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0. Introduction: The importance and danger of interdisciplinarity in understanding narratives

“By now it has become hard, if not cumbersome, to trace the exact origins of the often cited *turn* to narrative. Open to debate is whether it started as an adherent or in opposition to the French structuralist theories of the mid- to late 1960s ... or whether it started with the 1981 publication of the special issue of *Critical Inquiry* (entitled “On Narrative”), or whether its breakthrough came in publications in the late 1980s by Bruner (1986), Polkinghorne (1988), Sarbin (1986).” (Bamberg 1)

These words open Michael Bamberg’s editorial effort to get to grips with four decades’ worth of “unbounded waves” of narrative theorizing. Insinuating a skeptical note with words as “frenzy” and tone observing “spawning” of narrative journals and “skyrocketing” of narrative monographs, he makes a very important statement saying that “it has become apparent that what may have emerged at some point as a new field of narrative inquiry with the appearance of homogeneity is not necessarily coherent or homogenous at all” (Bamberg 2).

At this point, it is necessary to declare the intended contribution of this thesis to the seemingly too broad field of narrative research. It aims to:

- create an interdisciplinary framework which is grounded in the evolutionary biological and computational aspects of human cognition
- make a selection of individual perspectives which shed the most light upon the whole
- put forward perspectives on narrative which never became part of the mainstream narrative theorizing

- perform a literary analysis as an application of this interdisciplinary framework in the highly difficult research battlefield between the humanities and natural sciences.

The argumentation of this thesis is fuelled by an underlying conviction that the narrative turn satisfies the definition of an **epistemological revolution** by bringing a hitherto unfathomed synergy into the study of the human mind. If grounded correctly and applied wisely, it has the potential to connect entire societies with a single individual, and to fuse evolution and biology with human values, art, and the “meaning of life”. May the words of Jean-Paul Sartre, who, having published these words in his 1938 *Nausea*, seems to be the proper philosophical father of narrative pursuits, lead you through the selective recollections, suggestions, and analyses of this thesis.

“This is what fools people: a man is always a teller of tales, he lives surrounded by his stories and the stories of others, he sees everything that happens to him through them; and he tries to live his life as if he were recounting it.” (61)

1. Paradigms, frameworks, and definitions

1.1 Back to the roots: a methodological reminder from ethology

This thesis is based on the conviction that the interdisciplinary field of narrative research is best addressed by asking the Tinbergen's four elementary questions of ethology. It is important to note here that Tinbergen's capacity for abstraction exceeded the boundaries of ethology by a great margin. As shown by Gerhard Medicus, the perspectives of **causation, ontogeny, adaptation, and phylogeny** (96) can be applied on multiple levels of complexity ranging from the molecule to human societies. The following figure shows the general formulation of Tinbergen's questions systematized by Randolph Nesse:

The Four Areas of Biology		Two Different Objects of Explanation	
		<u>Developmental/Historical</u>	<u>Single Form</u>
Two Different Kinds of Questions	<u>Proximate</u> Explains how organisms work by describing their structures and mechanisms and their ontogeny	<u>Ontogeny</u> Description of an organism's development, from DNA code to the forms of different life stages <i>Developmental explanations</i> for sequential changes in individuals across the lifespan	<u>Mechanism</u> Description of an organism's structure and how its mechanisms work <i>Mechanistic explanations</i> for <i>what</i> an organism's structures are like and <i>how</i> they work
	<u>Evolutionary</u> Explains why organisms are the way they are by describing how selection shaped current forms and their phylogeny	<u>Phylogeny</u> Description of the history of a species as reconstructed from its fossil precursors and DNA evidence <i>Phylogenetic explanations</i> for sequential changes in a species across time	<u>Adaptation</u> Explanation for the characteristics of a species based on how they give a selective advantage <i>Evolutionary explanations</i> for <i>why</i> an organism is the way it is.

Figure 1: Tinbergen's four questions as presented by Nesse (1)

Let us formulate these questions with respect to narrative research:

- **Ontogeny:** How does narrative use develop and change in an individual?
- **Mechanism:** What are the psychological/neural mechanisms underlying narrative use?
- **Phylogeny:** How did narrative use evolve in human animals? What was its relation to language?
- **Adaptation:** What adaptive advantage does/did narrative use convey to human animals?

1.2 Consilience

Consilience: The Unity of Knowledge (1998) is the culmination of E. O. Wilson's lifelong meta-scientific pursuits. Believing that "the greatest enterprise of the mind has always been and always will be the attempted linkage of the sciences and humanities" (8), he assumes a clear position – everything can and ought to be explained with conceptual unity and positioned on an explanatory continuum as opposed to being enclosed in discontinuous pools of research. Carroll paraphrases it as a conviction that "nature [including humanities] forms an unbroken chain of causal sequences" (70). Wilson believes that "to the extent that the gaps between the great branches of learning can be narrowed, diversity and depth of knowledge will increase." (14)

It is a fit, ready-made epistemological platform on which to base a study dedicated to narrowing gaps and finding a connecting thread in the discontinuous picture of psychology, evolutionary biology, artificial intelligence, neuroscience, and literary theory placed together.

1.3 What is narrative?

Brian Schiff highlights a linguistic problem chewing at the basis of any hypothesized unity of narrative research. The dictionary meaning of the word narrative is rather unambiguous; according to the Oxford English Dictionary, a narrative is “an account of a series of events, facts, etc., given in order and with the establishing of connections between them; a narration, a story, an account.” However, as noted by Schiff, the meaning in research can range from a narrow definition, “study of storytelling proper, including the analysis of specific stories, the study of plot lines, themes, forms of address” (30) to a very broad one: “the act of telling, narrating or showing subjective experience” (30). This broad definition leads to perceiving narrative psychology as a study of expressive acts, which, although less ethnocentric, is quite a departure from the dictionary definition (30).

Schiff reminds of the “variety of senses” (28) the term “narrative” acquired in psychology over the course of the past four decades. He mentions (28):

- Sarbin’s “form that organizes experience and guides action and emotion”
- Stein’s and Policastro’s “cognitive structure for explaining obstacles to be overcome and the plans created to meet them”
- Gergen’s and Mishler’s “performance of cultural discourses that is negotiated in concrete social interactions”
- Spence’s “fictionalized account of the past that helps to better understand the self”
- McAdams’s “internalized and evolving self-story that provides modern life with some modicum of psychosocial unity and purpose”

Slight differences in viewpoints do not harm a research field, but as soon as the meaning of narrative is extended beyond the commonly understood temporal structure of events (such as studying expressive acts in general,

binding narrative to cultural discourse, or binding it to a specific purpose), the synergy of research is threatened.

In this thesis, narrative is understood as a body of information, notably about events, bound to a temporal and causal skeleton. Ample empirical evidence documenting that human cognition makes heavy use of narrativized information justifies categorizing narrative as a **cognitive structure**. Having these properties, narrative is then utilized for encoding a variety of evolutionary-fitness-relevant information, starting with planning a way towards fulfilment of bodily needs, and possibly developing into complex metaphorical manipulations of abstract entities (for example comprehending quantum physics or events of intellectual history).

2. The significance of narrative

As Matti Hyvärinen writes in a volume tellingly entitled *The Travelling Concept of Narrative*,

“the concept of narrative has become such a contested concept over the last thirty years in response to what is often called the ‘narrative turn’ in social sciences ... The concept has successfully travelled to psychology, education, social sciences, political thought and policy analysis, health research, law, theology and cognitive science.” (20)

This chapter will attempt to identify the grounds for this “narrative ubiquity” by locating:

- instances of some of the most integrative perspectives, “geographies of science” which recognize underlying patterns across research on narrative
- research that finds narrative in such a place or extent that it gains new horizons of significance.

2.1 Narrative and human reality

In 1991, using the sweeping title “The Narrative Construction of Reality”, the cognitive and educational psychologist Jerome Bruner wrote what could be easily put on a pedestal as the manifesto of the narrative paradigm shift in academia.

Bruner bases his argument on the premise that at the centre of the “study of mind”, there is the question of “how man achieves a ‘true’ knowledge of the world” (“The Narrative Construction” 1). Opposing the “child as a little scientist” answers of both the empiricist and rationalist traditions, Bruner puts

forward one of his earlier theories stating that there are two modes of thought, the paradigmatic mode, establishing truth by means of proof, and the narrative mode, operating with different degrees of verisimilitude (*Actual Minds* 11). He argues that after the

“‘cognitive revolution’ in human sciences ... it became apparent that it did not suffice to equate representations with images, with propositions, with lexical networks, or even with more temporally extended vehicles such as sentences.” (“The Narrative Construction” 5)

To substantiate his claims, Bruner lists ten properties of narrative which render it central to cognitive science (the following list was extracted from “The Narrative Construction” 6-18):

- **Diachronicity**, the “irreducible durativeness” of narrative
- **Particularity** – narrative is suggestive thanks to being an emblematic example of a generic story pattern.
- **Intentional state entailment**
- **Hermeneutic composability**, the relations between what is encoded and what can be decoded, between the meaning of the whole and that of the constituents.
- **Canonicity and breach**, the way in which narratives are used to subvert existing scripts.
- **Referentiality**, the direct or indirect correspondence to what we perceive as reality
- **Genericness**, the ways in which generic patterns of narrative frame and guide the mind
- **Normativeness**, the relation of narrative to cultural legitimacy

- **Context sensitivity and negotiability**, the pragmatic viability of narratives
- **Narrative accrual**, the cumulativeness of narratives

Theodore Sarbin ascribes to narratives the role of a “root metaphor” for psychology (3), building on Stephen Pepper’s seminal theory that “any metaphysical posture, or world hypothesis, is derived from a basic or root metaphor” (Sarbin 3-4). **He proposes a “narratory principle: that human beings think, perceive, imagine, and make moral choices according to narrative structures”** (8). Narrative is supposed to be an organizing principle for human action in a similar way as Kahneman and Tversky’s heuristics or Rosenberg’s implicit personality theory (Sarbin 9).

Although Sarbin explicitly mentions only psychology as the discipline centered around narrative, there are enough cues to make it reasonable to assume that the wider conception of psychology as the “study of mind” was the intended meaning. Given the references to metaphysics or to the anthropologist Clifford Geertz, the message can be easily translated into: **“narrative can serve as a root metaphor for cognitive science”**.

2.2 The narrative intelligence hypothesis

“Stories are so functional because social interaction is central to human beings, and stories are fundamentally about social interaction ... stories are central to the human cognitive system because they capture the essence of social information, the structure of human action.” (Read and Miller 139)

These words can serve as an introduction to the biologically rooted aspects of narrative significance. This section intends to present a concrete, believable narrative (meta-reference intended) of embodied action leading to the state described in Bruner’s and Sarbin’s abstract conclusions from the previous section.

Building upon the widely discussed “social intelligence hypothesis”, which “suggests that the primate brain and primate intelligence evolved in adaptation to the need to operate in large groups where structure and cohesion of the group required a detailed understanding of group members” (Dautenhahn, “Stories of Lemurs” 65), Kerstin Dautenhahn makes a proposal with a name drawing power from this momentous topic. Arguing that “an evolutionary trend seems to exist from physical contact (non-human primates) to language (hominids) to communicating in stories (modern, highly ‘enculturated’ humans living in complex societies)” (“Stories of Lemurs” 68), she proposes a “**narrative intelligence hypothesis**”. The theory behind it is

“that the evolutionary origin of communicating in stories was correlated with increasing social dynamics among our human ancestors, in particular the necessity to communicate about third-party relationships (which in humans seems to reach the highest degree of sophistication among all apes, cf. gossip and manipulation).” (“Stories of Lemurs” 68)

The evolutionary origin of narrative use according to Dautenhahn will be elaborated on in Chapter 4. At this point, it is desirable to explain why she believes that “the structure of narrative is particularly suited to communicate about the social world” (“Stories of Lemurs” 68), providing a kind of evolutionarily situated counterpart of Jerome Bruner’s abstract properties of narrative.

Suggesting that “narrative might be the ‘natural’ format for encoding and re-constructing meaningful, socially relevant information (e.g. emotions and intentions of group members)” (“Stories of Lemurs” 69), Dautenhahn indicates the direction of her argument. She stresses the broadening **temporal horizon** in the development of language. With respect to social bonding mechanisms, she counterpoints the physical actions of social bonding and the “mental picture of physical actions” of a narrative, “providing the stage, actors, intentions and a storyline” (“Stories of Lemurs” 71). This counterposition highlights the fact that as presupposing a language in human animals is a step from disorderly and arbitrary symbols to capacity for represented information, presupposing

narrative might be an equally pronounced step from capacity for represented information to capacity for represented action. Dautenhahn describes how the basic narrative structure fulfils the requirements of social bonding situations:

“usually a narrative gives a certain introduction of the characters (making contact between individuals, actors, listener and speaker), develops a plot, namely a sequence of actions that convey meaning (value, pleasurable, unpleasurable), usually with a high point and a resolution (reinforcement or break-up of relationships), and focuses on unusual events rather than stereotypical events.” (“Stories of Lemurs” 71)

Narrative is described as a “structure which resembles (and goes beyond) physical grooming” (“Stories of Lemurs” 71).

2.3 The “grand narrative”

Critical theory, often respectfully referred to as just “theory”, came to view narrative as the central organizing element of human society. In his seminal book on *The Postmodern Condition*, Jean-Francois Lyotard operates with the concept of metanarratives or “grand narratives” – meaning narratives shared by entire nations or cultures, which these communities use to legitimate their existence or purpose; metanarratives can create historical meaning or provide a framework for all experience and knowledge (Childers and Hentzi 186). Stephens and McCallum define a metanarrative as “a global or totalizing cultural narrative schema which orders and explains knowledge and experience” (6). Halverson et al., while discussing “master narratives” of Islamist extremism, defines a master narrative as a “coherent system of interrelated and sequentially organized stories that share a common rhetorical desire to resolve a conflict by establishing audience expectations according to the known trajectories of its literary and rhetorical form” (14). An important anchoring point and, recently, the object of criticism, is the usual reliance of metanarratives on some form of transcendent and universal truth (Lyotard xxiv-xxv).

It is thus that narrative became a central component of human society as viewed by critical theory. But it did not happen by chance: there is a reason for the emergence of the concept of metanarrative at this point in history. The age of the postmodern, generally recognized as taking place in the latter half of the 20th century, is defined by Lyotard “simplifying to the extreme, ... as incredulity towards metanarratives” (xxiv). The shift towards postmodernity is the first time that the very grand narratives are questioned in favour of “local” narratives with partial explanatory power, a “multiplicity of theoretical standpoints” (Peters 7). The topicality of dealing with narrative is further amplified by critical theory’s notion that “the narrative function is losing its functors, its great hero, its great dangers, its great voyages, its great goal. It is being dispersed in clouds of narrative language ... Where, after the metanarratives, can legitimacy reside?” (Lyotard xxiv-xxv)

2.4 Scalability

Michael Bamberg identifies two strains of narrative research, namely the subjectivity-centered approach and the social approach (Bamberg 2-3), in order to demonstrate the disjunction of the body of narrative theory. However, from a diametrically opposed view, **this state might be perceived as possession of a well-specified unit of data which can be used to explain human phenomena on levels ranging from momentary states of the individual, for example:**

- Micro-narratives consisting of a simple cause-effect representation (agent hears a familiar noise and creates a micro-story of what might have happened)
- Mini-narratives created and shared in human conversation

to narratives integrating the totality of an individual's existence:

- A single biographical narrative that is being rewritten constantly to integrate new input and is the very filter through which the human animal views its existence

to narratives shared by or imposed on societies that form(ed) entire historical epochs:

- Christianity, a narrative with a mostly unchanging form, was a key force in shaping the cognitive and physical reality of Western civilization
- Metanarratives of progress and science seem to be the shaping forces of present Western approaches to the available physical environment

Whether and how this explanatory power is able to produce appropriately grand-scale output will be one of the guiding questions of the following chapters.

3. Proximate explanations of narrative: Ontogeny and mechanism

3.1 Development of narrative use in children

Lost in theoretical abstractions and presupposing boundless complexity of human narrative use, researchers often do not give sufficient consideration to how understanding and production of narratives dates back to its most rudimentary form in the cognitive development of a child. The primary source for this section will be Katherine Nelson's *Narratives from the Crib*, a collaborative project "focusing on what a 2-year old child, Emily, said to herself when she was alone in her crib at naptime or at night" (Nelson v). The source material consisted of tape recordings made during 15 months between the ages of 21;7 and 36;9 (Nelson 2).

The rationale behind this approach was to utilize child bedtime talk, which often summarized the events of the day, together with the adult viewpoint, to gain access to how the child organizes its experience. Nelson recalls being "intrigued by the contrast between Emily's long and richly textured monologues and her short and spare contributions to pre-bed dialogues with her parents" (vi). Even this general observation of a human being in the early stages of cognitive development, in Vygotskian terms certainly before the internalization of thought, carries a strong indication that of the corpus of language use observed in the child, only the tip of the iceberg is employed in social interaction while the most substantial part directly supports cognitive development. As will be shown later in this section on the casuistry of Emily, narrative seems to be the central, if not organizing component of at least this visible manifestation of cognitive development.

In a preliminary categorization of the kinds of discourse Emily employed, Nelson recognizes three major "genres" (6-7):

- Narrative or proto-narrative. Sequences organized temporally or causally.
- Sequences organized around a central problem.
- Enactment sequences. Corresponding to or bringing about action (for example playing with dolls and describing their actions at the same time).

A possible interpretation is that the meaning of these genres for cognitive development is, respectively:

- Making sense of the past/of previous input.
- Problem-solving in the present.
- Story creation/performance based on a synthesis of how the world works (as a result of the processes of the two previous points).

Nelson writes that “through representing and interpreting in words Emily manages to organize, generalize, categorize, narrativize, and thus ultimately to clarify what may originally have been problematic or troublesome” (20).

In line with her previous research on “general event representations that structure [children’s] understanding of everyday experience” (Nelson 27), she focuses on Emily’s (changing) mental representation of the world, in particular the events in which she participates. She recognizes a special sequentially organized type of monologue, which consists in “reciting of stories based on books that have been read to her” (29) and observes that across the 15 months of observation, Emily starts to “construct stories of her own, based on those she has heard and involving sometimes real friends, sometimes story characters” (29) and that her recounting increasingly employs the “dramatic narrative prosodic frame” (29).

Daily routines (such as being brought home from day-care, put to sleep etc.) are mentioned as a frequent theme of Emily’s monologues – for the needs of this thesis, they are possible candidates for the very first narratives each

human being understands and learns, and then uses as a prototype for scenarios of increasing complexity. They might be viewed as structures which, out of randomness, give the child a recurring temporal and causal sequence in order to allow for a prolonged inspection time.

An interesting feature of the monologues noted by Nelson is the fact that they often summarize plans for the next day, even though these are Emily's father's plans. It indicates that Emily is aware of adults' planning ability and by recounting the plans, she attempts to understand both their meaning (or intentionality) and their temporal and causal structure. **The “interplay between mediated knowledge (from parental talk) and unmediated knowledge (based on direct experience)” (35) might be just the developmental cognitive problem that the unique structure of narrative is especially good at resolving.** A further possible hypothesis stemming from the fact that in human cognitive development, one's “mental model of the real world increasingly depends upon mediated knowledge” (Nelson 39) is that as the importance of first-hand learning diminishes, there arises a need for mental space and narrative-like structure tracking causality across time, in which **the bulk of mediated knowledge can be chained in the form of placeholders which, initially containing only names of the components** (for example “nursery” or “caretaker Tanta”), **are gradually clarified and filled with information** (what kind of an institution a nursery is, who is Tanta and why does she, not being a member of the family, spend time with Emily).

Nelson notes that at the age of 2, Emily begins to “use her memory of past events to speculate about the future” (35), expecting that these events might happen again. A reading of this from the point of view of narrative study could be that for the child, the act of positioning herself in the middle of a protonarrative (with both past and future), with its explanatory and predictive capacity, provides necessary foundation for detailed knowledge. The possibility of event prediction in a patterned narrative also increases assurance of continuity and therefore motivation for learning. This is related to an important observation: “relatively novel material was much more likely to be discussed in the monologue in *anticipation* of an event rather than after the fact” (Nelson 37).

For the needs of this thesis, **it offers the interesting suggestion that in explaining the evolutionary development of human narrative use, the fitness-enhancing skill of predicting the occurrence of narrative patterns in the future might have been underestimated/not stressed enough beside orthodox notions highlighting representation and memorization of the past/present.**

At the age of 21 months and 7 days, while describing an event of the family car being broken, Emily is observed to “have acquired some of the rudiments of storytelling at this point – **a theme statement, setting statements, use of repetition, an ending** – even though her narrative has more of a circular than a linear structure” (Nelson 48, emphasis mine). This selection based on observation is a useful basis for establishing the simplest, centremost constituents in the evolution of narrative use.

Nelson’s findings are also an interesting reminder of the Sapir-Whorf hypothesis – it is not clear in what order Emily acquires the components necessary for narrative use, whether she first understands the concepts and then maps them to the corresponding grammatical rules, or she first imitates grammatical rules and placeholder ordering principles and then gradually discovers their conceptual implications. Nelson writes about “Emily’s narratives [being] sprinkled with connectives such as *so, then, and, when, and then, but* (all these by 23 months), and later *though, just, see, where*” (48). However, usage is limited: these elements “do not at first seem to mark actual event sequences” (48), even though Emily seems to have “some intuitive sense of what connectives (or at least *so*) are useful for” (49). The fact of her not having “constructed a contrastive system of connectives” (49) might mean that she either does know the causal concepts behind and needs only to map them to respective connectives or that she is in the process of developing the causal concepts from her parents’ use of these connectives when connecting known concepts (nouns and verbs). Similarly, Emily’s occasional correct usage of *because* and *actually* makes Nelson state that “clearly something is guiding their use at appropriate points and not at inappropriate ones” (53).

Nelson reminds us of an important variable in early stages of narrative development, the differentiation between:

- Reference time
- Event time
- Speech time

which is an interesting pointer to the question where in the process of cognitive development does temporal representation of reality become disjointed, first to create awareness of the possibility of reference to the past, then to add capacity for assuming temporal positions and creating interplay between them. At 32 months, Emily shows “indications of a sophisticated understanding of temporal relations” (58), with all these components separated.

Emily is said to “achieve an integration of the form and content of the sequentially organized narrative” (Nelson 54) at the age of 23 months, and from that point onwards she is expected to start “master[ing] the many linguistic devices that will enable her to formulate her narratives in a way that more adequately expresses her intentions” (54). Then, at 33 months, “the sequential structure of event narratives” is said to be “well mastered” (55).

3.2 Narrative pre-construction

Searching back to the inception of human narrative performance, Katherine Nelson sought along the temporal axis of human cognitive development – on the other hand, William Labov contributed to the understanding of narrative beginnings along the axis of the cognitive “life” of individual instances of narrative. These are the “set of cognitive operations that operate in the reverse order [as opposed to order of events in time], the narrative *pre-construction* that every narrator must accomplish before beginning the narrative itself” (Labov 47).

Following the root abstraction that narrative is “about something”, Labov identifies the necessity of either an internal (need to share) or an external (question) stimulus for narrative initiation. Among the preconditions, together with the social situation, the alertness of the audience, anticipation of “an extended turn of talk on the part of the narrator” (48), is the attribute of **reportability** of narrative, marked usually by the event not occurring regularly. The narrator is then prompted to engage in a **recursive process** of identifying the causally related preceding events of each thus revealed preceding event starting with the “most reportable event” and ending before an “event that is not in itself **reportable** and does not require an explanation” (49), in other words, which is known or occurs regularly. One iteration of the recursive process results in a single **temporal juncture**, “a relation of before-and-after that holds between two independent clauses, and matches the order of events in time” (48). Labov’s definition of narrative requires that there be at least one temporal juncture in the series of clauses in question.

The symbolic representation of narratives based on the abovementioned framework begins with the “most reportable” event e_0 , acquires at least the immediately preceding event e_{-1} (minimal narrative), and a recursively generated chain of events going: e_{-2} , e_{-3} , to e_{-n} .

In the context of Labov and Waletzky’s 1967 framework, the event e_{-n} stems from **orientation**, the events e_{-n+1} to e_{-1} form the **complicating action** and the event e_0 can be used alone as the introducing **abstract** of the narrative which triggered the whole process either externally or internally. The **resolution** and **coda** of the narrative might then come as e_{0+m} , based on whenever the sequence of events returns to regularity.

This perspective on narrative seems to be especially helpful in two directions:

- Artificial intelligence research can benefit from the operationalization of the reasons a temporally persevering, homeostatic cognitive agent with a memory can have to decide to start composing a narrative; the

framework also highlights the position of specific criteria for choosing e_0 , e_n and the coda from the available events.

- Labov, pointing out the fact that memory deteriorates and various unconscious processes operate on the material that will constitute future narratives, judges that the framework

“lays the foundation for further inquiry into how narrative events are stored in memory and accessed by the narrator, how the narrator makes selection from that storage, and how that selection is rearranged to transform the normative significance and evaluation of the events in the interests of the narrator” (50).

3.3 Narrative and the self

Daniel Dennett, while discussing “The Origins of Selves”, provides a metaphorical introduction to the narrative aspect of the human self:

“Words are potent elements of our environment that we readily incorporate, ingesting and extruding them, weaving them like spiderwebs into self-protective strings of narrative. Our fundamental tactic of self-protection, self-control, and self-definition is not building dams or spinning webs, but telling stories – and more particularly concocting and controlling the story we tell others – and ourselves – about who we are.”

He claims that the production of narratives in humans is an unconscious process, comparable to the previously used metaphor of a spider spinning a web; that human brains are designed to “spin” narratives. He recognizes a quality of narratives which takes part in creating selves: “their effect on any audience or readers is to encourage them to (try to) posit a unified agent whose words they are, about whom they are: in short, to posit what I call a *center of narrative gravity*” (Dennett, original emphasis).

Kerstin Dautenhahn argues for the importance of narrative (or its constituent properties) in constructing the self from the bottom-up, agent perspective:

“The behaviour and appearance of any biological agent can only be understood with reference to its history, considering its context, past, present and future situations. This is particularly important for life-long learning human agents who are continuously learning about themselves and their environment and are able to modify their goals and motivations.” (Dautenhahn, “Stories of Lemurs” 76)

Based on this, she reminds the reader that **humans “dynamically reconstruct their individual history (autobiography) during their lifetimes”**

(Dautenhahn, “Stories of Lemurs” 77).

Mark Freeman also stresses the notion that rather than simply observing and remembering it, humans interpret and re-interpret their identity. Recollecting his earlier theories, Dan McAdams describes his

“life-story model of identity, contending that people begin, in late adolescence and young adulthood, to construe their lives as evolving stories that integrate the reconstructed past and the imagined future in order to provide life with some semblance of unity and purpose.” (“The role of narrative” 19)

McAdams also notes that with respect to personality psychology’s belief that human behaviour is guided by internal factors, the individual differences in narrative identities are an alternative to the long-standing paradigm of personality traits (“The role of narrative” 20). Moreover, this alternative is supported by the context-oriented, social constructionist tendencies of current research. From this clash inside personality psychology, a new model surfaced, describing three levels of psychological individuality (McAdams, “The role of narrative” 22-23):

- Level 1: Dispositional traits – decontextualized traits such as temperament and tendencies to certain behaviour.

- Level 2: Characteristic adaptations – situated (time, place, social role) behavioural traits such as current motives, goals, interests, attitudes, values, or defense mechanisms.
- Level 3: Integrative life stories – evolving psychosocial constructions of the self strongly shaped by context.

Noting the absence of taxonomies for the levels 2 and 3 (as opposed to scales of extraversion or classifications such as the Big Five for level 1), McAdams creates an example taxonomical unit, a prototype of the “redemptive self”, stemming from and observed frequently in the United States (“The role of narrative” 23-25). It concerns middle-aged adults who score high on measures of generativity. McAdams elaborates on the “redemptive tales of atonement, emancipation, recovery, self-fulfillment, and upward social mobility” (“The role of narrative” 25), which form this shared narrative structure. Obviously, such taxonomical knowledge is highly valuable in safely approaching new case studies.

3.3.1 Narrative and the social self

It is only a small step from the isolated human self to the entire system of interacting selves, learning about and combining each other’s narratives.

Kerstin Dautenhahn describes the system:

“to tell autobiographic stories about oneself and create biographic re-constructions about other persons, is linked to the emphatic, experiential way of relating other persons to oneself. Storytelling is a central mechanism in human social understanding”
(Dautenhahn, “Stories of Lemurs” 77)

This dimension indicates that **agents, apart from their own autobiographic stories, form hypotheses about selves of other people** based on partial biographical information. Consequently, **they calculate future behaviour of other agents based on the expected continuation of their narratives at**

that point in time, possibly referring to general culture-based rules of continuing narratives laid out in a specific way. For example, a person five years into a career in computer science, who is married and has two children, and at the same time does not verbally signal possible reformulation of her/his life narrative (such as “my true passion is the violin” or “I am having serious doubts about the concept of marriage”) is likely to perform actions that preserve or extend the indicators of success in computer science and marriage.

3.4 Narrative capacity impairment

Children with autism are usually described as lacking “theory of mind”. Dautenhahn remarks that an alternative explanation for the specific failures of autistic people is, “although related to mindreading skills, ... a failure to properly interpret, re-construct and understand stories” (“Stories of Lemurs” 79, also suggested in Bruner and Feldman). Interestingly, she connects the difficulty of autistic people to remember and describe events diverging from their usual routines to Nelson’s evidence of preschool children’s memory being structured around routine episodes until they acquire the ability of storytelling in its true significance according to Bruner (“The Narrative Construction”): when they recognize that a narrative is worth telling only if it breaks/deviates from the existing scripts. This would create a new perspective on autism as a condition of not proceeding beyond a certain stage in early narrative development. Dautenhahn refers to her personal communication with Stuart Powell and to Howlin et al., both of whom point towards the importance of social context and history, the former encouraging explicit guidance of autistic children’s memory formation “in order to create autobiographical stories that they can tell” (“Stories of Lemurs” 81).

3.5 AI: narrative intelligence modelling, interactive storytelling

In response to the emerging narrative paradigm for understanding cognition, Dautenhahn speaks of **narrative technology** as a means of meeting “the social and cognitive needs of young primate story-tellers” (“Stories of Lemurs” 81) in education. She contributes by proposing the minimum requirements for a socially intelligent agent capable of dealing with narratives (“Stories of Lemurs” 82-83):

1. Capacity to identify and recognize individual group members
2. Capacity to establish, maintain, remember and utilize social networks:
 - 2.1 Ability to remember interactions with others and build direct relationships
 - 2.2 Ability to identify third-party relationships
 - 2.3 Ability to understand others
 - 2.4 Recognition of conspecifics as members in a group hierarchy
3. Efficient mechanisms of social bonding – grooming/language
4. Social learning and the capacity to use others as social tools.

These ideas resulted in a number of research projects devoted to building narrative software, virtual or physical environments. They include Glos and Cassell’s Rosebud, the story creation environment of Machado and Paiva, or Montemayor’s robot for pediatric rehabilitation.

Lakoff and Narayanan, proceeding “Toward a Computational Model of Narrative”, begin by stating that systems attempting to model narrative “need to access the underlying cognitive structure of human motivation, actions, goals, and events” (21). In order to encode this structure, they developed an “action ontology” with the following schema:

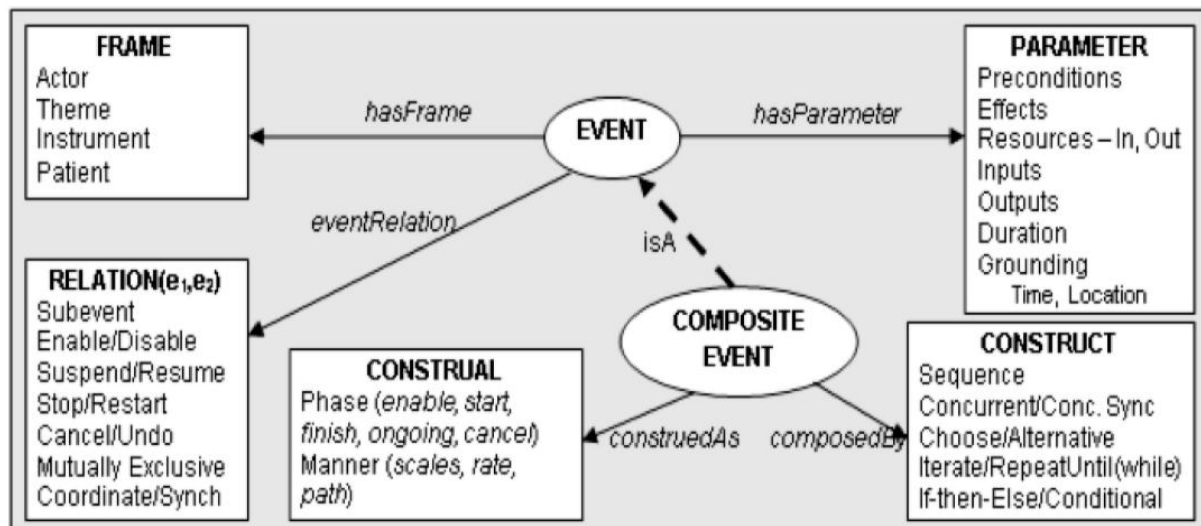


Figure 2: Lakoff's and Narayanan's ontological schema of event structure (22)

At this point, I would like to highlight the potential utility of this schema in cognitive therapy; it could serve as a tool for analyzing target events, providing an explicit structure for systematic problem identification. For example, there could a maladaptive notion of mutual exclusivity of events ("It cannot be done without...")(box Relation), a maladaptive perception of event phase (positive components of life perceived as having ended)(box Construal) or an incorrect conception of available resources (personality?)(box Parameter).

3.6 Narrative inquiry/analysis

The foremost field of practical narrative research, inquiry into authentic human narratives to either help a client in narrative therapy or gain knowledge about specific social groups, presents a challenge for academia due to the special nature of its outcome. The first subsection is dedicated to this methodological issue.

3.6.1 The interpretive nature of narrative inquiry

Ruthellen Josselson addresses the problem that narrative research, “rooted in interpretive hermeneutics and phenomenology” (7), does not allow for amalgamation of knowledge across researchers. Following from the fact that “in a postmodern framework, there are no ‘facts,’ so knowledge has to be considered relative to its context of creation” (9), Josselson describes the current state where “we are in danger of drowning in a tsunami of solipsistic studies that we are unable to assimilate” (10). Trying to solve the problem of adding up “intersubjectivities and constructed understandings,” Josselson encourages researchers “to treat [research reports] as situated interpretations” (10). The proposed approach incorporates strong theoretical grounding and a system of “layering studies in a way that establishes correspondence and difference” (13), enabling for aggregation of corresponding concepts and enrichment brought by studying outliers (“map of the repertoire of the phenomenon” (13)).

3.6.2 Approaches to narrative analysis

Fischer and Goblirsch, taking the perspective of social construction of the self, “[distinguish] and [triangulate] the reconstructive perspectives of the lived life, the experienced life, and the presented life” (37). They elaborate the concept of “biographical structuring”, stressing the role of the act of biographical narration as “a main agent in self constitution” (39). This occurs in highly differentiated settings from short life summaries designed for strangers to complex biographical variations formulated in interaction with one’s family, friends, or institutions (CV and interviews). The method derived from this perspective is the **narrative biographical interview**, which is designed to retrieve information about “the social process of biographical structuring” (39). Out of the different dimensions scrutinized, the most innovative and central is the “double temporal horizon of past and future” (39), where the present, the “now” of the interview dynamically mediates between fulfilled/thwarted expectations of the future and the varying selection of events from the past. The

generic starting question of an interview goes as follows: “Please tell me your family and life story. I will not interrupt you; I will listen to you and only write down some notes. When you finish I will ask you some questions according to my notes” (40). Afterwards, the interviewer avoids not only argumentation and judgmental language, but also questions regarding meaning or consequent feelings connected with life events – this, according to the authors, “allows an individual to present the biographical process without justification” (40). A similar approach is Wengraf’s **Biographic Narrative Interpretative Method** (BNIM), which limits the interviewer’s role to “minimalist-passive” responses (Wengraf 10).

The **structural-hermeneutical analysis** of biographical texts is a sociological method of biographical research. The premises are as follows: After the events experienced by an individual become biographically relevant, it is necessary to come to terms with them. The consequent decisions and interpretations depend on the individual’s “previous biographical experiences, ... possibilities and social constraints, and the era [he/she lives] in.” (Fischer and Goblirsch 40)

Fischer and Goblirsch, active in an institution of professional youth care, outline the directions in which the **narrative-biographical diagnosis** benefits the therapeutic process (41):

1. Understanding of the genesis of the client’s problems
2. Developing a case specific plan of intervention
3. Evaluating previous clinical or support processes.

As an example, the authors introduce the case of Alexej, on which they demonstrate how the narrative is evaluated, taking into account the political and cultural climate in the countries to which the narrative is bound, what is being mentioned first or stressed, or how are different people rendered in language (“in comparison to ‘*my father*’ Alexej presents his mother as ‘*the mother*’ ... he renders her faintly, indistinctly” (43)). Counterpointing the lived life and the presented life unfolds a **structure of self-presentation**, and the therapists are

able to utilize the revealed **structural problems and resources** in channelling the client's competencies (in Alexej's case social and leadership skills) "into accepted legal and social realms, allowing him to lead a socially integrated life" (44)

3.7 Components of cultural narratives

Beholding the gigantic web of narrative that binds and separates human cultures, one necessarily notices recurring themes and devices. Vladimir Propp focused on the Russian folktale and identified 31 components, "functions of *dramatis personae*". A few illustrative examples:

- **Absentation**, where a family member, hero or future rescuee leaves home, creating tension
- **Villainy or lack**, harm caused to a family member or an identified absence
- **First function of the donor**, where the hero is tested or attacked, serving as preparation for a magical agent
- **Receiving a magical agent**
- **Pursuit**, the state of the hero being physically threatened
- **Unfounded claims**, involving a false hero
- **Transfiguration**, a change in appearance of the hero for better (handsome, new clothing) or worse (into an animal or an object), with identity staying the same
- **Wedding**, one of the largest clusters of specific action, where the hero marries and either ascends the throne or receives an exceptional reward

This perspective is central not so much in telling us something about the Russian folktale as in demonstrating the recipe for dissecting entire cultural

heritages into discrete components linkable to human biological needs. Since this framework targets folktales often told to and between illiterate people with major concerns regarding physical survival, the functions therein reflect mostly physiological needs of the absence of danger, abundance of resources, and presence of kin or people to which the reader has an emotional bond. An extension of this framework to encompass modern fiction would probably require representation of finer cognitive needs higher up the Maslow's pyramid of human motivation, concerning truth, ethics and philosophy.

4. Ultimate explanations of narrative: Phylogeny and adaptation

4.1 Evolution of narrative use

As indicated in Section 2.2, Kerstin Dautenhahn's argument follows and attempts to extend the social intelligence hypothesis. Introducing the field of primate intelligence, she reminds the reader of the individualized nature of primate societies, with their "complex recognition mechanisms of kin and group members", and the consequential "complex kinds of social interaction and the development of various forms of social relationships and networks" ("Stories of Lemurs" 64). She refers to the theory of Robin Dunbar, where language serves as an efficient device of social bonding within the human neocortical limit of approximately 150 simultaneously monitored personal relationships (Dunbar). Pointing out Byrne's remark that social intelligence hypothesis "offers little explanation for the evolution of specific ape and human kinds of intelligence (e.g. involving mental representations)" ("Stories of Lemurs" 68), she proceeds to propose the "narrative intelligence hypothesis", stating that narrative use evolved from the need to communicate about third-party relationships. Oliphant's conclusion that a representational system merely learning word-meaning associations does not need much computational power, and therefore language alone can hardly account for the difference in information processing capacity between humans and apes, is used to highlight the importance and the computational expenses of constructing and attributing meaning to an utterance, which includes considering narrative-regulated variables of the primate social field such as "the personality/character of the sender (is he trustworthy?), the relationship between 'sender' and 'recipient' of a message (potential mate? competitor?), important third-party relationships, positions in the group hierarchy etc." (Dautenhahn, "Stories of Lemurs" 70). Dautenhahn also specifies four fundamental components of the primate social field ("Stories of Lemurs" 72-74):

1. Vision-dominated individual and kin recognition based on previous experience, group membership perception
2. Emotion-based “understanding” and prediction of the behaviour of other animals
3. Memory of previous interactions with group members – dyadic, direct relationships
4. Memory of third-party relationships, interactions in the whole group, manipulation with information about a set of relationships

To use Bruner’s terminological apparatus, it seems that within these constraints, a highly context-dependent format rooted in personal, emotional meaning and operating with verisimilitude such as narrative is more likely to have been perfected by evolution than a logical system of propositional knowledge.

Michelle Scalise Sugiyama’s continuous effort to reveal the evolutionary origins of narrative resulted in a number of momentous articles. While joining Dautenhahn in referring to the social intelligence hypothesis, she formulates the basic notion of narrative as “a transaction in which the benefit to the listener is information about his or her environment, and the benefit to the storyteller is the elicitation of behaviour from the listener that serves the former’s interests” (“On the Origins” 403). Extending Steven Pinker’s demonstration that language is a product of natural selection, Sugiyama voices the possibility

“that narrative, too, is an adaptation. It is easy to imagine how a faculty for narrative might have evolved: all other things being equal, once humans acquired the language faculty, any individual who could better manipulate the behaviour of others via this new medium would have had greater reproductive success than his or her less verbally adroit fellows.” (“On the Origins” 419)

4.1.1 Benefit to the storyteller

Sugiyama treats elicitation of certain behaviour in the listener, the “manipulation of the perceptions, opinions, and/or behaviour of others” (“On the Origins” 405), as the primary mechanism in the evolution of narrative use.

Arguing that “it seems highly plausible that self-interest is one of the chief psychological factors and content of stories” (“On the Origins” 405), she uses the phenomenon of “storyteller bias” in ethnographic research as a demonstration of how different fitness goals of storytellers influence the wording of a particular story. She finds an exceptionally rich source of observations of this kind in Edmund Leach’s study of the Kachins of Burma. Leach writes that

“there is no ‘authentic version’ of Kachin tradition to which all Kachins would agree, there are merely a number of stories which concern more or less the same set of mythological characters and which make use of the same kinds of structural symbolism ... but which differ from one another in crucial details according to who is telling the tale.” (266)

He explains the purpose of storytelling as serving “to validate the status of the individual who tells the story, or rather of the individual who hires a bard to tell the story” (265). Similarly, Raymond Firth observes that

“the lack of agreement between ... different versions [of a given Tikopian tale], often in conflict, is due not so much to differential memory as to differential interest. Even one informant will give stories which are inconsistent with one another.” (175)

He ascribes to traditional tales the function of “pressure instruments for keeping alive competing claims of varying kind, in particular claims to social status”, even inferring from this the “general function of the oral tradition” (175). The difference of fitness interest might be due to “differences in sex, age, health, social status, marital status, [or] number of offspring” (Sugiyama, “On the Origins” 408). She uses as example a study of competitive joke-telling sessions

in men and, on the other hand, the noncompetitive nature of women's joke- and storytelling.

Of the fields of human endeavour influenced by narrative, implications of the grandest scale are quite likely to be found in politics. From narratives validating the status of individuals, there is only a small step to an **organized system of validation of a hierarchical distribution of power**. Sugiyama begins her discussion of the political uses of storytelling with "the deployment of rumor as a form of psychological warfare" in ancient Rome's "rumor wardens (delatores)" ("On the Origins" 415). She uses the findings of Napoleon Chagnon's study of the Yanomamo tribe to demonstrate "not only that **narrative may be used to manipulate the perceptions and opinions of the audience to serve the storyteller's interest**, but that **it can also be used as a nonconfrontational means of exercising (or acquiring) power**" ("On the Origins" 416). In this respect, Sugiyama observes "a link between storytelling and prestige: possession of valuable information that others do not have appears to boost an individual's status" ("On the Origins" 417). She documents this by citing studies of macaque monkeys whose social status changed after they were taught special information and of the Eskimo cultures, where "individuals are given special respect and prestige if they are especially knowledgeable" (Nelson 374).

4.1.2 Benefit to the listener

The benefit to the listener in the form of useful information is intuitively understandable. Sugiyama, investigating why humans sacrifice valuable time resources in order to listen to narratives, opens the issue of gossip as a kind of market for social information. She refers to Roger Abrahams's study of gossip, which found that the inhabitants of St. Vincent often perceived "people who refrain from gossiping" as not only silent, but also "greedy and uncooperative" (Sugiyama, "On the Origins" 411), highlighting the resource-like nature and the consequential fitness relevance of the social information contained in gossip.

The phenomenon of “audience design” (Sugiyama, “On the Origins” 413), accommodation of the narrative to the needs or interests of the listeners, indirectly points to the fact that there are needs or interests a narrative can saturate. It implies that a narrative’s benefit to the listener not only exists, but its degree is commonly subject to conscious control.

In a later article, Sugiyama elaborates on narratives serving information acquisition as a “broader selection pressure” (“Food, foragers” 221) than her former focus, the manipulation of the audience.

4.2 Evolution of literature (as the frontier of the narrative form)

This long quotation from Joseph Carroll’s seminal publication titled *Literary Darwinism: Evolution, Human Nature, and Literature*, due to its highly effective combination of reasoning and imagination, can serve as a fit introduction to the basic notions of Darwinian literary studies:

“As a small boy, David Copperfield is tormented and abused by his vicious stepfather, but close to his own room he discovers a neglected store of old books, including *Tom Jones*, *Humphrey Clinker*, *Don Quixote*, and *Robinson Crusoe*. What David gets from these books is not just a bit of mental cheesecake, a chance for a transient fantasy in which all his own wishes are fulfilled. What he gets are lively and powerful images of human life suffused with the feeling and understanding of the astonishingly capable and complete human beings who wrote them. [...] By nurturing and cultivating his own individual identity through his literary imagination, he enables himself to adapt successfully to this world. He directly enhances his own fitness as a human being, and in doing so he demonstrates the kind of adaptive advantage that can be conferred by literature.” (Carroll 67-68)

In opposition to purely constructivist or cultural accounts of literature, Boyd advocates a **biocultural** approach: “we cannot simply go back to literary texts

without assimilating what science has discovered about human nature, minds, and behaviour over the last half-century ... without considering fiction's origins we cannot follow its full story" (2-3). He strongly reminds readers of the "stringent cost-benefit criteria required in biological explanation" (80) and of the fact that most non-evolutionary explanations of art and literature fail to satisfy these.

4.2.1 Literature as play

In evolutionary inquiry about the origin of narratives, literature taken as the starting point shifts much of the researchers' attention to the seeming vanity of devoting valuable time resources to fictional accounts of events. This tendency made way for an important theory applicable mainly to the later stages of the evolution of narratives, which is gaining relevance with each century of increasing human affluence.

Play can be delimited as voluntary, intrinsically motivated, and positively valued activity (Garvey 4). One of the major evolutionary-neurobiological theories of play holds that it has the function of cognitive training – the study of rats' brains being improved by play by Ferchmin and Eterovic may serve as representative supporting evidence.

Brian Boyd draws on this theory when he hypothesizes that art derives from play. He introduces the proposition with the fact is that "play evolved through the advantages of flexibility; the amount of play in a species correlates with its flexibility of action" (14) and with the parallel: "Animals that play repeatedly and exuberantly refine skills, extend repertoires, and sharpen sensitivities. Play therefore has evolved to be highly self-rewarding" (14). The definition of art as "cognitive play with pattern" (15), as "playground for the mind" (15), and the specification of fiction as play with **social pattern** as a result of human "ultrasocial" nature (15) forms a new perspective on narratives, which might be complementary to Dautenhahn's and Sugiyama's accounts of direct fitness benefits, and adds an explanation of the development of the fictional form standing alone.

Pattern, the input for Boyd's conception of art as play, has been noted for attracting human attention. "Information that forms arrays from which we can make rich inferences" (Boyd 89) appears to be the optimal source material for exploring the environment. In addition, the specifically open-ended nature of human pattern detection (89) facilitates the infinite process of discovery based on previously identified patterns, similar to the continuous change and redefinition of art. Art, "[stimulating] our brains more than does routine processing of the environment", introduces a supernormal stimulus, a rush of suitable patterned information (94).

Boyd describes the benefit humans draw from literature as "[fine-tuning] our minds for rapid response in the information models that matter most to us" (94). He summarizes neuroscientific opinion as follows: "only focused attention and incremental remodeling can make the most of the brain's plasticity" (94). The tangible result is then increased efficiency in creating "scenarios for reasoning about our own and others' plans and actions" (95).

4.2.2 Literature as a means of sharing attention

Boyd, pointing out how evolution shaped humans into hyper-social creatures who are unique in the extent to which their attention is shared, writes that art "[encourages] us to share attention in coordinated ways that improve our attunement with one another" (101). He introduces mirror neurons and cites Frans de Waal observing that "selection pressure on paying attention to others must have been enormous" (de Waal 25). The situations where humans "read others' attention to resources as well as risks" (Boyd 102) are so commonplace that they render the original practice of finding out for oneself an exception: An average member of the Western society receives a staggering majority of money-, status-, and health-related information mediated from others' attention.

Boyd identifies reports of biological reinforcement of basic shared attention: "bigger than life" feelings of belonging to a nation, synchronized movements leading almost to intoxication. The very awareness of sharing seems to bring about an emotional reaction. Competition on the level of

individuals is dealt with using the notion that status in a social group is mostly regulated by dominance, which is in turn based on attention.

The role of the cognitive play of stories, beginning with parents sharing attention to a particular narrative with a child, transforms and creates the final product, advanced literary texts, which mirror the wealth of fictional, simulation worlds presenting various problems and answers, shared by millions of active homeostatic agents experiencing, examining, learning from and searching for solutions to the same material.

5. An interdisciplinary reading of Kurt Vonnegut's *Timequake*

In this chapter, I will attempt to apply the outlined interdisciplinary framework for understanding narratives to a literary text – to observe the separately described phenomena interwoven in practice.

Kurt Vonnegut's voice introduces the 1983 BBC documentary about himself with these words:

"We all see our lives as stories, it seems to me, and I'm convinced that psychologists and sociologists and historians and so on would find it useful to acknowledge that. If a person survives an ordinary span of sixty years or more, there is every chance that his or her life as a shapely story has ended, and that all that remains to be experienced is epilogue. Life is not over, but the story is." (0:40-1:08, emphasis mine)

Vonnegut expresses his conviction that identity, relationships, and historical reality are perceived as narratives, and calls for an interdisciplinary narrative turn at a time when the actual narrative turn was in a very early stage, preceding the seminal publications of Bruner, Sarbin and Dennett, and also preceding the period of "late 1980s and mid-1990s", when the narrative turn was "particularly strong" (Webster and Mertova 116). The fact that he presents the perspective in the form of a layman's opinion even increases its authenticity – it seems improbable that Vonnegut based this position on anything but personal insight. **Kurt Vonnegut was chosen to be the scrutinized writing agent of this thesis, because he is both an intuitive narrative theorist and a narrative practitioner with a rich bibliographic record, thus rendering his texts not only objects of analysis, but also contributions to it.**

Specifically, Vonnegut's 1997 novel *Timequake* was chosen because it contains a unique combination of literary devices: it is both an autobiography

and a work of fiction within one plot structure, using techniques of metafiction, science fiction, parody, and historical fiction, to name just a few.

5.1 Identification of biological subjects

Since an essential precondition for conducting any kind of literary analysis is to know whether authorial intent or reader reception is being studied, and whether conscious or unconscious processes are being paid attention to, this section serves to delineate the space of interpretation.

This analysis constructs an interpretation of *Timequake*, **a hypothesis in which the author and the readers cooperate on the effects described**, referring to both author's and readers' evolutionary benefits. Potential misinterpretations and misexpectations are disregarded in order to build a robust framework based on effects as widely used (authors) and perceived (readers) as possible. **The analysis is rooted in biological existence of both author and reader, viewing the conscious and the subconscious as synergic processes without differentiating between their individual contributions to the final state, which is the evolutionarily meaningful achievement of having written or read the text.**

5.2 Introductory and contextual considerations

To start with elementary, general observations about the text as a whole: since Vonnegut interweaves autobiography with fiction, *Timequake* can to a certain extent serve as information material about the writer, with direct factual correspondence to historical "reality". As the author of the 1969 cult novel *Slaughterhouse-Five* and a public intellectual since the 1960s, Kurt Vonnegut has enjoyed considerable social status by the time of publishing *Timequake* at the age of 74. When we take the evolutionary point of view of Dautenhahn and Sugiyama, **acquiring information about the reasoning, habits, or specific pathways to success of a highly successful agent in a competitive**

environment can be expected to be one of the major survival-level benefits of *Timequake* to the general population.

In the parts where Vonnegut introduces fictional components (characters, events, fictional traits of historical characters) or describes autobiographical events with a level of detail indicating fictional reconstruction, evolutionary-fitness-related information can be found in patterns of social information: even though the subjects and locations do not correspond to historical reality, the structure of their functioning, their internal states, their rules are effectively generalizations of reality – the fiction of *Timequake* can be read as a fitness-relevant selection out of the set of all possible details, attributes, and permutations of third-party relationships, identified by an especially observant and precise storyteller. At this point, the survival-level motivation to read *Timequake* disregards Vonnegut's success as a human agent and exploits only his **ability to select the most relevant input from an excessively large learning space**.

When trying to trace the context of *Timequake* to the very roots in human culture, after finding language and narrative structure as the basis for the existence of literature, there is a long array of literary works, narrative patterns and conventions, the entire literary tradition, and the specific style and values in Vonnegut's then almost complete bibliography. This body of knowledge is contrasted with the overall experience and memory of an average literate member of the Western civilization. **Similar to the infinite decomposition of meaning in semiotics, this analysis must operate with a text which retrieves parts of the entire cultural discourse and of a lifetime's worth of subjective memory, creating a gargantuan hyper-text with infinite space for interpretation (subjective) and analytic decomposition of possible meaning (quasi-objective) by referencing the contexts of contexts.**

5.3 Close reading

This section contains close reading of selected parts of the text of *Timequake* (roughly the first 80 pages) in the tradition of the original I. A. Richards's method of detailed literary analysis.

Vonnegut's dedication forms the first lines of the self-contained, publisher-independent body of text:

“In memory of Seymour Lawrence,

a romantic and great publisher

of curious tales told with ink

on bleached and flattened wood pulp” (vii, emphasis mine)

The latter two lines are an obvious example of defamiliarization (see Margolin), a frequently utilized technique in the arts, connected with postmodernity in particular. It is commonly understood as presentation of ordinary things in an unfamiliar way to make human perception alert to the familiar object. The natural and efficient expression of the meaning of the italicized words would be simply “literature”. Since the intended reader is surely expected to know that literature presents “curious” or extraordinary narratives, that printing press uses ink, and that paper is made of wood pulp, they offer no additional information. What is, then, the reason for substituting eleven words for a single one?

An abstract, literary theoretical answer could be that this instance of defamiliarization is intended to enable the reader to gain some distance from the act of human beings writing and publishing literature and see it as if from outside, perhaps with a slightly ironic undertone; that the time of reading and decoding those two lines might be a space for reflection on the human condition. Of course, biocultural and evolutionary explanations usually do not address questions humans ask about the “meaning of life”. Such recursive, metaexistential questions seem to be an extrapolation of small-scale rules (such as effective utility of a part with relation to the whole) to the largest conceivable scale, leading to confusion of the agent caused by insufficient

specification – the necessary input argument specifying the teleological direction of known reality (the whole in the part-whole relationship) is either missing or based on religious faith – and by exceeding the relevant temporal problem space by referring to ends beyond its (or its progeny's) lifetime. This phenomenon could be explained as an agent playing on the borders of its problem space, testing "border values", to use programming terminology. Boyd's definition of literature as "cognitive play with pattern" (15) can be utilized in explaining the defamiliarization of Vonnegut's dedication, as it presents both **novelty of perceptual perspective and exploration of the borders of the problem space.**

The next piece of text in *Timequake* is a line resembling the ubiquitous "all persons fictitious disclaimer". However, Vonnegut completely changes its meaning. Out of the generic version: "All characters appearing in this work are fictitious. Any resemblance to real persons, living or dead, is purely coincidental", using mostly simple truncating as modification, he makes "All persons, living and dead, are purely coincidental." (ix) This is an obvious parody of the formal legal disclaimer with the intent to amuse. It again creates a perceptual distance between the agent and the automatized nature of using such disclaimers, which triggers the context of mistrust and excessive suing among the population. At the same time, it explicitly addresses and elaborates on the theme initiated by the defamiliarization in the dedication, the human condition. It states the opinion of the narrator that human life neither started with an intention, nor does it have an ultimate purpose. Such views are characteristic of the atheistic worldview. At this point, it is important to note the strong correspondence between the notion of worldview and Lyotard's concept of metanarrative. The capacity of a worldview to organize all knowledge and experience resembles metanarrative to such extent that it is reasonable to believe that the concept of metanarrative is only a derivation of the concept of worldview specified for advanced discourse in the humanities. Perhaps the only noticeable difference in their meaning is that metanarrative can also stand for a slightly smaller unit: one person usually has one coherent worldview, but there may be multiple coexisting, complementary metanarratives (for example, Allan Luke asks "which grand narratives should count in curriculum making and

pedagogy" (11)) constituting one worldview. Vonnegut's parodic disclaimer **claims adherence to the metanarrative of coincidence and purposelessness of human existence**. As noted in the general analysis, the high social status of the author agent can be expected to increase the probability of other agents adopting the metanarratives chosen by him.

A biographical digression is required when discussing the metanarratives accepted by Vonnegut. Since *Timequake*, the last long fiction he published, is meant as a farewell to the readers (Schulz-Elsing), many of whom are closely acquainted with his bibliography, this analysis should account not only for what the text contains, but also what specific knowledge is widespread enough in the audience to be considered part of the basic, majority context, or knowledge of the ideal reader. Without prior acquaintance with Vonnegut, a reader perceiving the "metanarrative of human coincidence" which, presented alone, triggers neutral to negative emotions, might form an incorrect representation of his worldview. However, most readers are aware of the fact that Vonnegut was a staunch humanist, which demonstrated itself in his lifelong support of the American Civil Liberties Union (see "Kurt Vonnegut, MA" in Works Cited) and his position as the honorary president of the American Humanist Association (Friedman). Perceived through the prism of readers' expectations, simply because it is agent Kurt Vonnegut's utterance, **the exposition of the book automatically acquires layers of meaning which reinforce the narratives and metanarratives of Vonnegut's previous novels**.

Moving to the prologue of the novel, we encounter the following paragraph:

"Ernest Hemingway in 1952 published in *Life* magazine a long short story called *The Old Man and the Sea*. It was about a Cuban fisherman who hadn't caught anything for eighty-four days. The Cuban hooked an enormous marlin. He killed it and lashed it alongside his little boat. Before he could get it to shore, though, sharks bit off all the meat on the skeleton." (xi)

These scene-setting sentences retrieve to immediate attention the context of publishing and reading literature. Although the average reader is expected to know *The Old Man and the Sea*, Vonnegut chooses to reiterate its plot structure, which may serve both as compensation for those readers which do not know or are not very familiar with it, and as a concise induction of specific imagery (needed in the following paragraphs) in the embodied imagination of each reading agent.

“I was living in Barnstable Village on Cape Cod when the story appeared. I asked a neighbouring commercial fisherman what he thought of it. He said the hero was an idiot. He should have hacked off the best chunks of meat and put them in the bottom of the boat, and left the rest of the carcass for the sharks.” (xi)

Here, Vonnegut effectively specifies the kind of narrative he is using. Building on the previous paragraph, which sets up and maintains historical accuracy, this paragraph’s temporal and spatial placement of the narrator completes the appearance of an autobiographical narrative. Following the placement sentence is a scene with a strong literary appeal, brought about again by defamiliarization. Confronting a literary classic of Hemingway’s calibre with the reality of commercial fishing causes a major Eureka effect (alternatively Aha! moment), first described by Auble, Franks and Soraci. The fact of Hemingway possibly having neglected fisherman’s common sense in *The Old Man and the Sea* is attractive to the reading agent as a **novel insight into rarely modified data**, which the heroized Western literary canon supposedly is, based on usual high school teaching methods.

“It could be that the sharks Hemingway had in mind were critics who hadn’t much liked his first novel in ten years, *Across the River and into the Trees*, published two years earlier. As far as I know, he never said so. But the marlin could have been that novel.” (xi)

This paragraph, pointing out possible psychological defence mechanisms influencing the content of Hemingway’s writing, increases reader’s metafictional and metalinguistic awareness: the reading agent may transfer the principle of

the author's psyche determining the book's content, found in a book, to the very book that is being read and its author, thus enjoying a defamiliarized perspective on literature.

From this point on, this analysis will cease to present the uninterrupted stream of text as it appears in *Timequake*, and consider only selected parts of the text instead. Vonnegut creates an unusual situation by reflecting on his writing of *Timequake* in *Timequake*:

“And then I found myself in the winter of 1996 the creator of a novel which did not work, which had no point, which had never wanted to be written in the first place. *Merde!* I had spent nearly a decade on that ungrateful fish, if you will. It wasn't even fit for shark chum.

... What was I to do?

Answer: Fillet the fish. Throw the rest away.

...

My great big fish, which stunk so, was entitled *Timequake*. Let us think of it as *Timequake One*. And let us think of this one, a stew made from its best parts mixed with thoughts and experiences during the past seven months or so, as *Timequake Two*.” (xi-xii)

Besides reusing the previously mentioned fisherman's common sense in another key point of the prologue and thus creating further surprise and facilitating play, Vonnegut confesses to having subjectively failed at producing a regular novel and explains the method he used to create the actual text the agent reads. A naïve interpretation could hold that this is a regular autobiographical remark, a neutral statement about the creative process involved. However, given the postmodernist milieu with its preference for changes not only in the work of art but also in the social and epistemological basis on which it was built, Vonnegut's method is likely to be taken as an added

value, resembling the method of collage (for an example elaboration on this subject see Adamowicz).

Vonnegut explains the central event of the former attempt at *Timequake* in this way:

“The premise of *Timequake One* was that a timequake, a sudden glitch in the space-time continuum, made everybody and everything do exactly what they’d done during a past decade, for good or ill, a second time. It was déjà vu that wouldn’t quit for ten long years. ... There was absolutely nothing you could say during the rerun, if you hadn’t said it the first time through the decade. You couldn’t even save your own life or that of a loved one, if you had failed to do that the first time through.” (xii)

The event of timequake as described above is, of course, impossible, because even if there could be a ten-year jump in the space-time continuum and every physical event was supposed to happen again, it would be impossible for agents to keep the memory of the decade to be repeated and awareness of their lack of free will, both taking place in their neural substrate. However, **this logical paradox as a setting can be explained as an unreal value (an imaginary number, to complete the mathematical parallel), which, used in an equation, renders a result which is useful.** The construction captures the attention of reading agents for a number of reasons. The change of perspective and saturation of imagination to give agents the physical stimulation of play is obvious. By making agents observe and re-evaluate ten years of their lives without the option to interfere, it also perfects defamiliarization, which has by now established itself as the main literary device of the book. But one of the most important aspects of the event of timequake is that it is highly personalizable – it is a structure which has a large capacity for individual biographical input. ***Timequake’s* major event captures the attention of agents by enabling them to use it extensively for calculations on their own data, making the result both indirectly (patterns) and directly (concrete results based on biography) relevant.**

Vonnegut, known for his simple writing style (dealt with elsewhere), uses several conversational sentences bordering on familiarity. When he explains that he is too old to write literature, he finishes the paragraph with “Have pity!” (xii) Shortly afterwards, when describing the process of reusing parts of the first attempt, he asks the reader: “Hokay?” (xii) When describing the consequences of the event of timequake he invented, he explicitly invites the reader to add his own biographical data: “betting on the wrong horse again, marrying the wrong person again, getting the clap again. You name it!” (xiii) These fragments obviously do not add informational value, nor can they serve as learning material of any kind. Still, most readers would find them vital to the overall impression. A linguist would probably identify such words as a demonstration of Jakobson’s phatic function of language (Jakobson 355) – **an evolutionary operationalization of the phatic function, establishing contact for the sake of establishing contact, could be to maintain or extend the agent’s social network, to show signs of being a cooperative member, which lead to safety and benefits provided by the group.** Of course, use of the phatic function in *Timequake* is not intended to earn Vonnegut safety or benefits in a similar way as the ubiquitous weather talk of the English. The reading agent perceives the familiarity of the author agent as not exploiting the status he has to further his ends and, for example, selfishly pursue elusive heights of text complexity. Rather, it shows cooperation, or reading-agent-orientedness of the narrative – **the author agent signals that he is willing to assist the reading agent in extracting as much fitness-increasing experience as possible from the narrative.**

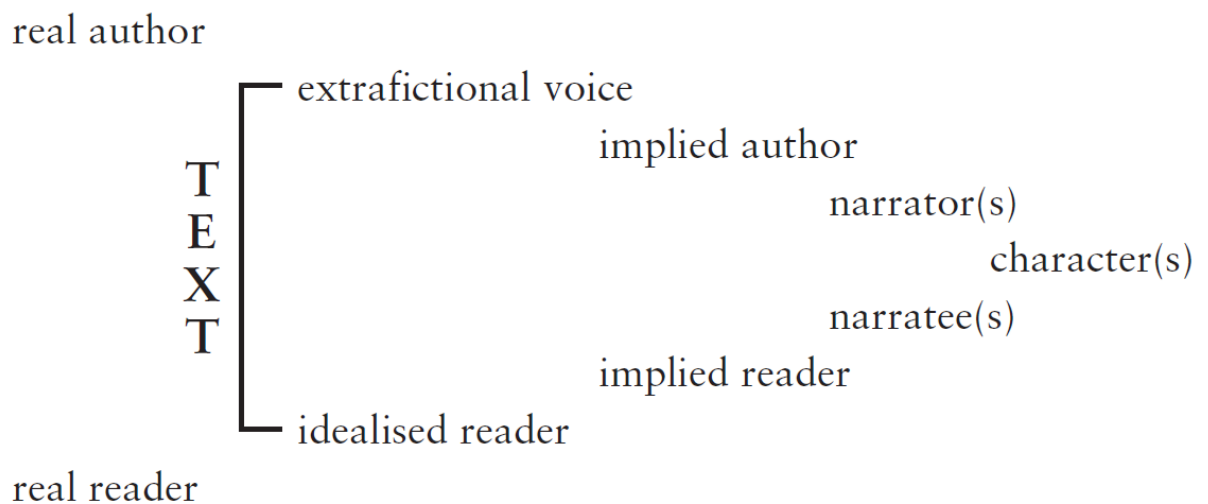


Figure 3: Diagram showing different roles in the process of reading literature (Stockwell 42)

Vonnegut creates several metafictional layers as an addition to the layers implicitly present between the author and the reader (Stockwell 42). In *Timequake* and many of his previous novels, there is a character named Kilgore Trout, an unsuccessful, but highly productive short story writer. Vonnegut himself claims that Trout is his “alter ego”. Several times throughout *Timequake*, he inserts a summary of a short story written by Trout:

“His very first story, he told me as he was dying, was set in Camelot, the court of King Arthur in Britain: Merlin the Court Magician casts a spell that allows him to equip the Knights of the Round Table with Thompson submachine guns and drums of .45-caliber dumdums.

Sir Galahad, the purest in heart and mind, familiarizes himself with this new virtue-compelling appliance. While doing so, he puts a slug through the Holy Grail and makes a Swiss cheese of Queen Guinevere.” (xiii)

This highly amusing instance of Vonnegut’s gallows humour is far from being a result of a random creative process. The choice of setting raises to attention the concept of virtue, and the novel objects in that setting, modern firearms, symbolize the increasing power of contemporary civilization’s devices. The presented situation with catastrophic consequences, stating an opinion that

even the most virtuous people may be incapable of wise conduct with weapons of mass destruction (or any device which is too far removed from human physical capacities), triggers the **metanarrative of pacifism**. The reading agents are recommended to adopt it to maximize their inclusive fitness.

The prologue is concluded with Vonnegut's description of the temporal confusion of the narrative of *Timequake*:

"I have pretended in this book that I will still be alive for the clambake in 2001. In chapter 46, I imagine myself as still alive in 2010. Sometimes I say I'm in 1996, where I really am, and sometimes I say I am in the midst of a rerun following a timequake, without making clear distinctions between the two situations.

I must be nuts." (xiv)

This points to two aspects of the book. First, novelty of stimulus including temporal confusion is novelty of a higher order - mere random permutations of ordinary plots with changed names do not attract as much attention, because their novelty is easily repeatable. Reading agents, due to limited time available for play, have to do heavy filtering while choosing the text which offers optimal stimulation by novelty, while not being too complicated to follow. *Timequake's* intended audience seemingly consists of people, whose cognitive systems' level of optimal novelty stimulation exceeds that of assembly-line romance novels.

Second, its metafictional/metalinguistic dimension creates the impression that the temporal dimension of narrative "does not really matter" (a biased reader could even say that he proves it) – that the flow of narrative does not necessarily require temporal continuity. This is a theoretical insight that could find its place in the theoretical part of this thesis, and as such it might appeal to reading agents – a scientific insight into narrative which stimulates the reading agent as additional knowledge of the problem space. It is especially relevant for the problem space if the reading agent happens to be an aspiring writer.

In what appears to be one of the biographical parts of *Timequake*, Vonnegut writes:

“I say in speeches that a plausible mission of artists is to make people appreciate being alive at least a little bit. I am then asked if I know of any artists who pulled that off. I reply, ‘The Beatles did.’”
(1)

At this point, the narrative does not capture attention by using literary devices, but rather by presenting an opinion, an answer to the frequently asked question about the purpose of art. Since most reading agents direct some resources towards art, the question is relevant. This quote proposes a **happiness-oriented theory of art, focusing on generating positive emotions or serotonin release in a supposedly fitness-neutral situation**. An attentive reader automatically considers Vonnegut’s own art/craft of writing and its relation to this statement. It is important to note that humour is both one of the major devices of accomplishing serotonin release in fitness-neutral situations, and the particular device noted for this effect in Vonnegut’s works. Nevertheless, the fact that his bibliography frequently targets the Second World War and related atrocities raises **the question to what extent, then, can be literature considered art/purely stimulating narrative, and to what extent philosophy/educational narrative**.

In this part, Vonnegut quotes three major thinkers to forward his argument about the whole of life having negative emotional valence:

“The funniest American of his time, Mark Twain, found life for himself and everybody so stressful when he was in his seventies, like me, that he wrote as follows: ‘I have never wanted any released friend of mine restored to life since I reached manhood.’... Jesus said how awful life was, in the Sermon on the Mount: ‘Blessed are they that mourn,’ and ‘Blessed are the meek,’ and ‘Blessed are they which do hunger and thirst after righteousness.’ Henry David Thoreau said most famously, ‘The mass of men lead lives of quiet desperation.’” (1-2)

By introducing an array of historical personalities, Vonnegut implicitly reinforces the notion that historical personalities should be known and listened to. He establishes himself and the reading agent as sharing the membership in the social group of comparatively educated, historically aware human agents, thus increasing the emotional bond within the group. Even though the quote selection is rather negative, the joint effect of metanarratives connected with Vonnegut is to encourage the reading agent to oppose this reality and try to improve life on Earth against all odds. The metanarratives in question could be approximated using concepts as atheism, life as coincidence, humanism, acceptance, and hope.

At times, the reader cannot be sure, whether the events of the autobiographical parts really happened exactly as described or whether they have fictional extensions:

“My father, Kurt Senior, an Indianapolis architect who had cancer, and whose wife had committed suicide some fifteen years earlier, was arrested for running a red light in his hometown. It turned out that he hadn’t had a driver’s license for twenty years!

You know what he told the arresting officer? ‘So shoot me,’ he said.” (2)

This is another example of fostering cooperation in a social group: the juxtaposition of a human situation heavily laden with negative emotions and the sterile world of laws and procedures culminating in the humorous gesture of defiance is very likely to produce a mirror neuron response as soon as it is formed in the embodied imagination. The social group in question consists of human agents who promote humane, context-sensitive justice partly based on compassion. They are opposed to the “alien” structures of normalized and automated evaluation of physical actions, where only immediate context is taken into account.

The fact of Vonnegut reminding the reader that “the African-American jazz pianist Fats Waller had a sentence he used to shout when his playing was absolutely brilliant and hilarious. This was it: ‘Somebody shoot me while I’m

happy!” (2) brings about the problem space of different philosophical stances towards human death. Its function in the narrative might be to create a novel instance of the juxtaposition between the hardwired evolutionary pressure to survive and a rational, cognitively consonant explanation of why premature death might be in certain cases not only acceptable, but even welcome. At this point in the narrative, the reading agent seems to benefit not by learning or extending his/her worldview, but rather by “border testing” (see p. 45) targeting the consistency of his/her cognitive structure of ethical concepts.

Recurring worldviews of pacifism and humanism (which create “virtual groups” being a member of which increases the reading agent’s feeling of belonging (Maslow’s pyramid) and, consequently, increases the perceived probability of biological safety when surrounded by other agents) combine to create one of the highlights of *Timequake*’s irony. Starting with what appears as an ordinary exposition of the imperfections of society’s institutions: “Now imagine this: A man creates a hydrogen bomb for a paranoid Soviet Union, makes sure it will work, and then wins a Nobel Peace Prize!” (5), Vonnegut adds unexpectedly intimate cognitive imagery: “His wife was a pediatrician! What sort of person could perfect a hydrogen bomb while married to a child-care specialist?” (5) and then finishes the already conversational paragraph with a fictional dialogue designed solely for entertaining the audience:

“Anything interesting happen at work today, Honeybunch?”

‘Yes. My bomb is going to work just great. And how are you doing with that kid with chicken pox?’” (5)

It seems to be one of the characteristics of Vonnegut’s writing that the most appealing ironies are exposed for a prolonged period of time. The narrative seems to stall only to keep the novel juxtaposition within the reading agent’s immediate perception, giving him/her a certain amount of time for having the multi-tasking nature of cognition spread the implications of the paradox into other simultaneously present contexts, which might include even practical reasoning of daily life.

A metafictional remark that a protagonist writer “could tune out the creak of shit being alive as long as he was scribbling, head down, with a ballpoint pen on a yellow legal pad” (7) is as much literature as theoretical observation about narrative generation process. Pointing out the widely known escapism connected with the process of writing, Vonnegut binds it to previous counterintuitive statements about human existence not being preferable to non-existence (“Somebody shoot me while I’m happy!” (2)). This creates an interesting situation where narrative producers use the creative process as an anaesthetic against existence and narrative consumers often report that they escape the everyday existence via reading as well. This formulation is a sufficient impetus to try to express it through the concepts of the theoretical framework of this thesis. Readerly escape can be explained as fulfilling a cognitive need for diversity of experience, of which a day full of mundane, repeating tasks is certainly deprived and which can be easily reinstated through cognitively simulated worlds of literary narrative. In the mirror image, writerly escape, one might then secure diversity of experience by crafting a possible reality in his/her imagination and merely recording it. If, however, we understand writing as a conscious language-crafting process, and we can be certain that at least the final touch of editing is exactly that, the imaginative escape is likely only in the very first outline, the rough draft, production of which without any further thinking is so often recommended in writing guides when giving advice to starting writers. In turn, neither is the reading of a literary critic, consciously dissecting the text, a proper escape. In conclusion of this paragraph on the writing process, writing and reading, when done primarily for emotional benefit, be it enjoyment or escape (meaning impulsive, sometimes auto-therapeutic writing, and leisure reading), might be jointly explained as utilizing cognitively simulated worlds to expose oneself to cognitive novelty or diversity, with the only difference being that readers simulate the possible world after decoding a narrative, while writers synthesize the possible world with its narrative lines out of varying sources and encode it into static narrative.

Vonnegut often uses the character of Kilgore Trout, recurring in his novels and often termed his alter ego, to make an exclamation in simple language and clear moral judgement. This common opinion on the bombing of

Hiroshima and Nagasaki by the US Air Force can serve as an example: “To quote Kilgore Trout: ‘This wasn’t war anymore, and neither had been the obliteration of Nagasaki. This was ‘Thanks to the Yanks for a job well done!’ This was *show biz* now.’” (9). This quote obviously does not present an original opinion and what is more, neither is it expressed in an original way, even though there certainly are traces of Vonnegut’s conversational rhythm. It rather seems to be an outlet for Vonnegut’s (or of someone else chosen by Vonnegut) personal view, a channel for sharing a metanarrative of pacifism through common talk without compromising the persona of the narrator and consequently the neutrality and utility of the entire narrative. Again, preparing a sense of belonging (Maslow’s pyramid) to an abstract group for the readers, a heightened probability of encountering helping hands of group members on the street, is a far more likely explanation than trying to teach them that bombing was unnecessary, a topic that has been subject to a debate where the pacifist side prevailed for the last 50 years (at the time of writing) and, it can be argued, won the battle.

While the metanarrative of pacifism is rather simple and complete, this instance is more complex: “I heard the poet Robert Pinsky give a reading this summer, in which he apologized didactically for having had a much nicer life than normal. I should do that, too.” (11). There is a clear thread of the humanist metanarrative, instructing people to empathize with their fellow humans. There is also an indication of guilt as a possible construct that might motivate the “luckier” ones to help others. However, this does not resemble the abstract group membership reassurance brought by many previous reminders of metanarratives. Indirectly prompting reading agents to silence their constant drive for improvement of the current state, this instance seems to be didactic if not for the long term memory, then certainly so for short-term perception. It might serve as a cognitive exercise in alertness of consciousness and perception, trying to improve emotional response to the environment by reminding the agents of the rarely cognized positive aspect of the totality of their experience. Vonnegut reports the advice of his uncle: “He said that when things were really going well we should be sure to *notice* it,” stressing that it concerned “simple occasions, not great victories: maybe drinking lemonade on

a hot afternoon in the shade, or smelling the aroma of a nearby bakery” (12). Especially the last item is accessible to everyone possessing the olfactory sense and thus isolates the need to **generate positive emotional response on the basis of perceiving evolutionarily irrelevant sensations from within a homeostatic situation** as far as fitness is concerned. An argument could be made that much of literature and its defamiliarization, making people aware of the same things in a different light again and again, serves exactly this role.

Vonnegut slowly begins to insert systematic autobiographical information into *Timequake*:

“I commuted from the Cape to Boston to work for an industrial advertising agency, and then became a dealer in Saab automobiles, and then taught high school English in a private school for seriously fucked-up rich kids.” (13)

This paragraph serves a number of roles. On the level of reading agents learning from the practices of a successful agent, this implicitly signals (in this case reassuringly) that in order to be successful in an independent creative activity, one does not need to have a straight career path and devote as much time as possible to the skill. On the level of metanarratives, by confessing to have held several corporate positions with few qualification requirements and little expected spiritual satisfaction, Vonnegut clearly signals his belonging to the middle class. Then he adds the vulgar expression describing the mental and behavioural qualities of children raised in an environment of ample material resources, which summons and reinforces the social group of working and middle classes together. His opinion both warns of the threat wealth poses to mental health and ethics and asserts that it not only does not put a child at an advantage; it even threatens the ordinary qualities of middle and working class upbringing, rendering them, at least the former one, healthier. **This instance of sharing elementary values in a virtual social group to receive practical reassurance and emotional feedback serves in a more distant implication as a biological hypothesis** of human agents being deprived of vital cognition-forming factors when they undergo the critical phases of cognitive development in an environment of material abundance.

Chapter 5 of *Timequake* is an experiment with alternate realities. Vonnegut describes a short story idea taking place on a planet “coincidentally” similar to Earth:

“On the matriarchal planet Booboo in the Crab Nebula, there were three sisters whose last name was B-36. It could be only a coincidence that their family name was also that of an Earthling airplane designed to drop bombs on civilian populations with corrupt leaderships. Earth and Booboo were too far apart to ever communicate.” (15)

At this point, we can see the pacifist metanarrative reinforced through the sarcastic naming of the sisters, which, lacking a direct metaphorical meaning, introduces the postmodern art’s device of **randomness**, supposedly effective through the exploratory requirements of play: after the reading agents started to feel that they are able to anticipate most of canonical literary outcomes sufficiently, they developed an enjoyment of impressionistic, seemingly random combinations of cultural artefacts as a new challenge for their cognitive systems. The fact that it gained popularity so late in literary history is consistent with the emergence of many other characteristics of postmodernism: **during the 20th century, there was a noticeable movement of the literary tradition from picturing a complete, consistent reality to fragmented and ambiguous worlds serving as triggers for new kinds of cognitive experience.**

However, further coincidences on Vonnegut’s planet Booboo turn out to be anything but random:

“The written language of Booboo was like English on Earth, in that it consisted of idiosyncratic arrangements in horizontal lines of twenty-six phonetic symbols, ten numbers, and about eight punctuation marks” (15-16)

He defamiliarizes human language, exposing anew the wonder of so few symbols making up entire human cultures. At the same time, the precision of

this “coincidence” indicates to the readers what will follow: the entire planet Booboo is going to be exactly the same as Earth, only defamiliarized.

Briefly introducing the initial setting where two of the sisters, a painter and a short story writer, are popular, and one, a scientist, is considered boring, is jealous and had a secret ambition to eclipse her popular sisters, Vonnegut launches on to his defamiliarizing journey:

“Booboolings were among the most adaptable creatures in the local family of galaxies. This was thanks to their great big brains, which could be programmed to do or not do, and feel or not feel, just about anything. You name it!

The programming wasn’t done surgically or electrically, or by any other sort of neurological intrusiveness. It was done *socially*, with nothing but talk, talk, talk. Grownups would speak to little Booboolings favourably about presumably appropriate and desirable feelings and deeds. The brains of the youngsters would respond by growing circuits that made civilized pleasures and behaviour automatic.” (16)

This biological hypothesis, including an extended analogy between human learning and computer programming, triggers **metacognition** in the reading agent and leads to the positive emotional response resulting from exploring a relevant subject. Vonnegut also adds a proto-hypothesis about the origin of the enjoyment of literature: “it seemed a good idea, for example, when nothing much was really going on, for Booboolings to be beneficially excited by minimal stimuli” (16) such as the defamiliarized set of characters constituting texts. Apart from asserting that children are specifically trained to comprehend stories, it stresses the requirement of an extended temporal space in which a homeostatic agent may develop fine-tuned positive reactions to minimal stimuli. Vonnegut extends his proto-model with a neuronal module for imagination,

“circuits, microchips, if you like, which on Earth would be called *imagination*s. Yes, and it was precisely because a vast majority of

Booboolings had imaginations that two of the B-36 sisters, the short story writer and the painter, were so beloved.” (17)

This analogy is again very close to this project’s analogy of imagination as a **simulation environment** for narratives to take place in. From this point on, Vonnegut treats this tale as a hyperbolic medical hypothesis about television making this part of human brain obsolete: The scientist sister, taught thermodynamics symbolically by “nuts” in the garden of a lunatic asylum,

“worked up designs for television cameras and transmitters and receivers. Then she got money from her very rich mom to manufacture and market these, which made imaginations redundant.” (18)

Vonnegut’s nostalgic criticism of contemporary culture unites and reinforces the virtual social group of “literature-enjoyers” with literally prescribed emotions both among themselves and towards the threatening generations which “grew up without imaginations”. These are warned against on the basis of becoming immoral because of the absence of imagination, which seems to be a precondition for emotional empathy, “imagining” or simulation of the emotions of other people:

“Without imaginations, though, they couldn’t do what their ancestors had done, which was read interesting, heartwarming stories in the faces of one another. So, according to Kilgore Trout, ‘Booboolings became among the most merciless creatures in the local family of galaxies.’” (18)

This lengthy treatment of one of Vonnegut’s short story sketches shows how the interlacing threads of

- **social group reinforcement by using components of shared metanarratives**

- **exploration of the problem space of reality by changed perspective of defamiliarization leading to adjusting of variables (opinions)**
- **free play of textual and metatextual combinations**

build one part of a highly respected literary text. The totality of literary experience these threads achieve here suggests that after some extension and validation using texts of different authors, they **might be candidates for a distinct interdisciplinary method of literary narrative analysis.**

An important aspect of literature is how it connects with itself; a literary work may contain references or allusions to other works, thereby leveraging much of the cultural message of the works just by including handles – their names. Apart from reinforcing the social group of well-read readers, at its most effective, this device picks up a cluster of cognitive images and evaluations and all evolutionary problems addressed in it, and mixes these with the present work, creating an enrichment that is heavily dependent on the reader and the sociocultural era she/he lives in. Vonnegut lists several “emotional and ethical landmarks” (22) he encountered in stage plays, “chief among manmade epiphanies” (20):

“Now I find myself maundering about parts of plays hardly anybody knows or cares about anymore, such as the graveyard scene in *Our Town*, or the poker game in Tennessee Williams’s *A Streetcar Named Desire*, or what Willy Loman’s wife said after that tragically ordinary, clumsily gallant American committed suicide in Arthur Miller’s *Death of a Salesman*.

She said, ‘Attention must be paid.’

In *A Streetcar Named Desire*, Blanche DuBois said as she was taken away to a madhouse, after she was raped by her sister’s husband, ‘I have always depended on the kindness of strangers.’” (21-22)

The well-read agent is expected to have seen/read these moments before at least once. Vonnegut makes her/him experience the clusters of emotions again, integrating this emotional repetition into the **experience sequence** of the novel. Based on this, a hypothesis can be made that **one of the functions of literature is to serve as a filter for the agent's own cognitive content**. The reader of *Timequake* enjoys being reminded of the literary works Vonnegut selected for her/him, even though he already knows them. Reading agents might choose literary works also because they **pick and structure some of the most pleasing contents of their own memory**. Following a narrative might be more efficient and reliable than trying to retrieve random positive contents without cues.

A distinct experiment for the imagination is a congress of talking chemical elements who are outraged at human conduct:

“On September 1st of 1945, immediately after the end of World War Two, representatives of all the chemical elements held a meeting on the planet Tralfamadore. They were there to protest some of their members' having been incorporated into the bodies of big, sloppy, stinky organisms as cruel and stupid as human beings” (43)

An exploratory experiment in creating such a mental picture, this story fragment reinforces the pacifist metanarrative and contains a philosophical proposition (at the borders of the problem space, without evolutionary benefit apart from exercise itself) that the human race disturbed the moral neutrality of physics by functioning in the negative direction. The humorous resolution of this congress is for “all chemicals involved in medical research [to] combine whenever possible to create ever more powerful antibiotics,” making disease organisms resistant and resulting in catastrophic epidemics, after which “all elements will be free of sin again” (44). This obviously reminds of a global threat to the evolution of human organisms, functioning as a warning of physical damage which may lead to a change in behaviour, one of the rudimentary roles of communication.

Vonnegut does use traditional literary devices as well. When his alter ego, Kilgore Trout, is about to sleep in a homeless shelter which shares a wall with the American Academy of Arts and Letters, he uses this structuralist contrast:

“On the Academy side of the wall, hanging over the rosewood desk of Monica Pepper, was a painting of a bleached cow’s skull on a desert floor, by Georgia O’Keeffe. On Trout’s side, right over the head of his cot, was a poster telling him never to stick his ding-dong into anything without first putting on a condom.” (47)

This technique seems to create a rewarding response of play based on simultaneously creating two cognitive contexts and counterpointing them, which results in dishabituated, patchworky, rich perception. The painting plays a role of its own, marking a virtual social group membership (cultured people for which it makes sense to mention the painter besides content), and shifting the reader’s mental image of the Academy of Arts and Letters (in both visual and functional aspects) towards the bleached, dead appearance of the skull. Attributes of the cognitive scheme of the skull are being transferred, using the polysemantic nature of natural language, into a different domain, eventually leading to biologically relevant decisions (such as not engaging with similar institutions when seeking emotional fulfilment). Vonnegut concludes this counterposition in a postmodern manner:

“When Trout realized how close his cot had been to her desk during the fifty-one days before the timequake struck, he would remark as follows: ‘If I’d had a bazooka, I could have blown a hole in the wall between us. If I hadn’t killed one or both of us, I could have asked you, ‘What’s a nice girl like you doing in a place like that?’” (48)

Since this violent, physical resolution of the contrast is highly unlikely to be carried out in reality because of extreme risk and the resulting purposeless destruction, it creates an impression of **random decisions** in the mind of the author and either **mental illness** or extreme nihilism on the part of the

character, entertaining the reading agent as play in an extended, but still tangible alternate reality. The latter part turns around the question a general secretary would normally ask a homeless person, “what is a nice person like you doing here”, so that the question comes from a homeless, but authentic writer to a secretary of a bleached, dead institution. This echoes the metanarrative of human authenticity that Vonnegut reveres as opposed to institutionalization of any kind.

Kilgore Trout voices what seems to be a metafictional remark on the purpose of literature:

“If I’d wasted my time creating characters,’ Trout said, ‘I would never have gotten around to calling attention to things that really matter: irresistible forces in nature, and cruel inventions, and cockamamie ideals and governments and economies that make heroes and heroines alike feel like something the cat drug in.’”
(63)

For Trout (and possibly Vonnegut), realistic description of agents, detailed simulation of an alternate reality which satisfies the evolutionary need of play, is secondary to literature’s space for “**calling attention**”, **warning** the reading agents of different biological dangers that might await them. This constitutes a theory of priority in cultural narratives and at the same time an opinion about what type of narrative has the highest utility for reading agents who belong to the sociocultural era of the novel. Importantly, the metaliterary remark of Trout indicates a hypothesis that the **contemporary world does contain enough dangers preventable using additional information to make literature based on cognitive need of play of secondary importance.**

Chapter 21 offers the most detailed treatment of Vonnegut’s worldview on the highest level of metanarratives, the **long-term setting of emotional processing, coping strategies and cognitive constructs for maintaining optimal motivation and goal-directedness of behaviour even in Western culture’s capacity to saturate basic human biological needs regardless of**

status. Then holding the position of Honorary President of the American Humanist association, Vonnegut writes:

“Humanists try to behave decently and honourably without any expectation of rewards or punishments in an afterlife. The creator of the Universe has been to us unknowable so far. We serve as well as we can the highest abstraction of which we have some understanding, which is our community.” (72)

This worldview indicates unwillingness to accept cognitive content which has not been arrived at using empirical knowledge or empirically based reasoning consistent with the metanarrative of scientific epistemology. The “highest abstraction” which can be served, community, has a distinct evolutionary meaning in terms of hypersociality, evolutionarily stable strategies and kin selection. Importantly, Vonnegut specifies that this worldview, even though compatible with his own cognitive context, might pose a risk to the stability/sustainability of many other human agents’ cognitive systems:

“The German philosopher Friedrich Wilhelm Nietzsche, who had syphilis, said that only a person of deep faith could afford the luxury of religious scepticism. Humanists, by and large educated, comfortably middle-class persons with rewarding lives like mine, find rapture enough in secular knowledge and hope. Most people can’t.” (74)

Besides reassuring the members of the “well-read and cultured” social group and positioning Nietzsche into the realm of biology by mentioning his illness, this paragraph presents a **biological hypothesis** that cognizing with such worldview is not compatible with cognitive systems that must frequently cope with repetition (supposedly the opposite of rewarding existence) and biological deprivation (amount of resources and social status of the working class). Vonnegut reports writing back to an inquiring prisoner to be released into a world where he does not have friends or relatives:

“‘Join a church.’ I said this because what such a grown-up waif needs more than anything is something like a family.

I couldn't recommend Humanism for such a person. I wouldn't do so for the great majority of the planet's population." (74)

He not only hypothesizes about the **compatibility of worldview-like cognitive schemes and perceptual input**, but introduces a **meta-worldview of not considering any worldview true**, which retrieves both the concept of varying degrees of **verisimilitude** of Bruner's narrative mode of thinking and Jean-Francois Lyotard's observation of postmodernity's metanarratives ceasing to be credible as totalizing structures, however, remaining functional in local, limited contexts.

One of the richest demonstrations of the multitude of functions a short linguistic utterance can serve is given by Vonnegut while describing the culmination of Trout's short story idea about a man who was born with his head in the location where genitalia should be and vice versa. This instance combines random, playful ideas, metanarratives of social criticism and humour with visceral as well as cultured elements:

"Albert Hardy would be blown to pieces while a soldier in the Second Battle of the Somme in World War One.

Albert Hardy's dogtags wouldn't be found. His body parts would be reassembled as though he had been like everybody else, with his head atop his neck. He couldn't be given back his ding-dong. To be perfectly frank, his ding-dong wouldn't have been what you might call the subject of an exhaustive search.

Albert Hardy would be buried under an Eternal Flame in France, in the Tomb of the Unknown Soldier, 'normal at last.'" (79)

Reminding of the pacifist metanarrative by reiterating a generic template of war death, this excerpt creates a complex emotion related to physical disfigurement and the different ways of interpreting the fact that the corpse was assembled according to criteria of normality (of the entities "society", "relatives" and "Hardy", who suffered while the disfigurement lasted and who was relieved after it was corrected?). The humorous situation of the group of body "reassemblers"

not being willing to search for separated genitalia is put forward using unexpectedly formal language, creating an explosive contrast gradated in a way likely to elicit not only cognitive laughter, but also the associated diaphragm convulsions, which, according to partial scientific consensus, are both a reinforcement of the internal emotion and an involuntary, evolved means of social group maintenance by signalling emotions and possibly eliciting these in other members.

This thesis already pointed out several passages in which Vonnegut briefly outlines his own scientific proto-hypotheses about literature and narrative. Here, he uses Kilgore Trout to describe a prototype of narrative attractive for reading agents:

“The Bible may be the Greatest Story Ever Told, but the most popular story you can ever tell is about a good-looking couple having a really swell time copulating outside wedlock, and having to quit for one reason or another while doing it is still a novelty.”
(80-81)

The observation that the **story template which is evaluated as interesting by most people concerns basic reproductive choices of human beings** indicates the extent to which the reading agent under evolutionary pressure correlates the cognitively simulated literary narrative with the interpreted narrative of her/his own physical existence. Balancing the benefits of the resources and safety of matrimony with the incessant readiness to be attracted by “genetically superior” individuals, most humans view the problems entailed by infidelity and the extremely positive emotions contained in advancements in a new romantic relationship as **highly relevant** in their immediate problem space, even if they do not actively participate in any of these. The interesting question is **what kind of mental imagery do reading agents use to simulate a highly relevant narrative. Specifically, the questions are whether, or to what extent, do reading agents ignore the physical description in language and whether or not they actively choose the elements of their perceptual memory that they want to see.**

This is one of the proto-hypotheses about emotion and human male-female interaction:

the concept of the *man-woman hour* as a unit of measurement of marital intimacy. This is an hour during which a husband and wife are close enough to be aware of each other, and for one to say something to the other without yelling, if he or she feels like it.

...

a standard *man-woman week* of thirty-six man-woman hours.

... a standard *man-woman year* of eighteen hundred man-woman hours. (83-84)

Vonnegut, using the format of definitions and hypotheses based on the epistemology of science, destabilizes the common understanding of relationship length stressing the disjunction between the absolute bond on the conceptual level and frequently occurring significant temporal and spatial separation on the physical level, possibly with relation to the prevalent practice of occupation (nine-to-five on corporate premises) in Western society. Apart from constituting another theory stub about the human psyche, it can serve the reading agent as a tool for reflection on the nature of her/his own romantic relationships and potential improvement brought by changed focus and habitual behaviour.

As the reader approaches the end of *Timequake*, Vonnegut includes information that influence how the reader views the relation of the author to the text and the degree of autobiographicality, immediacy and genuineness of his communication:

My big and only brother Bernard, a widower for twenty-five years, died after prolonged bouts with cancers, without excruciating pain, on the morning of April 25th, 1997, at the age of eighty-two, now four days ago. (215)

Vonnegut not only states the actual timeframe of biographical events, he positions the act of writing those very lines to four days after the death of his brother. This (the complex input that is the whole text, not the sentence) creates the effect of veritableness as the output of evolutionarily developed veritable communication checking to ensure mutually benefiting cooperation.

5.4 Conclusions of analysis

Having performed a detailed reading of *Timequake* and selected a miscellany of quotes that point to the variety of ways in which it influences cognition; these are some of the most frequently recurring mechanisms categorized according to the target layer of their effects. **The nature of these observations make them a potential extension of Vladimir Propp's *Morphology of the Folktale*, systematizing the devices which constitute literary fiction, even though necessarily starting with a higher level of abstraction due to the complex nature of the object of systematization.** The layers are modelled on Maslow's hierarchy of needs:

- **Level 1: Physiological needs - Play**

- Even though narratives, and literature in particular, are usually utilized only after physiological needs have been met, the scientific evidence collected by Boyd suggests that play might qualify as a **neurological need**. In that case, the function of *Timequake* maintaining physical homeostasis would be introduction of novel input (including the novel portions of the material active on all following levels), often seemingly random combinations of elements which supply cognition with raw material for the play of simulation/imagination.

- **Level 2: Safety - Physical security, homeostasis and increase of resources**

- Biographical information about Vonnegut can be read as information about the initial status of a successful agent (before success) and his following conduct, so that the reading agent can learn from him and thus enhance her/his existing strategies of survival and reproduction or discover new ones.

Example:

- Vonnegut specifies his middle-class background, varied education, and several occupations for which no qualification is needed. The implicit message is that variety and experience are a more valuable asset than strong focus on one skill.
- Many propositions describing the decline of morality and culture in the Western civilization can be read as information about social, cultural, economic, and psychological processes which might have negative impact on physical homeostasis or cause a higher statistical probability thereof. Examples:
 - The roots of war and exploitation are tracked to certain ways of scientific and political reasoning, such as the creation, storage and use of the atom bomb.
 - Vonnegut hypothesizes that television, which makes people view less stories and pictures, causes illiteracy and lack of imagination. This in turn causes inability to simulate other people's emotions (empathize), leading to lack of moral sense ("merciless creatures").

- **Level 3/4: Love/belonging/esteem – virtual group membership**

- *Timequake* abounds with reinforcers of virtual social group memberships by means of affection for other members

brought by empathy or identification with a common goal.

Examples:

- Humanism
- Pacifism
- Literacy and culture of the imagination
- Working to middle-class consciousness

- **Level 5: Self-actualization – Knowledge acquisition, border testing of reality**

- Transformation of existing schemas, changing perspective, context, level of detail and internal motivation of protagonists, thus generating cognitive novelty even in well-researched, evolutionarily relevant areas of knowledge (as opposed to learning about newly discovered galaxies which are novel, but irrelevant to the fitness of most human agents). Achieved with contrast, defamiliarization, or description from the viewpoint of an unusual or alien agent. The categorization in this case is ambiguous, because this effect might be used either in pure intellectual and moral curiosity, or with the goal of using knowledge to increase one's social status and resources, which would place it into Level 2. Examples:

- Dedication of *Timequake* (vii) defamiliarizes the human practice of producing literature.
- Vonnegut's anecdote about *The Old Man and the Sea* (xi) being either inaccurate or about an incompetent character presents a new perspective challenging intellectual and educational authority.
- The fictional short story about the planet Booboo (15-18) which is "coincidentally" the same as Earth uses the

convention of exhaustive description of previously unknown natural phenomena to analyse and criticize human civilization.

- Proto-hypotheses (in terms of the epistemology of science) testing the limits of human problem space related to the meaning of life as a whole and emotional strategies of approaching it, alternatively, meta-fictional and meta-linguistic proto-hypotheses regarding the function of literature, narrative, and language. Examples:
 - Vonnegut provides an introduction to humanism (72), a belief that a deity is unknowable and not necessary for moral action, the human community being the practical justification of ethics and the highest comprehensible reference.
 - Proto-hypotheses as discrete attempts at comprehending reality need not be consistent with each other - the story about the congregation of chemical elements on the planet Tralfamadore (43-44) presents a negative proto-hypothesis about the human race bringing evil and stupidity into the “peace” of the universe.

Importantly, all of these levels are addressed not only in the text alone, but also behind “**hyperlinks**”, references to various parts of cultural discourse known to the reading agent, which instantiate practically and emotionally relevant content with minimal spatial and temporal requirements.

As to the generalizability of these conclusions, they should be valid for most literary fiction, while the degree of biographicality and philosophizing varies based on authorial preference. Low novelty, clichéd fiction might qualify as well, satisfying the physiological need of play, the need to belong and to be agreed with, and might contain novelty, transformation of knowledge and proto-hypotheses appropriate to the experience of the target readers’ group. This

need level based framework for interpreting literary works could be used as a tool for assisting literary theory, but it could also serve such practical purposes as advanced narrative evaluation or literary education.

6. Conclusion

To boil the purpose of this thesis down to the simplest, most practical propositions, it intended to:

1. posit an evolutionary-biological kernel for interdisciplinary narrative theory
2. systematically seek out especially valuable or prototypal approaches to narrative and organize them around this kernel
3. perform an analysis of a literary work taking into account all of the above.

In fulfilling aim number one, I chose to draw heavily on the work of Nikolaas Tinbergen: an ahead-of-its-time system of questions to ask in order to understand any animal behaviour. In addition, I used the ideas of Gerhard Medicus, who elaborated on Tinbergen's questions and utilized them to categorize all human sciences. As a philosophical justification for such kernel served Edward Osborne Wilson's concept of consilience, assuming an "unbroken chain of causal sequences" (Carroll 70) stretching all the way between the laws of the smallest particles and the most abstruse philosophical speculations.

Success in aim number two, which consisted in selecting research which was either exceptionally momentous or particularly illustrative, is the hardest to judge because of the inherent subjectivity of selection and, nonetheless, the incredibly large volume of research which accumulated around "narrative", which remained a buzzword for more than four decades. I started with locating scientific efforts that were exceptionally successful in outlining the overall significance of narrative in human cognition, such as forewords and edited volumes of Theodore Sarbin, who stated that narrative could serve as a root metaphor for psychology, and Jerome Bruner, who on several occasions wrote about narrative construction of reality. To show the importance of narrative from

the evolutionary-biological point of view, I referred to Kerstin Dautenhahn's "narrative intelligence hypothesis". To demonstrate the centrality of narrative in philosophy, anthropology and cultural studies, I introduced Jean-Francois Lyotard's view of late 20th century western culture, also referred to as the age of the postmodern, as incredulity towards "grand narratives" or metanarratives, the underlying, totalizing explanations of history and ethics which hitherto characterized all ideologies. My selection out of the variety of research explaining narrative using proximate questions, or in other words, questions relating to the ontogeny and mechanism of narrative use in humans, let the most space for Katherine Nelson's longitudinal research of the crib monologues starting with a 20-something months old Emily and following her for more than a year, for Daniel Dennett's speculations on how human self is constructed through narrative, and some space was reserved also for George Lakoff's and Srinivas Narayanan's scheme for computational modelling of an action ontology. The part covering ultimate questions (phylogeny and evolution) can be roughly divided into the part dedicated to Kerstin Dautenhahn and Michelle Scalise Sugiyama, two theorists of narrative evolution, and Joseph Carroll and Brian Boyd, two pioneers of Darwinian literary studies (the rationale of their inclusion being that they are trying to uncover the evolution and biology behind outstanding analysable human narratives read by millions for entertainment).

The third aim, to use this theoretical framework to analyse Kurt Vonnegut's semi-autobiographical novel *Timequake*, was the easiest to fail at. Behind every stated finding, there lurked the danger of evolutionary reductionism or platitude. Being an author implies not being able to step out of the frame of mind in which all statements and conclusions follow automatically and seem to have been won too easily. Of course, the reader side often needs all those for the author seemingly plain and repetitious findings to gradually inflate the whole complex of ideas including minute details. Whether there is anything to inflate in this thesis, I leave upon the readers to judge. My analysis of *Timequake*, originally intended to balance the different views in the theoretical part, skewed itself towards an evolutionary reading using AI "agent" abstraction and helping itself with various psychological, sociological and economic concepts. To more accurately target literary culture, in which every

literary work is necessarily rooted, it reads not only the text itself but also many literary theoretical concepts encountered therein, such as the postmodern, defamiliarization, metafiction, or juxtaposition. Starting with general considerations about the meaning of the very existence of *Timequake*, the context of its creation, reader expectation and reception, the analysis proceeded to detailed reading of isolated sentences, densely covering Vonnegut's magnetic opening and sparsely pointing out illustrative passages throughout the entire novel. Out of the targeted literary theoretical concepts, much space was dedicated to defamiliarization, explaining it on the basis of different kinds of cognitive novelty and modification of usually static, solidified cognitive schemas. Philosophising about ethics and the meaning of life was explained in a computer scientific abstraction as testing the border values of the human problem space. The conclusion of the analysis attempted to generalize and systematize the observed functional patterns of the text into layers of effect loosely based on Maslow's hierarchy of human needs:

- Level 1: Physiological/neurological needs seem to be partially fulfilled by *Timequake* by presenting novel input, which is at the same time simulable in the imagination (mostly combinations of known elements/properties).
- Level 2: Safety, physical security and homeostasis, including the drive to increase one's resources when possible, are secured both by valuable information specifying ways to success in different areas, financial, social or emotional, and by information on possible future threats presented by civilization.
- Level 3/4: The need of love, belonging or esteem is satiated with countless acts of reinforcing virtual group membership, a cognitive, emotional connection to other people of similar status, goals, values, philosophies or problems.
- Level 5: Self-actualization is achieved either by knowledge acquisition beyond the areas where it can be practically useful, in particular the search for answers to open-ended questions of ethics and purpose of

human life and the universe, operationalized as “border testing of reality”.

Far from claiming to carry a paradigm shift or signal a revolution, this thesis aspires to present at least a refreshing reminder of the central position of ethology, an original cocktail of research and a signature approach to literature. It participates in the movement to empower the consistent, biocultural understanding of the world on the levels of research, education, but also laypeople’s theories.

Works Cited

- Adamowicz, Elza. *The Surrealist Collage in Text and Image: Dissecting the Exquisite Corpse*. Cambridge: Cambridge University Press, 1998. Print.
- Auble, Pamela, Jeffrey Franks, and Salvatore Soraci. "Effort toward comprehension: Elaboration or aha!?" *Memory & Cognition* 7.6 (1979): 426–434. Print.
- Bamberg, Michael. *Narrative – State of the Art*. Amsterdam: John Benjamins Publishing Company, 2007. Print.
- Boyd, Brian. "Getting it all wrong - Bioculture critiques cultural critique." *American Scholar* 75.4 (Fall 2006): 18-30. Print.
- . *On the Origin of Stories: Evolution, Cognition, and Fiction*. Cambridge: Harvard University Press, 2009. Print.
- Bruner, Jerome. *Actual Minds, Possible Worlds*. Cambridge, MA: Harvard University Press, 1986. Print.
- . "The Narrative Construction of Reality." *Critical Inquiry* 18 (1991): 1-21. Print.
- Bruner, Jerome and Carol Feldman. "Theories of mind and the problem of autism." *Understanding other minds: Perspectives from autism*. Eds. Simon Baron-Cohen et al. Oxford: Oxford University Press, 1993. Print.
- Carroll, Joseph. *Literary Darwinism: Evolution, Human Nature, and Literature*. New York: Routledge, 2004. Print.
- Childers, Joseph W. and Gary Hentzi. *The Columbia Dictionary of Modern Literary Theory and Cultural Criticism*. New York: Columbia University Press, 1995. Print.

- Dautenhahn, Kerstin. "The Narrative Intelligence Hypothesis: In Search of the Transactional Format of Narratives in Humans and Other Social Animals." *Cognitive Technology: Instruments of Mind: 4th International Conference, CT 2001, Warwick, UK, August 6-9, 2001*. Eds. Meurig Beynon, Chrystopher L. Nehaniv and Kerstin Dautenhahn. Berlin: Springer, 2001. 248-66. Print.
- . "Stories of Lemurs and Robots: The Social Origin of Story-telling." *Narrative Intelligence*. Eds. Michael Mateas and Phoebe Sengers. Amsterdam: John Benjamins Publishing Company, 2003. 63-90. Print.
- De Waal, Frans. "Morally evolved: Primate social instincts, human morality, and the rise and fall of 'veneer theory'." *Primates and Philosophers: How Morality Evolved*, ed. Stephen Macedo and Josiah Ober. Princeton: Princeton University Press, 2006. 1–80. Print.
- Dennett, Daniel C. "The Origins of Selves." *Cogito* 3.3 (Autumn 1989): 163-173. Web. 3 May 2013. <<http://cogprints.org/257/1/originss.htm>>.
- Dunbar, Robin I. M. "Neocortex size as a constraint on group size in primates." *Journal of Human Evolution* 22.6 (June 1992), 469–93. Print.
- Ferchmin, P. A., and A. Eterovic. "Play stimulated by environmental complexity alters the brain and improves learning abilities in rodents, primates, and possibly humans." *Behavioral and Brain Sciences*. 5.1 (1982): 164. Print.
- Firth, Raymond. *History and Traditions of Tikopia*. Wellington: The Polynesian Society, 1961. Print.
- Fischer, Wolfram and Martina Goblirsch. "Biographical structuring: Narrating and reconstructing the self in research and professional practice." *Narrative – State of the Art*. Ed. Michael Bamberg. Amsterdam: John Benjamins Publishing Company, 2007. 37-46. Print.
- Freeman, Mark. *Rewriting the Self: History, Memory, Narrative*. London: Routledge, 1993. Print.

- Friedman, Elaine. "Kurt Vonnegut, Humanist, 1922-2007." *American Humanist Association*. American Humanist Association, 18 Apr 2007. Web. 14 May 2013.
<<http://www.americanhumanist.org/hnn/archives/?id=293&article=2>>.
- Garvey, Catherine. *Play*. Cambridge, MA: Harvard University Press, 1990. Print.
- Glos, J., and Cassell, J. "Rosebud: Technological Toys for Storytelling." *Proceedings of CHI'97*. Atlanta, GA, March 22-27, 1997. pp. 359-360. Print.
- Halverson, Jeffry R., H. L. Goodall Jr. and Steven R. Corman. *Master Narratives of Islamist Extremism*. New York: Palgrave Macmillan, 2011. Print.
- Herman, David, Manfred Jahn and Marie-Laure Ryan (Eds.). *Routledge Encyclopedia of Narrative Theory*. Abingdon: Routledge, 2005. Print.
- Hyvärinen, Matti. "Towards a Conceptual History of Narrative." *The Travelling Concept of Narrative*. Eds. M. Hyvärinen, A. Korhonen, and J. Mykkänen. Helsinki: Helsinki Collegium for Advanced Studies, 2006. 20-41. Web. 05 May 2013. <http://www.helsinki.fi/collegium/e-series/volumes/volume_1/001_04_hyvarinen.pdf>.
- Jakobson, Roman. "Closing Statement: Linguistics and Poetics." *Style in Language*. Ed. Thomas A. Sebeok. New York: MIT Press and Wiley, 1960. Print.
- Josselson, Ruthellen. "Narrative Research and the Challenge of Accumulating Knowledge." *Narrative – State of the Art*. Ed. Michael Bamberg. Amsterdam: John Benjamins Publishing Company, 2007. 7-15. Print.
- "Kurt Vonnegut, MA." *ACLU*. American Civil Liberties Union, 12 Jun 2008. Web. 14 May 2013.
<<http://aclu.procon.org/view.source.php?sourceID=002358>>.

- Labov, William. "Narrative pre-construction." *Narrative – State of the Art*. Ed. Michael Bamberg. Amsterdam: John Benjamins Publishing Company, 2007. 47-56. Print.
- Labov, William and J. Waletzky. 1967. "Narrative analysis." *Essays on the Verbal and Visual Arts*. Seattle: University of Washington Press. 12-44. Reprinted in: *Journal of Narrative and Life History*. 7 (1997): 3-38. Print.
- Lakoff, George and Srinu Narayanan. "Toward a Computational Model of Narrative." *Computational Models of Narrative, Papers from the 2010 AAAI Fall Symposium*. Ed. Mark Finlayson. Menlo Park, CA: AAAI Press, 2010. 21-28. Print.
- Leach, Edmund R. *Political Systems of Highland Burma: A Study of Kachin Social Structure*. Cambridge, MA: Harvard University Press, 1954. Print.
- Luke, Allan. "Curriculum, Ethics, Metanarrative: Teaching and Learning Beyond the Nation." *Struggles over Difference: Curriculum, Texts, and Pedagogy in the Asia-Pacific*. Ed. Yoshiko Nozaki, Roger Openshaw, and Allan Luke. Albany: State University of New York Press, 2005. Print.
- Lyotard, Jean-Francois. *The Postmodern Condition: A Report on Knowledge*. 1979. Trans. Geoff Bennington and Brian Massumi. Manchester: Manchester University Press, 1984. Print.
- Margolin, Uri. "Russian Formalism." *The Johns Hopkins Guide to Literary Theory and Criticism*. Ed. Michael Groden, Martin Kreiswirth, and Imre Szeman. Baltimore, Maryland: The Johns Hopkins University Press, 1994. Web. 10 May 2013.
<<http://litguide.press.jhu.edu.proxy.uchicago.edu/cgi-bin/view.cgi?eid=227&query=defamiliarization>>.
- Machado, Isabel, and Ana Paiva. "Heroes, Villains, Magicians, ...: Believable Characters in a Story Creation Environment." *Proceeding of the AIED workshop on Life-like Pedagogical Agents*. Le Mans, 1999. Print.

- Maslow, Abraham H. "A Theory of Human Motivation." *Psychological Review*. 50.4 (1943): 370-96. Web. 17 Mar. 2014.
<<http://psychclassics.yorku.ca/Maslow/motivation.htm>>.
- Mateas, Michael, and Phoebe Sengers. (eds.) *Narrative Intelligence*. Amsterdam: John Benjamins Publishing Company, 2003. Print.
- McAdams, Dan P. "The Role of Narrative in Personality Psychology Today." *Narrative – State of the Art*. Ed. Michael Bamberg. Amsterdam: John Benjamins Publishing Company, 2007. 17-26. Print.
- Medicus, Gerhard. "Mapping Transdisciplinarity in Human Sciences." *Focus on Gender Identity*. Ed. Janice W. Lee. New York: Nova Science Publishers, 2005. 95-114. Print.
- Montemayor, J. et al. "A Storytelling Robot for Pediatric Rehabilitation." *Proceedings of ASSETS'2000*. Washington D.C., Nov. 2000, ACM, New York. Print.
- "narrative, n.". *OED Online*. March 2013. Oxford University Press. 30 May 2013
<<http://www.oed.com/view/Entry/125146?rskey=PYVqWI&result=1&isAdvanced=false>>.
- Nelson, Katherine. *Narratives from the Crib*. Cambridge, MA: Harvard University Press, 1989. Print.
- Nelson, Richard. *Hunters of the Northern Ice*. Chicago: University of Chicago Press, 1966. Print.
- Nesse, Randolph M. "The Four Areas of Biology." University of Michigan personal website. 2000. <<http://www-personal.umich.edu/~nesse/Nesse-Tinbergen4Q.PDF>>
- Peters, Michael A. *Poststructuralism, Marxism, and Neoliberalism: Between Theory and Politics*. Lanham, MD: Rowman and Littlefield, 2001. Print.
- Propp, Vladimir. 1928. *Morphology of the Folktale*. Trans. L. Scott. Austin: University of Texas Press, 1968. Print.

- Read, S. J. and L. C. Miller. "Stories are fundamental to meaning and memory: For social creatures, could it be otherwise?" *Knowledge and memory: The real story*. Ed. R. S. Wyer. Hillsdale, NJ: Lawrence Erlbaum, 1995. 139–152. Print.
- Richards, I. A. 1929. *Practical Criticism: A Study of Literary Judgement*. New Brunswick, NJ: Transaction Publishers, 2009. Print.
- Sarbin, Theodore R. *Narrative Psychology: The Storied Nature of Human Conduct*. Westport: Praeger, 1986. Print.
- Sartre, Jean Paul. *Nausea*. 1938. London: Penguin, 2000. Print.
- Schiff, Brian. "The Promise (and Challenge) of an Innovative Narrative Psychology." *Narrative – State of the Art*. Ed. Michael Bamberg. Amsterdam: John Benjamins Publishing Company, 2007. 27-36. Print.
- Schulz-Elsing, Sharon. "Timequake, Kurt Vonnegut." *Curled up with a good book*. 1998. Web. 14 May 2013. <<http://www.curledup.com/quake.htm>>.
- Stephens, John and Robin McCallum. *Retelling Stories, Framing Culture: Traditional Story and Metanarratives in Children's Literature*. New York: Garland, 1998. Print.
- Stockwell, Peter. *Cognitive Poetics: An Introduction*. London: Routledge, 2002. Print.
- Sugiyama, Michelle S. "On the Origins of Narrative: Storyteller Bias as a Fitness-Enhancing Strategy." *Human Nature* 7.4 (1996): 403-25. Print.
- . "Food, foragers, and folklore: the role of narrative in human subsistence." *Evolution and Human Behavior* 22 (2001): 221-40. Print.
- Tinbergen, N. 1963. "On aims and methods of ethology." *Zeitschrift für Tierpsychologie* 20: 410-33. Print.
- Vonnegut, Kurt. *Timequake*. London: Jonathan Cape, 1997. Print.

Vonnegut, Kurt, perf. *Arena: Kurt Vonnegut, Jr.: "Deadeye Dick"*. BBC, 1983.

Web. 13 May 2013. <<http://youtu.be/F5EqOiye7zl>>.

Webster, Leonard and Patricie Mertova. *Using Narrative Inquiry as a Research Method: An Introduction to Using Critical Event Narrative Analysis in Research on Learning and Teaching*. Abingdon: Routledge, 2007. Print.

Wengraf, T. *The Biographic-narrative Interpretative Method: Short Guide (version 23)*. Middlesex: Middlesex University, 2004. Print.

Wilson, Edward O. *Consilience: The Unity of Knowledge*. New York: Vintage, 1998. Print.

Appendices

Abstract (English)

Summary: In its first part, this thesis proposes an interdisciplinary framework for understanding human use of narrative built around Nikolaas Tinbergen's four types of ethological questions, pertaining to either ontogeny, mechanism, phylogeny, or adaptive value of a particular animal behaviour. In the second part, this framework is applied in analysing Kurt Vonnegut's semi-autobiographical novel *Timequake*.

Introduction: A reaction to the confusion of almost fifty years' worth of using the word "narrative" in a long list of disciplines and with varying shades of meaning, this thesis asserts an evolutionary- biological centre for this interdisciplinarity and collects illustrative pieces of research to outline it. Because of an authorial focus on widely read literary texts as exceptionally rich sources for research, a significant portion of the theoretical base is dedicated to researchers around Darwinian literary studies. In order to test the synergic potential of individual pieces of research, a successful analysis was deemed a suitable proof of consistency.

Theoretical framework: The selection of research asking proximate questions (mechanism and ontogeny) uses among others Katherine Nelson's work with the crib monologues of Emily to get as close as possible to the developmental aspects of human narrative use, Daniel Dennett's theory of constructing one's own self through narrative to point out the relevance of narrative for studying base, deep processes of cognition, and George Lakoff's and Sridhar Narayanan's model of action ontology to suggest a prospective approach to AI abstraction suitable as an addition to interdisciplinary study of narrative. Ultimate questions (adaptation and phylogeny) are outlined referring to two central theorists of the evolution of narrative, Kerstin Dautenhahn and Michelle Scalise Sugiyama, and additional literary focus is acquired through

Joseph Carroll and Brian Boyd, pioneers of evolutionary approaches to literature.

Method of analysis: The analysis is an evolutionary reading using AI “agent” abstraction and additionally utilizing various psychological, sociological and economic concepts. Since every text stems from a tradition and has its respective cultural context including various expectations and criteria, not only the text itself is analysed but also some literary theoretical concepts used or referred to therein, such as defamiliarization, metafiction, and other “postmodern” devices.

Conclusion: This thesis is concluded with a systematization of patterns and functions found in *Timequake*, built along Maslow’s pyramid of human needs, which might serve as a base for an extension of Vladimir Propp’s *Morphology of the Folktale*. Other directions of future research might include either building a consistent theory of narrative which would synthesize and let individual theories selected in this thesis correct each other, or elaborating the methods of analysis and testing them on other instances of shared, cultural narrative. A particularly recommended follow-up would be to perform a similar analysis as that of *Timequake* and correlate it with reader-response data from both leisure readers and literary critics.

Abstract (Deutsch)

Zusammenfassung: Der erste Teil dieser Diplomarbeit entwirft einen interdisziplinären Rahmen für das Verständnis von menschlicher Nutzung von Narrativen. Es ist auf Nikolaas Tinbergens vier Typen von ethologischen Fragen aufgebaut, betreffend Ontogenie, Mechanismus, Phylogenie, und auf den adaptiven Wert von einem spezifischen Tierverhalten. Im zweiten Teil wird dieser Rahmen in die Analyse von Kurt Vonneguts halb-autobiographischen Roman *Timequake* (Zeitbeben) eingesetzt.

Einführung: Als Reaktion auf die Verwirrung von fast fünfzig Jahren Anwendung des Wortes "Narrativ" in einer langen Liste von Disziplinen und mit verschiedenen Meinungen, bringt diese Diplomarbeit einen evolutionär-biologischen Mittelpunkt dieser Interdisziplinarität hervor und sammelt illustrative Forschungsbeispiele. Weil sich der Autor auf eine Vielzahl gelesener literarischer Texte als eine außergewöhnlich reiche Quelle für seine Forschung stützt, ist ein signifikanter Teil der theoretischen Grundlagen für den Forscher dem „literarischen Darwinismus“ gewidmet. Eine erfolgreiche Analyse wurde als Beweis der Konsistenz und des synergetischen Potenzials individueller Teile der Forschung betrachtet.

Theoretischer Rahmen: Eine Forschungsmethode, die die Fragen aus der Perspektive unmittelbarer Ursachen (Mechanismus, Ontogenie) des Verhaltens stellt, verwendet unter anderem Katherine Nelsons Arbeit mit Kinderbett-Monologen von Emily, die so nah wie möglich zu den Entwicklungsaspekten menschlicher Narrativ-Verwendung hinzukommen versucht, Daniel Dennetts Theorie, dass ein Mensch sein „Ich“ durch den Narrativ bildet, die den Fokus der Narrativ-Forschung für das Studieren auf grundsätzliche, tiefe kognitive Prozesse legt, und George Lakoffs und Srinivas Narayanans Modell der Ontologie der Aktion, das eine vielversprechende Betrachtungsweise zur Abstraktion aufwirft. Die Fragen aus der Perspektive ultimativer Ursachen (Adaptation, Phylogenie) sind von zwei zentralen Theoretikerinnen der Evolution von Narrativen, Kerstin Dautenhahn und Michelle Scalise Sugiyama, bestimmt und der zusätzliche literarische Fokus ist

mit Joseph Carroll und Brian Boyd, den Pionieren evolutionärer Annäherungen zu Literatur, gegeben.

Analysemethoden: Als Analysemethode wird die evolutionäre Lesung “agent” Abstraktion künstlicher Intelligenz verwendet, die zusätzlich verschiedene psychologische, soziologische und ökonomische Konzepte nützt. Weil jeder Text aus einer Tradition stammt und seinen entsprechenden kulturellen Kontext einschließlich verschiedener Erwartungen und Kriterien hat, werden nicht nur der Text, sondern auch viele literaturtheoretische Konzepte wie Defamiliarisation, Metafiktion und andere „postmoderne“ Theorien analysiert.

Conclusio: Diese Diplomarbeit wird mit einer Systematisierung von in *Timequake* gefundenen Mustern und Funktionen abgeschlossen. Die Arbeit wird mithilfe der Maslowschen Bedürfnishierarchie aufgebaut und könnte in Zukunft als Basis für Erweiterungen von Vladimir Propps *Morphologie des Märchens* dienen. Andere mögliche Richtungen zukünftiger Forschung könnten entweder eine konsistente Theorie des Narrativs bilden, die für diese Diplomarbeit ausgewählte, individuelle Theorien synthetisiert und diese einander korrigieren lässt. Zudem könnten die Analysemethoden herausgearbeitet und mit anderen Instanzen des gemeinsamen, kulturellen Narrativs angewendet werden. Ein empfohlener weiterer Schritt wäre eine ähnliche Analyse von *Timequake* oder einem anderen Buch, um diese anschließend mit Leser-Rücklauf-Daten von Freizeitlesern und Literaturkritikern in Beziehung zu setzen.

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