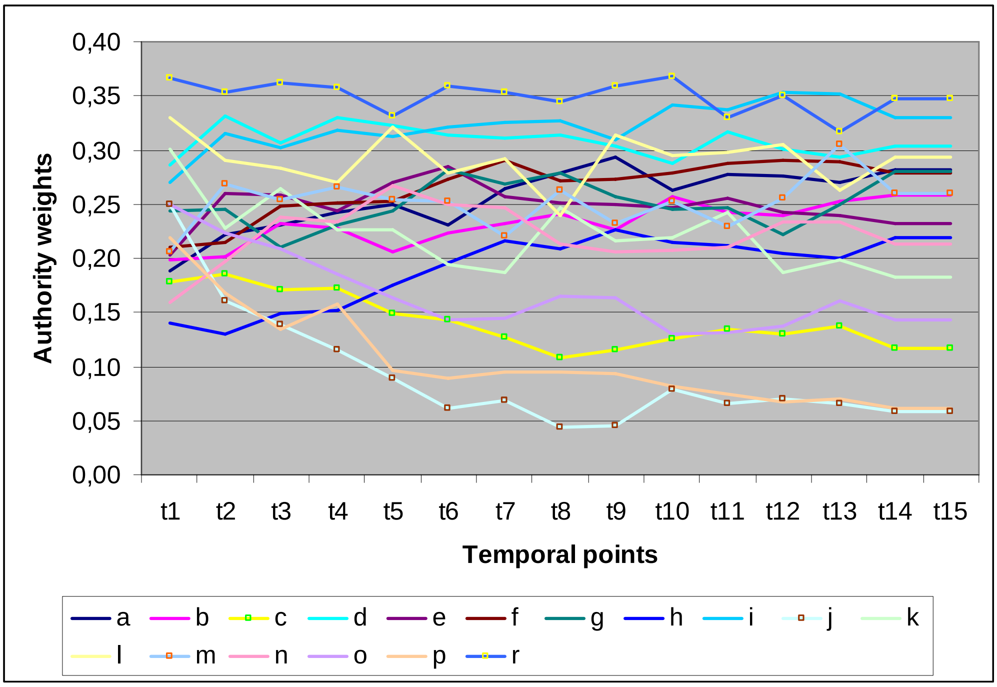
4.6 Temporal Networks

Narratives can be represented as temporal networks. **Actors** are presented as **nodes** and the **relationship** between two actors is presented by an **arc** or **edge**. Sociologists often investigate relationships such as friendship, support, respect, giving advice, etc. among different social entities. Economists are, for example, interested in partnerships and cooperation among companies. If the investigation of enumerated or similar phenomenon is going on through a certain time period, then we are dealing with narratives. An example of this kind of narrative could be the **Newcomb fraternity** data. Seventeen men were recruited to live in off-campus (fraternity) housing, rented for them as part of the Michigan Group Study Project, which was supervised by Theodore Newcomb from 1953 to 1956. All were incoming transfer students with no prior acquaintance of one another. Their supervisor was interested in the **acquaintance process**. He collected on a weekly basis, data about the sociometric preferences of his students. The study lasted for 15 weeks, so 15 matrices were collected (Batagelj and Ferligoj, 2003).

The given narrative can be presented as 15 different networks of sociometric preference. Each network has students presented as nodes and sociometric preference as valued arcs. Number “1” means the first preference. We conducted analysis on these networks. We were interested in the **importance** of each vertex at a given point in time. In a directed network we can identify two types of important vertices: **hubs** and **authorities** (Batagelj and Mrvar, 2004). Weights for each vertex are computed that show how good a certain vertex is as regards authority and hub. Weights can occupy a number on an interval between 0 and 1. The closer the measure is to one, the better hub or authority a certain vertex is.

The network in question is valued: the higher the number on the line is, the less liked a student is. That is why we have **recoded** those line values so that the **larger** the number on the line is, the **more liked** a student is. This way, when calculating the weights of vertices, a higher value of weight means a more important vertex. We were interested in **authority** weights, which in our case show the **popularity** of the student in question. These weights can be presented in a graph (Figure 4.16).

Figure 4.16: The popularity of students through weeks.



From Figure 4.16 we can see that the most popular students in the last week were r, i and d, while the least popular were j, p and c. It is interesting to see how the least popular students in the first week, h and a for instance, gained popularity through time, while some other students that were quite popular in the beginning lost popularity. For example, students j and p were quite popular in the beginning, but did not receive a high ranking from the other students as early as in the second week. They did not regain popularity after that. Student r was popular from the beginning to the end, and in spite of losing a high ranking, l and k still remained quite popular.

Through the example given, we wanted to show how analysis on narratives presented as temporal networks could be conducted. Analysis can be quite time-consuming, because we have to do it on each network separately. Good news however, is that version 1.04 of the Pajek program is capable of automatic repetition of a given command throughout time points. This means that if we are interested in the same measure throughout the time points, we can calculate it rather quickly.

Summary

In Chapter 4 we focused our attention on approaches representing narratives as networks. We saw that analysis is different according to the area in which a certain approach to narrative analysis was developed. Kathleen Carley's approach was developed to understand cognitive processes of people better. Because cognitivists are interested in concepts that are central and common to all human beings, they developed mentioned method to detect these concepts more easily. Van Attevelt et al. dealt mainly with the evaluation of political relationships between countries. Franzosi, on the other hand, was interested in historic events and being able to analyse them by way of newspaper articles. In this thesis we use his findings or more generally, formulation of narratives as semantic triplets and some findings from analysis of genealogies to get an improved tool for the analysis of narratives. By this we mean a tool capable of revealing some basic structure or existence of patterns in narratives with similar content.

5. ALTERNATIVE METHODS FOR NETWORK PRESENTATION AND ANALYSIS OF NARRATIVES

In a previous chapter we introduced several methods for the network presentation of narratives and their analysis. What all presentations have in common is that when introducing a graph of a narrative the graph contains **one-relational** lines. In a narrative, however, several different relationships among units are possible. If vertices represent actors in a narrative, a pair of actors can have ties according to several relationships, for example, they can be friends, co-workers, or husband and wife. When there are multiple lines among vertices, we talk about a *multirelational network*. An example of a multirelational network is one representing relationships among actors performing in a German soap opera called Lindenstrasse. It was introduced at the 1999 Graph-drawing conference contest (http://kam.mff.cuni.cz/conferences/GD99/contest/graphs/A.html). On the graph, the main characters are shown with their photos, and other characters as shapes. To each character a colour is associated: blue – currently active, yellow – currently inactive, grey – dead, white – never appeared personally. Relationships are shown as lines of different colours: purple – business, orange – friendship, red – partnership, green – family connections, blue – hostile or antagonistic relationship. The graph describing the soap opera is not just multirelational, but is also a temporal graph. It is actually a temporal network, which was described in a previous chapter, with the addition of multiple relationships.

Examples of temporal networks containing multiple relationships are also narratives coded by KEDS. We mentioned KEDS in the second chapter and said that it used semantic grammar for the encoding of political events reported by Reuters. In this chapter we will describe in more detail how coding is done and what the current analysis of the coded data is like. We will show in an example of a narrative coded by KEDS that a network presentation by temporal multirelational network of a given narrative is possible and also that network analysis can be performed on it to gain some new and useful information.

5.1 KEDS – introduction

Kansas Event Data System (KEDS) is a Macintosh program for the machine coding of international event data using pattern recognition and simple grammatical parsing. It is designed to work with short news articles. To date, KEDS has primarily been used to code WEIS[13] events from Reuters wire service lead sentences, but in principle it can be used for other event coding schemes (http://www.ku.edu/~keds/intro.html). It linguistically **parses** news reports so that it identifies political actors, recognizes compound nouns, compound verb phrases, and determines the references of pronouns (Schrodt and Gerner, 1997). The result of the coding by KEDS therefore is the identification of:

- a **political actor** who initiated an event (source),
- a **type** of political **action** involved (event)
- an **actor** to whom the action was directed (target)
- the **date** of an event.

Advantages of machine coding over human coding are that coding is quick and inexpensive and coding rules are applied with complete consistency. The disadvantage of machine coding however, is that it is unable to take into account the political context of events. It is also unable to interpret complex grammatical constructions (Schrodt et al., 1994).

5.2 KEDS – analysis

The KEDS project focuses on the development of **early warning techniques** for **political change**. People working on the project have experimented with many different methods, including factor analysis, discriminant analysis, an assortment of clustering algorithms, and most recently, the hidden Markov model. Because all of the listed statistical methods work with numerical data, scientists have employed **Goldstein's scale** for converting WEIS events to **numerical** values. In Goldstein's scale, the most cooperative events are assigned +10, the most conflictual events are assigned -10, and neutral events are assigned 0. The remaining WEIS categories have intermediate values. Among others, the assigning of numerical values to data enables presenting graphs of a month's averages and a month's totals of events, and from them the **valence** of relationship between two countries can be seen.

[13] World Event Interaction Survey

Papers on predicting political change, automated coding and mediation are available on KEDS's web site (http://www.ku.edu/~keds/).

5.3 KEDS – multirelational temporal network

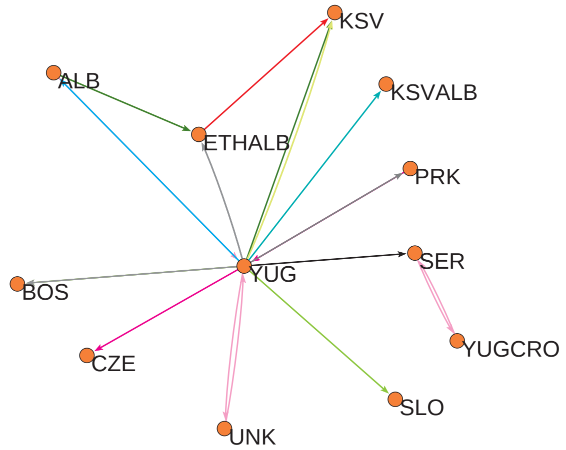
We have described how Franzosi changes story grammar into network presentation of narratives. He takes into account only sentences in which the **subject** and **object** are social actors and presents them as **vertices** in the graph. Actions are **grouped** into spheres of actions and those are presented as lines among vertices on the graph. One graph, however, presents only one relationship or sphere of action at a given time point.

Franzosi and KEDS both use semantic grammar or triplets (Subject, Verb, Object) coding of events. While all coded sentences in story grammar do not have a social actor for object or do not contain an object at all, this is not the case in KEDS coding. In KEDS coding all subjects and objects are **social actors**. Relationships, however, are not grouped in higher order categories; only codes according to WEIS are assigned to them. Because the **time** of an event is also listed, narratives coded by KEDS are actually multirelational temporal networks and can be presented graphically as temporal multigraphs. This can be done so that vertices in a given graph represent political actors who initiated an event, and actors to whom the action was directed. Arcs in a network represent actions and a colour of a given arc represents a certain type of relationship[14]. Also the time dimension is taken into account in a network. Images of the network at each point of time are presented (time slices). The network presentation of narratives coded by KEDS is very similar to Franzosi's but **multiple** relationships are also present.

As an example of a network presentation of narrative coded by KEDS, we will use Balkan data set. It includes major actors involved in conflicts in the former Yugoslavia from April 1989 until July 2003. Let's look at the network presentation of data at one time point: April, 1989.

[14] According to WEIS.

Figure 5.17: Multirelational network representing actions between given actors in April, 1989.



In the figure above we can see the representation of actions (lines) among actors (vertices) in April, 1989. We can see that different kinds of actions took place among actors. When we have a **small** number of **different** relationships, we can accurately determine, on the basis of the colour of the line, which relationship it represents. A network containing multiple lines is more informative than the simple network Franzosi introduced, due to the fact that it includes all actions among actors. Actions are not combined into categories at the very beginning. However, the disadvantage of this kind of presentation can be the **overload** of information. The Balkan data set, for example, includes 170 distinct relationships. There are not enough colours to represent that many relationships, and consequently several relationships are of the same colour. In this case, to gain a clearer picture of events, it is necessary to **combine** several actions to make the data easier to read and understand. Analysis of the data is also easier with a smaller number of relationships among the actors.

One way of classifying relationships is to separate them into three categories containing **positive**, **neutral** and **negative** relationships. The consequence of this classification is presented in Table 5.1.

Table 5.1. Classification of relationships into positive, neutral and negative categories.

Positive	Neutral	Negative
Yield	Agree	Demand
Comment	Request	Warn
Consult	Propose	Threaten
Approve	Reject	Demonstrate
Promise	Accuse	Reduce Relationship
Grant	Protest	Expel
Reward	Deny	Seize
		Force

Source: Batagelj Vladimir, Mrvar Andrej. (2004). Pajek – Program for Large Network Analysis. URL: [Http://vlado.fmf.uni-lj.si/pub/networks/pajek/].

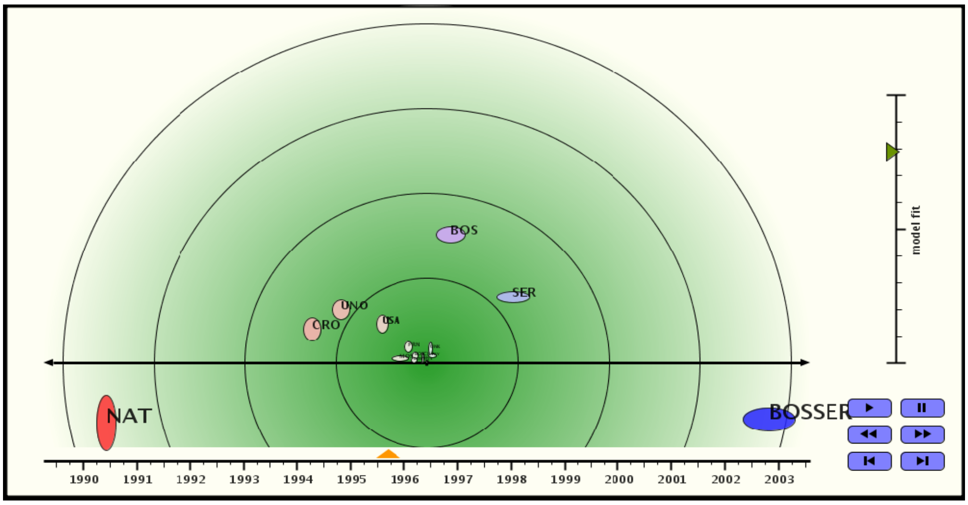
The given partition is possible because WEIS categories are given in three bundles – the first representing positive relationships (WEIS categories 0-79), the second neutral relationships (80-150), and the third negative (150-225) relationships. In the table above every tenth WEIS category is listed.

Another example of **categorization** is combining events into groups of events describing verbal cooperation (WEIS categories 2,3,4,5,8,9,10), material cooperation (1,6,7), verbal conflict (11,12,13,14,15,16,17) and material conflict (18,19,20,21,22) (Hudson, Schrodt, Whitmer, 2004).

Ulrik Brandes, Daniel Fleischer and Jürgen Lerner (2005) used a bit different method for categorizing of events. They were focused only on negative events between actors (as defined by WEIS) in a given time period. In a network actors were represented by vertices and actions by edges. Weights on edges represented minus the sum of all negative Goldstein weights. On such network authors were trying to identify two opponent groups involved in a conflict. They actually wanted to obtain a bipartite graph. The latter would clearly represent situation where conflicts would be only between and not within the two groups. Strict idea of bipartition in empirical data was not applicable, that is why they used a relaxed bipartition by the help of structural projections. Actors were projected into the two dimensional conflict space so, that actors mapped mostly into one dimension had major conflicts with actors mapped mostly into the other dimension, but only minor conflicts with actors mapped into their own dimension.

The result was a scatterplot whose coordinates were transformed to indicate the degree of membership to each of the two classes. The distance from the centre was the indicator of the actor's importance, colour emphasized group membership, high and narrow shape represented aggressiveness of actors, and size of a vertex involvement into the conflict structure. To animate the conflict dynamic researchers formed a sequence of graphs, each of which represented the view on the set of events at the specific time point.

Figure 5.18: The scatterplot showing NATO bombing in Bosnia (1995).



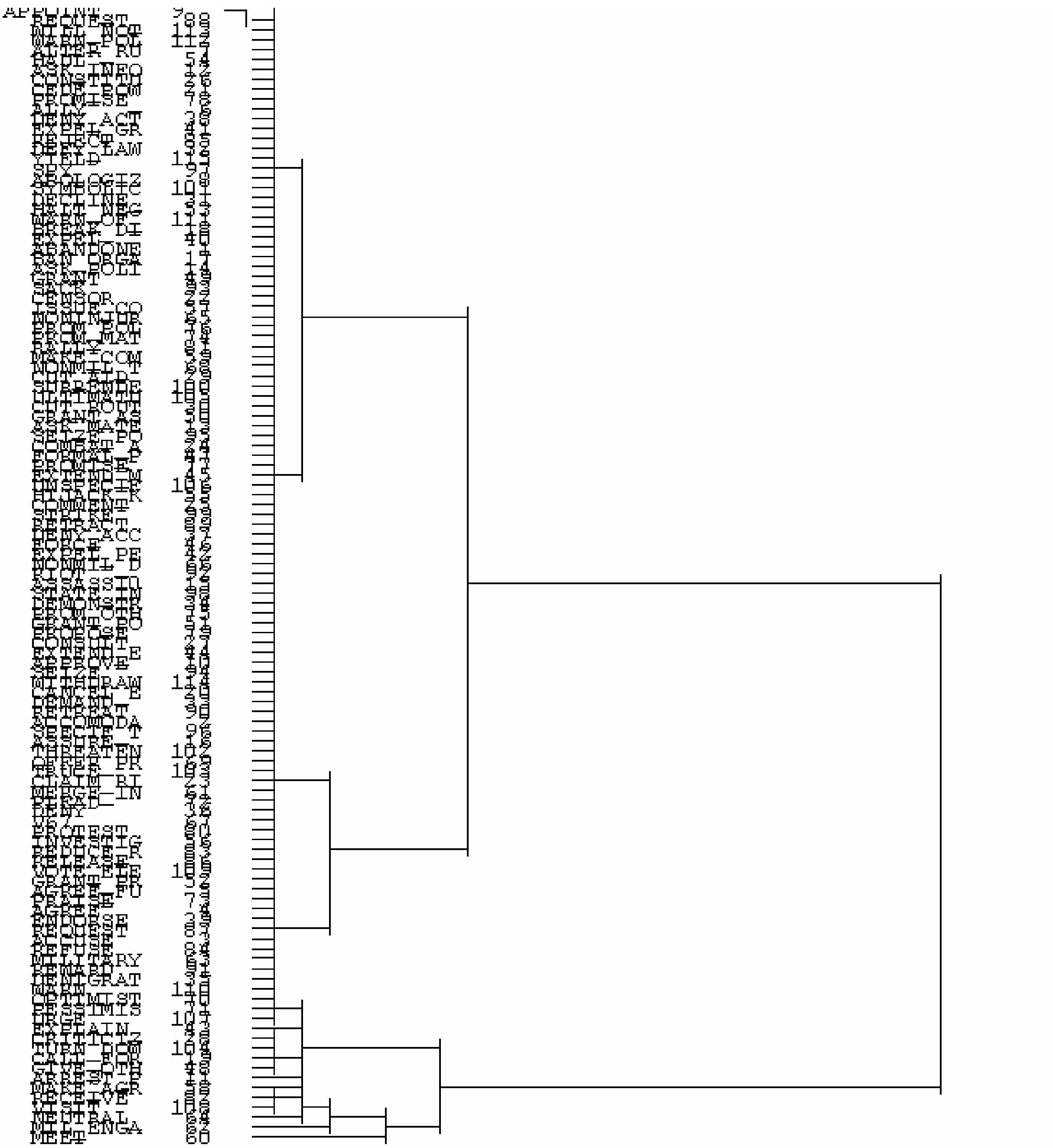
Source: Brandes Ulrik, Fleischer Daniel, Lerner Jürgen (2005). "Highlighting Conflict Dynamics in Event Data." IEEE Symposium on Information Visualization, pp. 103-110.

The method described above is one of the ways of using the existing categorization of events and make the large amount of event data easier to read and understand.

From all we have said about the partitioning of events, it is evident that in WEIS's categorization there is a somewhat logical order and events can consequently be merged together according to the nature of the problem under investigation.

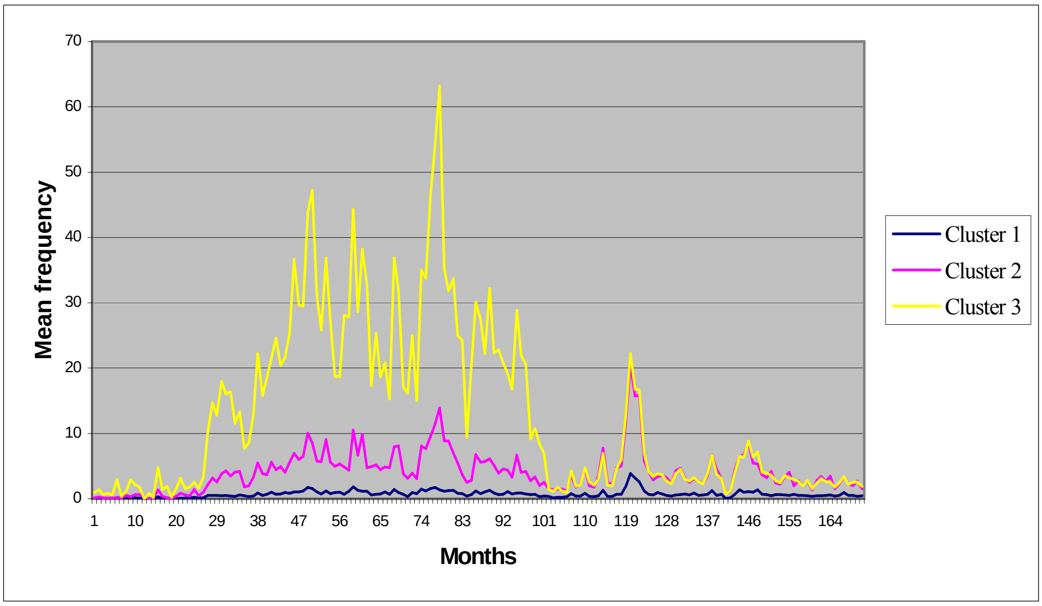
We can also try to merge actions by **cluster** analysis. We can conduct it on the matrix showing frequencies of relationships in time points. This matrix was obtained with the help of the Pajek and R program. First we extracted summary statistics of relationships at each time point with the help of the Pajek program. Summary statistics were given as a list of the **frequency** of **relationships** present at a given **time point**. With the help of the R program, we then formed a table in which rows represented time points, and columns types of relationship. The program is given in Appendix A. We imported the resulting table into the SPSS program, where we used cluster analysis to obtain clusters of similar relationships. We used Ward's agglomerative clustering method and Euclidian distance as a measure of distance between units, and obtained the following dendrogram:

Figure 5.19: Dendrogram showing steps of the clustering of actions.



From the dendrogram, we can see that there are **three** quite homogenous **groups of actions**. The first group contains 67, the second 34 and the last 14 actions. The table of actions is shown in Appendix B. Let's look at the graph showing the **mean frequency** of the three groups of actions through **time** points.

Figure 5.20: Frequency of each group of actions through time.



From the figure above we can see that political actions belonging to the third group were the most typical and frequent during the war in the Balkans. There were a lot of meetings, visits, pessimistic and neutral comments, military engagements, criticizing, agreements, explaining of positions and so forth. We can also see that those actions were more common during a certain period of time, that is, from the 27th until the 101st month.

We have presented different possibilities for the merging of relationships into higher categories. The first three combined events according to their meaning or connotation, and the last according to the frequency of relationships. The last classification combined events that were introduced with a similar frequency and was therefore already a part of the analysis of the data. It provided new information about which relationships were more common during the Balkan war.

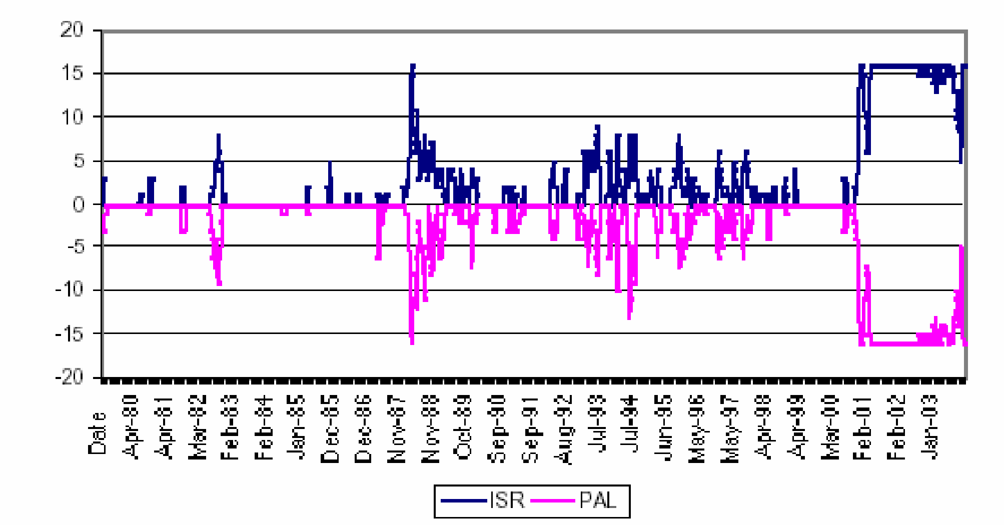
5.4 Pattern searching in political relationships

In the chapter describing the analysis of KEDS data, we mentioned several methods that have been used in predicting political change. Prediction of political change is possible only if an assumption exists that events happen in a certain order, which can be recognized. If we express this somewhat differently, we can say that KEDS analysts argue that the sequence of political events follows a certain recognizable **pattern**, and consequently, when a part of a pattern is found, other parts can be predicted.

In general, pattern recognition can be defined as the ability to consider a complex set of inputs, often containing hundreds of features, and to make a decision based on a comparison made of some subset of those features with a situation which the individual has previously encountered and learned (Hudsonet al., 2004). Therefore, meaning for people comes from the recognition of patterns and vice versa, it is also created through their behaviour. If we compare **individual** and **organizational** information processing, there is a certain difference. While individual information processing is done with the help of **associative** recall and on a non-linguistic basis, organizational information processing is constrained by language and explicit **if…then** rules. However, those rules are insufficient in crisis decision situations. Because the meaning is derived from pattern recognition, the function of political discourse is to stimulate pattern recognition in the minds of the audience and consequently trigger a desired behaviour (Hudson et al., 2004).

One of the analyses of the KEDS project focused on the recognition of patterns or behaviour with rules in the Israeli-Palestinian dyad. Analysts examined the behaviour of the mentioned countries during a certain time period. They were interested only in events describing **conflict** or **cooperation**. That is why they divided events into **four** categories: verbal conflict, verbal cooperation, material conflict and material cooperation. The **time unit** was a six-day period and measure was the total for incidences of conflictual or cooperative nature. As part of the research, they examined the tit-for-tat pattern. *Tit-for-tat* pattern means the reciprocity of behaviour - when one country shows a higher level of cooperation or conflict, so does the other country. The analysis showed that in general the reciprocity assumption holds. The tit-for-tat pattern for conflictual behaviour can be seen in Figure 5.21.

Figure 5.21: Tit-for-tat conflict



Source: Hudson Valerie M., Schrodt Philip A., Whitmer Ray D (2004): A New Kind of Social Science: The Path Beyond Current (IR) Methodologies May Lie Beneath Them. URL: [http://www.ku.edu/~keds/papers.dir/ISA04.NKSS.pdf]

They also looked for the so-called *olive branch* pattern. This describes behaviour where one side engaged in cooperation despite having experienced conflict from other side. They discovered that olive branch patterns also occurred among countries – the Israelis during some periods showed more cooperation despite the conflictual behaviour of the Palestinians. Analysts also looked for some **meta-rules** in the relationship and found that some are more frequent than others (Hudson et al., 2004).

In one of the articles written by Schrodt and Hall (1994) a concept of ″adaptive landscape″ is introduced. The model tries to explain rule-base adaptive behaviour in foreign policy.

Scientists working on the KEDS project also argue that there are several **phases** of conflict among countries and they have found, with the help of discriminant and cluster analysis used on data showing interactions among countries of the Middle East, that different phases can be identified. They studied the **dyadic** relationship across a certain time period. They converted events to a numerical score on the **Goldstein scale**, totalled by month. They gained cooperation score for each directed dyad over time. Their analysis of dyadic behaviour has shown that political behaviour in the Middle East did go through different phases, for which a distinct pattern of interaction was characteristic (Schrodt and Gerner, 1997). Statistical methods for identification of conflict phases can be very helpful in crisis forecasting and in the engagement of mediation techniques.

From the surveys listed above, we can see that there is a general **belief** and also some evidence that political behaviour follows certain **rules** or patterns. Several different methods have been used to identify those patterns, but network analysis was not one of them. What we want to show is that network analysis can also be used for obtaining information from such data. This can be done by introducing an example.

In one of the previous paragraphs we mentioned a survey looking for several kinds of patterns between Israelis and Palestinians. We described briefly how it was conducted. What we want to do now is introduce an alternative for pattern searching in the data with the help of **network** analysis. We will do so by using the knowledge gained from structural relinking analysis in genealogies. As we mentioned in a previous chapter, structural relinking is examined by searching the patterns in the genealogical network.

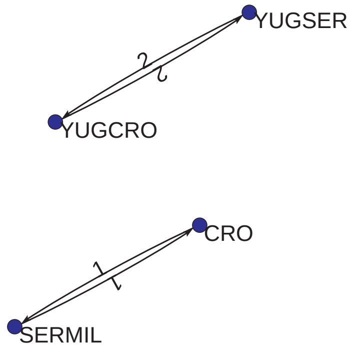
We decided to do the analysis on the Balkan data. First we merged relationships into **positive**, **neutral,** and **negative**. Although the war in the Balkans included several actors, we have decided to direct our attention only to the Serbia-Croatia dyad. We **extracted** from the data those dyads including relationships between the mentioned countries and combined those relationships into the categories mentioned above. The program for doing that is listed in Appendix C. The data is represented as a multirelational temporal network. Relationships among countries were presented in different time slices. We described another **network** representing a **pattern**[15]. First we were interested in the **tit-for-tat** pattern among the countries. We described it in two ways: as a network containing two vertices and

- two arcs representing a positive relationship going in both ways
- two arcs representing a negative relationship going in both ways.

When the data and the pattern were described, we started **looking for** the described **pattern** in the data. That was possible with the help of the Pajek program, which has the ability of searching one network in another. Figure 5.22 shows the tit-for-tat pattern for negative relationships in the 39th month of the war.

[15] Description of a network is given in Appendix D and E.

Figure 5.22: Tit-for-tat patterns showing negative relationships.



From Figure 5.22 we can see the tit-for-tat pattern for negative relationships between Croatia and Serbia in the 39th month.

What we have gained with the help of Pajek are all the time slices in which a tit-for-tat pattern is present. The frequency of a pattern is shown by the weights on the arcs. We can therefore analyse in **which months** patterns are present and also how **frequent** they are. Of course, the same procedure can be conducted for the searching of an olive branch pattern. Let's look at the example of the olive branch pattern.

Figure 5.23: Olive branch pattern.

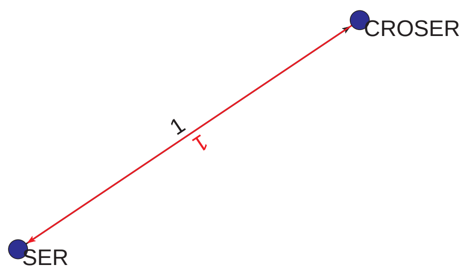


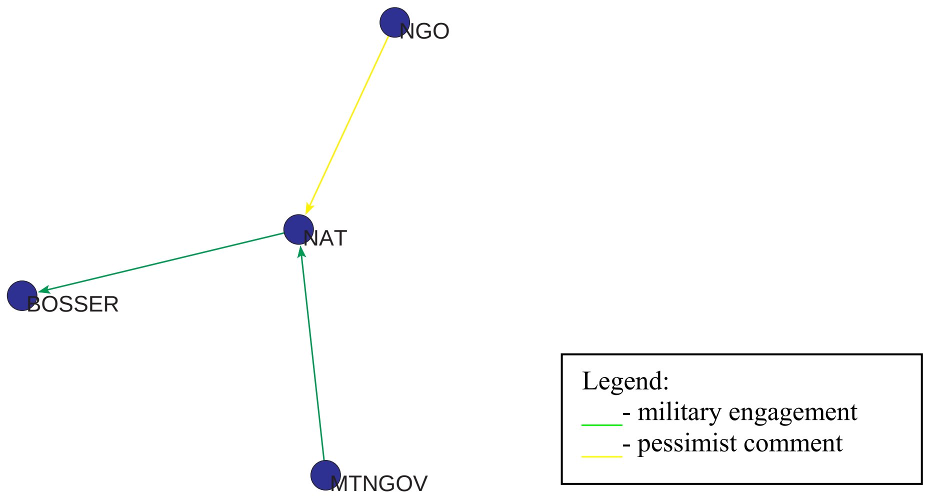
Figure 5.23 shows the olive branch pattern between the Serbs and Croatian Serbs in month 81 of the war. While the Croatian Serbs show a positive relationship towards the Serbs, Serbians show a conflictual relationship.

Through the given example, we have shown that an **alternative approach** towards the pattern searching in the data is also possible. The information we gained by network analysis is the same as if we had worked with the help of the Goldstein scale. This means that network analysis presents a good alternative approach to the one KEDS's analysts have used. This conclusion however, is not totally satisfactory to us. We want to argue further that with the network approach, we can get **information** that cannot be easily gained by the Goldstein scale approach. We will show this with the help of a concrete example referring to the area of pattern searching.

We will once again work with the Balkan data. We will define a somewhat **more complicated** pattern and try to find it in the data. This pattern will consist of four vertices and four different relationships among them (Appendix F).

We conducted analysis as described above and got the following result.

Figure 5.24: The pattern found in the 35th month of the Balkan war.

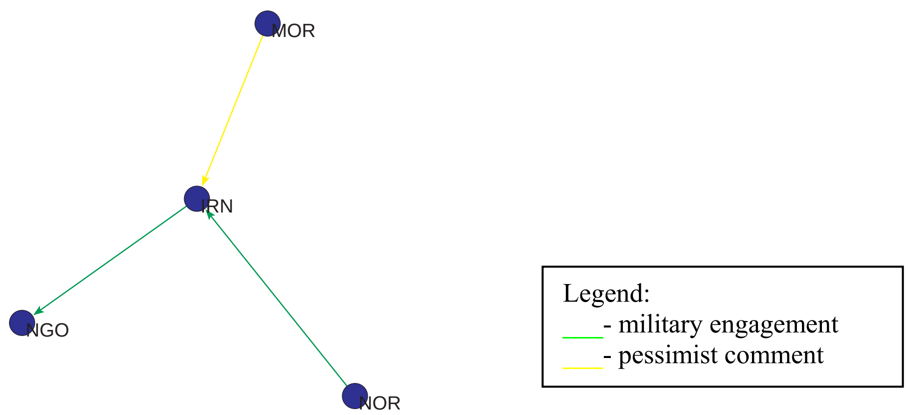


The figure above shows the pattern we were looking for in the Balkan data. We worked with data including **all** the relationships – we did not merge relationships into higher categories. The pattern shows that Nato were militarily involved with the Bosnian Serbs. Following this, Montenegro's government decided to attack Nato forces. There was a pessimistic comment made by one of the nongovernmental organizations.

We described a pattern that we thought was logical and found it in the data. We know that the interpretation of events, which the pattern is composed of, is weak due to our lack of historical knowledge. We focus, however, more on the method for pattern searching than on the interpretation of historical events. Our method has shown that quite complicated patterns in the data can be found, and we believe that they could not be found by way of the methods KEDS's analysts use.

We can take it a step further and try to generalize the pattern we found in the Balkan data. The first step towards generalization of the pattern would be to look for the same one in other sets of data. We can try to find it in the Gulf data. The Gulf data describes happenings in the states of the Gulf region and the Arabian Peninsula for the period 15 April 1979 to 31 March 1999. We tried to find the described pattern in this data, and this is what we obtained.

Figure 5.25: The pattern found in the Gulf data.



The figure above shows Iran attacking one of the nongovernmental organizations, and consequently Norwegian forces attacking Iran. Morocco is giving a pessimist comment regarding actions undertaken by Iran.

We have shown that quite complicated patterns can be found in data with the help of network analysis. The general advantage of the network approach towards pattern searching is that assignment of numerical values to events is not necessary. We can work efficiently with **nominal** data. The disadvantage, or perhaps what is missing in the approach presented, is the ability to look for patterns **through time** slices. It is not possible to look for a pattern that would start in one time slice and continue in the other. Another disadvantage is in the **length** of the time unit the slice is presenting. It is not totally clear which events in a given time slice happened first and which followed. The chronological order of some events is logical, but this does not hold true for all events. That is why sometimes the order of events remains unclear to the reader. This could be improved a little by shortening the length of the time slices, although this is still not the best solution as we cannot search for a pattern through several time slices.

6. CONCLUSION

In the thesis we have described several approaches towards narrative analysis. First, we have described narratology, the theory of narratives. It encompasses different definitions of a narrative. Those definitions differ from one another in the number of layers they distinguish in narrative analysis, and also in medium through which a story is told. Some, like Genette, restrict narratives to verbally narrated texts, while others do not. In the thesis we have presented approaches to narrative analysis that mostly work with narratives expressed through language. Computer programs have been produced which are capable of parsing texts and also automatically analyse them. We believe that the reason for the large number of methods dealing with narratives given in textual form is mainly in saving time and money. Narratives presented through any other medium would need a person or very advanced software for their analysis.

Narratology provides several characteristics that can be analysed at each level: fabula, story, text. The methods for analysis of narratives we have presented focus mainly on the plot, fabula, and story. In general, they do not take into account that different authors would tell a story differently. An exception here is the network evaluative approach, which considers the implied author. Other methods try to deal with the question of an author's bias by analysing several texts on the same subject, or by testing the validity of their methods. When revealing the map of a certain subject, Carley's approach takes into account several texts on the same subject. The computer program it uses is capable of making a map comparison of different subjects and also establishing concepts that are in common to all subjects. Franzosi, on the other hand, has not compared articles on the same subject from different newspapers. He has concentrated on articles of one single newspaper (Il lavoro) and presented the results of analysis almost as facts. It is known, however, that newspapers differ from one another in presenting the same story. The KEDS program also analyses news provided by one single agency, Reuters, but researchers have tested validity by comparing the machine-coded data to a human coded WEIS data set, based on the New York Times and Los Angeles Times (Schrodt and Gerner, 1994). They found significant correlations between variables gained from different, above mentioned, sources reporting on the same topic in the corresponding time period. All three sources apparently covered events in similar way. It is interesting, however, that when Brandes et al. (2005) studied the KEDS Balkan data, they found a sudden shift in media coverage of events in 1997, from Turkey – Kurds to Bosnian Serbs – NATO conflict. They discovered that the main reason for the shift was not historical, but it lied in changing of the source of information from Reuters North America to Reuters Business Briefing, with the latter apparently not covering the Turkey – Kurds conflict. Their discovery certainly shows that the author or source of information does matter and that the validity of data taken from the isolated source is not straightforward.

We have introduced several approaches that represent narratives as networks. We have mentioned those presenting a story graph and also those that are part of text content analysis.

The former are satisfied with only representation of the plot of the investigated narrative. They do not analyse gained networks any further. We have presented genealogies as a version of story graphs and also shown that analysis of this kind of presentation of narratives is possible. Different information can be gained from it.

The latter usually employ the definition of events including confrontation. The definition of events including confrontation given by narratologists says that events consist of three components: two actors and an action. This definition describes a dyad of actors belonging to a relation defined by the action. That is why when a text is parsed as S-V-O triplets, it defines a network. We have presented narratives as networks according to different methods. Those methods make networks out of texts in a somewhat different manner. They differ mostly according to the theory they follow and the problems they are dealing with. We have been particularly interested in how news articles could be presented, because we were familiar with the KEDS database and also with analysis of its data, which did not include network analysis. We reached the opinion that network analysis of this data could be possible. We have presented narratives coded by the KEDS following the theoretical views of semantic context analysis. The graphical representation of a network included the subject and object presented as vertices on a graph and a verb expressing a relationship presented as an arc between the subject and object. Because temporal information is assigned to the KEDS data, we have graphically presented it as temporal networks, that is, networks in different time points.

Our main motivation for introducing the network analysis approach towards narrative analysis was to contribute towards the search for the basic structure of narratives that was somehow started by Vladimir Propp. He was one of the first researchers to reveal that the generalization of narratives from the same area was possible. It is in our, that is human, nature to search for similarities in the large amount of information we encounter everyday. In doing this, we classify things in categories, simplify the world, and make it more predictable. Narratives reflect the world's laws and are thus an important source of information about it. After Propp, many researches tried to find some basic laws in narratives with a similar structure, and were more or less successful in their efforts. We, also, tried to contribute by introducing another approach towards determining the basic structure or pattern search, which was built on the analysis of genealogies approach. As an example we used political data. In politics some unwritten rules are followed. Diplomacy, for example, has its own rules of how to react to a certain action. KEDS's researchers have come to the conclusion that the search for some patterns in relationships can be successful. Our approach also revealed some patterns in interrelational behaviour. In contrast to KEDS scientists, we worked successfully with nominal data and revealed quite complicated patterns. After a certain pattern is found, it can be searched for also in other data with the same content. If it is found in many or all cases, then a generalization can be made and thought as describing some common sequence of interrelational behaviour. When this is established, the continuation of the pattern can be predicted, after one part of it is found.

Our method, however, has some limitations. It is not possible to search patterns, which continue through several time slices. If the time slice includes a longer period of time, the revealing of the sequence of events it encompasses, may not be straightforward. On the other hand, if it includes a very short period of time, some patterns may not be found. It is also true that certain patterns include a very long period of time, and thus with our approach cannot be recognized.

According to what we have inquired about narrative analysis, we can confirm all three working hypotheses. We have shown that narratives can be presented as networks and that their representation differs according to the method we use. Throughout the thesis we have given some examples of network analysis of narratives and shown that a lot of different information can be gained using it. Moreover, we have shown that network analysis is one of the methods that could be used for pattern searching in narratives coded by the KEDS. Presentation of narratives by multirelational networks, as shown in the example of the KEDS data, can be applied to most other narratives. Support for searching temporal patterns in networks of narratives, however, should be developed further, but this is beyond the goals and knowledge of the author of this thesis.

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8. APPENDIX

Appendix A: Program for obtaining the table of frequency of relationships in separate time points.

```
podatki<-read.table("podatkiKEDS.txt",header=T)
ind<-c(1:10307)
pod<-cbind(ind,podatki)
ind1<-c(0:170)
ind_nerel<-c()
for(i in 1:171 ){which(pod[6]==ind1[i])->a;ind_nerel<-
c(ind_nerel,a)}
pod[-ind_nerel[1:171],6]->rel1
t<-as.vector(as.data.frame(table(rel1)))
rel<-t[172:286,1]
relac<-as.matrix(rel)
tab1<-c()
for(i in 1:170){
pod[pod[pod[pod[which(pod[6]==ind1[i])+1,1],1]:pod[pod[which(po
d[6]==ind1[i+1])-1,1],1],1],1:6]->a;for(j in 1:115){
ifelse(length(which(a[6]==relac[j]==F))==length(a),0,a[which(a[
6]==relac[j]),5])->d;tab1<-c(tab1,d)}}
tab<-c()
for(i in 1:115){sek<-seq(i,length(tab1),115);tab1[sek]-
izbr;tab<-c(tab,izbr)}
tab2<-matrix(tab,nrow=170,ncol=115)
rel1<-matrix(rel,nrow=1,ncol=115)
write.table(tab2,file="tab2.txt",col.names=rel1)
```

Appendix B: Actions divided into three clusters.

First cluster			
ABANDONED	CONSULT	HAUL	GRANT POSITION
ALLY	CUT AID	HIJACK, KIDNAP	RETRACT
ALTER RULES	CUT ROUTINE ACT	ISSUE COMAND	RIOT
APOLOGIZE	DECLINE	MAKE COMPLAINT	SACK
APPOINT ELECT	DEFY LAW	NONINJURY	SEIZE POSSESSION
APPROVE	DEMONSTRATE	NONMILITARY	SPY
ASK INFORMATION	DENY	HALT NEGOTIATIOS	STATE INVITATION
ASK MATERIAL AID	DENY ACTION	NONMILITARY THREAT	STRIKE
ASK POLICY AID	EXPEL	PROMOTE_MATERIAL	SURRENDER
ASSASSINATE TORTURE	EXPEL GROUP	PROMOTE OTHER	SYMBOLIC ACT
BAN ORGANIZATION	EXPEL PERSON	PROMOTE POLICY	ULTIMATUM
BREAK DIPLOMATIC	EXTEND	PROMISE	UNSPECIFIC THREAT
CEDE POWER	EXTEND	PROMISE RIGHTS	WARN OF PROBLEM
CENSOR	FORCE	PROPOSE	WARN POLICIES
COMBAT, ACCEPT, CONTROL	FORMAL PROTEST	RALLY	WILL NOT ATTEND
COMMENT	GRANT	REJECT	YIELD
CONSTITUTION	GRANT ASYLUM	REQUEST POLICY	

Second cluster		
ACCOMODATE	INVESTIGATE	RETREAT
ACCUSE	MERGE, INTEGRATE	REWARD
AGREE	MILITARY	SEIZE
AGREE FUTURE ACT	OFFER PROPOSAL	SPECIF
ASSURE	OPTIMIST COMMENT	THREATEN
CANCEL EVENT	PLEAD	TRUCE
CLAIM RIGHTS	PRAISE	WITHDRAW
DEMAND	PROTEST	VOTE, ELECT
DENIGRATE	REDUCE RELATIONS	WARN
DENY	REFUSE	URGE
ENDORSE	RELEASE	NONMILITARY
GRANT PRIVILEGE	REQUEST	

Third cluster	
ARREST PERSON	VISIT
CALL FOR	
CRITICIZE	
EXPLAIN POSITION	
GIVE OTHER ASSIST	
MAKE AGREEMENT	
MEET	
MIL ENGAGEMENT	
NEUTRAL COMMENT	
PESSIMIST COMMENT	
RECEIVE	
TURN DOWN	

Appendix C: Syntax for extraction of Serbia-Croatia dyads and classification of relations into negative, neutral and positive.

```
podatki<-read.table("Blkha.dat")
pod<-
paste(podatki[,1],podatki[,2],podatki[,3],podatki[,4],podatki[,
5])
pod[1]
dolz<-c()
for(i in 1:length(pod)){length(which(pod==pod[i]))-dolz1;dolz<-
c(dolz,dolz1)}
podatki1<-cbind(podatki[1:nrow(podatki),-4],dolz)
podatki1[1,]
nepon<-uniquewt.df(podatki1)
write.table(nepon,file="Blk_nep.dat")


podatki<-read.table("Blk_nep.dat")
local({pkg <- select.list(sort(.packages(all.available =
TRUE)))
```

```
if(nchar(pkg)) library(pkg, character.only=TRUE)})
komb<-
rbind(expand.grid(cro=c(246,248,251,322),ser=c(317,56,60,57)),e
xpand.grid(ser=c(246,248,251,322),cro=c(317,56,60,57)))
pod<-paste(podatki[,2],podatki[,3])
komb1<-c()
for(i in 1:32){paste(komb[i,1],komb[i,2])->komb2;komb1<-
c(komb1,komb2)}
ind<-c()
for(i in 1:length(komb1)){which(pod==komb1[i])->a;ind<-
c(ind,a)}
ind
podatki[ind,]->diade
write.table(file="diade.dat")
```

Appendix D: Description of network representing tit-for-tat pattern of negative.

```
*Vertices 2
*Arcs
3: 1 2
3: 2 1
```

Appendix E: Description of network representing olive branch pattern.

```
*Vertices 2
*Arcs
3: 1 2
1: 2 1
```

Appendix F: Description of the pattern used in the thesis.

```
*vertices 4
*arcs
223: 1 2
223: 3 1
22: 4 1
```

POVZETEK

Magistrska naloga raziskuje možne pristope k analizi pripovedi. Pripoved je definirana kot predstavitev vrste dogodkov, ki so vzročno in logično povezani med seboj. Sestavljena je iz najmanj dveh temeljnih prvin: zgodbe in diskurza. Medtem ko zgodba zajema dogodke oziroma zaporedje dogodkov, diskurz označuje način kako so ti dogodki predstavljeni. Nekateri teoretiki (npr. Bal) razlikujejo med tremi prvinami pripovedi: tekstom, zgodbo in fabulo. Posebej analizirajo pripovedovalca in njegov vpliv na pripoved, zgodbo z njenimi časovnimi preskoki, kraji dogajanja in karakterji ter fabulo kot nekakšno temeljno ogrodje zgodbe. Teorija, ki definira pripoved na opisan način in jo podrobneje analizira, se imenuje naratologija. Je teorija o strukturi pripovedi. Nekateri npr. Štuhec, jo definirajo kot del literarne teorije. Večinoma naratologi uporabljajo kvalitativen pristop k analizi pripovedi. Izjema je ruski naratolog Vladimir Propp, ki je na podlagi analize ruskih pravljic oblikoval tipologijo sedmih temeljnih vlog nastopajočih in seznam funkcij, ki jih opravljajo. Kot funkcije je razumel dejanja, ki so pomembna za potek dogajanja v pripovedi. Opredelil je 31 funkcij, ki se lahko na višjem nivoju združijo v t.i. sfere dejanj (»spheres of action«) in si sledijo v določenem vrstnem redu. Do podobnih dognanj je prišel tudi Benjamin Colby, ko je analiziral eskimske pravljice. Sam je namesto izraza funkcija uporabil izraz »eidon«.

Naratologi so se ukvarjali s pripovedmi v tekstovni obliki kot takimi in niso predrugačili njihovega zapisa. Podobno velja tudi za teoretike, ki so se ukvarjali z analizo pripovedi podanimi v obliki številskih podatkov. Število živorojenih otrok v neki državi skozi določeno časovno obdobje, npr., ravno tako predstavlja pripoved. Podatke predstavljene v številski obliki, so raziskovalci analizirali s pomočjo različnih statističnih metod. Med drugim so uporabili analizo časovnih vrst, analiza Markovskih verig in analizo preživetja.

Posebno poglavje v analizi pripovedi predstavljajo raziskovalci, ki so pripovedi podane preko jezikovnega medija, predrugačili v zapis, večinoma številski ali omrežni, ki jim je omogočil lažjo analizo. Analiza vsebine je ena izmed takih metod. Definirana je kot metoda za sistematično, objektivno in kvantitativno analizo značilnosti sporočil. V primeru, da se njena uporaba zoži na analizo vsebine tekstovnih sporočil, je bolje govoriti o analizi besedil. Obstajajo trije pristopi: tematski, semantični in omrežni. Tematski pristop se ukvarja predvsem s klasifikacijo besed v pomenske kategorije, rezultat katere je matrika frekvenc pomenskih kategorij. Semantični pristop poleg pomenskih kategorij identificira relacije med njimi. To pomeni, da v besedilu išče t.i. pomenske trojke (osebek, glagol, objekt), ki hkrati predstavljajo naratološko definicijo dogodka. Naratologi namreč definirajo dva akterja in relacijo med njima kot temeljne prvine dogodka. Eden izmed predstavnikov tega pristopa je Roberto Franzosi. Besedila člankov na temo stavk delavcev iz časopisa Il lavoro je analiziral na omenjen način. Prišel je do podobnega zaključka kot Propp in Colby, da je število akterjev in njihovih dejanj omejeno.

Iz semantičnega pristopa se je razvil omrežni pristop k analizi besedil. Sem spada iskanje kognitivnih zemljevidov (»cognitive mapping approach«), omrežni pristop k ovrednotenju besedil (»network analysis of evaluative texts) in »centering resonance analysis« (CRA). Omrežni pristop spremeni besedilo v omrežje, ki je definirano kot množica enot in množica povezav med njimi. Iskanje in analiza kognitivnih zemljevidov je sestavljena iz identifikacije t.i. konceptov (pomenskih simbolov) in odnosov med njimi. Rezultat je semantični oziroma kognitivni zemljevid, ki prikazuje koncepte in njihove medsebojne relacije, ki so lahko različnih vrst. K. Carley, med drugimi, je predstavnica tega pristopa. Najprej identificira koncepte, ki so polnopomenske besede v besedilu. Le te je možno združiti v pomenske razrede, ki predstavljajo abstrakcijo besed, ki jih vsebujejo. Dve besedi sta povezani, če se v stavku pojavljata skupaj. Kako bližnja ali daljna soseda si morata biti, da je med njima prisotna povezava, je odločitev, ki jo naredi vsak raziskovalec za sebe. Povezavam se lahko dodeli lastnosti kot so moč, pomen, valenca in usmerjenost. Ponavadi se analizira kognitivne zemljevide več ljudi, da je omogočena posplošitev ugotovitev. Analiza kognitivnih zemljevidov je sestavljena predvsem iz iskanja središčnih konceptov.

Omrežni pristop k ovrednotenju besedil najprej definira subjekte in objekte ter glagole, ki predstavljajo povezave med njimi. Glede na pomen glagola, se določi tip povezave (obstaja jih 15). Tipi so vsebovani v štirih pomenskih razredih: povezave, ki opisujejo podobnost, vzrok, ovrednotenje ali asociacijo. Vsaki povezavi so pripisane točno določene mere. Rezultat je ovrednoten usmerjen graf konceptov in povezav med njimi. Tak graf je mogoče posplošiti s pomočjo algebre poti (»path algebra«). Z abstrakcijami je mogoče identificirati vrednostni odnos med vsakim parom konceptov v omrežju.

V ozadju CRA metode je mišljenje, da pisatelji in govorniki načrtno izbirajo besede s katerimi oblikujejo razumljivo in zaokroženo sporočilo. Tako metoda identificira samostalnike in pridevnike v besedilu, ki jih poveže med seboj, če se pojavljajo v isti samostalniški frazi (»noun phrases«) ali si zaporedno sledijo v istem stavku. Besedilo je v končni obliki predstavljeno v obliki omrežja z vrednostmi na povezavah. To so frekvence, ki povedo, kolikokrat se dve besedi v tekstu pojavljata skupaj.

Poleg analize besedil obstajajo še druge metode za analizo pripovedi. Andrew Abott je npr. razvil tehniko najboljšega ujemanja (»optimal matching technique«), ki spremeni (kodira) besedilo v sosledje dogodkov. Nato išče besedila s čim bolj podobnim sosledjem. Še ena metoda, ki ravno tako daje poudarek zaporedju dogodkov, se imenuje analiza strukture dogodkov (»event strukture analysis«). Metoda od raziskovalca zahteva, da najprej definira vse prisotne dogodke v pripovedi, predpostavi njihovo kronološko zaporedje nato pa ugotavlja vzročne povezave med njimi. Končni rezultat je usmerjeni oziroma vzročni diagram logične strukture pripovedi. Metoda teži h generalizaciji strukture in iskanju pripovedi s podobno vzročno oziroma temeljno strukturo. Še ena metoda, ki išče pripovedi s podobno strukturo je Abellova teorija primerljivih pripovedi.

Časovno sklepanje (temporal reasoning«) je ravno tako ena izmed metod, ki se ukvarja predvsem z iskanjem kronološkega poteka dogodkov. Analizira omrežje v katerem točke predstavljajo časovne intervale dogodkov in so povezane v primeru, da se časovni intervali dogodkov, ki jih predstavljajo, križajo. Za preverjanje ali je določeno sosledje dogodkov možno, se uporabljajo različni algoritmi.

Analiza časovnih omrežij prav tako predstavlja enega izmed pristopov k analizi pripovedi. Časovna omrežja namreč prikazujejo spremembe v odnosih med enotami skozi čas – v različnih časovnih točkah (rezinah). Poseben primer omrežja, ki vsebuje časovno komponento je prikaz rodovnikov. Rodovniško drevo je mogoče prikazati na več načinov. V ore grafu, na primer, točke predstavljajo osebe, poroke so prikazane z neusmerjenimi povezavami, usmerjene povezave pa predstavljajo relacijo je starš od. P- graf je preglednejši od ore grafa, saj v njem vsaka točka predstavlja par ali posameznika, če le ta ni poročen. Puščice kažejo od otrok k staršem. Še en način predstavitve rodovniškega omrežja je bipartitni p-graf, ki vsebuje dva tipa točk: točke, ki predstavljajo pare in točke, ki predstavljajo posameznike. Zadnje so različne oblike glede na spol – trikotnik za moškega in krog za žensko. Ko je zgodovina neke družine prikazana kot omrežje, jo je mogoče analizirati. Predvsem zanimivo je iskanje vzorcev v omrežju (velja za rodovnike predstavljene v obliki p-grafa), ki predstavljajo večkratne poroke znotraj družin ali celo poroke znotraj družine, med sorodniki. Taki vzorci izražajo temeljno mišljenje v neki kulturi npr. pri turških nomadih so bile poroke znotraj nomadske skupine izraz pripadnosti le tej.

Pričujoče magistrsko delo gradi na nekaterih že uveljavljenih pristopih k analizi pripovedi. Pripoved razbije na semantične trojke, ki se zlahka pretvorijo v omrežje. Subjekti in objekti so predstavljeni kot točke, glagoli, pa kot povezave med temi točkami v omrežju. Vrsta povezave je v grafu prikazana s pomočjo različnih barv. Ker je v vsaki pripovedi zelo pomembna časovna komponenta, jo predstavimo kot večrelacijsko časovno omrežje. Ko je pripoved pretvorjena v omrežje, je možno izvesti analizo le tega. Ena izmed v nalogi predlaganih načinov analize, je iskanje časovnih vzorcev znotraj pripovedi.

KEDS (Kansas event data system) je eden izmed programov za kodiranje besedil. Uporablja se za kodiranje političnih dogodkov in razbije besedilo na semantične trojke tako, da definira političnega akterja, ki je sprožil nek dogodek, tip političnega dejanja (dogodka), političnega akterja kateremu je bila dejanje namenjeno ter čas dogodka. Dve obsežni bazi podatkov kodirani s pomočjo KEDS programa sta t.i. balkanska in zalivska baza. Prva vsebuje kodirane dogodke med glavnimi političnimi akterji bivše Jugoslavije od leta 1989 do 2003. Druga pa vsebuje dogajanja v zalivskih državah in Arabskem polotoku od 1979 do 1999. Obe podatkovni bazi sta bili spremenjeni v zapis, ki ga bere program Pajek. S pomočjo omenjenega programa je bilo moč analizirati ti bazi, ki predstavljata dve pripovedi. Program Pajek namreč omogoča:

- analizo velikih omrežij;
- delo z omrežji, ki vsebujejo več relacij;
- analizo časovnih omrežij.

Obe bazi podatkov sta tako predstavljali večrelacijsko časovno omrežje. Časovna rezina je zajemala enomesečno obdobje. Podobno kot se iščejo vzorci v rodovniškem omrežju, se lahko iščejo tudi vzorci v večrelacijskem časovnem omrežju. Najprej je potrebno definirati določen časovni vzorec, ki predstavlja podomrežje. Le tega je nato moč iskati znotraj celotnega omrežja. V nalogi je definiran vzorec, ki opisuje določene relacije med državami in je identificiran znotraj omrežja, ki opisuje dogajanja na Balkanu. Ko je vzorec poiskan znotraj ene pripovedi, ga je potrebno poiskati še v kakšni drugi. V pričujočem delu je isti vzorec identificiran tudi v pripovedi, ki opisuje dogajanja med zalivskimi državami. Namen je najti iste vzorce v čim večjem številu (podobnih) pripovedi, da se omogoči generalizacija določenega časovnega vzorca. Ko je nek časovni vzorec posplošen, je mogoče z veliko verjetnostjo pričakovati, da bodo dogodkom, ki so opisani s prvim delom vzorca, sledili še dogodki opisani v preostalem delu.

Omenjen pristop k analizi pripovedi ima nekaj pomanjkljivosti. Trenutno je s programom Pajek omogočeno iskanje vzorcev znotraj časovnih rezin. Nemogoče je npr. najti vzorec, ki se začne v eni časovni rezini in nadaljuje v drugi. Tako je pomembno kako obsežno obdobje časovna rezina zajema. V primeru, da je to predolgo, je včasih zaporedje dogodkov težko določljivo, če pa je prekratko, je moč kakšne vzorce spregledati.

Na splošno je iskanje vzorcev v pripovedih smiselno, saj so že mnogi, prej omenjeni, raziskovalci prišli do ugotovitev, da med pripovedmi obstajajo določene podobnosti. V primeru političnih dogodkov obstajajo določena pravila, npr. v diplomaciji, ki določajo kakšen naj bi bil potek dogodkov. Če bi bilo mogoče izpopolniti metodo za iskanje časovnih vzorcev opisano v magistrskem delu, bi lahko postalo politično dogajanje bolj predvidljivo, obvladljivo in bi bilo mogoče kakšne dogodke tudi pravočasno preprečiti (preventiva).

Prikaz in analizo pripovedi kot sta opisana v magistrskem delu, je mogoče posplošiti tudi na druge pripovedi, ne samo pripovedi političnih dogodkov.