

THE ANALYSIS OF CHILDREN'S WRITING:
A STUDY ON THE CREATIVE POTENTIAL AND
RHETORICAL STRUCTURE OF WRITTEN TEXTS

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ABSTRACT

THE ANALYSIS OF CHILDREN'S WRITING: A STUDY ON THE CREATIVE POTENTIAL AND RHETORICAL STRUCTURE OF WRITTEN TEXTS

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This thesis investigates the relationship between creative potential and the rhetorical structure of children's narratives. 44 middle school children (aged 12-15) were given a set of paper-pen activities including one divergent thinking test, one convergent thinking test and a story to be completed. Results of the divergent and convergent thinking tests were taken as the predictors to estimate the potential for creative thinking. Children were examined in terms of how they encode rhetorical relations in their writings. Whether a creative potential made a difference in children's writings in terms of rhetorical relations they used, and whether

children within the same creative potential group used the same rhetorical relations in common were investigated. Rhetorical Structure Theory (RST) (Marcu, 2000 and Carlson and Marcu, 2001) was used in coding children's writings. It was found that children in the study interpreted story writing as an act of attribution. This result is contrary to Marcu *et.al* (1999b), who found the elaboration-additional relation as the most frequent relation in their corpora. The study also found that there was an inverse relationship between the convergent thinking scores and the number of satellites (an EDU (elementary discourse unit) playing an auxiliary role for a text in question) for the 7th graders. Finally, it was found that high quartile (highest scorers in the study, top 25%) convergent thinkers were able to construct a narrative element with few number of EDUs and few number of discourse relation types.

Keywords: creativity, divergent and convergent thinking, children narratives, rhetorical relations, Rhetorical Structure Theory.

ÖZ

ÇOCUK HİKAYELERİNİN ANALİZİ: YARATICILIK POTANSİYELİ VE METİNLERİN SÖZBİLİMSEL YAPISI ÜZERİNE BİR ÇALIŞMA

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Bu çalışmada yaratıcılık potansiyeli ve çocukların hikayelerinin sözbilimsel yapısı arasındaki ilişki incelenmektedir. Bu amaçla 12-15 yaşlarında, 44 ilköğretim öğrencisinden oluşan bir grup çocuğa, farklı düşünme ve benzer düşünme testleri ve sonu yazılmak üzere bir hikayeden oluşan bir dizi kağıt-kalem etkinliği uygulanmıştır. Farklı düşünme ve benzer düşünme testleri sonuçları, yaratıcı düşünme potansiyelini tahmin eden unsurlar olarak alınmıştır. Çocukların hikayeleri, içerdikleri sözbilimsel ilişkiler açısından incelenmiştir. Yaratıcılık potansiyeli farklı olan çocukların hikayelerinde de özellikle sözbilimsel ilişkiler açısından bir farklılık gözlenip gözlenmeyeceği ve aynı yaratıcılık potansiyeli grubundaki çocukların hikayelerinde grup olarak ortak sözbilimsel ilişkiler kullanıp kullanmadıkları araştırılmıştır. Çocukların hikayelerini analiz etmek için genişletilmiş

sözbilimsel ilişki dağarcığı ile Sözbilimsel Yapı Kuramı (SBY) (Marcu, 2000 and Carlson and Marcu, 2001) kullanılmıştır. Çalışmaya katılan çocukların hikaye yazmayı bir atıfta bulunma eylemi olarak yorumladıkları bulunmuştur. Bu sonuç Marcu *et. al* (1999b) çalışmasında analiz edilen metin külliyatlarında en sık rastlanan ilave-detaylandırma ilişkisiyle uyuşmaz. Bunlara ek olarak, 7.sınıftaki çocukların benzer düşünme testindeki sonuçları ile metinde kullandıkları uydu tipi metin kısımlarının (metnin anlaşılmasında yardımcı rol oynayan temel söylem yapıtaşları) sayısının ters orantılı olduğu gözlenmiştir. Son olarak, yüksek kartildeki (çalışmaya katılanların en yüksek skoru alan; tepe %25'i) benzer düşünürlerin daha az EDU (temel söylem yapıtaşı) ve daha az söylem ilişki tipi ile hikayesel bir element yazmayı başardıkları gözlenmiştir.

Anahtar Kelimeler: yaratıcılık, farklı ve benzer düşünme, çocuk hikayeleri, sözbilimsel yapı, Sözbilimsel Yapı Kuramı.

To The Only Owner of My Heart - My Dear Husband ; Dinçer Batırbek, for providing the endless love, care and patience that made this MSc possible.

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LIST OF ABBREVIATIONS

ANOVA	Analysis of Variance
ARP	Aptitudes Research Project
CPS	Creative problem solving
CQ	Creativity Quotient
DCUs	Discourse constituent units
EDUs	Elementary discourse units
LDM	Linguistic Discourse Model
PDTB	Penn Discourse Tree Bank
RST	Rhetorical Structure Theory
SD	Standard Deviation
SI	Structure-of-intellect
TTCT	Torrance Test of Creative Thinking

CHAPTER 1

INTRODUCTION

To raise new questions, new possibilities, to regard old problems from a new angle, requires creative imagination and marks real advance in science.

Albert Einstein

1.1 The Aim of the Study

The aim of the present study is to analyze children's writing. It is a study investigating creative potential in terms of rhetorical relations encoded in written texts.

1.2 Background to the Study

This section comprises the background of the study, which will be reviewed in the sub-sections shown in parentheses.

Creativity (section 1.2.1)

Rhetorical Structure Theory (section 1.2.2)

Children's Narrative as Discourse (section 1.2.3)

1.2.1 Creativity

Creativity has numerous definitions in the literature. Parners (1967) defines it as a function of knowledge, imagination and evaluation. Some

other creativity definitions are the ability to see things in new ways; boundary breaking and going beyond the information given; thinking unconventionally; making something unique; and combining unrelated things into something new (Schirrmacher, 2002, p.6).

In most cases, creating something has two aspects, namely originality and the process involved in using learned skills such as writing and playing an instrument. Originality is the discovery of an idea, plan, answer, etc. and it involves imagination, playing with ideas, exploring, etc. (Mayesky, 2003).

Runco (2004) emphasizes the necessity of originality for creativity, being the most widely acknowledged requisite. Creativity is usually related with originality though it is more than that (Eysenck and Keane, 2005). It is a reactive and contributive act. It is the capacity (resulted from flexibility) to deal with the advances, opportunities, changes as well as the reaction to problems or challenges.

Cognitive research on creativity is quite diverse. The present study is on the side of idiographic studies (the studies of individuals) which involve intellectual skills, especially divergent thinking. Divergent thinking is defined as the ability to generate new and varied ideas, whereas convergent thinking is defined as the ability to seek and find one true solution to a problem by taking a novel approach. Divergent thinking is often viewed as providing an estimate of the potential of creative thinking. For example, flexibility (the variety or diversity of the ideas) is often studied by means of divergent thinking tests, which are open-ended assessments. Although divergent thinking tests have been widely criticized (Hocevar and Michael, 1979, Baer, 1993, 1994), they are often used due to their psychometric qualities that parallel IQ tests and other accepted measures (such as artistic achievements (e.g. Barron-Welsh Art Scale), self assessments (e.g. Khatena-Torrance Creative Perception Inventory))

(Runco, 2004). What is important about the evaluation of the results of these tests is that they are only predictors.

Convergent thinking is a part of one of the most important areas for research where one sees the impact of education on creativity. Most tests given in schools require primarily convergent thinking thus down-grading divergent thinking (Runco, 2004). On the other hand, a good amount of research including divergent thinking and creative problem solving (CPS) has actually been done in the field of education.

As for CPS, studies have focused mostly on the divergent thinking aspects of it. On the other hand, the trilevel matching theory (Brophy, 1998a, 1998b) proposes that CPS tasks vary widely in the degree to which they require differing kinds of thought and prior knowledge. A complete CPS process has a divergent and convergent nature. It uses divergent ideation and convergent judgment. This convergent side receives less attention from CPS researchers than its divergent side (Brophy, 2001).

The creativity theories of J. P. Guilford are known as a strong influencer in the field of education and have become popular first in the 1950's. The concepts of convergent and divergent thinking are the baseline for his psychometric approach. Since the development of Guilford's psychometric approach, a number of creativity tests had been devised, most of which are geared towards measuring divergent thinking. The discriminant validation and predictive validation¹ of these tests showed that divergent thinking is surely necessary but it is not the only element necessary for creative achievement. Many researchers concluded that creative achievement requires both divergent and convergent thinking (Creativity,

¹ The discriminant validation is exemplified with the empirical separation of creativity from IQ and traditional expressions of intelligence, whereas predictive validation is exemplified with finding how strongly the creativity test is associated with some measure of real-world Performance (Runco, 2004).

1998). The psychometric approach assumes that creative potential can be captured in paper-and-pencil tests. (Runco, 2004)

1.2.2 Rhetorical Structure Theory

As mentioned in section 1.1, the aim of the present study includes analyzing children's writings, more specifically, children's narratives (See section 1.2.3 for an introduction to children's narratives). Since narrative is a discourse type, we needed a discourse theory to analyze children's narratives and hence used Rhetorical Structure Theory (RST) in coding the rhetorical relations encoded by children.

Rhetorical Structure Theory is a theory of text organization developed by Mann and Thompson (1988). Mann and Thompson (1988, p. 243) state that:

“As a descriptive framework for text, Rhetorical Structure Theory provides a combination of features that has turned out to be useful in several kinds of discourse studies.”

RST recognizes the hierarchical structure in text. They describe relations between text parts functionally. No matter what size the text is, RST claims to provide a comprehensive analysis for it. RST offers a general way to describe the relations among clauses. That is the feature of RST to shed a light on the local level of text analysis. Due to its descriptive nature, it has been used as an analytical tool for a wide range of text types. It also proved to be useful in analyzing narrative discourse as shown by Kumpf². The author shows that RST is valuable in describing the grammatical and rhetorical properties of narratives (Mann and Thompson, 1988). This is one of the factors leading us to choose this discourse theory for our study.

²See Kumpf, L. (1986). *Structuring narratives in a second language: A description of rhetoric and grammar*. Unpublished doctoral dissertation, University of California, Los Angeles. for further detail

RST addresses text organization via rhetorical relations. The number of rhetorical relations defined in the original 1988 paper is 24. Marcu (2000) extended the list to 76 rhetorical relations and 2 pseudo relations, namely Same-Unit and Textual-Organization. With 76 relations and their precise definitions, RST provides a systematic way to annotate a text and hence is suitable for analyzing empirical data.

Mann and Thompson (1988) have suggested that RST has been useful in the study of text coherence because it can shed light on the global level of text analysis. Recently, this aspect of the theory has been emphasized by Taboada and Mann (2006a), who argued that RST explains coherence as a hierarchical, connected structure of texts. Every part of a coherent text has a role or function with respect to other parts of the text.

Four constraints are obligatory for a tree-structure of a text to be represented on the basis of Mann and Thompson's theory (1988, p.248):

- **Completeness** – The set contains one schema application that contains a set of text spans that constitute the entire text.
- **Connectedness** – Except for the entire text as a text span, each text span in the analysis is either a minimum unit or a constituent of another schema application of the analysis.
- **Uniqueness** – Each schema application consists of a different set of text spans, and, within a multi-relation schema, each relation applies to a different set of text spans.
- **Adjacency** – The text spans of each schema application constitute one text span.

RST defines rhetorical relation as the relation between the non-overlapping text spans, namely nucleus (N) and satellite (S). The nucleus is more essential to the writer's purpose than the satellite and comprehensible independent of the satellite. This asymmetric form of relations constitutes the rationale for the Nuclearity principle. The fact that "some textual units play a more important role in text than others" is also one of the basic features of the extended version of RST by Marcu (2000). For the purpose of determining the rhetorical relations that hold between

large discourse segments, Marcu (2000) proposes compositionality principle. This explains the relationship between rhetorical relations between large textual spans and rhetorical relations between elementary units and provides unambiguous determination of span boundaries. Nuclearity assignment by the method proposed by Carlson and Marcu (2001) uses a set of rhetorical relations consisting of paratactic (relations between units of equal importance) and hypotactic relations (the relations between a unit playing a central role and a unit playing an auxiliary role).

1.2.3 Children's Narrative as Discourse

According to Schiffrin (1994), discourse can be viewed from two perspectives: the functional and structural view points. The functional view sees discourse as a system organized socially and culturally. On the other hand, the structural view suggests discourse as a language above sentences. Labov & Waletzky (1967, p.28), who are the first and the most prominent researchers of the "structural view", have defined the narrative as "any sequence of clauses which contains at least one temporal juncture". Temporal juncture is the separation of the two clauses temporally ordered with respect to each other (Labov & Waletzky, 1967, p.25). Structural approach to discourse holds that "a narrative must include a recounting of events".

Labov (1972, p.362) models narratives consisting of narrative elements. In his view, a fully-formed narrative has the following six elements: abstract, orientation, complicating action, evaluation, result or resolution and coda. In this thesis, although these elements will not be referred to explicitly, they will be used as a guideline in understanding the overall structure of children's narratives as explained in the following.

In the present study, children were given a story having the narrative elements of orientation (the narrative element answering the questions of

“who, when, what, where”), complicating action (the narrative element answering the question of “then what happened”, which gives the series of events) and evaluation (the narrative element answering the question of “so what”). They were asked to complete the story by writing a conclusion for it. This includes resolution (the narrative element answering the question of “what finally happened”) and a coda (the narrative element signaling the finish of the narrative). These narrative element(s) children wrote were evaluated structurally using RST.

Studies about the organization of children’s discourse explain narrative development by focusing on two aspects of children’s discourse organization (Hickman 2003). Those are discourse-structural aspects of narratives and discourse-cohesive aspects of narratives. The former is linked to coherence (the knowledge of the rules underlying the well-formed story structure), whereas the latter is linked more directly to cohesion (the knowledge of rules governing the flow of information across utterances in discourse) itself. Coherence is typically defined on the global level of plot organization. It corresponds to various basic types of information units and rules governing their hierarchical organization in a structure. Hickman (2003) stresses that “the largest component of narrative coherence might pertain directly to the hierarchical organization of narrative units into larger chunks”. Similar to cohesion, coherence also partially involves local adjacency and linear ordering. For example, the rules governing the order of successive episode-internal elements in the narrative schema count for this local level organization.

The children in our study wrote a result for a story, they did not write a complete story. In other words, they wrote a narrative component or components which Hickman calls “a large component of narrative” and which Labov calls “result” or “resolution”. As described briefly above, the extended version of Rhetorical Structure Theory (Carlson and Marcu, 2001) is a theory useful in showing the relations at the local level of

discourse as well as the global level (hierarchical text structure). Given that children's narratives in our study require an analysis on the local as well as global levels, RST was thought to serve our purpose well. As it will be described further in other sections of the thesis, children's narratives can be captured using the relations provided by RST.

1.3 Motivation

The motivation of the study was to measure children's (potential for) creativity through a writing task. A discourse theory was searched and RST was chosen as a tool for analysis. Creativity potential was determined by creative thinking tests.

1.4 Research Questions

The present study seeks to answer two main questions:

Research Question 1:

Do different levels of creative potential that children have make a difference in narratives they write in terms of the rhetorical relations they use?

Research Question 2:

Do children with the same creative potential show common rhetorical relation(s)?

1.5 The Scope of the Study and Research Design

This research limits its scope to the relation between creative potential and the analysis of the children's narratives. In order to achieve this task, the study makes use of both quantitative and qualitative techniques in data

analysis. Creativity scores are analyzed quantitatively while the rhetorical structure of children's writings is analyzed qualitatively. This study takes a discourse analytic perspective i.e. the relationship between creativity potential and narrative organization is investigated.

1.6 Methodology

The participants, the research tools, data analyses and the RST analyses in the study are as follows:

The Participants

There were 44 participants who are middle school children. They were chosen from Grades 6, 7 and 8, respectively. Middle school children (aged 12-15 years) were chosen on purpose. Though there is uncertainty about the developmental trends, creativity in middle school years is somewhat more agreed than adults (Charles and Runco, 2001). Therefore the participants were chosen from these age groups. There were 15 students (8 girls, 7 boys) from 6th grade, 16 students (8 girls, 8 boys) from 7th grade and 13 students (8 girls, 5 boys) from 8th grade. All 6th grade students were 12-years-old; all 7th grade students were 13-year-old and excluding one student aged 15, all 8th grade students are 14-year-old.

Thirty of the participants were from the same middle school, named ODTÜ Geliştirme Vakfı Ankara Okulu İlköğretim Bölümü, while 14 of them were from different middle schools. The subjects from the former school participated in the study in a 40-minute-class hour under the supervision of their teachers and the researcher in class, while the rest of the subjects participated in the study for the same amount of time under the supervision of their parents or older individuals (informed about the tests) at their home.

The Research Tools

There were a number of research assessment tools used in the study.

Those were

- Divergent thinking test;
- Convergent thinking test; and
- The story to be completed

(See Appendix A for the materials). All were prepared in Turkish. The divergent thinking test used was Guilford's Alternative Uses Task (1967) and the convergent thinking test used was the "Insight Problems" task (Dow, 2003).

Data Analysis

Firstly creativity thinking tests, namely divergent thinking tests and convergent thinking tests were scored. For the divergent thinking test, the creativity quotient (an objective scoring of ideational fluency) was calculated by the method suggested by Snyder, Mitchell, Bossomaier and Pallier (2004). In order to calculate the total divergent thinking scores, creativity quotient scores were added to originality and elaboration scores were calculated by the method suggested by Dow (2003). For scoring the convergent thinking test, the scoring key provided in Appendix B was used. No answers and all errors were calculated as 0 points. Only the correct answers were counted as 1 point each.

The RST Analyses

Children's writings were analyzed via RST with the relation inventory provided by Carlson and Marcu (2001). Two independent coders analyzed the data in terms of RST. The rhetorical relations used and the RST trees in the high and low creativity score groups were evaluated qualitatively for common and different rhetorical relations and narrative properties.

1.7 Significance of the Study

Creativity

As it is mentioned in section 1.2.1, creativity problem solving requires both divergent and convergent thinking. Also, the convergent side of CPS receives less attention from CPS researchers than its divergent side. Based on these facts, a test battery, which includes Guilford's Alternative Uses Task (1967) for measuring divergent thinking and a set of insightful problems consisting of 12 questions for measuring convergent thinking, was prepared. Creative thinking tests constituting such a test battery would make a good assessment of the cognitive side of creativity, especially for predicting creative potential.

Rhetorical Structure Theory

As it is mentioned in section 1.2.2, we decided to use RST in analyzing narrative discourse (Kumpf, 1986). The present study aims to analyze children's narratives. Given that RST provides a tight relation between rhetorical relations and coherence (Taboada and Mann, 2006a), it is a proper, systematic analytical tool for our purpose.

Analysis of Children's Narratives

As it is mentioned in section 1.2.3, more research is needed to relate two aspects of children's discourse organization, namely discourse-structural aspects and discourse-cohesive aspects. The present study will focus on the discourse-structural aspects of narratives and try to explain the organization of the resolution and sometimes coda written by Turkish students. The investigation is based on clause-level analyses as proposed by Carlson and Marcu (2001).

The combination of these three aspects (i.e. creativity, children's narratives, RST) makes this study unique. Numerous studies exist in respective fields of study but a combination of these aspects in a single

study is the first to be conducted. Moreover the analysis of Turkish children's discourse by means of RST is another novelty of the study.

1.8 Limitations

Firstly, the present study is limited with its procedures. In order to work with as many subjects as possible, two sets of subjects were included in the study. That might affect the consistency of the results. Secondly, divergent thinking tests measure the creative potential but they are only predictors. Besides the predictive validation of these tests (e.g., finding how strongly the creativity test is associated with some measure of real-world- creative performance) is still a question for a number of researchers. Moreover, the number of participants is limited to 44, and the number of subjects, actually makes the result of this study only suggestive, not yet comprehensive.

1.9 Overview of the Chapters

Chapter 2 reviews the literature in three sections. Section 1 reviews the literature that deals with the creativity part of study. Section 2 reviews the original Rhetorical Structure Theory; it provides the fundamentals of the theory and explains why rhetorical relations extended by Marcu are preferred for this study. It compares the extended version of RST with some other linguistic theories and with the original theory. It presents the use of RST in discourse analysis, in the area of writing and in narrative analysis as well. Section 3 reviews children's narratives as discourse, the narrative elements and temporal organization in narratives.

Chapter 3 is devoted to methodology. It deals with how this study is designed; who the participants are; what the data collection techniques and the research tools are; and what procedures are followed for test

administration, and data analyses. Tagging rules, drawing tree-structures and RST analyses are defined and described.

Chapter 4 presents the findings related to the study along with quantitative, qualitative analyses and related statistics. Besides it discusses all the findings both from the point of view of creativity and children's discourse organization sides.

Chapter 5 presents the summary of findings and conclusions obtained from this study. It briefly reviews the cognitive aspects of the study. It also includes avenues for further research.

CHAPTER 2

REVIEW OF LITERATURE

This chapter positions the present study and its research questions in the literature, which will be reviewed in the sub-sections shown in parentheses.

Creativity (section 2.1)

Rhetorical Structure Theory (section 2.2)

Children's Narrative as Discourse (section 2.3)

2.1 Creativity

Nearly half a century ago, a researcher named Mel Rhodes attempted to define creativity after analyzing 50 published definitions of creativity and imagination. Rhodes discovered a multifaceted concept, creativity, which defied a single definition. Creativity is the interaction of at least three facets (person, process and environment/press) that yield a creative product. Here, person stands for research on personal characteristics (skills, traits, abilities and motivation); process stands for mental activities of a person or a group who goes through to reach a creative end (e.g. associative processes seem to be an aspect of divergent thinking and open-ended problem solving); and press stands for the relationship of individuals and their environment that serve to either facilitate or undermine creative thought (Puccio, 2006, January). The "creative" product focuses on outcomes and those things that result from the "creative" process. One must pay attention to the difference between

being productive and being creative. They are correlated, but not synonymous. Being productive does not guarantee originality which is the most widely acknowledged requisite for creativity (Runco, 2004).

As Runco (2004) discusses creativity, a disciplinary framework is necessary to understand the overlap between four categories of person, process, press, product and some researches. For example, cognitive research on creativity focuses on basic cognitive processes such as memory, attention, knowledge etc., which are involved in creative thinking. Cognitive research also focuses on intellectual skills such as divergent thinking. Divergent thinking tests (open-ended assessments) provide an estimate of the potential for creative thinking, however, they are only predictions (Runco, 2006).

Runco and Charles (1997, p.115) emphasize one of the most important questions in creativity, i.e. the distinction between potential and performance:

“Should research focus on the potential creativity of individuals, perhaps inferring it from measures such as divergent thinking tasks, personality inventories, or assessments of previous activity, should research focus on the actual creative products of individuals, such as publications or works of art?”

At this point, this study focuses both on potential and performance. As mentioned in this quotation, it focuses on the potential creativity of individuals by inferring it from measures of divergent thinking tasks as well as convergent thinking tasks. In addition, it suggests supplementing divergent thinking tests with performance assessments of creativity such as story writing (See Baer (1994) for a critique about the validity of generic creativity tests). A number of studies use story writing as a measure of creativity (Gutbezahl, J. and Averill, J.R., 1996, Wolfradt, U. and Pretz, J.E., 2001, Fraser, 2006). In addition, Runco (1986) notes that particular performance areas like writing were strongly related to divergent thinking

than other areas like music and science. Therefore this study uses the predictor role of creativity thinking tests about the potential for creative thinking to comment on the actual creative products of individuals, namely narratives of children. In this folk - psychological – fairy - tale, children write a conclusion for a story. Writing an end or a conclusion for a story is a convergent task. While developing conclusions, I assumed that the divergent thinking is still at work.

Continuing with the disciplinary framework, Runco (2004) mentions that another research area is developmental research. Developmental research focuses mostly on person and press. Although the empirical research that identifies developmental stages was never universally applied, it is applicable to a large number of children and adolescents. Surprisingly, there is even more disagreement about the developmental trends in adulthood than those of childhood. Runco and Charles (1997) note that there is uncertainty about the developmental trends. This is because the developmental trajectory of creativity tends to vary from one person to another and individual differences are significant. They propose that a number of different studies suggest various slumps of creative potential and performance throughout the lifespan. For example, Charles and Runco (2001) argued that divergent thinking and evaluative skills are important processes in the development of creative thinking in elementary school children. They found that the accuracy of their originality judgments increased significantly with age. The results of this study were noted to be different than previous studies. For this study, the study of Smith and Carlsson (1985), who investigated creativity in middle and late school years, is the starting point. As mentioned in Chapter 1, Smith and Carlsson (1985) found a significant decline in strong creativity signs that were found for 12-year-old participants which is followed by a gradual increase at 14 to 15 years. This is consistent with the view of Vygotsky, who wrote “the fantasy of adolescence is more creative than the child and less productive than adults” (cited in Runco and Charles, 1997, p.126).

Though there is an uncertainty about the developmental trends, creativity in middle school years is somewhat more agreed on in the developmental trajectory results than those of adults. Therefore it is worth studying with middle school children (aged 12-15).

Another disciplinary framework related to this study is the educational research and what it has to tell about assessing creativity. There are serious concerns about the impact of education on creativity (Fasko, 2001). The studies mostly focus on the person, process and product facets of creativity. As introduced in Chapter 1, Runco (2004) emphasizes the fact that most tests in schools require primarily convergent thinking, while down-grading divergent thinking. Besides, creativity necessitates the originality that is assessed by divergent thinking. A substantial body of research deals with divergent thinking and creative problem solving (CPS, defined as “a sequence of successive phases of divergent thinking followed by convergent thinking”, Lumsdaine and Lumsdaine, 1995, p:17). Divergent thinking aspects of CPS have to be investigated in order to understand the creative potential. However as Brophy (2001) points out, convergent thinking aspects are also needed to be studied. That is the starting point of using convergent thinking tests together with divergent thinking tests in this study.

Divergent thinking tests are measures used in the psychometric approach which assumes that creative potential can be captured by paper and pencil tests. The psychometric approach mostly focuses on the person and the product. One of the most commonly used divergent thinking tests is Guilford's Alternative Uses Task (1967). Runco (2004) gives a great deal of credit to J.P. Guilford for his efforts toward convincing individuals of the possibility of being scientific about creativity. Guilford and his psychometric approach are better to be understood with the concepts of convergent thinking and divergent thinking. Guilford (1959, p: 169) defines them as follows:

Convergent thinking, ..., involves thinking toward one right answer, or toward a relatively unique determined answer. A companion factor was defined as an interest in or liking for *divergent thinking*, a type of thinking in which a considerable searching about is done and a number of answers will do.

Another definition for these concepts comes from S. G. Isaksen and D.J. Treffinger (cited in Lumsdaine and Lumsdaine, 1995, p: 18):

Divergent thinking is an effort to search, to stretch our thinking, and to consider many possibilities and directions. Convergent thinking is an effort to screen, select, or choose the most important or promising possibilities, closing in on or a few items.

Dealing with problems requires not only divergent, but also convergent thinking. (Lumsdaine and Lumsdaine, 1995) This view is consistent with the trilevel matching theory (Brophy, 1998a, 1998b). The trilevel matching theory proposes that CPS tasks vary widely in the degree to which they require differing kinds of thought and prior knowledge. A complete CPS process has divergent and convergent aspects. It uses divergent ideation and convergent judgment. This convergent side receives less attention from CPS researchers than its divergent side (Brophy, 2001). That justifies the position of the study trying to interpret both divergent and convergent thinking in assessing creativity potential.

Like Brophy, Cropley (2006, p: 391) dwells upon the importance of convergent thinking as:

Free production of variability through unfettered divergent thinking holds out the seductive promise of effortless creativity but runs the risk of generating only quasicreativity or pseudocreativity if it is not adapted to reality. Therefore, creative thinking seems to involve 2 components: generation of novelty (via divergent thinking) and evaluation of the novelty (via convergent thinking).

Taylor and Holland (1964, p: 20) evaluate the role of convergent and divergent thinking in creative product/work as follows:

In broader terms, a few components of memory, cognition and, evaluation, more of convergent production, and even more of divergent production are involved in creative work.

In addition to divergent thinking, Taylor and Holland (1964) emphasize the role of convergent thinking in creative work and refer to test batteries. The test batteries were proposed by Guilford and his students as the measures of creative potential. It was found that people selected by these test batteries—which usually include many divergent thinking tasks—show tendencies of having more fantasy and more ability to play with ideas, and/or they are more humorous and more likely to suggest solutions.

The divergent thinking task can be related with Gibson's affordances (1977) in the sense that divergent thinking in the study might be considered as solving the same kind of problem (in our case, the story character's dilemma) with different tasks applied to it (in our case, different pathways taken by story characters). Greeno (1994, p: 338) reviews the term 'affordances' as follows:

If we choose not to factor behavior into the process categories of perception, memory, movement, reasoning, decision making, and so on, one then needs theoretical terms for referring to aspects of the phenomena and systems at the level of agent-situation interactions. Gibson's concept of affordance is a key proposal. The idea is quite straightforward. In any interaction involving an agent with some other system, conditions that enable that interaction include some properties of the agent along with some properties of the other system. Consistent with his emphasis on understanding how the environment supports cognitive activity, Gibson focused on contributions of the physical system. The term affordance refers to whatever it is about the environment that contributes to the kind of interaction that occurs.

To understand the term "affordances", one can take the following example: a story book sketched with nice and colorful sketches / illustrations does not

afford the act of reading if the actor is a 6-month infant. Affordances are simply all "action possibilities" latent in the environment, objectively measurable and independent of the individual's ability to recognize them, but they are always in relation to the actor and therefore dependent on the capabilities of the actor being concerned.

2.1.1 Creative Thinking Tests

Wieder (1998) gives a special credit to Guilford for building the basis of most of today's creativity tests in use with his theory. Guilford's theory posits divergent thinking at the core of creativity. Divergent thinking (the ability to envision multiple solutions to a problem) and its opposite, i.e. convergent thinking (the tendency to narrow all options to a single solution) were the bases of Guilford's theory. It is important to note that, while divergent thinking constituted the core of Guilford's theory, convergent thinking was the companion process.

Creative thinking testing had started with the dominance of test batteries which mainly included divergent thinking tasks. However, researchers have argued that there is still a need for research on convergent thinking because creative achievements actually require not only divergent, but also convergent thinking.

2.1.1.1 Divergent Thinking Tests

Divergent thinking tests are open-ended assessments that are paper and pencil tests to measure potential creativity. There are a number of divergent thinking tests Dow (2003):

- Guilford's Alternative Uses Task (1967): The task is to list as many possible uses for a common house hold item (such as a brick, a paperclip, a newspaper)

- Wallas and Kogan Assessment of Creativity (1965): The task is to come up with many possible items that contain a specific component, such as with wheels, round things, or things that make noise.
- Torrance Test of Creative Thinking (TTCT) (1974): The task is to complete 3 components of the test. The test components are as follows:
 - **Thinking Creatively with Pictures** measures creative thinking using three picture-based exercises to assess five mental characteristics: fluency, originality, elaboration, abstractness of titles, and resistance to closure.
 - **The Figural TTCT** contains abstract pictures. The task is to state what the image might be.
 - **The Verbal TTCT** presents a situation. The task is to give the examinee(s) the opportunity to ask questions, to improve products, and to “just suppose.”

TTCT has an excellent validity and reliability but it is not available free of charge.

According to Wieder (1998)

The most extensive work on divergent thinking was done under Guilford's direction at the University of Southern California by the Aptitudes Research Project (ARP), whose findings between the 1950s and 1970s produced a broad structure-of-intellect (SI) model which encompassed all intellectual functions, including divergent thinking. A number of the ARP divergent thinking tests, which were originally devised as research instruments for the study of creativity, have been adapted by a variety of testing companies for use by educators in placing gifted students and evaluating gifted and talented programs.

As Wieder (1998) mentions, the ARP divergent thinking tests have two categories, namely verbal and figural categories. The Guilford's Alternative Uses Task (1967) belongs to the verbal ARP tests category measuring verbal ability to list as many uses as possible for a given object.

Wieder (1998) also emphasizes the components of divergent thinking that Guilford identified as fluency (the ability to quickly find multiple solutions to

a problem / the number of ideas or solutions provided); flexibility (being able to simultaneously consider a variety/ diversity of alternatives /ideas); and originality (referring to unusualness or uniqueness of ideas that differ from those of other people). These components constitute the scoring factors (Runco, 2001) of Guilford's Alternative Uses Task. In addition to these factors, elaboration (the amount of detail) is also included in the scoring.³

2.1.1.2 Convergent Thinking Tests

Convergent thinking tests measure the ability to narrow down the ideas to find one correct solution to a given problem by taking a novel approach. Since creative achievements require both divergent and convergent thinking, these tasks are also important in predicting the creative potential (Wieder, 1998).

Insight problems⁴ are the problems used in convergent thinking tests. Dow (2003) defines an insight problem as a problem that requires the examinee to shift his or/ her perceptive and view the problem in a novel way in order to achieve the solution. Among the several types of insight problems, three predominant types can be discussed: verbal, mathematical, and spatial (Dow and Mayer, 2004). Therefore the test battery used in the study contained equal number of problems (4 problems) from these three predominant types making up to 12 insight problems in total.

In order to evaluate and interpret the divergent thinking and convergent thinking test results together, the performance of divergent and convergent thinkers should be taken into account. Therefore the comparison that Brophy (2001) made was used for the purpose of this study. Brophy

³ See Chapter 3 for the details of the scoring of the divergent thinking tasks used in the study.

⁴ See Appendix B for the Insight Problems chosen for the study and their solutions.

(2001) discussed a number of hypotheses about the similarities and differences of the attributes, activities and performance of divergent, convergent and combination thinkers based on his trilevel matching theory (1998a, 1998b).

This added to past findings (...) that persons who prefer generating diverse ideas and defining new problems can do the needed kinds of thinking well. This study also found that convergent thinkers have CPS preferences complementing those of divergent thinkers, and these include preferences for evaluating ideas according to present standards, adapting ideas to new circumstances, and logical reasoning. All prediction about preferences of people with equal divergent and convergent performance likewise were confirmed, meaning such persons were equally inclined to do things for which they showed equal ability, such as ideation and evaluation. (Brophy, 2001, p.450)

Brophy (2001) emphasizes the valuable contribution of such studies on people who are both divergently and convergently inclined people who may be claimed to be the most creative ones. The present study builds on Brophy and uses divergent and convergent thinking inclination to group children and evaluate their narratives accordingly.

2.2 Rhetorical Structure Theory

As already mentioned in Chapter 1, Rhetorical Structure Theory (RST) has been developed by Mann and Thompson (1988). Although the descriptive linguistic approach has been criticized by a number of critics (Moore and Pollack, 1992, Halpin, 2003 and Webber, 2006), it has become one of the most popular discourse theories.

2.2.1 The Fundamentals of Rhetorical Structure Theory

RST is about how the text works. Its scope is a written monologue. RST describes rhetorical relations; it uses a number of schemas with applications and helps to structure text organization. RST defines

rhetorical relation as the relation between the non-overlapping text spans, namely nucleus (N) and satellite (S). Exceptions to this rule are multinuclear relations such as Contrast or Sequence.

In the original theory, a relation definition consists of four fields:

1. Constraints on the N.
2. Constraints on the S.
3. Constraints on the combination of N and S.
4. The Effect.

For example, the constraints of a **background** relation operate on the nucleus and on the combination of nucleus and satellite and an overall effect is associated with the relation (See Figure 1 that is reproduced from Mann and Thompson, 1988, p.273).

Background

Constraints on the N: Reader (R) won't comprehend N sufficiently before reading text of S

Constraints on the S: none

Constraints on the combination of N and S: S increases the ability of R to comprehend an element in N.

The Effect: R's ability to comprehend N increases.

Locus of the effect: N.

Example: [*Home addresses and telephone numbers of public employees will be protected from public disclosure under a new bill approved by Gov. George Deukmejian.*]_{satellite} [**Assembly Bill 3100 amends the Government Code, which required that the public records of all state and local agencies, containing home addresses and telephone numbers of staff, be open to public inspection.**]_{nucleus}

Figure 1 The definition of the BACKGROUND relation in Rhetorical Structure Theory.

Rhetorical relations can be represented in tree-structure by using the five structural constituency schemas, which are reproduced in Figure 2 reproduced from Mann and Thompson (1988, p: 247). The arrows in the figure link the satellites to nuclei. The relation names are given above these arrows. Vertical lines represent non-overlapping text spans, whereas the edges in b, c and d represent the notation for the relations of

the multinuclearity (equal importance of nuclei rather than a more important nucleus over a satellite).

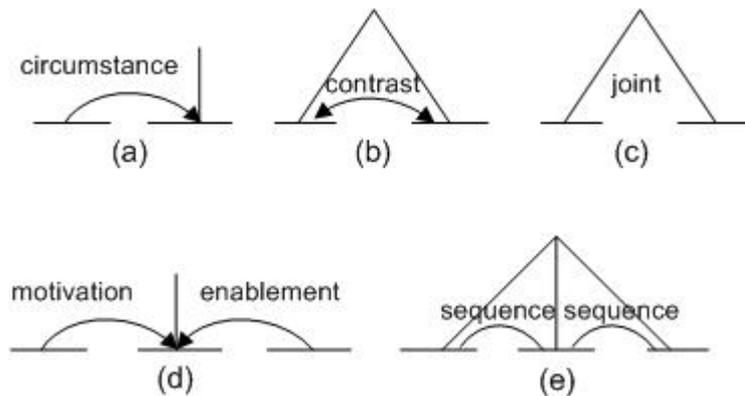


Figure 2 Examples of five types of schema used in Rhetorical Structure Theory

A large majority of the relations are brought together with the pattern given in Figure 2a. Schema 2d covers the cases in which multiple satellites are connected with a nucleus by possibly different rhetorical relations. Schemas 2b, 2c and 2e cover the multinuclear relations (Marcu, 2000).

Schema applications are permitted to have some variations. There are three conventions to determine the possible applications of a schema. (Mann and Thompson, 1988)

1. **Unordered Spans:** The order of nucleus or satellites in the text span in a schema is not being constrained by schemas.
2. **Optional Relations:** All individual relations are optional for multi-relation schemas as long as at least one of the relations is hold.
3. **Repeated Relations:** There is no limitation for the number of a relation being a part of a schema with a definite schema application.

As mentioned in Chapter 1, analysis of a text is made by applying schemas that obey the four constraints of (Mann and Thompson, 1988, p.248):

- **Completeness** – The set contains one schema application that contains a set of text spans that constitute the entire text.
- **Connectedness** – Except for the entire text as a text span, each text span in the analysis is either a minimum unit or a constituent of another schema application of the analysis.
- **Uniqueness** – Each schema application consists of a different set of text spans, and, within a multi-relation schema, each relation applies to a different set of text spans.
- **Adjacency** – The text spans of each schema application constitute one text span.

Mann and Thompson (1988) give operational definitions of rhetorical relations and suggest a taxonomy of the relations. Their taxonomy is based on the “subject-matter” and “presentational” aspects of the text structure. The effect of a relation on the reader, which is a part of a relation definition, is the clearest indicator in classifying the relations. The definitions of subject-matter and presentational relations are as follows (Mann and Thompson, 1988, p.257):

Subject matter relations are those whose intended effect is that the reader *recognizes* the relation in question; presentational relations are those whose intended effect is to *increase some inclination* in the reader, such as the desire to act or the degree of positive regard for, belief in, or acceptance of the nucleus.

Based on these definitions, rhetorical relations are divided into two groups. (See Table 1 that is reproduced from Mann and Thompson (1988, p: 247))

Table 1 The subject-matter vs presentational classification of rhetorical relations.

Subject – Matter Relations	Presentational Relations
Elaboration	Motivation (increases desire)
Circumstance	Antithesis (increases positive regard)
Solutionhood	Background (increases ability)

Table 1 (continued)

Subject – Matter Relations	Presentational Relations
Volitional Cause	Enablement (increases ability)
Volitional Result	Evidence (increasing belief)
Non-Volitional Cause	Justify (increases acceptance)
Non-Volitional Result	Concession (increases positive regard)
Purpose	
Condition	
Otherwise	
Interpretation	
Evaluation	
Restatement	
Summary	
Sequence	
Contrast	

2.2.2 Extended Version of Rhetorical Relations

Carlson and Marcu (2001) use a set of rhetorical relations (a total of 53 mononuclear and 25 multinuclear relations) consisting of hypotactic (mononuclear) and paratactic (multinuclear) relations as reproduced in Table 2⁵ that is reproduced from Carlson and Marcu, (2001, in Appendix II). In this study, this extended version of rhetorical relations was used (See Appendix F for the rhetorical relations that were found in this study).

Table 2 Rhetorical relations list.

Mononuclear (satellite)	Mononuclear (satellite)	Multinuclear
analogy		Analogy
antithesis		Contrast
attribution		
attribution-n		
background		
	cause	Cause-Result

⁵ Mononuclear relations listed in Column 1 are those in which the satellite characterizes the relation name. Similarly, mononuclear relations listed in Column 2 are those in which the nucleus characterizes the relation name. Column 3 lists the multinuclear relations. When a mononuclear relation and a multinuclear relation have the same name the multinuclear one is differentiated by capitalizing its first letter. In the list two of the multinuclear relations (namely, Same Unit and Textual Organization) are not rhetorical relations per se, i.e. they are pseudo relations (Carlson and Marcu, 2001).

Table 2 (continued)

Mononuclear (satellite)	Mononuclear (satellite)	Multinuclear
circumstance		
comparison		Comparison
comment		
		Comment-Topic
concession		
conclusion		Conclusion
condition		
consequence-s	consequence-n	Consequence
contingency		
definition		
		Disjunction
elaboration-additional		
elaboration-set-member		
elaboration-part-whole		
elaboration-process-step		
elaboration-object-attribute		
elaboration-general-specific		
enablement		
evaluation-s	evaluation-n	Evaluation
evidence		
example		
explanation-argumentative		
hypothetical		
interpretation-s	interpretation-n	Interpretation
		Inverted-Sequence List
manner		
means		
otherwise		Otherwise
preference		
problem-solution-s	problem-solution-n	Problem-Solution Proportion
purpose		
question-answer-s	question-answer-n	Question-Answer
reason		Reason
restatement		
	result	Cause-Result
rhetorical-question		
		Same Unit Sequence
statement-response-s	statement-response-n	Statement-Response
summary-s	summary-n	
	temporal-before	
temporal-same-time-s	temporal-same-time-n	Temporal-Same-Time
	temporal-after	
		Textual Organization

Table 2 (continued)

Mononuclear (satellite)	Mononuclear (satellite)	Multinuclear
		Topic-Comment
topic-drift		Topic-Drift
topic-shift		Topic-Shift

2.2.3 Marcu’s view of RST - The Theory and Practice of Discourse

Marcu (2000) applies discourse parsing rules to a text (See Marcu, 1999; Marcu, Amorrortu and Romera, 1999a; and Marcu, Romera and Amorrortu, 1999b). The text is constituted of a sequence of non-overlapping, elementary discourse units (minimal building blocks of a discourse tree). A tree structure can be associated with this text based on four features:

- The elementary units of complex text structures are non-overlapping spans of text.
- Discourse relations hold between textual units of various sizes
- Some textual units play a more important role in text than others
- The abstract structure of most texts is a tree.

Referring to the original theory of Mann and Thompson (1988), Marcu (2000) indicates the problem of “compositionality” in RST, which is the lack of precise explanation of the relationship between rhetorical relations, between large textual spans and rhetorical relations, and between elementary units. All these cause the ambiguous determination of span boundaries. It is important to formulate precisely the conditions required to be satisfied if two contiguous spans are to be put together. Marcu (2000) also claims that “determining formally and computationally whether a given representation is valid” is not possible in the discourse theories of Mann and Thompson (1988), Hobbs (1990), Grosz and Sidner (1986) and Polanyi (1988).

Even though it is not very precise, the original RST (Mann and Thompson, 1988) implicitly contains conditions that formally specify how to join two contiguous textual units. The nucleus of a rhetorical relation is more essential to express the writer's purpose than the satellite. The satellite of a rhetorical relation is not understandable independent of the nucleus. Thus the deletion of a satellite of a rhetorical relation does not make the text incomprehensible. On the contrary, the deletion of a nucleus of a rhetorical relation makes the text incomprehensible.

Marcu (2000) provides a first-order formalization of valid text structures defined by a set of paratactic and hypotactic rhetorical relations. In addition to the four features given above, he proposes the following formalization (on p.83):

If a relation R holds between two textual spans of a tree structure of a text, that relation can be explained by a similar relation that holds between the most important units of the constituent spans. The most important units are determined recursively: they correspond to the union of the most important units of immediate subspans when the relation that holds between these subspans is paratactic, and to the most important units of the nucleus subspan when the relation that holds between the immediate subspans is hypotactic.

Here, Marcu (2000) proposes that hypotactic relations consists of a nucleus playing a central role over a satellite playing an auxiliary role, whereas paratactic relations consists of two nuclei of equal importance.

Carlson, Marcu and Okurowski (2001) used their discourse tagging experience (Marcu, 1999, Marcu *et al.* 1999a, Marcu *et al.* 1999b, Marcu, 2000) to develop a discourse-annotated corpus. They stated that for a number of reasons, their study is grounded in the RST framework (Mann and Thompson, 1988). One of their reasons is that RST is a framework which yields rich annotations that uniformly capture intentional, semantic and textual features that are specific to a given text.

2.2.4 Original Rhetorical Structure Theory and Other Discourse Theories

RST is not the only theory concerned with (discourse) relations in text. In this section, this descriptive theory is compared with a number of discourse theories. The ones to be mentioned are the studies of Halliday and Hasan (1976); Hobbs (1985); Grosz and Sidner (1986) and Polanyi (1988, 1996).

The study of Halliday and Hasan (1976) is the first model to be used in discourse analysis. The authors proposed a number of conjunctive relations (types of which are additive, adversative, causal and temporal) as part of a general theory that aims to explain cohesion in text (Taboada and Mann, 2006b). The principles of the theory are derived from the lexicogrammatical resources that explicitly signal cohesive and rhetorical relations in discourse (Marcu, 2000).

The study of Hobbs (1985) is about inference based coherence principles. The author proposes principles to explain the nature, number and taxonomy of the discourse relations. These principles are derived from the types of inferences that the reader needs to draw in order to make sense of a text. This theory assumes that coherence relations make up a discourse segment. The taxonomy of these relations is fewer in number than that of RST (Turan and Bican, 2003).

The study of Grosz and Sidner (G&S) (1986) stresses the role of purpose and processing in discourse by means of 3 components, namely the structure of discourse, intentions and attention. Their discourse building blocks are intentionally defined as discourse segments (units having a recognizable purpose (Turan and Bican, 2003)). The principles of the theory are derived from the intentions that the writer had when s/he wrote the text. Moser and Moore (1996) suggest the synthesis of the two

theories (RST and G&S) for the use of interpretation and generation of discourse. The basic similarity between these two theories is explained by Moser and Moore (1996) as the correspondence between the notions of dominance in G&S and nuclearity in RST.

The study of Polanyi (Linguistic Discourse Model (LDM)) (1988, 1996) is the one which most resembles RST (Mann and Thompson, 1988) in providing a formal pragmatic account in terms of discourse relations. The author proposed that a discourse is composed of discourse constituent units (DCUs), which are related to each other recursively through three different relations: coordination, subordination and binary (Taboada and Mann, 2006b) Like Hobbs, the taxonomy of LDM is slimmer than that of RST (Turan and Bican, 2003)

As a result of a careful analysis of the discourse structures that Mann, Thompson, Grosz, Sidner, Hobbs and many others built, Marcu (2000) formulated his extended approach.

2.2.5 Criticisms of RST

Revisiting the original RST, Moore and Pollack (1992) question the original RST for its representational and intentional structure and for its 2 levels of analysis. The intentional structure refers to the structure that is crucial for responding effectively to questions which address a previous utterance and is needed to make certain types of choices during the generation process. By 2 levels of analysis the authors mean the informational level (relation between the information conveyed in consecutive elements of a coherent discourse) and the intentional level (where relation results from the fact that discourses are produced to affect changes in the mental state of the discourse participants) of analysis. According to Moore and Pollack (1992), the basic problem with the original RST is that the RST

representation of a discourse does not fully specify the intentional structure (of Grosz and Sidner, 1986) of that discourse. A more fundamental problem is that RST analysis of a discourse presumes that consecutive elements will either be related by an informational (subject-matter) or an intentional (presentational) relation. Moore and Pollack (1992) argue that a complete computational model of discourse structure cannot depend upon analyses in which the informational and intentional levels of relation are in competition. Marcu (2000) does not give a clear response to this criticism but he proposes a formulation for solving ambiguous decision-making strategy in RST, which is another problem with RST (stated by Moore and Pollack (1992)). RST presumes that, in general, there will be a single, preferred rhetorical relation holding between consecutive discourse elements. Moore and Pollack (1992) emphasize that the assumption of a single rhetorical relation between consecutive discourse elements is one of the reasons that RST analyses are inherently ambiguous.

On the other hand, Marcu (2000) claims that his formulation of compositionality leaves room for valid discourse interpretations even in cases in which different elementary relations are hypothesized to hold between the same two elementary units. With this formulation, Marcu's version of the extended rhetorical relations provides a solution to the fundamental problem (posed by Moore and Pollack) of ambiguous decision-making strategy in the original RST. We repeat his formulation of compositionality again:

A strong compositionality criterion of valid text structures: If a rhetorical relation R holds between two textual spans of the tree structure of a text, then it can be explained by a similar relation R that holds between at least two of the most important textual units of the constituent spans. (Marcu, 2000, p: 32)

2.2.6 Other Aspects of RST

Taboada and Mann (2006b) discuss two main characteristics of RST: descriptive adequacy and cognitive plausibility. RST is claimed to be descriptively adequate in capturing the underlying structures of text based on the experience gained through the years of analyses of various texts. To elaborate the cognitive plausibility (stated to be more elusive) and the nature of relations, Taboada and Mann (2006b) apply issues of coherence, hierarchy and intentions. Relations (clearly established connections between two text spans) and hierarchical structure (captured by rhetorical relations) are said to help in producing the impression of coherence in discourse. There is usually an intention behind expressing a relation, but the two terms are not synonymous. Taboada and Mann (2006b) ask whether relations are actually in the minds of language users or they are a product of text analysis. On the basis of Hobbs (1979), Knott and Sanders (1998) and Sanders et al. (1993), they conclude that readers recognize the intention behind a text when interpreting those parts. Overall, the author's view about the cognitive plausibility of RST is better to be understood as coherence, hierarchy and intentions. It is my opinion that the cognitive plausibility of the theory might be sought in discourse relations. As the writers discuss, relations are necessary in discourse processing.

2.2.7 Applications of RST

As for the area of writing, Torrance and Bouayad-Agha (2001) proposed RST as a method for understanding writing processes on the basis of concurrent think-aloud protocols and written products. They take 3 stages of writing process as follows:

1. The generation of unstructured content (content determination);
2. The organization (structuring) and
3. The translation to linear text.

In their study they examined how content is represented in text and focused on hierarchical text structure as the product of the writing process. They treat the first two stages (generation and organization, respectively) as the plan and tried to figure it out by means of think-aloud protocols. They compared the final texts with these plans to control the structure of translation (of ideas into linear text). In their analyses, they used RST (Mann and Thompson, 1988) and illustrated their work as a sample comparison of one think-aloud protocol (plan) with one written product (text). They suggested that the relationship between plan and text is not adequately captured by existing accounts of writers' plans as control structures.

Two studies in Turkey can be mentioned. Yöndem (2001) used RST in identifying discourse boundaries while developing a method for discourse segmentation to be applied to the Turkish language domain. Another study, Çokal (2005) made use of RST in the contrastive analysis of the pronominal uses of 'this' and 'that' in academic written discourse.

2.2.8 Narrative Analysis and RST

Discourse has an internal and hierarchical structure (Oberlander et al.1999 cited in Turan and Bican, 2003). The structure of narratives as discourse genre is the subject of numerous studies. For example, Kumpf (1986) uses RST to analyze 6 second language speakers' narrative discourse and investigates the relationship of this structure to certain rhetorical and grammatical features found in the data. The author explains the goal of using RST to analyze narratives as the demonstration of the hierarchical relations in the narratives and of the signals of those relations at macrostructural and propositional levels.

Stede (in print) mentions how narrative genre is analyzed by means of RST. In his article, Stede discusses RST trees which conflate too much information from different realms of description in a single structure. The author states that presentational (intentional) relations are less relevant for narrative and one might expect an abundance of Sequence relations. Therefore, the present study builds on the conclusion that narratives include more subject-matter (informational) relations than presentational (intentional) relations and searches the subject-matter relations commonly used children's narratives (See Tables 3-7 presented in Chapter 4). This approach can also be supported with the view of Halpin (2003), who also emphasizes that narratives are primarily informational.

2.3 Children's Narrative as Discourse

In narratives' analysis, the works of Labov and Waletzky (1967) and Labov (1972) are the most prominent ones to be mentioned. Labov & Waletzky (1967) have defined narrative as "any sequence of clauses which contains at least one temporal juncture". The authors' narrative sequence means sets of clauses which are ordered so that the position of clauses is unalterable without affecting the temporal sequence of the semantic interpretation (Kumpf, 1986, p.8). In other words, we understand children's narratives as a temporally ordered discourse. This aspect of discourse is related with tense, aspect and modality in the literature (Zeyrek, 2003) as well as discourse markers such as after, before etc. Tense, aspect and modality are beyond the scope of the study. Discourse markers signaling sequence is in the study's scope.

Labov (1972) models narratives composed of narrative elements:

A fully-formed narrative has the following six elements:

1. Abstract (answering the question of "what was this about?")
2. Orientation (answering the questions of "who, when, what, where?")

3. Complicating action (answering the question of “then what happened?”)
4. Evaluation (answering the question of “so what?”)
5. Result or resolution (answering the question of “what finally happened?”)
6. Coda (not answering any question, only signaling the finish of the narrative)

As it is mentioned in Chapter 1, in this study, these elements will be used as a reference point in understanding the overall structure of children’s narratives. The story that children are expected to complete has the narrative elements of orientation, a complicating action and evaluation. Children wrote a conclusion that includes a resolution and sometimes a coda, (which is found less frequently than any other narrative element). These narrative element(s) children wrote are evaluated structurally using RST and compared in terms of the commonly used rhetorical relations.

CHAPTER 3

METHODOLOGY

The study is based on a corpus of 44 Turkish texts written by middle school students aged 12-15 years. The research design, the participants, the materials, the procedures in administering the tests, the data analyses (scoring of creativity tests), tagging rules used in RST and drawing trees in the study are provided in this chapter.

3.1 Research Design

This research aims to investigate creative potential in terms of rhetorical relations encoded in written texts. For this purpose, the study makes use of both quantitative and qualitative techniques in data analysis. Creativity scores (divergent thinking scores and convergent thinking scores) are analyzed quantitatively while the rhetorical structure of children's writings is analyzed qualitatively. To relate the creativity analyses and the writing analyses, a number of quantitative analyses are done as well.

This study focuses on rhetorical structure of children's writings by using RST, which is an analytical tool used for the analysis of among a wide range of text types, narratives. Therefore we take a discourse-analytic perspective as the theory applies. In other words, we examine the relationship between creativity potential and narrative organization.

3.2 Participants

There were 58 Turkish participants (44 participants who took the tests in classroom environment and 14 individual participants who took the tests at home) at the beginning. Unfortunately 14 of them (all from participated in the study in classroom environment) could not be included in the analysis as they did not complete the story section. Participants are middle school children. They were chosen from Grades 6, 7 and 8, respectively. Middle school children (aged 12-15) were chosen on purpose. As Runco and Charles (1997) suggest a number of different studies suggest various slumps of creative potential and performance throughout the lifespan.

Thirty of the participants were from the same middle school, namely ODTÜ Geliştirme Vakfı Ankara Okulu İlköğretim Bölümü while 14 of them were from different middle schools. The subjects from the former school participated in the study in a 40-minute-class hour under the supervision of their teachers and the researcher in class, while the rest of the subjects participated in the study for the same amount of time under the supervision of their parents or older individuals (informed about the tests) at their home.

3.3 Research Tools

There were a number of research tools⁶ used in the study. Those were the divergent thinking test; the convergent thinking test; and the story to be completed (See Appendix A for the materials). All were prepared in Turkish. Only the results of divergent thinking test, convergent thinking test and the story to be-completed were evaluated in this study.

⁶ In addition to these materials, there were 2 more tools (Demographic Data questionnaire and the Creative Behavior Inventory) that had to be excluded from the study. The reason for that was some of the participants did not hand in these forms. See Appendix A for the excluded material.

Divergent thinking test consisted of two divergent thinking tests, namely Guilford's Alternative Uses Task (1967) and Wallas and Kogan's assessment of creativity (1965). However, the answers for Wallas and Kogan showed that the Turkish translation of the test was ambiguous for the subjects. Therefore, the results of Wallas and Kogan test were excluded, only the results of Guilford's Alternative Uses Task were taken into account for the divergent thinking scores.

Convergent thinking tests were originally chosen from the Insight Problems provided by Dow (2003) and were adapted and translated into Turkish. 12 insight problems (4 mathematical, 4 verbal, and 4 spatial problems) were asked in the test.

3.4 Procedures

The tests were administered with a total of 58 school children. 44 of the students (14 of whom had been excluded from the study due to the lack of stories) did the test in a classroom environment whereas the remaining 14 did them at home.

3.4.1 The Procedures Applied in the Classroom Environment

The tests were administered in a free-recitation-hour that was reserved for this study in the guidance of Turkish language teachers. There were 3 classrooms reserved for the grades (6th, 7th and 8th grades respectively). The tests were administered at the same time in each classroom with the help of the teachers. The teachers were given a brief explanation about the experimental procedure before the test session.

After applying the procedures required by the Ethical Committee⁷, the participants were informed about the material. They had been told that there are 3 documents (Divergent Thinking Test, Convergent Thinking Test and Story to be Completed) to be completed in the classroom and 2 documents (Demographic Data Questionnaire and Creative Behavior Inventory) to be completed at home and to be returned in next week's class hour to their teachers. Then they were informed that they were expected to take the tests in following order:

1. Divergent Thinking Test (Time allowed: 10 minutes at maximum)
2. Convergent Thinking Test (Time allowed: 15 minutes at maximum)
3. Story to be Completed (Time allowed: 15 minutes at maximum)

The participants were informed that there were 2 tests and a story to be completed in one-class-hour. Without changing the order of the tests, they were free to start other test(s) independent of the time allowed for each activity (after finishing one, they started the other). The participants were allowed to ask questions about the tests. If they asked a question about how to answer, they got "Use your imagination" kind of answers. At the end of the class hour, the informed consent forms and the 3 documents (Divergent Thinking Test, Convergent Thinking Test and the Story) were collected⁸.

3.4.2 The Procedures Applied at Home

The tests in this application were administered by individuals trained by the researcher. The test administrators were either parents of the subjects or a close relative / acquaintance of the subjects. After applying the

⁷ See Appendix I for the ethical details of the study.

⁸ Some of the students also finished and returned the other 2 documents (Demographic Data Questionnaire and Creative Behavior Inventory) along with the 3 documents. Only 9 questionnaires and 7 inventory documents could be collected from 30 subjects. The school administration was asked for any students bringing their questionnaires a number of times but no other documents could be collected. That was the reason to exclude Demographic Data Questionnaire and Creative Behavior Inventory from the study.

procedures required by the Ethical Committee, the material was given to the test administrators to administer the tests. They were informed that there were 5 documents (Demographic Data Questionnaire, Divergent Thinking Test, Convergent Thinking Test, Story to be completed, and Creative Behavior Inventory). Then they were told that they were expected to give the tests to the students in the following order:

1. Demographic Data Questionnaire (Time allowed: 10 minutes at maximum)
2. Divergent Thinking Test (Time allowed: 10 minutes at maximum)
3. Convergent Thinking Test (Time allowed: 15 minutes at maximum)
4. Story to be completed (Time allowed: 15 minutes at maximum)
5. Creative Behavior Inventory (Time allowed: 20 minutes at maximum)

Without changing the order of the tests, the test administrators informed the participants that they were free to start other test(s) independent of the time allowed for each activity (after finishing one, they started other). The participants were allowed to ask questions about the tests. Test administrators were warned about the consistency of the study and asked for not providing any extra explanations about the questions. They were requested to give "Use your imagination" kind of answers to how-to-solve-this-problem kind of questions. The data collected from 14 individual participants by this procedural application were complete.

3.5 Data Analyses

Creativity thinking tests, namely divergent thinking tests and convergent thinking tests were scored firstly. For divergent thinking test⁹, the creativity quotient (an objective scoring of ideational fluency) was calculated by the method suggested by Snyder, Mitchell, Bossomaier and Pallier (2004).

⁹ See Appendix C for sample answers given to the divergent thinking test.

In their study, the authors derive a simple mathematical expression for a more objective measure of ideational fluency, which accounts for the number of ideas (namely fluency) and the number of distinct categories ideas fall into (the flexibility). The method applies to the heuristic derivation shown in Figure 3 that is reproduced from Snyder et al. (2004, p: 416-417).

$$\begin{aligned}
 \text{CQ} &= \log_2 \{(1 + u_1) (1 + u_2) \dots (1 + u_c)\} \\
 &= \underbrace{\hspace{10em}}_{\log_2 A} \\
 &= 1.44 \ln A
 \end{aligned}$$

Figure 3 Heuristic derivation of CQ

Here, **CQ** stands for creativity quotient and u_c stands for number of uses offered in category c. The distinct categories found determine this “c”. By calculating the CQ we found flexibility added to fluency in a more objective way. Then to calculate the total divergent thinking scores, creativity quotient scores were added to originality and elaboration scores that were calculated by the method suggested by Dow (2003). Figure 4 that is reproduced from (Dow, 2003) shows the scoring in Guilford’s Alternative Uses Task. Since we have already calculated the flexibility and fluency as CQ, we add originality (Runco et al. 1987) and elaboration scores to get the total divergent thinking scores.

Scoring

Scoring is comprised of four components:

Originality - each response is compared to the total amount of responses from all of the people you gave the test to. Responses that were given by only 5% of your group are unusual (1 point), responses that were given by only 1% of your group are unique - 2 points). Total all the points. Higher scores indicate creativity*

Fluency - total. Just add up all the responses. In this example it is 6.

Flexibility - or different categories. In this case there are five different categories (weapon and hit sister are from the same general idea of weapon)

Elaboration - amount of detail (for Example "a doorstep" = 0 whereas "a door stop to prevent a door slamming shut in a strong wind" = 2 (one for explanation of door slamming, two for further detail about the wind).

Figure 4 The scoring suggested for Guilford's Alternative Uses Task

For scoring the convergent thinking test, the scoring key provided in Appendix B was used¹⁰. The blank questions and errors were calculated as 0 points. Only correct answers were counted as 1 point each.

The quantitative analysis of the data showed that the most reasonable analysis of the data was to split the group into two on the basis of median values. Therefore the median values were calculated for both total divergent thinking scores and convergent thinking scores. The participants were grouped into two on the basis of their creativity scores i.e, with respect to the median values of both total divergent thinking scores and convergent thinking scores. In other words, we grouped the participants:

1- With respect to the convergent thinking median value

Low Convergent Group,

High Convergent Group,

2- With respect to the divergent thinking median value

Low Divergent Group and,

High Divergent Group.

3.6 RST Analyses

As it is mentioned in Chapter 1, children's writings were analyzed via RST with the relation inventory¹¹ provided by Carlson and Marcu (2001). To

¹⁰ See Appendix D for the convergent thinking scores found in the study.

facilitate the analysis of the writings the texts were transferred to electronic documents¹². In order to build RST trees, the procedure given below was followed:

1. Texts were first segmented into elementary discourse units (EDUs)
2. Nuclearity assignments were done
3. Discourse relation choices were made according to the rules suggested in the Discourse Tagging Manual (Carlson and Marcu, 2001).

Determining Elementary Discourse Units

EDUs correspond to clauses or clause-like units that are unequivocally the nucleus or a satellite of a rhetorical relation that adds some significant information to the text (Marcu *et al.*1999b, p.72). In the present study, EDUs are identified from two syntactic units, namely clauses and sentences, following Carlson and Marcu (2001). For example in the following excerpts¹³, excerpt (1) exemplifies clausal EDUs, whereas, excerpt (2) exemplifies sentential EDUs.

(1) [Ama bulmadı] [peşine düşmedi]_{stu_7}

(2) [Her zaman bu umutla yaşadı.] [Ailesini yani sıcak ve mutlu bir yuvayı çok özlemişti.]_{stu_19}

Based on the tagging rules in the manual (Carlson and Marcu, 2001), the rules specific to this study were determined and listed in Table 3.

¹¹ See Appendix F for the Relations Inventory that is reproduced and adapted from Carlson and Marcu (2001) for this study.

¹² See Appendix E for samples from the data.

¹³ See Appendix F for the formatting conventions used for analyzing children's writings in this study.

Table 3 The list of tagging rules used in the study.

Syntactic Unit or Device	Tagged as EDU?	Qualifications, Exceptions, Examples
Main Clauses	Yes	Example: [<i>Her zaman bu umutla yaşadı.</i>]
Subordinate Clause with Discourse Cue (including those with -Ip,-ArAk,-dİğIndAn...)	Yes	Example: [Birden cesaretlenip]
Clausal Subjects and Objects	No	Example: [<i>Fakat burası avcularıyla ün kazanmış bir ormandı.</i>]
Clausal Complements	No	Exception: Complements of attribution verbs are EDUs. (see the next part)
Complements of Attribution Verbs	Yes	Includes both speech acts and other cognitive acts. <ul style="list-style-type: none"> • Examples: [Bir çiçek onları karşıdaki evdeki çocuğun beslediğini] [<i>söyledi.</i>] <p>[Birden bire ailesinin nerde olabileceği] [<i>aklına geldi.</i>]</p> <p>Exception: If the complement is a <i>to</i>-infinitival, do not segment.</p> <ul style="list-style-type: none"> • Example: [Bir gün küçük kuş rüyasında gördüklerini bir bilgine anlatmaya karar verdi.]
Coordinated Sentences	Yes	Example: [Evdeki çocuk küçük kuşu da beslemeye karar verdi] [ve küçük kuş çok mutlu oldu.]
Coordination in Superordinate Clauses	Yes	Example:[Sanki hayat mutluluğun yok olmasının yeni bir başlangıç,] [yeni bir mutluluk peşinde koşma arzusu olduğunu] [<i>anlatmaya çalışıyordu.</i>]
Temporal Clauses	Yes	Clausal temporal expressions are EDUs. Temporal clauses triggered by <i>önce, sonra,yaklaşık</i> (<i>before, after, just about</i>) may have a number of modifiers that are included in the EDU: <ul style="list-style-type: none"> • Example: [<i>Yaklaşık beş saat kanat çırpıktan sonra</i>] <p>[<i>Tepeyi aşdıktan sonra</i>]</p>

Table 3 (continued)

Syntactic Unit or Device	Tagged as EDU?	Qualifications, Exceptions, Examples
Temporal Phrases	No	Temporal phrases, such as <i>o an, bundan sonra, her gün, her zaman</i> (then, thereafter, everyday, everytime) are not EDUs. Even if the temporal phrase is event-like in nature, it is not marked as an EDU: • Example: [O andan sonra hayatına devam etti.]
Embedded Discourse Units ¹⁴	No	Relative clauses, nominal postmodifiers, appositives, parentheticals are not treated as embedded EDUs.
“Discourse-Salient” Phrases	Yes	Must be marked by a strong discourse cue, such as <i>ama, fakat, çünkü</i> (but, however, because). Phrases marked by cues that are weak or only occasional discourse indicators are not segmented as EDUs: <i>için, ile</i> (for, with).

Using the tagging rules listed in Table 3 that is reproduced and adapted from Carlson and Marcu (2001, p.39-41), the texts were segmented into EDUs by two coders. One of the coders was the researcher herself, the other a linguist experienced in discourse analysis. Afterwards, nuclearity assignment was done by the methods suggested in Stede (in print). Then relation choices were made according to the rules suggested in the Discourse Tagging Manual (Carlson and Marcu, 2001).

Having completed the three steps, RST trees were drawn via Microsoft Office Visio 2003 program (<http://office.microsoft.com/en-us/visio/FX100487861033.aspx>). The RST trees¹⁵ were analyzed both qualitatively and quantitatively.

¹⁴ Only difference with the tagging manual by Carlson and Marcu (2001) was in the embedded discourse units. These units were tagged but not presented in the trees to have visually better trees. They were noted and counted for each participant.

¹⁵ See Appendix G for sample RST tree analyses.

As for the agreement between coders, the following procedure similar to the one used in Penn Discourse Tree Bank (PDTB) was used:

1. The coders (coder 1 and coder 2) decided and agreed on what and how to tag as EDUs based on the rules suggested in the manual (Carlson and Marcu, 2001).
2. For the first ten texts of forty four texts, that is for more than one-fifth of the corpus, coder 1 (the researcher) did the segmentation, nuclearity assignment and she made the relation choices. Then she built the RST trees.
3. Conciliation was done. Coder 2 (the expert linguist) controlled the analysis and stated her disagreements. Coder 1 re-evaluated the disagreed parts and revised them, informing coder 1. Any disagreements were conciliated by discussions between the coders. Discussions were made via email correspondences. In order to annotate and analyze correctly, the unclear points were stated, the examples from the tagging manual (Carlson and Marcu, 2001) and the methodology explained in the articles were discussed (See Marcu, 1999; Marcu, Amorrortu and Romera, 1999a; and Marcu, Romera and Amorrortu, 1999b) and another solution -if there was any- was suggested during these correspondences. This process continued until total agreement was reached.
4. Then the remaining 77% of the texts were analyzed by coder 1 and analyses were controlled by coder 2. In case of disagreements the process defined in step 3 was applied until total agreement was obtained.

After 100% agreement between coders, the rhetorical relations used and the RST trees in the high and low creativity score groups were evaluated qualitatively for common and different rhetorical relations.

The number of EDUs, the maximum depth from one root in a RST tree, total rhetorical (discourse) relation types used and types of schemas used in a RST tree were counted one by one and analyzed quantitatively, while the rhetorical relations used in groups with different creative potential were analyzed qualitatively by comparing the rhetorical relations found on the basis of creativity groups. Subject-matter relations and temporal relations were counted and the figures were interpreted.

In order to relate writing analyses with creativity analyses, a number of various statistical analyses were done. Only quartiles¹⁶ analysis for “number of EDUs” and for “the total discourse relation types” as the grouping factor on convergent thinking scores were found significant and interpreted.

To determine the most frequent type of schemas used in the RST trees, the schemas shown in Figure 2 were counted in each tree.

¹⁶ Quartiles can be defined as statistic that divides the observations of a numeric sample into four intervals, each containing 25% of the data. The lower (25%), middle (50%), and upper quartiles (75%) are computed by ordering the data from the smallest to the largest and then finding the values which fall 25%, 50%, and 75% of the data.

CHAPTER 4

RESULTS AND DISCUSSION

The results of the study are presented and discussed in this chapter¹⁷. The chapter includes the sub-sections shown in parentheses.

The Results and Discussion of the Creative Thinking Tests (Section 4.1)

The Results and Discussion of the Writing Analysis Task (Section 4.2)

The General Discussion of the Study (Section 4.3)

Discourse Variables in High and Low Convergent and Divergent Thinkers (Section 4.4)

4.1 The Results and Discussion of the Creative Thinking Tests

Creative thinking tests were scored based on the methods explained in Chapter 3. Descriptive statistics analyses were applied to the data to see whether they were normally distributed. None of the creativity distributions were normal. So the correct non-parametric test, i.e. the Kruskal-Wallis test for independent measures was chosen for further analysis. The dependent variables were total divergent thinking scores and convergent thinking scores. The independent variables were “grade” and “age”, respectively.

It was found that there was a main effect for “grade” as grouping factor on

¹⁷ See Appendix H for the summary of the results of the experiment represented on a spreadsheet.

convergent thinking (the Standard Deviation SD = 2.56, number of subjects = 44, $H(2) = 6.036$, $p=.049$). Pupils from the 6th grade had a mean rank of 21.50; pupils from the 7th grade had a mean rank of 17.88 and pupils from the 8th grade had a mean rank of 29.35 as shown in Figure 5.

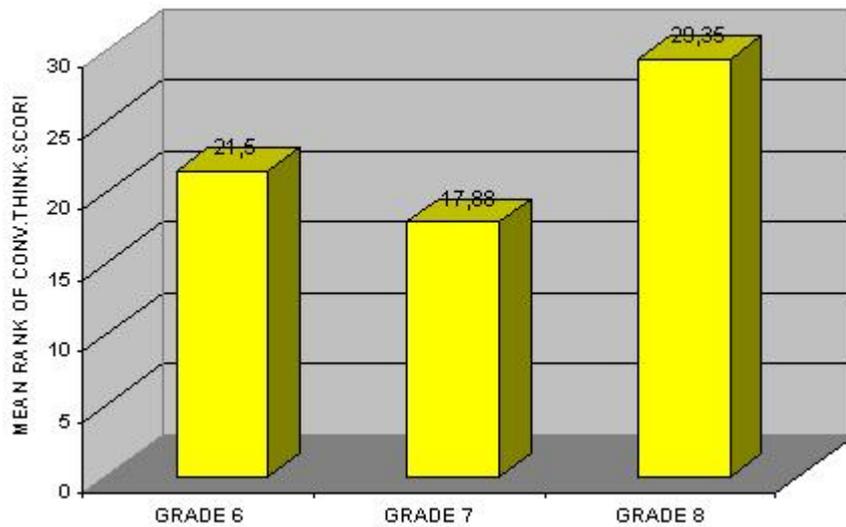


Figure 5 Bar graph showing the mean ranks of convergent thinking scores with respect to grade

This was reasonable and parallel with the trilevel matching theory (Brophy, 1998a, 1998b). The trilevel matching theory (Brophy, 2001) proposes that CPS tasks vary widely in the degree to which they require differing kinds of thought and prior knowledge. The children in the higher grades are expected to have more prior knowledge than the ones in the lower grades. Cropley (2006) suggests that convergent thinking is based on familiarity with what is already known i.e. prior knowledge. Therefore our results are reasonable. As for divergent thinking, no grade effect was obtained. This might be acceptable because the developmental trajectory of divergent thinking tends to vary from one person to another (Charles and Runco, 2001). Individual differences are said to be highly important. In other

words, to be in a higher grade does not guarantee a higher score in divergent thinking.

There was no effect for “age“, neither for convergent nor for divergent thinkers. The patterns, however, were exactly the same as Figure 5 for “grade“(as grouping factor) on the convergent thinking score: the older the children were, the higher the convergent thinking scores. This was again reasonable since the age of the students is related to the grade of the students. For example, the 6th graders are all aged 12 years, and 7th graders are all aged 13 years in this study. However the 8th graders include two age groups as age 14 years and age 15 years.

There was no relationship with gender between the groups on the convergent and divergent thinking measures, as expected.

For the evaluation of the quantitative analysis of the creative thinking tests, we decided to split the group into high and low creativity with respect to convergent and divergent thinking results. The median values were calculated both for divergent (3.5) and convergent thinking scores (4.0). Splitting the group on the basis of divergent thinking scores was done very easily as there were no children who scored 3.5 in divergent thinking. So the group was splitted into two evenly subgroups. However, splitting the group into two on the basis of convergent thinking scores was done by randomly distributing the children who scored 4.0 in convergent thinking to high and low groups. So the group was splitted into two unevenly subgroups. After splitting children into high and low groups on the basis of their convergent and divergent thinking results, the groups were formed as follows:

- 1 - Low Convergent Group (24 children),
- 2 - High Convergent Group (20 children),
- 3 - Low Divergent Group (22 children), and
- 4 - High Divergent Group (22 children).

4.2 The Results and Discussion of the Writing Task

As mentioned above, the high and low creativity groups formed on the basis of divergent and convergent thinking scores provided groups of children with different levels of creative potential. Then the research questions of this study were investigated.

4.2.1 The Results and Discussion of Research Question 1

Research question 1 is repeated below:

Do different levels of creative potential that children have make a difference in narratives they write in terms of the rhetorical relations they use?

For searching the differences in children's writings, rhetorical structural analyses were done by means of the methods explained in Chapter 3. All the RST trees (44 in total) were built. The number of EDUs, the total number of discourse (rhetorical) relation types, the total number of discourse relations, the number of embedded EDUs, the types of schemas, and the number of words in the writings were counted.

It was found that this small corpus study was composed of 529 EDUs. There were 50 rhetorical relation types used, 29 of which was mononuclear. 20 of the rhetorical relations were multinuclear and the remaining one relation was not a rhetorical relation *per se*. It was Same Unit (See Appendix F for the definition of this relation).

The most frequent rhetorical relations used in the study are shown in Table 4 below. This table shows that the majority of the relations are subject-matter (informational), as expected for narratives.

Table 4 Distribution of the most frequent rhetorical relations in the study

Relation	Percent
attribution (mononuclear)	9,03
temporal-before (mononuclear)	8,13
temporal-after (mononuclear)	7,90
background (mononuclear)	6,32
Temporal-Same-Time (multinuclear)	5,42
Cause-Result (multinuclear)	5,42
Contrast (multinuclear)	5,19
temporal-same-time (mononuclear) ¹⁸	4,97
Conclusion (multinuclear)	4,97
Sequence (multinuclear)	4,97
means (mononuclear)	4,74
elaboration-additional (mononuclear)	4,74
Consequence (multinuclear)	3,16
Reason (multinuclear)	2,71
circumstance (mononuclear)	2,26
cause (mononuclear)	1,81
Topic-Shift (multinuclear)	1,58
Topic-Drift (multinuclear)	1,35
reason (mononuclear)	1,35
restatement (mononuclear)	1,13
consequence-s (mononuclear)	0,90
Topic-Comment (multinuclear)	0,90
Statement-Response (multinuclear)	0,68
Question-Answer (multinuclear)	0,68
Comment-Topic (multinuclear)	0,68
List (multinuclear)	0,68
result (mononuclear)	0,68
condition (mononuclear)	0,68
interpretation-s (mononuclear)	0,68
topic-drift (mononuclear)	0,68
...	...

For evaluating the differences in children’s writings, the rhetorical relations that were frequently used by 50 or higher percent of children in the groups of different creative potential were determined, and tables (Tables 5-8) were formed for each group.

The tables (5-8) were compared to each other to determine the overlapping rhetorical relations and differences in rhetorical relations

¹⁸ The mononuclear relations “temporal-same-time-s” and “temporal-same-time-n” were counted together as “temporal-same-time”

Table 5 Frequently used rhetorical relations in the Low Convergent Group

Relation	Percent of the students in Low Conv. Group
background (mononuclear)	71
Cause-Result (multinuclear)	63
Conclusion (multinuclear)	63
temporal-before (mononuclear)	58
temporal-after (mononuclear)	58
attribution (mononuclear)	50
Sequence (multinuclear)	42
Temporal-Same-Time (multinuclear)	42

Table 6 Frequently used rhetorical relations in the High Convergent Group

Relation	Percent of the students in High Conv. Group
attribution (mononuclear)	50
Sequence (multinuclear)	45

Table 7 Frequently used rhetorical relations in the Low Divergent Group

Relation	Percent of the students in Low Div. Group
background (mononuclear)	55
attribution (mononuclear)	55
Cause-Result (multinuclear)	50
Conclusion (multinuclear)	45

Table 8 Frequently used rhetorical relations in the High Divergent Group

Relation	Percent of the students in High Div. Group
temporal-after (mononuclear)	59
Sequence (multinuclear)	59
background (mononuclear)	55
temporal-before (mononuclear)	55
Conclusion (multinuclear)	50
attribution (mononuclear)	45
Temporal-Same-Time (multinuclear)	45
Cause-Result (multinuclear)	45
Contrast (multinuclear)	45

produced by children with different creative potentials. The resultant table (Table 9) was formed:

Table 9 Overlapping rhetorical relations used in all groups

Rhet.Rel.name	Low Conver.	High Conver.	Low Diver.	High Diver.
background	71 %		55%	55%
Cause-Result	63%		50%	
Conclusion	63%			50%
temporal-before	58%			55%
temporal-after	58%			59%
attribution	50%	50%	55%	
Sequence				59%

As it can be seen from Table 9, all groups used one or more overlapping rhetorical relations in different percentages. The analyses showed that different levels of creative potential make a difference in the narratives in terms of the rhetorical relations children used. This result is discussed in more detail below in (4.3).

4.2.2 The Results and Discussion of Research Question 2

Research question 2 is repeated below:

Do children with the same creative potential show common rhetorical relation(s)?

To search the frequently used rhetorical structures in children’s writings with the same creative potential, Tables 4-7 were evaluated individually. These tables aimed to show the percentages of frequently used rhetorical relations. There were some rhetorical relations frequently used by children within the same creative potential group(s) as predicted. This result is discussed in more detail below in (4.3).

4.3 The General Discussion of the Study

As we already mentioned above, children with different creative potentials used different rhetorical relations. Second, the rhetorical relations that 50 or higher percent of children within the same creative potential group used were in common.

The Low Convergent Group

Figure 6 gives the frequently used rhetorical relations in this group.

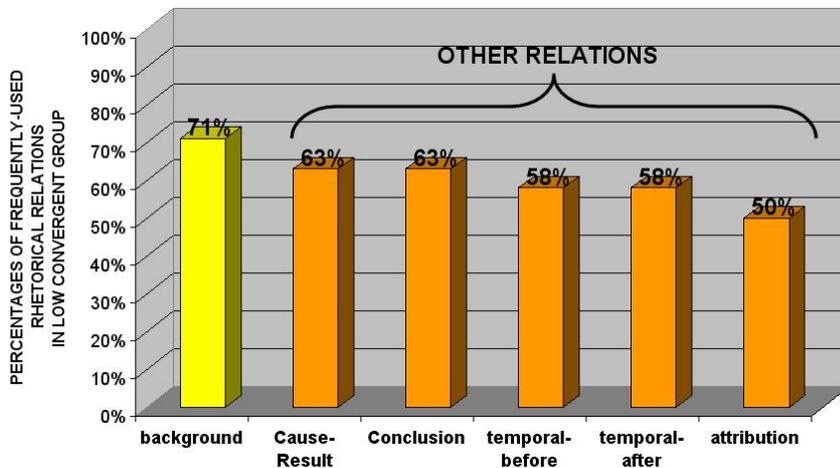


Figure 6 Bar graph showing the frequently used rhetorical relations in the Low Convergent Group

- The most frequently used rhetorical relation by the Low Convergent Group was background (used by 71% of children), which is a presentational (intentional) relation.
- As shown in Figure 6, there are the other relations, namely Cause-Result, Conclusion, temporal-before, temporal-after and attribution. These rhetorical relations found in the Low Convergent Group were compared with the subject-matter (informational) vs presentational (intentional) taxonomy of Mann and Thompson (1988) (refer to Table 2 in section 2.2.1). Since the original rhetorical relation list

has fewer relations than the extended version (Carlson and Marcu, 2001), not all of the relations found in the extended version could be mapped onto the relations in the taxonomy. However, where in the taxonomy a relation belongs to was inferred by analyzing the intended effect of a relation on a reader (Mann and Thompson, 1988). On this basis, the other frequently used rhetorical relations in this group were all subject- matter.

- Temporal relations are frequently used by 58% of children in the Low Convergent Group. This can be interpreted as follows: more than half of the children in this group wrote stories satisfying the central properties of a narrative defined by Labov and Waletzky (1967).

The High Convergent Group

Figure 7 gives the frequently used rhetorical relations in this group.

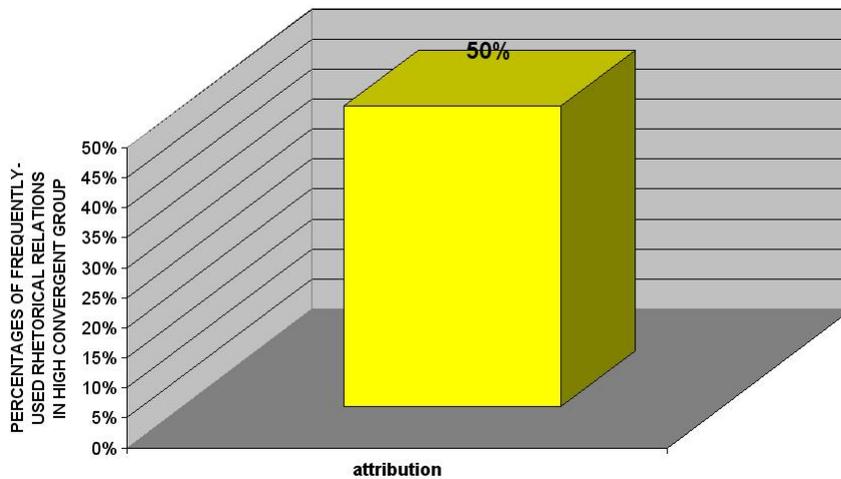


Figure 7 Bar graph showing the frequently used rhetorical relations in the High Convergent Group

- The most frequently used rhetorical relation by the High Convergent Group was attribution (used by 50% of children), which is a subject-matter relation.
- The temporal relation was quite common in the High Convergent Group (used by 45% of children). Similar to the Low Convergent Group, approximately half of the children wrote stories satisfying the central properties of a narrative.

Overlapping Rhetorical Relation in the Low and High Convergent Groups

Comparing the rhetorical relations of the Low Convergent Group with the High Convergent Group with respect to the percentages of relations used by 50 or higher percent of children, the overlapping relation was attribution (i.e. instances of reported speech), 50% of both high and low convergent thinkers used attribution, probably because for convergent thinking children, a narrative means telling of events from the mouth of others. This is consistent with Labov and Waletzky's definition for narrative: "A narrative must include a recounting of events" (Labov and Waletzky, 1967, p.25).

The Low Divergent Group

Figure 8 gives the frequently used rhetorical relations in this group.

- The most frequently used rhetorical relations in the Low Divergent Group were background (presentational) and attribution (subject-matter) (used by 55% of children, respectively).
- As shown in Figure 8, there is another frequent relation, namely Cause-Result (used by 50% of children), which is also subject-matter.
- The majority of the Low Divergent Group did not use any temporal relation. Instead of temporal relations, the children in this group

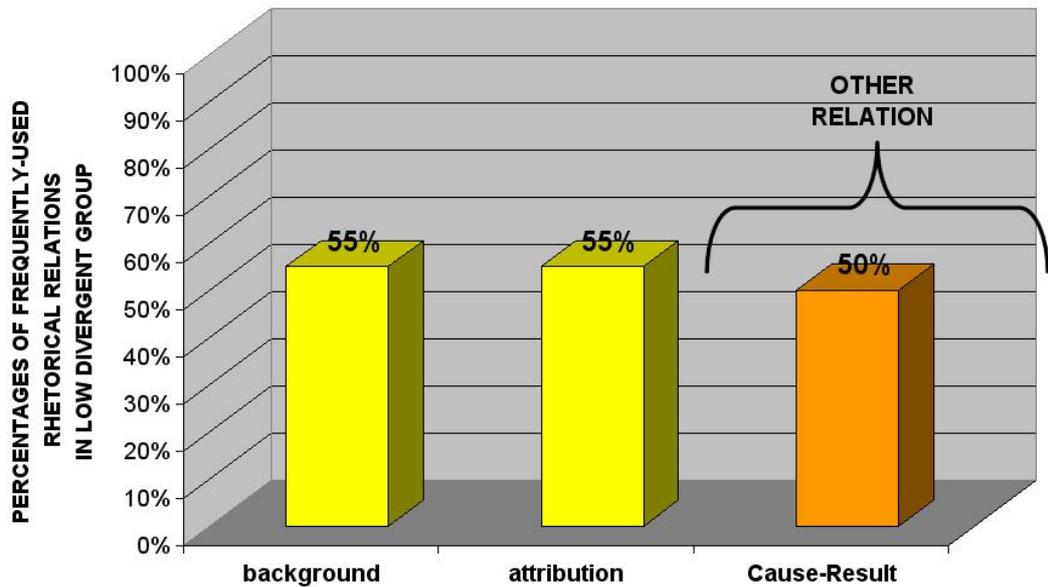


Figure 8 Bar graph showing the frequently used rhetorical relations in the Low Divergent Group

used background, attribution and causal relations to conclude their stories.

The High Divergent Group

Figure 9 gives the frequently used rhetorical relations in this group.

- The most frequently used rhetorical relations by the High Divergent Group were temporal-after and Sequence (used by 59% of children, respectively), both of which are temporal (subject-matter) relations.
- As shown in Figure 9, there are the other relations used by this group, namely background (presentational), temporal-before (subject-matter) and attribution (subject-matter).

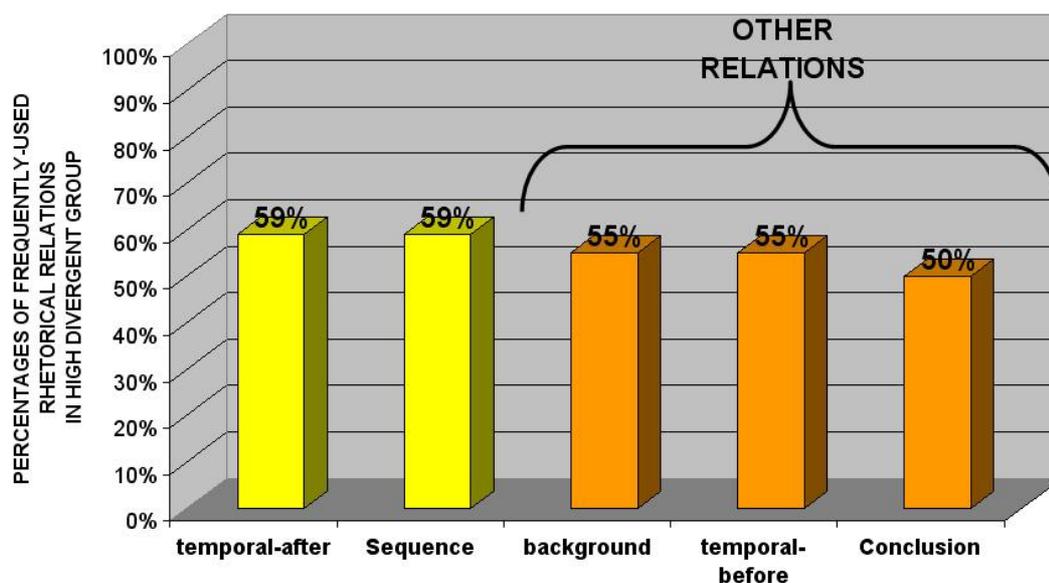


Figure 9 Bar graph showing the frequently used rhetorical relations in the High Divergent Group

Overlapping Rhetorical Relation(s) in the Low and the High Divergent Groups

Comparing the rhetorical relations of the Low Divergent Group with the High Divergent Group with respect to the percentages of relations used by 50 or higher percent of children, the overlapping relation was background (used by 55% of children in both groups). Background relation means establishment of the context or the grounds. It can therefore be inferred that 55% of both the high and low divergent thinkers used background because for divergent thinking children, a narrative means elaborations on the plot, rather than the plot itself.

Overall Discussion about the Low and the High Convergent and Divergent Groups

1. The convergent thinking aspect of the children in this study allowed them to use the attribution relation, whereas the divergent thinking side allowed them to use the background relation. When compared to Table 4 (showing the distribution of the most frequent rhetorical relations in the study), the most frequent rhetorical relation found in this study is attribution. This result shows that independent of creativity scores, the attribution relation is the most preferred relation. On the other hand, the background relation is the fourth frequent relation used. Children in our study clearly interpreted story-writing as an act of attribution.
2. Comparing the RST analysis of Marcu *et.al* (1999b) with our study, the most frequent rhetorical relations we found were different. In the study of Marcu *et.al* (1999b) with three corpora consisting of the MUC corpus (containing news stories about changes in corporate executive management personnel); the Brown corpus (containing long, highly elaborate scientific articles); and the WSJ corpus (containing editorials, Wall Street Journal articles), the most frequent rhetorical relation found was elaboration-additional¹⁹. The most frequent relation in our study found was attribution. This might be caused by genre difference as well as the younger age of participants.
3. The low scoring groups, namely the Low Convergent and the Low Divergent Groups shared the background relation. On the other hand, the high scoring groups, namely the High Convergent and the High Divergent Groups did not show any overlapping rhetorical relation at all.

¹⁹ See Table 1 on p: 74 in Marcu *et.al* (1999b) for further details.

4.4 Discourse Variables in High, Low Convergent and Divergent Thinkers

Developmental Perspective of Rhetorical Relations

We have examined all the variables from a developmental perspective. The number of satellites in a story was the only significant variable ($H(2) = 6.410, p = .041$). Pupils from the 6th grade had a mean rank of 16.57; pupils from the 7th grade had a mean rank of 28.13 and pupils from the 8th grade had a mean rank of 22.42 as shown in Figure 10.

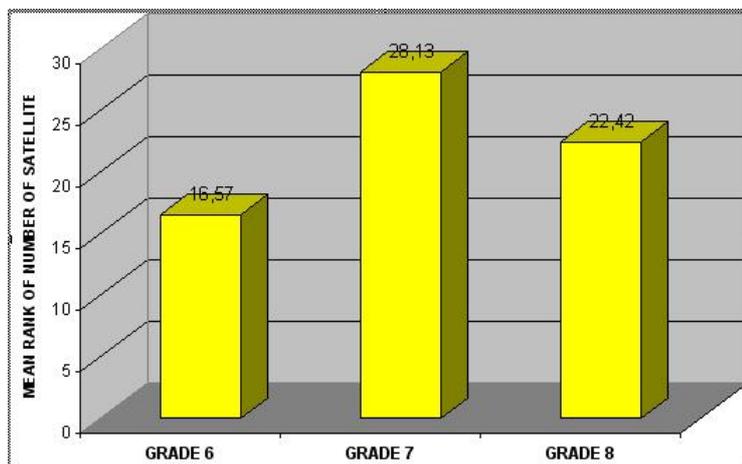


Figure 10 Bar graph showing the mean ranks of number of satellites with respect to grade

If we take the nuclei as the plot indicating the sequential relation in a narrative, then the satellites are elaborations of the story. The backbone consists of the nuclei. Elaborations enrich the backbone of the narrative. The 7th graders seemed to use more elaborations than the 6th and 8th graders.

As it is seen in Figure 10, there is a peak in the number of satellites in the 7th grade. This pattern is found through all the analyses but the only significant variable was the number of satellites. What is behind this tendency is left to be explained by future research. In the future, one might consider whether 7th graders are encouraged more than the others to write more elaborations for a story, and what kind of rhetorical relations they use to express these elaboration parts.

According to Figure 5, the 7th graders had the lowest convergent thinking score. However, Figure 10 shows a peak for 7th graders for “number of satellites. This comparison suggests that low convergent thinking scores are inversely related to the number of satellites, i.e low convergent thinkers tend to write elaborative parts to a story. This is quite reasonable because the nature of writing a story end is a convergent task itself. Low convergent thinkers are inclined elaborate more since they cannot converge to an end for the story.

In order to find out whether the total number of EDUs as a covariate effect of the types of discourse relations and number of satellites, a follow-up Multivariate ANOVA analysis was conducted with grade as independent variable, types of discourse relation and total number of satellite as dependent variables, and number of EDUs as a covariate. The ratio of explained variation to unexplained variation, namely Roy’s largest root (the most powerful one) is the only significant one. In the multivariate test, the number of EDUs had a main effect on the combination of both two variables tested ($F(2, 39) = 231.383, p < .001$)²⁰. Grade did not generally show a significant effect, only Roy’s largest root, which is considered as the most powerful multivariate statistics was significant ($F(2, 40) = 3.911, p = .028$). Apart from the number of EDUs, covariate grade has also an independent but weaker effect on both dependent variables. Following up

²⁰ All multivariate statistics (Pillai’s trace, Wilks’ lambda, Hotelling’s trace and Roy’s largest root) had the same value.

the multivariate ANOVA, the results of two separate ANOVAs confirmed the strong effect of total number of EDUs on both dependent variables, namely types of discourse relations and number of satellites separately ($F(1, 40) = 242.646, p < .001$ for types of discourse relations; $F(1, 40) = 178.541, p < .001$ for number of satellites). Grade, however, was not a significant independent variable.

Quartiles Analysis

Regarding discourse variables in high and low convergent and divergent thinkers, the results of the analyses with the median split were insignificant. For this reason, an analysis of the lower (25%) and the upper quartiles (75%) was made.

For the grouping variable “convergent thinking”:

There was a main effect of quartile (highest vs. lowest quartile of convergent thinkers) on the number of EDUs so that subjects in the highest quartile (upper 25% of the distribution) showed a lower number of EDUs (Mean rank = 8.68, SD= 7.167, n=11) and the lowest quartile (lowest 25% of the distribution) showed a higher number of EDUs (Mean rank = 15.73, SD=7.167, n=13). The test statistic of the Kruskal-Wallis test was ($H(1) = 5.997, p = .014$).

There was also a main effect of “quartile” (highest vs. lowest quartile of convergent thinkers) on the “total discourse relation types” so that the highest quartile had fewer total discourse relation types (Mean rank = 8.59, SD= 3.917, n=11) and the lowest quartile showed a higher number of total discourse relation types (Mean rank =15.81, SD= 3.917, n= 13). The test statistic of the Kruskal-Wallis test was ($H(1) = 6.325, p = .012$).

For the grouping variable “divergent thinking”:

There were no differences of the highest and lowest quartiles of divergent thinkers on any of the three variables “number of EDUs”, “total discourse relation type” and “maximum depth from one node in a RST tree”.

In summary, the high-quartile children had fewer EDUs , whereas the low-quartile children had more EDUs. The high-quartile children had fewer total discourse relation types, whereas the low-quartile children had more total discourse relation types. In order to interpret these results we looked for a correlation between the number of EDUs and number of words in children’s writing. We found a 1-tailed highly significant Pearson correlation in the data ($r = 1 / .897$, $p < .001$). The number of EDUs increased when the number of words increased and the number of EDUs decreased when the number of words decreased. On the basis of these findings, it was reasonable to infer that the high-quartile convergent thinking children in the study managed to construct a narrative with fewer number of EDUs (with fewer number of words). This fewer number of EDUs (and fewer number of words) resulted in fewer number of total discourse relation types as well.

Number of Types of Schemas used in RST trees

Referring to the Mann and Thompson’s five schemas (1988), we examined the RST trees and counted the schemas types in the trees in order to see the most frequent schema type in the corpus. The large majority (95%) of children used the simple pattern of the schema showing a single relation between nucleus and satellite (refer to Figure 2.a in Chapter 2).

CHAPTER 5

CONCLUSION

The summary and the conclusion of this study are given in this chapter. The cognitive aspects of the study are briefly discussed in this chapter as well. Finally the avenues for further research are pointed out.

Summary and the Conclusion of the School Children Study

The study investigated creative potential in terms of rhetorical relations encoded in written texts. 44 Turkish middle school children (aged 12-15) were given a paper-pen activity including one divergent thinking test, one convergent thinking test and a story to be completed. The group was splitted into two on the basis of the median of the creativity score(s). The group was splitted into two groups on the basis of two separate grouping factors, namely convergent thinking and divergent thinking. The groups formed were Low Convergent Group and High Convergent Group with respect to the median value of convergent thinking as well as Low Divergent Group and High Divergent Group with respect to the median value of divergent thinking. Then the story ends were analyzed by RST. The original theory was not used in this thesis. Instead, the extended version of rhetorical relations (Marcu, 2000, Carlson and Marcu, 2001) was used. The latter was preferred because the richer inventory of relations provided us with a good tool to analyze children's writings. It is worth mentioning that discourse relations are important in the processing of discourse. However I agree with Moore and Pollack (1992) in that the

original theory (Mann and Thompson, 1988) confuses the informational and intentional relations. Although Marcu (2000) and Carlson and Marcu (2001) do not admit this, in the final analysis we concerned ourselves more with the informational relations which were more relevant for the structure of narrative discourse.

Analyses of children's writing in terms of rhetorical relations showed that the majority of the relations were subject-matter (informational), as expected for narratives.

The convergent thinking side of the participants showed a frequent use of attribution, whereas the divergent thinking side allowed them to use of background frequently.

Independent of the creativity scores, the children used attribution relation the most while they used background relation as the fourth most frequent relation.

This thesis showed that independent of creativity scores, children preferred to construct a narrative with the frequent use of attribution. In addition, they also used temporal relations, largely satisfying the central aspects of narratives mentioned in the literature. Secondly, the study showed that high quartile convergent thinkers were able to construct a narrative element with few number of EDUs and few number of discourse relation types. Finally, we found that for the large majority of children the schema showing a single relation between nucleus and satellite was sufficient for narratives.

Considering the results of the convergent thinking and the divergent thinking tests together and measuring creativity through a writing task and may enhance creativity measurements. Writing a story end is a creative

task and relating the performances of children in convergent and divergent thinking tests with such a creative task can be a reasonable extension.

The Cognitive Aspects of the Study

Firstly, creativity research on its own has a cognitive nature. In the study we used divergent thinking and convergent thinking tests to estimate the creative potential of children. Divergent thinking, being an intellectual skill, is one of the research areas that cognitive research on creativity focuses. Secondly, using RST as an analytical tool to analyze children's writings enabled us to represent the discourse / narrative structure in the format of RST trees. Lastly, discourse is a huge research area which, among other things, investigates the knowledge of the rules underlying the well-formed story structure (coherence). This study investigated the narrative structures children produced and tried to relate their creative potential with their creative product.

Avenues for Further Research

There are three main avenues for future research:

1. The study can be repeated with TTCT (Torrance Test of Creative Thinking) for its excellent validity and reliability (Creativity Assessment, 2002) for predicting a better estimate of creative potential.
2. The study can be repeated with an extension in the analysis procedure. In addition to RST analysis, children's writings could be independently evaluated by experts of children's literature in terms of creativity. Then the predictor ability of creative thinking tests, the RST trees and the evaluation results of the experts could be compared.
3. The study can be repeated with an extension in the writing process, i.e children may write a complete story rather than completing a

story. This task of divergent thinking may add different perspectives to the study and an opportunity to see how different rhetorical relations are used in the stories.

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APPENDICES

APPENDIX A: MATERIALS AND FORMS

The materials used in the study are as follows:

1. Divergent Thinking Test
2. Convergent Thinking Test
3. The Story to be completed

The forms that are required by the Ethical Committee are as follows:

1. Informed Consent Form (Gönüllü Katılım Formu)
2. Parental Consent Form (Veli Onay Mektubu)
3. Debriefing Form (Katılım Sonrası Bilgilendirme Formu)

The materials excluded from the study are as follows:

1. Demographic Data Questionnaire (Anket)
2. The Creative Behavior Inventor

Adı:

Soyadı:

DIVERGENT THINKING TEST

Bir tuđla ne (amaç) için kullanılabilir?
Aklınıza gelen tüm alanları sıralayın.

The students were given 20 single spaced text space.

Ses çıkaran şeylerden yapılmış ne kadar madde düşünebiliyorsanız sıralayabilir misiniz? Aklınıza gelen tüm nesnelere sıralayın.

The students were given 20 single spaced text space.

Adı:

Soyadı:

CONVERGENT THINKING TEST

1. Güler ailesinde 7 kız kardeş var. Kız kardeşlerin her birinin 1 erkek kardeşi var. Babayı da sayarsak Güler ailesinde kaç erkek var?
2. Nilüferlerin sayısı bir günde iki katına çıkar. Yazın başında gölde 1 tane nilüfer vardır. Gölün üzerinin tamamen nilüferle kaplanması 60 gün sürüyorsa, kaçınıcı gün gölün yarısı nilüferle kaplıdır?
3. Dün hayvanat bahçesine gittim. Zürafaları ve devekuşlarını gördüm. Toplam 30 göz ve 44 ayak saydım. Buna göre kaç hayvan gördüm?
4. Bir kurbağa 32 metrelik bir kuyuya düşmüş. Kurbağa her gün 2 metre yukarı doğru zıplayıp 1 metre aşağı doğru kayıyorsa, kurbağanın bu kuyudan zıplayarak çıkması kaç gün alır?
5. Ezgi ve Ezel aynı yıl, aynı ay, aynı gün, aynı anne ve babanın çocukları olarak dünyaya geldiler. Ayrıca Ezgi ve Ezel ikiz kardeş değiller. Bu nasıl olabilir?
6. Okulun basketbol takımı geçen hafta karşı takımı 73-49'luk bir skorla yendi. Maçta erkek oyuncularından biri bile bir sayı atamadı. Bu nasıl olabilir?

Adı:

Soyadı:

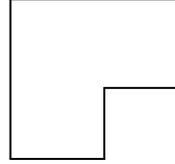
7. Bugün de dünyanın pek çok yerinde kullanılan, duvarlardan dışarıyı görmemizi sağlayan buluşun adı nedir?

8. Yılın kaç ayının 28 günü vardır?

9. Kalemimizi kaldırmadan bu 4 noktadan nasıl 2 düz çizgi çekilebileceğini gösterin.



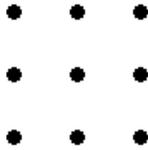
10. Aşağıdaki şekli, böldüğünüz parçaların şekilleri aynı olacak şekilde dört eşit parçaya bölün.



11. Aşağıdaki seride sıradaki sayının kaç olacağını yazın.

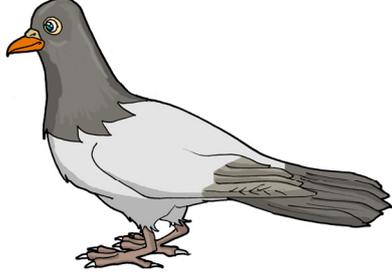
88 ... 64 ... 24 ... ?

12. Kalemimizi kaldırmadan bu 9 noktadan nasıl 4 düz çizgi çekilebileceğini gösterin.



AŞAĞIDAKİ ÖYKÜYÜ OKUYUP SİZİN İÇİN AYRILAN KUTUYA ÖYKÜNÜN DEVAMINI YAZINIZ. ÖYKÜYÜ OKUDUKTAN SONRA ÖYKÜYE UYGUN BİR BAŞLIK YAZINIZ.

STORY TO BE COMPLETED



ÖYKÜNÜN BAŞLIĞI:

Kış yaklaşıyordu. Güneşin altın sarısı rengi yavaş yavaş kayboluyor, soğuk gece, siyah bir battaniye gibi erkenden çöküyordu şehrin üzerine. Uzun kış gecelerinden nefret ediyordu. Yalnızdı. Üşüyor ve korkuyordu. Kuytu bir köşeye titreyerek sokulup gri gözlerini yakıp minicik gagasına bıçak gibi saplanan keskin soğğun, gümüş rengi tüylerinde bıraktığı titremeyle uyanıyordu her sabah.

Eski bir dokuma fabrikasının yıkık dökük, terkedilmiş deposuydu evi. Burada doğmuştu o. Bir zamanlar rengarenk kumaşlarla dolu, sıcacık bir yerdi burası. Çatıdaki ahşap kirişlerden birinin üzerindeydi yuvaları. Annesi, babası ve iki kardeşiyle, dünyanın en güzel mutlu ailesiydi onlar. Ailesinin en küçüğüdü o, gök gözlü, parlak tüylüdü. Ne çok severdi ailesini... Bahar yağmurlarının çatıda çıkardığı seslerle uykuya dalarlardı hep birlikte, ılık nisan akşamlarında. Güneş doğunca, pencerelerden nazlı nazlı süzülen sabah ışıklarıyla, gökkuşağının tüm renkleri doluşuverirdi içeriye. Esmem yüzölü işçiler, öğlen aralarında ısıklarla seslenirdi onlara, bilgiç bilgiç öterek karşılık verirlerdi onlar da. İşçilerin nasırlı elleriyle attıkları ekmek kırıntılarını kapmak için taklalar atar, birbirleriyle yarışlardı. Her yeni gün, depoda yeni bir hareket, yeni bir heyecan olurdu. Nefes aldığına yemin edebilirdi deponun o günlerde.

AŞAĞIDAKİ ÖYKÜYÜ OKUYUP SİZİN İÇİN AYRILAN KUTUYA ÖYKÜNÜN DEVAMINI YAZINIZ. ÖYKÜYÜ OKUDUKTAN SONRA ÖYKÜYE UYGUN BİR BAŞLIK YAZINIZ.

Oysa şimdilerde, yer yer paslanmış metal iskeletinin üzerinde, unutulmuş hâline sessizce ağıyor gibiydi yaşlı depo. Tüm camları kırıktı artık, tıpkı yorgun kalbi gibi. Bu yüzden çok çetin geçirdi kışlar içerde. Hele bir de buz gibi kuzey rüzgarı uğultuyla esmeye başladı mı uzun geceler bir türlü geçmek bilmezdi. O daha küçücük bir yavruyken, ne kadar da sıcaktı kışlar. Annesinin, babasının ve sevgili kardeşlerinin sıcaklığı mıydı bu hatırladığı, yoksa deponun eski pırıl pırıl hâli miydi? Galiba her ikisiydi aklında kalan ...

Eski günlere dönmeyi ne çok isterdi. Ah keşke o da annesi, babası ve kardeşleriyle beraber olsaydı yine. Şimdi neredeydiler acaba? Geçen yazın sonunda depoya düşen bomba en az ailesi kadar onu da korkutmuştu. Bu olaydan sonra doğup büyüdükleri bu depodan gitme zamanının geldiğine karar verilmişti. Uzaklaşacaklardı buralardan. Gideceklerdi, hayatta kalabilmek için. Ama o, yola çıkacak cesareti bulamamıştı kendinde bir türlü. Tam da yola çıkacakları gün ortadan kaybolmuş ve kendisini arayan ailesinin çağrılarına sessiz kalmıştı saklandığı yerde. Sonunda aramaktan umudunu kesen ailesi, bitkin kanatlarla uzaklaşmıştı buradan. Arkalarından nemli gözlerle bakakalmıştı. Neden onlarla gitmemişti? Bilmiyordu. Sadece çok korktuğunu hatırlıyordu. Şimdi yalnızdı. Ve o günden daha çok korkuyordu.

Acaba o günleri geri getirebilir, ailesine yeniden kavuşabilir miydi? Aklında hep bu soru vardı, yalnız geçen aylar boyunca... Geçen yazdan beri ne ailesinden birini görmüş, ne de bir haber alabilmişti. Her geçen gün, onlara yetişme olasılığını biraz daha düşürüyordu. Bunu biliyordu. Yine de peşlerine düşse onları bulup bulamayacağını düşünmekten kendini alamıyordu. Nerede olduklarını hiç bilmiyordu. Ama onlara bir gün kavuşacağına dair umudunu hep yaşatmıştı. Kimi geceler gördüğü o güzel rüyada bile zorlu bir yolculuktan

AŐAĐIDAKİ ÖYKÜYÜ OKUYUP SİZİN İÇİN AYRILAN KUTUYA ÖYKÜNÜN DEVAMINI YAZINIZ. ÖYKÜYÜ OKUDUKTAN SONRA ÖYKÜYE UYGUN BİR BAŐLIK YAZINIZ.

sonra ailesine kavuŐuyordu. Tam bunun bir rüya mı yoksa gerçek mi olduĐunu anlamaya çalıŐırken, hep aynı yerde uyanıyordu. Bir dahaki sefere bu rüyaĐı gördüĐünde, ailesine kavuŐmak için geçtiĐi yerlere, aŐtıĐı tepelere dikkat edip uyandıĐı zaman da Őansını denemeye karar veriyor ve içini sıcacık bir umut, taptaze bir heyecan kaplıyordu o zaman. Sanki ailesinin peŐine düŐse onları bulabilecekti.

The students were given 11 single spaced text space. The original form of this material was typed in 12 Comic Sans MS 1.5 spaced font. "Name-Surname" was added to the footer section in the original form.

INFORMED CONSENT FORM

Gönüllü Katılım Formu

Bu çalışma, Müge Batırbek tarafından yürütülen bir çalışmadır. Çalışmanın amacı, ilköğretim 6,7-8.sınıf öğrencilerinin yaratıcılıkları ile ilgili bilgi toplamaktır. Çalışmaya katılım tamamıyla gönüllülük temelinde olmalıdır. Cevaplarınız tamamıyla gizli tutulacak; sadece bilimsel amaçlar doğrultusunda değerlendirilecektir ve elde edilecek bilgiler bilimsel yayımlarda kullanılacaktır.

Çalışma (çalışmanın başında dolduracağınız anket, sonrasında cevaplayacağınız sorular, yaratıcı davranış ölçümü testi ve tamamlayacağınız hikaye), genel olarak kişisel rahatsızlık verecek soruları içermemektedir. Ancak, katılım sırasında sorulardan ya da herhangi başka bir nedenden ötürü kendinizi rahatsız hissederseniz cevaplama işini yarıda bırakıp çıkmakta serbestsiniz. Böyle bir durumda anketi uygulayan kişiye, anketi tamamlamadığınızı söylemek yeterli olacaktır. Anket sonunda, bu çalışmayla ilgili sorularınız cevaplanacaktır. Bu çalışmaya katıldığınız için şimdiden teşekkür ederiz. Çalışma hakkında daha fazla bilgi almak için Orta Doğu Teknik Üniversitesi Enformatik Enstitüsü Bilişsel Bilimler Bölümü Yüksek Lisans Öğrencisi Müge Batırbek (ODTÜ Teknokent Gümüş Bloklar C Blok, Tel: 292 62 51; E-posta: e073148@metu.edu.tr, mutunca@gmail.com) ile iletişim kurabilirsiniz.

Bu çalışmaya tamamen gönüllü olarak katılıyorum ve istediğim zaman yarıda kesip çıkabileceğimi biliyorum. Verdiğim bilgilerin bilimsel amaçlı yayımlarda kullanılmasını kabul ediyorum. (Formu doldurup imzaladıktan sonra uygulayıcıya geri veriniz).

Adı Soyadı

Doğum Tarihi

Tarih

İmza

----/----/-----

PARENTAL CONSENT FORM



**ORTA DOĞU TEKNİK ÜNİVERSİTESİ
MIDDLE EAST TECHNICAL UNIVERSITY
06531 ANKARA - TURKEY**

**Enformatik Enstitüsü / Informatics Institute
Bilişsel Bilimler Bölümü / Department of Cognitive Science**

Veli Onay Mektubu

Sayın Veliler, Sevgili Anne-Babalar,

Orta Doğu Teknik Üniversitesi Enformatik Enstitüsü Bilişsel Bilimler Bölümünde yüksek lisans öğrencisi olarak çalışmaktayım. Tez çalışmam kapsamında 12-15 yaş-grubu (İlköğretim 6-7-8.sınıf) çocuklarında yaratıcılık ile ilgili bir çalışma yapılması hedeflenmektedir. Bu mektubun yollanış amacı sizleri bu çalışma hakkında bilgilendirmek ve onayınızı almaktır.

Tezim kapsamında hedeflediğim araştırmamın amacı bu yaş-grubu öğrencilerde yarım kalan bir hikayenin sonunu tamamlamak suretiyle elde edilecek metinleri bilişsel savı olan bir dilbilim yöntemiyle analiz etmek ve aynı zamanda yaratıcılık hakkında değerlendirme yapılmasına olanak sağlayacak bir teste verecekleri cevaplar ile analiz sonuçlarını birlikte değerlendirerek yaratıcılıkla ilgili somut sonuçlar elde etmeye çalışmaktır. Bu amacı gerçekleştirmek için çocuklarınızın bir anket ve bir yaratıcılık testi doldurmaları ve mini bir hikayeyi okuyarak hikayenin sonunu/devamını yazmalarına ihtiyaç duymaktayım.

Katılmasına izin verdiğiniz ve kendi de katılmaya gönüllü olduğu takdirde, çocuğunuz bu çalışmayı okulda ders saatinde yapacaktır. Çocuğunuzun katılacağı bu çalışmanın onun psikolojik gelişimine olumsuz etkisi olmayacağından emin olabilirsiniz. Çocuğunuzun katılacağı bu çalışmadaki cevaplar kesinlikle gizli tutulacak ve bu cevaplar sadece bilimsel araştırma amacıyla kullanılacaktır. Bu form imzalandıktan sonra dahi, çocuğunuz katılmama ya da vazgeçme hakkına sahiptir. Yani bu çalışmaya katılımın ön şartı çocukların gönüllü olmasıdır ve arzu etmeleri durumunda, çocuklar herhangi bir yaptırıma maruz kalmadan katılmadan vazgeçebilirler. Araştırma sonuçlarının özeti, tarafımdan okula yaklaşık 6-8 ay sonra ulaştırılacaktır.

Bu çalışmaya katılmasına izin vereceğiniz çocuklardan toplanacak bilgiler çocukların yaratıcılıkları ile ilgili saptama yapmaya önemli katkıda bulunacaktır. Araştırmamla ilgili sorularınızı aşağıdaki e-posta adreslerini veya telefon numarasını kullanarak bana yöneltebilirsiniz.

Saygılarımla,
Müge Batırbek
Yüksek Lisans Öğrencisi
ODTÜ Teknokent Gümüş Bloklar C Blok, 06531 Ankara
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Yukarıda açıklamasını okuduğum çalışmaya, oğlum/kızım _____'nin katılımına izin veriyorum/vermiyorum. Çocuğumun bu çalışmaya gönüllü katıldığını, çalışmayı istediği zaman yarıda kesip bırakma hakkının olduğunu ve toplanan bilgilerin bilimsel amaçlı olarak kullanılmasını kabul ediyorum. Ebeveynin:

Adı,soyadı: _____ İmzası: _____ Tarih: _____

DEBRIEFING FORM

KATILIM SONRASI BİLGİ FORMU

Bu çalışma daha önce de belirtildiği gibi Orta Doğu Teknik Üniversitesi Enformatik Enstitüsü Bilişsel Bilimler Bölümü Yüksek Lisans Öğrencisi Müge Batırbek tarafından yürütülen bir tez çalışmasıdır. Yaratıcılık testleri sonuçları ile tamamladığımız hikayenin analizini kıyaslayarak bu testlerin ne kadar birbirine paralel ölçüm yapabildiğini inceleyeceğim bu çalışmada, yaratıcılıkla ilgili somut çıkarımlar yapmayı hedefliyorum.

Yaratıcılık ölçümünde kullanılan testler genellikle farklı düşünebilmeyi, benzer düşünebilmeyi, artistik düşünebilmeyi ve Yaratıcı Davranış Envanteri (Hocevar 1979, 1980) gibi kendini değerlendirme anketlerinden oluşmaktadır. Artistik düşünmeyi ölçer testlerin değerlendirmesi profesyonel kişilerce yapılması gerektiğinden bu çalışmanın dışında tutulmuştur. Onun dışında cevaplanan sorular farklı düşünmeyi ve benzer düşünmeyi sorgulamak amaçlıdır. Ayrıca Yaratıcı Davranış Envanteri (Hocevar 1979, 1980) de yaratıcı davranışları konusunda kişinin kendini değerlendirmesine olanak sağlamaktadır. Bu testlerden elde edilecek sonuçların topluca değerlendirilmesi ve gruba göre bir çıkarım yapılması söz konusudur.

Devamını yazdığımız ve bir başlık verdiğiniz öyküde sizin tarafınızdan yazılmış cümleler de anlamsal ilişkileri bazında değerlendirilecektir.

Yaratıcılık testlerinden ve öykülerinizin analizlerinden elde edilecek veriler karşılaştırılacak ve yaratıcılıkla ilgili somut veriler oluşturulmaya çalışılacaktır.

Bu çalışmadan alınacak ilk verilerin Haziran 2007 sonunda elde edilmesi amaçlanmaktadır. Elde edilen bilgiler sadece bilimsel araştırma ve yazılarda kullanılacaktır. Çalışmanın sonuçlarını öğrenmek ya da bu araştırma hakkında daha fazla bilgi almak için aşağıdaki kişiye başvurabilirsiniz. Bu araştırmaya katıldığınız için tekrar çok teşekkür ederiz.

Müge Batırbek (ODTÜ Teknokent Gümüş Bloklar C Blok, Tel: 292 62 51;
E-posta: e073148@metu.edu.tr , mutunca@gmail.com)

DEMOGRAPHIC DATA QUESTIONNAIRE
SİZİ DAHA YAKINDAN TANIMAMIZ İÇİN BU ANKETİ DOLDURUR MUSUNUZ?

MATERIALS EXCLUDED FROM THE STUDY

Ad: _____ Soyad: _____

Sınıf: _____ Yaş: _____

1. Okul öncesi eğitim aldınız mı? (Kreşe/anaokuluna/ana sınıfına gittiniz mi?)

Evet Hayır

2. Bu okuldan önce başka ilköğretim okuluna gittiniz mi?

Evet Hayır

3. Boş zamanlarınızda ne yaparsınız? (Birden fazla işaretleyebilirsiniz.)

Resim yaparım. Müzik dinlerim.
 Parkta, evde oyun oynarım. Bilgisayar kullanırım.
 Diğer Varsa, diğer uğraşlarınızın adını yazınız:

4. Okul dışında kitap okur musunuz?

Evet Hayır

5. Ne tür kitaplar okursunuz? (4.soruya "Evet" dediyseniz bu soruyu yanıtlayın.)

Roman Çizgi roman Şiir Öykü
 Diğer Varsa, diğer okuduğunuz kitap türlerinin adını yazınız:

6. Şubat tatilinde kaç kitap okudunuz?

0 1 2 3 4 ve daha fazla

7. Televizyon izler misiniz?

Evet Hayır

8. Ne sıklıkta televizyon izlersiniz? (7.soruya "Evet" dediyseniz bu soruyu yanıtlayın.)

Günde 1 saatten az Günde 1-2 saat
 Günde 2 saatten fazla Haftada 3-4 saat
 Diğer Yukarıda belirtilmeyen, sizin televizyon izleme sıklığınız:

9. Bilgisayar kullanıyor musunuz?

Evet Hayır

DEMOGRAPHIC DATA QUESTIONNAIRE

SİZİ DAHA YAKINDAN TANIMAMIZ İÇİN BU ANKETİ DOLDURUR MUSUNUZ?

10. Bilgisayarı ne amaçlı kullanıyorsunuz? (9.soruya “Evet” dediyseniz bu soruyu yanıtlayın. Birden fazla işaretleyebilirsiniz.)

- Oyun oynarım. İnternete girerim.
 Eğitim amaçlı kullanırım. Arkadaşlarımla sohbet ederim.
 Diğer Varsa, diğer kullanım amaçlarınızı yazınız:

11. Ne sıklıkta bilgisayar kullanıyorsunuz? (9.soruya “Evet” dediyseniz bu soruyu yanıtlayın.)

- Günde 1 saatten az Günde 1-2 saat
 Günde 2 saatten fazla Haftada 3-4 saat
 Diğer Yukarıda belirtilmeyen, sizin bilgisayar kullanma sıklığınız:

12. Sinemaya gider misiniz?

- Evet Hayır

13. Ne sıklıkta sinemaya gidersiniz? (12.soruya “Evet” dediyseniz bu soruyu yanıtlayın.)

- Haftada 1 kez Onbeş günde 1 kez
 Ayda 1 kez Tatillerde, fırsat oldukça
 Diğer Yukarıda belirtilmeyen, sizin sinemaya gitme sıklığınız:

14. Tiyatroya gider misiniz?

- Evet Hayır

15. Ne sıklıkta tiyatroya gidersiniz? (14.soruya “Evet” dediyseniz bu soruyu yanıtlayın.)

- Haftada 1 kez Onbeş günde 1 kez
 Ayda 1 kez Tatillerde, fırsat oldukça
 Diğer Yukarıda belirtilmeyen, sizin tiyatroya gitme sıklığınız:

16. Spor yapar mısınız?

- Evet Hayır

17. Ne sıklıkta yaparsınız? (16.soruya “Evet” dediyseniz bu soruyu yanıtlayın.)

- Her gün Haftada 1 kez
 Onbeş günde 1 kez Ayda 1 kez
 Diğer Yukarıda belirtilmeyen, sizin spor yapma sıklığınız:

18. Annenizin öğrenim durumu:

- İlkokul Ortaokul Lise Yüksekokul / Üniversite
 Diğer Açıklayınız:

DEMOGRAPHIC DATA QUESTIONNAIRE
SİZİ DAHA YAKINDAN TANIMAMIZ İÇİN BU ANKETİ DOLDURUR MUSUNUZ?

19. Babanızın öğrenim durumu:

- İlkokul Ortaokul Lise Yüksekokul / Üniversite
 Diğer Açıklayınız:

20. Hikaye / öykü / şiir yazar mısınız?

- Evet Hayır

THE CREATIVE BEHAVIOR INVENTORY

Adı:

Soyadı:

Yaratıcı Davranış Ölçümü (Hocevar, 1979, 1980)

Aşağıdaki soruların her birine cevap veriniz. Size en uygun olan kutucuğun içini karalayınız ve kendi kendinizi değerlendiriniz.

	Hayır	Bir kez	Birkaç kez (2-4)	Çok kez (≥5)
1. Gösteride aldığım rol için ödüllendirildim.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Okul gazetesinin hazırlanmasında görev aldım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. (Okul projeleri dışında) bilgilerimi kullanarak radyo, teleskop ya da arın gibi bilimsel bir alet/araç yaptım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Resim yaptım, boyadım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Kendi kartpostalımı kendim yaptım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Konser/resital verdim.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Beste yaptım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Okul gazetesinde ya da başka bir yerde yazdığım şiir/öykü/hikaye vb. yayımlandı.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Okuldakilerden başka, kendim bir deney tasarladım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Ödevlerim dışında da şiir yazdım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Bilimsel projemle bir yarışmaya katıldım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Sanatsal bir başarıml için ödüllendirildim.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Karikatür yaptım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Seramikten heykeller yaptım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15. Kıyafet tasarladım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16. Orijinal bir yemek tarifi ile kendi yemeğimi pişirdim.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17. Çiçeklerden bir aranjman/buket yaptım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18. Günlük hayatta karşıma çıkan bir problemi çözmek için matematikten yararlandım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Okul ödevlerim dışında, bir bilgisayar programı yazdım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Şarkı sözü yazdım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

THE CREATIVE BEHAVIOR INVENTORY

Adı:

Soyadı:

Yaratıcı Davranış Ölçümü (Hocevar, 1979, 1980)

Aşağıdaki soruların her birine cevap veriniz. Size en uygun olan kutucuğun içini karalayınız ve kendi kendinizi değerlendiriniz.

	Hayır	Bir kez	Birkaç kez (2-4)	Çok kez (≥5)
21. Koreografi (müzik eşliğinde yapılacak dansın adımlarını, figürlerini) tasarladım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Ödevlerim dışında kısa bir öykü/hikaye yazdım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Espri, şaka, fıkra vb. yazdım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Takı tasarladım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Radyo programı yaptım/radyo için bir program yazdım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Fotoğraf çektim.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Bir gösteride/yanışmada bale/modern dans yaptım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Müzikal bir başarıml için ödüllendirildim.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29. Bilimsel bir projem için ödüllendirildim.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Bir roman/hikaye/öykü yazmaya başladım ama bitirmedim.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Bir roman/hikaye/öykü yazdım ve bitirdim.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Edebiyatta bir başarıml için ödüllendirildim.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. Şarkıcı/solist/korist/vokalist olarak bir yanışmaya katıldım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
34. Müzisyen olarak çaldığım bir çalgıyla bir yanışmaya katıldım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. Bir kostüm tasarladım ve diktim/yaptım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Piyano ile bir şarkı çaldım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. Vurmalı bir çalgı ile bir şarkı çaldım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. Yaylı bir çalgı ile bir şarkı çaldım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. Üfleli bir çalgı ile bir şarkı çaldım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Bir koroda ya da orkestrada aktif olarak görev aldım.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**APPENDIX B: ORIGINAL INSIGHT PROBLEMS THAT WERE
TRANSLATED INTO TURKISH AND THE SCORING KEY FOR
CONVERGENT THINKING TEST**

Mathematical Insight Problems

1. Smith Family: In the Smith family, there are 7 sisters and each sister has 1 brother. If you count Mr. Smith, how many males are there in the Smith family?

Solution: *Two (the father and the brother)*

2. Water lilies: Water lilies double in area every 24 hours. At the beginning of summer there is one water lily on the lake. It takes 60 days for the lake to become completely covered with water lilies. On which day is the lake half covered?

Solution: *Day 59 then it doubles on the 60th*

4. Eyes: Yesterday I went to the zoo and saw the giraffes and ostriches. Altogether they had 30 eyes and 44 legs. How many animals were there?

Solution: *15 (30 eyes each animal has 2 eyes = 30/2)*

8. Frog: A frog fell into a well thirty-two feet deep. Each day he jumped two feet up the wall and slid back down one foot each night. How many days did it take him to jump out of the well?

Solution: *30 (not 31 - he didn't slide back down once he was out).*

Verbal Insight Problems

3. Twins: Marsha and Marjorie were born on the same day of the same month of the same year to the same mother and the same father - yet they are not twins. How is that possible?

Solution: *They are triplets*

5. Basketball: Our basketball team won a game last week by the score of 73-49, and yet not even one man on our team scored as much as a single point. How is that possible?

Solution: *It was a woman's team.*

17. Invention" There is an ancient invention still used in parts of the worlds today that allows people to see through walls. What is it?

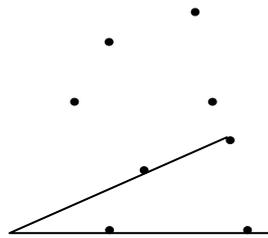
Solution: *A window*

38. Months: How many months have twenty-eight days in them?

Solution: *All of them.*

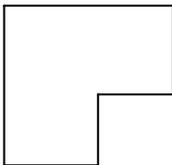
Spatial Problems

1. 4 dots: Without lifting your pencil from the paper, show how you could join all 4 dots with 2 straight lines

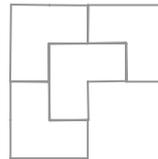


Solution:

4. Figure: Show how you can divide this figure into four equal parts that are the same size and shape



Solution:



8. Series: Identify the next term in the series:

88 ... 64 ... 24 ...

Solution: 40 ($88-64=24$, so $64-24=40$)

13. The 9 Dots: Draw four continuous straight lines, connecting all the dots without lifting your pencil from the paper.

Solution:



**APPENDIX C: SAMPLE ANSWERS GIVEN TO DIVERGENT THINKING
TEST**

Stu #	The Answers given to the Guilford's Alternative Uses Task (Uses of a Brick Task) (1967)
3	Bir tuğla inşaatlarda, insan yaralamada ve birşeye destek olması amacıyla kullanılabilir.
6	İnşaat (bina yapmak için) Bina çatısı yapmak için Duvar yapmak için Baca kağıdı
25	Yemek, araba, adam öldürmek, sakatlamak, ev, savaşta engel (barikat) yapılabilir, çöp kutusu, kutu, havuz, barbekü, karton dayamak, gözlük, kulübe, mahalle maçında kale, yol, atış hedefi.
37	Bir yeri inşa etmek için kullanılır.

APPENDIX D: THE SCORES OF CONVERGENT THINKING TEST

Student #	Convergent Thinking Test Scores
1	0 (5 blanks, 7 errors)
2	2 (4 blanks, 6 errors, 2 correct answers)
3	3 (4 blanks, 5 errors, 3 correct answers)
4	1 (0 blanks, 11 errors, 1 correct answers)
5	3 (0 blanks, 9 errors, 3 correct answers)
6	4 (1 blanks, 7 errors, 4 correct answers)
7	6 (1 blanks, 5 errors, 6 correct answers)
8	3 (2 blanks, 7 errors, 3 correct answers)
9	2 (6 blanks, 4 errors, 2 correct answers)
10	4 (2 blanks, 6 errors, 4 correct answers)
11	5 (0 blank, 7 errors, 5 correct answers)
12	5 (1 blank, 6 errors, 5 correct answers)
13	4 (1 blank, 7 errors, 4 correct answers)
14	2 (0 blanks, 10 errors, 2 correct answers)
15	4 (2 blanks, 6 errors, 4 correct answers)
16	4 (0 blank, 8 errors, 4 correct answers)
17	4 (1 blank, 7 errors, 4 correct answers)
18	7 (2 blanks, 3 errors, 7 correct answers)
19	2 (3 blanks, 7 errors, 2 correct answers)
20	3 (4 blanks, 5 errors, 3 correct answers)
21	3 (0 blank, 9 errors, 3 correct answers)
22	7 (1 blank, 4 errors, 7 correct answers)
23	4 (3 blanks, 5 errors, 4 correct answers)
24	6 (4 blanks, 2 errors, 6 correct answers)
25	10 (1 blank, 1 error, 10 correct answers)
26	10 (0 blank, 2 errors, 10 correct answers)
27	3 (5 blanks, 4 errors, 3 correct answers)
28	10 (0 blank, 2 errors, 10 correct answers)
29	9 (0 blank, 3 errors, 9 correct answers)
30	9 (1 blank, 2 errors, 9 correct answers)
31	5 (2 blanks, 5 errors, 5 correct answers)
32	3 (3 blanks, 6 errors, 3 correct answers)
33	6 (0 blank, 6 errors, 6 correct answers)
34	3 (6 blanks, 3 errors, 3 correct answers)

Student #	Convergent Thinking Test Scores
35	4 (0 blank, 8 errors, 4 correct answers)
36	9 (0 blank, 3 errors, 9 correct answers)
37	4 (1 blank, 7 errors, 4 correct answers)
38	3 (1 blank, 8 errors, 3 correct answers)
39	2 (4 blanks, 6 errors, 2 correct answers)
40	3 (1 blank, 8 errors, 3 correct answers)
41	4 (1 blank, 7 errors, 4 correct answers)
42	5 (0 blank, 7 errors, 5 correct answers)
43	3 (3 blanks, 6 errors, 3 correct answers)
44	4 (2 blanks, 6 errors, 4 correct answers)

APPENDIX E: SAMPLES FROM THE DATA

Stu #	Samples from the Data
3	Birden bire ailesinin nerde olabileceği aklına geldi. Aklından geçen çok uzaklardaki bir ahırdı. Oraya yol almaya başladı. Birdenbire havanın değiştiğini gördü. Gittiği yerde iklim farklıydı. Karşısına çıkan herkese ailesini sordu. Sonunda tahmin ettiği yerde buldu ailesini
6	Tabii bu sadece sanki kelimesinde kalmıştı. Birçok yaz ayı gelmiş; fakat ailesi buraya bir daha hiç gelmemişti. O hala onları bulmaya korkuyordu, gerçi artık ne kadar çalışsa da bulamazdı. Olaydan tam 2 yıl geçmişti. Bu 2 yıl arta kalan sadece özlem ve gözyaşları olmuştu.
25	Peşlerinden koştu, koştu, koştu, koştu ama yetişemedi, Ailesi bir duman gibi uçup gitmişti ama ne yapacağını bilmeden koştu.
37	Yine soğuk bir gün geçmişti içinde bir umutla yattı ve yine aynı rüyayı gördü ve geçtiği yerleri aştığı tepelere dikkat etti ve yolu öğrendi çok uzun bir yola başladı ve yoluna devam etti uzun bir süre sonra ailesine ulaştı ve çok uzun ve mutlu bir şekilde yaşadı.

APPENDIX F: CONVENTIONS AND RELATION INVENTORY

CONVENTIONS

To read the excerpts correctly, the necessary formatting conventions that are reproduced and adapted from Carlson and Marcu (2001) are as follows:

- All examples are shown in **Verdana** font to distinguish them from the body of the text. Elementary discourse units are marked in square brackets; the source of the example (stu_#) is shown as a subscript at the end of the example:

(1) [Ama bulmadı] [peşine düşmedi]_{stu_7}

- When discussing relations, the nucleus is shown in normal font and the satellite is shown in italics:

(2) [*Her zaman bu umutla yaşadı.*] [Ailesini yani sıcak ve mutlu bir yuvayı çok özlemişti.]_{stu_19}

- When a particular issue is in focus, all segmentation will be shown, but the unit or text fragment relevant to the issue being discussed will be underlined for clarity. Boldface may be used to highlight particular lexical or syntactic cues that are relevant to determining the discourse structure. Superscripts at the end of a bracketed unit mark the unit number. For example, the sentence below contains nine EDUs. However, since the focus of the section is on pseudo relation Same Unit linking two non-adjacent parts, when separated by intervening relative clauses or parentheticals, only units [1] and [5] are underlined:

(3) [Daha sonra uyanarak¹] [“oh be rüyaymış”²] [*demesi*³] [onu çok mutlu etti⁴] [gitti⁵] [elini yüzünü yıkadı⁶] [ve ailesine şöyle bir baktı⁷] [ben nasıl böyle bir aile bulucam⁸] [*diye kendi kendine konuşuyordu*⁹]_{stu_1}

- Further distinctions in the examples may be made with italics or double underlined, and will be noted accordingly.

RELATION INVENTORY

This relation inventory is reproduced and adapted from the Relation Inventory in Carlson and Marcu (2001) for this study. A total of 29 mononuclear and 20 multinuclear rhetorical relations were used for the tagging of our corpus. In addition, a relation of OTHERMULTINUC is used for the coda of a story (written by stu_37),

OTHERMULTINUC is chosen because no other relation did not apply to a narrative organization. Table given below is a complete listing of all the relations, arranged alphabetically by mononuclear relation. Mononuclear relations are listed in Column 1 if the satellite is the unit that characterizes the relation name. For example, in a BACKGROUND relation, the satellite provides background information for the situation presented in the nucleus. Mononuclear relations listed in Column 2 are those in which the nucleus characterizes the relation name. For example, in a CAUSE relation, the nucleus is the cause of the situation presented in the satellite. Column 3 lists the multinuclear relations. Corresponding mono- and multinuclear relations are shown across a single row. (In some cases, this results in the multinuclear relations appearing out of alphabetical order.)

Rhetorical relations found in the study

Mononuclear (satellite)	Mononuclear (satellite)	Multinuclear
analogy		Analogy
antithesis		Contrast
attribution		
background		
	cause	Cause-Result
circumstance		
comment		
		Comment-Topic
concession		
		Conclusion
condition		
consequence-s	consequence-n	Consequence
contingency		
		Disjunction
elaboration-additional		
elaboration-set-member		
evaluation-s		Evaluation
interpretation-s		
		List
manner		
means		
		Otherwise
		Othermultinuc
preference		
		Problem-Solution
		Question-Answer
reason		Reason
restatement		
	result	Cause-Result
rhetorical-question		

Table (continued)

Mononuclear (satellite)	Mononuclear (satellite)	Multinuclear
		Same Unit
		Sequence
statement-response-s		Statement-Response
	temporal-before	
temporal-same-time-s	temporal-same-time-n	Temporal-Same-Time
	temporal-after	
		Topic-Comment
topic-drift		Topic-Drift
		Topic-Shift

Section below provides an alphabetical listing of all relations used to tag the children's writings, along with their definitions and corresponding examples from the corpus.

Relations Definitions

Relations are listed alphabetically, followed by a status mononuclear, multinuclear, or both. (Note that when a mononuclear and multinuclear relation have the same name, the multinuclear one is distinguished by capitalizing the first letter).

1. ANALOGY (both)

Definition: In an ANALOGY relation, two textual spans, often quite dissimilar, are set in correspondence in some respects. An analogy contains an inference that if two or more things agree with one another in some respects, they will probably agree in other respects. In most cases, the relation is multinuclear.

2. ANTITHESIS (mononuclear)

Definition: In an ANTITHESIS relation, the situation presented in the nucleus comes in contrast with the situation presented in the satellite. The contrast may happen in only one or few respects, while everything else can remain the same in other respects. An ANTITHESIS relation is always mononuclear -- it is a contrastive relation that distinguishes clearly between the nuclearity of its arguments. It differs from the mononuclear CONCESSION relation, which is characterized by a violated expectation. When both units play a nuclear role, the multinuclear relation CONTRAST should be selected.

3. ATTRIBUTION (mononuclear)

Definition: Instances of reported speech, both direct and indirect, should be marked for the rhetorical relation of ATTRIBUTION. The satellite is the source of the attribution (a clause containing a reporting verb, or a phrase beginning with *according to*), and the nucleus is the content of the reported message (which must be in a separate clause). The ATTRIBUTION relation is also used with cognitive predicates, to include feelings, thoughts, hopes, etc.

Counter-examples: In order to segment a sentence into attribution source and content, two conditions must hold:

1) There must be an explicit source of the attribution. If the clause containing the reporting verb does not specify the source of the attribution, and if the source cannot be identified elsewhere in the sentence or nearby context, then a relation of attribution does not hold, and the reporting and reported clauses are treated as one unit. This frequently occurs in passive voice constructions, or generic expressions like *it is said*:

2) The subordinate clause must not be an infinitival complement. The following examples contain infinitival complements, which are not segmented, and thus, an ATTRIBUTION relation does not hold:

4. BACKGROUND (mononuclear)

Definition: In a BACKGROUND relation, the satellite establishes the context or the grounds with respect to which the nucleus is to be interpreted. Understanding the satellite helps the reader understand the nucleus. The satellite IS NOT the cause/reason/motivation of the situation presented in the nucleus. The reader/writer intentions are irrelevant in determining whether such a relation holds. In contrast with the CIRCUMSTANCE relation, the information or the context of the BACKGROUND relation is not always specified clearly or delimited sharply. Hence, the CIRCUMSTANCE relation is stronger than BACKGROUND. Often, in a BACKGROUND relation, the events represented in the nucleus and the satellite occur at distinctly different times, whereas events in a CIRCUMSTANCE relation are somewhat co-temporal.

5. CAUSE (mononuclear)

Definition: The situation presented in the nucleus is the cause of the situation presented in the satellite. The cause, which is the nucleus, is the most important part. The satellite represents the result of the action. The intention of the writer is to emphasize the cause. When the result is the nucleus, the mononuclear relation RESULT should be selected. When it is not clear whether the cause or result is more important, select the multinuclear relation CAUSE-RESULT.

6. CAUSE-RESULT (multinuclear)

Definition: This is a causal relation in which two EDUs, one representing the cause and the other representing the result, are of equal importance or weight. When either the cause or the result is more important, select the corresponding mononuclear relation CAUSE or RESULT, respectively.

7. CIRCUMSTANCE (mononuclear)

Definition: In a CIRCUMSTANCE relation, the situation presented in the satellite provides the context in which the situation presented in the nucleus should be interpreted. The satellite IS NOT the cause/reason/motivation of the situation presented in the nucleus. The reader/writer intentions are irrelevant in determining

whether such a relation holds. Select CIRCUMSTANCE over BACKGROUND when the events described in the nucleus and satellite are somewhat co-temporal.

8. COMMENT (mononuclear)

Definition: In a COMMENT relation, the satellite constitutes a subjective remark on a previous segment of the text. It is not an evaluation or an interpretation. The comment is usually presented from a perspective that is outside of the elements in focus in the nucleus.

9. COMMENT-TOPIC (multinuclear)

Definition: A specific remark is made on a topic or statement, after which the topic itself is identified. This relation is always multinuclear, as both spans are necessary to understand the context. When the spans occur in the reverse order, with the topic preceding the comment, the relation TOPIC-COMMENT is selected. While COMMENT-TOPIC is not a frequently used device in English, it is seen in news reporting, for example, when someone makes a statement, after which a reference is given to help the reader interpret the context of the statement.

10. CONCESSION (mononuclear)

Definition: The situation indicated in the nucleus is contrary to expectation in the light of the information presented in the satellite. In other words, a CONCESSION relation is always characterized by a violated expectation. (Compare to ANTITHESIS.) In some cases, which text span is the satellite and which is the nucleus do not depend on the semantics of the spans, but rather on the intention of the writer.

11. CONCLUSION (both)

Definition: In a CONCLUSION relation, the satellite presents a final statement that wraps up the situation presented in the nucleus. A CONCLUSION satellite is a reasoned judgment, inference, necessary consequence, or final decision with respect to the situation presented in the nucleus. When the nucleus and satellite are of equal importance, select the multinuclear CONCLUSION.

12. CONDITION (mononuclear)

Definition: In a CONDITION relation, the truth of the proposition associated with the nucleus is a consequence of the fulfillment of the condition in the satellite. The satellite presents a situation that is not realized.

13. CONSEQUENCE (multinuclear), CONSEQUENCE-N (mononuclear), CONSEQUENCE-S (mononuclear)

Definition: In a consequence relation, the situation presented in one span is a consequence of the situation presented in the other span. The reader/writer intentions are irrelevant to determining whether such a relation holds. A CONSEQUENCE-N relation is similar to a RESULT relation, in that in both cases, the *nucleus* presents a consequence or result of the situation in the satellite. Similarly, a CONSEQUENCE-S relation is similar to a CAUSE relation, in that in both cases, the *satellite* presents a consequence or result of the situation in the nucleus. The relations CAUSE and RESULT

imply a more direct linkage between the events in the nucleus and the satellite, whereas a CONSEQUENCE-S or CONSEQUENCE-N relation suggests a more indirect linkage. If both spans carry equal weight in the discourse, select the multinuclear CONSEQUENCE.

14. CONTINGENCY (mononuclear)

Definition: In a CONTINGENCY relation, the satellite suggests an abstract notion of recurrence or habituality. Hence, the expression of time, place, or condition is not the primary focus.

15. CONTRAST (multinuclear)

Definition: In a CONTRAST relation, two or more nuclei come in contrast with each other along some dimension. The contrast may happen in only one or few respects, while everything else can remain the same in other respects. Typically, a CONTRAST relation includes a contrastive discourse cue, such as *but*, *however*, *while*, whereas a COMPARISON does not.

16. DISJUNCTION (multinuclear)

Definition: DISJUNCTION is a multinuclear relation whose elements can be listed as alternatives, either positive or negative.

17. ELABORATION-ADDITIONAL (mononuclear)

Definition: In an ELABORATION-ADDITIONAL relation, the satellite gives additional information or detail about the situation presented in the nucleus. This relation is extremely common at all levels of the discourse structure, and is especially popular to show relations across large spans of information. It is the default for the family of elaboration relations, and should be used when none of the other, more specific, elaboration relations apply.

18. ELABORATION-SET-MEMBER (mononuclear)

Definition: In this elaboration relation, the nucleus introduces a finite set (which may be generic or a named entity) or a list of information. The satellite then specifically elaborates on at least one member of the set. Typically, the members themselves are represented in a multinuclear LIST relationship.

19. EVALUATION (multinuclear), EVALUATION-N (mononuclear), EVALUATION-S (mononuclear)

Definition: In an evaluation relationship, one span assesses the situation presented in the other span of the relationship on a scale of good to bad. An evaluation can be an appraisal, estimation, rating, interpretation, or assessment of a situation. The evaluation can be the viewpoint of the writer or another agent in the text. The assessment may occur in the satellite (EVALUATION-S) or the nucleus (EVALUATION-N), or it may occur in a multinuclear relationship (EVALUATION), when the spans representing the situation and the assessment are of equal weight.

20. INTERPRETATION (multinuclear), INTERPRETATION-N (mononuclear), INTERPRETATION-S (mononuclear)

Definition: In interpretation relations, one side of the relation gives a different perspective on the situation presented in the other side. It is subjective, presenting the personal opinion of the writer or of a third party. An interpretation can be: 1) an explanation of what is not immediately plain or explicit; 2) an explanation of actions, events, or statements by pointing out or suggesting inner relationships, motives, or by relating particulars to general principles; or 3) an understanding or appreciation of a situation in light of individual belief, judgment, interest, or circumstance.

The interpretation may be mononuclear, with the interpretation occurring in the satellite (INTERPRETATION-S) or in the nucleus (INTERPRETATION-N); or it may be multinuclear (INTERPRETATION), with the interpretation occurring in one of the nuclei.

21. LIST (multinuclear)

Definition: A LIST is a multinuclear relation whose elements can be listed, but which are not in a comparison, contrast or other, stronger type of multinuclear relation. A LIST relation usually exhibits some sort of parallel structure between the units involved in the relation. At lower levels of the discourse structure, such as between clauses or sentences, a LIST relation is often selected when there is some sort of parallel syntactic or semantic structure between the units, such as in the examples below. At higher levels of the discourse structure, the relation may be found when there are paragraphs of items enumerated in a similar fashion.

22. MANNER (mononuclear)

Definition: A manner satellite explains the way in which something is done. (It sometimes also expresses some sort of similarity/comparison.) The satellite answers the question “in what manner?” or “in what way?”. A MANNER relation is less “goal-oriented” than a MEANS relation, and often is more of a description of the style of an action.

23. MEANS (mononuclear)

Definition: A means satellite specifies a method, mechanism, instrument, channel or conduit for accomplishing some goal. It should tell you how something was or is to be accomplished. In other words, the satellite answers a “by which means?” or “how?” question that can be assigned to the nucleus. It is often indicated by the preposition *by*.

24. OTHERWISE (both)

Definition: This is a mutually exclusive relation between two elements of equal importance. The situations presented by both the satellite and the nucleus are unrealized. Realizing the situation associated with the nucleus will prevent the realization of the consequences associated with the satellite. This relation may also be multinuclear.

25. PREFERENCE (mononuclear)

Definition: The relation compares two situations, acts, events, etc., and assigns a clear preference for one of the situations, acts, events, etc. The preferred situation, act, event, etc. is the nucleus.

26. PROBLEM-SOLUTION (multinuclear), PROBLEM-SOLUTION-N (mononuclear), PROBLEMSOLUTION-S (mononuclear)

Definition: In a problem-solution relation, one textual span presents a problem, and the other text span presents a solution. The relation may be mononuclear or multinuclear, depending on the context. When the problem is perceived as more important than the solution, the problem is assigned the role of nucleus and the solution is the satellite. The relation PROBLEM-SOLUTION-S should be selected in this case. When the solution is the nucleus, use the label PROBLEM-SOLUTION-N; when the relation is multinuclear, use the relation PROBLEM-SOLUTION.

27. QUESTION-ANSWER (multinuclear), QUESTION-ANSWER-N (mononuclear), QUESTIONANSWER-S (mononuclear)

Definition: In a question-answer relation, one textual span poses a question (not necessarily realized as an interrogative sentence), and the other text span answers the question. The relation may be mononuclear or multinuclear, depending on the context. When the question is perceived as more important than the answer, the question is assigned the role of nucleus and the answer is the satellite. The relation QUESTION-ANSWER-S should be selected in this case. When the answer is the nucleus, use the label QUESTION-ANSWER-N; when the relation is multinuclear, use the relation QUESTION-ANSWER.

28. REASON (both)

Definition: In a REASON relation, the nucleus must be an action carried out by an animate agent. Only animate agents can have reasons for performing actions. You can paraphrase it as “Satellite is the reason for Nucleus.” In cases where both spans appear equally important, select the multinuclear REASON.

29. RESTATEMENT (mononuclear)

Definition: A restatement relation is always mononuclear. The satellite and nucleus are of (roughly) comparable size. The satellite reiterates the information presented in the nucleus, typically with slightly different wording. It does not add to or interpret the information.

30. RESULT (mononuclear)

Definition: The situation presented in the satellite is the cause of the situation presented in the nucleus. The result, which is the nucleus, is the most important part. Without presenting the satellite, the reader may not know what caused the result in the nucleus. In contrast to a PURPOSE relation, the situation presented in the nucleus of a result relation is factual, i.e., it is achieved. The intention of the writer is to emphasize the result. When the cause is the nucleus, select the mononuclear relation

CAUSE. When it is not clear whether the cause or result is more important, select the multinuclear relation CAUSE-RESULT.

31. RHETORICAL-QUESTION (mononuclear)

Definition: In a RHETORICAL-QUESTION relation, the satellite poses a question vis-a-vis a segment of the text; the intention of the author is usually not to answer it, but rather, to raise an issue for the reader to consider, or to raise an issue for which the answer should be obvious.

32. SAME-UNIT

Definition: A pseudo-relation used as a device for linking two discontinuous text fragments that are really a single EDU, but which are broken up by an embedded unit. Examples of embedded units that can break up other EDUs include: relative clauses, other nominal postmodifiers, parentheticals, participial clauses, etc. By convention, this relation is always multinuclear.

33. SEQUENCE

Definition: A SEQUENCE is a multinuclear list of events presented in chronological order.

34. STATEMENT-RESPONSE (multinuclear), STATEMENT-RESPONSE-N (mononuclear), STATEMENT-RESPONSE-S (mononuclear)

Definition: In a STATEMENT-RESPONSE relation, one textual span presents a statement and the other span makes some sort of response to it. The statement may be one actually spoken by someone or the author's statement of a situation. Similarly, the response may be one actually spoken or a situational response to what is occurring in the statement portion. When the statement is perceived as more important than the response, the statement is assigned the role of nucleus and the response is the satellite. The relation STATEMENT-RESPONSE-S should be selected in this case.

When the response is the nucleus, use the label STATEMENT-RESPONSE-N; when the relation is multinuclear, use the relation STATEMENT-RESPONSE.

35. TEMPORAL-BEFORE (mononuclear)

Definition: In a TEMPORAL-BEFORE relation, the situation presented in the nucleus (often realized as a superordinate clause) occurs before or leading up to the situation in the satellite (often realized as a subordinate clause). When the relation is multinuclear but the spans occur in reverse temporal order i.e., the situation presented in the second span occurs before the situation presented in the first span select the multinuclear relation INVERTED-SEQUENCE.

36. TEMPORAL-SAME-TIME (both)

Definition: In a TEMPORAL-SAME-TIME relation, the situations presented in the nucleus and satellite occur at approximately the same time, or at least there is an overlap between the two situations. This relation can be mononuclear or multinuclear.

37. TEMPORAL-AFTER (mononuclear)

Definition: In a TEMPORAL-AFTER relation, the situation presented in the nucleus (often realized as a superordinate clause) occurs after the situation presented in the satellite (often realized as a subordinate clause). When the relation is multinuclear, and the spans occur in temporal order i.e., the situation presented in the second segment occurs after the situation presented in the first segment select the multinuclear relation SEQUENCE.

38. TOPIC-COMMENT (multinuclear)

Definition: A general statement or topic of discussion is introduced, after which a specific remark is made on the statement or topic. This relation is always multinuclear, as both spans are necessary to understand the context. When the spans occur in the reverse order, with the comment preceding the topic, the relation COMMENT-TOPIC is selected.

39. TOPIC-DRIFT (both)

Definition: The relation TOPIC-DRIFT is used to link large textual spans when the topic drifts smoothly from the information presented in the first span to the information presented in the second. The same elements are in focus in both textual units. While this relation may be either mononuclear or multinuclear, it is usually multinuclear. Only select mononuclear if the relative size or importance of one of the spans is less significant than that of the other.

[

40. TOPIC-SHIFT (both)

Definition: The relation TOPIC-SHIFT is used to link large textual spans when there is a sharp change in focus going from one segment to the other. The same elements are NOT in focus in the two spans. While this relation may be either mononuclear or multinuclear, it is usually multinuclear. Only select mononuclear if the relative size or importance of one of the spans is less significant than that of the other.

Some Examples From the Corpus

ANALOGY

Multinuclear Example:

(4) [[*çünkü o bir kuştur*³] [*insan değil*⁴]] [[*annesini unutsa*⁵] [*birşey olmazdı*⁶]]_{stu_7}

The relation in the above example applies between units 3-4 and units 5-6.

ANTITHESIS

Example:

(5) [*gerçi artık ne kadar çalışsa da*] [*bulamazdı.*]_{stu_6}

ATTRIBUTION

Examples:

(6) [*Ailesinin orda olduğunu*] [*biliyordu sanki.*]_{stu_22}

(7) [*Bir çiçek onları karşıdaki evdeki çocuğun beslediğini*] [*söyledi.*]_{stu_10}

BACKGROUND

Example:

(8) [*Tam olarak cesaretini toplamıştı artık.*] [*Yarın sabah ailesini bulmak için yola çıkacaktı.*]_{stu_32}

CAUSE

Example:

(9) [*Hiç bir yerde yoktular.*] [*Tam çaresizliğe kapılacakken*]_{stu_11}

CAUSE-RESULT

Example:

(10) [*Cesareti olmadığından*] [*kalmıştı burada ya.*]_{stu_4}

CIRCUMSTANCE

Example:

(11) [*Sonunda zavallı yorgun düşmüş,*] [*soğuktan kıpırdayamaz hale gelmişti.*]_{stu_12}

COMMENT

Example:

(12) [*ve coşkuyla yanlarına gitti.*] [*Biraz tedirgindi.*]_{stu_41}

COMMENT-TOPIC

Example:

(13) [*O eski pırıl pırıl depoydu.*] [[*Ailesini gördü.*] [*Onlara doğru uzandı*] [*ya da çalıştı*] [*ama olmadı.*]]_{stu_34}

CONCESSION

Example:

(14) [*Bahanelerinin nedeni içini rahatlatmaktı*] [*aslında gitmek istemiyordu.*]_{stu_36}

CONCLUSION

Multinuclear Example:

(15) [*ve yalnızlığa mahkum kalacak.*] [*Kendiyle başbaşa kalacaktı.*]_{stu_15}

CONDITION

Example:

(16) [*annesini unutsa*] [*birşey olmazdı*]_{stu_7}

CONSEQUENCE-s Mononuclear Example:

(17) [*sonra birden evleri sallanmaya başladı*] [*kuş dışarı çıktı*]_{stu_1}

APPENDIX G: SAMPLE TREE STRUCTURED ANALYSES

Stu #	Sample RST Trees Built
3	<p>statement-response-s</p> <p>1-2 attribution (1) Birden bire ailesinin nerde olabileceği (2) aklima geldi.</p> <p>3 background (3) Akıldan geçen çok uzaktaki bir ahırdı.</p> <p>4 temporal-before (4) Oraya yol almaya başladı.</p> <p>4-6 temporal-before (4) Oraya yol almaya başladı.</p> <p>5-6 elaboration-additional (5) Birdenbire havanın değiştiğini gördü. (6) Gittiği yerde iklim farklıydı.</p> <p>7-8 attribution (7) Karşısına çıkan herkese ailesini (8) sordu.</p> <p>8-9 temporal-after (8) sordu. (9) Sonunda tahmin ettiği yerde buldu ailesini.</p>
6	<p>1-8 Topic-Shift</p> <p>1-3 background (1) Tabii bu sadece sanki kelimesinde kalmıştı.</p> <p>2-3 Contrast (2) Birçok yaz ayı gelmiş; (3) fakat ailesi buraya bir daha hiç gelmemişti.</p> <p>4-8 elaboration-additional (4) O hala onları bulmaya korkuyordu.</p> <p>5-6 antithesis (5) gerçi artık ne kadar çalışsa da (6) bulamazdı.</p> <p>6-7 Reason (6) bulamazdı. (7) bulamazdı.</p> <p>7-8 elaboration-additional (7) Olaydan tam 2 yıl geçmişti. (8) Bu 2 yıldan arta kalan sadece özlem ve gözyaşları olmuştu.</p>

Stu #	Sample RST Trees Built
25	
37	

APPENDIX H: EXPERIMENTAL RESULTS

Stu #	Gen.	Grade	D.T.R. TOTAL	C.T.R.	H/L Conv. Group	H/L Diver. Group	No.of EDUs	tot. disc.rel. (type)	No.of words	types of sch.	no.of satel.
1	Fem.	7th	3	0	Low	Low	18	12	63	4	5
2	Mal.	7th	8	2	Low	High	7	6	39	1	3
3	Mal.	7th	3	3	Low	Low	9	6	35	1	5
4	Fem.	7th	0	1	Low	Low	12	10	37	1	3
5	Mal.	7th	3	3	Low	Low	3	2	17	1	1
6	Fem.	7th	5	4	Low	High	8	6	44	2	4
7	Mal.	7th	7	6	High	High	7	6	19	1	2
8	Fem.	7th	3	3	Low	Low	9	7	57	1	3
9	Mal.	7th	1	2	Low	Low	15	11	51	1	6
10	Fem.	7th	13	4	High	High	16	10	77	1	6
11	Fem.	7th	6	5	High	High	18	9	78	2	7
12	Fem.	7th	2	5	High	Low	26	13	81	3	8
13	Mal.	7th	5	4	Low	High	23	17	58	3	6
14	Mal.	6th	8	2	Low	High	3	2	14	1	1
15	Fem.	6th	2	4	High	Low	4	3	10	1	1
16	Fem.	6th	3	4	Low	Low	5	4	31	1	2
17	Mal.	6th	17	4	High	High	6	5	28	1	2
18	Fem.	6th	5	7	High	High	8	6	31	2	2
19	Fem.	6th	2	2	Low	Low	11	8	56	3	4
20	Mal.	6th	3	3	Low	Low	8	6	28	1	2
21	Fem.	6th	4	3	Low	High	14	10	68	3	2
22	Fem.	7th	2	7	High	Low	10	8	38	2	3
23	Mal.	7th	2	4	Low	Low	17	10	77	2	5
24	Fem.	8th	2	6	High	Low	7	6	23	1	3

Stu #	Gen.	Grade	D.T.R. TOTAL	C.T.R.	H/L Conv. Group	H/L Diver. Group	No.of EDUs	tot. disc.rel. (type)	No.of words	types of sch.	no.of satel.
25	Mal.	8th	25	10	High	High	9	5	18	3	2
26	Fem.	8th	7	10	High	High	8	4	36	2	2
27	Fem.	8th	1	3	Low	Low	8	6	50	1	3
28	Mal.	8th	3	10	High	Low	7	5	32	1	3
29	Fem.	8th	8	9	High	High	1	0	6	0	0
30	Mal.	8th	0	9	High	Low	3	1	3	1	0
31	Mal.	7th	4	5	High	High	21	11	93	3	8
32	Fem.	8th	7	3	Low	High	15	10	73	2	6
33	Fem.	6th	2	6	High	Low	7	6	34	1	2
34	Fem.	6th	4	3	Low	High	30	15	106	3	6
35	Mal.	6th	3	4	High	Low	9	7	33	2	3
36	Mal.	8th	18	9	High	High	20	13	58	3	7
37	Mal.	6th	1	4	Low	Low	9	4	47	2	1
38	Mal.	6th	5	3	Low	High	11	7	48	3	4
39	Fem.	8th	2	2	Low	Low	21	14	66	3	5
40	Mal.	6th	2	3	Low	Low	6	5	20	1	2
41	Fem.	6th	7	4	High	High	29	14	84	3	10
42	Fem.	8th	12	5	High	High	15	11	69	2	4
43	Mal.	8th	5	3	Low	High	14	11	55	2	4
44	Fem.	8th	5	4	Low	High	22	10	81	2	9

APPENDIX I: THE ETHICAL DETAILS OF THE STUDY

The Ethical Issues Applied in the Classroom Environment

The parental consent forms (See Appendix A) were distributed to the students one week before than the study by the school administration of ODTÜ Geliştirme Vakfı Ankara Okulu İlköğretim Bölümü. Unfortunately only 6th grade students returned their parental consent forms. The 7th and 8th graders had been asked for their consent by their teachers in the class whether their parents objected to their participation in the tests. The students stated no objections. Then they were asked whether they were willing to participate in the experiment. Only the ones willing to participate in were given the informed consent form (See Appendix A) plus the other materials in 7th and 8th grades. In the 6th grade, only the ones with the positive parental consent form were given the informed consent form plus the other materials. And all of the students were informed that they had a right to withdraw the experiment any time they felt to. And some of the students (majority from 6th grade) withdrew during the experiment. After signing the informed consent forms, the participants have been informed about the tests. Before administering the test, children were informed about the debriefing form (See Appendix A) to read after the testing session.

The Ethical Issues Applied at Home

Parental consent forms and informed consent forms were distributed to the test administrators to distribute to the subjects. Then test administrators had the forms signed. After getting the consent forms with the signatures, the material was given to the test administrators to administer the tests. They were informed that there were 5 documents and a debriefing form to read after the session.