COGNITIVE ASPECTS OF LEGAL CASE REPRESENTATION WITH NARRATIVES AND GRAPHICS

A Thesis

by

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Spring 2014

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DEDICATION

To my family, teachers, and friends.
ACKNOWLEDGEMENTS

This project gave me an opportunity to experiment with my research flexibility. That was a journey. And I would like to say thank you to those who accompanied me on this journey.

I would like to express my gratitude to Dr. Neil Schwartz. When it was “storming,” I knew I could count on your encouragement and advice, and most important of all – being available to listen to me when i needed it the most. I would also like to thank Prof. Dr. Wolfgang Schnotz, who has always been a great inspiration for me, and who shared his wisdom on life and science. I am also very thankful to Dr. Erica de Vries, who taught to pay attention to important details.

Finally, I will always be grateful to many more other people: thank you, the first cohort: Martin, Simone, David, Laura, Sandra, Isa, Marcela. I would also like to say special thank you to David Philhour, Marie Lippmann, David Sarmento, and Cameron Clifford. And, of course, very very very special thanks goes to Anna Bartel, Diane Miller, and Allison Zimmerman, - guys, you were amazing, and your help was invaluable! Thank you, the department of Psychology and CSUC.
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This investigation was designed to explore the effects of verbal narratives (chronological vs. conceptual), graphics (conceptual vs. chronological vs. none) and their interaction on information processing – comprehension, perspective, and judgment—of jury members in a litigation law setting with regard to a complex legal case. Two hundred and two undergraduate participants from a midsized western university took part in this study—147 females and 49 males with a mean age 22.56 (SD=5.80). Participants were learned about a legal case based on clues for case comprehension provided by the narratives and graphics in six experimental condition, where information was structurally organized either around concepts (conceptual type) or events (chronological type), with or without a visualization. Measurements of information processing consisted of three questionnaires—one measuring general case understanding, including short-answer
essays, the second measuring perceptions and attitudes towards the case, and the third collecting information about demographics. Results revealed no significant influence on pairing narratives and graphics together, relative to conceptual or chronological structure, on comprehension of a case across all conditions. Yet, findings indicated significant variations in the type of opinions and elaborations participants used across their essays to express understanding of the legal case they were presented, as well as in judgments of guilt and blame. For example, participants remembered significantly more from the narrative as paraphrases and were most expressive in their opinions, without having a particular perspective. Results also failed to indicate any significant differential influence of the narrative type and graphic type on participants’ assignment of guilt and blame toward the plaintiff and defendant. Participants assigned significantly more blame to the Defendant than to the Plaintiff. And yet, the less participants understood the case, the more likely they were to find the Plaintiff guilty.
CHAPTER I

INTRODUCTION TO THE STUDY

Introduction

This study was designed to investigate how verbal narratives, graphics, and their interaction affect information processing—comprehension, perspective, and judgment—of jury members in a litigation law setting. Specifically, I was interested in whether a higher level of case memory and case comprehension would be achieved if a case narrative were accompanied by a graphic. I was also interested in whether the structure of the narrative and the structure of the graphic would have a differential influence on the jury members’ information processing if the narrative and graphic were structurally of the same type.

Within a forensic system, a litigation case is usually delivered to a judge and a jury. In a very short period of time, a group of selected people has to decide not only how to reason with elements of the case, but how to make a decision that would respond to the ethical and moral sides of jurisprudence and what it represents – justice. Servants of justice look for an answer on the following questions: what happened, what are the circumstances, what is the harm, and who is guilty.

As the legal case evolves from a collision between two parties, and contains a complicated combination of facts, participants, and events, attorneys struggle to find a clear explanation for the jury members on how these issues are interrelated.
Hence, defining important elements of a case is essential, so that the elements can serve to guide the thinking of the jury, and support the arguments of the attorneys.

Therefore, it is not surprising that attorneys are so persistent in their search of case presentation tools that have a reliable predictability for a jury’s verdict. In the last few years, there has been increasing interest in the use of visualizations as one of these tools (Feigenson, 2010a). And yet, in terms of presenting information to a jury via visualizations, little is known about the cognitive aspects of information processing for the purposes of adequate case comprehension and the ultimate jury decisions that are made on the basis of this comprehension when visualizations are used.

Although there are studies that attempt to explain what might be operating on a jury’s verdict as an outcome of the litigation process, there is still a lack of consistent and directive work in the litigation law domain. The focus of attention is either on the social side of the interaction between attorneys and jury members or on the legal persuasive strategies used by attorneys. Few studies have looked at the cognitive approaches that facilitate the decision making process of the jury members. Consequently, the present investigation was designed to explore the effects of case materials organized according to pertinent visualization research, the nature of the way a case narrative is presented by an attorney, and major principles of cognition in the way jurors make meaning of a case.

Pairing a text and visualization is not a novel idea, and the saying “a picture is worth a thousand words” is a well documented and a reliable concept (Larkin, & Simon, 1987; Mayer, & Gallini, 1990). Unfortunately, most applications of the utility of visualizations have been done in school settings. Students are tested on their
comprehension of textbooks containing illustrations, but with little regard for the presence of the illustrations on the learning process.

Mass production of textbooks has often lacked scientific input on how many illustrations to include in a textbook, and the general design of textbooks has usually been excluded from the area of educational research as well as issues of the functional purposes of different types of illustrations included in these textbooks (Woodward, 1993). Thus, the shortcomings of integrating cognitive theory into the domain of textbook-illustration applications demonstrates the existing gap between theoretical and practical approaches to the matter of learning and instruction.

Shortcomings of an understanding of how and why visualizations and text should be paired is not only restricted to the educational domain. These shortcomings are also replete in settings other than schools. Currently, there is little understanding of the way visualizations can and should be used in litigation law.

In recent years, the use of visualizations in courtrooms has increased. Although the use of courtroom visualizations is not new to the practice of law (Leighton, 1990; Feigenson, 2010a,b), the reasons why visualizations work, or fail to work, is not well understood. In the courtroom, visualizations typically take the form of demonstrative evidence—computer simulations, animations, photographs, artifacts, etc. (Sainato, 2009; Nemeth, 2011). The problem is that the visual features of demonstrative evidence are extremely heterogeneous, with the effectiveness of each type possessing different influential weight, technological complexity, and different levels of impact depending upon the place they are introduced in the legal process.
On the other hand, while the types of visualizations as demonstrative evidence are not uniform, most litigators think of and understand visualizations homogeneously only as instruments of persuasion in a case of deliberation (Kantor, 1998; Solomon, 2002; Morse, 2009).

Still, there are a number of empirical studies where the efficacy of visualizations has been investigated in the context of courtroom use—for example, animations (Schofield, 2009; Morell, 1998), computer simulations (Schofield, 2009), graphics (Denenberg, & Learned, 1994), video (Hahn, & Clayton, 1996; Kassin, & Garfield, 1991), photographs (Douglas, Lyon, & Ogloff, 1997), and other images (Tait, 2007; Golan, 2008).

For the most part, these investigations were conducted in relation to their impact on verdict and decision making processes (Nemeth, 2011), as well as whether there were definitive persuasive effects following their use (Dunn, Salovey, & Feigenson, 2006).

The process of learning and decision-making about a legal case for a jury, with visualizations, has been examined across a number of conditions. These conditions have been primarily focused on: 1) pre-trial procedures of instructions for jurors (Brewer, Harvey, & Semmler, 2004); 2) different types of trials (i.e. criminal law, civil law) (Bennett, Leibman, & Fetter, 1999; Feigenson, Park, & Salovey, 1997; Feigenson, 2010b), 3) whether juries were mock (Dunn, Salovey, & Feigenson, 2006) or real (Schweitzer, Saks, Murphy, Roskies, Sinnott-Armstrong, & Gaudet, 2011), and finally, 4) whether age was instrumental in the decisions (Higgins, Heath, & Grannemann, 2007).
In the case of pre-trial procedures of instruction, Brewer, Harvey and Semmler (2004) demonstrated the beneficial effect of multimedia animations on jurors’ of the legal concepts described in pre-trial instructions. Across a number of different types of trials, Bennett et al. (1999) discovered that when jurors were presented with visualizations in the format of a graphic, the jurors were more likely to rely on this type of evidence as accurate and worthy of consideration, whereas Feigenson (2010b) found that visualizations give jurors a profound level of stress.

Regarding mock versus real juries, photographs were used to present evidence on a case when the juries were mock (Douglas et al., 1997). Photographs were in color or black and white depicting the victim of a murder, and the control group with was given no photographic evidence at all. Results demonstrated an increased assignment of guilt when groups viewed the photographs, either in color and black and white, relative to no graphic at all.

Finally, with regard to age, Higgins, Heath, and Grannemann (2007) found that age influenced the way jurors made decisions on the presented evidence presented in a case, altering the jurors’ final verdicts.

In the aggregate, these studies affirm that visualization tools have a much larger influence than just the additional support of verbal arguments. Furthermore, representing arguments and evidence with visualizations helps a jury, on the one hand, to see a bigger picture on the case without losing important details, and on the other hand, understand the centrality of those details as crucial points of the attorney’s full case argument. Next, visualizations function to gather the legal case story that let jurors assess it on a surface level or more attentively if visualizations contain something contradictory
to the jury’s values about the case (Fiedler, 2003). Thus, visualizations serve, to some extent, as a visual description of the case without additional verbal explanation. Finally, while attorneys use visualizations as an instrument of persuasion, visualizations also make evidence and arguments comprehensible and memorable.

And yet, while a number of investigations have manipulated features of visualization in the context of litigation law, it is unknown if there is an influence of the structure of visualizations and the structure of the narratives that accompany those visualizations on people’s comprehension, perspective, memory, as well as their judgments of guilt and blame. Therefore, in the current investigation, we undertook the opportunity to explore this research question.

Structures of Visualizations

Structures of visualizations, in the current investigation, refer to the way information in a graphic is arranged visually, where each graphical item corresponds to an overall meaning of the visualization. In this respect, we are primarily following Cohn’s defining principles (Cohn, 2013) of visual structure that Cohn formulated when talking about principles of visual image decoding. Hence, Cohn (2013) provides a definition for visualization structure, identifying two levels that contribute to a structural format: first, a graphic structure consisting of lines and shapes that underline individuals’ “recognition of drawn objects in perceptually salient ways”, and as having a distinguishable “navigational component that tells us where to start the sequence and how to progress through it” (p. 414); and second, a conceptual structure where meaning is
constructed by “connecting graph marks to conceptual structures that encode meaning in (working and long-term) memory” (p. 414).

In addition to the graphic and conceptual structures, Cohn suggests several other important components that contribute to the construction of generic visual structure—for example, spatial structure, where abstract higher-order ideas overlap with the design of a graphic.

The question of considering the structure of visualizations requires an examination of the integration processes of external representations that result in a mental model—not only in terms of the design of a graphic, but for the purposes of affecting memory.

As an abstract product of a visual input, a mental model is processed in working memory. (Liu, & Stasko, 2010). According to Mayer (2009), structural components are better understood when seen visually displayed as a graphic. These components are also better digested when visual and verbal parts are presented together at the same time.

To explain this integration, the principles of text-graphic integration is proposed by the multimedia theory of learning (Mayer, 2009) and explained by the integrated theory of text-picture comprehension of Schnotz (c.f. Schnotz, 2002; Schnotz, & Bannert, 2003). Mayer (2009) suggests that verbal and visual items are integrated with prior knowledge, resulting in a mental representation. In Schnotz’ (2002) text-graphic integration model, Schnotz (2002) and Schnotz and Bannert (2003) note that the linkages between the external representation of the visualization, are analogous to the representation of a mental model. Furthermore, Schnotz (2002) extended his research of
the integration of visual and verbal items with prior knowledge—the combination of which yielded a more cohesive model than that described from the multimedia theory of cognitive learning by Mayer (2009). Schnotz not only addressed the question of the integration of images with verbal representations, but also attributed the external structure of a representation to the mental model that is constructed on the basis of the representation. Therefore, further exploration of the interactive nature of mental internal mapping processes to external representations is important to explore in regards to the role of the process in learning from external representations.

In the current investigation, we pay particular attention to the mental scaffolding activated by a visual representation, since it drives our research question of whether the structural arrangement of visualizations about a legal case, as well as the narrative organization of a case story, would have an observable impact on parameters of learning about the legal case. Specifically, we considered the impact on active processing of case information, as well as the ease of processing this information, by virtue of “external anchoring” (Liu, & Stasko, 2010) in the form of salient structural elements embedded into the organization principles applied to the legal narrative and the graphic.

Relative to external anchoring, Liu and Stasko (2010) investigated the subject of the top-down mechanisms of meaning making via mental model construction, attempting to disentangle the concept of a mental model from mental imagery when visualizations are used. They concluded that the two concepts are quite different, noting a distinguishable difference between what they refer to as a mental model—a form of higher order spatial representation—as opposed to what is referred to as “mental imagery.”
In the current investigation, we ascribe to the characteristics of a mental model—a model that is represented in mind in a format of spatially organized knowledge construction. This is an important determination for the purposes of this investigation, since we are exploring a structural construct of visualizations and narrative in terms of experimentally designed methods to organize the structure for testing hypotheses.

In this regard, another important feature of a mental model is the capacity of the mental model to function during learning and performance. (Liu, & Stasko, 2010, p. 2). Thus, it is important to emphasize that a mental model has the function to carry characteristics of an external representation, such as schema and meaning. With these visuospatial characteristics of information arrangement, external representations enable the anchoring of important-to-remember information, reducing cognitive effort to process all components of the model in a restricted-capacity short-term memory (p. 2). The notion of external anchoring is determined in terms of ascribing meaning to visual items such as text labels, shapes, and their spatial layout.

Having this in mind, the current investigation aims to explore the impact of the structural organization of visualization on memory and comprehension via mental model construction. In regards to comprehension, the meaning of an external visual representation is interdependent with its structure and leads attention toward sense-making (Cohn, Paczynski, Jackendoff, Holcomb, Kuperberge, 2012). Therefore, visualizations can either function as a structure for assembling information accordingly or help to map the mental representation of information to the structure presented visually (Mayer, & Gallini, 1990; Schnottz, & Bannert, 2003; Schnottz 2002; Schnottz, & Kürschner, 2008; Hegarty, 2011).
With this in mind, we can conclude that, in order to understand a visualization and its structural effectiveness, we need to understand what the mechanisms are that comprise the process of perception of a graphic. The process of perception of a graphic produces comprehension of its display and the meaning behind it. The process of comprehension of a graphic deals with the understanding of its surface characteristics and the formation of the representation it conveys. On the other hand, Kintsh (1988) suggested a construction-integration model for discourse and text comprehension that provides the basis for understanding graph comprehension. Thus, graph comprehension results in a mental representation that is influenced by its features. However, from the perspective of the construction-integration model, the mental representation a reader constructs of text relies on text features and the reader's prior knowledge, both of which undergo phases of construction that result in a cohesive representation. Thus, the importance of prior knowledge and graph schemata are precursors of graphic comprehension (Pinker, 1990). Hence, cognitive mechanisms of graphic comprehension and perception rely on the display features of a graphic because the graphic interacts with interpretations that can be made from the visual characteristics (Freedman, & Shah, 2002; Shah, & Freedman, 2011) that essentially comprise its structure.

In a number of studies, visualizations and their format, both of which essentially comprise a visualization’s structure, have been manipulated to show what criteria can be applied to a graphic or a picture to conclude that it is effective. Schnotz and Bannert (2003) concluded that any graphic design process should follow principles that allow a viewer to construct “a task-appropriate mental modal” (p. 154).
In related research, work with diagrams has suggested that the efficiency of diagrams, as a specific kind of external representation, should be understood as a concentration of the most “relevant” information (Larkin, & Simon, 1987; Ainsworth, 2006).

Other criteria suggested to be influential are the effects emergent from combining diagrams with auditorially-narrated text. When diagrams are combined with auditory text, learning is enhanced (Mayer, 2009; Mousavi, Lowe, & Sweller, 1995). Other studies note consistency between graphics and text that should be considered as beneficial for a viewer’s understanding of relevant information. The consistency has been highlighted as one of prerequisites of graph comprehension when a graph is used for instructions (Shah, & Hoeffner, 2002). In short, the power of a graph to serve comprehension purposes can be understood by its effectiveness.

Hegarty draws from a full body of research on the topic of a visual display’s effectiveness, resulting in an interesting list of principles discovered to underlie the effective visualization. Among many components that comprise a graphic’s effectiveness, Hegarty (2011) refers to the work of Tversky (p. 469) and agrees that most important of all is the component of natural arrangement and format to deliver the communicative message via the visual display. The general recommendation is to include as many “natural mappings” in visual displays as possible with the hope that some of these mappings will be recognized and conform to the advantage of the chosen graph format. Indeed, Kosslyn’s work (as cited in Hegarty, 2011, p. 467) illustrates that there are two semi-generalized principles of natural mappings that are important to consider: principles of compatibility and usability.
Essentially, the principle of compatibility refers to the ultimate fit between the form of the graphic and the meaning it conveys. The principle of usability tells us of the importance of a learner-centered visual display organization that is compatible with a learner’s prior knowledge and experiences, both of which provide the baseline for meaning and information extraction from the graphic. Specifically, Hegarty (2011) focuses on an external mapping function of graphics and diagrams. That is, the salient points of organization as anchors should be present in a graphic for it to become cues for mental mapping onto it. Hegarty and her colleagues refer to this attribute of visual cues as a signaling technique that guides attention and focuses a viewer's attention onto relevant parts (Shah, Mayer, Hegarty, 1999). In this regard, Palmer (1977) suggests a selective building process for perceived representation of a graphic, in a hierarchical manner with attention to the organization of parts of it. Finally, Denis and Kosslyn (1999) demonstrate findings of a perceptual and representational match in structural models, where a mental structure for a visual representation is adopted to construct an image of it.

Overall, these cases support the view that structure in graphics deals with two dimensionally different operational properties: actual display and message delivery. Or as Kosslyn (1973) names it: a “functionalist” and “structuralist” orientation.

We adopt the idea of the influential nature of the structural organization in visualizations and further suggest looking at structural organization from the perspective of effectiveness to facilitate integration of novel and complex information about a legal case into a mental model of jurors. Therefore, salient features of the visual structure presented in the form of the diagrams designed for this investigation would provide an
access to key information that jurors can use as clues to guide their attention on the importance of this information.

Proponents of the claim that graphics eliminate barriers of miscommunication put forward a graphic function to enhance a viewer’s memory of the message. However, other studies show that although visual presence of information can strengthen a visualization’s encoding and comprehension, nevertheless, it is not always a case.

Mayer (2001), from a multimedia theory perspective, cautions that using graphics in instruction may increase learning outcomes for one group, but may cause another group of learners to lose benefits of effective learning (i.e. novices often have an advantage from graph presence as opposed to experienced/expert learners). Freedman and Shah (2002) point out that all the cases when graphics were not considered effective dealt with prior knowledge and graph knowledge. Drawbacks of comprehension that result in ineffectiveness of a visualization often stem from the flaws found in a design, the level of difficulty of information presented in the graphic, as well as in graphical literacy of viewers—an ability to “read” the graphic (Pinker, 1990). Pinker (1990) names this ability a “graph schemata”—the ability that mediates the translation between the graphical display and the construction of its conceptual meaning.

Diagrams, in relation to a salience of its elements, have been mostly researched by Hegarty (2011). However, no one has yet attempted to look at the frame outline of a diagram relative to the structure of information organized with symbols, icons, and text labels presenting a higher order idea of meaning, which is being reconstructed from all the parts of the visualization. And yet, if we consider a diagram as a meaning summary, Leopold, Sumfleth, and Leutner (2013), in an experiment on the
impact of the scientific text summaries, discovered that when participants were given visual summaries of a scientific text, the visualizations led to a deeper level of comprehension, and the visual summary facilitated the process of learning and understanding of the scientific content. In terms of the higher order idea as a salient structural element of a visualization, in the present investigation concepts were included to correspond to the familiar categories known to jurors from their prior experiences, and therewith, relate to the mental model activation. This reasoning is similarly represented by Smith (1991) in what he calls “prototypes,” when jury members were influenced in their verdict choices by the categories they assigned to crimes from their prior legal knowledge. Also, in regards to a conceptual consideration, researchers argue for the simplification of legal concepts to somehow appeal to prior knowledge and experiences of jury members in order to be better understood by them. For example, Brewer, Harvey and Semmler (2004) found that when complicated legal concepts were presented visually in a simplistic way, jurors were clearer on the case and found it easier to make decisions from the information. Miles and Cottle (2011) as well suggest taking to a learner-centered approach for instructing a jury in plain English and consider an expert/non-expert relationship in the processes of instructing a jury before trial about the legal system`s procedure. A plain English approach demonstrated a much needed level of simplicity for the jurors. This simplicity can be very beneficial for the formation of concepts cognitively (Feldman, 2003). Therewith, we integrated concepts that deliver the main idea about a legal case into the experimental design of visualizations and narratives in the current investigation.
To summarize this section, literature demonstrates a variety of questions that were asked in regards to the effectiveness with which diagrams can be assembled, according to the topics as follows: (1) design elements that attract and guide attention of a reader/viewer; (external anchoring) (2) attentional power of these elements that can be ascribed to their prominence (natural mapping); and, (3) impact of the visualization on comprehension and learning (information relevance and salience).

Having defined what is meant by visualizations in our study, discussing the central conceptual issues relating to the structure of visualization, let us now consider the structural frame of the narrative.

**Structures of Narratives**

In essence, a narrative consists of a series of linked episodes that enable the flow of ideas and comprise an overall story message. This flow of ideas in narrative organization is referred to as “coherence,” and it directly predicts the level of comprehension (McNamara, Louwerse, & Graesser, 2002).

In litigation, a narrative is the primary form of articulating information; therefore, legal narratives have been in the focus of attention of researchers as well (see Sileno, Boer, & van Engers, 2012).

Previous studies on narratives in litigation law have demonstrated that the story content an attorney presents to a judge or a jury correlates closely with the case hearing outcome (Johnson, Wahlbeck, & Spriggs, 2006). The verdict, for example guilty vs. not guilty, has been found to be in interdependent with the degree of cognitive coherence of the case (Simon, 2004).
In the work of Sileno et al. (2012) and Johnson et al. (2006), the internal consistency of the narration was manipulated. However, there is no information on other features of the case story content that was investigated under conditions of case litigation. Thus, the following characteristics of the legal narrative, as structure and elements that signify salient frame of the structure, should be explored to evaluate its impact on the overall process of learning about a case.

Therefore, the verbal form of the arguments—which in effect is the case narrative—becomes another instrument affecting the case outcome. An attorney’s argument is a narration of the case, delivered in a legal setting. How well the attorney builds his or her case may have distinct consequences as to whether the jury will consider the attorney’s side of a story credible and will produce a verdict commensurate with the characteristics of the arguments (Johnson, Wahlbeck, & Spriggs, 2006). Structure, therefore, becomes a crucial element of comprehension of a legal case, as it conveys principles of knowledge organization that guides understanding.

Events comprise the body of arguments an attorney provides a jury, with the slant of the information of what happened given from the perspective of the attorney’s client. Therefore, the attorney’s argumentation is rhetorically built to pinpoint major aspects of the violation of the client’s rights as well as other important issues that call for justice and influence the jury’s verdict.

The structure of the narratives in the current investigation refers to the way information is meaningfully organized. Here we again refer to Cohn (2013), but this time refer to his theory of narrative grammar in which narrative presentation structure is said to be different from narrative meaning structure. In particular, Cohn’s separation between
presentation and meaning structure is similar to the visual structure we described earlier. This separation allows conveying the same meaning in different surface presentations. Meaning, therefore, can be conveyed from the narrative as a whole and its parts that comprise the whole. In the meaningful organization of the narrative structure we strive for in the current investigation, parts of the narrative contain meaningful segments, segregated with higher-level topics, like titles and concepts that induce references to arranged information, towards giving details of events and facts.

It is equally important to keep in mind that a structure can further give guidelines around its elements. Therefore, remembered elements help to understand the general construct and attributive details in relation to the elements. Hence, if we consider remembering elements as a task, the principle of structural organization defines better performance results (Sorensen, & Stanton, 2013).

In application to a legal setting, better performance can mean better decision-making. In legal settings, arguments presented verbally define the focus of attention in the context of a courtroom for one of the case participating opponents. Based on this, arguments contain claims and provide evidence to prove these claims and demonstrate intentions. Processing arguments and making sense of them requires recognizing key elements in the arguments.

Despite the elements and details that need to be considered, main ideas about the case narrative need to be considered as well. According to Meyer (1987) main ideas are at the top level of the content hierarchy of a text and are remembered better then details. Both the details and the main ideas are explained relative to the content structure of the text.
Meyer and her colleagues (Meyer, Brandt, & Bluth, 1980) conducted an experiment attempting to explain the effect on recall and comprehension when a text was organized with established characteristics of importance for remembering relative to structure of the texts, arranged either as problem-solution or comparison. The findings revealed that attending to the structure helped learners remember the text.

Larson and Larson (2004) also investigated the comprehension of long texts containing arguments, but without manipulations of structure. The results demonstrated that, as long as the learners had the capacity to detect key elements from the arguments, the better learners performed on text recall. In short, when key elements were explicitly defined and properly signaled recall performance was improved.

In other example of key element signaling, Chambliss (1995) provided findings for structural cueing on comprehension and guidance of that comprehension. Eighty 12th grade students read a text of arguments organized differently in terms of content and textual cues relative to the structure of an argument. Additionally, text content varied according to familiarity, and students were measured via a “think-aloud protocol comprehension task” (Chambliss, 1995). Results revealed that the structure of the text and “signaling”, especially in the introduction and conclusion of the text, had a positive impact on the students’ answers, and hence text recall. Chambliss (1995) identified the functions of structural text cues that influenced learning, namely: 1) argument structure recognition in a long text; 2) determining claim and evidence; and, 3) formulating an essential idea or concentrated summary from the presented information.

Structure of the narrative has also been investigated by Thorndyke (1977). Thorndyke showed an impact of text content structure on memory, in a study where
participants were asked to recall presented story passages. Thorndyke’s findings revealed that participants remembered high-level structural elements of the content that were, essentially, conceptualized features of the story, rather than low-level story details. Thorndyke (1977) also demonstrated that both memory and comprehension depended on the story plot and text structure, not on the overall content. In short, participants remembered more facts if the facts were central to the structure of the story—in other words, when participants gave summaries about the story they referred to the general attributes of the structure—elements of organization: ideas, themes, and not to precise details (Thorndyke, 1977).

Thus, we find strong support for choosing to use signified generic elements of structural narrative organization that follow the cognitive aspects of learners during processing. These aspects include: (a) the effects of structural organization of content in the narrative as a task for a jury, and on jury performance; (b) the effects of the narrative elements that define the structure and its abstractness; and (c) the effects of information organization around these elements of narrative structure.

The Way Jurors Cognitively Process a Case

The role of structure in legal narratives has not yet been investigated to shed light on the impact of narrative structure on a jury’s comprehension and memory of a case. Thus, in the present investigation, jurors’ understanding of, and predictions from, a case outcome within a legal setting was of interest. However, there are many known simulation models that explore processes of judgments and decision-making among jurors. Although, these models have originated from variety of sciences (e.g. social
science, computer science, law, and education), predictions of jurors’ verdict judgments have been made on the basis of courtroom processes and goals, rather then on the mind of a juror. Specifically:

- Mathematical models mainly calculate the predictions out of statistical probability on the basis of prior estimates of “defendants' "convictability" and juror accuracy”; (Penrod, & Hastie, 1979).
- Sociological models use the logic of rational choices of participants, norms of social situations, and the organizational powers of these situations.
- Psychological models demonstrate an affective side of legal case process and often deal with irrational choices of participants in a courtroom. (Penrod & Hastie, 1979).

All these types of decision-making models demonstrate interest in approaching behavior and the mind of a jury, but only one model—the story model—explains the principles crucial to a construction of knowledge about a legal case in the minds of the jurors.

The Storytelling Model

Proposed by Bennett in 1978 and 1979 (as cited in Pennington, & Hastie, 1981), the model is a fundamental tool in the cognitive framing of information. Therefore, a story is a method of information organization, and the functional properties of such organization help jurors interpret a case. Considering verdict judgments from a storytelling model contributes to existing knowledge about cognitive processes of jury members by approaching the process of their thinking as a process of story construction. Juries have to construct a cohesive narrative out of all the elements that comprise a legal case, which is essentially a summary of conclusions and inferences extracted across
multiple forms of information representations, in a form of disorganized evidence, exhibits, and the arguments of both sides of a case: the Plaintiff and the Defendant.

In the end, the “ideal” jury member, to whom most of the researchers appeal when describing this model, must dissect a case into key components. Those key components will then be merged and arranged to form a cohesive story. Therewith, information that was given as the content of the case function to regulate the jury’s decision to form a verdict. Based on this model, we may conclude that jurors are dependent in their thinking and judgments on three important parts of a case presentation: (1) what is being told (2) how it is being told, and (3) what is being seen. Hence, jurors draw conclusions from all the presented explanations, as well as the evidence.

Bennett (as cited in Pennington, & Hasti, 1981, p. 277), explains that the method of story construction in jurors is accomplished through a mental procedure, where first, items of various degrees of importance to the story are identified; next, the items provide a background for how the story elements are interrelated around a core of participant actions; then, the jurors interpret the events around the message of the story, and determine the importance of the conclusion they draw. The conclusion is made relative to the juror’s prior knowledge. Lastly, jurors then decide on the interrelatedness of the story parts to form an acceptable and uniform whole.

Pennington and Hasti (1988) added to this model by explaining that the story has the power to influence a juror’s cognitive processing. In particular, the researchers developed a cognitive story model that advocates for a story construction strategy that is prompted from inferences, functioning to make the case easy to understand. However, as Bennett was focusing on the perceptual side of making sense through inferences in a case
story that leads to judgments performed on a basis of interpretation, Pennington and Hasti (1991) suggested that the story model puts cognitive activities in the center of the story construction process.

This process, according to Pennington and Hasti (1991), prioritizes cognitive activities over perceptual sense making, suggesting that the process occurs in phases. According to Hastie, Penrod, and Pennington, (2013), the phases are: 1) story construction, where a jury member makes sense of “what happened” resulting in an “abstract episode schema” with structural organization derived from cause-effect relationships; 2) verdict category establishment, where each possible decision regarding the story forms a class of substitute decisions with distinct features; and, 3) story classification, where jurors search cognitively for the best fit between decision classes and story properties. Finally, legal instructions that are given to jurors in regards to the law lead the jurors to reconstruct the story again for the final verdict (Hastie, Penrod, & Pennington, 2013).

Although Pennington and Hasti criticized Bennett’s earlier version of the story model claiming it lacked precision in describing the cognitive mechanisms of juror’s decision, they acknowledged the importance of linking jurors’ attention to connections between episodes in the case story that further led to decisions on guilt assignment.

Mental Constructs in Relation to the Structure of Visualizations and Structure of the Case Narrative

Although the story model gives a good approach for dealing cognitively with legal case complexity and what elements the case contains, there is still a gap that exists in the current research as to how a juror decides on the selection of items and prioritizes
those items when constructing and reasoning with the case story information. It is equally unclear as to how, after a juror incorporates these items, the juror goes about making a decision on what kind of story was told to them (Smith, 1991).

Cognitive mechanisms in the work of jurors relies on the complex task of selecting, interpreting, and evaluating information in regards to presented facts, understanding evidence, remembering key points, and then deciding on a case verdict in compliance with the courtroom procedure which requires following instructions given by a judge (English, & Sales, 1997; Hastie, & Pennington, 1991). To this end, Brunell, Dave and Morgan (2009) conducted a study to examine causes that elongated the times of case deliberations on a data obtained from a real jury. The findings revealed several important variables that have an impact on the jury. Level of case complexity was among those variables. Surprisingly, while the experience of being a juror did not influence case deliberation time, the level of case complexity did. Thus, the more complex a legal case was for a juror, the longer it took him/her to make a decision of right and wrong, and the longer it took the juror to provide a verdict.

It is also the case that multiple charges play a role in elongating case deliberation times, as well as a type of a case: criminal or civil. In particular, when a juror had to decide on guilt, where a murder or other physical harm to a person was the charged, it took longer for the juror to reach a decision on the case than with a different type of a crime, i.e. fraud. On the other hand, in a civil case, it takes the juror more time to find the Defendant "liable" and takes less time to clear the Defendant of accusations. Researchers also point out the close correlation between the amount of time spent
deciding on a verdict and the quality of the verdict—in addition to how accurate the verdict is.

Authors refer to Devine et al (2001) and Reid Hastie who note the link between time spent on a verdict and its accuracy (as cited in Brunell, Dave, & Morgan (2009). The point is that juries are more accurate in their verdicts when they take more time to reach their decision.

Relative to the present investigation, it is important to note that Brunell and his colleagues did not test the influence of visual evidence on jury verdicts. Yet, we can extend the conclusions from his work and suggest that it is of crucial importance to consider the complexity of a legal case across the verbal and visual modalities. Thus, we expect that jurors’ understanding of a case to be influenced by the way the case story is organized and presented. In this regard, a jury is compiling a story from diverse pieces of information, including visualizations and narratives, and cognitively conceptualizing a whole legal case as a unit in order to further reach a verdict on it. The question is whether jury members construct a legal case story model relative to the structure of case relevant visualizations and the structure of case relevant narratives.

A cognitive process of conceptualizing a legal case from information in an attorney's arguments, organized in narratives and visualizations, structurally determine and accentuate elements of importance and first-order attention. Hence, we can expect a change in performance on the basis of the structural organization of the arguments and further look for explanations in cognitive mechanisms that stand behind human information processing.
The purpose of distinguishing among these core elements of structures is in their functionality of becoming indicative objects of meaning. This is important because elements of structure explicitly state where to pay attention (Chambliss, 1995). These markers also introduce a general idea and further direct how the events are linked, in both types of visual and verbal information.

Miles and Cottle (2010) suggest a learner-centered approach for instructing a jury in simple English. In regards to conceptual consideration, researchers argue the simplification for legal concepts to somehow appeal to prior knowledge and experiences of jury members in order to be better understood by them. With this in mind, we can conclude that familiar categories known to jurors from their prior experiences, might, therewith, relate to the activation of mental schema. Altogether, we find characteristics of the schema to be in congruence with characteristics that, in the current investigation, are ascribed to structures of narratives and visualizations. In other words, the mental processes involved in understanding a legal case story, after the schema has been constructed with all the provided evidence, becomes a “narrative schema” (Britton, Glynn, Meyer, & Penland, 1982) that builds a baseline of sensemaking from a story and what was claimed in arguments presented by an attorney.

Anderson and colleagues (1984) conducted one of the early studies on comprehension and recall of text passages, providing a rationale at to why schema activation that contains world knowledge becomes a mediator of comprehension and memory for certain elements of the text. Based on this research, Anderson concluded that the functional characteristics of schema are pertinent to the idea of meaningful structural organization, implying that structures of visualizations and narratives serve the purpose
of constructing a strong mental model of a case story. Among the characteristics of schema that Anderson et al. (1984) suggest are the following: (1) to absorb received information and fully understand it; (2) deduce inferences and determine a coherence of the message in places where it lacks coherence; (3) allot attentional importance of certain items and parts of a text (4) seek data systematically for memories; (5) sum up information; and (6) interpret meaningful connections to restore details of the message that lacks some of the details (Anderson, 1984). This idea similarly represented by Smith (1991) in what Smith calls “prototypes." Gordon (2013), in relation to a problem of jurors understanding instructions for a trial procedure, suggests that a consideration must be made of “schemas” as “frameworks that influence the way people see, interpret, and remember information” (p. 676). Thus, Gordon (2013) concludes that schema play an essential role in structuring and organizing knowledge so that a case is easy to understand.

Therefore, this investigation aimed to address differential influence of structures of the narratives (conceptual vs. chronological) with the structures of visualizations (conceptual vs. chronological vs. none), as well as their impact on levels of comprehension, perspective, memory, and judgments of guilt and blame. Hence, structures of visualizations and structures of narratives shared commonalities in the message, uniting them in such a way as to tell a story of a legal case from the Plaintiff’s perspective. The only difference in these structures was in how the information of the legal case was organized. In other words, the original content of the legal case was the same in both narratives and visualizations, but the organization of the content material in the narrative and the level of representation of this content in the visualization was
different. Structures were designed according to the type of core elements contained in both the narratives and visualizations—concepts and events, resulting in the conceptual structure and chronological structure of knowledge organization, respectively.

Hypotheses

Hypothesis 1

We hypothesize that when visualizations (conceptual or chronological) are paired with narratives (conceptual or chronological), participants will remember more information. We reasoned with a spatial contiguity principle of multimedia theory (Mayer, 2001). The principle states that better learning takes place when a correspondence exists between words and visualizations that are relevant to each other are presented next to one another, rather then apart or in different parts of a screen or a page in a textbook. That means pictures and accompanying text or words should be placed near to each other rather then far apart in a document, page or a screen. Multimedia theory also suggests a better “transfer” of information when information is displayed on a picture and accompanied with verbal narration. (Mayer, 2005; 2002). Hence, we hypothesize, that pairing visual materials with audio narrations will contribute to a better case understanding in jurors over just narratives without visualizations.

Hypothesis 2

When the structure of the graphic (Chronological or Conceptual) is consistent with the structure of the narrative (Chronological or Conceptual) comprehension of the case will be higher. Consistency between a graphic and text works for comprehension and it has been highlighted as well in a mode of graph comprehension proposed by Shah
and Hoeffner (2002). At the same time, the hypothesized positive type of redundancy effect due to pairing of a narrative and a visualization of the same type will result in a stronger effect on comprehension and memory (Mayer, 2005).

**Hypothesis 3**

The Chronological graphic will be as good in its effect on comprehension of the case as the Conceptual graphic. According to Mayer (2001) structural components are better understood when seen visually displayed as a graphic. These components are also better digested when visual and verbal parts are presented together at the same time. The conceptual diagram will be summarizing the gist of the case story, providing a visual aid that would be easier to hold in memory and operate with when reasoning on attributions of guilt and blame to the Defendant. But, the chronological graphic will benefit because of the labeled key elements of the story, presented as a visual timeline.

**Hypothesis 4**

The Conceptual Graphic will result in better comprehension of the case then the Chronological graphic. We reasoned that the conceptual components in visualization would provide a summarization for crucial ideas in the case story and participants would use them as a map to remember the case. Hence, the condition where the conceptual diagram is displayed would be beneficial disregarding the type of narrative. Therewith, we claim that the information shown in the conceptual graphic would aid comprehension since the information is of a higher order level of ideas and therefore simpler to process (Feldman, 2003; Meyer, 1987).
Hypothesis 5

The Conceptual Narrative will result in better memory of the case than the Chronological narrative. A more understandable and clear structure provided by the conceptual narrative with distinct segmentations of evidence organized around concepts in the story of the case will result in better memory of these segments and a better memory of the story. We also reasoned with the findings suggested by Thorndyke (1977) demonstrating that participants remembered high-level structural elements of the content that were, essentially, conceptualized features of the story better than specific story details.

Hypothesis 6

The Conceptual Narrative will result in better comprehension and higher confidence of guilt of the Defendant than the Chronological narrative. Pennington and Hastie (1992) demonstrated the important interdependence between judgments and the level of case comprehension by the story model jurors derive. Therefore, the better jurors understand a case, the higher their confidence in their decisions about the case. Therewith, we predict a better understanding on the case from the conceptual narrative over the chronological narrative because the conceptual narrative will be easier to process leading to a more cohesive story model formation, hence better comprehension of the case.
CHAPTER II

LITERATURE REVIEW

Introduction

In practice, an attorney, who prepares for litigation, considers several objectives: elements that comprise a legal case, external representations of arguments in format of visualizations and narratives, as well as the structural organization of these materials. In these matters, a targeted strategy of attorney’s preparations for a courtroom consists of choosing between representational format and options to implement main ideas and claims by means of legal terminology.

Hence, several areas of these preparations can be explored. First, area of decisions regarding elements of a legal case that will be presented in a visual or verbal way to grasp attention of jurors. Next, effectiveness of arguments presented with a narrative perspective, and visual aid, designed to support claims of this perspective. Finally, whether the attorney’s narrative, along with visualizations, will provide a powerful meaning consolidation about the case and will be understood by jurors.

Therefore, these components and materials of legal case representations require attention to details and some cognitive investments. Therewith, in this investigation, we considered information facilitation to be a dominant function of legal case representations, and we explored this area.
By means of processes of information selection, acquisition, interpretation and memory, jury members can benefit with better comprehension, better decision-making and a stronger verdict.

Therefore, comprehension, thinking, and reasoning with difficult-to-understand information, redirect us to problems of prior-knowledge, expertise and background—to activate the familiar schema or mental model. It also redirects us to the problems of memory, in terms of information storage, as at a later stage information should be recalled to support a process of making decisions and judgments. These factors also influence the amount of time that jury members spend learning about a complex legal case.

Therefore, it is important to consider research in pertinent to cognitive information processing areas. Hence, we justify the deeper level of theoretical anchoring in our suggestions for a litigation practice, as well as a place of narratives and visualizations in it.

In current overview of research, we will describe a number of theories that outlined a background for current investigation: information processing theory, model of working memory, dual coding theory, multimedia theory of learning, integrated model of text – picture processing, and schema theory.

Theories

Cognitively, process of information sensemaking consists of several stages of information assessment, in several storage systems, with each corresponding to the assessment. These systems regulate what information to encode, and control what
information comes into the processing mode of working memory via the sensory channel. Then, information is interpreted in regards to salient features that might correspond to an activated schema. An activated schema can already exist in long-term memory store, so it will be less effortful in terms of a control process of working memory to integrate incoming information with the existing scope of domain-specific and non-specific knowledge (see works of Baddeley & Hitch, 1974; Baddeley, 1992; Cowan, 1998; Sweller, van Merrienboer, 1998; Paivio, 2006). The link between memory, comprehension and confidence in decisions has been explained through several studies in cognitive psychology, in particular through schema theory studies (Schnotz & Bannert, 2003).

The Cognition of Memory and Information Acquisition

Information Processing Theory

The human information processing theory presented by Sweller (2008) describes the acquisition of new information as a process of encoding it and redirecting from a short term store or working memory to the long term memory for storage and further active and quick retrieval when cued.

Overall, an information processing system in our minds consists of: a sensory buffer, a short-term store and a long term store, where a cyclic process of information retrieval and information encoding happens on the way from sensory buffer to the long-term store and in the opposite direction.

Encoding processes assimilate the information that is coming from the situational setting into cognitive system and process it. In order to process the incoming
information during a retrieval process, information that is pertinent to external stimuli is being brought in from the cognitive system.

In sum, human information processing theory is dealing with short-term and long-term stores for information. Hence, a model of working memory, offered by Baddeley postulates an idea of how to interpret and explains different stores for information in need of information processing theory.

**Baddeley’s Working Memory Model**

According to the Baddeley’s model, working memory consists of the following sub-systems: the visuospatial sketchpad, phonological loop, and central executive. Central executive is also used as an episodic buffer that activates control processes over and between systems of information redirection and activation (Baddeley, & Hitch, 1974; Baddeley, 1992).

A model of working memory by Baddeley suggests assumptions, which comprise a notion of working memory theory. These assumptions are: limited capacity of storage and holding of information and its amount, and capacities of subsystems that work on routing the thinking process from perception to long-term store of memory and performance. Therewith, a model of working memory offers a system that executes central control over attention with the assistance of two mechanisms: a visuo-spatial sketchpad that processes incoming visual stimuli, and phonological loop that processes incoming verbal information auditorially (Baddeley, 1992).

The visuo-spatial sketchpad is a subsystem of working memory, where visual or spatial information is processed. The phonological loop is an auditory subsystem, where verbal information is rehearsed. Although these subsystems are functionally
different, they, yet, have common limitations in processing of the amount of information, and durable access to this information.

In general, working memory is understood as a short-term store. Therewith, these two terms are often used interchangeably. In temporal memory storage, information is received from sensory stimuli, and operated with assistance of prior knowledge. It shapes a novel memory that can be later preserved in a long-term store for further recall (Baddeley, 1992). Therefore, working memory has constraints that come from its executed temporal functions. Such constraints are: (a) the amount of informational items that can be hold without further mental effort that one can imply in attempt to extend the capacity, and (b) time duration for holding information in a short-term store.

Another approach to a limited capacity of maintaining and holding information in working memory was described in terms of the amount of meaningful chunks that further can be accessed. For example, Miller (1956) claims a possibility to recall up to seven chunks of information, whereas Cowan (1998) argues a limitation to recall up to three meaningful pieces of information; is approximately thirty seconds, and thereafter these accessible memories fade away. They can fade away very quickly if not reactivated by further additional processing (Atkinson, & Shiffrin, 1971).

A model of working memory by Baddeley (1992) was formulated to explain processes of information storage and maintenance in a short-term memory, whereas another model, proposed by Alan Paivio (2006) focused on a long-term store of memory.

A theory described by Paivio (2006) shares similarities with Baddeley’s model regarding kinds of systems of information processing for two kinds of information:
a visuo-spatial and a phonological types of information respectively, but in relation to a long-term memory.

Paivio’s Dual Coding Theory

As it has been mentioned earlier, in the model of working memory, information processing is using two subsystems: visual and verbal. Dual coding theory accepted this assumption of two ways to encode information, but understood it as two separate channels of information processing: nonverbal and verbal (Paivio, 2006).

Paivio’s dual coding theory identifies the storage principles for information in a long-term store as well as describes how this items of information, in a format of images and propositions, or imagenes and logogens are stored (Sadoski, &Paivio, 2000; 2004). Imagenes and logogenes, as units of representation, are stored differently. Logogenes are cognitively handled as hierarchical networks, and imagenes are linked to a visual, as well as to other sensory modalities, and can be handled as individual images, as parts of a whole, or accessed all at one time. Therewith, a meaning occurs when these modalities communicate. Logogenes and imagenes represent two different ways to encode perceptive experiences that will be preserved for a long-term storage. Further, functional processes of representation, references, and associations take place and, thus, in presence of a context, unite these two separate non-verbal and verbal channels.

Cognitive Load Theory

This theory was built on the premises of limited working memory capacity. Therefore, the cognitive load theory deals with an ability to retain information in working memory and construct knowledge that further is stored in a long-term memory (Chandler, & Sweller, 1991; Sweller, 2008). Hence, this process of knowledge construction is
directly related to schemas, as the cognitive load theory assumes that knowledge is preserved in schemas. Cognitive load theory understands a perspective of limited capacity of short-term memory, and focuses on the fact of efficiency and productivity of a learning process, as well as extraction of new knowledge from offered study materials. In other words, cognitive load theory strives to explain how to optimize a learning process by introducing a mental effort of students as a variable that has to be included into instructional design of materials.

The theory describes three distinguishable types of cognitive load. First type is an intrinsic load, which is provoked by a task and task materials that are presented to a learner. Intrinsic load occurs in a working memory. Second type is an extraneous load that deals with irrelevant information and materials that do not serve learning purposes, thus, do not aid to meet the instructional goals. And, third type is a germane load, a type of cognitive load that is crucial for activating strategies that participate in deployment and construction of a schema or a mental model of a task.

When learners approach a task, it requires creation of a mental model in order to understand this task. Therewith, the process of mental model construction requires cognitive allocation in working memory. Hence, the process of a mental model construction should be proportionate to the limited working memory capacity. If cognitive demands are high, learners fail to understand (Sweller, van Merriënboer, & Paas, 1998). In these regards, theory suggests reducing a “bad” cognitive load along with increasing a “good” type of a cognitive load: i.e. reducing extraneous load from task materials, but encourage a germane load for active processing and deep learning from these materials through a schema construction.
Therefore, a research question on how to balance between different types of cognitive load for learning purposes guided a growing body of literature in two directions that have been investigated. First, a direction of learning effects from multimedia and text, and second—a direction of a search of essential components that: (a) define learning materials’ effectiveness and (b) provide necessary integration of new information in mental models of learners. In other words, research seeks for the balance between a purpose of a learning process – a strong mental model construction, and effective components of learning materials that contribute to this balance.

In these regards, there are two dominating theories that explain the processing and learning from text and visualizations and consider known limitations in cognitive systems. Theories that explored the area of text-graphic processing and its cognitive integration have been developed with assumptions found in previous research on cognitive information processing. For example: assumptions in how information is stored in human memory, how information is processed according to a type of information—visual and verbal, and how information is organized, which has an important effect on learning.

The Cognition of Text-Graphic Processing

Cognitive Theory of Multimedia Learning

The cognitive theory of multimedia learning (Mayer, 2001; 2009; 2005) is based on major ideas of dual coding theory by Paivio (2006), dual processing assumption of working memory by Baddeley (1992), and a limited cognitive capacity in terms of the informational load (Sweller et al 1998; Chandler, & Sweller, 1991). These assumptions
are used as a baseline for an active and meaningful learning. An active and meaningful learning goes as described by Mayer (2009), takes place in several cognitive phases. These phases consist of: selection of relevant words from a text presentation, selection of relevant visuals from a pictorial presentation, verbal integration of words into a cohesive format in a verbal subsystem, selecting relevant images and their pictorial integration into a cohesive format in another parallel subsystem, and further, formed visual and verbal cohesive representations are integrated with prior knowledge. In short, selection of information occurs in each channel and further is integrated with a mental model of information and prior knowledge (Mayer, 2009). Mayer (2009) also points out, that effective learning from presented multimedia occurs with the presence of active learning. This notion is comprised of a cognitive monitoring in each channel: verbal and visual, as well as cognitive processes of selection, filtering, organization and integration of presented information.

In the cognitive theory of multimedia learning Mayer (2001) suggested major multimedia principle of learning – learning from visuals paired with text (words) is better than just from text (words). This principle embraces other several principles of multimedia design for instruction purposes: spatial contiguity, temporal contiguity, coherence, modality, redundancy and individual differences principle.

*Spatial contiguity principle* describes available correspondence between words and visual materials presented to a learner. That means pictures and accompanying text or words should be placed near each other rather then far apart in a document, on a page or on a screen.
Temporal contiguity principle describes, similarly to previous principles, how words and corresponding visual materials should be presented at the same time. This principle works better in application in instructional animations rather than for static visuals.

Coherence principle suggests that unrelated words or unconnected visuals are not included into the presented combination of words and pictures.

Modality principle claims that a better learning takes place when a narration and an animation are presented together rather than an animation and an “on-screen text”.

Redundancy principle describes that when too many alternatives for representation of what needs to be learned are presented, it can be overwhelming for a learner. That means that an effect of better learning can be lost if we present information in a variety of formats: a format of animation, narration, and on-screen text. So, a choice of formats is suggested: animation and narration rather than all at once (Mayer, 2001).

Individual differences principle describes how “low-knowledge learners” benefit from instructive multimedia designs in comparison with “high-knowledge learners”, that may see presented instructions in multimedia as redundant. Also, the individual differences principle suggests that “high-spatial learners” learn better than “low-spatial learners” (Mayer, 2001).

Overall, principles, described by Mayer (2001) are congruent with other theories on cognitive systems of information processing: for example, theory of dual coding. Cognitive theory of multimedia learning is in line with principles described by other dominant theory in research on learning from text and graphics— a theory,
proposed by Schnotz (Schnotz, 2002; Schnotz, & Bannert, 2003) about integrated comprehension of text and graphic with a suggested model of text-graphic processing.

**Schnotz’s Integrated Model of Text-Graphic Processing**

The model describes how modalities are integrated in a mental representation. The proposed model of comprehension of verbal and pictorial types of information explains this comprehension through a combined processing of text and graphic. Text and graphic are combined in a process of learning are acquired as sign systems that comprise two types of internal mental representations: depictive and descriptive (Schnotz, & Bannert 2003). These two types of representations are integrated in a mental model in a conjoint fashion. Both types of representations are comprised of two levels of information they define: external and internal (Schnotz, & Bannert, 2003).

Depictive representations contain external level of information in a format of a picture along with internal perceptive image of a picture and a correspondence of what is on the picture to a pertinent mental model (Schnotz, 2002).

Descriptive representations contain external level of information in a format of a text along with internal perception of a text structure and content semantics of a text (Schnotz, 2002).

Therewith, an intra-correspondence takes place within each type of these representations: depictive and descriptive representations are formed through the principles of mapping and processing—structurally and symbolically. These processes are processes of meaning acquisition, and are guided by cognitive schema. When a mental model is constructed, a schema is further getting activated, in order to regulate
between top-down and bottom-up processes’ interplay. Hence, schema influences mental models. In fact, mental models can be a result of individual experiences. Therefore, a process of mental models’ creation can be facilitated through external and internal levels of both types of representations: depictive and descriptive.

Schnotz and Bannert (2003) also stated that a structure of mental representations reflects a structure of information that was used to build this mental representation. And, therefore, incoming information has a potential to shape a mental representation in structural way, by organizing it.

**Mental Product of Processing**

The link between memory and comprehension has been explained through several studies in cognitive psychology, in particular through schema theory studies.

**Schema Theory**

Schema theory suggests that knowledge is stored in a format of schemas and explains how material that is stored in memory is connected (Sweller, Van Merrienboer, & Paas, 1998). Schemas are understood as abstract conceptual structures that are arranged hierarchically and are retained in memory in a form of top-down frameworks.

In other words, when people recognize elements of a bigger unit, the whole schema is getting activated. Activation of a schema is an important element of maximizing learning effects from a task because it reduces a load in a working memory and automates commonly used strategies towards a recognized task. As schema theory suggests, its activation takes place due to a reconstructive nature of memory (Sweller et al., 1998). Schema is activated via triggering higher-order elements: ideas and concepts.
These higher-order ideas and concepts are a product of world-knowledge generalizations. In other words, schemas contain a gist of redundant experiences and, therewith, we can make generalizations regarding things we encounter. In short, each individual has generalizations regarding every particular domain of knowledge (Alba, & Hasher, 1983). Therefore, schemas also set up a context for inferences when we need to make sense of novel information. In addition to schemas, being big generic representations in memory, our declarative and procedural knowledge contain scripts and system of concepts that also contribute to storing knowledge in memory.

Researchers Alba and Hasher (1983) suggested a prototypical nature of schema activation and its interdependences with the comprehension of a structure. These peculiar features of schema deal with processes of information encoding, where humans make meaning of information in relation to existed and constructed schemas. In other words, processes of information abstraction, interpretation and integration it into a schema. Alba and Hasher (1983) also distinguish between scripts and scenarios as they contribute to the general schema formation and accessibility. In application to the legal scenario, we can apply these accessible components as being an important precursor of a schema, and, therewith argue, that a jury can activate the schema and, in these regards, anticipate it with a certain attitude. We evoke and recall the schema on the ascribed situation because of certain conceptual cues in the narrative or some visual cues in the graphic. Collective sensory modalities activate an audiovisual comprehension process and contribute to the mental model formation of text and graphic.
Conclusion

We conducted this investigation with several goals in mind. First goal was to explore the way jurors assess information from unfamiliar professional domain in a number of conditions. Next goal was to examine effectiveness of narratives and visualizations for making it easier for jurors to access information about a legal case. Hence, these graphic and narrative representations would facilitate comprehension of a legal case via such format of information presentation. Finally, a goal was to provide recommendations of an effective use of the case representations for an attorney.

It is important to consider studies that were presented in the current literature review in relation to the research described earlier in the Chapter I Introduction. We need to understand a mechanism of cognition in order to investigate cognitive processes further, and with a perspective of applying this understanding of cognitive processes to a specific domain of law. Additionally, task demands and many contextual dimensions of a domain influence cognitive mechanisms of sense making in work with external representations (Ainsworth, 2006). Therefore, a cognitive task to make judgments of guilt and blame in jurors is also dependent on the task demands offered by a legal case and how complex the case is.
CHAPTER III

METHODOLOGY

Design

Two factors, Type of Verbal Narrative and Type of Graphic were crossed to yield six experimental cells. The resulting design was a 2 Type of Verbal Narrative (Conceptual vs. Chronological) X 3 Type of Graphic (Conceptual vs. Chronological vs. None) fixed analysis of variance.

Participants

Two hundred and two undergraduate students from a midsized western University participated in this investigation. Participants consisted of 147 females and 49 males, (6 did not state their gender), with a mean age of 22.56 years (SD = 5.80) and were randomly assigned to experimental conditions. All were predominately white with no apparent sensory impairments that would influence their participation in the investigation.

Materials

The experimental materials in the current investigation contained three legal case texts, two types of graphics depicting the legal case, and three questionnaires—one measuring general case understanding, the second measuring perceptions and attitudes towards the case, and the third collecting information about demographics.
Legal Case Texts

The legal case texts used in this investigation were of three types, an introductory case description, and two versions of the case narrative—conceptual and chronological.

When the text was an introductory case description, it was 293 words in length, derived from a real legal case complaint being prepared for litigation in a US state court, and introduced the case allegations in a top-down structure. First, a legal financial issue of ownership and internal stock activity bringing two adversarial parties together was introduced; then, the major parties—the plaintiff/s and the defendant/s—were introduced and defined. The legal issue dealt with the plaintiff/s accusing and suing the defendant/s of holding all profits, of not following the agreed commitment and breaching their fiduciary responsibility of the contract, and taking the plaintiff’s property while maintaining the superficial appearance of reasonable business practices.

When the texts were case narratives, they were written either as a chronology or organized around concepts. Both types of narratives used the shared content of the real legal case complaint with a selective assignment of the content to fit the conceptual or chronological structure of those narratives. The content was comprised of the 61 pieces of evidence composing the case. Events were important and notable happenings occurring at specific points in time over the course of the case.

The chronological narrative was 2,207 words in length and was written as a historical retrospective of the events underlying the case, along with the evidence. Specifically, the narrative was written in the form of a timeline, with evidence of the case
described for each event, without providing the summarizing points conceptually. Subtitles were used to introduce a year or year range in which the events occurred.

The conceptual narrative was 2,044 words in length and was written as an expository description of the core concepts underlying the case, along with the evidence supporting each concept. These concepts were the higher order ideas interpreted from the evidence and inferred from the concrete actions of the defendant and the plaintiff. Thus, concepts were notions or higher-order ideas interpreted from the evidence where the aggregate of the evidence comprised a unified conceptual whole.

The chronological narrative consisted of 22 events, with 2.8 pieces of evidence per event, while the conceptual narrative contained seven concepts—three first-order and four second-order concepts—with 8.7 pieces of evidence supporting each concept. First order concepts were at the head of each selective cluster of the evidence they represented. Second order concepts represent the subordinate characteristics of the first order concepts. The organization of the events in the chronological narrative and the concepts in the conceptual narrative are shown in Tables 1 and 2, respectively.

Both narratives were recorded in order to be presented auditorally. The audio narrations were recorded by a male narrator at a rate of approximately one word per second. Two to three second pauses were made throughout the recorded narratives to facilitate listening comprehension.

Experimental Graphics

The graphics used in this investigation were two diagrams—one representing the core concepts underlying the case, and the other representing the chronological timeline in which the case transpired. When the diagram was conceptual, it represented
### Table 1

**Chronological Events**

<table>
<thead>
<tr>
<th>Event</th>
<th>Year/s</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1995</td>
<td>The Start up was formed</td>
</tr>
<tr>
<td>2</td>
<td>1999</td>
<td>By 1999 The company was experiencing significant growth</td>
</tr>
<tr>
<td>3</td>
<td>1995-1999</td>
<td>The Plaintiff met the investor</td>
</tr>
<tr>
<td>4</td>
<td>2000</td>
<td>By 2000, the Investor offered potential for bigger profitability and bigger clients for the company</td>
</tr>
<tr>
<td>5</td>
<td>2000</td>
<td>By 2000, A Partnership agreement was established</td>
</tr>
<tr>
<td>6</td>
<td>2000-2005</td>
<td>Between 2000 and 2005, the Plaintiff was misled and anticipated the wrong action</td>
</tr>
<tr>
<td>7</td>
<td>2005</td>
<td>The Plaintiff was dismissed from the board</td>
</tr>
<tr>
<td>8</td>
<td>2005-2006</td>
<td>Between 2005 and 2006, the information was kept in a narrow circle of people</td>
</tr>
<tr>
<td>9</td>
<td>2006</td>
<td>By 2006, the Defendant acquired ownership</td>
</tr>
<tr>
<td>10</td>
<td>2006</td>
<td>From July 2006 through October 2006, Secret discussions were held about a merger</td>
</tr>
<tr>
<td>11</td>
<td>2006</td>
<td>The Minority was persuaded that the merger was fair</td>
</tr>
<tr>
<td>12</td>
<td>2006</td>
<td>An External evaluation was requested by law but performed to benefit the Defendant</td>
</tr>
<tr>
<td>13</td>
<td>2006-2007</td>
<td>The External evaluators were given inaccurate information</td>
</tr>
<tr>
<td>14</td>
<td>2000-2007</td>
<td>The Defendant made a strategic plan to cover-up his actions</td>
</tr>
<tr>
<td>15</td>
<td>2006</td>
<td>The Defendant proposed a price per share</td>
</tr>
<tr>
<td>16</td>
<td>2006</td>
<td>The Defendant took steps to control stocks and votes</td>
</tr>
<tr>
<td>17</td>
<td>2006</td>
<td>The Plaintiff protested against the merger</td>
</tr>
<tr>
<td>18</td>
<td>2006</td>
<td>The Defendant stated the merger could not be stopped</td>
</tr>
<tr>
<td>19</td>
<td>2006-2007</td>
<td>Between 2006 and 2007, the Plaintiff was not informed of transactions preceding the merger plan</td>
</tr>
<tr>
<td>20</td>
<td>2007</td>
<td>By 2007, the Plaintiff was paid for his stockholdings at the old price per stock with no knowledge of the current value</td>
</tr>
<tr>
<td>21</td>
<td>2007-2008</td>
<td>Between 2007 and 2008, neither the Plaintiff nor the external valuation company was given accurate information about the financial value of the company</td>
</tr>
<tr>
<td>22</td>
<td>2008</td>
<td>By 2008 The Plaintiff was given no information about projected profit</td>
</tr>
</tbody>
</table>
the main theme of the legal case using icons, symbols and labels horizontally oriented from left to right. (See Figure 1).
Figure 1. Experimental graphic: Conceptual diagram.
When the diagram was chronological, it represented the time sequence of events marked as years in periods of time in the history of the legal case, using labels and symbols, horizontally oriented from left to right. (See Figure 2).

When the diagram was conceptual, the labels contained concepts underlying the legal case; when the diagram was chronological, the labels contained the names of the major case events.

Both diagrams were static visualizations, with no animation, produced in black and white in Adobe Illustrator CS5 and Pages. Major elements of both graphics shared similar geometrical shapes: circles, lines and in both cases were aligned horizontally on one page in a landscape orientation. Both used the same font—Myriad Pro, size 9-point and were designed to fit on one PowerPoint page, approximately 8.5” x 11”, and were aligned in the center.

**Experimental Questionnaires**

Three questionnaires were used in this investigation—one measuring general case understanding, the second measuring perceptions and attitudes towards the case, and the third collecting information about demographics.

The questionnaire measuring case understanding consisted of 25 items, six of which assessed case comprehension and recall, 12 items assessing prior experience with investments and shareholding, and 7 items assessing terminology related to stock types and corporate mergers. When the questionnaire assessed case comprehension and recall, it was comprised of three 9-point Likert scales, and three short answer questions (one question for retelling the story in an essay, another question with a request to give a title for the story, and the last one to list keywords). When prior experience with investments and shareholding was
Figure 2. Experimental graphic: Chronological diagram.
assessed, the set was comprised of nine 9-point Likert scales, and three true/false questions. When the questionnaire assessed familiarity with terminology related to stock types and corporate mergers, the set contained seven items requiring participants to provide a definition for each of seven stock- and merger-related terms.

The questionnaire measuring perceptions and attitudes towards the case consisted of 13 items, ten of which assessed beliefs of guilt and blame, one item assessing attitudes toward business, and 2 items assessing perceptions of helpfulness of the materials. All 13 items in the questionnaire that assessed beliefs of guilt, blame, attitudes to business, and helpfulness of the materials were comprised of 9-point Likert-scales.

The third questionnaire collecting information about demographics consisted of 8 items, designating age, sex, primary and secondary languages, ethnicity, college major, and level of education.

When questionnaire items were scaled, some of the scales were reversed to guard against a response set effect in participants. All questionnaires were presented using Google.forms.

Procedure

Participants were invited into a computer laboratory and guided to computer stations to choose a seat randomly. A random condition assignment corresponded to each individual computer station and was marked with a number on a post-it note attached to each monitor. Participants were provided with verbal instructions on how to proceed on the task and were given an Informed Consent for participation in the study.
The procedural sequence was deployed using PowerPoint. The PowerPoint presentation contained 14 slides—four text slides containing instructions, six wait pages, and a slide each for either of the two audio narrations and their respective experimental graphics (see Figure 3.). The PowerPoint presentation was delivered in the following sequence:

- Welcome page
- Page of informed consent
- What can I expect page
- Page containing the introductory case description
- Page of instructions
- Wait pages
- Page with the experimental materials (one each for the six experimental conditions).
- Page containing the link to the post-task questionnaire on Google.forms.
- Debriefing page

The experimenter guided timing of the PowerPoint presentation, with the exception the pages with the introductory case description and both versions of the case narratives and their respective diagrams. These pages, in addition to the no diagram conditions, were presented automatically. The timing for the introductory case description was 2 minutes 19 seconds; the timing for the two versions of the case narratives was 14 minutes and 17 seconds, and 15 minutes and 55 seconds, for the conceptual and chronological narratives respectively. The entire procedural sequence
Figure 3. PowerPoint map of study.

lasted approximately one hour and forty-five minutes. Following debriefing, the participants were thanked for their participation and excused.
Data Source

Participants’ protocols were scored for the: (a) 9-point Likert scales (see Table 3 for scale names and values), (b) true/false questions, and (c) short answer questions. The scores measured by the scales were aggregated by category. The true/false questions were summed to yield a total score for the number of questions answered correctly. The short answer essay was scored according to a scoring scheme developed by the author. The story title question, and the keywords question were not scored in this investigation.

Short answer essays were scored for content units and perspective types based on a scoring scheme designed to determine the level of perspective present in essays across all conditions and count a number of content units that represented each perspective per protocol.

Using a grounded theoretical approach, four distinguishable types of content units and four types of perspective were recognized from the data. A content unit was defined as a keyword, phrase, clause or a sentence that conveyed a complete idea. Content units were derived using a parsing principle for the separation of phrases or clauses in places where a “natural” break occurred with the help of punctuation and grammar. The four content types were the following:

- “Authentic unit” (AU) = is a content unit directly transferred from the original narrative.

- “Inferred unit” (IU) = is a content unit inferred/interpreted from the original narrative and expressed as a paraphrase.
<table>
<thead>
<tr>
<th>Category name</th>
<th>Item name</th>
<th>Scaling value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case comprehension and recall (6 items)</td>
<td>From Plaintiff’s perspective the fairness of the merger</td>
<td>1 = extremely fair 9 = extremely unfair</td>
</tr>
<tr>
<td></td>
<td>Understanding of the motivation behind actions of the Plaintiff</td>
<td>1 = extremely low 9 = extremely high</td>
</tr>
<tr>
<td></td>
<td>Understanding of the actual actions of the Plaintiff</td>
<td>1 = extremely low 9 = extremely high</td>
</tr>
<tr>
<td>Prior experience with investments and shareholding (12 items)</td>
<td>Eye on financial news</td>
<td>1 = most of the time 9 = very rarely</td>
</tr>
<tr>
<td></td>
<td>Pertinence of financial news to everyday life</td>
<td>1 = not at all pertinent 9 = very pertinent</td>
</tr>
<tr>
<td></td>
<td>Heard of stocks, shareholders and market, but no understanding</td>
<td>1 = strongly agree 9 = strongly disagree</td>
</tr>
<tr>
<td></td>
<td>Learned the meaning of stocks, shareholders through the materials</td>
<td>1 = strongly agree 9 = strongly disagree</td>
</tr>
<tr>
<td></td>
<td>Helpfulness of the narrative</td>
<td>1 = minimally 9 = maximally</td>
</tr>
<tr>
<td></td>
<td>Helpfulness of the graphic</td>
<td>1 = minimally 9 = maximally</td>
</tr>
<tr>
<td></td>
<td>Difficulty in understanding of the monetary values</td>
<td>1 = strongly agree 9 = strongly disagree</td>
</tr>
<tr>
<td></td>
<td>Amount of quantitative information in the narrative</td>
<td>1 = not enough 9 = too much</td>
</tr>
<tr>
<td>Judgments of guilt and blame (10 items)</td>
<td>Guilt of the Plaintiff</td>
<td>1 = not at all guilty 9 = extremely guilty</td>
</tr>
<tr>
<td></td>
<td>Confidence in guilt of the Plaintiff</td>
<td>1 = not at all confident 9 = extremely confident</td>
</tr>
<tr>
<td></td>
<td>Guilt of the Defendant</td>
<td>1 = not at all guilty 9 = extremely guilty</td>
</tr>
<tr>
<td></td>
<td>Confidence in guilt of the Defendant</td>
<td>1 = not at all confident 9 = extremely confident</td>
</tr>
<tr>
<td></td>
<td>Blame of the Defendant</td>
<td>1 = no blame at all 9 = extremely blameful</td>
</tr>
<tr>
<td></td>
<td>Confident in blame of the Defendant</td>
<td>1 = not at all confident 9 = extremely confident</td>
</tr>
<tr>
<td></td>
<td>Blame for the Plaintiff</td>
<td>1 = not at all confident 9 = extremely convinced</td>
</tr>
<tr>
<td></td>
<td>Confident in blame of the Plaintiff</td>
<td>1 = not at all confident 9 = extremely convinced</td>
</tr>
<tr>
<td></td>
<td>Convinced of the Defendant’s position</td>
<td>1 = not at all convinced 9 = extremely convinced</td>
</tr>
<tr>
<td></td>
<td>Convinced of the Plaintiff’s position</td>
<td>1 = not at all convinced 9 = extremely convinced</td>
</tr>
<tr>
<td>Attitude to business (1 item)</td>
<td>Belief in entrepreneurship</td>
<td>1 = very strong 9 = not strong at all</td>
</tr>
<tr>
<td>Perceptions of Helpfulness of the experimental materials (2 items)</td>
<td>Making sense of the graphic</td>
<td>1 = not at all difficult 9 = extremely difficult</td>
</tr>
<tr>
<td></td>
<td>Making sense of the narrative</td>
<td>1 = not at all difficult 9 = extremely difficult</td>
</tr>
</tbody>
</table>
“Opinionated Elaborative unit” (OEU) = is a content unit that is labeled as IU/KU; it is a content unit that suggests an opinion, emotionally expressive use of words, contains judgment and/or provides a conclusive logical statement stating a cause-effect relationship between information provided in the original narrative.

“Knowledge unit” (KU) = is a content unit that is used in the retelling of the original narrative, but brought up from the participant’s personal experiences or prior knowledge. Often an illustrative example from participant’s experience or impression is provided (formulating subjective definitions may occur).

A perspective was defined as an attitude towards the major parties’ actions, judged from narrative references implied from the events or situations that were subject of dispute.

The four perspective types were the following:

○ “Plaintiff’s Perspective” = is a perspective, that states a negative evaluation of the actions of the Defendant.

○ “Defendant's Perspective” = is a perspective that states either a negative evaluation of the actions of the Plaintiff or provides reasoning behind actions of the Defendant that led him into the opposition towards the Plaintiff.

○ “Company Perspective” = is a perspective without an explicit relation to the Plaintiff or the Defendant, often neutral and/or distant.

○ “None” = without a prevalence of one perspective over the other, or where the perspective is split 50-50 between the Plaintiff and the Defendant.

See Table 4 for the scoring scheme for the essays. Each identified content unit of either type was counted as a point.
Table 4

Scoring Scheme for Essays and Short Answer Questions

<table>
<thead>
<tr>
<th>Perspective</th>
<th>Units Type I (AU)</th>
<th>Units Type II (IU)</th>
<th>Units Type III (KU)</th>
<th>Units Type IIb (EOU):IU/KU</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Plaintiff</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>The Defendant</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>The Company</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>None</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>
CHAPTER IV

RESULTS

Participants’ protocols were scored for the: (a) 9-point Likert scales (see Table 3. Questionnaire Items in Chapter III Methods for scale names and values), (b) true/false questions, and (c) short answer questions. The scores measured by the scales were aggregated by category. The true/false questions were summed to yield a total score for the number of questions answered correctly. The short answer essay was scored according to the scoring scheme described above. All protocols were for all types of content units and perspective. (see Table. 4, Scoring Scheme for Essays and Short Answer Questions in Chapter III Methods)

The story title question, and the keywords question were not scored in this investigation.

Comprehending the Case

In the first set of analyses, it was important to determine whether the type of narrative and graphic would combine to influence the degree to which participants comprehended the case. Participants derived their comprehension of the case according to the four types of perspective on each of the four types of content units -- authentic, inferred, opinionated elaborative, and knowledge. Thus, four analyses of variance were conducted separately on each of the content unit types.
The resulting design was a 2 Type of Narrative (Conceptual vs. Chronological) X 3 Types of Graphic (Conceptual vs. Chronological vs. None) X 4 Types of Perspective (Plaintiff vs. Defendant vs. Company vs. None), with repeated measures on the perspective type variable.

It the first analysis in this set, it was important to determine whether participants remembered verbatim the information contained in the narrative. The analysis yielded no significant influence from any of the main effects or first- and second-order interactions. These results are not surprising since authentic content units required exact wording from the original narratives.

In the second analysis, content units of the inferred type were tested. The analysis revealed only significant variation for the perspective participants took on what they understood from listening to the case narrative, $F(1, 195) = 271.69$, $MS_{error} = 14.06$, $p = .000$. $\eta^2 = .122$. Post-hoc Bonferroni tests revealed that participants remembered significantly more from the narrative as paraphrases without perspective ($M = 6.53; SD = 5.86$) than they remembered in paraphrases that took either the company’s perspective ($M = 1.29; SD = 1.81$), the Plaintiff’s perspective, ($M = .41; SD = .83$) or the Defendant’s perspective ($M = .01; SD = .12$).

While the Bonferroni tests yielded significance for all pairwise comparisons between each of the four perspectives, participants remembered in paraphrases effectively no content from the Plaintiff’s or Defendant’s perspective.

In the next analysis, the influence of the four factors was tested on the opinionated elaborative content units. Again, the analysis revealed only significant variation for the perspective participants took on what they understood from listening to
the case narrative, $F(1, 195) = 27.19, MS_{\text{error}} = 5.95, p = .000. \eta^2 = .122$. Post-hoc Bonferroni tests revealed that participants were most expressive in their opinions, without having a particular perspective of the case ($M = 3.39; SD = 3.03$), relative to all the other perspectives—either in support of the plaintiff’s perspective ($M = 2.55; SD = 2.46$), the company’s perspective ($M = 1.74; SD = 2.49$), or of the defendant’s perspective ($M = .23; SD = .77$). Once again, while the Bonferroni tests yielded significance for all pairwise comparisons between each of the four perspectives participants took in their essays, the participants expressed nearly no opinions in their essays in support of the defendant’s perspective.

In the final analysis of this set, the influence of the four factors was tested on the knowledge content units. Again, the analysis revealed only significant variation for the perspective participants took on what they understood from listening to the case narrative, $F(1, 195) = 27.19, MS_{\text{error}} = 5.95, p = .000. \eta^2 = .122$. Post-hoc Bonferroni tests demonstrated that participants used more examples from their prior knowledge when they took the company’s perspective on the case ($M = .12; SD = .64$) than all the other perspectives—either when participants did not have a particular perspective ($M = .01; SD = .17$), or when having a perspective in support of the Plaintiff ($M = .01; SD = .12$), or the Defendant ($M = .00; SD = .07$).

Once again, while the Bonferroni tests yielded significance for all pairwise comparisons between each of the four perspectives participants took in their essays, the participants brought in nearly no prior knowledge in their essays in support of either the Plaintiff’s perspective, the Defendant’s perspective, or when they had no perspective at all.
Judgments of Guilt and Blame

In the second analysis, it was important to determine whether the type of narrative and graphic would combine to influence the extent to which participants assigned guilt and blame to either the Plaintiff or the Defendant.

Since the plaintiff and the defendant were separate targets to which blame and guilt could be assigned, the target was manipulated as a within-subjects variable, and crossed with narrative and graphic type. For blame, the analysis yielded only significance for the blame target—that is, whether participants targeted their blame assignment towards the Defendant or the Plaintiff $F(1, 196)=199.25, MS_{\text{error}}=4.54, p=.000, \eta^2=.504$. Specifically, participants assigned significantly more blame to the Defendant ($M=7.07; SD=1.66$), than to the Plaintiff ($M=4.07; SD=1.97$). No other significant first- or second-order interactions were found.

For guilt, the same design was used—again, with target manipulated as a within-subjects variable, and crossed with narrative and graphic type. The results yielded only significance for the blame target—that is, whether participants targeted their blame assignment towards the Defendant or the Plaintiff $F(1, 196)=161.77, MS_{\text{error}}=7.39, p=.000, \eta^2=.452$. Specifically, participants assigned significantly more blame to the Defendant ($M=7.00; SD=1.98$), than to the Plaintiff ($M=3.55; SD=2.35$). No other significant first- or second-order interactions were found.

Since there was no significant differential influence of the narrative type and graphic type on participants’ assignment of guilt and blame toward the plaintiff and defendant, it was important to determine whether participants’ were influenced by other variables. Specifically, it was important to determine whether the participants made a
decision regarding guilt on the basis of: (a) the amount and type of information they remembered from the case, (b) how convinced and confident they were in making this decision, (c) their beliefs on entrepreneurship, and (d) their prior knowledge of finance, stocks, and shareholding. Therefore, measures of these variables were regressed on the guilt of the defendant and plaintiff, separately.

For the Defendant, the stepwise multiple regression yielded a significant prediction model, $F(5, 195) = 51.49, p = .000$, accounting for 56% of the variance. The analysis disclosed that participants’ ratings of guilt were predicted by the amount of blame they assigned to the Defendant ($t = 11.01, p = .000; \beta = .647$), as well as their confidence in their assignment of the Defendant’s blame, ($t = -3.04, p = .003; \beta = -.243$), and guilt ($t = 6.05, p = .000; \beta = .425$). In addition, participants assigned more guilt to the defendant based on the amount of prior knowledge they brought in without having a particular perspective on it ($t = -3.40, p = .001; \beta = -.163$), as well as how much they remembered about the company ($t = 2.03, p = .044; \beta = .097$).

For the Plaintiff, the stepwise multiple regression yielded a significant prediction model, $F(5, 195) = 20.67, p = .000$, accounting for 33% of the variance. The analysis disclosed that participants’ ratings of guilt were predicted by the amount of blame they assigned to the Plaintiff ($t = 7.31, p = .000; \beta = .428$), as well as the general content units they remembered but with no particular perspective ($t = -3.13$). In addition, their guilt ratings were predicted by their opinion that the merging process was fair ($t = -2.70, p = .007; \beta = -.162$), as well as their opinion of ($t = 3.26, p = .001; \beta = .207$) and memory of ($t = -2.22, p = .028; \beta = -.137$), the content units supporting their perspective of the company. When participants assigned more blame to
the Plaintiff and they thought the merger was fair, in addition to remembering more information about the company and having opinions about it, the more they regarded the plaintiff as guilty. In addition, the more the participants remembered the case, the higher they rated the Plaintiff’s guilt.
CHAPTER V

DISCUSSION

Introduction

In the current investigation, we attempted to determine the effect of narratives and graphics on the comprehension of legal case, in addition to case memory, perspective, as well as judgments on guilt and blame relative to the Plaintiff and the Defendant.

Two hundred and two undergraduate students were asked to listen to an audio narration of the case and look at the screen where, depending on a condition they were in, either saw one of two types of visualization or were exposed to a blank screen, and heard one of two organizational structures of the case narrative.

After the task, we asked the students to complete a questionnaire measuring their levels of comprehension, perspective, memory and judgments of the legal case.

These measures were assessed using three questionnaires—one measuring general case understanding, the second measuring perceptions and attitudes towards the case, and the third collecting information about demographics.
Findings in Category: Comprehension of The Case

Finding 1 Information Remembered vs Comprehension Level on a Case

The link between memory, comprehension and confidence in decisions has been explained through several studies in cognitive psychology, in particular through schema theory studies. Participants remembered significantly more from the narrative as paraphrases without perspective. This finding suggests that a simple retelling of general facts took place. Therefore, we might hypothesize that participant were relying on their memory, rather then comprehension of the information about the case.

Findings also revealed that participants who brought in prior knowledge examples in the essays they wrote took the company’s perspective on the case and were most expressive in their opinions, without having a particular perspective on the case. We suspect here an underlying uniting principle of bringing background information to assist in sense-making in order to process the case. This finding suggests that the participants brought in prior knowledge from the schema they possessed of the topic; and mixed them with the main ideas derived from the narratives. The point is that neither the type of narrative structure, nor the type of graphic differentially influenced the participants’ perspective on the case. In addition, quantity remembered and the level of comprehension of the case showed no differential influence from the graphic and narrative manipulations.
Finding 2 Type of Information Remembered vs Perspective Assigned

Findings demonstrated that participants expressed nearly no opinions in their essays in support of the defendant’s perspective.

The perspective on the case was given *apriori*—both types of narratives were given from the perspective of the Plaintiff, even though it was never stated explicitly that the narrative was delivered just from the perspective of the Plaintiff. In other words, the description of events and argumentation details narrated about the case offered no values in favor of the Defendant or the Plaintiff, but the narration did imply support for the Plaintiff. Still, participants took neither position in their memory of the case. This suggests that the participants were rather impartial to the pro-Defendant slant on the case. From an applied perspective, the results suggest that people can disengage from the bias in presentation of a case and pull out the facts to make judgments on it.

Still, all kinds of the elaboration that the participants made were categorized per unit type and perspective type. The explanation why there were almost no authentic units recalled across protocols, but only paraphrased units and opinionated units, might be explained first, due to limited capacities of the working memory (see Baddeley, & Hitch, 1974; Baddeley, 1992) and second, due to a general overload (see cognitive load theory, Sweller, & Chandler, 1994) with a thematically similar information.

Baddeley’s model of working memory explains a limitation in holding information actively accessible in short–term store for processing—and, only for a very brief amount of time—well beyond the amount of time participants necessary to reason from case information to make a judgment of guilt and blame. Cognitive encoding...
strategies like rehearsal, organization, and elaboration, for example, require a considerable amount of working memory space for processing. Thus, it is quite possible that participants attended only to pertinent elements of the case, neglecting the presentation bias of the audio narration. The audio narrations in the experimental materials of this investigation were approximately 15 minutes in length and following the assumption of limited working memory capacity, we can conclude that the length of the verbal narrative exceeded participants’ ability to hold that amount of information (Baddeley, & Hitch, 1974). Therewith, participants might have had difficulties holding so many important details in memory long enough to further retrieve them and attend to the Plaintiff-biased slant of the case facts and events. This suggests that attorneys would do well to keep case material to the bare minimum so that jurors do not get confused, allowing facts and events to be able to be processed along with perspective.

At the same time, we can suggest a word length effect, described by Baddeley and colleagues recently (2014). The majority of sentences in both types of narratives (conceptual and chronological) contained lengthy sentences with complex syntactical structures. Therefore, we can assume that an active subvocalization by the participants was not following the complex and long-in-time lexical sequence of the case narrative. Thus, the memory span for longer words, and possibly, sentences was not enough to process all of this verbal material (Baddeley, Papagno, & Norris, 2014).

Additionally, thematically similar information might have produced a redundancy effect and this explanation finds support in a theory of cognitive load described by Sweller and Chandler (1994) and discussed elsewhere by Schnotz and Kuerschner (2007).
The idea of such a redundancy effect—an effect that differs from the similar effect described in multimedia theory—focuses on the impact of similar content within just one channel of information communication, instead of looking at the combined effect of multiple channels of information delivery (i.e. verbal and visual channels or different types of media). From this vantage point, the redundancy effect as cognitive load theory explains it, happens when a lot of irrelevant message information “clatters” the processing of this information, thereby impairing comprehension and learning.

At the same time, the hypothesized positive type of redundancy effect due to pairing of a narrative and a visualization of the same type (Mayer, 2005) did not find support. In the hypothesis, we expected a positive effect and stronger effect on comprehension and memory from pairing a conceptual narrative and a conceptual visualization, as well as pairing chronological narrative and chronological visualization. It is possible that there was too much information in both the auditory narrative and either type of graphic to discern the potential influence of either. While this assumption is a reasonable position to take, it does not bode well for generalizations that can be made to courts of law since most cases are comprised on very large amounts of information (both verbal and visual) from which jurors must make judgments of guilt and blame. Thus, the absence of effects from the types of diagram and narrative structures—in light of the plethora of information presented in most courts—implies that attorneys may be well advised to concentrate only on the most pertinent parts of a case. Exceeding a level of basic simplicity may run the risk of making the presentation of complex verbally- and visually-presented facts of little to no value.
Findings in Category: Judgments of Guilt and Blame

Finding 1 Information that was Remembered vs Guilt/Blame Target

Although, research suggests interrelations between memory and judgments (Hastie & Park, 1986), we found outcomes of our investigation ambivalent.

On the one hand, participants assigned more blame and guilt to the Defendant regardless of the graphic type and the narrative type. And there was no significant differential influence of the narrative type and graphic type on participants’ assignment of guilt and blame toward the Plaintiff and Defendant.

On the other hand, our findings reveal that participants also were found to assign guilt and blame to the Plaintiff on the basis of information they remembered and understood. Overall, the tendency that we conclude was: the less participants understood about the case, the more they found the Plaintiff guilty.

It is possible to suggest that when participants assigned more guilt and blame to the Plaintiff (the victim in this legal case story), they were driven by a vacancy of real case understanding. We suggest that this was due to a lack of motivation that would lead to cognitive investment in order to understand the case. Thus, participants might have selectively decided on their guilt and blame preferences relative to what kind of general facts they could recall, or when they remembered and opinionated about fairness of the corporate merger described in the case, since the merger description was a crucial element of the story that was followed by financial loss for the Plaintiff.

When participants assigned more blame to the plaintiff and they thought the merger was fair, in addition to remembering more information about the company and
having opinions about it, the more they regarded the Plaintiff as guilty. Feigenson, Park and Salovey (1997) described similar outcomes in shifting assignment of blame and guilt from the accused to the accuser—the victim—in a study assigning blame in a legal case. In that study, participants were inclined to blame the victim more and, therewith be biased by evidence, the more unfortunate were the results to the victim modeled in the incident. Feigenson et al. (1997) explained such an outcome to the fact that, in their decisions, participants were guided not by objective evaluation of damages proportionate to how much the person was worthy of blame, but by the “holistic judgmental processes” (Feigenson, Park, & Salovey, 1997). This, therewith, can be understood as inferring a verdict by assumptions derived from a partial understanding of facts, which might have suggested inferences about the final guilt of the Plaintiff.

Further Investigations

This investigation raised questions in need of further research. The findings of this study have a number of important implications for the domain of law and practical suggestions for an attorney. Specifically, for an attorney in professional practice, it is extremely important to know about effects, as well as about no effects of narratives and visualizations.

Despite the fact that the current investigation failed to support the hypothesized beneficial effects of visualizations, our findings revealed crucial cognitive aspects of information contained in the experimental materials. Particularly, findings about shifts of perspective in guilt (i.e. assigning blame and guilt to the Plaintiff), in regards to the subject matter of a company, suggest participation of prior knowledge and
opinions in the decision making process of jurors. In short, knowing about topics of
primary attention in jury members is helpful to litigate a case successfully.

Indeed, further investigations need to explore the individual characteristics of
manipulated narratives and visualizations. For instance, testing a condition with just
graphics and no accompanying narratives would have shed light on patterns of
information across essays that participants wrote and would accentuate aspects of the
information that was directly transferred and retained from the graphic.

The next important contribution would be to examine those components of the
experimental materials used in the present investigation, which comprised the data source
but were not scored. Specifically, evaluation of concepts derived by participants would,
certainly, help us understand the favored parts of the legal case evidence that attributed to
inferences about the case and, therewith, led to core concept formation in the mental
models of the participants.

And, finally, the internal coherence of each type of narrative would be
important to explore further, approaching structural organization of narratives for benefits
of comprehension in non-experts in litigation law (McNamara, & Kintsch, 1996).

General Limitations

Contrary to expectations, this study did not find a significant difference
between narrative type and a graphic type. A possible explanation for no effects for the
narratives and visualizations can be ascribed to limitations of this study. The conceptual
type of graphic might have been too simple, and chronological too complex.
It is also possible that, for the undetected impact of the narratives, might have been due to the fact that participants found the materials too complex and too long in time. Still, however, as we mention above, we can argue that the experiment itself, and the materials it contained, were closer in their ecological validity to real-life courtroom conditions. And, the level of the materials were built on a real legal case that was very complex in nature.

Findings in Limitations

Limitation Finding 1 Graph Type/Narrative Type Insignificance vs Split Attention vs Redundancy Effect

Multimedia theory (Mayer, 2001) describes a redundancy effect that often occurs when presented information is repeated through different channels. Although it can be very beneficial for novice learners, it does, at the same time, cause confusion for those learners who are familiar with the domain, e.g. students with majors in criminology, law, forensic psychology, etc.

Another explanation of this might be due to incongruency of the visualization and narrative information of different types in some conditions. We may hypothesize that this incongruence led to switching attention and choosing a convenient source and channel of the information between the two. In addition, some participants were exit interviewed randomly and their interviews suggested the importance of thinking about their attempts of integrating information from the audio narratives and the visual display (see Split-Attention effect in Chandler, & Sweller, 1992).
Limitation Finding 2 Graphical Illiteracy vs. Trap of Multiple Information Representations

No effect from the visualizations may have been due to a problem of graphical illiteracy—specifically, not knowing how to read a graphic. In other words, participants lacked some skills of graphicacy, or knowledge of how to use visualizations displayed in front of them, which could have decreased a potential beneficial effect of the experimental diagrams presented in this study (Balchin, & Coleman, 1966). While this is a plausible consideration, it is important to point out that no measure of graphical literacy was used to assess the skill. Thus, while graphical literacy may have been operating during diagram processing, its presence and role is indeterminable in the present investigation.

Another explanation for insignificant results for the presence or absence of either of two types of graphics can be seen in the additional confusion participants showed on how to relate the graphic and the audio narration, or in other words, how they read and understood the graphic relative to the information they heard—in short, whether they “worked” with the graphic and tried to find a link with the narrative. Research by Ainsworth (2006) informs this phenomenon. Ainsworth argues that successful learning occurs when several factors are combined: design of the representation, its type and characteristics, domain familiarity, age, and individual differences. That is, learning from multiple representations can be demanding due to the task complexity since it requires a lot of cognitive resources for “translating” between multiple representations as well as the functions of the types of multiple representations and their display features.
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