



UCAM

UNIVERSIDAD CATÓLICA
DE MURCIA

FACULTAD DE CIENCIAS SOCIALES,
JURÍDICAS Y DE LA EMPRESA

ADMINISTRACIÓN Y DIRECCIÓN DE EMPRESAS

“Adjustments in Business Education for
Enhanced Analogical Transfer”

Autor:

Christian Mayer

Directores:

Prof. Dr. Gonzalo Wandosell

Prof. Dr. Oliver Gansser

Murcia, el 9 de noviembre de 2015

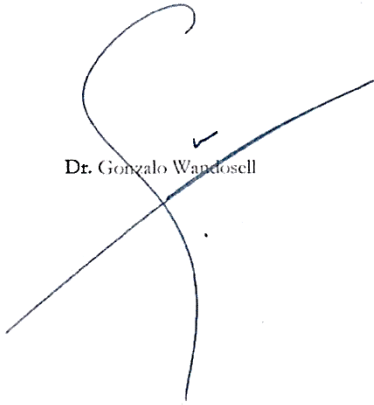


**AUTHORIZATION OF THE DIRECTOR OF THE THESIS
FOR SUBMISSION**

Prof. Dr. Oliver Gansser and Prof. Dr. Gonzalo Wandosell Fernández de Bobadilla as Directors⁽¹⁾ of the Doctoral Thesis "Adjustments in Business Education for Enhanced Analogical Transfer" by Mr. Christian Mayer in the Departamento de Ciencias Sociales, Jurídicas y de la Empresa, **authorizes for submission since it has the conditions necessary for his defense.**

Sign, to comply with the Royal Decrees 99/2011, 1393/2007, 56/2005 y 778/98, in Murcia 1th of November 2015.


Dr. Oliver Gansser


Dr. Gonzalo Wandosell

⁽¹⁾ If the thesis is directed by more than one Director must noted and sign both.

Tercer Ciclo. Vicerrectorado de Investigación
Campus de Los Jerónimos. 30107 Guadalupe (Murcia)
Tel. (+34) 968 27 88 22 • Fax (+34) 968 27 85 78 - C. e.: tercerciclo@pdi.ucam.edu

ACKNOWLEDGEMENTS

Writing a doctoral thesis is a challenging and long-lasting project. I could not have been successful without the support of a few people I would like to thank.

First of all, I have to thank my doctoral supervisor Prof. Dr. Gonzalo Wandosell for his kind support and helpful feedback over the last years. Also, I have to especially thank my second supervisor Prof. Dr. Oliver Gansser for all the motivating discussions and the fact of always having time for me when next steps had to be defined.

Moreover, I want to thank my brother, Fabian Mayer, for his technical assistance and always having an open ear when things became too much to handle, and my sister Katrin, for being such a precious and caring aunt for my daughter.

Also, I am very grateful to have such great parents, who supported me in so many different manners and encouraged me to go my way since I was born.

Last but not least I have to mention two more persons. I would like to thank my wife, Claudia, for her love, patience and understanding. Without her, covering my back all the time, I would have failed. Finally, I have to apologize to my beloved daughter, Annika, for being at the library and not at home for so many Saturdays and evenings over the last years. This thesis is dedicated to Claudia and Annika.

TABLE OF CONTENT

List of Figures	11
List of Tables.....	13
1 Introduction of the Topic.....	15
2 Relevance in the Context of Business Administration	17
3 Problem Defintion and Research Questions	21
4 Structure of Dissertation.....	25
5 Theoretical Part: State of Research.....	27
5.1 Theoretical Background of Analogical Transfer.....	27
5.1.1 General Definition of Analogy	27
5.1.2 Classification of Analogy in Reasoning	31
5.1.2.1 Deduction	31
5.1.2.2 Induction.....	31
5.1.2.3 Analogy.....	32
5.1.3 General Process of Analogical Reasoning	33
5.1.3.1 Retrieval.....	34
5.1.3.2 Mapping.....	34
5.1.3.2.1 Structure-Mapping Theory	34
5.1.3.2.2 Multiconstraint Theory	38
5.1.3.2.3 Mapping Process and Additional Factors.....	42
5.1.3.3 Evaluation.....	44
5.1.3.4 Learning.....	45
5.2 Educational Context.....	47
5.2.1 Teaching with Case Studies	51
5.2.2 The Case Study Approach in Business Administration.....	52
5.2.3 Case Studies in the Context of Analogy	55

5.3	Relevant Parts of Reasoning Process in Education	58
5.3.1	Retrieval of Analogs	58
5.3.1.1	Novice vs. Expert	62
5.3.1.2	Time Delay	63
5.3.1.3	External Hints	63
5.3.1.4	Goals of Analogizer	64
5.3.1.5	Auditory vs. Written Presentation	64
5.3.1.6	Schema Quality	65
5.3.2	Excursion: Definition of Schemata	66
5.3.3	Schema Abstraction	70
5.3.3.1	Comparison	71
5.3.3.2	Source Penetration via Variation	74
5.3.4	Reflection in an Educational Context	78
5.3.4.1	Comparison	79
5.3.4.1.1	Process	80
5.3.4.1.2	Content	81
5.3.4.1.3	Consideration of Prior Studies	83
5.3.4.2	Variation	87
5.4	Literature Overview and Key Issues	89
6	Research Gaps and Hypotheses	91
6.1	Re-evaluating Comparison Approach	91
6.2	Variation of Case Studies	94
6.3	Overview of Key-Hypotheses	102
7	Experimental Part: Testing Hypotheses	103
7.1	Experimental Design	103
7.1.1	Definition of Teaching Process	105

7.1.2	Underlying Principle of Cases.....	107
7.1.3	Methodology	108
7.1.3.1	Study 1.....	108
7.1.3.2	Study 2.....	111
7.1.3.3	Measuring Performances	115
7.1.4	Case Development.....	117
7.1.4.1	Study 1.....	117
7.1.4.2	Study 2.....	127
7.1.5	Content and Objectives Study 1	129
7.1.5.1	Group 1	129
7.1.5.2	Group 2	131
7.1.5.3	Group 3	132
7.1.5.4	Group 4	134
7.1.6	Content and Objectives - Study 2.....	134
7.1.6.1	Online Retrieval Case - Group 1, 2, 3, 4.....	134
7.1.6.2	Online Case - "No Education"-Group	135
7.2	Results.....	136
7.2.1	Study 1	136
7.2.2	Study 2.....	140
7.3	Summary of Hypotheses and Further Results.....	150
8	Conclusions.....	153
8.1	Limitations of Research	153
8.2	Discussion of Results and Future Research.....	155
8.3	Recommendations for Business Education	160
	References	163
	Appendix	177

LIST OF FIGURES

Figure 1: Lava lamp analogy	29
Figure 2: Analogy and literal similarity	30
Figure 3: Process of analogical reasoning	33
Figure 4: Systematicity	37
Figure 5: Mapping process	43
Figure 6: Example of re-representation.....	46
Figure 7: Content and context of case studies.....	55
Figure 8: Examples of Aesop's fable in terms of relations	68
Figure 9: Retrieval, schema abstraction and schema quality	78
Figure 10: Selection of principles in business administration	82
Figure 11: Case as used in analogical reasoning experiments	84
Figure 12: Experimental cases and educational cases	86
Figure 13: Literature overview	90
Figure 14: Experimental design.....	104
Figure 15: The meeting	118
Figure 16: The video game	119
Figure 17: The meeting – extended.....	123
Figure 18: The video game – extended	126
Figure 19: The driver-problem	128

LIST OF TABLES

Table 1: Interpretation rules of analogy	36
Table 2: Determination of chosen information by analogizer's goals	41
Table 3: Possible schemata of business principles	69
Table 4: Convergence schema.....	72
Table 5: Juxtaposition of characteristics of cases	92
Table 6: Applied types of variation	95
Table 7: Question technique variation	98
Table 8: Process of teaching	105
Table 9: Juxtaposition of cases - incl. cases dissertation.....	133
Table 10: Number of participants of study 1.....	136
Table 11: t-Test results of groups 1, 2	137
Table 12: ANOVA average values of groups 1, 2, 3, 4.....	138
Table 13: ANOVA results of groups 1, 2, 3, 4	139
Table 14: t-Test for time consumption of groups 2, 3	140
Table 15: Number of participants of study 2.....	140
Table 16: Chi-Square distribution of 'age'	141
Table 17: Chi-Square distribution of 'sex'	142
Table 18: Chi-Square distribution of 'negotiation'	142
Table 19: Chi-Square distribution of 'degree'	143
Table 20: Chi-Square distribution of 'apprenticeship'	143
Table 21: Chi-Square distribution of transfer groups 1, 2, 3, 4, 5.....	144
Table 22: Chi-Square distribution of transfer groups 1, 2.....	145
Table 23: Chi Square distribution of transfer groups 1+2, 5	145
Table 24: Chi-Square distribution of transfer groups 1+2, 4.....	145

Table 25: Chi-Square distribution of transfer groups 3, 5.....	146
Table 26: Chi-Square distribution of transfer groups 3, 4.....	146
Table 27: Chi-Square distribution of transfer groups 4, 5.....	147
Table 28: Further results of studies.....	148

1 INTRODUCTION OF THE TOPIC

“The details of knowledge which are important will be picked up ad hoc in each avocation in life, but the habit of the active utilization of well understood principles is the final possession of wisdom.”

Alfred North Whitehead (1967, p. 37)

In the sense of Alfred North Whitehead, a famous Philosopher and Mathematician, not received knowledge-details, but the transfer of principles is crucial. In business administration many principles exist. With such principles managers often got in touch within the scope of their former education. Later, in their real business lives, they try to apply these learned principles to current problems and, thereby, reason by analogy.

However, managers often fail to remember or correctly apply the principles they once learned or experienced. This can lead to wrong decisions and result in fatal company developments. Therefore, the improvement of correct retrievals of principles is an important issue. According to that, the author decided to focus on this problem in his doctoral thesis.

In order to increase the performance of the application of correct analogies and based on theoretical findings, a large experiment was conducted. First, the author applied existing models of receiving sound abstractions to circumstances as they are prevailing in business education. The results of this part of the experiment have already been discussed on an international conference and published as a paper.¹ The paper has been peer reviewed by at least two academic members of the institute (Mayer and Gansser, 2015, p. 2). Second, the author developed a question technique that allows students to more thoroughly abstract principles in education. This approach was also successfully evaluated in the experiment.

Summarized, the thesis contributes to an improvement of principle abstraction in business education and, therefore, the retrieval and correct application of principles in later situations in real-business life.

¹ see Mayer and Gansser (2015).

2 RELEVANCE IN THE CONTEXT OF BUSINESS ADMINISTRATION

Nowadays managers need to show fast reactions in a highly dynamic environment and have decreasingly time to make them (Bleicher, 2011, p. 59).² Moreover, many decisions lack of structure and clear set goals and show risks (Dubin, 2007, p. 3). In order to reach decisions and accelerate the decision making process, managers can rely on their own former made experiences. For generating strategic options, managers can compare their current business problem with another situation they have either personally experienced in prior career steps, in their education or by searching for other companies that already went through this problem.

They are using analogies in order to connect the current problem with an identical situation (Gavetti *et al.*, 2005, p. 691; Farjoun, 2008, p. 1001; Gavetti *et al.*, 2008, p. 1017; Gary *et al.*, 2012, p. 1229; Lovallo *et al.*, 2012, p. 496; Gavetti and Rivkin, 2005, p. 1). This could lead to a reduction of complexity, minimizes uncertainty and creates new insights (Schwenk, 1984, p. 117). Additionally, in order to simplify the characteristics and advantages of highly complex products and IT-services, entrepreneurs and company founders use analogies to communicate their ideas with the help of already understood and familiar examples to investors and banks (Vohle and Reinmann-Rothmeier, 2000, p. 2). Communicating the idea with the help of a familiar analog which demonstrates the tremendous potential of the new invention, could help to convince creditors.

As an example for a famous analogy in business serves the process to the development of Intel's entry to the lower price segment (see Gavetti and Rivkin, 2005, p. 1). Intel's top management visited a training class at Harvard where a case was discussed that dealt with the steel business in the United States in the 1970s. The young company Minimills had positioned itself at the lower end segment by producing cheap rebars. US Steel and other established companies, which were only positioned in the higher end price segments of the steel industry, neglected

² To read on in the context of this dilemma, called „scissor of time“, compare Bleicher (2011, pp. 56 et seq.).

Minimills and disposed this market segment to it. However, by time, Minimills started to position itself also in higher priced segments and all other companies realized that they should have had intervened earlier. The management of Intel took the lesson that losing the low end in present could lead to losing the high end in future. In consequence, Intel began to develop cheaper processors in order to also cover this market segment.

Another example for an analogical well-adapted business solution is about the company Circuit City and its entry to the car market (see Gavetti and Rivkin, 2005, p. 1). With its concept of a broad assortment, professional and friendly sellers who always had to be fair-minded to their customers, the company was successful in the consumer electronics industry in the 1970s in the United States. In the 1990s, the company then entered the industry of used-cars with the explanation that their business of electronics showed a high similarity to the used-car industry. They referred to the bad reputation of predominantly small used-car sellers with limited selection that often betrayed customers. Therefore, they argued, the success formula of their way of selling electronics would also be applicable to the used-car industry – and they should be proven right over the following decades.

However, when looking for some identical analogs in order to solve a problem, people often get distracted by similar superficialities instead of focusing on the structurally identical relations of both situations (Gentner and Markman, 1995, p. 111; Gentner *et al.*, 1993, p. 524; Gentner and Markman, 1997, p. 45; Gentner and Toupin, 1986, p. 277; Holyoak and Koh, 1987, p. 332). In consequence, wrong analogies lead to wrong decisions which could have a fatal impact on the strategic development of the company (Gary *et al.*, 2012, p. 1229; Gavetti and Rivkin, 2005, p. 1). Such dangerous focus on superficial characteristics also can be demonstrated with numerous examples from real business life.

In this context, the management of Ford pinpointed the identical supply chain of Dell computers and wanted to adapt their virtual integration of suppliers due to the fact that both companies assembled their products with the help of standardized components (see Gavetti and Rivkin, 2005, p. 4). However, this is one important aspect, but another one shows that the analogy is not really working: the prices of computer components strongly decrease monthly which plays an important role for Dell's management of the supply chain, whereas the car

components' prices remain relatively stable. Therefore, following this analogy that is not thoroughly based on a complete set of important structural commonalities, would be very costly and dangerous.

Another example shows the fatal impact of following wrong analogies. In order to expand business, Managers of Enron, an established and big US gas and electric supplier, were detecting business models related to their own one. The apparent characteristics were about “fragmented demand, rapid change due to deregulation or technical progress, complex and capital-intensive distribution systems, lengthy sales cycles, opaque pricing, and mismatches between long-term supply contracts and short-term fluctuations in customer demand” (Gavetti and Rivkin, 2005, p. 4). The managers thought that their business model could be transferred to markets that show these characteristics. As a result of their investigations, they thought the broadband market would fit to these characteristics. However, in this context some very important differences were ignored (e.g. unproven technologies, dominated by strong players avoiding Enrons engagement, no comparable standard contracts, delivery to the final customers). These differences resulted in losses and finally contributed to the collapse of Enron.³

The mentioned examples have shown the importance of considering analogizing in the context of business administration. Additionally, some other effects do strongly influence decision making processes in companies. Two of them will be shortly introduced due to the fact that they strengthen the danger for analogies only based on superficialities.

First, the anchoring effect states that if an analog – or generally an idea – is already introduced within an organization or management team, it is difficult to replace it (Furnham and Boo, 2011, pp. 35 et seq.). This was effectually demonstrated with a simple study (see Gavetti and Rivkin, 2006, p. 4). Participants were asked to estimate the percentage of African countries in the United Nations. Before guessing, they had to turn a roulette table including numbers from 0% to 100%. The roulette results had a strong impact on the estimations of the participants. Lower percentages at the roulette led to lower estimations regarding

³ To read on in the context of Enron's collapse see Frenzt (2003, p. 1).

the percentage of African countries in the United Nations and vice versa. The point is, that even if the analogy is based on superficial similarities, it is hard to displace it after it has once been verbalized.

The second effect is called confirmation bias and refers to the tendency of seeking only information that confirms the beliefs of oneself (Nickerson, 1998, pp. 175 et seq; Gavetti and Rivkin, 2006, p. 4). The general focus on confirming ("a yes-response", Gilovich, 1991, p. 33) instead of challenging beliefs could be demonstrated by the following example (see Gilovich, 1991, p. 33). Four cards were given to participants, all with a letter on the one side and a number on the other. However, for the participants only one side was visible ("A", "B", "2", "3"). They were then told – either right or wrong – that cards with a vowel on it do have an equal number. They should now prove the statement. In doing so, besides for looking at the other side of the "A", many people look for the "2" in order to confirm the statement. However, turning the "2" does not lead to any clarity, due to the fact that also a consonant does not hurt the statement. Nevertheless, people are turning the "2" in order to receive a clear confirmation instead of turning the number 3, which would clearly provide an answer by disconfirming (turning a vowel).

In the following dissertation such additional biases will not be considered further. This is up to the fact, that the focused educational approach in business initially tries to help to enable people to draw correct analogies – focused on structural not superficial similarities. While the dissertation focuses on improvements in retrieving sound analogs, the above mentioned effects occur when an assumed correct analog has already been retrieved.

3 PROBLEM DEFINITION AND RESEARCH QUESTIONS

Even though managers often use analogies, in business education this has not been considered to an adequate level yet. Some results of experiments have shown that with the help of hints, people were able to retrieve correct analogs (Gentner *et al.*, 2003, p. 393; Gick and Holyoak, 1983, p. 1). However, after the education is over, in business life, the likeliness of receiving such external hints is very limited (Gary *et al.*, 2012, p. 1234). The Harvard Business School released a guideline for managers in order to avoid superficial analogies (Gavetti and Rivkin, 2005, p. 5). Conversely, such a guideline is nothing managers put on their desk in order to adjust their daily decisions. They would also need a hint to use this guideline before trying to analogize.

In order to train managers to retrieve correct analogs from their long term memory, one important aspect is that they need to abstract relevant schemata (Gick and Holyoak, 1983, p. 1) during their prior education. When reasoning by analogy, these schemata could later get retrieved.

In business education, case studies are one of the most common teaching methods (Garvin, 2003, p. 56). Moreover, in the context of analogy, they provide a simulated real-life situation whose underlying principles students can store and later use to solve their current problems (Kolodner, 1997, p. 57; Gavetti and Rivkin, 2006, p. 2). However, in literature it is criticized that normally only one case is provided per class and students do not abstract relevant schemata from a single example (Gentner *et al.*, 2003, p. 404).

In order to improve schema abstraction and receive proper schema quality and, therefore, increase the probability for retrieving the principle when later needed, multiple examples sharing the same underlying structural principles should be provided in class (Gentner *et al.*, 2003, p. 404). Moreover, the lecturers should encourage students to compare the examples. This will result in an abstraction of the underlying principle. Comparisons of situations have shown successful schema abstraction in a series of experiments in literature (Gick and Holyoak, 1983, p. 1; Kurtz *et al.*, 2013, p. 1303; Gentner *et al.*, 2009, p. 1343; Markman and Gentner, 2000, p. 501; Thompson *et al.*, 2000, p. 60).

Notwithstanding, these results are based on the comparison of cases that strongly vary from the cases as they are used in real business education. For example, for each class at least two analog examples must be provided instead of the usually practiced single case. The suggested comparison approach would impact the current teaching approaches (e.g. longer preparation time for lecturers and students). Moreover, real business cases are very much longer, including more relevant and irrelevant information. However, people are sensitive regarding the amount of details they receive about a situation (Mandler and Orlich, 1993, p. 486). The details in case studies could distract people from recognizing the structural commonalities. Moreover, if people work with more extensive cases, the higher cognitive load could avoid recognition of structures. People are less able to recognize structural relations, if the working memory is demanded higher (Tohill and Holyoak, 2000, p. 30). Finally, by working with business case studies, many objectives should be reached, meaning for instance the improvement of diagnostic and persuading skills (Garvin, 2003, p. 60). They are not only developed to facilitate later analogical reasoning.

This poses two questions. First, are the results for schema abstraction and retrievals as positive for real business cases as they were for the used experimental cases of prior studies? Second, independently from the effectiveness of the comparison approach, it takes very much effort to include this in the common business teaching approach – is there an alternative?

With the help of an experiment, both questions will be evaluated and answered in this dissertation. In the context of the first question an evaluation of the schema quality of answers of participants took place. For answering question two, the author developed a methodology which enables the student to vary a case.

The variation of a situation has already been proven to be an effective method to abstract high quality schemata (Schilling *et al.*, 2003, p. 39; Gary *et al.*, 2012, p. 1229; Mandler and Orlich, 1993, p. 485). However, it has not been applied in the context of case studies and business education yet. This methodology would be applicable with less effort to normal teaching by case studies in business classes (e.g. still having only one case to prepare and work with instead of two when applying the comparison approach).

Summarized, the research objectives of the dissertation are the following. First, the comparison approach will be verified under conditions that are much closer to real business education with case studies. Second, for the first time, a variation approach will be developed and tested within education with case studies.

4 STRUCTURE OF DISSERTATION

After having already introduced the topic and demonstrated its relevance in the context of business administration, first, a general definition of analogical reasoning and analogical transfer will be provided and analogy will be classified within the common types of reasoning.

Subsequently, the author is going to provide a general overview of all process parts of analogical reasoning and its most relevant theories. This part should shed light on the whole cognitive procedure of drawing analogies.

In the aftermath, the educational context will be introduced. The case study approach and its advantageous characteristics for analogical reasoning will be explained.

After that, the author discusses influencing factors on the retrieval step of analogical reasoning, which is crucial for education. As an important influencing factor, the schema quality will be considered. Two possibilities for schema abstraction will be discussed in detail. First, schema abstraction via comparison of examples and second, via variation of an example.

In the following, both options will be critically reflected and verified for the applicability in the context of teaching with case studies. Consequences of the application of the approaches of comparison and variation will be evaluated. Prior studies in this context will be discussed.

An overview of literature will close the theoretical part of the dissertation.

Next to this, the research gaps will be defined and the hypotheses derived. The comparison approach must be re-evaluated in the scope of business case studies. Additionally, variation will be applied to case studies. An overview of hypotheses will be provided.

In the experimental part of the dissertation, first, the experimental design will be explained. The teaching process, as assumed in reality and simulated in the experiment, will be introduced. Moreover, the principle that was used in the experimental cases is explained. Next, the methodology of study 1 and study 2 will be discussed including the way of how the performances were measured. Subsequently, the author shows how the experimental cases were developed. This

is followed by an explanation of the exact content and the objectives of all experimental groups of study 1. Next, study 2 including the retrieval-case and the control group will be introduced.

After having described the experimental framework, the results of both studies are discussed in detail. All hypotheses will be evaluated and all results are summarized.

The dissertation will be closed by mentioning the limitations of the conducted studies. Moreover, implications of this work for future research will be shown. Finally, some recommendations for future education in business administration will be provided.

5 THEORETICAL PART: STATE OF RESEARCH

First of all, a short general definition and a classification of the placement of analogical reasoning within the well-known types of reasoning by “deduction” or “induction” will be delimited. After that, the constituent parts of an analogy will be conveyed in detail. The most important theories implicated in the single process steps of drawing analogies and the educational context and the case study approach in business administration will be introduced. In the aftermath, the step of retrieval will be discussed in detail. As an important driver for retrieval, the schema quality of the source will be discussed, followed by an evaluation of two ways to reach schema abstraction. Finally, these possibilities of receiving schema quality will be reflected in an educational context and a general literary overview will be provided.

5.1 THEORETICAL BACKGROUND OF ANALOGICAL TRANSFER

5.1.1 General Definition of Analogy

Thinking and reasoning with analogies is omnipresent in all human beings' daily lives, as people by facing a new problem often say “Ah, I've seen this before” and fall back to a prior experience for a solution (Gavetti and Rivkin, 2005, p. 3). Analogical reasoning is often considered as a fundamental part of human cognition (Gentner and Smith, 2012, p. 130) and one of its core functions (Dunbar and Blanchette, 2001, p. 334; Gentner, 2002a, p. 106).

Generally, an analogy is characterized by a familiar situation (often referred to as source or base domain) which is taken to explain another, maybe new, domain (labeled as target). Experiences with a familiar example will be generalized to the new situation and, therefore, the last one will be perceived as another type of an already known example (Gentner and Holyoak, 1997, p. 32). The analogy is the relation between the original and the model (Seel, 2003, p. 202). In other words, knowledge of the source is “imported” (Blanchette and Dunbar, 2001, p. 730) to an unfamiliar situation. Transferring the known source structure to the target

structure is called analogical transfer (Gavetti *et al.*, 2005, p. 693; Klauer, 1989, p. 179; Gick and Holyoak, 1983, p. 2).

Reflecting the relevance of analogies, the ability of drawing them is often verified within psychological intelligent tests, where they are mostly expressed in four-term sequences like A:B:C:? (Holyoak and Thagard, 1996, p. 28). For example, such a term could express “a cap is to head as shoe to what? (cap : head ; shoe : ?). The answer is substituting the missing part (“foot”). “cap : head” builds the source. The knowledge of the source is taken to complete the target “shoe : ?” by the appropriate solution “foot”.

However, reasoning by analogy not only takes the initially given information, but extends these by generating inferences to the new situation (Holyoak, 2005, p. 118). Thus, propositions known from the source will be “copied with substitution” (Holyoak and Thagard, 1996, p. 30), meaning that known and true propositions of the source will become inferences about the target. This is what good analogies are characterized by: an exposure to common structures and suggesting further inferences (Gentner and Colhoun, 2010, p. 35). In this context, the more the two analogs (source and target) are isomorph⁴, the more plausible are the inferences to the target (Holyoak and Thagard, 1996, p. 29). However, a guarantee for correctly supposed inferences never exists.

For example (see Gentner, 1983, p. 156), the statement “an electric battery is like a reservoir” expresses that people transfer their knowledge from (known) reservoirs to (unknown) electric batteries. The reservoir serves as the familiar source and its attribute, or at least one or some of them, are taken to explain an unknown and apparently different target (the electric battery). The core analogy is that both, the domain and the target, store energy and provide it to other systems or components. The inference here seems to be plausible and true. However, the inference “the electric battery is also full of wet content” is not as easy to judge and, at least at the first glance, might be right or wrong.

Analogical reasoning is about the identification of relational commonalities of two situations (Gentner, 1983, p. 162). Such a structural connection between both

⁴ Meaning that one-to-one correspondence and structural consistency are fully given, for a more detailed explanation see point 5.1.3.

objects is crucial, whereas a superficial similarity could be given, but is not obligatory for good and valid analogies (Gentner *et al.*, 2001, p. 2; Holyoak, 2005, p. 123; Gentner and Markman, 1997, p. 47). Therefore, two situations are referred as analogous if common underlying structural relationships exist even though the superficialities, meaning the attributes of the situation, may be different (Holyoak, 2005, p. 123). In the example above, a reservoir and a battery both could have a cylindrical form, but this is no condition for the validity of the common relational structure (Gentner, 1983, p. 156).

The example of Gentner and Smith (2013, p. 670; based on Tolley and Richmond, 2003, p. 218) filters the analogy, the common structural relation of source (lava lamp) and target (earth), which is the principle of thermal convection as illustrated in Figure 1.

"The bulb at the bottom of the lava lamp slowly begins to heat the solid lava on top of it. As its density is reduced by thermal expansion, the lava begins to rise. The lava continues to rise to the top of the lamp and away from its heat source; thus, it begins to cool and sinks back to the bottom of the lamp. As the lava begins to heat up again, the process starts anew.
Likewise, the earth's outer core begins to heat the solid mantle above it. The mantle then begins to rise toward the surface and away from the outer core; consequently, the mantle begins to cool."

Figure 1: Lava lamp analogy

Source: Gentner and Smith, 2013, p. 670; based on Tolley and Richmond, 2003, p. 218

Due to the common structural relation but no shared attributes, the "Analogy" is placed at the top of Figure 2 on the left side.

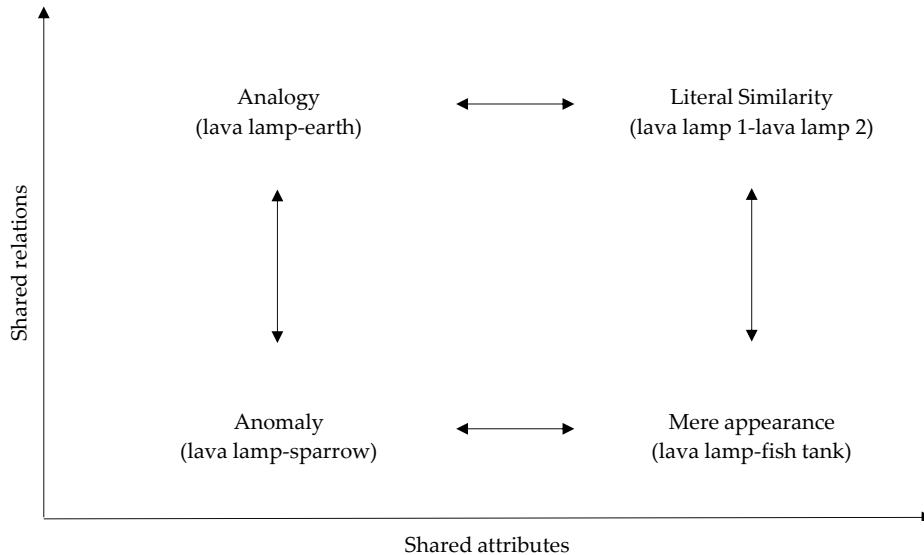


Figure 2: Analogy and literal similarity

Source: Gentner and Colhoun, 2010, p. 40; Gentner and Markman, 1997, p. 48

A “literal similarity” could be a comparison between two lava lamps, sharing the same attributes as well as the same structural relations. Therefore, it is placed at the top on the right side of the illustration. According to the fact, that an analogy must share structural relations and can also share similarities on the attribute level, a literal similarity could be also considered as an analogy. A “mere appearance”, meaning both situations sharing many attributes but no common relations is placed at the bottom on the right side of the graphic. In the example this could refer to a comparison of a lava lamp and, e.g. a fish-tank. Finally an “anomaly” has no shared attributes nor shared relations, and is therefore placed at the bottom on the left side. For example, comparing a lava lamp with a sparrow.

5.1.2 Classification of Analogy in Reasoning

In this chapter a classification of analogy within the reasoning types of deduction and induction is discussed.

5.1.2.1 *Deduction*

Using deductive reasoning, people apply existing rules and general knowledge for creating inferences and solving their specific problem (Edelmann, 2000, p. 141). It is about deviating a solution from the general to the specific (Solso, 2005, p. 385).

Provided having correct underlying premises, the solution of the problem will always be true (Solso, 2005, p. 386). If clear rules and information exist, deduction can be effectively used (Gavetti and Rivkin, 2005, p. 2). For instance, a legal law of a city could state that, as an act of kindness to its citizens, between Christmas and New Year's Day no tickets will be handed out by traffic wardens for not paying for parking. In that case everyone could deduce and definitely rely on the fact that he will not have to pay for his parking violation during this time period.

However, if receiving rich data, it is very time-consuming to analyze and interpret all information (Gavetti and Rivkin, 2005, p. 2), as it could happen with very complicated legal texts when exporting certain products to new countries. Moreover, the access to the needed data is not always given (Gavetti and Rivkin, 2005, p. 2), as often no detailed market analyses for developing countries are available. Finally, deduction never explores new knowledge, it always only deals with existing evidences (Seel, 2003, p. 193).

5.1.2.2 *Induction*

In contrast to deduction, solutions based on using inductive reasoning are not derived from existing underlying general rules. By inductive reasoning people conclude from specific examples to general rules (Solso, 2005, p. 393).

All scientific laboratory and field studies only cover a certain context. Provided that a statistical representativeness is given, the results and conclusions of those inductive observations serve as the base for generalization (Smaling, 2008,

p. 53). Induction is a powerful scientific weapon to generate new knowledge (Gentner, 2002ba, p. 108). Following Holyoak and Morrison (2005), the core of inductive reasoning “lies in its ability to take us beyond the confines of our current evidence or knowledge to novel conclusions about the unknown” (p. 95). Moreover, compared to deduction, induction is much closer to daily decisions made in the real world (Solso, 2005, p. 394). One reason is that this kind of reasoning does not need too many data and a lot of time to analyze and interpret them. Referencing to the above mentioned example of parking violation, for instance, no general legal law exists. However, maybe it could be experienced that even though not paying the parkometer between Christmas and New Year’s Day no parking tickets were received (while already having gotten one at this parking place at another time). After having observed this for several years it could be derived that the city does not want its traffic wardens to distribute parking tickets in this period of time (maybe as an act of kindness to its citizens).

However, there is no guarantee of the correctness of drawn general conclusions that are based on a number of tested single examples – even though the number is high (Seel, 2003, p. 195; Holyoak and Morrison, 2005, p. 96). The inductive conclusion of the parking ticket example might be right, but does not have to.

5.1.2.3 *Analogy*

Within an analogy, the drawn inferences from the source to the target are more or less plausible assumptions but no guaranteed implications (Holyoak and Thagard, 1996, p. 21). For example, in one city it is regulated by law or it was experienced, that no parking tickets are distributed by traffic wardens between Christmas and New Year’s Day. It was known or expected that this happened to please citizens during this time. Therefore, after moving to another city, it could be derived that – based on the assumption the new city also wants to please its citizens – also no parking tickets will be distributed during this time in the new town.

The developed inferences could be correct or incorrect, a guarantee for their trueness does often not exist. Consequently, besides statistical generalization, analogy is another very important form of inductive reasoning (Holyoak, 2005, p. 117; Smaling, 2008, p. 56).

5.1.3 General Process of Analogical Reasoning

The upcoming chapter will provide a general overview of the analogical reasoning process and its single components and corresponding theories. Finally, the relevant steps within the objectives of the dissertation will be highlighted.

Psychological and computational scientists differ in how strongly they emphasize the meaning of the components of an analogy regarding their impact on reasoning quality (e.g. Kolodner, 1997; Gentner, 1983; Novick and Holyoak, 1991; Gick and Holyoak, 1980, 1983). However, in literature exists an agreement regarding the generally involved steps of an analogy, which are: retrieval, mapping and evaluation (Gick and Holyoak, 1980, p. 380, 1983, p. 11; Novick and Holyoak, 1991, p. 398). The actual reasoning process ends here. However, some authors add learning in different forms in the hindsight of the analogical reasoning process itself (e.g. Gentner and Colhoun, 2010, p. 38; Gentner and Smith, 2013, p. 678).

Even though Holyoak (2005, p. 118) excludes the step of evaluation and reduced learning to schema abstraction, that is one form of learning via analogical reasoning, in his illustration (Figure 3), the general process of analogical reasoning is visualized.

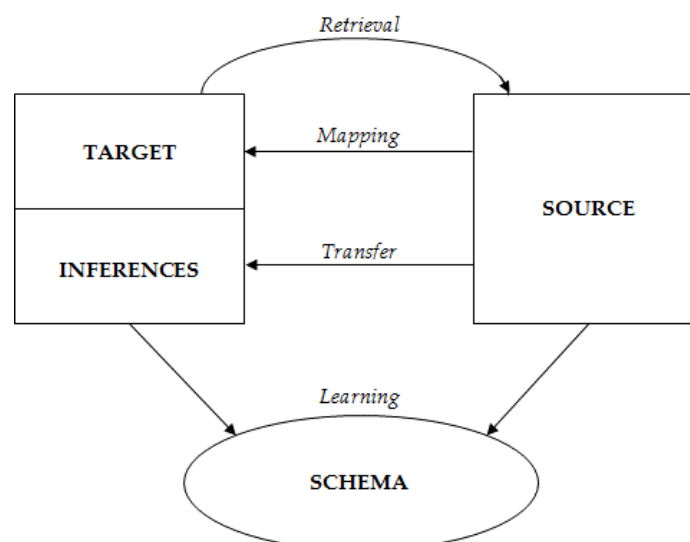


Figure 3: Process of analogical reasoning
Source: Holyoak, 2005, p. 118

A current problem situation (target situation) reminds the analogist of a prior and (maybe) useful experience (source analog). Having retrieved a proper analog, a mapping has to take place in which relational commonalities are spotted and potential inferences from the source to the target are transferred (Gentner and Smith, 2013, p. 670). The non-shown step in the illustration of evaluation takes place subsequently (Holyoak and Thagard, 1996, p. 10). Afterwards, as one form of learning, often a more abstract schema is reached, which could be used as a generalization for a certain kind of situation of which the starting target and its mapped source are examples (Holyoak, 2005, p. 118).

These steps will be discussed in detail in the following part of the dissertation.

5.1.3.1 *Retrieval*

Having a current problem in working memory, a prior situation will be retrieved from the long-term memory (Gentner and Colhoun, 2010, p. 37). Even though this is the first step of all analogical reasoning – without having source and target already given – the author will postpone this step to a later chapter.

5.1.3.2 *Mapping*

If a source is available (due to the previous step of retrieval), the analogist is going for the mapping step. The mapping represents the “essence” (Gick and Holyoak, 1983, p. 2) respectively the “core process” (Gentner and Smith, 2013, p. 668) of analogical reasoning. Traditionally, it is the most deeply and thoroughly researched part within the reasoning steps (Gentner and Colhoun, 2010, p. 36).

Within the mapping, a structural alignment between the commonalities of the source and the target has to take place. Moreover, from known facts of the source, inferences have to be made to the target. With the help of two relevant theories chiefly affecting the mapping process, in the following it will be introduced how the alignment and inferences are run.

5.1.3.2.1 *Structure-Mapping Theory*

In the 1980s Dedre Gentner developed the structure-mapping theory of analogy, which is essential to understand the procedure of generating analogies in cognition. Within the use of analogies the theory primarily focuses on the mapping

process. According to this theory the mapping is about defining a structural alignment between two analogs and projecting inferences (Gentner, 1983, p. 155).

Gentner claimed that in analogy, the core similarity⁵ is about the relations between the domains, no matter to what extent the analogs are also similar in other ways (Gentner, 1983, p. 155). This focus on structural relations without being interested in superficialities allows to compare cross-domain situations and not only works with analogs sharing the same context (Gentner, 1983, p. 167). Both, the finding of superficial and relational similarities, takes place by comparisons of situations (Gentner and Markman, 1997, p. 47; Gentner, 1983, p. 161).⁶

Alignment

For generating analogies a finding of structural alignments between the target and the source has to take place (Holyoak, 2005, p. 117). This alignment is characterized by the inherent interpretation rules of analogy which are relational focus, one-to-one correspondence, structural consistency and systematicity (Gentner, 1983, p. 157).

Table 1 illustrates the first three of the four interpretation rules of Gentner's structure-mapping theory.

⁵ At the beginning of research similarity and analogy have been understood as cognitively different things. Analogies were perceived as intelligent and sophisticated processes for problem solving and creative solutions, whereas similarity was understood as a simple and obvious perceptual process that also animals could show (Gentner and Markman, 1997, p. 45). Later insights were expressed by the slogan "similarity is like analogy" (Gentner and Markman, 1995, p. 111).

⁶ The rules of interpretation have also been transferred to computer simulations (structure mapping engine [SME]). To read on in this context see Falkenhainer *et al.* (1986) and Keane *et al.* (1994).

<p>Hercules (a Great Dane) chases Fifi (a Chihuahua), Fifi runs away. Chasing is the cause of the running.</p> <p>chase (Hercules, Fifi) name: chase-1 run (Fifi) name: run-1 cause (chase-1, run-1) name: cause-1</p>	<p>Detective chases Hero. Hero runs away. Chasing is the cause of the running.</p> <p>chase (Detective, Hero) name: chase-2 run (Hero) name: run-2 cause (chase-2, run-2) name: cause-2</p>
<p>Relational Focus (Hercules/Detective/Fifi/Hero → objects); (chase-1/chase-2/cause-1/cause-2 → relations). The analogy is drawn by relations, not by single objects.</p> <p>One-to-One (Hercules → Detective; Fifi → Hero; chase-1 → chase-2; run-1 → run-2; cause-1 → cause-2)</p> <p>Structural Consistency (cause → chase) following: (Hercules → Detective)</p>	

Table 1: Interpretation rules of analogy

Source: Own illustration based on Holyoak and Thagard, 1996, p. 29; Gentner, 1983, p. 156; Gentner and Markman, 1997, p. 47

A relational focus states that, as already discussed, analogies must share a common structural relation whilst do not necessarily be identical on a superficial level, meaning that they do not have to own the same objects (Gentner and Markman, 1997, p. 47). An object is a single element within the whole context (e.g. a dog or the leg of a dog).

A mapping is one-to-one if all objects or relations of the base can be connected to a single element in the target and the other way around (Holyoak and Thagard, 1996, p. 29).

Structural consistency refers to the need to also map the objects⁷ when mapping two relations (Holyoak and Thagard, 1996, p. 29).

If the interpretation rules of one-to-one correspondence and structural consistency are both fully satisfied, the mapping of an analogy is called an isomorphism (Holyoak and Thagard, 1996, p. 29).

Additionally, when comparing a target situation with a source domain, only certain identical objects and/or relations are selected whilst others are not chosen

⁷ Or propositions if dealing with higher-order relations.

(Gentner and Markman, 1995, p. 126). It is supposed by the structure-mapping theory that an important factor for choosing commonalities is systematicity. Whilst the relational focus states the difference between related and non-related objects, the systematicity rule defines the difference between first-order and higher-order relations within an analogy. Analogies tend to match connected systems of relations (Gentner, 1983, p. 157). This means that relations belonging to a system of higher order relations will be rather perceived (Gentner and Toupin, 1986, p. 296) and preferred (Gentner and Markman, 1997, p. 47) by drawing an analogy than isolated relations not belonging to a higher-order system.

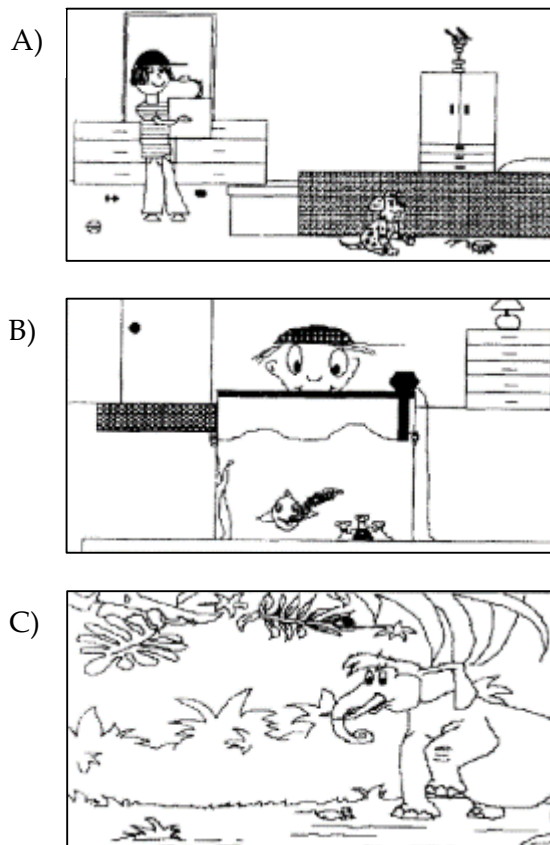


Figure 4: Systematicity

Source: Gentner and Markman, 1997, p. 50

Comparing the illustration A with B in Figure 4 emphasizes the commonality that both show a child looking at a pet. However, comparing picture A with C highlights the commonality that in both an animal is frightened by another animal. In essence, the emphasized information build an interrelated relational system. Vice versa, commonalities not connected within the relational system are generally neglected (e.g. also in A and B are dressers).

Inferences

An isomorphism, as mentioned above, is not always given. In that case, inferences from the source to the target have to be made. True propositions from the known source will be inferred and assumed as to be also true for the unknown target.⁸ This structural completion with the help of such a candidate inference could help to explain the target. The systematicity principle not only guides the alignment process, but also suggests that analogists are strongly influenced by it when drawing inferences: the deeper causal relations are, the higher the probability to be chosen (Gentner and Colhoun, 2010, p. 37).

Additionally to systematicity, another relevant factor is influencing the mapping process and is named transparency. If the objects play the same roles and the relational structures are identical (or at least similar) and vice versa⁹, the analogy is highly transparent (Gentner and Smith, 2012, p. 134, 2013, p. 675; Gentner and Kurtz, 2006, p. 635). As already explained in the context of Figure 2, those analogies are often literally similar and, therefore, easier to align. In contrast, a low-transparency analog is one in which identical (or similar) objects have different roles within the relational structure (Gentner and Smith, 2012, p. 134).

5.1.3.2.2 *Multiconstraint Theory*

Keith Holyoak and Paul Thagard developed the multiconstraint theory a few years later as Gentner came up with her structure-mapping theory. Whilst Gentner's theory mainly focuses on the mapping process with its interpretation

⁸ Termed as "copying with substitution" by Holyoak and Thagard (1996, p. 30).

⁹ Meaning objects playing different roles are not identical or at least dissimilar (Gentner and Smith, 2012, p. 134).

rules, the multiconstraint theory also significantly sheds light on the retrieval step and the evaluation of the use of analogies. However, due to the fact that the multiconstraint theory also generated insights into the “heart” (Gentner and Colhoun, 2010, p. 37) of the analogy process, the mapping, Holyoak’s and Thagard’s theory will be allocated to this process step.¹⁰

The multiconstraint theory builds on and extends prior researches on analogy – foremost it includes gained knowledge from Gentner’s structure-mapping theory. Gentner’s theory is strongly syntactically, whilst the multiconstraint theory rules are more pragmatically oriented. It is a general theory of how analogies can be used to extend knowledge in human daily lives (Holyoak and Thagard, 1996, p. 15). The theory also contains some rules how the use of analogy is guided (Holyoak and Thagard, 1989, p. 302).¹¹

Alignment

The rule of structure (one-to-one correspondence and structural consistency) is already analyzed by the structure-mapping theory and within the multiconstraint theory almost superposable. Also, within the mapping process, Holyoak’s and Thagard’s constraint of similarity is close in its understanding to Gentner’s theory, meaning the existence of superficial and structural similarities in analogy. Gentner emphasizes the role of structural relations within an analogy in general; meaning that an analogy could also show superficial commonalities, but the quality of the analogy depends on the structural relations. The multiconstraint theory does not argue against this but highlights the importance of similarities – no matter if superficial and/or structural – especially their influence while retrieving for a matching analog (Holyoak and Thagard, 1989, p. 304). However, within the theory, similarity plays a maybe even more important role in the retrieval of potential sources, as it was discussed in point 5.1.3.1.

¹⁰ Its relevance for the other steps is discussed in 5.1.3.1 and 5.1.3.3.

¹¹ The rules have also been transferred to computer simulations (Analogical Constraint Mapping Engine [AMCE]). To read on in this context compare Holyoak and Thagard (1989); Keane *et al.* (1994).

Beside structure and similarity, Holyoak and Thagard emphasize the purpose, respectively the goals of the analogist, as one more guiding rule. A constraint in their theory refers to the purpose, to the goals an analogy is to be made for. In this context the important role of analogies for problem solving and decision making becomes clearer. For example in politics, law and business, analogies are often used to receive arguments for persuading counterparts to adapt the path that should be chosen from the analogist's perspective.¹² Therefore, the thinker's background, the reason why he is using an analogy, plays a very important role (Holyoak and Thagard, 1989, p. 34).

In order to reduce all available information, the analogizers only select those helping to satisfy their goals (Holyoak and Thagard, 1996, p. 34). This is an important assumption during the mapping process¹³ when it is about to select which relations should be highlighted and reflects an important difference to the structure-mapping rules. Within the structure-mapping theory the selection of relations in the mapping process is guided by systematicity as explained above, within the multiconstraint theory it is determined by the goals of the analogist.¹⁴ Within comparable analogs the emphasized information of the thinker can strongly differ as Table 2 shows.

¹² For examples of analogy in politics compare Holyoak and Thagard (1996). For an example in law compare Schauer (2009). For examples in business compare point 0 of this thesis.

¹³ As well it is important for the retrieving step, see 5.1.3.1.

¹⁴ Gentner confirms the guidance of purpose within analogies for the retrieval and evaluation process but not within the mapping process (see Gentner, 1983, 1989).

Goal Understanding in terms of baseball how cricket is played.		Goal Understanding the role of baseball / cricket in American / British social life.	
Important Rules of the two games.	Unimportant Americans drinking beer / British tea in breaks.	Important Americans drinking beer / British tea in breaks.	Unimportant Rules of the two games.

Table 2: Determination of chosen information by analogizer's goals

Source: Own illustration according to the example of Holyoak and Thagard, 1996, p. 35

Depending on the goal of the analogizers, they are either driven by the rules of baseball (as the source) or by the role of baseball in social life. Consequently, the information emphasized as important strongly differs.

Inferences

As mentioned above, the theory extends research of Gentner's structure-mapping theory. Whilst Gentner is arguing that purpose and goals of the analogist do only play a role before and after the mapping process, Holyoak and Thagard state that this constraint plays an important role in all steps of analogy – the mapping as well (Holyoak and Thagard, 1989, p. 302). Therefore, within the multiconstraint theory also the drawn inferences are guided by the pragmatic factor of the analogist's goals.

Regarding the analogist's goals a final remark has to be made. Holyoak and Thagard always interpreted their pragmatic approach to analogy in the context of problem solving. This is owed to the fact, that if goals are the drivers of the analogy, always a context has to be given that determines what is significant before analogical reasoning can take place (Gentner, 1989, p. 219). Therefore, some problems arise if analogies should be interpreted without a problem definition or in an isolated way. For example, Francis Bacons analogy "all rising to a great place is by a winding stair" is not interpretable in Holyoak's interpretation (Gentner, 1989, p. 219). Moreover, Gentner criticizes that if only the goal orientation counts, there is no room for unexpected outcomes in an analogical interpretation, e.g. scientific discoveries (1989a, p. 219).

Even though Gentner's arguments are valid, due to the fact that in daily business' lives analogies are mostly used in order to solve problems (Gary *et al.*, 2012, p. 1229; Gavetti *et al.*, 2005, p. 692), in the context of this dissertation the problem oriented approach will be followed.

Following Holyoak and Thagard, their three constraints (similarity, structure, purpose/goals) of building analogies do not appear as hard rules, "instead, they function more like the various pressures that guide an architect engaged in creative design, with some forces in convergence, others in opposition, and their constant interplay pressing toward some satisfying compromise that is internally coherent" (Holyoak and Thagard, 1997, p. 36). Within the multiconstraint theory one-to-one correspondence and structural consistency are viewed as a kind of "soft" constraints. Meaning that even though these rules are not fully satisfied, an analogy could be coherent anyway (Holyoak and Thagard, 1996, p. 29).

5.1.3.2.3 *Mapping Process and Additional Factors*

According to the structure-mapping theory and the theory of multiconstraints, the mapping process consists of a structural alignment and inferences that are predominantly driven by some rules. Structural alignment brings together both, representations of target and source and inferences arise if differences between the analogs are recognized (Gentner and Smith, 2013, p. 670). Figure 5 reflects the mapping process again.

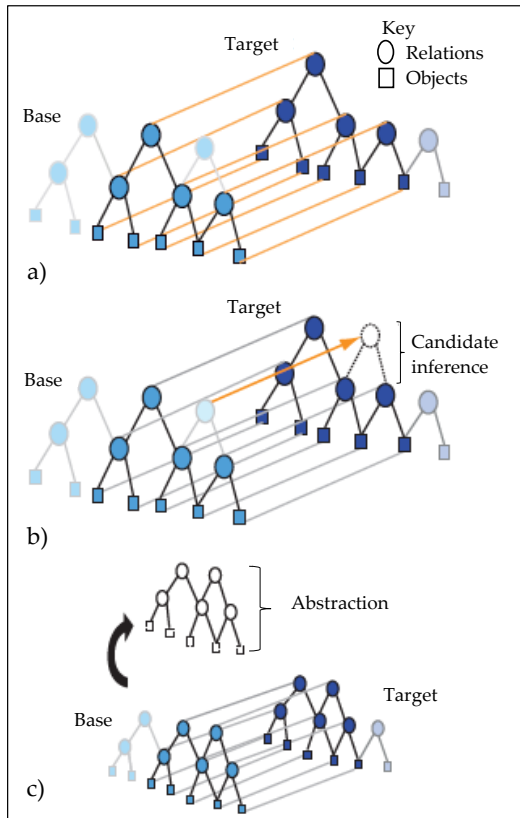


Figure 5: Mapping process

Source: Gentner and Smith, 2012, p. 132

First, a starting alignment of the structural commonalities takes place (important here are the rules of one-to-one correspondence and structural consistency). Second, for the completion of the structural patterns between the analogs, one or more candidate inferences are generated. This can only take place if both analogs are not isomorphic. If so, the first step will complete the analogy and no inferences can be drawn. As a result of both steps, often a common principle owning the same structural relations can be abstracted, what will be discussed in the learning process step (see point 5.1.3.4).

Beside factors influencing the mapping itself, some other drivers can determine this process. These factors are connected to the analogist and, in addition to the goals of the thinker as explained in the context of the multiconstraint theory, refer to age and experience (Richland *et al.*, 2006, p. 270; Gentner, 1988, p. 57;

Gentner and Toupin, 1986, p. 277; Ball *et al.*, 2004, p. 503). Summarized, younger children are highly influenced by similarities on the surface level when mapping two analogs. The more the analogy is literally similar (see point 5.1.1) and transparent, the higher their ability to create proper analogies. With an increasing age and experience a “relational shift” (Gentner, 1988, p. 47) from an object focus to a relational focus takes place.

One last point has to be made regarding factors influencing the mapping process. Within this process always two analogs are already available. However, in many cases those two analogs are not given and a source first has to be retrieved from the long-term memory (see point 5.1.3.1).

5.1.3.3 *Evaluation*

After the steps of retrieving a source and mapping it to the target, the analogy and its inferences have to be evaluated. This is a very important step because even though the alignment and the inferences seem to be satisfying, it could happen that the target situation does not develop as it was assumed to do (Holyoak and Thagard, 1996, p. 131). This is owed to the fact that inferences still are a conclusion that could be either right or wrong. Therefore, some critical reflections have to be made in order to ensure, to the extent it is possible, a proper analogy. There are four groups of possible judgments: factual correctness, adaptability, goal orientation and the amount of new knowledge.

In case of incorrect inferences, the whole analogy will be readapted or even completely rejected (Smith and Gentner, 2010, p. 716). However, this sounds logically but very often it is not easy to identify the factual correctness, e.g. working with projections for future developments or in a scientific context (Gentner and Colhoun, 2010, p. 41).

Very close to the factual correctness, the second point refers to adaptability. Keane (1996, p. 1062) stated that the easier inferences can be modified from the source to the target, the better it will be accepted by the analogists.

As already explained in point 5.1.3.2.2, goal orientation is an important driver for the acceptance of the drawn inferences. The more inferences are relevant to the analogists’ goals, the higher is the possibility to positively evaluate them (Holyoak and Thagard, 1996, p. 35).

Finally, in the evaluation the question of how much new knowledge the analogy and its inferences have generated is important (Forbus *et al.*, 1997, p. 5; Gentner and Smith, 2012, p. 133). For the analogists it is desired to find and draw inferences providing more new knowledge, even though this might be of some potential risk to fail (Gentner and Smith, 2013, p. 673).

5.1.3.4 *Learning*

After retrieval, mapping and evaluation, the actual analogical reasoning process is over. However, analogy is a very effective learning mechanism, that occurs in four ways: candidate inferences, difference detection, re-representation and schema abstraction (Gentner and Smith, 2013, p. 674; Gentner and Colhoun, 2010, p. 40).

The learning chances with the help of candidate inferences are already discussed in points 5.1.1 and 5.1.3.2 of the dissertation. In general, it is the most obvious learning result and the deepest researched field (Gentner and Smith, 2013, p. 674).

During the alignment in the mapping step of analogy process, commonalities are spotted. However, the concentration on commonalities automatically makes visible the differences (Gentner and Markman, 1994, p. 152). Moreover, Markman and Gentner (1993a, p. 517) found out that a correlation between the number of commonalities and the number of differences that can be aligned exists. For instance, participants dealing with the pair “car-motorcycle” mostly listed “both have wheels” (= commonality) and “cars have four wheels, motorcycles two” as a difference (Gentner and Smith, 2013, p. 676). During the mapping, therefore, the differences also come to the mind of the analogist and subsequently enable learning by contrast (Gentner and Smith, 2013, p. 676).

Re-representation is an effective learning mechanism. Normally both, relations of the target of one domain as well as the source of one domain, are represented separately from each other in mind when starting to analogize (Gentner and Smith, 2013, p. 677). However, after an analog has been highlighted (e.g. through an instructor) the more abstract common relation of those different domains replaces the relations of the two analogs by re-representation (Yan *et al.*, 2003, p. 6; Kotovsky and Gentner, 1996, p. 2797). For example, focusing on both

pictures in Figure 6 separately, in the first one “a car is being towed” and in the second one “a boat is hitched to a car”. Though, after both pictures have been structurally aligned, the single representations are re-represented more abstract by “a vehicle towing another conveyance”.

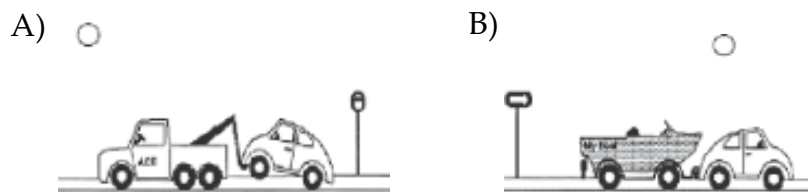


Figure 6: Example of re-representation
Source: Gentner and Smith, 2013, p. 671

A final possibility of learning, schema abstraction, will become a significant part in this dissertation (see points 5.3.1.6 and 5.3.3).

5.2 EDUCATIONAL CONTEXT

After having described the whole analogical reasoning process and before discussing the important components of analogy in more detail within an educational context, a framework for such an educational context has to be provided.

In business, managers often face new situations and problems and in order to solve them they take already mastered prior problems as analogical sources (Gavetti and Rivkin, 2005, p. 54; Gary *et al.*, 2012, p. 1229; Gavetti *et al.*, 2005, p. 692). The problem of not being able to access such relevant knowledge when needed, even if it is slumbering in memory, is known as the inert-knowledge problem (Whitehead, 1959, p. 3). In order to generate analogies, such prior learned knowledge must be available in memory. Wrong retrieved analogs or not found proper analogous situations in memory at all, are an instance of the inert-knowledge-problem. The accessing of prior knowledge that has been learned once before and being able to apply it to later real-life situations in a changed and different context is one of the biggest challenges in educational research (Barnett and Ceci, 2002, p. 613). Therefore, an important question in education is how to overcome the inert-knowledge-problem.

Generally, knowledge in education can be submitted by two methods. First, teachers can provide students with relevant principles and techniques theoretically (teacher-centered-approach¹⁵). Within this approach the lesson is run by the teacher, the students are only recipients of information and often have to learn the subject matters by heart. Normally no activation of the learners during the teaching process takes place.

Second, they can be submitted via the student-centered-approach¹⁶. Within this approach not the teacher, but the students are „on stage“ (Gorlich *et al.*, 2000, p. 4). An active participation of the students in class is demanded. Working with

¹⁵ For more information about the teacher-centered approach see Chall (2000) and for a discussion of its different styles see Grasha (1994).

¹⁶ Both ways of teaching do have long traditions and have proven success – including all their individual strengths and weaknesses. See Lambert and McCombs (1998) for a review of teacher- and student-centered styles.

case studies is the best known and most famous example for this approach. Cases reflect a real-life situation students should immerse themselves in and discuss opinions in class.

Before discussing the question of which approach fits best in the context of analogical transfer, a note has to be made regarding the question of what differs the needs of knowledge learned for analogical transfer and the knowledge learned in any other way. All knowledge that is submitted via education should be retrieved later when needed; this is not exclusive to analogical purposes. Generally, the role of retrieval was underestimated for a long time in educational research (Karpicke, 2012, p. 157). The assumption was that successful learning, meaning a profound encoding of submitted knowledge by learners, in itself is enough for successful learning (Karpicke, 2012, p. 158). Therefore, the focus was based more on processes of how to submit knowledge to learners and less on retrieval mechanisms. Also, in analogical reasoning the step of retrieval was subordinated to the process of mapping that was considered as the heart of analogy (Gentner and Colhoun, 2010, p. 37). Over the last decades, the perception of the importance of the retrieval step increased in all educational disciplines (e.g. Karpicke, 2012, p. 157).

As already discussed, an analogy is often made in a problem solving context and is often applied in a cross-domain context. Analogies are often used to explain new domains with already gained experiences. This means, the knowledge once learned has to be adapted to different circumstances. Moreover, correct analogous retrievals have to consist of structural similarities. Additionally, in real-life for analogous retrieval no external hints are available to facilitate the access to prior knowledge. Finally, an analogical retrieval differs from other retrievals in the form of the needed knowledge. Often principles/techniques and problem solutions serve as analogical sources.

In non-analogical retrievals, the needed knowledge often has to be applied without such specifications. For example, learning grammar and vocabulary and later using it when speaking the language, or by reproducing a poem. Also in tests in school, often knowledge has to be only recalled one-to-one as learned before. Often, it is no inner structural consistency and different context needed, but only

the pure reproduction of knowledge.¹⁷ Also, often hints are provided to access prior learned knowledge, also in business. For example, by working with computer software that shows assistances to your applications. In Microsoft Excel, the user has probably learned once what could be done by a VLOOKUP¹⁸, but the program always provides an overview in the input line of the formula which parts have to be included in which sequence. Another example for external hints in (business) education refers to multiple-choice tests, where (mostly) the correct solution(s) are already represented in the available answers.

Generally speaking, the need of retrieval of learned knowledge is always given in education. However, for analogical purposes the type of knowledge (e.g. structurally related) and the circumstances of retrieval (e.g. no external hints) differ. In the following chapters, retrieval will only be considered in the context of analogical purposes with the main focus of how to increase it.

Now, the question by which methodology of teaching (teacher vs. student-centered) the probability of relational retrieval in analogy is higher has to be answered. Studies have proven that by providing abstract principles to students less analogical transfer took place compared to working with cases (Gentner *et al.*, 2004, p. 4; Loewenstein *et al.*, 2003, p. 125; Thompson *et al.*, 2000, p. 64; Gillespie *et al.*, 1999, p. 368).

For example, Gentner *et al.* (2004, Experiment 2) gave participants an abstract principle and a case, that embedded the principle, to read. Later a face-to-face negotiation took place. Only 19% were able to transfer and applied the principle in the negotiation. In another experiment of Gentner *et al.* (2004, Experiment 1) participants received two separate cases that embedded the same principle. In the later face-to-face negotiation about 33% were able to transfer and, therefore, applied the principle. In both experiments almost none of the participants linked the two cases respectively the principle and the case to each other. Consequently,

¹⁷ To read on in the context of classification of learning targets see Bloom *et al.* (1973).

¹⁸ In Germany: SVERWEIS, in Spain: BUSCARV.

the effect of cases on analogical transfer is higher, than when providing only a principle.¹⁹

Some explanations exist for these results. Abstract principles are generally harder to understand than cases that show a practical application (Forbus and Gentner, 1986, p. 311; quoted from Gentner *et al.*, 2004, p. 5). As a consequence of missed links to the usability of learned principles in reality, the content cannot be referred to daily lives and pupils and students do not consider them as important and are not intrinsically motivated (Konrad, 2005, p. 5). Even though a benefit of the combination between a theoretical principle and an example only arises if both are linked and the case is understood as a practical demonstration of the principle. However, also in this combination people tend to remember for the example and forget the principle (Ross and Kilbane, 1997, p. 427; quoted from Gentner *et al.*, 2004, p. 5).²⁰ Finally, by providing people only a principle, it could get interpreted wrong and, consequently, they do not retrieve it for later analogies (Gentner *et al.*, 2004, p. 5).

For improving analogical transfer performance within an educational frame, the student-centered learning, and within this approach the case study method, is a better fitting instrument. In contrast to abstract principles, case studies provide students with “augment experiences” (Kolodner, 1997, p. 57), they can later retrieve as sources for solving current problems. This is further supported by an experiment of Ross and Kilbane (1997, p. 427, quoted from Bernardo, 2001, p. 628) who trained people in two ways. First, they provided abstract principles and explained this, followed by a problem of how the principle is used. Second, another group, received the principle embedded in a problem, wherein the use of it was illustrated. Also, the principles of how to solve the problem were included in the problem’s illustration. No explicit presentation and explanation of the principle took place in this group. Now, the effect on how the analogical problem solving process was affected by the kind of principle presentation was analyzed. As a result, the people

¹⁹ This is not a general downgrading of the teacher-centered-approach and only refers to the purposes of analogical transfer/retrieval. In reality often hybrid-forms of approaches exist.

²⁰ In the context of analogy this leads to retrievals predominantly based on superficialities (see Gentner and Markman, 1994).

in the group that received the principle explicitly, were much more distracted by superficial similarities. Ross and Kilbane assumed that by the first technique, the participants strongly focused on the context of the example and did not generate the abstract content (structural similarities). However, the group which received the principle embedded, were less distracted by superficialities. As an explanation for this it is likely, that people adopt more “contextualized knowledge” and are less superficial driven, due to the fact that the “abstract principles that need to be applied are functionally related to other elements of the episodic memory trace for the source problem” (Bernardo, 2001, p. 628).²¹

Before discussing case studies in the context of analogy more detailed in point 5.2.3, teaching with case studies in general and its role in business education will be highlighted first.

5.2.1 Teaching with Case Studies

In 1870, the case study method revolutionized the teaching practice. Prior to this, law was predominantly taught by learning original law texts by heart in order to be able to apply them in later court situations (Garvin, 2003, p. 58). Therefore, to overcome with the deficits of such a teacher-centered education, the case-study-approach²² was developed by a dean of the law faculty at the Harvard University and totally reversed its educational approach. From that point on, the students only read precise court examples – embedded in cases – and were asked to derive the underlying law principles. The teaching approach switched from a deductive methodology to an inductive one. Despite some hard resistance of colleagues and students at the beginning, the case study methodology has become widely accepted (Garvin, 2003, p. 59).

²¹ For a controversial discussion to what extent the embedded principal method is generally preferable see Bernardo (2001, p. 630).

²² Cases for research and teaching differ. Where a teaching case only reflects happenings, a research case tries to create new or refines existing theory (Gorlich *et al.*, 2000, p. 2). In the context of this dissertation, case studies are only considered in the context of teaching. For a detailed review of case studies as an instrument for research see Yin (1989).

In general, “a case is a story” (Gorlich *et al.*, 2000, p. 1). Within this story, real-life happenings are reflected to force students to dive into the story in order to distinguish important from unimportant information, identify the problem, formulate (alternative) strategies and state decisions by themselves, in group and class discussion (The Center for Teaching and Learning, 1994, p. 2; Gorlich *et al.*, 2000, p. 1). Nowadays, a lot of different types of case studies exist which could differ, e.g. in their design (single or multiple cases), purpose (research or teaching), data (quantitative or qualitative) and format (e.g. structured or unstructured) (Scholz and Tietje, 2002, p. 3). The sources case studies are generated from are multifaceted. For example, surveys, observation, interviews, experiments, and archival records can serve as potential input (Scholz and Tietje, 2002, p. 7).

Besides the above-mentioned use of case study in law, many other disciplines are using cases studies today in order to “focus on the transition between theory and practice” (Breslin and Buchanan, 2008, p. 36). For example, this refers to business and medicine (see Garvin, 2003, p. 56) and biology (see Zeakes, 1989, p. 33), public policy and international affairs (see Slaughter and Leslie, 1997, Chapters 4, 5, 6).

Finally, researching for a single style of how to correctly teach with case studies is useless. There are many different ways how to integrate cases in classes, depending on teachers and students (Shapiro, 1984, p. 1). Due to the fact, that business case studies from Harvard as the original inventor, are a worldwide benchmark for elaborated and profound cases, in the context of this dissertation the author is going to follow the guidelines and recommendations from the Harvard Business School for teaching with case studies.

5.2.2 The Case Study Approach in Business Administration

Fifty years after introducing case studies in law education, the Harvard Business School also started to develop its own cases. The first case book in business was a collection of business problems. Originally, the case-method at the Harvard business school was termed “problem-method” (Garvin, 2003, p. 60).

The cases in business administration at Harvard serve to improve three capabilities (see Garvin, 2003, p. 61). First, they should develop diagnostic skills.

Second, the ability to persuade other people should be trained. In this context, the crucial element is to discuss the cases in groups and in the whole class. Third, cases set people in the position of making decisions and deal with risks, therefore, prepare them optimal for their later function as managers.²³ One important aspect that differs cases of law and business cases is, that in business cases no decisions (respectively solutions) are stated (Donham, 1922, p. 61).

Finally, another important goal of case studies is to submit general principles to the students (Williams, 1992, p. 418). For analogical purposes this is the main focus. Most cases as used in business show some principal characteristics (see Garvin, 2003, p. 60 et seq.; Donham, 1922, p. 59 et seq.):

- Real situations are described
- No decision is stated
- Often more than one possible option
- Include relevant and irrelevant materials
- Detailed specifics of each business situation
- Often one case per class
- Average of about 10-20 pages, plus 5-10 additional pages with numerical data and illustrations
- Analytical questions for students
- Students put themselves in the role of the protagonist(s) (predominantly in older cases)
- Students need at least two hours to read and prepare before discussing in class

The working process with cases (see Garvin, 2003, p. 61) is based on a preparation of the case by the students and the teacher in advance. Later in class, the discussion starts by either nominating a student before the lecture starts

²³ This ability is crucial for business life but also strongly discussed. The degree between some risks that have to be taken as a successful entrepreneur and breakneck gambling is often small. In this context the case study is often criticized, due to the fact that they probably more often challenge students to take actions instead of being inactive. For a discussion see Garvin (2003, p. 62).

("warm call") or by asking him or her unheralded ("cold call") to first speak about the impressions of the case and the student's recommendations. After the presentation of the single student, now the whole class will be asked for a further discussion. This process is summarized by the 4Ps students have to follow when working with cases at Harvard (see Shapiro, 1984, p. 2) and refer to preparation (without preparation at home, no discussion about the case can take place in groups or class), presence (without attending the class, no insights from group discussion could be gained), promptness (coming late interferes class discussion) and participation (sharing the own understanding and opinion of the case with others).

With the help of questions the lecturers ask, students will be guided and discussions in group and classes are activated. In order to stimulate controversy, the questions of the lecturer are often open-ended. The best questions divide the class's opinion and ask students for decisions that cause lots of different reactions (Garvin, 2003, p. 61). Depending on the case, such questions could strongly vary but the following ones are relevant to almost all cases (see Shapiro, 1975, p. 1):

- Who is the protagonist?
- What are his or her objectives?
- What decisions must I, as the protagonist, make?
- What problems, opportunities and risks do I face?
- What evidence do I have to help me make the decision? Is the evidence reliable and unbiased?
- Can I improve it?
- What alternative courses of action are open to me?
- What criteria should I use to judge the alternatives?
- What action should I take?
- How should I convince others that my approach is best?
- What did I learn from this case?
- How does it relate to past cases?

The objective of the overall process of creating cases and the preparation of them by students at home and their discussion in groups and classes is that students can use all cases they have worked out during their education later in their

business life. The needed retrieval of cases and its mapping to a current problem pinpoints the relevance of them in the context of analogy.

5.2.3 Case Studies in the Context of Analogy

Referring back to the beginning of this chapter, it was mentioned that case studies serve well in the context of analogical transfer. Two analogs, the target and the source, must be of structural relatedness and through an adequate retrieval, such structures must be recognized independent from context. Otherwise, by orienting only on a superficial level, no correct analogy will be drawn. Therefore, the context of all cases that students have prepared during their educations must get ignored and the underlying structures, in the following defined as the content of cases, must be highlighted and saved. Figure 7 illustrates the composition of elements of a case study.

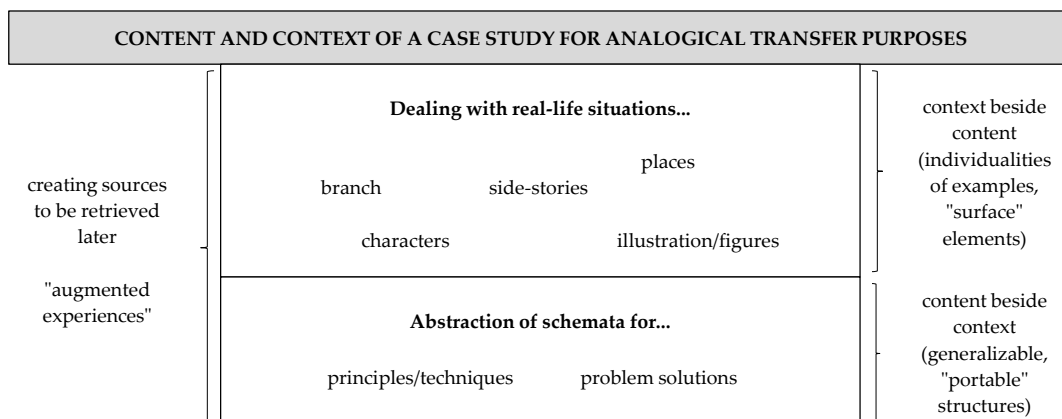


Figure 7: Content and context of case studies

Students dealing with the case study, receive information about the different characters playing a role in the case, the branch, they get some figures about the company's development and further elements. This context is individual and specific for the case. However, within this real-life situations, case studies also deliver principles/techniques²⁴ and problem solutions to the students (The Center

²⁴ In the context of this dissertation principles and techniques should be understood as synonymous.

for Teaching and Learning, 1994, p. 2). These approaches²⁵ are submitted by real-life contexts, but they are representative for many other industries and companies (Hammond, 1980, p. 1). They should get abstracted as schemata or solution plans by students while working on the examples (Loewenstein *et al.*, 2003, p. 120).

In business context, principles/techniques could refer to, for example, strategic choices (cost or quality leadership), a certain technique of entering new markets (waterfall vs sprinkler), principles of dealing with cross country variations (think local, act local; think global, act global; think global, act local) or using negotiation techniques (trade-off, contingent contract).²⁶ Furthermore, insights of the analysis of a case could be also defined as principles and analogically transferred to later situations (Gavetti and Rivkin, 2006, p. 2). As an example serves the profound analogical transfer of the Intel Management (see point 2), stating that losing the low-end today, means losing the high-end tomorrow. Vice versa, the example of Enron shows the misapplication or respectively misremembering of principles. Were they able to transfer the (probably) prior learned principles of branch analyses (e.g. techniques of PEST, Five Forces) they could have identified their wrong inferences in advance.

Summarized, principles/techniques should be derived from cases and later these approaches should be retrieved to solve a current structurally identical analogical problem embedded in different context. The examination with the case, the made conclusions about the problem can be stored in student's memory and later be retrieved for solving analogous problems (Gavetti and Rivkin, 2005, p. 3).

The operationalization of such an approach is defined as a schema. The abstraction of a schema is an important requirement for analogical transfer, that is based on the adaption and application of a solution plan of a prior situation to a current problem (Gick and Holyoak, 1983, p. 2). The question which way of working with case studies supports schema development at best will be discussed as one of the main questions of this dissertation.

²⁵ In the context of this dissertation the terms "knowledge" and "approach" are umbrella terms for principles/techniques and problem solutions.

²⁶ For some literature recommendations to read on in the context of the mentioned principles see point 5.3.4.1.2.

Other targets of case studies (see point 5.2.1) are essential for the overall case study process. However, within the context of analogical transfer, skills like persuading people take a back seat. Persuading and decision making are skills that students will develop over time; by doing many case studies and having lots of discussions. Of course, techniques exist for the facilitation of profound decision making (e.g. decision making trees, brainstorming, PEST- and SWOT analyses), or principles for persuading people (e.g. question techniques, Neuro Linguistic Programming). Such principles/techniques could be retrieved if needed for solving a current problem (e.g. previously taught within a case study). Nevertheless, the actual behavior behind these principles (e.g. balancing risks before making decisions, knowing important interfaces and whom to ask in company and outside, being generally willing to take risks or not, body language and habitus) depend on personal aspects or will be acquired by practicing. These are the aspects to be also developed, mentioned by the specified targets of working with Harvard cases.

5.3 RELEVANT PARTS OF REASONING PROCESS IN EDUCATION

After having discussed the educational framework, in this chapter the most important elements for educational purposes of the analogical reasoning process will be considered. The relevant question is which driver(s) for proper analogical transfer can be influenced by case study teaching. In later situations in real life, only the target is available and a fitting source has to be retrieved for problem solving. The objective of educational approaches is to provide a source that can be retrieved later. Therefore, it is about to find ways to really understand the source situation in order to make it memorable and retrievable.

Having two analogs already presented, the mapping process (see point 5.1.3.2) can take place. In many former experiments in the educational context both analogs were already given (e.g. Gick and Holyoak, 1983, p. 20; Gentner *et al.*, 2009, p. 1346). However, in real life it is about to retrieve proper sources. Only after having retrieved an (apparently) proper source, the reasoning process' next step (mapping) will follow. Therefore, this chapter starts analyzing factors that positively influence the retrieval of adequate sources. Afterwards, the factor that is realizable in an educational context will be further discussed.

5.3.1 Retrieval of Analogs

Before mapping and analogical inference(s) can take place, first, the analogizer has to get an understanding of the target situation and, second, needs to select a source to retrieve from the long-term-memory (Holyoak and Koh, 1987, p. 332).

Deriving a fitting analog from long-term-memory is the starting point of real life analogies (Gentner, 2002, p. 110). While retrieving, the analogizer uses specifications of the target situation and looks for cases in memory that have similar descriptions (Kolodner, 1997, p. 60). However, the retrieval of such learned schemata²⁷ often does not or only incorrectly take place (Gentner and Medina, 1998, p. 263; Gick and Holyoak, 1983, p. 31; Blanchette and Dunbar, 2000, p. 108; Holyoak

²⁷ A definition of a "schemata" will follow in point 5.3.2.

and Koh, 1987, p. 332). Solving real-world problems, one of the largest hurdles is to remember for adequate sources (Kolodner, 1991, p. 52).

Prior research evidences that people are mainly reminded to former experienced situations by superficial similarities that are common to the current target situation or problem and not based on structural relations²⁸ (Gentner *et al.*, 1993, p. 524; Holyoak and Koh, 1987, p. 338; Ross, 1987, p. 629; Gick and Holyoak, 1983, p. 31, 1980, p. 346). For example, with the help of Duncker's (1945) "radiation-problem"²⁹, in a series of experiments of Gick and Holyoak (1980), participants were about to find solutions for structurally identical problems (e.g. "the General"³⁰). Even though the number of correct analogical solutions was in general better than without providing analogous examples, many participants were not able to take benefits from the structurally identical analog provided to them *ex ante*. They showed no or incorrect answers, many of the latter ones based on reminding of superficial attributes of the source. As explained above, in the educational context, this is an instance for the inability to access learned knowledge when needed.

²⁸ For some exceptions regarding spontaneous relational transfer compare Gentner *et al.* (1993, p. 524).

²⁹ "Suppose you are a doctor faced with a patient who has a malignant tumor in his stomach. It is impossible to operate on the patient, but unless the tumor is destroyed the patient will die. There is a kind of ray that can be used to destroy the tumor. If the rays reach the tumor all at once at a sufficiently high intensity the tumor will be destroyed. Unfortunately, at this intensity the healthy tissue that the rays pass through on the way to the tumor will also be destroyed. At lower intensities the rays are harmless to healthy tissue, but they will not affect the tumor either. What type of procedure might be used to destroy the tumor with the rays, and at the same time avoid destroying the healthy tissue?" (Gick and Holyoak, 1983, p. 3). The solution is to apply the high-intensity rays from more than one direction simultaneously.

³⁰ Analog to radiation-problem "the General": "In this story a general wishes to capture a fortress located in the center of a country. There are many roads radiating outward from the fortress. All have been mined so that while small groups of men can pass over the roads safely, any large force will detonate the mines. A full-scale direct attack is therefore impossible" (Gick and Holyoak, 1983, p. 3). The solution is to go with small groups along the roads simultaneously.

As already discussed in point 5.1.3.2, similarity is important for the mapping process when both analogs are represented in the working memory. Whilst structural similarities are highly emphasized in the mapping process, superficial similarities do also play a significant role in the initial step of (correct) retrievals (Gentner and Smith, 2012, p. 133; Gentner, 2002, p. 110).

In 1993, Gentner *et al.* (p. 524) gave participants different stories to learn and tested their ability to retrieve them when after a time delay some targets were presented. These targets were either similar on the base of surface items (e.g. objects) or they were structurally identical sharing the same higher-order relations. In result, the retrievals based on superficial similarities were up to five times more frequent than reminding of structural identical analogs.³¹

Further experiments in this context were conducted by Wharton (1993) and Wharton *et al.* (1994, p. 64; 1996, p. 629). In these experiments students had to find commonalities between target and source stories that showed some intersections regarding the system level, the relational level, both or neither. Moreover, the number of presented target stories, that are in some way related to the first story was varied. As a result, the superficial similarity retrievals were dominating over relational level accesses. Additionally, if more than one target story was available, the one with more superficial similarity was chosen.³² Summarized, while the analogizer is searching in its long-term memory for a proper analog, especially retrieval cues with superficially similar items are effective (Markman *et al.*, 2007, p. 1102).

However, some notions have to be made. First, of course participants in many of the conducted studies also showed spontaneous structural transfer

³¹ In this context it must be mentioned, that after the participants were presented some solutions, their rating of the soundness of these analogies strongly were in favor of structurally identical relations (Gentner *et al.*, 1993, p. 561). Moreover, they also rated their own retrievals down if a better, structurally identical solution was available. This is another instance for the phenomena of the inert knowledge problem. Even though we know about the proper soundness of structurally identical analogies, were not able to initially retrieve them. Such findings were also replicated in the context of problem-solving tasks (Ross, 1989, p. 456).

³² Wharton's explanation of the experiments is based on Holyoak and Thagard (1996). See this work also for a more detailed description of the mentioned experiments.

performances. But such reminding are, compared to surface retrievals, much fewer (Gentner and Smith, 2012, p. 133). Second, as illustrated in Figure 2, a literal similarity includes superficial and structural matches. Cues, including superficial and structural similarity for reminding a source are very powerful ones³³ (Catrambone, 2002, p. 324). However, in reality, they do not exist very often.

Moreover, the author shortly wants to discuss the “production paradigm” and the “reception paradigm” (see Blanchette and Dunbar, 2000, p. 108). In the first, participants were successfully able to create sources for given targets. A high number of people successfully generated ones with empathized structural relations. Superficial similarities did not play a significant role. However, in the latter experiment, the “reception paradigm”, people had to retrieve previously received sources and not generated them by their own. In that experiment, participants’ retrievals were strongly dominated by superficial similarities. As an explanation of this, the authors assume that the kind of encoding information is different. In case of retrieving previously given sources, the instructions in experiments often might be identically and perhaps include some cues for participants to encode on a superficial base. In the production task people dismantled the target problem on the base of structural features.³⁴ However, in the context of this dissertation the reception paradigm is in focus. This is up to the fact that in education some in later lives potentially usable sources shall be submitted to students. Therefore, the author only refers to problems in retrieval when trying to find an adequate source for the current target problem in the long-term-memory.

Later retrieval of learned principles is essential for an effective education (see point 5.2). In the context of analogical transfer common structural relations between the taught principle in school (source) and the later problem (target) faced in real-life, have to be recognized and applied. The factors influencing retrieval, especially meaning to overcome the problems of only superficial reminding, were partly extensively researched in psychological studies. In the following, the most

³³ Even though they are not more effective for retrievals than cues with only containing superficial similarities (Catrambone, 2002, p. 324).

³⁴ For more speculations of authors explaining this phenomenon, see Blanchette and Dunbar (2000, p. 120).

important factors suggesting an improvement of structural retrieval will be introduced. The author will examine and focus on such mechanisms for better retrieval that are relevant in the context of this dissertation. Foremost it will be focused under which circumstances better conditions for successful later retrieval within an educational approach could be submitted.

5.3.1.1 *Novice vs. Expert*

Novick and Holyoak (1991, p. 398) conducted experiments and found that experts made less surface retrievals than untrained novices and, moreover, they were able to quicker reject wrong retrievals. In these experiments college students studied a mathematic problem and had to solve some analogical problem settings in the aftermath. Structural based analogical retrievals were more likely done by trained mathematicians than by mathematicians at a beginner level. However, even though expertise improves retrieval, also experts failed in correct retrieving (Novick, 1988, p. 510).

In the moment of education (the actual teaching process) it can be assumed, that for the learning matters no experts are involved. Otherwise people would not need to visit a class to learn about something they already know very well. Even though in MBA-classes, where people often have significant practical experience, they may have already dealt with the content of teaching, but often do not know about underlying principles. For example, if in a business class the trade-off or contingent-contract principle of negotiation³⁵ is introduced. Many employees may have had some negotiations in their career, but do not know about such principles. Or another example, many sales employees are selling products to different countries but do not know about how to develop a new market. They do not know about theoretical approaches like waterfall- or sprinkler-strategy³⁶.

³⁵ For an explanation of the trade-off principle see 7.1.2. A contingent-contract, or safeguard-contract, “is a type of negotiated agreement in which the future is uncertain, but people are willing to proceed based on what they will occur” (Gentner *et al.*, 2003, p. 406). To read on see Brett (2007, p. 74).

³⁶ For some literature recommendations see point 5.3.4.1.2.

Summing up, in an educational approach to improve analogical transfer capabilities, no experts are involved. Even though experts do retrieve proper analogs, in the educational context this characteristic is not available.

5.3.1.2 *Time Delay*

In realized experiments the time delay between experiments strongly varies, e.g. five minutes, 24 hours and seven days (Wharton *et al.*, 1996, p. 635), no time delay and one week (Loewenstein *et al.*, 1999, pp. 588, 590), six to eight days (Gentner *et al.*, 1993, p. 534). Markman *et al.* (2007, p. 1101) showed that the longer the distance between target and source, the less correct retrievals were conducted. However, this effect was even more salient for relational matches than for superficial retrievals (Markman *et al.*, 2007, p. 1103). In general, the longer the time delay, the less the number of analog retrievals and, moreover, the number of retrieved superficial reminders always outnumbered the number of relational retrievals (Wharton *et al.*, 1996, p. 635; Markman *et al.*, 2007, p. 1102). When retrieving a potential source, the target is presented in the working-memory and the source has to be accessed in the long-term memory (Gentner and Smith, 2012, p. 133). Basically, important knowledge (Laube and Anders, 2009, p. 206) and information whose meaning we really think about (Solomon, 2001, p. 103) is transferred from the short-term to long-term memory.³⁷

In an educational context the time delay between the presented source analog in class and facing a target situation in many cases is very long. Therefore, a time delay between learning and retrieval has to be given for evaluating the effects of the educational approach on the transfer performance.

5.3.1.3 *External Hints*

Referring back to the experiments of Gick and Holyoak (1980, p. 342), as mentioned in point 5.3.1, after the participants had received a hint to actively think about the previous studied story, the number of correct solutions increased from about 20% (no hint) up to 92%. This external intervention is helpful to bring analogs

³⁷ Simplified illustration, it depends on many factors, e.g. from the number of repetition, interest. To read on in detail see Laube and Anders (2009, pp. 204 et seq.).

or better solutions up to the working memory (Gentner and Colhoun, 2010, p. 44). However, in real life it seems to be unrealistic that people will be reminded to a relevant prior experience which they can use to solve current problems (Gary *et al.*, 2012, p. 1242).

External hints are not available in the educational context. It must be ensured to provide relevant knowledge that will be later remembered without external support.

5.3.1.4 Goals of Analogizer

As already discussed in the context of the mapping process in point 5.1.3.2.2, plans and goals of the analogizer also play an important role in the initial retrieval step (Holyoak and Thagard, 1996, p. 120). The study of Blanchette and Dunbar (2001, p. 730) showed that the precise goal of participants played an important role for the source selection. In those studies it is referred to the question whether to support or to attack the other's position or to support one's own. This seems to be comprehensible due to the fact that analogies are frequently used as tools for arguing in politics, business, scientific and private life (Holyoak and Morrison, 2012, pp. 719, 775; Dunbar, 1997, p. 7).

However, for what analogies will be used after a principle has been taught in an educational context cannot be known in advance. Therefore, for educational purposes the goals of the analogizer cannot be considered.

5.3.1.5 Auditory vs. Written Presentation

Most experiments in the context of analogical reasoning and retrieval presented study materials in written form to the participants (e.g. Gentner and Loewenstein, 2003; Gentner *et al.*, 2009, experiments 1,2,3,4,5; Loewenstein *et al.*, 1999, experiments 1A, 1B, 2; Gentner *et al.*, 2004, experiments 1, 2).

However, the written presentations possibly could not really come up with the real capabilities of people to retrieve analogically. This was researched by Markman *et al.* (2007, p. 1101). In the experiment participants were split in a spoken condition and a written condition and were challenged for retrieval qualities with the help of proverbs. People in the spoken condition heard a recorded reading, spoken by a person who did not know the purpose of the experiment. In result,

relational retrievals in the spoken condition were more often than in the written condition. Moreover, surface retrievals were almost always lower in the spoken condition than in the written condition. As an explanation for this fact the authors of the study refer to the higher demand for working memory if something is read instead of heard.

In another study the effects of the participants thinking aloud while analogizing compared to not thinking aloud was researched (see Lane and Schooler, 2004, p. 715). The results of this study show that with the help of verbalization, analogical performance was impaired and more surface retrievals were made. Moreover, the non-verbalization group was able to create more true analogies. According to the authors of the study these effects are owed to the fact that verbalization increases one's focus on superficiality. Moreover, this happens at the cost of structural findings.

Summarized, listening improves relational retrieval quality, thinking aloud decreases structural based retrieval performance. In a classic educational context, where many students are sitting in a class discussing and working on a case, the auditory approach does not seem to be applicable. Due to different capabilities of understanding and working-memory performances of the learners if the auditory presentation is not individually regulable, it is not appropriate for educational contexts. Many students would stay behind finding a solution for the task. However, in a context of learning alone (e.g. online learning at home) and the related possibility of a self-paced and repeatable listening could be promising. Due to the focus on normally conducted case studies in the context of analogical transfer in this dissertation, this learning forms will not be considered further.

5.3.1.6 *Schema Quality*

Another important influence on successful structural retrievals is the abstracted schema quality of the source, which will be stored in the long-term memory. Different research lines prove that for principles learned via abstractions, the probability for being retrieved again later increases (e.g. Loewenstein *et al.*, 1999a, p. 586; Gick and Holyoak, 1983, p. 1; Markman and Gentner, 1993b, p. 431). Due to the high relevance of this point, it will be discussed separately in the next chapters.

5.3.2 Excursion: Definition of Schemata

Before evaluating in detail the way to receive abstracted schemata, a short classification of the term “schema” should take place.³⁸

In psychology a schema is defined as a generalizable and abstract knowledge that could be generated on the base of different experiences of a person (Seel, 2003, p. 54).³⁹ It is a representation of events (d'Andrade, 1995, p. 151), a model of “habitual expectations” or “generalizable abstractions” (Seel, 1991, pp. 101, 102) on which persons can fall back in future situations.⁴⁰

An often mentioned example in psychology tradition of a schema in literature, is the visitation of a restaurant (see Schwarz, 1985, p. 269). People saved the procedure (coming in, looking for a table and sit down, reading the menu, ordering, eating, paying, tip, etc.) and no matter where and what kind of restaurant they enter, they can retrieve and apply the schema. The schema is also valid if it has to be slightly adapted – for example, entering a restaurant in Japan, where people are sitting on the floor or visiting countries where no tip has to be given.

³⁸ In literature, many authors use “schema” and “mental model” as interchangeable terms. However, in cognitive psychological tradition some differences exist. Whilst the building of schemata is based on assimilation, mental models refer to the process of accommodation. To read on in this context see Pirnay-Dummer (2006, pp. 7 et seq.).

Assimilation and Accommodation: “Assimilation is the process by which [...] old methods or experiences [are used] to deal with new situations” (Plotnik and Kouyoumdjian, 2014, p. 388). “Accommodation is the process by which [...] old methods [are changed] to deal with or adjust to new situations” (Plotnik and Kouyoumdjian, 2014, p. 388). In other words, assimilation means to apply new situations or objects to existing schemata in mind; accommodation allows to adapt new information by enriching respectively enlarging existing cognitive schemata (Walsh, 2011, p. 113).

One kind of rearrangements of knowledge is the construction of mental models (Seel, 2003, p. 58). They will be created to deal with the precise needs of situations and the demands of changing environments where no solution plans (schemata) are available (Seel, 2003, p. 58). To read on in detail in the context of mental models compare Johnson-Laird, 1983; Johnson-Laird *et al.*, 1998; Ifenthaler, 2006; Seel, 2003.

³⁹ In psychology the schema theory can be lead back to F.C. Bartlett. To read on in the context of schema theory compare Bartlett (1997, pp. 1 et seq.); Seel (2003, pp. 51 et seq.); Markus (1977, pp. 63 et seq.).

⁴⁰ To read on in detail in the context of schemata compare Seel (2003, pp. 51 et seq.).

As another example (see Holyoak and Thagard, 1996, p. 8) serves the famous fable of Aesop's sour grapes, where a fox fails to reach the desired grapes. Finally he gives up, goes away and tags the grapes as sour anyway. In present time a job seeker could apply for a desired job, get into some interviews and give his best but finally he does not get the job. The job seeker now tags the job as boring anyway. The common abstracted schema of both analogs is to want something, not to get it, and therefore declare it as not desirable anyway.

This schema could be stored in mind as, e.g. "the sour grape" schema and will later, if facing a structurally identical situation, be retrieved. For instance, a period of time later a riddle should be solved for winning a travel to France. After having unsuccessfully tried to solve the riddle, the person could argue, that he likes traveling to Spain better and he does not like France anyway. In such a moment he could remember for the stored schema, draw parallels and therefore, better reflect and understand the own tendency of intrinsic justification. The examples demonstrate, that only the structural relations play a role, not the different superficial similarities (example 1: the form and size of menu, to sit down on chairs or on pillars on the floor; example 2: fox and grapes vs. job seeker and job vs. riddle and price).

As already discussed in point 5.2, a case study should allow students to abstract schemata that can be later retrieved. In this context a schema can be understood as the underlying structure and the learning from the case. In Table 1 the relational structure of the Dane chasing a Chihuahua is expressed as the first-order relation "chase (Dane, Chihuahua)". Additionally, including a greater complexity, if the Chihuahua runs away and the chase is the cause for the running, this system can be stated as the higher-order relation "cause (chase, run)". The above-mentioned examples of Aesop's fable can be stated in the terms illustrated in Figure 8.

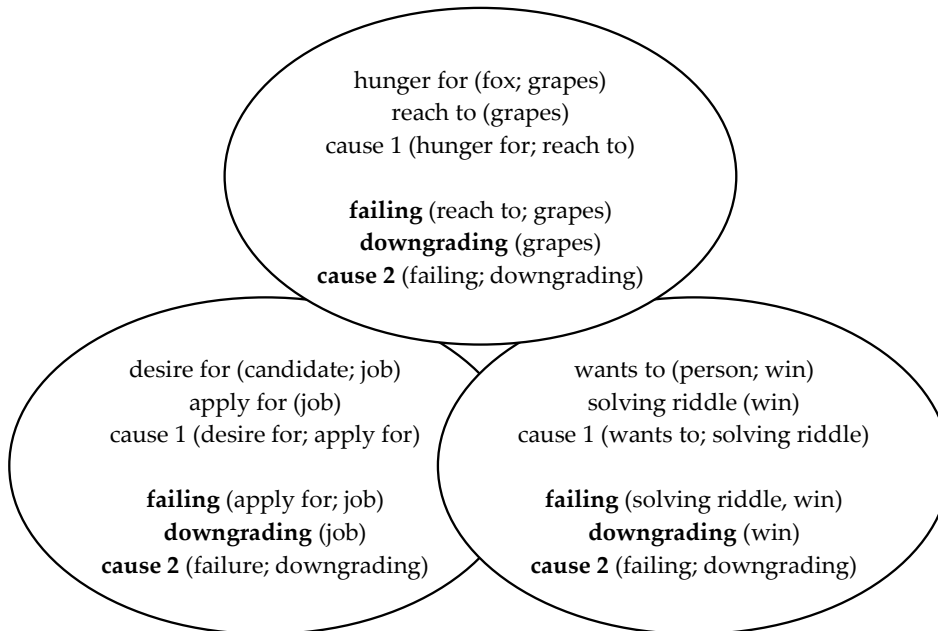


Figure 8: Examples of Aesop's fable in terms of relations

Source: Own illustration, partly based on Holyoak and Thagard (1996, p. 8)

The Aesop's fable examples exist with first order relations and with higher-order-relations. To bring this in the context of business administration⁴¹, for example, from a case that illustrates the cost-leadership strategy, a schema can be abstracted. Such a schema is illustrated in Table 3 on the left side.

⁴¹ See also the principles illustrated in Figure 10.

COST LEADERSHIP	QUALITY LEADERSHIP
following strategy (company; lower costs) standardizing (lower costs)	following strategy (company; higher quality) differentiating (higher quality)
cause 1 (following strategy; standardizing)	cause 1 (following strategy; differentiating)
internal succeeding (standardizing; lower costs) competitive advantage (lower costs)	internal succeeding (differentiating; higher quality) competitive advantage (higher quality)
cause 2 (internal succeeding; competitive advantage)	cause 2 (internal succeeding; competitive advantage)
external succeeding (competitive advantage; lower price) higher demand (lower price)	external succeeding (competitive advantage; higher quality) higher margin (higher price)
cause 3 (external succeeding; higher demand)	cause 3 (external succeeding; higher margin)
strategy succeeding (higher demand; increased number of sold products) higher profit (increased sold number of products)	strategy succeeding (higher demand; products sold with higher margin) higher profit (products sold with higher margin)
cause 4 (strategy succeeding; higher profit)	cause 4 (strategy succeeding; higher profit)

Table 3: Possible schemata of business principles

Such schemata could be retrieved when students in later business life, e.g. face restructuring projects and need to define new strategic approaches for their company. Also, the schemata of quality leadership can be learned via a case study. Moreover, it is possible that the needs for quality leadership can be the result of an analogy in later business life. If a former student has saved the schemata of cost leadership and is now working in the luxury industry, he can draw inferences between the source (cost leadership) and the target (quality leadership), based on the same structural principles. The needed adaptations are printed fat on the right side in Table 3. For example, in both analogs the competitive advantage is a result of following the defined strategy. The strategy is defined on the base of the market needs (cost leadership for standardized markets, quality leadership for manufacturing).

For a later retrieval it could be stated, that the better and more precisely the schema is defined, the higher the possibility for later structural retrievals (Gick and Holyoak, 1983, p. 23). For the retrieval, the quality of the stored schema plays an important role. The schema quality refers to the degree to what extent participants are able to express and describe the underlying principle (Gick and Holyoak, 1983, p. 23). In experimental tradition, the quality of the participants' schema is assessed

with questions to the participants to describe their solution and, within this description, to what extent they are able to articulate the major features of the underlying principle (Gick and Holyoak, 1983, p. 23; Gentner *et al.*, 2004, p. 3; Gentner *et al.*, 2003, p. 399). The abstraction of schemata often happens with the awareness of a study's participants which enables them to describe the principles underlying in the examples (e.g. Gentner *et al.*, 2004, p. 3). However, schema abstraction is also a process that often occurs unconsciously (e.g. Wulf and Schmidt, 1997, p. 987). Nevertheless, as proven by the above-mentioned research, it is possible to grasp the effect of approaches (e.g. comparison, variation) on schema abstraction by asking questions to the participants. With the help of certain techniques by working with case studies, it is the objective of this dissertation to receive well defined schemata of taught principles.

5.3.3 Schema Abstraction

As mentioned before, the schema quality is an important factor of improving the probability of retrievals. In this chapter, factors that enable to abstract such a schema will be generally discussed. In the aftermath it will be considered which approach fits at best to the educational context.

Derived from the illustration of Holyoak (2005, p. 118, see also point 5.1.3), learning is a result of the actual reasoning process. One possibility learning can occur is via schema abstraction. An abstracted schema with a good quality will improve later retrieval and therefore improve problem solving.

Within an educational context it seems promising to abstract schemata which can be easily retrieved when needed for problem solving after a period of time. In research, some methodologies for improving schema abstraction in the context of analogical transfer exist. However, their applicability in the context of education (referring to the conditions mentioned in point 5.2) must be challenged.⁴²

⁴² One short final differentiation regarding the difference between re-representation and schema abstraction should be made. In a re-representation (compare 5.1.3.4) two representations are pieced together to a new representation. An abstracted schema can either be a part of the composed re-representation or the re-representation itself (Gentner

5.3.3.1 *Comparison*

The comparison of two analogous examples and the deviation of their commonalities is termed as analogical encoding (Loewenstein *et al.*, 1999, p. 587). During the process of comparison, a structural alignment and mapping process takes place that highlights the commonalities of both examples (Gentner and Markman, 1997, p. 49). Simultaneously, individual context specifics of both examples will fade out (Gentner *et al.*, 2009, p. 1345; Bernardo, 2001, p. 628). A common schema will be induced (Gick and Holyoak, 1983, p. 8). For abstracting a common schema with the comparison technique, no one of the single analog's principle has to be understood in detail (Gentner *et al.*, 2003, p. 394). Table 4 shows the convergence schema of two structurally identical examples.⁴³

and Smith, 2013, p. 675). To read on in the context of re-representation in analogical transfer compare, e.g. Yan *et al.* (2003).

⁴³ For a more detailed explanation of the two analogs please compare footnotes 29 and 30.

MILITARY PROBLEM	RADIATION PROBLEM
<p style="text-align: center;"><i>Initial state</i></p> <p>Goal: Use army to capture forces. Resources: Sufficiently large army. Constraint: Unable to send entire army along one road.</p> <p style="text-align: center;"><i>Solution plan</i></p> <p>Send small groups along multiple roads simultaneously.</p> <p style="text-align: center;"><i>Outcome</i></p> <p>Fortress captured by army.</p>	<p style="text-align: center;"><i>Initial state</i></p> <p>Goal: Use rays to destroy tumor. Resources: Sufficiently powerful rays. Constraint: Unable to administer high-intensity rays from one direction.</p> <p style="text-align: center;"><i>Solution plan</i></p> <p>Administer low-intensity rays from multiple directions simultaneously.</p> <p style="text-align: center;"><i>Outcome</i></p> <p>Tumor destroyed by rays.</p>
CONVERGENCE SCHEMA	
<p style="text-align: center;"><i>Initial state</i></p> <p>Goal: Use force to overcome a central target. Resources: Sufficiently great force. Constraint: Unable to apply full force along one path.</p> <p style="text-align: center;"><i>Solution plan</i></p> <p>Apply weak forces along multiple path simultaneously.</p> <p style="text-align: center;"><i>Outcome</i></p> <p>Central target overcome by force.</p>	

Table 4: Convergence schema

Source: Gick and Holyoak, 1983, p. 7

Both situations (medical vs. military) in the figure above show completely different superficialities, but a solution for both problems could be derived from a common schema. At the radiation problem a tumor should get treated by using rays. However, using the rays with the needed power to destroy the tumor at one single point would destroy not only the tumor but also the whole skin and internal organs as well. Therefore, rays with lower intensity but from multiple points are aimed at the tumor to destroy it. At the military problem an army should conquer a fortress. Many ways are leading to the fortress. However, the ways are mined and taking one way with the whole army, the mines would detonate. Walking along multiple ways with smaller groups the army can pass in safety. Due to the fact that a direct attack is impossible, the commander decides to send out smaller groups on different roads and attack the fortress at the same time. The convergence schema of both examples is about not being able to use a force with full power on only one direction to reach a target. Therefore, the power is distributed on many ways to hit the target.

In case of comparison of examples which do not share common relational structures, no schema abstraction and therefore no transfer will take place (Gick and Holyoak, 1983, p. 21). Comparison is about finding identity and difference (Klauer, 1989, p. 183). Due to the fact that all distracting superficialities are eliminated, the pure schema increases the possibility of later retrievals when in long-term memory a fitting source is detected for a current target (Gentner *et al.*, 2009, p. 1345; Ross, 1989, p. 456). If a person is later confronted with a structurally identical example, the person will have a more recognizable match to the common relational schema as on the base of very individual superficial specifics (Gentner *et al.*, 2009, p. 1345).⁴⁴

As one way to overcome – at least to a certain degree – the inert knowledge problem (see point 5.2), the analogical transfer resulting from comparing two analogous examples was extensively studied. Most of the experiments were conducted in the domain of negotiation⁴⁵ (e.g. Loewenstein *et al.*, 1999, p. 586, 2003, p. 119; Gentner *et al.*, 2003, p. 393; Gentner *et al.*, 2009, p. 1343; Gentner *et al.*, 2004, p. 2). In this context some important insights were generated.

First, for later analogical transfer, comparing multiple examples always performed better than having only one example, respectively studying cases separately (Gentner *et al.*, 2003, p. 398, Experiment 2; Hesketh, 1997, p. 325). Second, having more examples, people do not automatically compare these cases, even though they are presented directly one after another or presented in juxtaposition (Loewenstein *et al.*, 1999, p. 589, Experiment 2). Third, when comparing two examples in order to abstract their common underlying principle, the single examples with their context do not have to be fully understood in detail (Gentner

⁴⁴ The above explained account refers to the “relational schema abstraction”. However, another theory of the way the results of comparison are proceeded exists. Within the “learning-to-encode” view, no isolated schema will be stored, but the way of encoding future examples is affected. For example, with an increasing knowledge of a domain, people start to change the way they deal with situations (Gentner *et al.*, 2009, p. 1345; Medin and Ross, 1989, p. 189). In this case the transfer to future examples is also higher. However, both views are not contrary for the objectives of the dissertation. Therefore, they will not be considered differently further.

⁴⁵ For the special adaptability and fit of negotiation principles in the context of analogical transfer see point 7.1.2.

et al., 2003, p. 394). Fourth, not only experts could improve their transfer, but also novices using this technique (Loewenstein *et al.*, 1999, p. 593; Gentner *et al.*, 2009, p. 1353). This is especially true if novices receive training in advance, including an explanation of principle, a visualization and further examples (Gentner *et al.*, 2003, p. 406; Loewenstein *et al.*, 1999, p. 595). Fifth, studies also demonstrated that participants who learned a principle in a paper-and-pencil task were able to transfer this in real-life negotiation situations (Thompson *et al.*, 2000, p. 66). Finally, in the aftermath of receiving a converging schema, this could be used again later when needed in a structurally similar new situation. However, vice versa, it is also proven that this abstracted schema allows people to retrieve some experiences fitting to the schema they have already built from the long term memory (Gentner *et al.*, 2009, p. 1347). The application of the comparison approach in education will be discussed in detail in point 5.3.4.1.

5.3.3.2 Source Penetration via Variation

Some authors suggest that without a deep and profound understanding of the source situation, it is later very likely that no proper analogies can be drawn (Gary *et al.*, 2012, p. 1242; Kolodner, 1997, p. 60). However, in this context it has to be mentioned that the advantages of knowledge about a source seem to have a peak on which additive knowledge may help to perform better in the current source situation, but the transfer quality later is not better. In Gary *et al.* (2012), the degree of understanding the source and its positive effect on transfer plateaued on a certain degree (table 1 & p. 1241). In an experiment of Gavetti *et al.* (2005, p. 691) an agent-based simulation was conducted for the strategic positioning of a company in a novel and complex environment.⁴⁶ The authors emphasize the importance of experience of management teams for proper analogies. A broad experience helps choosing a structurally correct analog instead of knowing in detail the most adequate solution of a single source. Therefore, it could be assumed that deep knowledge, at a certain point, has no additive effect on transfer. The higher the obtained expertise, the less it is transferable (Hesketh, 1997, p. 319). Summarized,

⁴⁶ For a discussion about the conducted study and its results see the responses of Farjoun (2008) and Gavetti *et al.* (2008).

both studies state that it is crucial to know important characteristics of a situation or source, but too much detailed knowledge will not further contribute to later relational retrieval.

This is further supported by an experiment of Mandler and Orlich (1993, p. 485) in which it was proven that analogical transfer strongly depends on how the source is perceived. Participants had to describe a source from very detailed to only on a relational level. Whilst working on the source, the detailed group worked with superficial attributes and the abstract group had to focus on relations. In result, subjects working on relational descriptions always transferred. The underlying principle was more salient to them compared to the other groups. Moreover, Mandler and Orlich (1993, p. 486) found out, that for later transfer remembering the source situation including superficialities is not necessary, whereas participants who were reminded of the abstracted principle always transferred.

However, even though too many details may impair transfer, a certain degree of source-understanding is necessary. For reaching such an understanding, some authors suggest variation as a slight change from the original to the source situation. In a computer-based experiment of Gary *et al.* (2012, p. 1229) two experiments were conducted. In the first experiment participants had to lead and perform well in a business production situation. Subsequently, they had to deal with a situation of leading a cricket team. However, both situations were structurally identical (the mechanisms of leading and rating team performances) and only differed on the surface level (business production vs. sports team). Initially, according to already mentioned prior researches, participants showed poor transfer in applying insights from the first to the second simulation. In the second experiment, the authors intervened in the source situation by varying it in the way of changing team members the participants had to lead. It was expected these group would explore the situation deeper due to the changes in complexity that are owed to the task variation. In result, through the deeper immersion into the source and the examination with it, the performance in the following simulation was much better. Whilst the control group, without experienced variations, showed a mean performance indicator of approximately 69, the variation condition performed a value of about 81 with a 2,5 times higher calculated transfer performance (Gary *et al.*, 2012, p. 1239). Moreover, the authors asked participants

to what extent they believed that the second simulation was based on the same underlying structural principles. With a value of 21% higher, the participants of the variation condition recognized the same structural relatedness compared to the control group (Gary *et al.*, 2012, p. 1241; 52% to 31%). Summarized, abstracting better schemata from the source situation by variation improves later analogical retrieval.

In another study Paas and van Merriënboer (1994, p. 122) gave participants geometrical problems to solve within a computer-based simulation. In the context of worked-out-examples,⁴⁷ people who were exposed to variation, showed significantly better transfer performances in less time than the other experimental conditions. The results indicate that participants of the variation experimental condition effectively acquired schemata (Paas and van Merriënboer, 1994, p. 131).

A further approach of variation was followed by Schilling *et al.* (2003, p. 39). In contrast to the popular opinion that organizations are learning via specialization, the authors conducted an experiment in order to prove that also task variation leads to learning. Moreover, the authors wanted to find out to what extent the variation has to be related or unrelated to the task to increase learning rate at the greatest possible degree. Related variation is about „working on different but similar types of problems over time“, whereas unrelated variation is about doing something different to the core task, e.g. having a rest (Schilling *et al.*, 2003, pp. 52, 46). As a result, participants dealing with related variations learned much faster than teams that learned by specialization or unrelated variation. In result, variation is proposed to enable the development of profound schemata (Schilling *et al.*, 2003, p. 52).

In mathematics, it is already common to vary task settings in education in order to explore and understand them more deeply. Some clearly specified methods exist to work on the source task. Amongst others it is about to, e.g. “generalize”, to “turn-back”, to “visualize”, to “compare”, to “specialize” the solutions of a task (Schupp, 2002, pp. 31 et seq.). The task variations are

⁴⁷ “Worked-out examples comprise the specification of a problem, the solution steps, and the final solution itself. Learners can use them as models how to solve certain types of problems.” (Renkl *et al.*, 1998, p. 90).

characterized to go beyond one certain solution of a task. An increase of competency in mathematical teaching classes by using that strategies has been confirmed (Kohls, 2007, p. 57).

In the context of case studies the study of hypotheticals is also suggested to be a helpful instrument for principle abstraction in order to get closer with a broader scope of problems (Williams, 1992, p. 418). Even though some research exists and it is already practiced in legal-reasoning (e.g. Ashley, 2007, p. 388), for the domain of business administration and the cases in this domain, no standardized approach for varying exists yet. This will be further discussed in point 6.2.

One important point has to be mentioned in the context of variation. In the simulation of Gary *et al.* (2012, p. 1238) the short-term performance in the simulation in which the variation took place significantly decreased. These results go along with the findings of Fischer and Ittner (1999, p. 771), who found a negative impact on automotive assembly plant performance by day-to-day product variation. In the simulation of Gary *et al.* the benefits of the variation paid out later in the simulation and in the second, the analogical comparable, situation. Nevertheless, a direct application of variation in real life context should be treated carefully. However, due to the fact that this thesis is focused on analogies in education, with real-life-events happening in most cases much later, this point will be neglected.

Summing up, in order to be able to grasp and abstract principles within the source situation, in literature the mechanism of source variation has crystallized as particularly effective. Variation has a positive effect on a deep understanding of the source with its structural relations.

5.3.4 Reflection in an Educational Context

The comparison of two analogous examples and the variation of the source situation are both effective ways for abstracting a proper schema of the principles that improves the likeliness to get retrieved for analogous problems later.

In this chapter the best approach for abstracting high quality schemata from case studies will be discussed, which could be reached via comparison or variation. However, whilst the methodology of comparison within the case-study approach was partly already considered⁴⁸, in experiments variation only took place in other contexts yet (computer-based simulations, mathematics, etc.). Figure 9 illustrates the dependencies between schema abstraction, schema quality and retrieval in education.

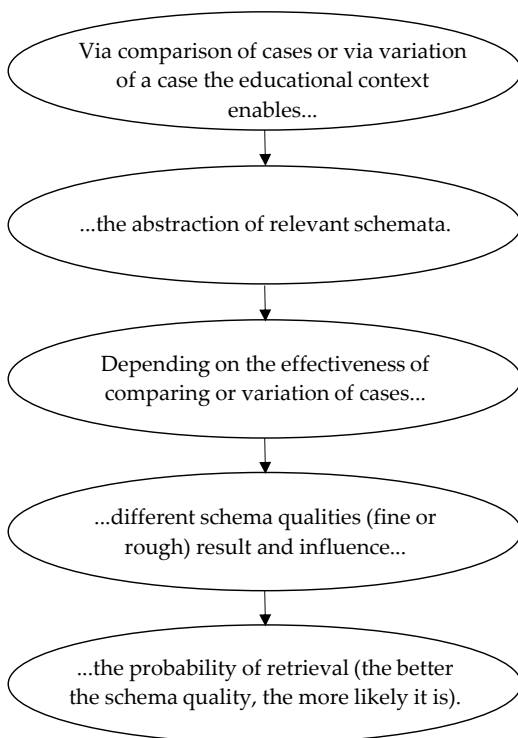


Figure 9: Retrieval, schema abstraction and schema quality

⁴⁸ With some limitations, see point 5.3.3.1.

The current teaching approaches consider one single case for each class (Gary *et al.*, 2012, p. 1243; Garvin, 2003, p. 60), what is strongly discussed in literature. On the one hand, authors confirm the possibility of people being able to abstract schemata and retrieve them in later situations (Gick and Holyoak, 1983 Part I; Flyvbjerg, 2006, p. 228). On the opposite it is stated that having only one example is not enough (Gentner *et al.*, 2003, p. 394; Lovallo *et al.*, 2012, p. 496; Hesketh, 1997, p. 319; Loewenstein *et al.*, 2003, p. 125). The following comparison approach will reflect the demand for more than one case. In the aftermath, the variation approach will discuss the teaching model of having only one case.

5.3.4.1 Comparison

In order to improve the retrieval for analog situations Gick and Holyoak (1983, p. 1) and later Gentner and Colleagues (Gentner *et al.*, 2004, pp. 1 et seq; Gentner *et al.*, 2003, pp. 393 et seq; Thompson *et al.*, 2000, pp. 60 et seq; Loewenstein *et al.*, 1999, p. 586) introduced the technique of analogical encoding of cases. They suggested to compare multiple cases in order to abstract the relevant underlying patterns (see point 5.3.3). The success was striking; by having only one case people did far less retrieve structural related source situations to a new problem. Even though they also studied two analogs subsequently, the effect of directly comparing the cases was much better. Moreover, by having only one example, people strongly focused on and remembered the precise conditions and superficialities of this example – rather than the relevant underlying principles on which people later should be reminded (Gentner *et al.*, 2003, p. 400). Therefore, in literature, lecturers of universities and business schools were requested to actively motivate their students to compare cases to better abstract the underlying principles for an improved transfer performance (e.g. Gentner *et al.*, 2003, p. 404; Gentner and Loewenstein, 2003, experiment 1; Loewenstein *et al.*, 2003, p. 125).

The opportunity to abstract a schema via comparison seems to be an easy way for better transfer at first glance. However, there are some points the author of this dissertation wants to highlight in this context.

5.3.4.1.1 Process

The existing worldwide applied processes when teaching with cases in business education are well established – from the preparation at home of lecturers and students to the discussion of material in groups to the presentation in class.⁴⁹ Having two cases for one topic to study, the existing process would be strongly affected. The adaptation of the new demands would be challenging. It means to establish a new process to differently work with cases as it was done over the last decades before. This impacts the time management of students and lecturers regarding the way the cases will be prepared and debated. It would be needed significantly more time at home, in group and class discussion. This fact rests on two pillars. First, only reading both cases would already take much more time. Second, to compare cases, the most salient attributes of the cases need to be highlighted what is more time consuming.

However, doing the cases in the normal way, after having studied the case some questions have to be answered. These questions also take time. Nevertheless, due to the tremendous more effort of comparing two cases (including to get through all distracting information and highlighting the relevant sequences in the text) this technique will take longer time in the class. Conversely, time for case-teaching is a bottleneck in education (Gorlich *et al.*, 2000, p. 5; Williams, 1992, p. 418). The time for the comparing process would not be available on top; other elements (e.g. moral discussions) have to be cancelled in the education of students. Additionally, business cases do not include a clear cut solution. In many situations the solution corresponds to the principle that should get abstracted. In such cases, the comparison process can only take place, after the class has discussed the case and a widely accepted solution/principle was defined. The actual comparison process can therefore only take place in the aftermath of class discussion. Doing the comparison with a second case at home would not be successful. Time is also for students a very scarce resource. Due to the fact, that the solution/principle was already defined in class, students would be less motivated to work on an identical case at home again. Moreover, due to the effect that abstracting principles is only one objective followed by teaching with case studies (see point 5.2.1), too much of

⁴⁹ For an overview of the processes see Aisner (2006, p. 1) and Garvin (2003, p. 60).

available resources would generally be used for this issue. Finally, novice students probably need the instructions of their lecturers for effective comparisons (Loewenstein *et al.*, 2003, p. 126), whereas doing it alone at home students could possibly fail.

5.3.4.1.2 *Content*

In current education only one case for a topic is used (Gary *et al.*, 2012, p. 1243; Garvin, 2003, p. 60). For the comparison approach, developing a second new analogous example for each taught principle takes a lot of effort.

For example, preparing a case at the Harvard Business School takes about three months and costs \$25k for companies within the United States and about \$50k for companies outside the United States (Aisner, 2006, p. 1). Moreover, it will worldwide overstrain many tutors. If analogous examples are not available (cannot be found or do not exist), lecturers will partly not be able to develop such analogous cases on their own. Developing multiple cases for one principle, sharing the same underlying relational patterns, but having very different superficial context is intellectually very challenging.

In this context some authors suggest, that the second provided case can be shorter than original cases and only should demonstrate the common structural relations (Loewenstein *et al.*, 2003, p. 125). However, the challenge of developing additional cases is not primarily about the mentioning of the superficial information. It is about to define and embed the crucial structural relations. Therefore, for the lecturers a shorter case would only partly reduce the time for its preparation. Related approaches also deal with the question how to improve decision making by analogy and thereby require more than one source. For example, the "outside view"⁵⁰. An outside view is a statistical and historical view of the problem; meaning to take multiple sources into account and not to focus on superficialities but on the common generalizable principle (Lovallo *et al.*, 2012, p. 497). In this context, for solving the current problem, a reference class of similar sources must be created. But, however, exactly this creation will be very

⁵⁰ To read on in the context of analogizing by outside views compare Lovallo *et al.* (2012, p. 496 et seq).

challenging for all lecturers in the real educational business application. Even though it is possible and realizable, it is extensive and time-consuming (Lovallo *et al.*, 2012, p. 509).⁵¹

From the author's perspective, the difficulty of developing or finding multiple analogs or reference classes is underestimated. This is also true for business principles. This is supported by the fact that even if analogies are often helpful in order to explain new domains to pupils, due to the fact that teachers are not aware or cannot develop them, they are not part of the classroom (Duit and Glynn, p. 4). Demonstrating the difficulty of creating analogous and comparable examples, the author lists a few principles, which are taught in almost all classes of students of business administration in Figure 10. Without investing much time, for lecturers it is not possible to develop one or more analogous examples, respectively cases, for these principles.

<p>Principles of...</p> <ul style="list-style-type: none">• Generic Strategies: Cost leadership, quality leadership (e.g. Porter, 1998, p. 11)• Market Entries: Waterfall-strategy, sprinkler-strategy (e.g. Lymbersky, 2008, p. 59)• Dealing with Cross-Country Variations: think local, act local; think global, act global; think global, act local (e.g. Thompson <i>et al.</i>, 2008, p. 205)• Negotiations: trade-off; contingent-contracts (e.g. Froman and Cohen, 1970, p. 180; Brett, 2007, p. 74)
--

Figure 10: Selection of principles in business administration

⁵¹ To read on in the context of cognitive biases and for some successful examples of created multiple analogies compare Lovallo *et al.* (2012).

5.3.4.1.3 *Consideration of Prior Studies*

The generally used experimental cases strongly differ from real cases as used in business education. Therefore, the transferability of results from previously conducted experiments to the use of real case studies is an open question. All the used cases in the negotiating experiments were very much shorter than a normal case used in business education. The experimental cases are about 200 words (Gentner *et al.*, 2003, p. 396) or about 225 words (Loewenstein *et al.*, 1999, p. 590). A regular case, as for example developed and used at the Harvard Business School, is about 10-20 pages with a lot of figures and additional information in the appendix (Garvin, 2003, p. 60). Also, in other highly renowned books all cases are longer and more complex in their structures (e.g. Thompson *et al.*, 2008, Part 2). Moreover, the objectives of real case studies are multifaceted (compare point 5.2). The used cases in the experimental designs for the comparison only focus the goal for transferring the analogical principle and do not follow other objectives as well. They do not allow any broader context-discussion due to their shortly described content. In order to demonstrate this, Figure 11 states a case as it was used in an experimental study of Thompson *et al.* (2000, p. 72) for the exemplification of the contingent contract-principle in negotiation.

Syd, a recently-promoted head buyer of a major retail store, has bought some wholesale goods from an Asian merchant. All aspects of the deal have been successfully negotiated except the transfer of the goods. The merchant tells Syd that he will pay to ship the goods by boat. Syd is concerned because the U.S. has announced that a trade embargo is likely to be placed on all goods from that country in the near future. The Asian merchant tells Syd not to worry because the boat will arrive at the U.S. dock before the embargo occurs. Syd, however, thinks the boat will be late. Syd wants the merchant to pay to ship the goods by air freight (which is substantially more expensive). The merchant refuses because of the higher cost. They argue about when the boat will arrive.

The Asian merchant suggests that they "make a bet". The Asian merchant will ship the goods air freight but they will both watch when the boat actually docks in the U.S. If the boat arrives on time (as the Asian merchant believes it will), Syd will pay for all of the air freight. However, if the boat arrives late (as Syd believes it will), the Asian merchant will pay the entire freight bill.

Figure 11: Case as used in analogical reasoning experiments

Source: Thompson et al. (2000, p. 72)

Cases in business education and all accompanying questions to them do not only target to improve the capability for analogical reasoning. However, for sure they try to make the student think about the context of the case and the principle. Nevertheless the questions also take points into account which extend the mere objective of schema abstraction (see point 5.3.3). The content allows a lot of different questions, and for each question often not only one single correct answer exists (Aisner, 2006, p. 1). A teaching approach that deals with shorter cases for only improving analogical transfer would neglect other learning targets.

Moreover, in the experimental case the solution is already stated (also see Figure 11). In real business cases the readers should create one possible solution by themselves and/or in class. The statement of the principle's solution in one or more of the compared cases is an additional modification of experimental cases compared to the real teaching approach.

For cases as illustrated in Figure 11, experiments show good performances for comparisons. However, for regular cases the technique was not tested yet. As

one explanation it could be argued, that the needed time of participants would overstrain the scope of an experimental study. Nevertheless, from the author's perspective there are doubts if the technique of comparison could also be adapted to such long cases. The mentioned aspects lead to the following key issues.

As studies have shown, people are very sensitive regarding the amount of details and distracting information that deters them from recognizing the underlying principle of a case (Mandler and Orlich, 1993, p. 43). Generally, more time is needed to make relational matches than matches only based on the object level (Goldstone, 1994, p. 26).

The assumption of the author is also based on the fact, that by comparing two real cases (long and very detailed) the cognitive load of the working memory is higher than only having two short cases at hand. The higher the working memory is demanded, the less people are able to recognize structural relations (Tohill and Holyoak, 2000, p. 30). This is also supported by the fact, that if more tasks have to be proceeded at the same time, the number of identified relational matches decreases and the focus on superficial similarities increases (Waltz *et al.*, 1999, p. 123).

Additional research about task complexity points in the same direction. In this context, "any objective task characteristic that implies an increase in information load, information diversity, or rate of information change can be considered as a contribution to complexity" (Campbell, 1988, p. 43). This is fulfilled if, for example, the task shows interdependencies, uncertainty of outcomes and multiple ends are possible (Campbell, 1988, p. 43). According to the characteristics of case studies (see point 5.2.2), regular business cases include these attributes. Therefore, the objective task complexity of business cases is higher than of cases as used in prior experiments. The higher the task complexity, the more people are overstrained in dealing with it. Consequently, they will probably not abstract any relevant underlying structure.

The author wants to anticipate one argument that could arise in this context. In general, an experiment should isolate the effect that should be proven from other causal factors (Malhotra and Birks, 2006, p. 261). This was realized for the comparison-effect. This effect for schema abstraction was proven with the help of diverse methods, especially by the usage of short descriptions of analog situations.

The success on schema abstraction has been indisputable demonstrated by the researchers (see point 5.3.3.1). However, the arguments within this dissertation build on one important aspect. The researchers define such short descriptions of a situation as a case study. Even though they have only included a principle but follow no other targets a business case normally has to include. Moreover, on this base they suggest to take normal business case studies and apply the gained insights from their experiments (e.g. Loewenstein *et al.*, 2003, p. 125; Gentner *et al.*, 2003, p. 404).

From the author's perspective, thereby they neglect factors as mentioned above (e.g. distraction from principle by details, higher cognitive load) that could inference the comparison effect on schema quality. Therefore, the results cannot be transferred one to one without having a test under conditions that are closer to reality. Summarized, a case as used in prior comparison-experiments and a case study as practiced in business education do both have an intersectional part (the embedded principle) but apart from that they are not comparable. A real business case study includes more targets than only to transfer the embedded principle. The additional targets could interfere the schema abstraction performance. Figure 12 illustrates this graphically.

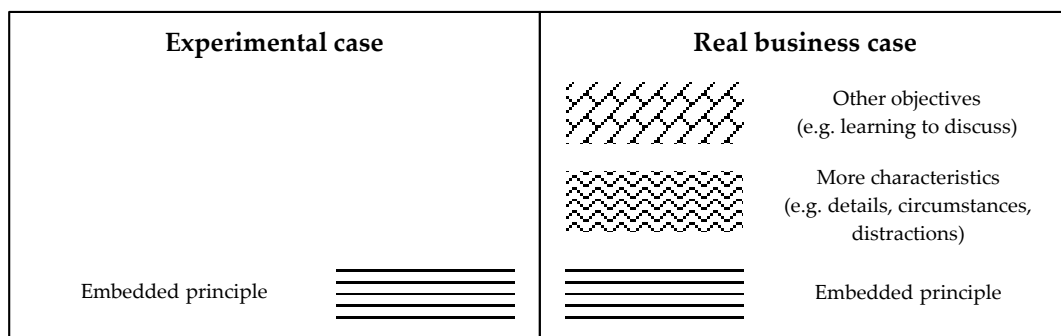


Figure 12: Experimental cases and educational cases

5.3.4.2 *Variation*

Besides comparison, variation is also an adequate way for source penetration and therefore schema abstraction (see point 5.3.3.2). Variation was tested in many fields and proved successful schema abstraction (see point 5.3.3.2). Also, it was tested in computer-based simulations (e.g. Gary *et al.*, 2012, p. 1229) that could be also used in an educational context. However, its applicability is limited. This is up to the fact of the high efforts to develop such simulations, meaning foremost timely and financial. Subsequently, the universities would have to buy licenses for using the simulations. Due to the fact that universities are generally often short of money, this is no option in general. Moreover, the computer-based teaching approach is not as established as other teaching approaches like, e.g. case-studies. Finally, in the context of working with business case-studies computers currently do not play a significant role.

Even though variation is already applied in other educational disciplines (see point 5.3.3.2, e.g. mathematics) current research dealing with source variation was not covered within the case-based approach of teaching. The author of this dissertation did not find standardized possibilities of varying business case studies for increasing schema abstraction and as a consequence, better structural retrieval performances in the aftermath.

Nevertheless, gaining profound schemata abstracted from the source through the confrontation with variation might be a proper way for education. Foremost, by a variation of the source, not more than one case is needed. One source is enough if the understanding includes relevant structural information (Mandler and Orlich, 1993, p. 487). The content of education would also not change, due to the fact that only one case is needed. This case is – according to the current educational approach – already available. As a consequence, the currently existing teaching approach must only be extended by purposive variations, but not by multiple cases sharing the same underlying structural relations. Additionally, these variations will also take time, but not as much as studying a whole second case (Williams, 1992, p. 418).

Even though variation seems to be a promising approach in education, in contrast to comparison it is limited because of the need for the full understanding of the source situation in order to abstract the schema (Kurtz *et al.*, 2001, p. 417).

Applying the comparison account, it is enough to partially understand both analogs for abstracting a common schema (see point 5.3.3.1). However, reflecting the intensions of real business cases, this does not seem to be a problem. Working with such cases, students should really immerse oneself with them. It is about to really engage with the text and materials of a case. Taking into account long preparation times at home and further discussions in group and class, the case will be intensively worked out.

Summarized, the variation seems to be a promising approach for teaching analogical transfer. However, its effectiveness has not been proven within case studies, which represents a very important teaching approach and is in focus within the scope of this dissertation. Consequently, a methodology must be developed that allows students to vary the case for better schema abstraction and, therefore, better retrieval in later situations.

5.4 LITERATURE OVERVIEW AND KEY ISSUES

Before defining research gaps, the author finally is going to provide an overview of the discussed relevant steps within analogical reasoning in combination with its influencing factors (Figure 13). Important literature focusing on the different research areas is given. The relevant and focused factors that need to be considered within the dissertation's educational approach are highlighted.

ANALOGICAL REASONING PROCESS - SELECTION OF RELEVANT RESEARCH			
RETRIEVAL	MAPPING (alignment/inference)	EVALUATION	LEARNING
<p><u>Goal relevance</u> Holyoak and Thagard, 1996, 1989 Blanchette and Dunbar, 2001</p> <p><u>External hints</u> Gick and Holyoak, 1980</p> <p><u>Expert vs. Novices</u> Novick, 1988 Blanchette and Dunbar, 2001</p> <p><u>Time delay</u> Wharton <i>et al.</i>, 1996 Loewenstein <i>et al.</i>, 1999b Gentner <i>et al.</i>, 1993</p> <p><u>Auditory vs. written representation</u> Markman <i>et al.</i>, 2007 Lane and Schooler, 2004</p> <p><u>Schema Quality</u> Gick and Holyoak, 1983 Gentner <i>et al.</i>, 2009</p>	<p><u>Systematicity</u> Gentner, 1983, 1989</p> <p><u>Transparency</u> Gentner and Smith, 2013 Gentner and Kurtz, 2006</p> <p><u>Goal Relevance</u> Holyoak and Thagard, 1996, 1989</p> <p><u>Age & Experience</u> Richland <i>et al.</i>, 2006 Gentner, 1988 Gentner and Toupin, 1986 Ball <i>et al.</i>, 2004</p> <p><u>Time Pressure</u> Goldstone, 1994</p> <p><u>Processing Load</u> Waltz <i>et al.</i>, 1999</p>	<p><u>Factual Correctness</u> Smith and Gentner, 2010</p> <p><u>Adaptability</u> Keane, 1996</p> <p><u>Goal Relevance</u> Holyoak and Thagard, 1996, 1989</p> <p><u>New Knowledge</u> Forbus <i>et al.</i>, 1997</p>	<p><u>Projection of Inferences</u> Gentner, 1983, 1989 Holyoak and Thagard, 1996</p> <p><u>Difference Detection</u> Markman and Gentner, 1993a</p> <p><u>Re-representation</u> Kotovsky and Gentner, 1996 Yan <i>et al.</i>, 2003</p> <p><u>Schema Abstraction...</u> via Encoding/Comparison Loewenstein <i>et al.</i>, 1999 Gick and Holyoak, 1983 Markman and Gentner, 1993b</p> <p>via Variation Gary <i>et al.</i>, 2012 Schilling <i>et al.</i>, 2004 Paas and van Merriënboer, 1994</p>

- Frame conditions that have to be considered within the educational approach
- Directly affected within the educational approach, focus of the dissertation
- Parts of Reasoning Process that are not (directly) part of the dissertation

Figure 13: Literature overview

6 RESEARCH GAPS AND HYPOTHESES

In the upcoming chapter the research gaps from the above mentioned facts will be derived and the hypotheses for the upcoming experiment within the dissertation will be defined.

6.1 RE-EVALUATING COMPARISON APPROACH

Due to the mentioned doubts concerning the performance of the comparison approach under real conditions in point 5.3.4.1, it is necessary to re-evaluate the performance of comparison under conditions that are closer to real educational conditions. However, the questions regarding the practicability (process and content) would remain if the approach also worked under real conditions, i.e. with real business cases. Nevertheless, if the approach does not perform under real conditions it fails anyway and the questions how to overcome hurdles of implementations are lapsed.

The differences between the experimental cases and the case studies in real business educations (see point 5.2) are juxtaposed in Table 5.

Juxtaposition of most important objectives and characteristics of case studies as used in real business education and as used in prior experimental studies to evaluate the "comparison"-approach.	Real cases	Prior experiments "comparison"
Targets of case studies		
1. Development of diagnostic skills	yes	no
2. Setting people in the position of making decisions	yes	limited
3. Transferring an embedded principle	yes	yes
Characteristics of case studies		
4. Describing real situations	yes	yes
5. No decision stated	yes	no
6. Often more than one possible option	yes	yes
7. Include relevant and irrelevant materials	yes	no
8. Detailed specifics of each business situation	yes	no
9. Often one case per class	yes	no
10. Average of about 10-20 pages, plus numerical data and illustrations	yes	200 words
11. Analytical questions for students	yes	no
12. At least two hours to read and prepare	yes	ca. 10 min.
Further criteria		
13. Preparation at home	yes	experiment

Table 5: Juxtaposition of characteristics of cases

As shown in the figure above, a lot of core elements a regular business case study normally includes (see point 5.3.1.2), are not included in the cases used by the previously conducted experiments. The experiments only focus on the abstraction of the embedded principle and almost fully neglect other objectives. Moreover, they do not include detailed information or provide business specifics. In reality only one case is distributed, whilst in prior experiments two training cases were given to students to compare and a sound solution had to be found for a third test case.

Based on the mentioned differences in the figure above and as a consequence the very much lower distracting information and working load of participants when comparing the cases (see point 5.3.4.1.3), the following hypotheses are derived:

Hypothesis 1a: Using experimental cases that are closer to real business cases, the schema quality of participants is lower than by using cases from previously conducted experiments.

Hypothesis 1b: Using experimental cases that are closer to real business cases, the transfer performance of participants is lower than by using cases from previously conducted experiments.

For evaluating the differences in schema quality and retrieval, an experiment must be conducted that includes cases as used in prior studies and, additionally, new cases must be developed in order to determine differences.

6.2 VARIATION OF CASE STUDIES

As discussed before, besides the comparison approach also variation has been proven to be successful for profound schema abstraction. Even though the comparison-approach would also be applicable to real business cases (see point 6.1), a variation approach is more advantageous in case study teaching due to the following aspects. First, only one source would be needed and, therefore, this approach is closer to the already established teaching style (having only one case study). In consequence, no second analog has to be developed additionally or researched. Second, the time consumption for studying would be extended, but not to the degree comparison would. This is up to the fact that still only one source (case) has to be prepared regarding process and content. However, variation for better schema abstraction has not been consciously practiced in the context of real business case studies yet.

Considering the advantages of a potential integration of a case-study-variation, the question arises how such a variation could look like. In this context, at first, types of possible variations must be defined.

Table 6 illustrates such variations that will be discussed on the following pages.

SOURCE VARIATION			
Generally preliminary conditions for variation: - Relatedness (Schilling <i>et al.</i> , 2003, p. 39)			
Preliminary conditions for case studies and teaching with them		- No decision stated (Donham, 1922, p. 62) - Often one case per class (Gavin, 2003, p. 61) - Analytical questions for students (Gavin, 2003, p. 61)	
Characteristics of case studies referred to Harvard guidelines, based on Garvin, 2003, p. 61; Donham, 1922, p. 62; Williams, 1992, p. 418	Types of variation	Influence factors	Construction of variation for schema understanding
Detailed specifics of each business situation Include relevant and irrelevant materials Often more than one possible option Average of about 10-20 pages, plus numerical data and illustrations For abstracting reasons: recognizability of underlying principle(s)	Difficulty / Complexity	Non relevant information Possible options / decisions Recognizability of principle	Making non-relevant information more salient Making different options more salient Making principle more salient
Describing [one] real situation[s]	Context	Changed contexts with other, familiarity or knowledge about domain	Making context more familiar / taking domain with better knowledge
Dealing with an interest provoking issue Often written from a personal perspective, involving real characters Students develop empathy with the main characters of the case	Involvement	Interest Personal point of view and attitudes	Making topic more interesting Including recipients' opinions more

Table 6: *Applied types of variation*

Before developing the construct of variation, some preliminary conditions have to be recalled (see top of Table 6). The general guidelines for the upcoming model are that variations have to be related (see point 5.3.3.2) and no decision or solution is stated within the case study (see point 5.2.2). Furthermore, only one case per class is submitted and the students basically have to answer some analytical questions (see point 5.2.2). Finally, as a general reminder, by varying, the underlying principle itself never gets changed.

The first column of Table 6 refers to general characteristics of business case studies (see point 6.1). The author identified general types of variation: difficulty/complexity⁵², context and involvement. As a consequence of variation, following the findings of research (see point 5.3.3.2), the underlying principle will become more salient and schema abstraction can take place.

A case can vary in its difficulty. More difficulty can be reached by, for example, changing the information load or the number of possible outcomes (Campbell, 1988, p. 44 based on Schroder *et al.*, 1967; March and Simon, 1958). From the general characteristics of business case studies, the ones of detailed specifics, irrelevant and relevant information, more than one possible option, many pages and the extent of the recognizability of the underlying principle are closest to that type of variation (Table 6, column 1). Thus, they are connected to it. In other words, the difficulty can be influenced by the degree of non-relevant information, the number of possible options and the recognizability of principle (column 3). Consequently, due to the fact that schema abstraction is reached by variation, it can be created by varying these factors regarding their difficulty (column 4). Generally, increasing degrees of difficulty will allow persons to improve learning quicker (e.g. Carver and Leibert, 1995, p. 26). However, in order to filter the underlying principle and abstract schemata, the author also assumes easing the task can be beneficial for variation and therefore schema abstraction.

Also, as another variation-type, a case can vary in its context. Generally, a context is about the surroundings of a set circumstances (Henricksen, 2003, p. 14). The characteristic of business cases, to describe a real business situation, is related to the type of variation "context". Factors of influencing the context of a case are to change the protagonists and set the principle in another context. Consequently, abstraction could be developed by for example varying the case to a more familiar framework with students having more knowledge about the new context (e.g. an industry the students know better).

⁵² In the scope of the dissertation the terms difficulty and complexity are used similar. For a possible differentiation see Campbell (1988, p. 45). For a better reading in the following text only the word difficulty will be written instead of difficulty/complexity.

Finally, it is about the case characteristics of interesting issues, real characters and possible empathy of students with the protagonists of the case. These characteristics are assigned to the variation type “involvement”. Involvement refers to the degree a person attaches importance to something or someone (Pepels, 2012, p. 140). By changing the interest and including personal points of view of students by more involving them, a variation can take place. To receive abstraction in the context of case studies, this could happen by making the content more interesting for students and including their individual opinions to a higher degree.

For both latter types of variation it could be stated, that variation can also take place in two directions. It would also be possible to, for example, set a more foreign context or decrease the interest of students. However, following sanity and reason, this approach rather seems to be gloomy in its success. The attention of students would decrease and therefore, their ability of working on the cases gets harmed.

It may be argued that these types may influence each other. For example, interest or a familiar context could decrease the perceived difficulty/complexity. Indeed, some research assumes such relations (for an overview see Campbell, 1988, p. 44). However, the primary objective of this thesis is to develop a model (see Table 7) that allows to abstract a schema by variation applied to case studies. In this context some intersections between the applied types of variations are not crucial. Most importantly, in the context of this thesis, all efforts should yield in the direction of variation in order to prove the general possibility of sound schema abstraction by variation of case studies. To what extent each type of variation contributes to schema abstraction can be subject of further investigations.

After having defined and discussed the types of variations, the author is going to transfer them to a precise approach of application. Before doing so, the teaching process, as it is currently practiced and will be followed within the context of the developed variation frame, must be defined. However, in order to set up the frame conditions for the evaluation of the hypotheses within an experiment, this process will be discussed in detail in point 7.1.1. Anticipating, this process states that after the lecturers have discussed the principle as one possible solution in class, variation can start. Table 7 illustrates the process from that point and will be explained on the following pages.

PROCESS AND QUESTION TECHNIQUE OF SOURCE VARIATION						
Introduction of principle	Giving principle solution to the case (starting point for variation)	Types of variation (not visible for students)	Guidelines, adapted from Schupp <i>et al.</i> , 2001, p. 60 et seq. (not visible for students)	Examples of application		
				Cost leadership	Sprinkler strategy	Trade-off
<p>The following principle is one sound solution to the case: [<i>formal description, input lecturer</i>]</p> <p>Note: After the case has been discussed in class, the lecturer can introduce this part with the sentence: "one solution having previously discussed in class is based on the principle the principle called..."</p>	<p>Description of the solution of the case by applying the principle [<i>input lecturer, applied to the principle</i>]</p>	<p>Difficulty / Complexity</p> <p>Context</p>	<p>(1) The principle is applicable to firms having the following characteristics [...] Are these characteristics all given in the case? Which are, which are not?</p> <p>(2) Which of the facts ease the recognition of the principle in the case? Which do cover a clear identification? What are key signals in the text that show the possibility of the application of this strategy?</p> <p>(3) What about trying to follow cost leadership and having high quality at the same time? Is this possible? What would be the solution? Describe.</p>	<p>(1) The principle is applicable to firms having the following characteristics [...] Are these characteristics all given in the case? Which are, which are not?</p> <p>(2) Which of the facts ease the recognition of the principle in the case? Which do cover a clear identification? What are key signals in the text that show the possibility of the application of this strategy?</p> <p>(3) What about trying to follow sprinkler strategy and waterfall at the same time? Is this possible? What would be the solution? Describe.</p>	<p>(1) As mentioned, the principle is applicable if both parties do have a very important interest and other interests they would give up for reaching their first priority interest. To what extent is this given in the case?</p> <p>(2) Which of the facts ease the recognition of the principle in the case? Which do cover a clear identification? What are the key signals in the text that show the possibility of the application of the principle?</p> <p>(3) What to do if only one party shows an interest, that is more important than other ones?</p>	
				<p>(4) Slightly change</p> <p>(5) Change view</p> <p>(6) Replace</p>	<p>(4) Imagine the same circumstances given in the text but changing the industry [<i>name industry</i>]. Why is the principle also working there? Why not?</p> <p>(5) What would be the most contrary strategy approach, compared to the mentioned strategy? Explain.</p> <p>(6) You read this strategy in the context of business. Is it also applicable to other domains? Which? (examples) Why not?</p> <p>(7) In which industry or service are you personally interested at most? Could you name a company following this strategy in this branch? Explain. Why not?</p>	<p>(4) Changing the characters and negotiation topic to other departments and topics of the company. Why is the principle also working there?</p> <p>(5) What would be the most contrary solution to the case, compared to the mentioned principle? Explain.</p> <p>(6) You read this principle in the context of business. Is it also applicable to other domains? Which? (examples) Why not?</p> <p>(7) Is there a solution you have personally experienced in the past where the principle could be applied? Explain.</p>
		<p>Involvement</p>	<p>(1) Specify</p> <p>(2) Narrow</p> <p>(3) Consider border cases</p>	<p>(7) In which industry or service are you personally interested at most? Could you name a company following this strategy in this branch? Explain. Why not?</p> <p>Do you think knowing about this principle will ease later work for you? Why? Why not?</p>	<p>Do you think knowing about the principle will ease later work for you? Why? Why not?</p>	

Table 7: Question technique variation

Having defined guidelines, as they are represented in Table 7 in the fourth column, the question arises how they could be applied to the variation of business case studies. Additionally, it must be considered that the approach must ensure the application for a broad range of business case studies embedding different principles. The author decided to realize this by using questions. This is based on the fact that, first, questions can be adapted quickly. Having the same guidelines but different cases with unequal principles, the questions only have to be partly rephrased. Second, questions are a very common instrument in classes and well known for lecturers and students (see point 5.2.1). Additionally, asking and answering questions is not as extensive as other techniques (e.g. computer based learning) and can be done almost everywhere. Finally, previous research already successfully worked with questions for grasping schemata (e.g. Catrambone and Holyoak, 1989, p. 1147).

Before asking questions, guidelines must be implemented. These guidelines ensure the possibility to lectures to quickly adapt questions to different cases. The author took the guidelines for variation as they are already established in the teaching of mathematic (see point 5.3.3.2). Also, teaching mathematics is about solving problems and often more than one solution is possible (Schupp *et al.*, 2001, p. 7). Therefore, the author presumes that by following these guidelines, also the variation of case studies can be implemented. According to Schupp *et al.* (see 2001, p. 30), the existing types of variation in mathematic are:

- “slightly change”
- “replace”
- “generalize”
- “specify”
- “consider border cases”
- “narrow”
- “fractionize”
- “combine”
- “change view”
- “return direction”
- “change context”

- “iterate”
- “create interest”

As an example, by variation in mathematics it can be generalized from the equation $y = 3x - 5$ to the linear equation $y = mx + t$.⁵³ It can be shown that a more specific example can be developed to a general formula. Supposed, in the scope of working with cases the general principle can be derived. A selection of these guidelines were chosen by the author in order demonstrate the possibility of schema abstraction by applying them to cases. After a possible solution of cases embedding the principles was discussed in class, the lecturer asks questions based on the following types of variations and guidelines (column 3 and 4 of Table 7).

The guidelines of “specify”, “narrow” and “consider border cases” are based on the yielded variation of difficulty/complexity. By applying the guideline of “specify”, the author wants to channel the thoughts of participants to consciously think about the principle in the case. Therefore, the principle gets shortly restated and the participants have to answer to what extent the special characteristics of the principle are given. To narrow means that the participants, the other way around, should focus on the circumstances in the case that ease or avoid a clear recognition of the principle. The participants sidle up to the principle. To consider border cases means, that persons are asked for a scenario in order to transfer the principle to a variation and prove their understanding by answering if the application is also possible under these conditions.

To “slightly change”, to “change view” and “replace” are guidelines the author related to the variation type of changing context. All of these guidelines target a variation of context. This could happen by asking for the most contradictory solution (“change view”) or by only changing the industry the case activities took place (“slightly change”). Replacing is about to fully change the context of the case, maybe from a business perspective to an example in private life.

⁵³ For this and more examples see University of Augsburg (2007, p. 2) based on Schupp (2002, pp. 31 et seq.) and Schupp *et al.* (2001, p. 30).

Finally, the variation type of context is supported by the guideline of “creating interest”. Within these questions the participants will be able to reflect the principle in experiences they possibly gained by themselves. Moreover, their opinions about the relevance of principle should be taken into consideration. These points can be considered by asking if they can remember that they have already dealt with the principle. Furthermore, they should answer to what extent they think the principle can be used in their later lives.

For the purpose of demonstration, the author applied the approach for three very common principles in business administration (see Table 7). All questions to the principles of cost leadership, sprinkler strategy and trade-off are based on and follow the same guidelines. Whilst current questions to case studies target foremostly different objectives (see point 5.2.2), these questions aim to abstract the underlying principle. An adaption of questions to the different principles can be done in a very short time by lecturers. For example, questions based on the difficulty type of variation and the guideline of “consider border cases” can be adapted from the trade-off principle (asking for a situation where only one party shows interests differing in their importance) to strategy principles where two possible strategies get mixed up (see columns 5, 6, 7 of Table 7). For many other guidelines no adaptations have to be made, at least for the mentioned principles of examples. All principles have the question of which factors ease or cover the identification of the principle in common.

For proving the effectiveness of the developed model of variation of business case studies the derived hypothesis is as follows:

Hypothesis 2: Applying source-variation to a business case study, the number of correct retrievals for target problems of participants is higher than applying the traditional case study teaching approach.

6.3 OVERVIEW OF KEY-HYPOTHESES

The discussed hypotheses of points 6.1 and 6.2 represent the key research within the scope of this thesis.

Hypothesis 1a: Using experimental cases that are closer to real business cases, the schema quality of participants is lower than by using cases from previously conducted experiments.

Hypothesis 1b: Using experimental cases that are closer to real business cases, the transfer performance of participants is lower than by using cases from previously conducted experiments.

Hypothesis 2: Applying source-variation to a business case study, the number of correct retrievals for target problems of participants is higher than applying the traditional case study teaching approach.

In the upcoming chapters these hypotheses will be evaluated within an experiment. Of course, in order to evaluate these hypotheses some sub-hypotheses will be derived. All results of different approaches and training groups will be analyzed and discussed in the second part of this dissertation.

7 EXPERIMENTAL PART: TESTING HYPOTHESES

In the following chapter the conduction of an experiment for proving the hypotheses stated in point 6.3 will be described. The methodology of realizing it as well as the different training groups and the used business cases will be discussed in detail. Finally, the results will be presented.

7.1 EXPERIMENTAL DESIGN

Figure 14 illustrates the general experimental design. Within the process of education (see Table 8) a principle was taught in four different ways, simulated by four different groups. The first group referred to the comparison conditions as already conducted in prior experiments. In order to evaluate the hypotheses mentioned in point 6.1, the author developed an adapted comparison approach that was represented in group two. The third group included the necessary variations for evaluating point 6.2. The fourth group reflected the classic approach of case study teaching.

Within the scope of a paper and pencil task (study 1) students of all mentioned groups had to deal with one or two case studies and answer questions to them. By the teaching procedure the participants should have abstracted a schema of the underlying principle. This schema should have been stored in different qualities in memory, depending on the quality of the effectiveness of the training approach. After a time delay of about fourteen days (see point 7.1.3) the students received a link via email. They had to solve another task (= target), where the principle appeared in a totally different context (study 2). The best solutions could be reached by applying the principle they had been taught in different ways (groups 1, 2, 3, 4) two weeks before. Depending on the effectiveness of the training program of study, the participants should have been able to retrieve their abstracted schema to solve the current task as well.

Independently, an online survey (group 5), as a reference size, showed to what extent students were able to solve the second task without previously having received a training. The several groups, the process and the used case studies will be discussed in detail in the following points.

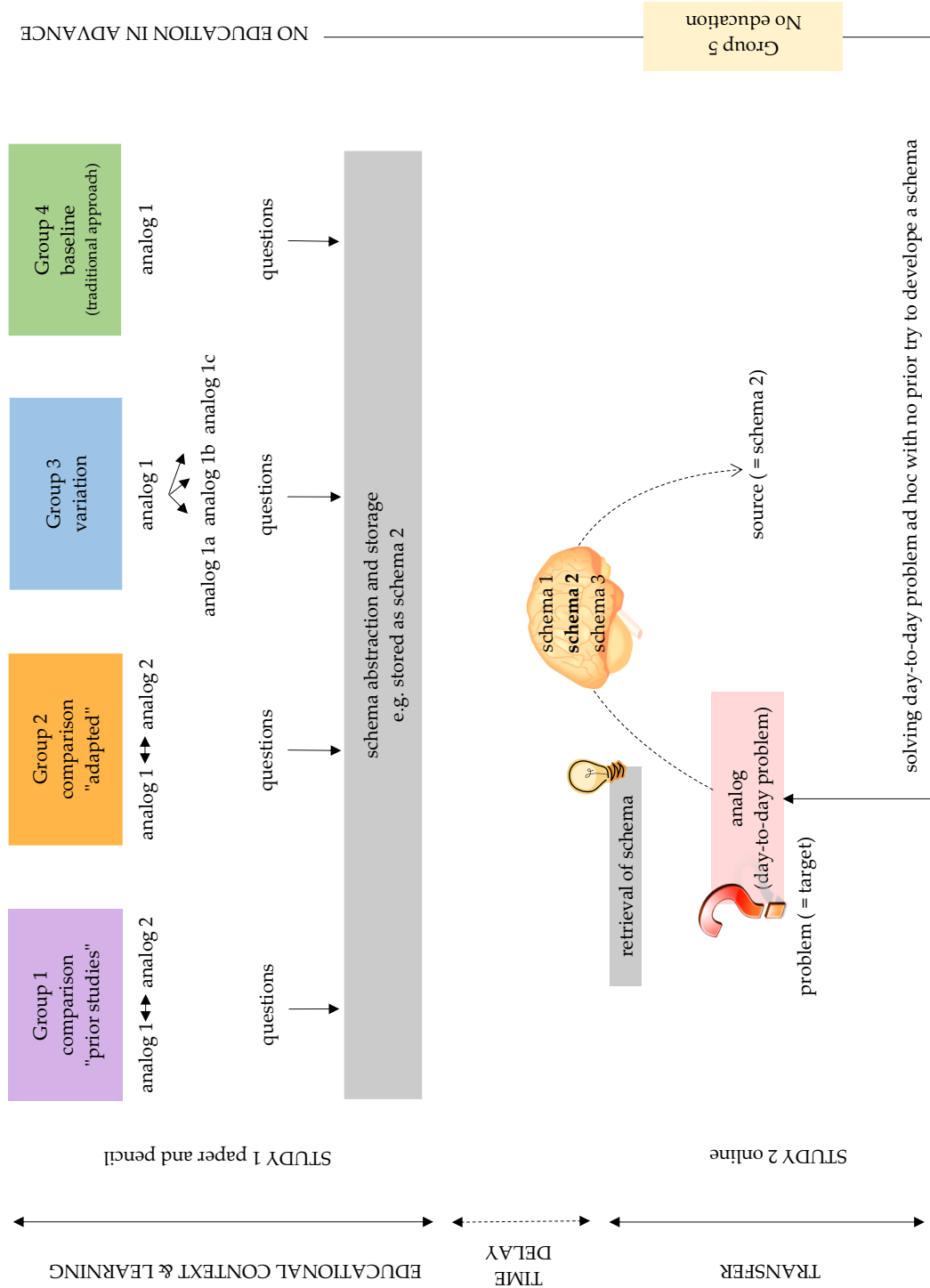


Figure 14: Experimental design

7.1.1 Definition of Teaching Process

In order to provide a clear and common understanding in advance, the author will restate and define the teaching process as it is practiced by working with case studies and assumed for the following experiments in the context of this dissertation.

As already mentioned, prior experiments and real case studies differ in one important aspect. The solution in real case studies is not given (see 5.2.2), whereas the solution was available to participants in formerly conducted experiments (Antonietti, 1991, p. 115). In real business cases the presented source is incomplete, the solution strategy is not obvious when reading the case. In order to apply the comparison approach to real business cases, a clear process has to be determined. Also, a potential new approach for a variation of case studies needs to follow this process. Table 8 illustrates an approach, as it will be simulated within the experiment.

Teaching Process		
<i>Task setting/ distribution of case in advance</i>		
Study at home/ group discussion		- Reading case - Answering questions
Class discussion		- Cold call/warm call - Discussion of solutions - Principle explanation
<i>Preparation after class discussion, recommendations for principle understanding/schema abstraction:</i>		
traditional approach	comparison approach	variation approach
not existing	reading second analogical case, defining commonalities	answering additional questions

Table 8: Process of teaching

First, the lecturer submits the case to the students. Second, the students prepare the case alone at home and often also in groups. Third, a class discussion takes place where some solutions are discussed. In case of an embedded principle (e.g. cost-leadership strategy), the lecturer examines this as a sound solution more detailed. In case of another sound solution, this one will be also discussed in class. For example, this could refer to the example of the Intel management who draw their insights, that if they lose the low end of the market today, they will also lose the high-end in future (see point 0).

Following the traditional approach, after the discussion of solutions in class no further efforts take place in order to increase the abstraction of the principle. Taking the comparison-approach into consideration, authors of prior studies suggest to work on a second case and ask for the commonalities of both. Finally, working with the developed case-variation, the lecturers provide no second case but some further questions the students have to answer.

In the conducted experiment, this process was simulated by the following steps. At the beginning of the study the participants read the first case. After that, they answered some traditional case questions in order to fulfill all objectives followed by working with case studies (see point 5.2.2). Having answered these questions, the principle was shortly introduced. Moreover, a solution to the case based on the application of the principle was presented.

The group that had to deal with the comparison-approach by using real business case studies now read their second case that will be followed by some questions regarding their commonalities (see point 7.1.5.1 and 7.1.5.2).

The group that dealt with the variation-approach did not receive a second case but had to answer the developed variation-questions.

That way, the principle abstraction should be promoted. Also, the conditions of both approaches were identically. Therefore, a comparison of the performance of schema abstraction of both approaches could be drawn. Finally, their performances could be benchmarked to the group that dealt with the traditional-approach, using no technique for further schema abstraction.

7.1.2 Underlying Principle of Cases

For the experiment in the scope of this dissertation the author chose a negotiation principle for evaluating the abstraction quality via the four different training approaches. This decision is based on two characteristics of the domain of negotiation.

First, the principle has already been served as a base in former experiments. Especially for the evaluation of the comparison-approach it was used in many studies (e.g. Gentner *et al.*, 2003; Loewenstein *et al.*, 1999b). Therefore, its appropriateness in the context of studies for analogical transfer is already proven. Moreover, the application of the comparison-approach to regular business cases and its results can be compared to the results of former studies.

Second, negotiation itself stands for an important domain in all human lives. Everyone negotiates sometimes, no matter if it is in the job or in private life. It appears in many situations and across a broad range of contexts (Loewenstein *et al.*, 2003, p. 125) and has already been classified as the “core of the manager’s job” (Lax and Sebenius, 1986; quoted from Loewenstein *et al.*, 2003, p. 125). Especially the mentioned characteristic of negotiation’s cross-domain relevance is very important in the context of analogical transfer (see point 5.1.1). In the conducted experiment the chosen negotiation principle was taught in one context (business) and had later to be applied in another one (private life).

The selected principle, a so called “trade-off”, also termed as “logrolling”, is a worldwide known negotiation technique (Froman and Cohen, 1970, p. 180). By the application of this principle one party receives what it really wants by giving up interests that are not as relevant to them as their first priorities (Loewenstein *et al.*, 1999, p. 595). Such differences in priorities provide chances for the use of this principle (Bazerman *et al.*, 2000, p. 299). While a trade-off tries to create value⁵⁴ for all parties, by compromising on the other hand all parties have to make concessions to not fully give up interests. Vice versa they are not fully satisfied with the solution. People often make suboptimal compromises in negotiations instead of creating trade-offs (Gentner *et al.*, 2003, p. 395).

⁵⁴ To read on in the context of value creation, see Thompson (2006, p. 77).

An example for this principle is about the two sisters having an argument about the last orange⁵⁵. Instead of just cutting the orange into two halves and not fully satisfying both sisters, the mother asked them what they were going to do with the orange. One sister wanted to make juice from the pulp of it. The other sister said she wished to bake cookies and therefore needed the peel. By questioning, each sister could get her personally high priority by giving up the first mentioned objective of getting the whole orange. In another example (see Loewenstein *et al.*, 1999, p. 588) for applying the trade-off principle a woman and a man want to go out for dinner and see a movie. If the man cares more about the movie and the women about the food (or vice versa), they can meet both interests fully if the man selects the movie and the women the restaurant instead of compromising at both.

The trade-off principle is applicable to a wide range of situations having totally different contexts. Therefore, it fulfills the above mentioned characteristics for analogical purposes.

7.1.3 Methodology

All studies in the context of this dissertation were conducted in German (see translated study documents in the appendix). In the following, the procedure of the investigation is described.

7.1.3.1 Study 1

Paper-and-Pencil in Classes

The educational part, meaning to learn the trade-off principle via different teaching approaches, took place at the FOM University of Applied Sciences in Munich in the first quarter of 2015. The realization of the experiment was approved by the managing director of the FOM in Munich and by all lecturers of the classes.

⁵⁵ This story is attributed to Mary Parker Follet, see Kolb (1995, p. 339).

The author went into six master and bachelor classes where students had to fill out the group-individual prepared case studies in paper-and-pencil format (see appendix).

At the beginning, the author presented an introduction on PowerPoint slights what had to be considered during the experiment. This was exactly identical in all classes. Before starting with those rules, the author introduced himself in a view words and explained that the following experiment was part of his doctoral thesis. In order to avoid a potential distortion of results by telling one class things he did not tell to other participants, he noted that he would not provide more information about the precise content of his work and not answer questions about it. He only stated that the following study was about negotiation. However, he left his email address to the students and suggested that everyone who wanted to have more information about the experiment could write an email to him and would receive an explanation after the random sample was closed.

Bringing together education and retrieval

The author started to explain the studies. He argued that his doctoral thesis was subdivided in different parts for which he had to make two studies. For being able to close the experimental part of his doctoral thesis, he kindly asked the students to write their email addresses in the designated domain on the first sheet of the following first study. After some time the participants would receive a link for the second study that was conducted online. The author consciously did not mention that the two studies were directly connected with each other. In all classes the students took this for granted and no questions were asked. Using the email-address, the author was able to clearly allocate the second study to the training groups of the first study.

Rules

Subsequently, the author started to explain the rules of the following first study. Additionally, these rules were visible (via PowerPoint at the classroom's wall) the whole time during the experiment:

- The first study takes place now in paper-form.
- You have to deal with case studies and questions about them.
- The groups will need different time of preparation. Depending on the group, you have to work on the cases longer or shorter. Therefore, the needed time is no indicator to what extent you fulfill expectations and do perform well or not.
- There is no time limit.
- The questionnaires will be distributed randomly.
- After you have finished, please submit all papers and leave the room.
- During the working phase the author cannot answer any questions regarding methodology and content. In case of any words you do not understand, it is allowed to ask.
- It is enough to answer in structured bullet points. The form of expression will be not rated.
- You have to work in sequence and should not turn following pages in advance.⁵⁶ If a page has been turned, looking back is always allowed but not doing rework on already written texts.
- You need a watch in order to note starting time and end time. You also need a pen.
- For respecting data privacy the author assures to you that your noted email address will only be used within the scope of this dissertation and will not be published.

Motivation

A frequent problem of experiments in classes is that students are not really motivated to work on the tests (Malhotra and Birks, 2006, p. 236). In order to increase motivation, the author raffled amazon vouchers (3x30€) for all who took part in both, study one and two. Additionally, the experiment was conducted during regular class time and, therefore, not in the spare time of the participants.

⁵⁶ Otherwise participants might have seen the solution of a case in advance.

Furthermore, in order to create a positive and friendly working atmosphere the author gave each participant when distributing the questionnaire a small package of gummy bears. Moreover, the study's topic and the negotiation principle were supposedly more interesting to young students compared to other experimental topics they might have already taken part formerly. Moreover, three classes took place in the master subject "scientific research". That way, students were able to experience their theoretical learnings also practically in a real experiment, what further contributed to their motivation. Also, one class took place at the first lecture of new starting bachelors. For these students, just having started their study, the author supposed a high motivation. Summarized, an adequate degree of motivation could be assured. This could also be confirmed by a participation quota of about 90 percent (see point 7.2.1).

7.1.3.2 Study 2

Retrievals Education

The basis for the second study was an online survey tool. With the help of this tool emails were sent to the participants fourteen days after having worked on study one. The email included a link to the retrieval case. The best solution for this case could be reached by applying the former learnt trade-off principle. In the email the author asked the students to please take part in the study. It was not written, that this is the second study, following the first one the participants already worked on two weeks before in their classes. Moreover, no logos of the UCAM or FOM in the form they were printed on study 1 were shown. That way, the author avoided to possibly remind the participants of the first study and, therefore, did not provide a hint to the learned principle. With the help of the email addresses, the answers could be directly allocated to the absolved training conditions of the participants from study 1.

Time delay

In prior experiments students were often asked to directly, or with only little time-delay, solve transfer tasks after the schema abstraction took place (see point

5.3.1.2). Moreover, the question to what extent the positive effects of the comparison approach also persist for a long time between both analogs has scientifically not fully been researched yet (Gillespie *et al.*, 1999, p. 368). After the teaching process, often a long time passes by until the gained knowledge will be needed in business life. Consequently, the author set a time delay of fourteen days that was longer than in prior studies and closer to real life conditions. After that time the author sent the emails with the retrieval task to the participants. However, some participants had to be reminded with a second email. Overall, the average time delay between the first and the second study was about 16 days (median value).

Motivation

In the second study the author provided the students the possibility to win one of three amazon vouchers. In order to avoid that students were directly reminded of the first study it was not written „for taking part also at the second study“. In average, about 55 percent of people who took part in the first study also filled out the online case.⁵⁷ From the perspective of the author regarding the statistical explanatory power this was a satisfying rate of return (see point 7.2).

Justification of second study

The question may arise why the second study was conducted even though a positive relation between a sound abstracted schema and a correct retrieval later was already found (see point 5.3.1.6).

One reason concerns the time delay that differs between formerly conducted studies and the delay that exists between the educational processes and potential transfer in reality. Even though two weeks is also not the same as such a long time that could pass until the in class learned knowledge will be used in reality, it is much closer than time delays of prior studies (see point 5.3.1.2).

⁵⁷ Due to the special character of this experiment, including two studies, the author was not able to find benchmarks for average response rates. For response rates in general see Malhotra and Birks, 2006, p. 238.

Moreover, in prior studies the participants, no matter which time delay between schema abstraction and retrieval was given, always took part in one given experiment. It is possible, that participants were looking for the connection between the first tasks (comparison) and further ones (retrieval). Even though the results for transfer performance were rather poor and students confirmed not to be reminded of the former case when answering the transfer tasks (see point 5.3.3.1), it could be even worse if participants in fact do not link the conducted studies to each other. Of course, many students of the experiment in this dissertation could have assumed that both studies they should take part, the first paper-and-pencil study and the second online study, were connected with each other. Nevertheless, first, the connection of both studies as two parts of one experiment is not as obvious as in prior research. Beside the separate communication as mentioned above, this is also owed to the fact that the first study takes place in class in paper-and-pencil form and the second study online at home or in transit. Additionally, receiving an email from colleagues of their university asking for taking part in an online survey is nothing extraordinary and happens quite often during semesters. Second, the long time delay of fourteen days between education and retrieval further contributes to a separate treatment of both studies by the students. They might have forgotten the author's appearance in one of their previously visited classes. Third, due to the fact that it is nothing extraordinary to do more than one survey for different reasons within the scope of a doctoral thesis⁵⁸, students will not intuitively search for a connection between both studies.

Finally and most importantly, the measurement of the performance of the schema quality in study 1, as it will take place in order to determine the success of the training approaches, cannot be used as an objective performance indicator for all training groups within the conducted experiment of this dissertation. It can be used for the two comparison groups. However, for the evaluation of the variation group the schema quality measurement would be distorted. This is up to the fact, that the measurement of schema quality took place by grasping the correct elements of schemata in the answers of the participants. The more correct elements

⁵⁸ For example, in case of a cumulative dissertation, where the doctoral degree will be awarded for the publication of a certain number of different papers.

of the schema were included, the better the schema abstraction. However, due to the fact that in the variation-group many more questions were asked, and the abstraction should have occurred by answering the questions (instead of doing a comparison in the comparison-approaches) the participants did have a lot more chances to write down their thoughts and opinions. Those could include schema elements. Subsequently, as a predication, the schema quality should be higher in the variation-group. This result could not be compared to the results of the other approaches, where an abstraction could also have taken place, but the participants might not have written it down (as a consequence of not asking for it). Therefore, the only way to receive real and comparable results was to run a second study for demonstrating the training effect on retrieval performance.

Summarized, the second study showed the real transfer performance of all training groups closer to reality and comparable among themselves.

No-Education-Group

Independently from any prior training, the participants maybe could have intuitively applied a correct solution to the second online case. In this case no correct inferences from the different trainings to the retrieval performances are possible. Even though prior studies' results may not forecast a lot of intuitively correct solutions as a realistic scenario, the author eliminated this factor by also conducting the online study with participants that had no prior training (see point 7.1.6.2). Thereby, the "intuitive" results can be compared with the results of groups that went through a prior training.

The participants with no prior training were selected using the online-campus of the FOM University of Applied Sciences. That way, the author wrote messages to the students of different classes. Thereby, it was decided first, not to write emails to students at the FOM University of Applied Sciences in Munich. Writing such an email to participants of study 1 from the FOM Munich could have led to the problem that they received two emails. One in the scope of study 2 and one in order to evaluate their supposed intuitively answer with no prior training. Obviously, this would be confusing. Second, emails were written to bachelor- and master-classes in order to receive a comparable composition of participants as it was given in study 1. In the online-survey for these participants the UCAM and

FOM-Logo appeared throughout the survey in order to convey a serious and official framework.

7.1.3.3 *Measuring Performances*

Study 1 – Education

The measurement of the success of the training groups (study 1) took place by evaluating the schema quality. This is an established technique in literature (e.g. Gick and Holyoak, 1983, p. 23; Loewenstein *et al.*, 1999b, p. 591; Gentner *et al.*, 2003, p. 399). In this context, the answers of the students to the questions (see point 7.1.5) were rated on a scale from 0-2.

As defined by the author in advance, a profound schema of a trade-off principle consists of the following elements, the participant had to recognize:

- It is about higher and lower priorities.
- It is about finding out what protagonists really want.
- It is about to realize that the interests are not contradictory.

Depending on the number of elements above appearing in an answer, the schema was rated in the following way:

- 0 = no criterion
- 1 = one criterion
- 1, 2 = two criteria
- 2 = three criteria

In order to support objective evaluations, the schema quality was also rated by the second supervisor of this doctoral thesis. He evaluated the schema independently from knowing to which group the participant belonged. Only a few evaluations differed, but could be aligned together after discussion.

In order to increase the differentiation and to allow to capture a broader range of answers, the author also rated the answers on a scale from 0-4 as followed:

- 0, 1 = no criterion
- 1, 2 = one criterion
- 2, 3 = two criteria
- 3, 4 = three criteria

Of course, some further aspects – beside the elements as stated above – were influencing the rating in its tendency. For example, some participants were just reproducing some core parts from the case or they wrote long texts without really answering the questions. On the other side, some of the students fully recognized the schema and stated the elements clearly and directly. Even though they might have forgotten one element it was clear that the participant understood the trade-off principle. For such cases, in both directions, the author followed his overall impression and rated the answers according to it.

Study 2 – Retrieval

The measurement of the retrievals (study 2) was realized by counting the right solutions of the online case of each group. As introduced in point 5.1.1, analogical transfer is about the transfer of a known source to the target. The trade-off principle, as learned via study 1, had to be transferred to the target problem, the online case (study 2). A case study might introduce a certain principle by the illustration of one branch and one company. However, even though it might be still in a business context, the need for the application later, can occur in a totally different industry and firm. In order to demonstrate that the principle was understood and analogical transfer across different contexts took place, the author decided to go a step further and not even stay in the scope of business, but fully change the problem context. Whilst the trade-off principle was learned in a business context, now it should be applied to solve a problem in a private context. In consequence, it could be assured that the application of the trade-off principle

did not only happen due to a similar context. Therefore, a clear inference can take place from the different training approaches to the retrieval performance of them.

For the calculation of the transfer performance the following fictitious example can be considered:

- In a group 100 participants took place in the training.
- From that 100 people, 60 also took place in the second study online.
- From that 60 people, 40 applied the trade-off principle and found a correct solution to the online case.
- Consequently, the performance of correct retrievals of this group is about 67%.

Study 2 – No Education

The score of performance of the participants of this group was evaluated in the same way as described above. From all students that took part, the correct answers were counted.

7.1.4 Case Development

As introduced above, the trade-off principle is embedded in the different training cases.

7.1.4.1 Study 1

Two different cases were needed within the first study. In order to be able to refer to previous results of analogical case comparisons and to use accepted and already tested, very established cases in literature, the short trade-off cases were first taken from Loewenstein *et al.* (1999, p. 596, "The Meeting-Case"), as illustrated in Figure 15.

The Sales and Marketing divisions of a large corporation are trying to decide where to have a major conference. Sales wants to go to a lodge in the mountains. Marketing, on the other hand, wants to go a major city.

They have considered the compromise of holding two conferences, but the added cost seems prohibitive and keeping the price of the conference down is of primary importance for both Sales and Marketing.

As they discuss the issue further, it comes out that what Sales really wants is to run the conference as a retreat, which requires having a location suitable to focusing on the work at hand. Furthermore, it comes out that Marketing wants to use the conference as an opportunity to promote the company image.

The two then agree on having a well-publicized conference located in the mountains.

Figure 15: The meeting

Source: Loewenstein et al., 1999, p. 596

The second case was taken from Gentner *et al.* (2009, p. 1382, "The Video-Game-Case"). This case is illustrated in Figure 16.

Vortex, Inc., a small video-arcade software firm, had a promising new line of special forces videogames. Keppel and Co., a major manufacturer of video-arcade equipment in Europe, was working with Vortex to produce the hardware needed for the special forces games. They were negotiating over how to share revenues from their joint product.

The deal was mostly going smoothly – Vortex wanted to broaden the market for its products and Keppel needed a boost in sales to meet their shareholders expectations for the year. However, the two companies were struggling with how to split sales revenues. Keppel was demanding a high percentage from sales to finance the added expense of a custom-made action control for Vortex's games. Further, Keppel knew that it had the greatest resources to get Vortex's special forces games on the market.

On the other hand, Vortex was also demanding a high percentage from sales on the grounds that what was being sold was their games, they had the patent on the new action control, and Keppel was simply one of several available manufacturers.

Having negotiations at a standstill was bad for both companies because Keppel needed to increase their sales by the end of the year and Vortex needed to get their products out while they were still state of the art.

The breakthrough came when negotiators from Keppel and Vortex began discussing the differing needs of their companies. The negotiation teams reached the following agreement: Vortex would give up some of its share of revenue for the remainder of the year to cover Keppel's production costs and to aid their current financial situation. In return, Keppel would give up a comparable share of revenue in future fiscal years for these products, and Vortex still maintained their patent on the new control device.

Figure 16: The video game

Source: Gentner et al., 2009, p. 1382

These cases build the basis for the in literature already proven success of comparisons. However, as already discussed, they are not really close to real business cases. In order to create such business cases, the author extended the cases

by adding more information, especially distracting one and details. The adaptations of the cases are highlighted based on the following caption:

- grey background: ORIGINAL CASE ELEMENTS
- underscored: DISTRACTION
- *italic*: DETAILS

Figure 17 shows the extended “Meeting”-case.

The Meeting

MacGrant LLC, a large traditional whiskey distillery, has gone through difficult times after the heir and owner Dave Billing has left the company due to his age of 69 years. After his departure, external managers started to run the business. However, Dave still owned high shares of the company and, therefore, in fact never completely retired. Consequently, he still took influence on the operational business whenever possible. For the external managers this was not a base to work upon and, as a result, in the first three years after Dave’s retirement, four external managers came and went. This led to very discontinuous strategy approaches and a low working climate. During these years the sales and revenues of the company were decreasing (see figure 1).

MacGrant LLC	CEO: Dave Billing			Various New CEOs			Entry of CEO Michael Haynes	
	2006	2007	2008	2009	2010	2011	2012	2013
Lower Price Segment								
Sold Bottles	3.282.658	3.492.367	3.320.380	3.369.611	3.006.430	3.644.294	3.238.547	3.259.489
Revenue Thd. \$	\$45.301	\$46.099	\$44.825	\$42.120	\$42.090	\$40.087	\$42.101	\$43.025
Average cost per bottle	\$13,80	\$13,20	\$13,50	\$12,50	\$14,00	\$11,00	\$13,00	\$13,20
Middle Price Segment								
Sold Bottles	2.852.554	2.953.694	3.015.362	2.837.072	2.392.398	2.964.034	2.791.877	2.488.920
Revenue Thd. \$	\$67.035	\$70.003	\$69.052	\$57.025	\$55.025	\$56.020	\$60.025	\$59.859
Average cost per bottle	\$23,50	\$23,70	\$22,90	\$20,10	\$23,00	\$18,90	\$21,50	\$24,05
Premium Price Segment								
Sold Bottles	377.576	393.624	395.878	349.401	335.755	363.737	376.743	384.107
Revenue Thd. \$	\$22.353	\$23.846	\$23.001	\$20.125	\$21.153	\$19.005	\$20.856	\$22.785
Average cost per bottle	\$59,20	\$60,58	\$58,10	\$57,60	\$63,00	\$52,25	\$55,36	\$59,32
Total								
Total Sold Bottles	6.512.788	6.839.685	6.731.620	6.556.083	5.734.583	6.972.065	6.407.167	6.132.516
Revenue Thd. \$	\$134.688	\$139.948	\$136.877	\$119.271	\$118.268	\$115.113	\$122.983	\$125.669
Profit Thd. \$	\$13.460	\$14.524	\$13.426	\$10.569	\$10.621	\$8.526	\$11.958	\$12.603

Figure 1: sales and revenues

In 2012, the current CEO Michael Haynes came into business being the first able to implement his strategy and to deal with Dave’s character. Before he came to

MacGrant LLC he was a successful manager of marketing and sales at various German breweries. Therefore, due to many breweries are led by their owners, he knew a lot of people who could not totally disengage their responsibility of a business leader after their retirement. He was able to use the deep and profound experiences of Dave and his high reputation at distributors and long-run business partners. Michael gave Dave in that way the possibility of still being part of the business. At the first time after his official retirement Dave's needs for involvement and participation were fully satisfied. Therefore, Michael himself could focus on the internationalization of sales, the global marketing strategy and the financial part of business.

In order to demonstrate that the turbulent years were past, Michael knew he had to do something to increase motivation in the marketing and in the sales divisions. This was one of his most important objectives in 2014. The marketing and sales divisions had particularly suffered from the permanent changes in strategy and had not been allowed to participate in the decision making processes at all. Therefore, he wanted to set up a meeting to work on the future course of MacGrant LLC. He knew that only by participating marketing and sales during the decision processes, he could increase motivation again.

He set up a meeting with the Head of Marketing Julia Singer, and the Head of Sales Roberto Toleti. In this meeting Michael told them about the backgrounds of his idea of the meeting. He gave both two weeks to define a concept and present this to him. His experiences have shown that often the ideas of marketing and sales regarding such a topic strongly differ, so he was quite curious about the concepts.

Julia and Roberto presented their ideas to Michael and he was proven right realizing that both did not create a common concept. In this case the ideas went into totally different directions. There were such substantial disagreements between the two divisions that they were even beginning to create conflict between them. Roberto wanted to go to a lodge in the mountains. He had researched this possibility already and due to the high popularity of such suitable locations he wanted to reserve a location as soon as possible. Julia wanted to set this meeting in a major city.

She had already generated materials on the potential exposure of the company in several urban markets in preparation.

Due to their different approaches Julia and Roberto suggested to Michael to hold two meetings, one as proposed from marketing and one as proposed from sales.

Michael denied this option immediately pointing on high costs and the hectic travel schedules of the executives involved. While thinking again on the proposals of Julia and Roberto he got confirmed in his decision to initiate a common meeting in order to improve cooperation and communication between the marketing and sales division.

After listening to both ideas and understanding the intensions of them he wanted to know more about the detailed backgrounds that led Julia and Roberto to their recommendations. Julia started and told about the current situation in the marketing department. Her employees were daily confronted with negative trends concerning the image and the reputation of the company in the market. She referred to still very much lower market reputation in 2013 than in 2008 (see figure 2). This is also something Dave was aware of and stated this facts as often as possible to her.

MacGrant LLC	2008	2009	2010	2011	2012	2013
Percentage of Whiskey Customers stated a...						
...positive Image Perception of the brand	86,2%	79,1%	75,2%	71,4%	72,0%	72,4%
...the brand as their first choice	9,1%	9,0%	8,4%	6,2%	6,8%	7,1%
Market Share Top 3 Markets						
Scotland	14,2%	14,0%	13,9%	10,0%	10,4%	10,7%
Germany	8,2%	8,3%	8,0%	7,7%	7,9%	8,0%
England	7,9%	7,9%	7,9%	7,7%	7,8%	7,8%

Figure 2: Marketing key-ratios

From Julia's perspective, this meeting should demonstrate to the employees that they still could be proud to work for MacGrant LLC and that a new era would start right now. She thought such a highly renowned location would contribute to this understanding. Also, external business partners and customers getting to know about the choice of such a location, would promote the company image.

Roberto listened carefully to Julia and then began to explain his understanding of the planned meeting. He said, that after these turbulent years the employees should get involved in the strategy process by working it out by themselves. They needed a quiet and simple, maybe totally unknown, location with enough space to work in groups and to discuss in teams.

Moreover, he wanted a relaxed atmosphere, offering the possibility to work completely focused without any distractions. From his perspective all these characteristics were available choosing a lodge in the mountains. Finally, Roberto closed his explanations pointing out what Dave had often criticized before, that the sales team only tried to sell bottles without having any idea which

products they should sell in which priority in order to increase profitability. For the sales teams, the more bottles are sold, the better it was. Only when working together in an atmosphere where the sales team could listen carefully, such important aspects could get taught.

After these detailed information of both sides, Julia and Roberto understood each other better. All arguments were valid and comprehensible from both points of view. Also Michael understood both negotiation parties well. However, for the moment they could not see a solution fitting to all interests. They broke up the meeting and Michael went back to his office.

At the evening, Michael had a look at both presentations again. He carefully reread the arguments again and again. He was very unconfident what he should do.

The interests were not as contradictory as it has appeared. Being separated from a stressful and hectic environment on the one hand and enjoying a high quality and elaborated location on the other hand does not necessarily need to exclude each other. Michael realized that Julia argued she wanted to hold the meeting in a big city, but what was really important to her was the reputation of the hotel in order to motivate the employees. Roberto did in fact not put full emphasis on the lodge in the mountains, for him it was all about having a quiet and relaxed place to be focused on work. The best solution was to look for a well-publicized meeting located in the mountains.

Figure 17: The meeting – extended

Source: Own case development, based on Loewenstein et al., 1999, p. 596

Figure 18 shows the extended “video-game”-case.

The Video Game

In 2005, three young people, Donald Greene, Carol Sutton and David Kleasy founded a start-up IT-firm called Vortex, focusing on the development of software for already existing hardware gaming controller. But then, Keppel, a major manufacturer of video game equipment in Europe, had been so impressed by a marketing campaign, initiated by Sutton that they offered her a great job and she left the company. However, the afterward necessary partly reorientation of Vortex with focusing more on own innovation, than on just delivering, paid out, also financially (see figure 1). Vortex developed from a simple supplier for software to a developer with own innovations.

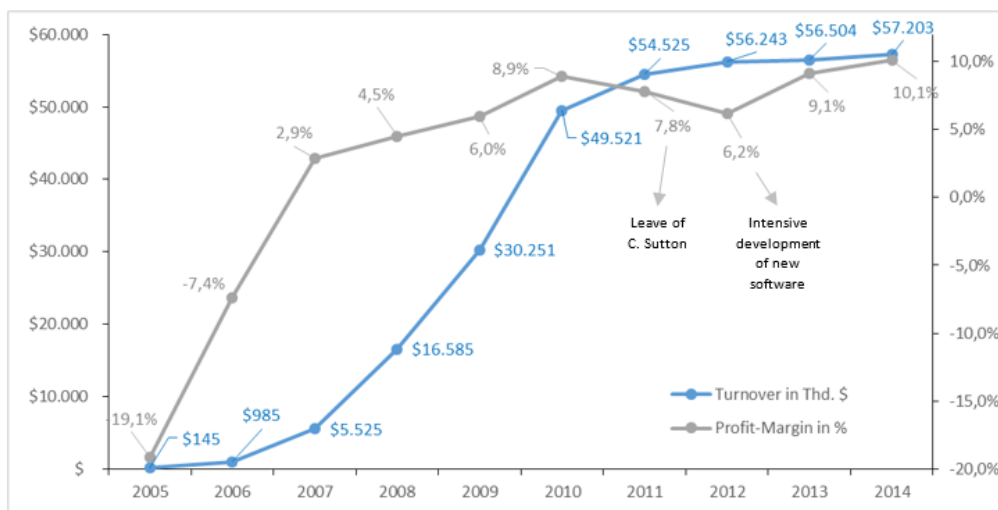


Figure 1: Financial development of Vortex

Greene and Kleasy tried to gain ground in a greater market and establish their brand. Therefore, they created a promising new line of special forces video games, but did not have the capacities and workforce to produce the hardware components independently. From the information they had collected following the career of Sutton at Keppel, they derived a great potential for a cooperation with that firm.

In contrast to many other competing hardware producers, Keppel, with its actual CEO

Frank Custon, had always resisted the seduction of outsourcing the production to other countries in order to keep the principles of the founder Joseph B. Keppel alive. However, this was not that easy in times of global production. To still meet the shareholders expectations in future, Custon decided he had to bring some new input into the firm philosophy. According to him the request of a little firm called Vortex came exactly at the right time.

Keppel and Vortex started negotiations. As mentioned above, Keppel on the one hand, had the capacities and workforce, together with being well-established on the market with a good reputation. These were all requirements for Vortex's aims who wanted to broaden the market for its products. One the other hand Keppel needed a good product for a boost in sales to meet their shareholders expectations for the year and such a product was offered by Vortex with the promising special forces game.

Unsurprisingly, the deal was mostly going smoothly at the beginning, a common concept of working together, was designed quite easy. However, when they came to the point of negotiating over how to share revenues from their joint product, both parties were at odds with each other. Keppel was demanding a high percentage from sales to finance the added expense of a custom-made action control for Vortex's games. Further, Keppel knew that it had the greatest resources and conditions to get Vortex's special forces games on the market. Custon also stated quite elaborately what great risk it could turn out to be for Keppel to focus completely on working with an uprising little firm. In that way he tried to intimidate Greene and Kleasy a bit, knowing they had not been to such big negotiations before. On the other hand, Vortex was also demanding a high percentage from sales on the grounds that what was being sold was their own games, having the exclusive patent on the new action control, also pointing out to other offers they had got from hardware producing firms. Vortex tried to stress that Keppel was simply one of several available manufacturers.

Disagreements concerning negotiation positions and importance of stated facts got so profound that the apparently fixed deal really got in danger. Negotiations came to a standstill.

Greene and Kleasy had the feeling that their product line of innovative games could really be their possibility to establish themselves on the market. Their only problem

was that Vortex had to get their products out while they were still state of the art. Custon however had the problem of already having promised a financial boost to the shareholders and in that context had already presented a preview of the new line of games, after the first part of negotiations had been promising. Now cancelling the deal would really damage his career and so an increase in sales by the end of the year was necessary. In his desperation, he asked Carol Sutton, who meanwhile got to be the head of marketing at Keppel, to join the negotiations. She agreed and one final meeting was determined between Vortex and Keppel.

Before the meeting started, Sutton went through the documents and was very motivated to find a fair and sound solution for both parties. She was really surprised when she came to the result that the aims of Keppel and Vortex were in fact completely different and not excluding each other at all. She realized that Greene's and Kleasy's focus in fact was on bringing their own firm up and for that it was not necessarily important to have short-term financial success, but more to establish themselves. Keppel in contrast needed exactly such a short-term financial boost. Sutton worked out an agreement both could live with: Vortex would give up some of its share of revenue for the remainder of the year to cover Keppel's production costs and to aid their current financial situation. In return, Keppel would give up a comparable share of revenue in future fiscal years for these products, and Vortex still maintained their patent on the new control device.

Figure 18: The video game – extended

Source: Own case development, trade-off based on Gentner et al., 2009, p. 1382

In result, the case “the meeting” was stretched from about 140 words to 1.175 words, excluding the two developed illustrations. After the modification, the case “the video game” has about 900 words instead of originally about 300 words.

7.1.4.2 *Study 2*

In order to evaluate the quantity of correct retrievals per group, meaning the correct application of the trade-off principle, participants received another case-study about fourteen days later (see point 7.1.3). By applying the trade-off principle the best solutions could be reached. The online case was identical for all participants that took part in the former study 1 and for those students who only received the online case. Figure 19 shows the test-case, simulating the target problem.

The driver-problem

The married couple Claire and Paul have an argument about their planned trip to Venice (Italy). They would like to start their vacation on 05/09/2015 and both exclude other means of transport than driving their own car due to their baggage and higher costs. So both meet up and start planning. Like with various vacations before, they strongly disagree in one point. Both insist on driving the common car due to the driving characteristics of each other.

A direct and therefore fastest route, which in fact would be preferred by Claire as well as by Paul, would lead them at first and most part of the route on the highway to the Alps. In the following, they would have to take some curvy mountain passes to overcome the Alps in order to take the highway again for the rest of the route. Like previously, both promise each other that if the other person relinquished the claim to drive himself, the driver would of course be considerate of the other. But several vacations dating back have shown, that promises have never been kept. Due to the fact that neither of them is up to give in, both submit alternative proposals. Claire is always stressed and angered when she has to sit for a longer time in a car not driving by herself. In contrast to her own driving style, in her opinion most drivers are too concerned not to exceed tempo limits and are too aware of safety. Paul basically ignores the navigation system, what frequently leads to detours because he misses highway departures and so the needed time in the car is extended. If Claire tries to support him by telling the right way, Paul always feels offended, what contributes to deteriorating Claire's mood even more. Because of that, she proposes another route, which is indeed connected with a bigger detour and a considerable expenditure of time, but on which she only had to drive highway routes. Paul always feels sick when he doesn't drive himself on curvy roads, especially if the driving person tends to a speedy and corner cutting driving style. For this reason, Paul proposes a route, which would only be a smaller detour, but mainly on country roads and mountain passes, which he wouldn't care about when driving himself. Both present their solution also for the way back on 05/23/2015.

Figure 19: The driver-problem

The best solution, by applying the trade-off principle, is about Claire driving the highway parts of the route where she can drive fast and where are no curves she could cut. Apart from that Paul cannot miss highway departures if he is not the driver. On the other side, Paul drives the curvy mountain parts of the route where he does not get sick when he is the driver. Moreover, Claire will not be stressed and angered, due to the fact that Paul cannot miss any departures and she herself could not drive faster on this part of the route anyway.

The deal made in private life is close to the situations of negotiations in business life. For example, on the one hand there are the two departments who have to find a place for their meeting, on the other hand two private persons have to find an adequate agreement about who to drive the common car. In both cases the parties have interests that are very different on the first sight but, in fact, not really contradictory. In the business case, a quiet place to work and a highly renowned location do not exclude each other, which is on a structural level comparable to the desires of driving fast on the one hand and not to get sick in the Alps on the other hand. So in both cases the best solution can be reached not by giving up interests and compromising, but to find out the real interests of the other party. In fact, all the structural parts of a trade-off principle are included in all cases and provide the best solution for the parties no matter in which context.

7.1.5 Content and Objectives Study 1

The following points provide an overview of the different training approaches and its objectives within the experiment.

7.1.5.1 Group 1

In group 1 the author replicated the effects of already received insights of analogical comparison. The cases were taken from prior realized experiments (see 5.3.3.1). This was necessary to be able to refer to prior results and in order to have a direct reference to the performances of the comparison of cases that were closer to reality and the results of variation.

At the beginning, the participant had to write its email address (for study 2) and the time the test was started on the paper. Afterwards, the first case had to be

read and subsequently on the next page the second case. In the aftermath, the participants were asked the following questions, which were taken from prior experiments (e.g. Gentner *et al.*, 2003, p. 396 based on Thompson and Hastie, 1990, p. 120; Gentner *et al.*, 2009, p. 1347):

- Please shortly summarize, what is going on in both negotiations?
- What are the key similarities between these two cases?

Then, the participants of group 1 received a short definition of the trade-off principle and had to answer the following question, which was also taken from prior studies (e.g. Loewenstein *et al.*, 1999, p. 590; Gentner *et al.*, 2009, p. 1348).

- What are the key signals that show the possibility of using the "trade-off"-principle? Please describe both cases' solutions in the context of the "trade-off"-principle.

Finally, the end time of the study had to be noted and before submitting the study, the participants had to answer a few general questions. These questions referred to:

- Familiarity with negotiation techniques.
- Data about participant's sex and age.
- The course of study.
- The aspired degree of the participants.
- Already made apprenticeships before studying.

The answers of these questions serve as indicators on potential significant influence factors on the results. For example, the degree participants aspire (bachelor or master) could positively influence the correct retrieval in study 2 (see 7.1.3.2) due to their greater learning experience. For the whole training condition of group 1 see appendix.

7.1.5.2 *Group 2*

Group 2 followed the regular teaching process in real business classes (see Table 8). The beginning of the questionnaire of group 2 was identical to group 1 (writing down email address and starting time). Then the participants had to read the cases, which were now extended in order to meet real conditions (see point 6.1). After having read the first case some questions were asked. These questions refer to some classic case study questions and are based on Shapiro (1975, p. 1):

- Who is the protagonist?
- Please shortly summarize, what is going on in this negotiation?
- As the protagonist...
 - What objectives do I have?
 - What problems do I face?
 - What courses of action are open to me?

The reading of the first case and the questions refer to the step of home preparation. Then the class discussion was simulated by presenting a short definition of the trade-off to the class and one possible solution to the case, based on this principle.

Subsequently, the participants in this group had to read another case. This is the part of preparation in the aftermath of a class for abstracting principles. After reading, they had to answer the following questions (see group 1):

- What are the key similarities between these two cases?⁵⁹
- What are the key signals that show the possibility of using the "trade-off"-principle? Please describe both cases' solutions in the context of the "trade-off"-principle.

⁵⁹ Due to the fact, that the question for summarizing what is going on in the negotiation was already asked in the general case study questions, it is omitted at this place.

Noting the end time of the study and the general questions were identical to group 1. The whole training condition of group 2 can be found in the appendix.

7.1.5.3 *Group 3*

The training in group 3 referred to the technique of variation, that has been developed by the author (see point 6.2). The participants started as in group 1 and 2, writing down their email addresses and starting time. Subsequently, they had to read the same case as the participants read at first in group 2. Also, the following classic case study questions were identical and also the presentation of a short definition of the trade-off principle and one possible solution based on this principle. Now, instead of reading another case as it was practiced in group 2, the participants received the defined questions for the variation-approach (see point 6.2).

After having received the training, based on the variation approach, the participants had to answer the following question:

- What are the key signals that show the possibility of using the "trade-off"-principle? Please describe both cases' solutions in the context of the "trade-off"-principle.

Writing down the end time of the study and the general questions were identical to group 1 and 2. The whole training condition of group 3 can be found in the appendix.

Referring back to Table 5, the juxtaposition of real cases and prior cases is now enlarged by another column, including the characteristics of experimental cases as used in the context of this dissertation. Table 9 shows that the new experimental cases are much closer to real business cases, as those used in prior studies.

Juxtaposition of most important objectives and characteristics of case studies as used in real business education and as used in prior experimental studies to evaluate the "comparison"-approach and as applied in the dissertation (in the context of preparation by students).	Real cases	Prior experiments "comparison"	Dissertation experiments "comparison adapted (C)" and "variation (V)"
Targets of case studies			
1. Development of diagnostic skills	yes	no	supposed
2. Setting people in the position of making decisions	yes	limited	yes
3. Transferring an embedded principle	yes	yes	yes
Characteristics of case studies			
4. Describing real situations	yes	yes	yes
5. No decision stated	yes	no	yes (V)
6. Often more than one possible option	yes	yes	yes
7. Include relevant and irrelevant materials	yes	no	yes
8. Detailed specifics of each business situation	yes	no	yes
9. Often one case per class	yes	no	yes (V)
10. Average of about 10-20 pages, plus numerical data and illustrations	yes	200 words	1,200 words
11. Analytical questions for students	yes	no	yes
12. At least two hours to read and prepare	yes	ca. 10 min.	ca. 30 min.
Further criteria			
13. Preparation at home	yes	experiment	experiment

Table 9: Juxtaposition of cases - incl. cases dissertation

The cases are about six times longer than prior experimental cases and include irrelevant information and distracting details. Therefore, they are much closer to real business cases. Also, due to some analytical questions within the experimental scope, the general objectives (number 1 and 2 in the table above) of business case studies are also fulfilled. In the comparison training approach participants still received a correct solution (a decision stated) for a second case. In the variation training the solution is only developed for one case. Besides the question to what extent decisions are stated, if one or two training cases are needed also depends on the approaches. Whilst the comparison approach needs two cases, the variation-approach equals to the classic approach taking only one case per class into consideration.

7.1.5.4 *Group 4*

Group 4 represents the classic teaching approach with case studies, meaning without special consideration of the schema abstraction in the aftermath of class. The participants started by writing their email addresses and the starting time on the paper. Then, they read the same case as the participants did in group 3 and as they did at first in group 2. Afterwards, they answered the classic case study questions, received a short definition of the principle and one possible solution to the case based on the principle. Then they were asked the following question:

- What are the key signals that show the possibility of using the "trade-off"-principle? Please describe both cases' solutions in the context of the "trade-off"-principle.

Finally, they wrote down the end time of the study and answered the general questions as in group 1 and 2. The whole training condition of group 4 can be found in the appendix.

7.1.6 **Content and Objectives - Study 2**

The second study was evaluated in order to determine the performances of the training conditions on the correct application of the trade-off principle. Moreover, another group that did not take part in the former training classes received this case for evaluating their performance compared to the trained participants. Even though the actual case was identical to all participants, the programmed online-survey for the groups with prior training and the group with no training slightly differed.

7.1.6.1 *Online Retrieval Case - Group 1, 2, 3, 4*

The study started by sending an email to the participants. By opening it, the students were directly guided to the online tool and the case study. After their answer to the case they were guided to a few additional questions. These questions were about:

- The way participants created their solution.
- If they applied a certain principle during their solution development.
- If they, from their perspective, applied the „trade-off“ principle.
- Depending on the answer, participants were asked to create a solution applying the “trade-off” principle.

Due to the fact, that for these participants all further information (e.g. sex, age) was already given within the scope of study 1, no further questions had to be answered. For the overall online study and all questions see the appendix.

7.1.6.2 Online Case - "No Education"-Group

The study also started by sending an email to the participants. By opening it, the students were guided to a first page with a short introduction. In this introduction it was explained that their answers were needed within the scope of a dissertation. Moreover, the approximated duration the study would take was specified (7-10 minutes). This is important in order to reduce interruptions of participants not knowing that the survey would end soon. Finally, the email address of the author was given for questions in the aftermath of the study.

On the second page it also had to be worked on the case study. Due to the fact that these participants did not take part in the first study, on the following pages general questions for sex, age, etc. (see point 7.1.5.1) were asked. With the help of these information it was assured that the basic set of participants was comparable to the students that took part in the training approaches.

7.2 RESULTS

In the following chapter the results of study 1 and study 2 are discussed. The key-hypotheses and further outcomes are evaluated. However, for the interpretation of results see point 8. Furthermore, the degree to which certain influence factors have an impact on the results (e.g. age, sex) are analyzed in the scope of point 7.2.2. This is owed to the fact that within study 2 the no-training group is also evaluated. The author will consider all groups together when analyzing these influences

7.2.1 Study 1

In study 1, within the scope of all four groups, a total of 209 students received the study in paper-and-pencil form. From that, the author sorted 20 questionnaires out. Reason for this was mainly that participants did not want to take part in the study. This was obvious due to a lot of missing answers or crossed spaces for answers. The author assumed that these students did not have the heart to state that they did not want to participate in advance before receiving the questionnaires. Finally, the results of $n = 189$ students could be used for further analyses. This equals to a response rate of about 90%. Compared to average rates of responses this rate is above the average of 82% for personal interviews, which show the best rates of return (Malhotra and Birks, 2006, p. 238) of all survey techniques. The number of participants were distributed to the groups as shown in Table 10.

Group 1	Group 2	Group 3	Group 4	n Total
43	49	51	46	189

Table 10: Number of participants of study 1

Within the scope of study 1, the performance of training groups regarding their received schema quality was evaluated. In this context, hypothesis 1a was tested. Therefore, the differences of schema qualities between group 1 and 2 were evaluated. A significant difference between the comparison group using cases as in former experiments (group 1) and group 2, that included cases close to real business cases, would state that participants were not able to acquire the

underlying schema to the same extent. In this case hypothesis 1a (see point 6.3) would be confirmed.

With the help of a statistical test the differences between group 1 and 2 became salient. A t-Test determined to what extent the mean values of groups differ and if the deviation was significant or not. As a level of significance the author decided to test with an Alpha-value of 0.05. As explained in points 7.1.3.2 and 7.1.3.3 the author rated the answers regarding the extent they grasped relevant schema elements on two different scales (a three-point scale from 0-2 and a five-point scale from 0-4). From all single ratings of participants' answers the mean values of groups were considered in the scope of the t-Test.

However, the test showed an unexpected result. Between group 1 and 2 no significant differences of schema quality existed. This is valid for the evaluation on the three-point scale as well as for the five-point scale. Table 11 shows the detailed information.

Scale 0-2	Group 1	Group 2
Mean	0.512	0.592
Variance	0.399	0.372
Observations	43	49
t-value	-0.618	
P(T<=t) two-tail	0.538	
t Critical two-tail	1.987	

t-Test: Two-Sample Assuming Unequal Variances, Alpha=0.05

Scale 0-4	Group 1	Group 2
Mean	0.791	1.041
Variance	0.741	0.957
Observations	43	49
t-value	-1.305	
P(T<=t) two-tail	0.195	
t Critical two-tail	1.987	

t-Test: Two-Sample Assuming Unequal Variances, Alpha=0.05

Table 11: t-Test results of groups 1, 2

The participants of both groups abstracted the schema in a comparable quality (Scale 0-2: Group 1: $M = 0.51$, Group 2: 0.59 , $t = -0.62$, n.s.; Scale 0-4: Group 1: $M = 0.79$, Group 2: 1.04 , $t = -1.30$, n.s.). In consequence, hypothesis 1a has to be rejected.

As already discussed, a general statement for the effectiveness of the training approaches based on the schema quality cannot be made. The variation approach probably distorts the results (see point 7.1.3.2). The questions as used in the variation approach of group 3 enable a broader space for writing more important aspects of schema quality. Therefore, the author assumed that the schema quality of group 3 is higher than the quality of other groups.

By applying an ANOVA-Test (analysis of variance) significant differences of means of more groups can be determined. Table 12 shows the average values of all groups for both types of scale.

Groups (Scale 0-2)	Count	Sum	Average	Variance
Group 1	43	22	0.512	0.399
Group 2	49	29	0.592	0.372
Group 3	51	37	0.725	0.523
Group 4	46	24	0.522	0.300

Anova: Single Factor, Alpha=0.05

Groups (Scale 0-4)	Count	Sum	Average	Variance
Group 1	43	34	0.791	0.741
Group 2	49	51	1.041	0.957
Group 3	51	71	1.392	1.363
Group 4	46	37	0.804	0.605

Anova: Single Factor, Alpha=0.05

Table 12: ANOVA average values of groups 1, 2, 3, 4

For both scales, group 3 shows a higher average-value. These are shown in Table 13.

Source of Variation	F	F crit	P-value
Scale 0-2	1.175	2.653	0.321
Scale 0-4	4.107	2.653	0.008

Anova: Single Factor, Alpha=0.05

Table 13: ANOVA results of groups 1, 2, 3, 4

It is not given that one group's average significantly differs from other groups using a using a scale from 0-2, but on a scale from 0-4 the difference is strongly significant (Scale 0-2: $F = 1.18$, n.s.; Scale 0-4: $F = 4.11$, $p < 0.01$).

Therefore, the assumption of the author was correct that the schema abstraction of group 3 strongly differs. However, this is based on the suggestion, that the questions of the variation group enable the participants to explain the content of the trade-off more explicitly. Nevertheless, the results can also be owed to the fact that the students really abstracted in a higher quality based on the training approach. Another important information is about the results of group 4. The traditional approach did not suffer regarding schema quality compared to group 1 and 2. The average-value on both scales is close to the values of group 1 and 2.

The latter mentioned points will be discussed in the scope of the interpretation of the results in chapter 8. Summarized, taking prior research into account that suggests a direct relation between the quality of schema and transfer performance, in study 2 all group performances should be close to each other. Except, if the results of group 3 are indeed better due to the previously received training instead of the supposed above mentioned measurement issues.

The author states in points 5.3.4.2 that the variation approach would be easier to implement in the current teaching approach. One argument for this is, that the variation approach would not take as much time as applying the technique of comparison. In study 1 it was recorded how long the students needed for working on the study. In this context, the time for applying the comparison approach that is close to real business education (group 2) and the time consumption of the

variation training (group 3) were evaluated. In average, group 3 needed about two minutes more than group 2.

Time Consumption	Group 2	Group 3
Mean	25.429	27.660
Variance	58.958	26.311
Observations	49	50
t-value	-1.697	
P(T<=t) two-tail	0.093	
t Critical two-tail	1.989	

t-Test: Two-Sample Assuming Unequal Variances, Alpha=0.05

Group 2: One participant no data. Observations=50, not 51

Table 14: t-Test for time consumption of groups 2, 3

Using a t-Test, the difference is not significant on an Alpha of 0.05 (Group 2: M = 25.43, Group 3: M = 27.67, t = -1.70, n.s.). In average, group 3 needed about two minutes more than group 2. This means, students of group 2 and 3 did not have high differences in their time-consumption for working on the study. For an interpretation of these results see point 8.

7.2.2 Study 2

In addition to groups 1, 2, 3 and 4 of study 1 and their transfer performance evaluated in study 2, the author conducted a survey with students that had no training at all. These students should solve the same case as the students who went through the training approaches of study 1. In this group 5 (no-education-group) the author had a sample size of 126 participants. Also, from the educational groups of study 1 the number of participants who also took part in the second study is stated in Table 15.

Group 1	Group 2	Group 3	Group 4	Group 5	n Total
27	25	27	25	126	230

Table 15: Number of participants of study 2

As mentioned in the introduction of point 7.1 some characteristics of the participants may have influenced the results on a significant level. These potential influences were collected from the participants by the questionnaires of study 1 and also by the online-survey of group 5. The author determined the following possible influences on performances:

- Age
- Sex
- Prior training in negotiation
- Current study/aspired degree
- Apprenticeship before study

These influences will be discussed in detail on the following pages. With the help of a Chi-Square-test, the author investigated to what extent the samples are normally distributed taking the different influence factors into account. After these potential influences are determined and, if significant, adjusted, the transfer performances of each group can be concluded to the success or non-success of the training approaches of study 1.

Age

For the evaluation of the influence of the age of participants on correct solutions of the online case, some clusters of age were built. Table 16 shows the distribution. Ten participants decided to not state their age in the study (n.a. = 10).

All Groups	Correct	Wrong	Total
< 23	26	30	56
23 - 25	33	43	76
26 - 28	17	33	50
> 28	15	23	38
n.a. = 10	91	129	220

Table 16: Chi-Square distribution of 'age'

Applying an Alpha of 0.05, the age has no significant influence on given correct and wrong answers of groups [$\chi^2(3, n = 220) = 1.90$, n.s.].

Sex

Table 17 reflects the distribution of correct and wrong answers for the influence factor of the sex of participants. Nine participants decided to not state their sex in the study (n.a. = 9).

All Groups	Correct	Wrong	Total
Female	57	85	142
Male	34	45	79
n.a. = 9	91	130	221

Table 17: Chi-Square distribution of 'sex'

Applying an Alpha of 0.05 the sex has no significant influence on given correct and wrong answers of groups [$\chi^2(2, n = 221) = 0.18$, n.s.].

Training in negotiation

The submitted principle was a negotiation technique. Therefore, it was possible that participants who had already gained training in negotiation before doing the study were significantly better than students without former training. Ten participants decided to not answer the question if they have already had prior training in negotiation (n.a. = 10).

All Groups	Correct	Wrong	Total
Prior negotiation training	16	27	43
No prior negotiation training	74	103	177
n.a. = 10	90	130	220

Table 18: Chi-Square distribution of 'negotiation'

Applying an Alpha of 0.05, no significant influence of prior negotiation training was given [$\chi^2(2, n = 220) = 0.30, n.s.$]

Current study/aspired degree

Table 19 reflects the distribution of correct and wrong answers for the influence factor of the aspired study degree. Thirteen participants decided to not state their degree in the study (n.a. = 13).

All Groups	Correct	Wrong	Total
Apprenticeship in advance	64	78	142
No apprenticeship in advance	27	52	79
n.a. = 9	91	130	221

Table 19: Chi-Square distribution of 'degree'

Applying an Alpha of 0.05, it does not play a role if the students are studying to receive a bachelor or master degree [$\chi^2(2, n = 217) = 0.72, n.s.$].

Apprenticeship before study

In job it is very often about negotiating. Therefore, students who had made an apprenticeship before studying could have had an advantage. Nine participants decided to not state if they absolved an apprenticeship in advance (n.a. = 9).

All Groups	Correct	Wrong	Total
Bachelor	52	66	118
Master	38	61	99
n.a. = 13	90	127	217

Table 20: Chi-Square distribution of 'apprenticeship'

Applying an Alpha of 0.05, it does not play a role if the students made an apprenticeship in advance [$\chi^2(2, n = 221) = 2.49, n.s.$].

Summarized, for all potential factors the author identified, no significant influences on the ability to solve the online-case could be identified. Therefore, in the following, the author focuses on the performance of the single groups.

Before doing so, referring back to study 1, the author also suggests no relevant influences when evaluating the schema quality. In both studies, except group 5, the identical participants were involved.⁶⁰ Even though the number of participants was higher in study 1 the author assumes that the distribution will not differ when taking the difference between all participants of study 1 and those of this study who also took part in study 2 into consideration. Therefore, no further analysis of influence factors of study 1 was conducted.

The author evaluated if significant differences exist between all groups regarding their performances of solving the online-case. Table 21 provides an overview of group performances.

Group	Correct		Wrong		Total	
	count	%	count	%	count	%
Group 1	15	55.6	12	44.4	27	100.0
Group 2	14	56.0	11	44.0	25	100.0
Group 3	14	51.9	13	48.1	27	100.0
Group 4	7	28.0	18	72.0	25	100.0
Group 5	42	33.3	84	66.7	126	100.0
	92	40.0	138	60.0	230	100.0

Table 21: Chi-Square distribution of transfer groups 1, 2, 3, 4, 5

Applying an Alpha of 0.05, significant differences of correct answers amongst all groups solving the online case exist [$\chi^2(4, n = 230) = 10.80, p < 0.05$]. In the following, the author discovers the significant differences amongst the single training respectively no-training approaches.

In line with the schema quality results, between both comparison conditions no significant differences in transfer performances existed. With an Alpha of 0.05,

⁶⁰ In group 5, not the identical students but the same type of participants (also students from the same university) were asked to solve the online-case.

the results are normally distributed [$\chi^2(1, n = 52) = 0.30, n.s.$]. Consequently, hypothesis 1b could also be denied.

Group	Correct	Wrong	Total
Group 1	15	12	27
Group 2	14	11	25
	29	23	52

Table 22: Chi-Square distribution of transfer groups 1, 2

Due to the non-existing differences in performance of groups 1 and 2, in the following the author added both values of groups up to an overall value of the “comparison approach”. The success of the comparison approach was contrasted to the performance of group 5, having received no further training. Table 23 reflects the share of correct and wrong solutions of these groups.

Group	Correct	Wrong	Total
Group 1+2	29	23	52
Group 5	42	84	126
	71	107	178

Table 23: Chi Square distribution of transfer groups 1+2, 5

In result, the comparison approach was very successful. Applying an Alpha of 0.01, the differences are highly significant [$\chi^2(1, n = 178) = 7.73, p < 0.01$]. Consequently, for solving the online case correctly, the comparison training in advance was very effective. Additionally, not only compared to group 5 the groups 1 and 2 were very much better. Also, compared to the performance of participants who took part at the traditional case study approach (group 4), the comparison approach succeeded. Table 24 reflects the answers.

Group	Correct	Wrong	Total
Group 1+2	29	23	52
Group 4	7	18	25
	36	41	77

Table 24: Chi-Square distribution of transfer groups 1+2, 4

For analogical transfer, based on an Alpha of 0.05, the comparison groups were not only significantly more effective than a group having no training at all, but also than a group that was educated by the traditional teaching approach [$\chi^2(1, n = 77) = 5.23, p < 0.05$].

Now, the author evaluated the success of the developed variation approach. This approach was compared to the performance of the group with no prior training. Table 25 reflects the corresponding information.

Group	Correct	Wrong	Total
Group 3	14	13	27
Group 5	42	84	126
	56	97	153

Table 25: Chi-Square distribution of transfer groups 3, 5

Based on an Alpha of 0.1, also the variation approach compared to non-trained students was successful [$\chi^2(1, n = 153) = 3.29, p < 0.1$]. Students who went through the variation training significantly more often solved the analogical transfer case.

Next, the variation performance was juxtaposed to group 4 that is following the traditional case study approach. Table 26 shows the split of correct and wrong answers.

Group	Correct	Wrong	Total
Group 3	14	13	27
Group 4	7	18	25
	21	31	52

Table 26: Chi-Square distribution of transfer groups 3, 4

The variation approach is also significantly more effective than the traditional approach on an Alpha level of 0.1 [$\chi^2(1, n = 52) = 3.07, p < 0.1$]. The sound schema quality and the good transfer performance go along with already exiting research regarding the relation of both. Moreover, the results confirmed hypothesis 2.

Finally, it was analyzed if the traditional teaching approach was at least significantly more effective than providing no training at all to students. Table 27 provides an overview of results.

Group	Correct	Wrong	Total
Group 4	7	18	25
Group 5	42	84	126
	49	102	151

Table 27: Chi-Square distribution of transfer groups 4, 5

Based on an Alpha of 0.05, in result, the distribution was normal [$\chi^2(1, n = 151) = 0.31, n.s.$]. Consequently, in the context of analogical transfer the classic training approach was not significantly more effective for solving a new analogical problem than if people who did not receive prior training solved the problem.

Summarized, the trainings that consciously yielded on an improvement in analogical transfer capabilities (groups 1, 2 and 3) showed significantly better results than groups that went through the classic teaching approach or had no training in advance.

After having discussed the results of schema quality and transfer performance, the author evaluated further aspects. These referred to the questions (for detailed questions see the appendix):

- Did the participants name the trade-off principle by themselves when explaining their solution development?
- Did the participant build a trade-off solution from his own understanding?
- If not, why did he not build such a trade-off solution?
- Was he able to build a trade-off solution after the reminder?

Table 28 provides an overview of the results of the above mentioned questions. Moreover, the figure also includes the overall number of participants and their correct transfer performances.

Number of participants in study 2?												
Group 1			Group 2			Group 3			Group 4			
27			25			27			25			

Number of participants with correct solutions (successful transfer)?												
Group 1			Group 2			Group 3			Group 4			
15			14			14			7			

Number of participants with principle denotations (unsupported)?												
Group 1			Group 2			Group 3 (n.a. = 1)			Group 4 (n.a. = 2)			
no	partly	full	no	partly	full	no	partly	full	no	partly	full	
17	5	5	13	7	5	15	7	4	16	4	3	

Number of participants who built a trade-off in their own understanding?												
Group 1			Group 2			Group 3			Group 4			
16			18			19			11			

Why not? (share of "no"-answers of question above, see legend below)												
	<i>Answer 1</i>		<i>Answer 2</i>		<i>Answer 3</i>		<i>Answer 4</i>					
Group 1	3		1		4		3					
Group 2 (n.a. = 1)	2		0		3		1					
Group 3 (n.a. = 1)	1		3		2		1					
Group 4 (n.a. = 4)	5		1		3		1					

Number of successful second tries of participants to build a trade-off? (share of answers of legend point number 3 above)												
Group 1 (n.a. = 1)			Group 2			Group 3 (n.a. = 1)			Group 4 (n.a. = 1)			
1			2			0			0			

1 = I remembered the „trade-off“-principle while working on the case study, but I did not see any possibility to apply it in the frame of this case study.

2 = I remembered the „trade-off“-principle while working on the case study, but I have forgotten what it means.

3 = I could not remember the „trade-off“-principle, but now it has come to my mind again.

4 = I could not remember the „trade-off“-principle and I still do not know any more what it means.

n.a. = no answer

Table 28: Further results of studies

From the 27 participants of group 1, ten named the trade-off principle in their description of their solution development partly or full. In group 2, 12 denoted the principle and in group 3, eleven did so. In the fourth group seven people named it. Therefore, in all groups the number of people who correctly applied the trade-off principle to the case was higher than the number of participants who actively named the principle in their description of solution.

However, this was not fully true for the participants who believed that they created a trade-off principle. This number was higher than the correct solutions. In group 1, 16 participants thought they made a trade-off solution, but in fact only 15 solutions existed. Also in group 2, four students more believed they had built a correct trade-off than in fact correct solutions existed. In group 3, 19 students thought they created it, but only 14 correct solutions existed. Also, in group 4, four participants thought they created a trade-off but did not in reality.

For the question why they did not build a trade-off from their perspective⁶¹, in group 1 most people could not remember the principle while solving the case, but they did then remember what the principle stands for. In group 2, also this answer was most frequently. In group 3, participants stated they could remember the principle, but forgot what it exactly means. In the fourth group, participants most often remembered the principle but were not able to apply it to the case.

Finally, participants who made a cross at the legend stating that they would now remember for the principle (number 3) got another chance to apply the principle to the case. Only the participants of group 2 were successful at a majority. However, for this question in particular and also for the previous question, the number of answers is small and no statistical reliable values can be stated.

⁶¹ The numbers of people who thought they created a trade-off plus the number of participants who did not answer the questions plus the number of people that made a cross at one of the possible explanations on the legend in total equals to the number of participants. For example, Group 2: $18 + 1 + 6 = 25$.

7.3 SUMMARY OF HYPOTHESES AND FURTHER RESULTS

Before interpreting the results, in the following chapter an overview of hypotheses and other findings will be provided.

- Hypothesis 1a: Using experimental cases that are closer to real business cases, the schema quality of participants is lower than by using cases from previously conducted experiments.
Result: The hypothesis had to be rejected. The schema quality of both groups was almost identical.
- Hypothesis 1b: Using experimental cases that are closer to real business cases, the transfer performance of participants is lower than by using cases from previously conducted experiments.
Result: The hypothesis had to be rejected. The transfer performance of both groups was almost identical.
In this context: The schema quality of the variation group outperformed the other groups (significant on a scale from 0-4).
- Hypothesis 2: Applying source-variation to a business case study, the number of correct retrievals for target problems of participants is higher than applying the traditional case study teaching approach.
Result: The hypothesis was confirmed. The transfer performance of the developed variation approach was significantly better.

Beside the mentioned key-hypotheses the thesis with its experiment draws more interesting results out of the given data. This includes the following points that also must be discussed and interpreted in the next chapter.

- The needed time of students doing the comparison approach with cases that are closer to real cases (group 2) and the time of the students doing the variation-training did not significantly differ.
- The schema quality of the traditional approach (group 4) was as good as the quality of groups 1, 2 and 3.

- However, the transfer performance of the traditional approach was worse than the performance of the other groups of study 1.
- The transfer performance of group 4 (traditional approach) was not significantly better than the results of group 5 that tried to solve the case without any prior training.
- The number of people who actively named the trade-off principle at least partly was lower than the correct retrievals.
- Vice versa, the number of participants who thought they had created a solution according to the trade-off principle was higher than the correct applications.

8 CONCLUSIONS

Within the scope of this chapter, first, limitations of the thesis' findings and the applicability are discussed. Second, the author is going to interpret and discuss the hypotheses' results and further findings. Based on these results, recommendations for adaptations in business education will be given. Finally, the author provides some open issues for future research.

8.1 LIMITATIONS OF RESEARCH

Before discussing the results the author wants to mention some limitations of the conducted research. Due to the character of an experiment, the results were gained in an artificial surrounding and students might not have been motivated. This can be regarded as a limitation because the motivation of students to solve the case might not have been as high as it would have been if the problem had personal relevance to them. This could refer to later business life where the correct abstraction of principles is crucial for their career or to private life when finding a good solution in a relationship can avoid a dispute. Also, in a real educational context the learned principle might be a part of the modules assessment load and, therefore, students have a high attention in order to not fail. Moreover, the students could have supposed a connection between both studies and, therefore, were reminded of the trade-off principle. Correct solutions could have been influenced by this fact in contrast to the no-education-group which possibly did not even suppose the existence of an underlying principle. Apart from that, conducting an online survey, it can never be assured under which circumstances participants take part. In this case the author had no control of the seriousness respectively the focus students attached to finding a solution. Nevertheless, this is a distorting factor for all groups to the same extent and can, therefore, be neglected for further interpretation.

Even though the author took some measures to decrease the mentioned effects to the highest possible degree (e.g. see point 7.1.3 for aspects increasing motivation), these points are general limiting issues of all conducted experiments.

Another effect influencing the findings of the thesis could be that all chosen students belong to only one particular university. Study 1 and 2 were exclusively conducted in Munich. For the no-training group students of different cities studying there at the FOM University of Applied Sciences were considered. Consequently, the composition of the sample of the groups differed. Additionally, all students at the FOM absolve their studies extra-occupational. It is not proven to what degree the results of this type of students are comparable to possible performances of students following their study fulltime. Therefore, considering the restrictions of the latter two points, a generalization of the results might be limited.

8.2 DISCUSSION OF RESULTS AND FUTURE RESEARCH

Based on different research the author derived hypothesis 1a (see points 5.3.3.1, 5.3.4.1 and 6.1). Following the literature, the results referring to this hypothesis of the conducted experiment should be different. The quality of group 1 should have been significantly better than the quality of group 2. However, the schema qualities are, on both scales, almost identical. For these somewhat surprising results some possible explanations exist. The developed cases are closer to real business cases, but do not correspond exactly to them. The base for the hypothesis was derived from the supposed distraction of students that arises when they have to deal with original business cases including many details in a text. Moreover, due to the length of the business cases, according to prior studies, the capability of working memory cannot recognize structural relations in the same quality as when handling shorter inputs. However, for the demonstration of such effects, the developed cases might be still too short and less distractive. Even though the author enlarged former used cases to about five times of their original size, the working memory capabilities might still be high enough to cope with this challenge. Also, the added details and distracting information possibly could be mastered by students. In this context, the question might arise why the author did not use real business cases for the conduction of the experiment. Even though it might be possible in theory, the problem is about the participants and their invested time for doing such an experiment. Using two real cases for evaluating the comparison approach would take much more time. Even though, as suggested by some researchers (e.g. Loewenstein *et al.*, 2003, p. 125) using only one case corresponding to the original length and a second one that is much shorter and only for comparison reasons, the time-demand would be still very high. In reality, it is difficult to motivate students to take part in an experiment whose performance takes such a long time. This is especially true when a sufficient sample size has to be generated.

However, in order to really exclude the influence factors of details and memory-load on schema abstraction, finally a qualitative analysis should follow. A selection of students should do the comparison approach with real business cases again. In order to persuade them to do the experiment they probably have to get

paid, which is one of the best techniques for increasing response rates (Malhotra and Birks, 2006, p. 238).

Subsequently, also the hypothesis 1b has to be rejected. The transfer performance for correct retrievals of group 2 was as good as in group 1. However, as already proven a sound schema goes along with good retrieval performances (see points 5.3.1.6 and 5.3.3.1). Both groups had more or less identical schema qualities and transfer performances. Consequently, this confirms former findings.

The results of hypothesis 2 are pleasing. The construct that was developed by the author was successful. In this scope two things should be discussed. First, the schema quality of participants dealing with the variation training approach. Second, the transfer-performance of them.

The schema quality of the variation approach was very good and significantly outperformed the other groups on a five-point evaluation scale. These results can be derived from either distortions in measuring or by, indeed, a very good schema abstraction due to the developed guidelines for questions. However, if excellent schema abstraction goes along with a very good transfer performance, the variation approach should have outperformed all other groups also in study 2. In result, the participants of the group with the variation approach did transfer on a comparable level as the comparison groups. Therefore, the abstraction of schema can be attributed to the variation approach, but possibly only to a certain degree. The high schema quality seems to be a mixture of really abstracted schema and a bias due to having more space for answering by the question technique itself. This is an effect that could not be avoided when working with the variation approach. Therefore, it was very important to measure the real transfer performance. The other way around, the transfer performance will be the "indirect measure of schema acquisition" (Bernardo, 2001, p. 629). As already stated, the variation approach also achieved better results than the classic approach or the group that had no training. Compared to group 1 and 2 the results were, as mentioned above, comparable. More precisely, the variation group was slightly worse, performing on a significance level of 0.9, whilst the comparison performed on 0.95.

However, the proven success of the variation approach was a first milestone. In future, further evaluations are needed. This includes the application of the technique to other business principles. Moreover, the precise drivers for abstraction

and retrieval should be determined. An analysis has to take place in order to determine which type of variation or guidelines reaches transfer performance at best. Also (see point 7.1), possible intersections of questions can be determined. In result, it might be possible to reduce non performing parts of the current variation approach and, therefore, with less questions an equal or even better level of schema abstraction could be received. In consequence, the needed time for students to work on it would also decrease. However, the measuring always has to go beyond schema abstraction and must include the real retrieval performance. This is up to the mentioned fact that, as explained above, within the variation approach the schema quality is ambiguous. However, in consequence such experiments also including the retrieval performances are often very extensive.

Another interesting result from the experiment is the needed time of students doing the comparison approach with cases that are closer to real cases (group 2) and the time of the students doing the variation-training (group 3). Even though the author suggested that group 2 would take longer, no significant differences existed. However, two important notes have to be made here. First, in the scope of the study the time students need for the work was measured. The time of lecturers preparing new cases (comparison technique) or adapting questions (variation approach) was neglected. In reality, the preparation for the comparison approach would take more time than for variation. Second, real business cases are even longer than the experimental cases. Therefore, the time for students doing the comparison approach would be much longer in reality having two original business cases with each of about 10-15 pages. Solely reading would take much more time.⁶² Consequently, from an overall view, the stated time here reflects only a part of the needed time.

Generally, the results enclosing group 4 are difficult in their interpretation. Between the schema quality of group 4 and groups 1 and 2 exist no significant differences. This would lead to the assumption that also group 4 successfully performs on the online transfer task. However, as the results show, this is not the case. The schema quality was rated on two different scales. Due to the clearly

⁶² Having only a short second case, the needed time for comparison decreases. However, the preparation in advance is still more extensive.

defined elements of the trade-off principle which had to be in the answer for receiving a good rating, the tolerance was minimized. Moreover, the same rating was done from the same authors for all groups in the same way. This leads to an, as best as it can be when doing such a rating, comparable and objective procedure (see also point 7.1.3.3). The sound schema quality might result from the type of question in the questionnaire. Following the traditional teaching approach (group 4) only standard questions were asked (e.g. who is the protagonist, what problems does he face?). Within the scope of these questions probably no elements of schema can be grasped and rated. Therefore, as a need for a basic evaluation of the schema abstraction, the author decided to provide the participants dealing with the traditional approach the possibility to write down their insights regarding the underlying principle gained from working with the case. This happened by answering the question regarding the key signals that show the possibility of using the trade-off principle (see appendix). In doing so, by solely answering this question, the participants could have abstracted the schema to a higher extent than by working only with the standard types of questions. This might have improved the schema quality of the traditional approach.

However, if the participants, no matter in which way, abstracted the schema in a sound quality, a good transfer performance should have followed. As mentioned above, this did not happen. Participants of group 4 did not transfer in study 2 as all other groups of study 1 did. The measure of transfer performance is about counting correct solutions in the sense of a trade-off principle and therefore, no room for misinterpretations exists. The author suggests that the differences could result from the time delay of about 14 days. As in real education, many things could happen during the point in time things get learned and the occasions in real lives they get applied. Even though all groups had to deal with the same time delay, the difference lies in the amount of time each group spent for abstracting a sound schema in study 1. Besides the mentioned question of stating the key signals for a trade-off, group 4 received no further scaffolding to develop a sound schema. The students in group 1 and 2 dealt with the content longer by the technique of comparison and in group 3 via the variation approach. Overall, the time participants of group 4 spent to the experiment in study 1 was about six minutes shorter than the average of the comparison and variation groups. Consequently,

the students in group 4 might have grasped the schema for the moment, but could not save it for longer. The transfer in the long term memory did not take place in group 4 to that extent as it happened in the other groups. This could be based on the fact, that particularly information we do think more about and that are perceived as important, will be stored in the long-term memory (see point 5.3.1.2) from that it can be retrieved later.

However, manifold possible interpretations arose from the results of group 4. For developing certainty, the specification of the results of the traditional approach, especially for schema abstraction, should be re-evaluated. Such further research should take place due to the fact that the transfer performance of group 4 was not significantly better than of group 5 which had not training at all. The traditional approach might focus on and possibly reach all other objectives that are followed when working with cases (see point 5.2.2), but it does not reach schema abstraction. If this result persists, the need for the application of additional tools for improved schema abstraction when working with case studies in business administration should be obligatory in future.

In the context of the analysis of results some more findings have to be discussed shortly. One conspicuousness was that the number of people who actively named the trade-off principle at least partly, was lower than the number of correct retrievals. One explanation would be that the difference of participants not stating the trade-off principle but created a correct solution anyway, would have been also able to solve the online-case also without prior training. Another possibility is that they forgot the name of the principle but applied the schema unconsciously (see point 5.3.2). However, most importantly this states that not for all participants a connection to the first study in class existed. If so, all participants would have written about the trade-off principle in their solution development.

However, after being asked if they had applied a trade-off principle as they have learned it about two weeks ago, more participants agreed. Indeed, more students thought their solutions would equal to such a trade-off principle than in fact students really built one. This generally shows, that even though the principle was taught by comparison and variation not all participants really understood what it means. A correct trade-off is not trivial. In many of these answers participants still mixed up a compromise with a sound trade-off.

8.3 RECOMMENDATIONS FOR BUSINESS EDUCATION

As proven in the conducted experiments within this thesis, analogical retrieval by the current teaching approach was performing at worst of all kinds of training. Of course, this has no expressiveness about the successful learning and later application of other objectives followed when working with case studies. Skills of assertiveness and the ability to persuade people in discussions might get well trained by the current approach and successfully applied in later situations. These are very important capabilities and do play a very large role in doing business. However, the results shed a rather gloomy light on the effectiveness of the current teaching style regarding the retrieval of schemata that were previously embedded in educational business cases. Even though the need for sound retrievals of principles is given ubiquitous, currently students are not getting educated well enough in this context.

The author has proven that changes for more effective retrievals of principles must not be extensive. Time is a very limited resource in education and some also effective, but more demanding approaches like comparison of cases, could bow out therefore. Even though the research of variation for schema abstraction and later retrieval in the context of case studies has just begun and a lot of open questions remain at this point, the first results within this thesis are promising. With a short selection of adaptable types of questions the students have to prepare, significant better results were achieved.

As a consequence, business lecturers can simply enable students to perform better in later business lives. The needed time for the preparation of questions or working with them is on both sides, for the lecturer and the students, manageable and does not influence the effective reach of all other objectives. Therefore, first, lecturers have to be aware of the shortcomings of the current teaching style regarding later schema retrieval. Second, they should start adapting the technique of variation within the scope of case studies as introduced in this thesis. Third, they have to learn to implement it in their classes in an elegant way. The variation approach can be consciously selected for those cases that have relevant principles embedded that students should learn to abstract. For all other cases, maybe targeting to reach other objectives, the approach can be omitted. Additionally, in

future a catalogue of questions for most common principles embedded in case studies can be worked out as a kind of “variation-database” for lecturers.

Drawing a final conclusion, the doctoral thesis has proven that the traditional business teaching approach is not suitable for analogical purposes. Moreover, within the scope of this work two more approaches were tested in this context. The comparison approach also proved to be successful for cases that are closer to real business cases. However, it is quite demanding and for practical reasons often not applicable. The developed variation approach for case studies also proved to be successful and is not as extensive for its use under real teaching circumstances. In the field of the latter approach the author assumes a high potential for improvements in teaching of business administration in future.

REFERENCES

- Aisner, J. (2006), "Was ist eine Case Study? Interview with James Aisner, Director of Harvard Business School", available at:
<http://www.handelsblatt.com/karriere/mba-news/in-harvard-nachgefragt-was-ist-eine-case-study-seite-all/2709324-all.html#> (accessed 23 August 2014).
- Antonietti, A. (1991), "Die Nutzung von Analogien beim induktiven Denken", *Unterrichtswissenschaft*, No. 19, pp. 111–120.
- Ashley, K.D. (Ed.) (2007), *Interpretive Reasoning with Hypothetical Cases*.
- Ball, L.J., Ormerod, T.C. and Morley, N.J. (2004), "Spontaneous analogising in engineering design: a comparative analysis of experts and novices", *Design Studies*, Vol. 25 No. 5, pp. 495–508.
- Barnett, S.M. and Ceci, S.J. (2002), "When and where do we apply what we learn?: A taxonomy for far transfer", *Psychological bulletin*, Vol. 128 No. 4, p. 612.
- Bartlett, F.C. (1997), *Remembering: A study in experimental and social psychology*, Reprinted, Cambridge Univ. Press, Cambridge.
- Bazerman, M.H., Curhan, J.R., Moore, D.A. and Valley, K.L. (2000), "Negotiation", *Annual review of psychology*, Vol. 51 No. 1, pp. 279–314.
- Bernardo, A.B.I. (2001), "Principle explanation and strategic schema abstraction in problem solving", *Memory & Cognition*, Vol. 29 No. 4, pp. 627–633.
- Blanchette, I. and Dunbar, K. (2000), "How analogies are generated: The roles of structural and superficial similarity", *Memory & Cognition*, Vol. 28 No. 1, pp. 108–124.
- Blanchette, I. and Dunbar, K. (2001), "Analogy use in naturalistic settings: The influence of audience, emotion, and goals", *Memory & Cognition*, Vol. 29 No. 5, pp. 730–735.
- Bleicher, K. (2011), *Das Konzept integriertes Management: Visionen, Missionen, Programme*, St. Galler Management-Konzept, 8., überarb. und erw. Aufl, Campus-Verl, Frankfurt u.a.
- Bloom, B.S., Engelhart, M.D., Furst, E.J., Hill, W.H. and Krathwohl, D.R. (1973), *Taxonomie von Lernzielen im kognitiven Bereich*, Beltz Weinheim, Germany.

- Bransford, J.D. (1979), "The role of prior knowledge", in Bransford, J.D. (Ed.), *Human cognition: Learning, understanding and remembering*, Wadsworth Belmont, CA, pp. 129–165.
- Breslin, M. and Buchanan, R. (2008), "On the case study method of research and teaching in design", *Design Issues*, Vol. 24 No. 1, pp. 36–40.
- Brett, J.M. (2007), *Negotiating globally: How to negotiate deals, resolve disputes, and make decisions across cultural boundaries*, The Jossey-Bass business & management series, 2nd ed, Jossey-Bass, San Francisco.
- Campbell, D.J. (1988), "Task Complexity: A Review and Analysis", *The Academy of Management Review*, Vol. 13 No. 1, pp. 40–52.
- Carver, R.P. and Leibert, R.E. (1995), "The effect of reading library books at different levels of difficulty upon gain in reading ability", *Reading Research Quarterly*, pp. 26–48.
- Catrambone, R. (2002), "The effects of surface and structural feature matches on the access of story analogs", *Journal of Experimental Psychology: Learning, Memory, and Cognition*, Vol. 28 No. 2, p. 318.
- Catrambone, R. and Holyoak, K.J. (1989), "Overcoming contextual limitations on problem-solving transfer", *Journal of Experimental Psychology: Learning, Memory, and Cognition*, Vol. 15 No. 6, p. 1147.
- Chall, J.S. (2000), *The Academic Achievement Challenge: What Really Works in the Classroom?*, ERIC.
- d'Andrade, R.G. (1995), *The development of cognitive anthropology*, Cambridge University Press.
- Donham, W.B. (1922), "Business teaching by the case system", *The American Economic Review*, Vol. 12 No. 1, pp. 53–65.
- Dubin, F. (2007), "The Use and Misuse of Analogies in Business. An experimental Study of the Application of analogies in Strategic Decision Making", National Honours Colloquium, The University of Western Australia, 17 August.
- Duit, R. and Glynn, S., "Analogien - Brücken zum Verständnis", *Naturwissenschaften im Unterricht. Physik*, Vol. 1995 No. 27, pp. 4–10.

- Dunbar, K. (1997), "How scientists think: On-line creativity and conceptual change in science", *Creative thought: An investigation of conceptual structures and processes*, pp. 461–493.
- Dunbar, K. and Blanchette, I. (2001), "The in vivo/in vitro approach to cognition: the case of analogy", *Trends in Cognitive Sciences*, Vol. 5 No. 8, pp. 334–339.
- Edelmann, W. (2000), *Lernpsychologie, Lehrbuch*, 6., vollst. überarb. Aufl, Beltz, PVU, Weinheim.
- Falkenhainer, B., Forbus, K.D. and Gentner, D. (1986), *The structure-mapping engine*, Department of Computer Science, University of Illinois at Urbana-Champaign.
- Farjoun, M. (2008), "Strategy making, novelty and analogical reasoning — Commentary on Gavetti, Levinthal, and Rivkin (2005)", *Strategic Management Journal*, Vol. 29 No. 9, pp. 1001–1016.
- Fisher, M.L. and Ittner, C.D. (1999), "The Impact of Product Variety on Automobile Assembly Operations: Empirical Evidence and Simulation Analysis", *Management Science*, Vol. 45 No. 6, pp. 771–786.
- Flyvbjerg, B. (2006), "Five Misunderstandings About Case-Study Research", *Qualitative Inquiry*, Vol. 12 No. 2, pp. 219–245.
- Forbus, K.D. and Gentner, D. (1986), "Learning Physical Domains. Toward a theoretical framework", *Machine learning: An artificial intelligence approach*, Vol. 2, p. 311.
- Forbus, K.D., Gentner, D. and Everett, J. O., Wu, M. (1997), "Towards a computational model of evaluating and using analogical inferences", in Forbus, K.D., Gentner, D., Everett, J.O. and Wu, M. (Eds.), *Proceedings of the Nineteenth Annual Conference of the Cognitive Science Society*, Erlbaum, Mahwah, pp. 229–234.
- Frentz, C. von (2003), "Enron - Chronik einer Pleite", available at: <http://www.manager-magazin.de/unternehmen/artikel/a-178836.html> (accessed 12 July 2014).
- Froman, L.A. and Cohen, M.D. (1970), "Research reports. Compromise and logroll: Comparing the efficiency of two bargaining processes", *Behavioral Science*, Vol. 15 No. 2, pp. 180–183.

- Furnham, A. and Boo, H.C. (2011), "A literature review of the anchoring effect", *The Journal of Socio-Economics*, Vol. 40 No. 1, pp. 35–42.
- Garvin, D.A. (2003), "Making the case", *Harvard Magazine*, Vol. 106 No. 1, pp. 56–65.
- Gary, M.S., Wood, R.E. and Pillinger, T. (2012), "Enhancing mental models, analogical transfer, and performance in strategic decision making", *Strategic Management Journal*, Vol. 33 No. 11, pp. 1229–1246.
- Gavetti, G., Levinthal, D.A. and Rivkin, J.W. (2005), "Strategy making in novel and complex worlds: the power of analogy", *Strategic Management Journal*, Vol. 26 No. 8, pp. 691–712.
- Gavetti, G., Levinthal, D.A. and Rivkin, J.W. (2008), "Response to Farjoun's 'Strategy making, novelty, and analogical reasoning—commentary on Gavetti, Levinthal, and Rivkin (2005)'", *Strategic Management Journal*, Vol. 29 No. 9, pp. 1017–1021.
- Gavetti, G. and Rivkin, J.W. (2005), "How strategists really think", *Harvard Business Review*, Vol. 83 No. 4, pp. 54–63.
- Gavetti, G. and Rivkin, J.W. (2006), "The Use and Abuse of Analogies", *Harvard Business School*.
- Gentner, D. (2002), *Analogical Reasoning, Psychology of*, Nature Publishing Group, London, pp. 106–112.
- Gentner, D. (1983), "Structure-mapping: A theoretical framework for analogy", *Cognitive Science*, Vol. 7 No. 2, pp. 155–170.
- Gentner, D. (1988), "Metaphor as Structure Mapping: The Relational Shift", *Child Development*, Vol. 59 No. 1, pp. 47–59.
- Gentner, D. (1989), "The mechanisms of analogical learning", *Similarity and analogical reasoning*, Vol. 199, p. 241.
- Gentner, D. and Colhoun, J. (2010), "Analogical Processes in Human Thinking and Learning", in Müller, A. von and Series Eds. (Pöppel, E.) (Eds.), *On thinking: Vol. 2. Towards a Theory of Thinking*, Springer Verlag, Berlin Heidelberg, pp. 35–48.

- Gentner, D., Holyoak, K. and Kokinov, B. (Eds.) (2001), *The analogical mind: Perspectives from cognitive science*, The MIT Press.
- Gentner, D. and Holyoak, K.J. (1997), "Reasoning and learning by analogy: Introduction", *American Psychologist*, Vol. 52 No. 1, p. 32.
- Gentner, D. and Kurtz, K.J. (2006), "Relations, objects, and the composition of analogies", *Cognitive Science*, Vol. 30 No. 4, pp. 609–642.
- Gentner, D. and Loewenstein, J. (2003), "Learning: Analogical Reasoning", in James W. Guthrie (Ed.), *Encyclopedia of Education*, 2nd edition, Macmillan, New York.
- Gentner, D., Loewenstein, J. and Thompson, L. (2003), "Learning and Transfer: A General Role for Analogical Encoding", *Journal of Educational Psychology*, No. 95 (2), pp. 393–408.
- Gentner, D., Loewenstein, J., Thompson, L. and Forbus, K.D. (2009), "Reviving inert knowledge: Analogical abstraction supports relational retrieval of past events", *Cognitive Science*, Vol. 33 No. 8, pp. 1343–1382.
- Gentner, D., Loewenstein, J. and Thompson, L.L. (Eds.) (2004), *Analogical Encoding: Facilitating Knowledge Transfer and Integration*, Proceedings of the Twenty-Sixth Annual Meeting of Science Society.
- Gentner, D. and Markman, A.B. (1994), "Structural alignment in comparison: No difference without similarity", *Psychological science*, Vol. 5 No. 3, pp. 152–158.
- Gentner, D. and Markman, A.B. (1995), "Similarity is like analogy. Structural alignment in comparison", in C. Cacciari (Ed.), *Similarity in language, thought and perception*, Brepols, Brussels, pp. 111–147.
- Gentner, D. and Markman, A.B. (1997), "Structure mapping in analogy and similarity", *American Psychologist*, Vol. 52 No. 1, p. 45.
- Gentner, D. and Medina, J. (1998), "Similarity and the development of rules", *Cognition*, Vol. 65 No. 2, pp. 263–297.
- Gentner, D., Rattermann, M.J. and Forbus, K.D. (1993), "The roles of similarity in transfer: Separating retrievability from inferential soundness", *Cognitive psychology*, Vol. 25 No. 4, pp. 524–575.

- Gentner, D. and Smith, L. (2012), "Analogical reasoning", *Encyclopedia of Human Behavior (2nd Ed.)*, VS Ramachandran, Ed. Elsevier, pp. 130–136.
- Gentner, D. and Smith, L. (2013), "Analogical learning and reasoning", in Reisberg, D. (Ed.), *The Oxford Handbook of Cognitive Psychology*, Oxford University Press, pp. 668–681.
- Gentner, D. and Toupin, C. (1986), "Systematicity and Surface Similarity in the Development of Analogy", *Cognitive Science*, No. 10, pp. 277–300.
- Gick, M.L. and Holyoak, K.J. (1980), "Analogical problem solving", *Cognitive psychology*, Vol. 12 No. 3, pp. 306–355.
- Gick, M.L. and Holyoak, K.J. (1983), "Schema induction and analogical transfer", *Cognitive psychology*, Vol. 15 No. 1, pp. 1–38.
- Gillespie, J.J., Thompson, L.L., Loewenstein, J. and Gentner, D. (1999), "Lessons from Analogical Reasoning in the Teaching of Negotiation", *Negotiation Journal*, No. 15 (4), pp. 363–371.
- Gilovich, T. (1991), *How We Know What Isn't So: The Fallibility of Human Reasoning in Everyday Life*, The Free Press - A Division of Macmillan, Inc., New York.
- Goldstone, R.L. (1994), "Similarity, interactive activation, and mapping", *Journal of Experimental Psychology: Learning, Memory, and Cognition*, Vol. 20 No. 1, p. 3.
- Gorlich, V.L., Boyer, M., Franko, P. and Lamy, S. (2000), *The ABCs of Case Teaching: Pew Case Studies in International Affairs*, Georgetown University, Georgetown.
- Grasha, A.F. (1994), "A matter of style: The teacher as expert, formal authority, personal model, facilitator, and delegator", *College Teaching*, Vol. 42 No. 4, pp. 142–149.
- Hammond, J.S. (1980), *Learning by the case method*, Harvard Business School.
- Henricksen, K. (2003), *A framework for context-aware pervasive computing applications*, University of Queensland Queensland.
- Hesketh, B. (1997), "Dilemmas in Training for Transfer and Retention", *Applied Psychology*, Vol. 46 No. 4, pp. 317–339.
- Holyoak, K.J. (2005), "Analogy", in Holyoak, K.J. and Morrison, R.G. (Eds.), *The Cambridge Handbook of Thinking and Reasoning*, Cambridge University Press.

- Holyoak, K.J. and Koh, K. (1987), "Surface and structural similarity in analogical transfer", *Memory & Cognition*, Vol. 15 No. 4, pp. 332–340.
- Holyoak, K.J. and Morrison, R.G. (Eds.) (2005), *The Cambridge Handbook of Thinking and Reasoning*, Cambridge University Press.
- Holyoak, K.J. and Morrison, R.G. (Eds.) (2012), *The Oxford handbook of thinking and reasoning*, Oxford University Press.
- Holyoak, K.J. and Thagard, P. (1989), "Analogical mapping by constraint satisfaction", *Cognitive Science*, Vol. 13 No. 3, pp. 295–355.
- Holyoak, K.J. and Thagard, P. (1996), *Mental Leaps: Analogy in Creative Thought*, MIT Press, Cambridge, MA.
- Holyoak, K.J. and Thagard, P. (1997), "The analogical mind", *American Psychologist*, Vol. 52 No. 1, p. 35.
- Ifenthaler, D. (2006), "Diagnose lernabhängiger Veränderung mentaler Modelle", Alberts-Ludwigs-Universität, Freiburg, 2006.
- Johnson-Laird, P.N. (1983), *Mental models: Towards a cognitive science of language, inference, and consciousness*, Harvard University Press.
- Johnson-Laird, P.N., Girotto, V. and Legrenzi, P. (1998), "Mental models: a gentle guide for outsiders", *Sistemi Intelligenti*, Vol. 9 No. 68, p. 33.
- Karpicke, J.D. (2012), "Retrieval-Based Learning: Active Retrieval Promotes Meaningful Learning", *Current Directions in Psychological Science*, Vol. 21 No. 3, pp. 157–163.
- Keane, M.T. (1996), "On adaptation in analogy: Tests of pragmatic importance and adaptability in analogical problem solving", *The Quarterly Journal of Experimental Psychology: Section A*, Vol. 49 No. 4, pp. 1062–1085.
- Keane, M.T., Ledgeway, T. and Duff, S. (1994), "Constraints on analogical mapping: A comparison of three models", *Cognitive Science*, Vol. 18 No. 3, pp. 387–438.
- Klauer, K. (1989), "Teaching for analogical transfer as a means of improving problem-solving, thinking and learning", *Instructional Science*, Vol. 18 No. 3, pp. 179–192.

- Kohls, K.-D. (2007), "Kompetenzzunahme durch Aufgabenvariationen im Mathematikunterricht einer Gesamtschulklasse mit Fallbeispielen von Schülerinnen und Schülern aus den Jahrgangsstufen 9/10", Dissertation, Fachbereich Mathematik, Universität Duisburg-Essen, Duisburg-Essen, 8 February.
- Kolb, D.M. (1995), "The Love for Three Oranges Or: What Did We Miss About Ms. Follett in the Library?", *Negotiation Journal*, Vol. 11 No. 4, pp. 339–348.
- Kolodner, J.L. (1991), "Improving human decision making through case-based decision aiding", *AI magazine*, Vol. 12 No. 2, p. 52.
- Kolodner, J.L. (1997), "Educational implications of analogy: A view from case-based reasoning", *American Psychologist*, Vol. 52 No. 1, pp. 57–66.
- Konrad, K. (2005), "Probleme der Wissensanwendung in Schule und Hochschule. Aktuelle theoretische Ansätze und Lösungen".
- Kotovskiy, L. and Gentner, D. (1996), "Comparison and categorization in the development of relational similarity", *Child Development*, Vol. 67 No. 6, pp. 2797–2822.
- Kurtz, K.J., Boukrina, O. and Gentner, D. (2013), "Comparison promotes learning and transfer of relational categories", *Journal of Experimental Psychology: Learning, Memory, and Cognition*, Vol. 39 No. 4, pp. 1303–1310.
- Kurtz, K.J., Miao, C.-H. and Gentner, D. (2001), "Learning by analogical bootstrapping", *The Journal of the Learning Sciences*, Vol. 10 No. 4, pp. 417–446.
- Lambert, N.M. and McCombs, B.L. (1998), *How students learn: Reforming schools through learner-centered education*, American Psychological Association.
- Lane, S.M. and Schooler, J.W. (2004), "Skimming the surface verbal overshadowing of analogical retrieval", *Psychological science*, Vol. 15 No. 11, pp. 715–719.
- Laube, W. and Anders, C. (Eds.) (2009), *Sensomotorisches System: Physiologisches Detailwissen für Physiotherapeuten ; 28 Tabellen, physiofachbuch*, 1. Aufl, Thieme, Stuttgart.
- Lax, D. and Sebenius, J. (1986), *The Manager as Negotiator: Bargaining for Competitive Gain*, New York, Free Press.

- Loewenstein, J., Thompson, L. and Gentner, D. (1999), "Analogical encoding facilitates knowledge transfer in negotiation", *Psychonomic Bulletin & Review*, No. 6 (4), pp. 586–597.
- Loewenstein, J., Thompson, L. and Gentner, D. (2003), "Analogical learning in negotiation teams: Comparing cases promotes learning and transfer", *Academy of Management Learning & Education*, Vol. 2 No. 2, pp. 119–127.
- Lovallo, D., Clarke, C. and Camerer, C. (2012), "Robust analogizing and the outside view: two empirical tests of case-based decision making", *Strategic Management Journal*, Vol. 33 No. 5, pp. 496–512.
- Lymbersky, C. (2008), *Market entry strategies: Text, cases and readings in market entry management*, Christoph Lymbersky.
- Malhotra, N.K. and Birks, D.F. (2006), *Marketing research: An applied approach*, Upd. 2. European ed, Pearson Education, Harlow.
- Mandler, J.M. and Orlich, F. (1993), "Analogical transfer: The roles of schema abstraction and awareness", *Bulletin of the Psychonomic Society*, Vol. 31 No. 5, pp. 485–487.
- March, J.G. and Simon, H.A. (1958), "Organizations".
- Markman, A.B. and Gentner, D. (1993a), "Splitting the differences: A structural alignment view of similarity", *Journal of Memory and Language*, Vol. 32 No. 4, pp. 517–535.
- Markman, A.B. and Gentner, D. (1993b), "Structural alignment during similarity comparisons", *Cognitive psychology*, Vol. 25 No. 4, pp. 431–467.
- Markman, A.B. and Gentner, D. (2000), "Structure mapping in the comparison process", *American Journal of Psychology*, Vol. 113 No. 4, pp. 501–538.
- Markman, A.B., Taylor, E. and Gentner, D. (2007), "Auditory presentation leads to better analogical retrieval than written presentation", *Psychonomic Bulletin & Review*, Vol. 14 No. 6, pp. 1101–1106.
- Markus, H. (1977), "Self-schemata and processing information about the self", *Journal of personality and social psychology*, Vol. 35 No. 2, p. 63.

- Mayer, C. and Gansser, O. (2015), "Challenging Analogical Encoding under real Conditions in Business Education", *ATINER'S Conference Paper Series*, No. EDU2015-1459.
- Medin, D.L. and Ross, B.H. (1989), "The specific character of abstract thought: Categorization, problem solving, and induction", pp. 189–223.
- Nickerson, R.S. (1998), "Confirmation bias: A ubiquitous phenomenon in many guises", *Review of general psychology*, Vol. 2 No. 2, p. 175.
- Novick, L.R. (1988), "Analogical transfer, problem similarity, and expertise", *Journal of Experimental Psychology: Learning, Memory, and Cognition*, Vol. 14 No. 3, p. 510.
- Novick, L.R. and Holyoak, K.J. (1991), "Mathematical problem solving by analogy", *Journal of Experimental Psychology: Learning, Memory, and Cognition*, Vol. 17 No. 3, p. 398.
- Paas, F. and van Merriënboer, J. (1994), "Variability of worked examples and transfer of geometrical problem-solving skills: A cognitive-load approach", *Journal of educational psychology*, Vol. 86 No. 1, p. 122.
- Pepels, W. (2012), *Handbuch des Marketing*, 6., überarb. und erw. Aufl, Oldenbourg Wissenschaftsverlag GmbH, München.
- Pirnay-Dummer, P.N. (2006), "Expertise und Modellbildung", Dissertation, Alberts-Ludwigs-Universität, Freiburg, 2006.
- Plotnik, R. and Kouyoumdjian, H. (2014), *Introduction to Psychology*, 10th ed, Wadsworth Pub Co, Belmont, CA.
- Porter, M.E. (1998), *Competitive advantage: Creating and sustaining superior performance ; with a new introduction*, Free Press, New York.
- Renkl, A., Stark, R., Gruber, H. and Mandl, H. (1998), "Learning from worked-out examples: The effects of example variability and elicited self-explanations", *Contemporary educational psychology*, Vol. 23 No. 1, pp. 90–108.
- Richland, L.E., Morrison, R.G. and Holyoak, K.J. (2006), "Children's development of analogical reasoning: Insights from scene analogy problems", *Journal of experimental child psychology*, Vol. 94 No. 3, pp. 249–273.

- Ross, B.H. (1987), "This is like that: The use of earlier problems and the separation of similarity effects", *Journal of Experimental Psychology: Learning, Memory, and Cognition*, Vol. 13 No. 4, p. 629.
- Ross, B.H. (1989), "Distinguishing types of superficial similarities: Different effects on the access and use of earlier problems", *Journal of Experimental Psychology: Learning, Memory, and Cognition*, Vol. 15 No. 3, p. 456.
- Ross, B.H. and Kilbane, M.C. (1997), "Effects of principle explanation and superficial similarity on analogical mapping in problem solving", *Journal of Experimental Psychology: Learning, Memory, and Cognition*, Vol. 23 No. 2, p. 427.
- Schauer, F.F. (2009), *Thinking like a lawyer: A new introduction to legal reasoning*, Harvard University Press, Cambridge, Mass.
- Schilling, M.A., Vidal, P., Ployhart, R.E. and Marangoni, A. (2003), "Learning by doing something else: Variation, relatedness, and the learning curve", *Management Science*, Vol. 49 No. 1, pp. 39–56.
- Scholz, R.W. and Tietje, O. (2002), *Embedded case study methods: Integrating quantitative and qualitative knowledge*, Sage Publications, Thousand Oaks, Calif.
- Schroder, H.M., Driver, M.J. and Streufert, S. (1967), *Human information processing: Individuals and groups functioning in complex social situations*, Holt, Rinehart and Winston New York.
- Schupp, H. (2002), *Thema mit Variationen: Aufgabenvariation im Mathematikunterricht*, Franzbecker KG.
- Schupp, H., Schmidt, G., Knichel, H. and Schuler, M. (2001), "Aufgabenvariation als Unterrichtsgegenstand. oder: Be merry, vary!", Universität des Saarlandes, Saarland, 2001.
- Schwarz, N. (1985), "Theorien konzeptgesteuerter Informationsverarbeitung in der Sozialpsychologie", *Theorien der Sozialpsychologie*, Vol. 3, pp. 269–291.
- Schwenk, C.R. (1984), "Cognitive simplification processes in strategic decision-making", *Strategic Management Journal*, Vol. 5 No. 2, pp. 111–128.
- Seel, N.M. (1991), "Induktives Denken und Analogiebildung", *Unterrichtswissenschaft*, No. 19, pp. 98–110.

- Seel, N.M. (2003), *Psychologie des Lernens: Lehrbuch für Pädagogen und Psychologen mit 12 Tabellen und zahlreichen Übungsaufgaben*, UTB, 2., aktualisierte und erw. Aufl, Reinhardt, München [u.a.].
- Shapiro, B.P. (1975), "Introduction to the Case Method", Harvard Business School Background Note, Harvard Business School, July, 1975.
- Shapiro, B.P. (1984), *Hints for case teaching*, Harvard Business School.
- Slaughter, S. and Leslie, L.L. (1997), *Academic capitalism: Politics, policies, and the entrepreneurial university*, ERIC.
- Smaling, A. (2008), "Inductive, analogical, and communicative generalization", *International Journal of Qualitative Methods*, Vol. 2 No. 1, pp. 52–67.
- Smith, L. and Gentner, D. (2010), "Structural constraints and real-world plausibility in analogical inference.", in Ohlsson, S. and Ctrambone, R. (Eds.), *Proceedings of the 32nd Annual Conference of the Cognitive Science Society*, Cognitive Science Society, Austin, TX, pp. 712–717.
- Solomon, M.R. (2001), *Konsumentenverhalten der europäische Markt*, PSWI, Pearson Studium, München.
- Solso, R.L. (2005), *Kognitive Psychologie, Springer-Lehrbuch*, Springer, Heidelberg.
- The Center for Teaching and Learning (1994), "Teaching with Case Studies", Stanford University, Stanford, 1994.
- Thompson, A.A., Strickland, A.J. and Gamble, J.E. (2008), *Crafting and executing strategy: The quest for competitive advantage ; concepts and cases*, 16. ed., internat. student ed, McGraw-Hill/Irwin, Boston, Mass.
- Thompson, L., Gentner, D. and Loewenstein, J. (2000), "Avoiding Missed Opportunities in Managerial Life: Analogical Training More Powerful Than Individual Case Training", *Organizational Behavior and Human Decision Processes*, Vol. 82 No. 1, pp. 60–75.
- Thompson, L. and Hastie, R. (1990), "Social perception in negotiation", *Organizational Behavior and Human Decision Processes*, Vol. 47 No. 1, pp. 98–123.
- Thompson, L.L. (2006), *Negotiation theory and research*, Psychosocial Press.
- Tohill, J.M. and Holyoak, K.J. (2000), "The impact of anxiety on analogical reasoning", *Thinking & Reasoning*, Vol. 6 No. 1, pp. 27–40.

- Tolley, S.G. and Richmond, S.D. (2003), "Use of the LAVA® Lamp as an Analogy in the Geoscience Classroom", *Journal of Geoscience Education*, Vol. 51 No. 2, pp. 217–220.
- University of Augsburg (2007), "Variieren von Aufgaben", available at: <http://www.math.uni-augsburg.de/prof/dida/studium/lehre/ws0708/lehren/material/04variieren.pdf> (accessed 23 July 2015).
- Vohle, F. and Reinmann-Rothmeier, G. (2000), "Analogietraining zur Förderung von Kommunikation und Innovation im Rahmen des Wissensmanagements".
- Walsh, J. (2011), "The Psychological Person", in Hutchison, E.D. (Ed.), *Dimensions of human behavior: Person and environment*, 4th ed, Sage, Los Angeles, Calif.
- Waltz, J.A., Knowlton, B.J., Holyoak, K.J., Boone, K.B., Mishkin, F.S., de Menezes Santos, Marcia, Thomas, C.R. and Miller, B.L. (1999), "A system for relational reasoning in human prefrontal cortex", *Psychological science*, Vol. 10 No. 2, pp. 119–125.
- Wharton, C.M. (1993), "Direct and indirect measures of the roles of thematic and situational knowledge in reminding", Doctoral dissertation, Univ. of California, Los Angeles, 1 January.
- Wharton, C.M., Holyoak, K.J., Downing, P.E., Lange, T.E., Wickens, T.D. and Melz, E.R. (1994), "Below the surface: Analogical similarity and retrieval competition in reminding", *Cognitive psychology*, Vol. 26 No. 1, pp. 64–101.
- Wharton, C.M., Holyoak, K.J. and Lange, T.E. (1996), "Remote analogical reminding", *Memory & Cognition*, Vol. 24 No. 5, pp. 629–643.
- Whitehead, A.N. (1959), "The aims of education", *Daedalus*, Vol. 88 No. 1, pp. 192–205.
- Whitehead, A.N. (1967), *The aims of education and other essays*, THE FREE PRESS, New York.
- Williams, S.M. (1992), "Putting case-based instruction into context: Examples from legal and medical education", *The Journal of the Learning Sciences*, Vol. 2 No. 4, pp. 367–427.

- Wulf, G. and Schmidt, R.A. (1997), "Variability of practice and implicit motor learning", *Journal of Experimental Psychology: Learning, Memory, and Cognition*, Vol. 23 No. 4, p. 987.
- Yan, J., Forbus, K.D. and Gentner, D. (2003), "A theory of rerepresentation in analogical matching", in *Proceedings of the 25th Annual Conference of the Cognitive Science Society*.
- Yin, R.K. (1989), *Case Study Research: Design And Methods*, Sage Publications, Inc.
- Zeakes, S.J. (1989), "Case studies in biology", *College Teaching*, Vol. 37 No. 1, pp. 33–35.

APPENDIX

Study 1 – Paper-and-Pencil

Group 1

Group 2

Group 3

Group 4

GROUP 1

Thank you for taking part in this study.

email

Please enter your email address for the following 2nd study (Duration of max. 10 to 15 min.)

Anonymity

The stated email address will be deleted after the completion of the online survey. The address will not appear in any publication. It will only be used in the context of the dissertation.

General information

Please work on the sheets in the given order (don't look on following sheets in advance). It is allowed to look back on prior pages.

Starting Time

Please note your starting time (hour + minute):



GROUP 1

Please read the following case studies.

The Meeting Case

The Sales and Marketing divisions of a large corporation are trying to decide where to have a major conference. Sales wants to go to a lodge in the mountains. Marketing, on the other hand, wants to go a major city.

They have considered the compromise of holding two conferences, but the added cost seems prohibitive and keeping the price of the conference down is of primary importance for both Sales and Marketing.

As they discuss the issue further, it comes out that what Sales really wants is to run the conference as a retreat, which requires having a location suitable to focusing on the work at hand. Furthermore, it comes out that Marketing wants to use the conference as an opportunity to promote the company image.

The two then agree on having a well-publicized conference located in the mountains.

GROUP 1

The Video Game Case

Vortex, Inc., a small video-arcade software firm, had a promising new line of special forces videogames. Keppel and Co., a major manufacturer of video-arcade equipment in Europe, was working with Vortex to produce the hardware needed for the special forces games. They were negotiating over how to share revenues from their joint product.

The deal was mostly going smoothly – Vortex wanted to broaden the market for its products and Keppel needed a boost in sales to meet their shareholders expectations for the year. However, the two companies were struggling with how to split sales revenues.

Keppel was demanding a high percentage from sales to finance the added expense of a custom-made action control for Vortex's games. Further, Keppel knew that it had the greatest resources to get Vortex's special forces games on the market.

On the other hand, Vortex was also demanding a high percentage from sales on the grounds that what was being sold was their games, they had the patent on the new action control, and Keppel was simply one of several available manufacturers.

Having negotiations at a standstill was bad for both companies because Keppel needed to increase their sales by the end of the year and Vortex needed to get their products out while they were still state of the art.

The breakthrough came when negotiators from Keppel and Vortex began discussing the differing needs of their companies. The negotiation teams reached the following agreement: Vortex would give up some of its share of revenue for the remainder of the year to cover Keppel's production costs and to aid their current financial situation. In return, Keppel would give up a comparable share of revenue in future fiscal years for these products, and Vortex still maintained their patent on the new control device.

GROUP 1

Please answer the following questions. Outlining main points for answers is sufficient (rhetoric is not crucial).

Please shortly summarize, what is going on in both negotiations?

The Meeting:

The Video Game:

What are the key similarities between these two cases?



GROUP 1

Definition of principle "trade-off"

A tradeoff is a type of negotiation agreement in which each party gets something that they really want by giving up something that they didn't care as much about.

GROUP 1

Please answer the following questions. Outlining main points for answers is sufficient (rhetoric is not crucial).

What are the key signals that show the possibility of using the "trade-off"-principle?
Please describe both cases' solutions in the context of the "trade-off"-principle.

Finishing Time

Please note your finishing time (hour + minute):

GROUP 1

General statements

Have you already participated in one or more courses for negotiation techniques also including some theoretical basic approaches? (Please make a cross at the right answer)

no yes

Sex male female

Age

Course of studies

Aspired degree of this study course

Did you make an apprenticeship before starting to study?

no yes if yes, which one

Please hand in your papers now.

Thank you very much for your kind support in the first study.

You will receive the link for the second study soon.

In this context I would like to thank you in advance for participating a second time!

GROUP 2

Thank you for taking part in this study.

email

Please enter your email address for the following 2nd study (Duration of max. 10 to 15 min.)

Anonymity

The stated email address will be deleted after the completion of the online survey. The address will not appear in any publication. It will only be used in the context of the dissertation.

General information

Please work on the sheets in the given order (don't look on following sheets in advance). It is allowed to look back on prior pages.

Starting Time

Please note your starting time (hour + minute):

GROUP 2

Please read the following case study.

The Meeting

MacGrant LLC, a large traditional whiskey distillery, has gone through difficult times after the heir and owner Dave Billing has left the company due to his age of 69 years. After his departure, external managers started to run the business. However, Dave still owned high shares of the company and, therefore, in fact never completely retired. Consequently, he still took influence on the operational business whenever possible. For the external managers this was not a base to work upon and, as a result, in the first three years after Dave's retirement, four external managers came and went. This led to very discontinuous strategy approaches and a low working climate. During these years the sales and revenues of the company were decreasing (see figure 1).

MacGrant LLC	CEO: Dave Billing			Various New CEOs			Entry of CEO Michael Haynes	
	2006	2007	2008	2009	2010	2011	2012	2013
Lower Price Segment								
Sold Bottles	3.282.658	3.492.367	3.320.380	3.369.611	3.006.430	3.644.294	3.238.547	3.259.489
Revenue Thd. \$	\$45.301	\$46.099	\$44.825	\$42.120	\$42.090	\$40.087	\$42.101	\$43.025
Average cost per bottle	\$13,80	\$13,20	\$13,50	\$12,50	\$14,00	\$11,00	\$13,00	\$13,20
Middle Price Segment								
Sold Bottles	2.852.554	2.953.694	3.015.362	2.837.072	2.392.398	2.964.034	2.791.877	2.488.920
Revenue Thd. \$	\$67.035	\$70.003	\$69.052	\$57.025	\$55.025	\$56.020	\$60.025	\$59.859
Average cost per bottle	\$23,50	\$23,70	\$22,90	\$20,10	\$23,00	\$18,90	\$21,50	\$24,05
Premium Price Segment								
Sold Bottles	377.576	393.624	395.878	349.401	335.755	363.737	376.743	384.107
Revenue Thd. \$	\$22.353	\$23.846	\$23.001	\$20.125	\$21.153	\$19.005	\$20.856	\$22.785
Average cost per bottle	\$59,20	\$60,58	\$58,10	\$57,60	\$63,00	\$52,25	\$55,36	\$59,32
Total								
Total Sold Bottles	6.512.788	6.839.685	6.731.620	6.556.083	5.734.583	6.972.065	6.407.167	6.132.516
Revenue Thd. \$	\$134.688	\$139.948	\$136.877	\$119.271	\$118.268	\$115.113	\$122.983	\$125.669
Profit Thd. \$	\$13.460	\$14.524	\$13.426	\$10.569	\$10.621	\$8.526	\$11.958	\$12.603

Figure 1: sales and revenues

GROUP 2

In 2012, the current CEO Michael Haynes came into business being the first able to implement his strategy and to deal with Dave's character. Before he came to MacGrant LLC he was a successful manager of marketing and sales at various German breweries. Therefore, due to many breweries are led by their owners, he knew a lot of people who could not totally disengage their responsibility of a business leader after their retirement. He was able to use the deep and profound experiences of Dave and his high reputation at distributors and long-run business partners. Michael gave Dave in that way the possibility of still being part of the business. At the first time after his official retirement Dave's needs for involvement and participation were fully satisfied. Therefore, Michael himself could focus on the internationalization of sales, the global marketing strategy and the financial part of business.

In order to demonstrate that the turbulent years were past, Michael knew he had to do something to increase motivation in the marketing and in the sales divisions. This was one of his most important objectives in 2014. The marketing and sales divisions had particularly suffered from the permanent changes in strategy and had not been allowed to participate in the decision making processes at all. Therefore, he wanted to set up a meeting to work on the future course of MacGrant LLC. He knew that only by participating marketing and sales during the decision processes, he could increase motivation again.

He set up a meeting with the Head of Marketing Julia Singer, and the Head of Sales Roberto Toleti. In this meeting Michael told them about the backgrounds of his idea of the meeting. He gave both two weeks to define a concept and present this to him. His experiences have shown that often the ideas of marketing and sales regarding such a topic strongly differ, so he was quite curious about the concepts.

Julia and Roberto presented their ideas to Michael and he was proven right realizing that both did not create a common concept. In this case the ideas went into totally different directions. There were such substantial disagreements between the two divisions that they were even beginning to create conflict between

GROUP 2

them. Roberto wanted to go to a lodge in the mountains. He had researched this possibility already and due to the high popularity of such suitable locations he wanted to reserve a location as soon as possible. Julia wanted to set this meeting in a major city. She had already generated materials on the potential exposure of the company in several urban markets in preparation.

Due to their different approaches Julia and Roberto suggested to Michael to hold two meetings, one as proposed from marketing and one as proposed from sales. Michael denied this option immediately pointing on high costs and the hectic travel schedules of the executives involved. While thinking again on the proposals of Julia and Roberto he got confirmed in his decision to initiate a common meeting in order to improve cooperation and communication between the marketing and sales division.

After listening to both ideas and understanding the intensions of them he wanted to know more about the detailed backgrounds that led Julia and Roberto to their recommendations. Julia started and told about the current situation in the marketing department. Her employees were daily confronted with negative trends concerning the image and the reputation of the company in the market. She referred to still very much lower market reputation in 2013 than in 2008 (see figure 2). This is also something Dave was aware of and stated this facts as often as possible to her.

<u>MacGrant LLC</u>	2008	2009	2010	2011	2012	2013
Percentage of Whiskey Customers stated a...						
...positive Image Perception of the brand	86,2%	79,1%	75,2%	71,4%	72,0%	72,4%
...the brand as their first choice	9,1%	9,0%	8,4%	6,2%	6,8%	7,1%
Market Share Top 3 Markets						
Scotland	14,2%	14,0%	13,9%	10,0%	10,4%	10,7%
Germany	8,2%	8,3%	8,0%	7,7%	7,9%	8,0%
England	7,9%	7,9%	7,9%	7,7%	7,8%	7,8%

Figure 2: Marketing key-ratios

GROUP 2

From Julia's perspective, this meeting should demonstrate to the employees that they still could be proud to work for MacGrant LLC and that a new era would start right now. She thought such a highly renowned location would contribute to this understanding. Also, external business partners and customers getting to know about the choice of such a location, would promote the company image.

Roberto listened carefully to Julia and then began to explain his understanding of the planned meeting. He said, that after these turbulent years the employees should get involved in the strategy process by working it out by themselves. They needed a quiet and simple, maybe totally unknown, location with enough space to work in groups and to discuss in teams. Moreover, he wanted a relaxed atmosphere, offering the possibility to work completely focused without any distractions. From his perspective all these characteristics were available choosing a lodge in the mountains. Finally, Roberto closed his explanations pointing out what Dave had often criticized before, that the sales team only tried to sell bottles without having any idea which products they should sell in which priority in order to increase profitability. For the sales teams, the more bottles are sold, the better it was. Only when working together in an atmosphere where the sales team could listen carefully, such important aspects could get taught.

After these detailed information of both sides, Julia and Roberto understood each other better. All arguments were valid and comprehensible from both points of view. Also Michael understood both negotiation parties well. However, for the moment they could not see a solution fitting to all interests. They broke up the meeting and Michael went back to his office.

At the evening, Michael had a look at both presentations again. He carefully reread the arguments again and again. He was very unconfident what he should do.

GROUP 2

Please take at most about 10 minutes to answer the following questions.

Outlining main points for answers is sufficient (Rhetoric is not crucial)

1. Who is the protagonist?

2. Please shortly summarize, what is going on in this negotiation?

As the protagonist...

a. What objectives do I have?

b. What problems do I face?

c. What courses of action are open to me?

Definition of principle "trade-off"

A tradeoff is a type of negotiation agreement in which each party gets something that they really want by giving up something that they didn't care as much about.

One Solution for the case

The interests were not as contradictory as it has appeared. Being separated from a stressful and hectic environment on the one hand and enjoying a high quality and elaborated location on the other hand does not necessarily need to exclude each other. Michael realized that Julia argued she wanted to hold the meeting in a big city, but what was really important to her was the reputation of the hotel in order to motivate the employees. Roberto did in fact not put full emphasis on the lodge in the mountains, for him it was all about having a quiet and relaxed place to be focused on work. The best solution was to look for a well-publicized meeting located in the mountains.

GROUP 2

Please read the following case study.

The Video Game

In 2005, three young people, Donald Greene, Carol Sutton and David Kleasy founded a start-up IT-firm called Vortex, focusing on the development of software for already existing hardware gaming controller. But then, Keppel, a major manufacturer of video game equipment in Europe, had been so impressed by a marketing campaign, initiated by Sutton that they offered her a great job and she left the company. However, the afterward necessary partly reorientation of Vortex with focusing more on own innovation, than on just delivering, paid out, also financially (see figure 1). Vortex developed from a simple supplier for software to a developer with own innovations.

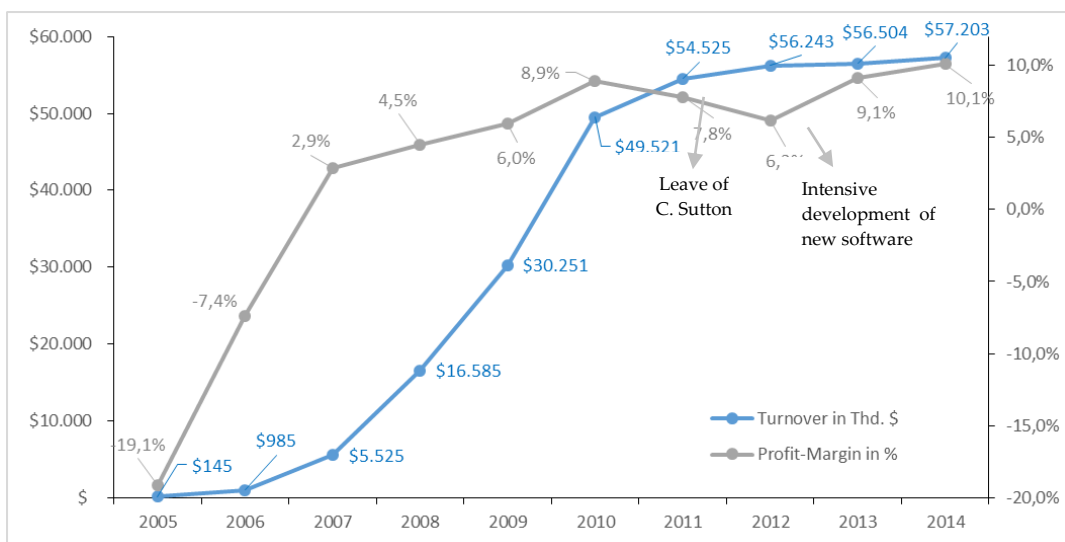


Figure 1: Financial development of Vortex

GROUP 2

Greene and Kleasy tried to gain ground in a greater market and establish their brand. Therefore, they created a promising new line of special forces video games, but did not have the capacities and workforce to produce the hardware components independently. From the information they had collected following the career of Sutton at Keppel, they derived a great potential for a cooperation with that firm.

In contrast to many other competing hardware producers, Keppel, with its actual CEO Frank Custon, had always resisted the seduction of outsourcing the production to other countries in order to keep the principles of the founder Joseph B. Keppel alive. However, this was not that easy in times of global production. To still meet the shareholders expectations in future, Custon decided he had to bring some new input into the firm philosophy. According to him the request of a little firm called Vortex came exactly at the right time.

Keppel and Vortex started negotiations. As mentioned above, Keppel on the one hand, had the capacities and workforce, together with being well-established on the market with a good reputation. These were all requirements for Vortex's aims who wanted to broaden the market for its products. On the other hand Keppel needed a good product for a boost in sales to meet their shareholders expectations for the year and such a product was offered by Vortex with the promising special forces game.

Unsurprisingly, the deal was mostly going smoothly at the beginning, a common concept of working together, was designed quite easy. However, when they came to the point of negotiating over how to share revenues from their joint product, both parties were at odds with each other. Keppel was demanding a high percentage from sales to finance the added expense of a custom-made action control for Vortex's games. Further, Keppel knew that it had the greatest resources and conditions to get Vortex's special forces games on the market. Custon also stated quite elaborately what great risk it could turn out to be for Keppel to focus completely on working with an uprising little firm. In that way he tried to

GROUP 2

intimidate Greene and Kleasy a bit, knowing they had not been to such big negotiations before. On the other hand, Vortex was also demanding a high percentage from sales on the grounds that what was being sold was their own games, having the exclusive patent on the new action control, also pointing out to other offers they had got from hardware producing firms. Vortex tried to stress that Keppel was simply one of several available manufacturers.

Disagreements concerning negotiation positions and importance of stated facts got so profound that the apparently fixed deal really got in danger. Negotiations came to a standstill. Greene and Kleasy had the feeling that their product line of innovative games could really be their possibility to establish themselves on the market. Their only problem was that Vortex had to get their products out while they were still state of the art. Custon however had the problem of already having promised a financial boost to the shareholders and in that context had already presented a preview of the new line of games, after the first part of negotiations had been promising. Now cancelling the deal would really damage his career and so an increase in sales by the end of the year was necessary. In his desperation, he asked Carol Sutton, who meanwhile got to be the head of marketing at Keppel, to join the negotiations. She agreed and one final meeting was determined between Vortex and Keppel.

Before the meeting started, Sutton went through the documents and was very motivated to find a fair and sound solution for both parties. She was really surprised when she came to the result that the aims of Keppel and Vortex were in fact completely different and not excluding each other at all. She realized that Greene's and Kleasy's focus in fact was on bringing their own firm up and for that it was not necessarily important to have short-term financial success, but more to establish themselves. Keppel in contrast needed exactly such a short-term financial boost. Sutton worked out an agreement both could live with: Vortex would give up some of its share of revenue for the remainder of the year to cover Keppel's production costs and to aid their current financial situation. In return, Keppel

**GROUP 2**

would give up a comparable share of revenue in future fiscal years for these products, and Vortex still maintained their patent on the new control device.

GROUP 2

Please answer the following questions. Outlining main points for answers is sufficient (rhetoric is not crucial).

What are the key similarities between these two cases?

GROUP 2

Please answer the following questions. Outlining main points for answers is sufficient (rhetoric is not crucial).

What are the key signals that show the possibility of using the "trade-off"-principle?
Please describe both cases' solutions in the context of the "trade-off"-principle.

Finishing Time

Please note your finishing time (hour + minute):

GROUP 2

General statements

Have you already participated in one or more courses for negotiation techniques also including some theoretical basic approaches? (Please make a cross at the right answer)

no yes

Sex male female

Age

Course of studies

Aspired degree of this study course

Did you make an apprenticeship before starting to study?

no yes if yes, which one

Please hand in your papers now.

Thank you very much for your kind support in the first study.

You will receive the link for the second study soon.

In this context I would like to thank you in advance for participating a second time!

GROUP 3

Thank you for taking part in this study.

email

Please enter your email address for the following 2nd study (Duration of max. 10 to 15 min.)

Anonymity

The stated email address will be deleted after the completion of the online survey. The address will not appear in any publication. It will only be used in the context of the dissertation.

General information

Please work on the sheets in the given order (don't look on following sheets in advance). It is allowed to look back on prior pages.

Starting Time

Please note your starting time (hour + minute):

GROUP 3

Please read the following case study.

The Meeting

MacGrant LLC, a large traditional whiskey distillery, has gone through difficult times after the heir and owner Dave Billing has left the company due to his age of 69 years. After his departure, external managers started to run the business. However, Dave still owned high shares of the company and, therefore, in fact never completely retired. Consequently, he still took influence on the operational business whenever possible. For the external managers this was not a base to work upon and, as a result, in the first three years after Dave's retirement, four external managers came and went. This led to very discontinuous strategy approaches and a low working climate. During these years the sales and revenues of the company were decreasing (see figure 1).

MacGrant LLC	CEO: Dave Billing			Various New CEOs			Entry of CEO Michael Haynes	
	2006	2007	2008	2009	2010	2011	2012	2013
Lower Price Segment								
Sold Bottles	3.282.658	3.492.367	3.320.380	3.369.611	3.006.430	3.644.294	3.238.547	3.259.489
Revenue Thd. \$	\$45.301	\$46.099	\$44.825	\$42.120	\$42.090	\$40.087	\$42.101	\$43.025
Average cost per bottle	\$13,80	\$13,20	\$13,50	\$12,50	\$14,00	\$11,00	\$13,00	\$13,20
Middle Price Segment								
Sold Bottles	2.852.554	2.953.694	3.015.362	2.837.072	2.392.398	2.964.034	2.791.877	2.488.920
Revenue Thd. \$	\$67.035	\$70.003	\$69.052	\$57.025	\$55.025	\$56.020	\$60.025	\$59.859
Average cost per bottle	\$23,50	\$23,70	\$22,90	\$20,10	\$23,00	\$18,90	\$21,50	\$24,05
Premium Price Segment								
Sold Bottles	377.576	393.624	395.878	349.401	335.755	363.737	376.743	384.107
Revenue Thd. \$	\$22.353	\$23.846	\$23.001	\$20.125	\$21.153	\$19.005	\$20.856	\$22.785
Average cost per bottle	\$59,20	\$60,58	\$58,10	\$57,60	\$63,00	\$52,25	\$55,36	\$59,32
Total								
Total Sold Bottles	6.512.788	6.839.685	6.731.620	6.556.083	5.734.583	6.972.065	6.407.167	6.132.516
Revenue Thd. \$	\$134.688	\$139.948	\$136.877	\$119.271	\$118.268	\$115.113	\$122.983	\$125.669
Profit Thd. \$	\$13.460	\$14.524	\$13.426	\$10.569	\$10.621	\$8.526	\$11.958	\$12.603

Figure 1: sales and revenues

GROUP 3

In 2012, the current CEO Michael Haynes came into business being the first able to implement his strategy and to deal with Dave's character. Before he came to MacGrant LLC he was a successful manager of marketing and sales at various German breweries. Therefore, due to many breweries are led by their owners, he knew a lot of people who could not totally disengage their responsibility of a business leader after their retirement. He was able to use the deep and profound experiences of Dave and his high reputation at distributors and long-run business partners. Michael gave Dave in that way the possibility of still being part of the business. At the first time after his official retirement Dave's needs for involvement and participation were fully satisfied. Therefore, Michael himself could focus on the internationalization of sales, the global marketing strategy and the financial part of business.

In order to demonstrate that the turbulent years were past, Michael knew he had to do something to increase motivation in the marketing and in the sales divisions. This was one of his most important objectives in 2014. The marketing and sales divisions had particularly suffered from the permanent changes in strategy and had not been allowed to participate in the decision making processes at all. Therefore, he wanted to set up a meeting to work on the future course of MacGrant LLC. He knew that only by participating marketing and sales during the decision processes, he could increase motivation again.

He set up a meeting with the Head of Marketing Julia Singer, and the Head of Sales Roberto Toleti. In this meeting Michael told them about the backgrounds of his idea of the meeting. He gave both two weeks to define a concept and present this to him. His experiences have shown that often the ideas of marketing and sales regarding such a topic strongly differ, so he was quite curious about the concepts.

Julia and Roberto presented their ideas to Michael and he was proven right realizing that both did not create a common concept. In this case the ideas went into totally different directions. There were such substantial disagreements between the two divisions that they were even beginning to create conflict between

GROUP 3

them. Roberto wanted to go to a lodge in the mountains. He had researched this possibility already and due to the high popularity of such suitable locations he wanted to reserve a location as soon as possible. Julia wanted to set this meeting in a major city. She had already generated materials on the potential exposure of the company in several urban markets in preparation.

Due to their different approaches Julia and Roberto suggested to Michael to hold two meetings, one as proposed from marketing and one as proposed from sales. Michael denied this option immediately pointing on high costs and the hectic travel schedules of the executives involved. While thinking again on the proposals of Julia and Roberto he got confirmed in his decision to initiate a common meeting in order to improve cooperation and communication between the marketing and sales division.

After listening to both ideas and understanding the intensions of them he wanted to know more about the detailed backgrounds that led Julia and Roberto to their recommendations. Julia started and told about the current situation in the marketing department. Her employees were daily confronted with negative trends concerning the image and the reputation of the company in the market. She referred to still very much lower market reputation in 2013 than in 2008 (see figure 2). This is also something Dave was aware of and stated this facts as often as possible to her.

MacGrant LLC	2008	2009	2010	2011	2012	2013
Percentage of Whiskey Customers stated a...						
...positive Image Perception of the brand	86,2%	79,1%	75,2%	71,4%	72,0%	72,4%
...the brand as their first choice	9,1%	9,0%	8,4%	6,2%	6,8%	7,1%
Market Share Top 3 Markets						
Scotland	14,2%	14,0%	13,9%	10,0%	10,4%	10,7%
Germany	8,2%	8,3%	8,0%	7,7%	7,9%	8,0%
England	7,9%	7,9%	7,9%	7,7%	7,8%	7,8%

Figure 2: Marketing key-ratios

GROUP 3

From Julia's perspective, this meeting should demonstrate to the employees that they still could be proud to work for MacGrant LLC and that a new era would start right now. She thought such a highly renowned location would contribute to this understanding. Also, external business partners and customers getting to know about the choice of such a location, would promote the company image.

Roberto listened carefully to Julia and then began to explain his understanding of the planned meeting. He said, that after these turbulent years the employees should get involved in the strategy process by working it out by themselves. They needed a quiet and simple, maybe totally unknown, location with enough space to work in groups and to discuss in teams. Moreover, he wanted a relaxed atmosphere, offering the possibility to work completely focused without any distractions. From his perspective all these characteristics were available choosing a lodge in the mountains. Finally, Roberto closed his explanations pointing out what Dave had often criticized before, that the sales team only tried to sell bottles without having any idea which products they should sell in which priority in order to increase profitability. For the sales teams, the more bottles are sold, the better it was. Only when working together in an atmosphere where the sales team could listen carefully, such important aspects could get taught.

After these detailed information of both sides, Julia and Roberto understood each other better. All arguments were valid and comprehensible from both points of view. Also Michael understood both negotiation parties well. However, for the moment they could not see a solution fitting to all interests. They broke up the meeting and Michael went back to his office.

At the evening, Michael had a look at both presentations again. He carefully reread the arguments again and again. He was very unconfident what he should do.

GROUP 3

Please take at most about 10 minutes to answer the following questions.

Outlining main points for answers is sufficient (Rhetoric is not crucial)

1. Who is the protagonist?

2. Please shortly summarize, what is going on in this negotiation?

3. As the protagonist...

a. What objectives do I have?

b. What problems do I face?

c. What courses of action are open to me?

Definition of principle "trade-off"

A tradeoff is a type of negotiation agreement in which each party gets something that they really want by giving up something that they didn't care as much about.

One Solution for the case

The interests were not as contradictory as it has appeared. Being separated from a stressful and hectic environment on the one hand and enjoying a high quality and elaborated location on the other hand does not necessarily need to exclude each other. Michael realized that Julia argued she wanted to hold the meeting in a big city, but what was really important to her was the reputation of the hotel in order to motivate the employees. Roberto did in fact not put full emphasis on the lodge in the mountains, for him it was all about having a quiet and relaxed place to be focused on work. The best solution was to look for a well-publicized meeting located in the mountains.

GROUP 3

Please answer the following questions.

As mentioned above, the principle is applicable if both parties do have a very important interest and other interests they would give up for reaching their first priority interest. To what extent is this given in the case? Please explain.

Which of the facts ease the recognition of the principle in the case? Which do cover a clear identification?

What to do if only one party shows an interest that is more important than other ones?

Changing the characters and negotiation topic to other departments and topics of the company. Why is the principle also working there?

GROUP 3

You read this "trade-off"-principle in the context of business. Is it also applicable to other domains? Which? Name at least two examples.

What would be the most contrary solution to the case, compared to the mentioned principle? Explain.

Is there a situation you have personally experienced in the past where the principle could be applied? Which one? Explain.

Do you think knowing about the principle will ease later work for you? Why? Why not?

GROUP 3

To summarize, please answer the following question. Outlining main points for answers is sufficient (rhetoric is not crucial).

What are the key signals that show the possibility of using the "trade-off"-principle?
Please describe both cases' solutions in the context of the "trade-off"-principle.

Finishing Time

Please note your finishing time (hour + minute):

GROUP 3

General statements

Have you already participated in one or more courses for negotiation techniques also including some theoretical basic approaches? (Please make a cross at the right answer)

no yes

Sex male female

Age

Course of studies

Aspired degree of this study course

Did you make an apprenticeship before starting to study?

no yes if yes, which one

Please hand in your papers now.

Thank you very much for your kind support in the first study.

You will receive the link for the second study soon.

In this context I would like to thank you in advance for participating a second time!

GROUP 4

Thank you for taking part in this study.

email

Please enter your email address for the following 2nd study (Duration of max. 10 to 15 min.)

Anonymity

The stated email address will be deleted after the completion of the online survey. The address will not appear in any publication. It will only be used in the context of the dissertation.

General information

Please work on the sheets in the given order (don't look on following sheets in advance). It is allowed to look back on prior pages.

Starting Time

Please note your starting time (hour + minute):

GROUP 4

Please read the following case study.

The Meeting

MacGrant LLC, a large traditional whiskey distillery, has gone through difficult times after the heir and owner Dave Billing has left the company due to his age of 69 years. After his departure, external managers started to run the business. However, Dave still owned high shares of the company and, therefore, in fact never completely retired. Consequently, he still took influence on the operational business whenever possible. For the external managers this was not a base to work upon and, as a result, in the first three years after Dave's retirement, four external managers came and went. This led to very discontinuous strategy approaches and a low working climate. During these years the sales and revenues of the company were decreasing (see figure 1).

MacGrant LLC	CEO: Dave Billing			Various New CEOs			Entry of CEO Michael Haynes	
	2006	2007	2008	2009	2010	2011	2012	2013
Lower Price Segment								
Sold Bottles	3.282.658	3.492.367	3.320.380	3.369.611	3.006.430	3.644.294	3.238.547	3.259.489
Revenue Thd. \$	\$45.301	\$46.099	\$44.825	\$42.120	\$42.090	\$40.087	\$42.101	\$43.025
Average cost per bottle	\$13,80	\$13,20	\$13,50	\$12,50	\$14,00	\$11,00	\$13,00	\$13,20
Middle Price Segment								
Sold Bottles	2.852.554	2.953.694	3.015.362	2.837.072	2.392.398	2.964.034	2.791.877	2.488.920
Revenue Thd. \$	\$67.035	\$70.003	\$69.052	\$57.025	\$55.025	\$56.020	\$60.025	\$59.859
Average cost per bottle	\$23,50	\$23,70	\$22,90	\$20,10	\$23,00	\$18,90	\$21,50	\$24,05
Premium Price Segment								
Sold Bottles	377.576	393.624	395.878	349.401	335.755	363.737	376.743	384.107
Revenue Thd. \$	\$22.353	\$23.846	\$23.001	\$20.125	\$21.153	\$19.005	\$20.856	\$22.785
Average cost per bottle	\$59,20	\$60,58	\$58,10	\$57,60	\$63,00	\$52,25	\$55,36	\$59,32
Total								
Total Sold Bottles	6.512.788	6.839.685	6.731.620	6.556.083	5.734.583	6.972.065	6.407.167	6.132.516
Revenue Thd. \$	\$134.688	\$139.948	\$136.877	\$119.271	\$118.268	\$115.113	\$122.983	\$125.669
Profit Thd. \$	\$13.460	\$14.524	\$13.426	\$10.569	\$10.621	\$8.526	\$11.958	\$12.603

Figure 1: sales and revenues

GROUP 4

In 2012, the current CEO Michael Haynes came into business being the first able to implement his strategy and to deal with Dave's character. Before he came to MacGrant LLC he was a successful manager of marketing and sales at various German breweries. Therefore, due to many breweries are led by their owners, he knew a lot of people who could not totally disengage their responsibility of a business leader after their retirement. He was able to use the deep and profound experiences of Dave and his high reputation at distributors and long-run business partners. Michael gave Dave in that way the possibility of still being part of the business. At the first time after his official retirement Dave's needs for involvement and participation were fully satisfied. Therefore, Michael himself could focus on the internationalization of sales, the global marketing strategy and the financial part of business.

In order to demonstrate that the turbulent years were past, Michael knew he had to do something to increase motivation in the marketing and in the sales divisions. This was one of his most important objectives in 2014. The marketing and sales divisions had particularly suffered from the permanent changes in strategy and had not been allowed to participate in the decision making processes at all. Therefore, he wanted to set up a meeting to work on the future course of MacGrant LLC. He knew that only by participating marketing and sales during the decision processes, he could increase motivation again.

He set up a meeting with the Head of Marketing Julia Singer, and the Head of Sales Roberto Toleti. In this meeting Michael told them about the backgrounds of his idea of the meeting. He gave both two weeks to define a concept and present this to him. His experiences have shown that often the ideas of marketing and sales regarding such a topic strongly differ, so he was quite curious about the concepts.

Julia and Roberto presented their ideas to Michael and he was proven right realizing that both did not create a common concept. In this case the ideas went into totally different directions. There were such substantial disagreements



GROUP 4

between the two divisions that they were even beginning to create conflict between them. Roberto wanted to go to a lodge in the mountains. He had researched this possibility already and due to the high popularity of such suitable locations he wanted to reserve a location as soon as possible. Julia wanted to set this meeting in a major city. She had already generated materials on the potential exposure of the company in several urban markets in preparation.

Due to their different approaches Julia and Roberto suggested to Michael to hold two meetings, one as proposed from marketing and one as proposed from sales. Michael denied this option immediately pointing on high costs and the hectic travel schedules of the executives involved. While thinking again on the proposals of Julia and Roberto he got confirmed in his decision to initiate a common meeting in order to improve cooperation and communication between the marketing and sales division.

After listening to both ideas and understanding the intensions of them he wanted to know more about the detailed backgrounds that led Julia and Roberto to their recommendations. Julia started and told about the current situation in the marketing department. Her employees were daily confronted with negative trends concerning the image and the reputation of the company in the market. She referred to still very much lower market reputation in 2013 than in 2008 (see figure 2). This is also something Dave was aware of and stated this facts as often as possible to her.

<u>MacGrant LLC</u>	2008	2009	2010	2011	2012	2013
Percentage of Whiskey Customers stated a...						
...positive Image Perception of the brand	86,2%	79,1%	75,2%	71,4%	72,0%	72,4%
...the brand as their first choice	9,1%	9,0%	8,4%	6,2%	6,8%	7,1%
Market Share Top 3 Markets						
Scotland	14,2%	14,0%	13,9%	10,0%	10,4%	10,7%
Germany	8,2%	8,3%	8,0%	7,7%	7,9%	8,0%
England	7,9%	7,9%	7,9%	7,7%	7,8%	7,8%

Figure 2: Marketing key-ratios



GROUP 4

From Julia's perspective, this meeting should demonstrate to the employees that they still could be proud to work for MacGrant LLC and that a new era would start right now. She thought such a highly renowned location would contribute to this understanding. Also, external business partners and customers getting to know about the choice of such a location, would promote the company image.

Roberto listened carefully to Julia and then began to explain his understanding of the planned meeting. He said, that after these turbulent years the employees should get involved in the strategy process by working it out by themselves. They needed a quiet and simple, maybe totally unknown, location with enough space to work in groups and to discuss in teams. Moreover, he wanted a relaxed atmosphere, offering the possibility to work completely focused without any distractions. From his perspective all these characteristics were available choosing a lodge in the mountains. Finally, Roberto closed his explanations pointing out what Dave had often criticized before, that the sales team only tried to sell bottles without having any idea which products they should sell in which priority in order to increase profitability. For the sales teams, the more bottles are sold, the better it was. Only when working together in an atmosphere where the sales team could listen carefully, such important aspects could get taught.

After these detailed information of both sides, Julia and Roberto understood each other better. All arguments were valid and comprehensible from both points of view. Also Michael understood both negotiation parties well. However, for the moment they could not see a solution fitting to all interests. They broke up the meeting and Michael went back to his office.

At the evening, Michael had a look at both presentations again. He carefully reread the arguments again and again. He was very unconfident what he should do.

GROUP 4

**Please take at most about 10 minutes to answer the following questions.
Outlining main points for answers is sufficient (Rhetoric is not crucial)**

1. Who is the protagonist?

2. Please shortly summarize, what is going on in this negotiation?

As the protagonist...

a. What objectives do I have?

b. What problems do I face?

c. What courses of action are open to me?

Definition of principle "trade-off"

A tradeoff is a type of negotiation agreement in which each party gets something that they really want by giving up something that they didn't care as much about.

One Solution for the case

The interests were not as contradictory as it has appeared. Being separated from a stressful and hectic environment on the one hand and enjoying a high quality and elaborated location on the other hand does not necessarily need to exclude each other. Michael realized that Julia argued she wanted to hold the meeting in a big city, but what was really important to her was the reputation of the hotel in order to motivate the employees. Roberto did in fact not put full emphasis on the lodge in the mountains, for him it was all about having a quiet and relaxed place to be focused on work. The best solution was to look for a well-publicized meeting located in the mountains.

GROUP 4

To summarize, please answer the following question. Outlining main points for answers is sufficient (rhetoric is not crucial).

What are the key signals that show the possibility of using the "trade-off"-principle?
Please describe both cases' solutions in the context of the "trade-off"-principle.

Finishing Time

Please note your finishing time (hour + minute):

GROUP 4

General statements

Have you already participated in one or more courses for negotiation techniques also including some theoretical basic approaches? (Please make a cross at the right answer)

no yes

Sex male female

Age

Course of studies

Aspired degree of this study course

Did you make an apprenticeship before starting to study?

no yes if yes, which one

Please hand in your papers now.

Thank you very much for your kind support in the first study.

You will receive the link for the second study soon.

In this context I would like to thank you in advance for participating a second time!

Study 2 – Online

Retrieval (Groups 1, 2, 3, 4)

Seite 1**Die Fahrer-Diskussion**

Die Eheleute Claire und Paul streiten über ihre Reise nach Venedig (Italien). Die beiden möchten am 9.5.2015 losfahren und schließen andere Transportmittel als ihr gemeinsames Auto aufgrund ihres Gepäcks und höherer Kosten aus. Beide setzen sich zusammen und beginnen mit der Planung. Wie bereits bei früheren Urlauben bekommen sich die beiden in die Haare. Jeder von beiden besteht darauf, das gemeinsame Auto zu fahren, aufgrund der Fahreigenschaften des jeweils anderen.

Eine direkte und somit schnellste Route, welche sowohl Claire als auch Paul eigentlich favorisieren, würde die beiden erst einmal einen Großteil der Strecke über die Autobahn bis zu den Alpen führen. Anschließend würden sie auf einigen kurvenreichen Passstraßen die Alpen überwinden um den restlichen Teil der Strecke dann wieder auf der Autobahn zurückzulegen. Beide versprechen sich auch diesmal wieder, dass sollte der andere nachgeben und auf das selber fahren verzichten, man natürlich auf ihn Rücksicht nehmen würde. Doch die Hin- und Rückfahrten in zahlreichen vorherigen Urlauben haben gezeigt, dass diese Versprechungen nie eingehalten wurden. Da keiner der beiden bereit ist zurückzustecken, machen beide nun ihrerseits alternative Vorschläge. Claire ist stets gestresst und gereizt wenn sie längere Zeit in einem Auto als Beifahrerin sitzen muss und nicht selber fahren darf. Im Gegensatz zu ihrem eigenen Fahrstil sind ihr die meisten Fahrer zu sehr darauf bedacht Geschwindigkeitsbegrenzungen einzuhalten und auf Sicherheit zu fahren. Paul achtet grundsätzlich nicht auf das Navigationssystem was häufig dazu führt, dass sie Umwege fahren müssen, weil er Autobahnausfahrten verpasst und somit die benötigte Zeit im Auto für die Fahrt noch verlängert wird. Wenn Claire dann versucht ihn unterwegs zu unterstützen, indem sie ihm den richtigen Weg sagt, fühlt sich Paul immer angegriffen und ist beleidigt, was Claires Stimmung nur noch weiter verschlechtert. Deshalb schlägt sie eine andere Route vor, die zwar einen größeren Umweg mit erheblichem Zeitaufwand darstellt, auf der sie als Fahrerin jedoch nur Autobahn zu fahren hätte. Paul wird immer schlecht wenn er auf kurvigem Straßen nicht selbst am Steuer sitzt, insbesondere wenn die fahrende Person zu schnellem und kurvenschneidendem Fahrverhalten neigt. Paul schlägt deswegen eine Route vor, die nur einen kleineren Umweg darstellt, jedoch hauptsächlich über Land- und Passstraßen führt, was ihm ja aber als Fahrer nichts ausmachen würde. Beide schlagen ihre Lösung auch für die am 23.5.2015 geplante Heimreise vor.

Aus Ihrer Sicht - was sollten die beiden am besten tun? Bitte machen Sie einen konkreten Lösungsvorschlag für Claires und Pauls Problem. Wenn es Ihrer Meinung nach keine Lösung gibt, schreiben Sie bitte „gibt keine Lösung“ in das Antwortfeld. *

Translation:**Page 1****The driver-problem**

The married couple Claire and Paul have an argument about their planned trip to Venice (Italy). They would like to start their vacation on 05/09/2015 and both exclude other means of transport than driving their own car due to their baggage and higher costs. So both meet up and start planning. Like with various vacations before, they strongly disagree in one point. Both insist on driving the common car due to the driving characteristics of each other.

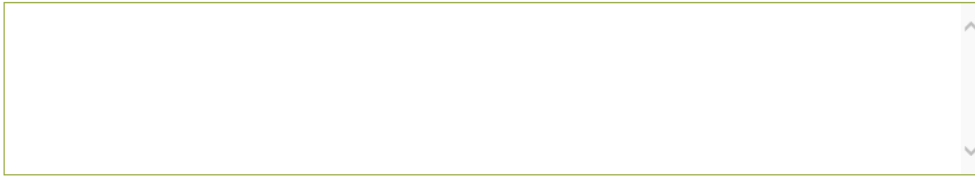
A direct and therefore fastest route, which in fact would be preferred by Claire as well as by Paul, would lead them at first and most part of the route on the highway to the Alps. In the following, they would have to take some curvy mountain passes to overcome the Alps in order to take the highway again for the rest of the route.

Like previously, both promise each other that if the other person relinquished the claim to drive himself, the driver would of course be considerate of the other. But several vacations dating back have shown, that promises have never been kept. Due to the fact that neither of them is up to give in, both submit alternative proposals. Claire is always stressed and angered when she has to sit for a longer time in a car not driving by herself. In contrast to her own driving style, in her opinion most drivers are too concerned not to exceed tempo limits and are too aware of safety. Paul basically ignores the navigation system, what frequently leads to detours because he misses highway departures and so the needed time in the car is extended. If Claire tries to support him by telling the right way, Paul always feels offended, what contributes to deteriorating Claire's mood even more. Because of that, she proposes another route, which is indeed connected with a bigger detour and a considerable expenditure of time, but on which she only had to drive highway routes. Paul always feels sick when he doesn't drive himself on curvy roads, especially if the driving person tends to a speedy and corner cutting driving style. For this reason, Paul proposes a route, which would only be a smaller detour, but mainly on country roads and mountain passes, which he wouldn't care about when driving himself. Both present their solution also for the way back on 05/23/2015.

From your point of view – what should they do best? Please make a specific proposal for solving Claire's and Paul's problem. If you think there is no solution, please note "no solution exists" into the blank.

Seite 2

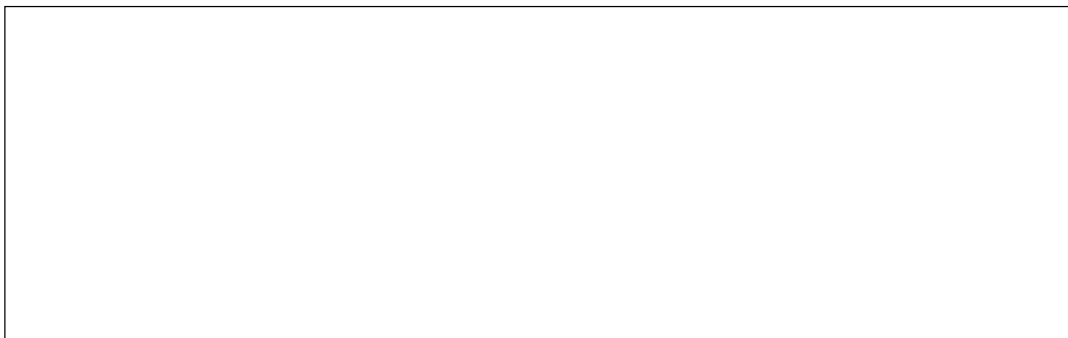
Wie sind Sie bei der Entwicklung Ihrer Lösung vorgegangen? *



Translation:

Page 2

How did you proceed developing your solution?



Seite 3

Haben Sie bei der Erstellung Ihrer Lösung ein bestimmtes Prinzip angewendet? Wenn ja, welches? *



Translation:

Page 3

Did you apply a certain principle for creating your solution? If yes, which one?



Seite 4

Haben Sie in Ihren Augen eine Lösung im Sinne des "trade-off"-Prinzips angewendet, das Sie vor circa zwei Wochen im Rahmen der 1. Studie kennengelernt haben? *

ja weiter mit Seite 7

nein

Translation:**Page 4**

From your perspective, did you apply a solution according to the "trade-off"-principle that you have learned in the context of the first study about two weeks ago?

<input checked="" type="radio"/> Yes → forwarding to page 7
<input type="radio"/> No

Seite 5

Sie haben in Ihren Augen keine Lösung im Sinn des "trade-off"-Prinzips entwickelt. Woran liegt das? *

- ich erinnerte mich bei der Bearbeitung der Fallstudie an das "trade-off"-Prinzip, weiß was es bedeutet, sah aber keine Möglichkeit zur Anwendung im Rahmen diese Fallstudie » weiter mit Seite 7
- ich erinnerte mich bei der Bearbeitung der Fallstudie an das "trade-off"-Prinzip, habe aber vergessen was es bedeutet » weiter mit Seite 7
- ich konnte mich nicht an das "trade-off"-Prinzip erinnern, aber jetzt ist mir wieder eingefallen was es bedeutet
- ich konnte mich nicht an das "trade-off"-Prinzip erinnern und auch jetzt weiß ich nicht mehr genau was es bedeutet » weiter mit Seite 7

Translation:**Page 5**

From your perspective, you did not apply a solution according to the "trade-off"-principle. Why not?

- I remembered the „trade-off“-principle while working on the case study, I know what it says, but I did not see any possibility to apply it in the frame of this case study. → forwarding to page 7
- I remembered the „trade-off“-principle while working on the case study, but I have forgotten what it means → forwarding to page 7
- I could not remember the „trade-off“-principle, but now it has come to my mind again.
- I could not remember the „trade-off“-principle and I still do not know any more what it means. → forwarding to page 7

Seite 6

Bitte entwickeln Sie eine weitere Lösung unter Anwendung des "trade-off"-Prinzips?

Hier noch einmal der Text: *

Die Fahrer-Diskussion

Die Eheleute Claire und Paul streiten über ihre Reise nach Venedig (Italien). Die beiden möchten am 9.5.2015 losfahren und schließen andere Transportmittel als ihr gemeinsames Auto aufgrund ihres Gepäcks und höherer Kosten aus. Beide setzen sich zusammen und beginnen mit der Planung. Wie bereits bei früheren Urlauben bekommen sich die beiden in die Haare. Jeder von beiden besteht darauf, das gemeinsame Auto zu fahren, aufgrund der Fahreigenschaften des jeweils anderen.

Eine direkte und somit schnellste Route, welche sowohl Claire als auch Paul eigentlich favorisieren, würde die beiden erst einmal einen Großteil der Strecke über die Autobahn bis zu den Alpen führen. Anschließend würden sie auf einigen kurvenreichen Passstraßen die Alpen überwinden um den restlichen Teil der Strecke dann wieder auf der Autobahn zurückzulegen. Beide versprechen sich auch diesmal wieder, dass sollte der andere nachgeben und auf das selber fahren verzichten, man natürlich auf ihn Rücksicht nehmen würde. Doch die Hin- und Rückfahrten in zahlreichen vorherigen Urlauben haben gezeigt, dass diese Versprechungen nie eingehalten wurden. Da keiner der beiden bereit ist zurückzustecken, machen beide nun ihrerseits alternative Vorschläge. Claire ist stets gestresst und gereizt wenn sie längere Zeit in einem Auto als Beifahrerin sitzen muss und nicht selber fahren darf. Im Gegensatz zu ihrem eigenen Fahrstil sind ihr die meisten Fahrer zu sehr darauf bedacht Geschwindigkeitsbegrenzungen einzuhalten und auf Sicherheit zu fahren. Paul achtet grundsätzlich nicht auf das Navigationssystem was häufig dazu führt, dass sie Umwege fahren müssen, weil er Autobahnausfahrten verpasst und somit die benötigte Zeit im Auto für die Fahrt noch verlängert wird. Wenn Claire dann versucht ihn unterwegs zu unterstützen, indem sie ihm den richtigen Weg sagt, fühlt sich Paul immer angegriffen und ist beleidigt, was Claires Stimmung nur noch weiter verschlechtert. Deshalb schlägt sie eine andere Route vor, die zwar einen größeren Umweg mit erheblichem Zeitaufwand darstellt, auf der sie als Fahrerin jedoch nur Autobahn zu fahren hätte. Paul wird immer schlecht wenn er auf kurvigen Straßen nicht selbst am Steuer sitzt, insbesondere wenn die fahrende Person zu schnellerem und kurvenschneidendem Fahrverhalten neigt. Paul schlägt deswegen eine Route vor, die nur einen kleineren Umweg darstellt, jedoch hauptsächlich über Land- und Passstraßen führt, was ihm ja aber als Fahrer nichts ausmachen würde. Beide schlagen ihre Lösung auch für die am 23.5.2015 geplante Heimreise vor.

Aus Ihrer Sicht - was sollten die beiden unter Anwendung des "trade-off"-Prinzips machen?

Translation:**Page 6**

Please develop an additional solution, according to the "trade-off"-principle?

In the following, you see the text of the case study again.

For a translation of the case see page 220 et seq. (first page of the online survey).

Seite 7

Unter den Teilnehmer/innen, die an beiden Studien teilgenommen haben, verlose ich amazon-Gutscheine (3x30€). Darf ich Ihre eMail-Adresse verwenden um Sie im Fall eines Gewinns zu kontaktieren?

ja

nein

Translation:**Page 7**

Amongst the participants that took part in both studies, I will raffle amazon-vouchers (3x30€). Am I allowed to use your email address for contacting you in case you win?

<input checked="" type="radio"/> Yes
<input type="radio"/> No

Study 2 – Online

No Education (Group 5)



Liebe/r Teilnehmer/in,

vielen Dank für Ihre Unterstützung im Rahmen meiner Promotion.

Bitte lesen Sie folgende kurze Fallstudie und schreiben Sie Ihre Lösungsempfehlung auf.
Im Anschluss folgen noch wenige Fragen für statistische Zwecke.
Die Teilnahme dauert nur ca. 7-10 min.

Mit den besten Grüßen aus München,

Christian Mayer
Kontakt: mayer_chris@gmx.de

Weiter

(Text ändern)

Translation:

Dear participant,

Thank you very much for your support concerning my dissertation.

Please read the following short case study and write down your recommended solution. Afterwards, a few questions for statistical purposes will follow.

Your participation will take a time consumption of about 7-10 min.

Best greetings from Munich.

Christian Mayer

Contact: mayer_chris@gmx.de

Continue

Die Fahrer-Diskussion

Die Eheleute Claire und Paul streiten über ihre Reise nach Venedig (Italien). Die beiden möchten am 9.5.2015 losfahren und schließen andere Transportmittel als ihr gemeinsames Auto aufgrund ihres Gepäcks und höherer Kosten aus. Beide setzen sich zusammen und beginnen mit der Planung. Wie bereits bei früheren Urlauben bekommen sich die beiden in die Haare. Jeder von beiden besteht darauf, das gemeinsame Auto zu fahren, aufgrund der Fahreigenschaften des jeweils anderen.

Eine direkte und somit schnellste Route, welche sowohl Claire als auch Paul eigentlich favorisieren, würde die beiden erst einmal einen Großteil der Strecke über die Autobahn bis zu den Alpen führen. Anschließend würden sie auf einigen kurvenreichen Passstraßen die Alpen überwinden um den restlichen Teil der Strecke dann wieder auf der Autobahn zurückzulegen. Beide versprechen sich auch diesmal wieder, dass sollte der andere nachgeben und auf das selber fahren verzichten, man natürlich auf ihn Rücksicht nehmen würde. Doch die Hin- und Rückfahrten in zahlreichen vorherigen Urlauben haben gezeigt, dass diese Versprechungen nie eingehalten wurden. Da keiner der beiden bereit ist zurückzustecken, machen beide nun ihrerseits alternative Vorschläge. Claire ist stets gestresst und gereizt wenn sie längere Zeit in einem Auto als Beifahrerin sitzen muss und nicht selber fahren darf. Im Gegensatz zu ihrem eigenen Fahrstil sind ihr die meisten Fahrer zu sehr darauf bedacht Geschwindigkeitsbegrenzungen einzuhalten und auf Sicherheit zu fahren. Paul achtet grundsätzlich nicht auf das Navigationssystem was häufig dazu führt, dass sie Umwege fahren müssen, weil er Autobahnausfahrten verpasst und somit die benötigte Zeit im Auto für die Fahrt noch verlängert wird. Wenn Claire dann versucht ihn unterwegs zu unterstützen, indem sie ihm den richtigen Weg sagt, fühlt sich Paul immer angegriffen und ist beleidigt, was Claires Stimmung nur noch weiter verschlechtert. Deshalb schlägt sie eine andere Route vor, die zwar einen größeren Umweg mit erheblichem Zeitaufwand darstellt, auf der sie als FahrerIn jedoch nur Autobahn zu fahren hätte. Paul wird immer schlecht wenn er auf kurvigen Straßen nicht selbst am Steuer sitzt, insbesondere wenn die fahrende Person zu schnellem und kurvenschneidendem Fahrverhalten neigt. Paul schlägt deswegen eine Route vor, die nur einen kleineren Umweg darstellt, jedoch hauptsächlich über Land- und Passstraßen führt, was ihm ja aber als Fahrer nichts ausmachen würde. Beide schlagen ihre Lösung auch für die am 23.5.2015 geplante Heimreise vor.

Aus Ihrer Sicht - was sollten die beiden am besten tun? Bitte machen Sie einen konkreten Lösungsvorschlag für Claires und Pauls Problem. Wenn es Ihrer Meinung nach keine Lösung gibt, schreiben Sie bitte „gibt keine Lösung“ in das Antwortfeld. *

Weiter

(Text ändern)

Translation:

The driver-problem

The married couple Claire and Paul have an argument about their planned trip to Venice (Italy). They would like to start their vacation on 05/09/2015 and both exclude other means of transport than driving their own car due to their baggage and higher costs. So both meet up and start planning. Like with various vacations before, they strongly disagree in one point. Both insist on driving the common car due to the driving characteristics of each other.

A direct and therefore fastest route, which in fact would be preferred by Claire as well as by Paul, would lead them at first and most part of the route on the highway

to the Alps. In the following, they would have to take some curvy mountain passes to overcome the Alps in order to take the highway again for the rest of the route. Like previously, both promise each other that if the other person relinquished the claim to drive himself, the driver would of course be considerate of the other. But several vacations dating back have shown, that promises have never been kept. Due to the fact that neither of them is up to give in, both submit alternative proposals. Claire is always stressed and angered when she has to sit for a longer time in a car not driving by herself. In contrast to her own driving style, in her opinion most drivers are too concerned not to exceed tempo limits and are too aware of safety. Paul basically ignores the navigation system, what frequently leads to detours because he misses highway departures and so the needed time in the car is extended. If Claire tries to support him by telling the right way, Paul always feels offended, what contributes to deteriorating Claire's mood even more. Because of that, she proposes another route, which is indeed connected with a bigger detour and a considerable expenditure of time, but on which she only had to drive highway routes. Paul always feels sick when he doesn't drive himself on curvy roads, especially if the driving person tends to a speedy and corner cutting driving style. For this reason, Paul proposes a route, which would only be a smaller detour, but mainly on country roads and mountain passes, which he wouldn't care about when driving himself. Both present their solution also for the way back on 05/23/2015.

From your point of view – what should they do best? Please make a specific proposal for solving Claire's and Paul's problem. If you think there is no solution, please note "no solution exists" into the blank.

Continue

Haben Sie schon einmal eine bzw. mehrere Schulungen im Bereich der Verhandlungsführung besucht in der/denen Ihnen auch theoretische Grundlagen vermittelt wurden?

 ja nein

Welches Geschlecht haben Sie?

 männlich weiblich

Wie alt sind Sie?

In welchem Studiengang befinden Sie sich?

Was ist der angestrebte Abschluss dieses Studiengangs (z.B. Bachelor of Arts, Master of Business Administration)?

Haben Sie eine Ausbildung/Lehre gemacht, bevor Sie begonnen haben, zu studieren?

 ja nein

Wenn Sie vorher eine Ausbildung/Lehre gemacht haben, welchen Abschluss haben Sie erhalten (z.B. Versicherungskaufmann/-frau, Einzelhandelskaufmann/-frau)

Fertig

(Text ändern)

Translation:

Did you ever take part in one or more training course(s) concerning negotiation techniques in which you have also learned theoretical basic concepts?

 Yes No

Sex

<input checked="" type="radio"/> Male
<input type="radio"/> Female

How old are you?**Which course of study do you follow?****Which is your aspired degree of this study course?****Did you make an apprenticeship before you began studying?**

<input checked="" type="radio"/> Yes
<input type="radio"/> No

If you made an apprenticeship, which completion did you get? (e.g. insurance salesman/woman, retailer)

Finish