An Eye for Accounting
Studies Investigating Judgmental Effects of Visual Cues in Accounting Communication

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Dissertation presented at Uppsala University to be publicly examined in Hörsal 2, Ekonomikum, Kyrkogårdsgatan 10, Uppsala, Friday, 24 April 2020 at 13:15 for the degree of Doctor of Philosophy. The examination will be conducted in English. Faculty examiner: Professor Jonas Gerdin (Örebro University School of Business).

Abstract

This dissertation investigates judgmental effects of visual cues in accounting communication. The dissertation comprises a comprehensive summary and four empirical studies. My overall objective is to highlight the relevance of the visual to both accounting theory and practice by empirically demonstrating that, in corporate reports, visual elements juxtaposed with accounting information can significantly influence report readers’ evaluative judgments regarding corporate performance. My research aims to bring theoretical work on framing and the power of the visual into the accounting domain, focusing predominantly on the emotive power of visual imagery and color. Using experiments and complementary methods such as interviews and eye-tracking, the empirical studies demonstrate that these supplementary visual elements, despite not conveying any additional facts, can indeed influence report readers’ evaluative judgments regarding various aspects of communicated corporate performance. In line with psychology-based theoretical propositions that frames can promote different interpretations, the combined results suggest that the presentation format of accounting information does matter for evaluative judgments of corporate performance, and that information-redundant but affect-laden visual cues in accounting discourse can systematically affect stakeholder understanding. A central line of argument in this dissertation is that in an increasingly visual society, it is essential to gain a more nuanced understanding of the psychological effects of visual graphics in accounting discourse if we are to advance our understanding of accounting-related judgment and decision making. The potential judgmental effects of visuals in accounting communication has so far received little attention in accounting research or from regulators, and the display of visuals is currently not considered by general guidelines regarding corporate reporting. My overall motivation for this research is to address this incompleteness in extant accounting research and practice.

Keywords: Behavioral accounting research, Visuals, Framing, Accounting communication, Judgment and decision-making

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ISSN 1103-8454
urn:nbn:se:uu:diva-406031 (http://urn.kb.se/resolve?urn=nbn:se:uu:diva-406031)
Acknowledgements

First of all, I want to thank my supervisors Jan Lindvall and Frank Hartmann. This PhD trajectory has been a long and eventful journey and I really appreciate all your guidance, wisdom, encouragement, patience, and support over these years.

I also want to thank all research colleagues and administrative staff who have helped advance this thesis project. A special word of thanks to Lars Fri-mansson, Janina Hornbach, Fredrik Nilsson, Göran Nilsson, Inger Persson, James Sallis, and Fredrik Tell for helpful comments on previous versions of this work. I also wish to express my gratitude to Associate Professor Tobias Johansson, Örebro University, for valuable feedback at my final seminar.

Mattias Kierkegaard and Tomas Mäkinen — thank you for all your support of my efforts to combine this research project with our joint teaching commitments. For that, and much more, you have been the best colleagues I could have wished for.

I also want to thank Svenska Revisionsakademin and Tom Hedelius Foundation for financial support in the collection of empirical data for this dissertation.

Last, but certainly not least, I want to express my deepest gratitude to all the ones who created a sense of togetherness around me when I needed it the most. My family, friends and close colleagues, I really want to thank each one of you, so much so that the words are too personal to go onto this page. What I will say here, though, is that without your support this thesis would not have been completed. For that, and much more, I am forever grateful.
This thesis is based on the following empirical studies, which are referred to in the text by their Roman numerals.

I  Backman, J. Imagination the Benefit of CSR: The Judgmental Effect of Affect-laden Visual Imagery in Social Accounting Reports


III Backman, J. & Hartmann F. The Effect of Color use in Management Reports: A Study of Performance Judgments Using the Balanced Scorecard

IV Backman, J. & Hartmann F. The Judgmental Effect of Traffic-Light Colors in Balanced Scorecard Reports: An Experimental Study Among Professional Controllers
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1. Introduction

We live in an increasingly visual society (e.g. Gabriel 2013; McCosker & Wilken 2014), a trend that is also reflected in contemporary accounting communication practice (Federation of European Accountants 2015; Davison 2015; Beattie et al. 2008; Hopwood 1996). Where corporate reports once relied solely on alphanumerical information, visual materials now increasingly accompany the numbers and narratives in these documents (Davison & Skerratt 2007; Beattie et al. 2008; Usmani 2018). This trend is most noticeable in external accounting reports (which often use glossy visual images and photographs, e.g. Beattie et al. 2008; Lee 1994; Graves et al. 1996; McKinstry 1996) but also in internal accounting reports (which often use visual techniques like color-coding and graphics in their presentation format, e.g. Dilla et al. 2010; Kelton et al, 2010; Few 2013).

From a rational-economic perspective, paratextual elements in the form of photographic imagery and displays of color should not influence report readers’ judgments regarding corporate performance if these elements do not convey additional facts to the accounting information provided in corporate reports. However, based on empirical findings in behavioral economics and cognitive psychology research, there is reason to believe that these visual elements albeit can “do something” to the information with which they are juxtaposed, where the most salient distinction between the relative effects of alphanumerical and visual material arguably seem to concern their emotive impact (Slovic and Slovic 2015). Numerous empirical studies in these fields suggest that seemingly irrelevant presentation elements can frame the information in a way that impacts interpretation and ultimately human evaluative judgments made based on the provided information (e.g. Kahneman and Tversky 1979; Bazerman 1984; Levin et al. 1998; Kühberger 1998). Furthermore, visual perceptions are thought to play a predominant role in the human sensory system (Wade & Swanston 2013; Fenko et al. 2010) with several distinguishing properties that argue for why visual attributes could constitute powerful elements for message framing, and thus have important implications for human judgment and decision making. First, the display of visual imagery or color, due to its strong visual salience, seems to guide human information processing by highlighting a specific feature or steering the reader’s attention (Lurie & Mason 2007; Jarvenpaa 1990). Second, visual elements, such as color and photographs, can carry emotional meaning and induce psychologically relevant associations (e.g. Messaris 1997; Kress & Van Leeuwen 1996;
Barry 1997; Elliot 2015). Third, visuals may not be as explicit and as accurate as text for explaining propositions such as cause-and-effect relationships, and this attribute may pose a challenge for identifying frames, although a specific visual syntax may well have been created through mere an editorial choice. Compared to numbers and words, visuals like photographs are relatively analogous to the real objects they represent (Messaris and Abraham 2001). Because of this, viewers may not question what they see and overlook the fact that these elements may, at least to a certain degree, be constructions of reality based on unacknowledged acts of selection and cropping, choosing one view over the other, or selecting one image over numerous alternative others.

Based on aforementioned theoretical arguments and the prevalence of visual material in contemporary corporate reporting, one might expect that a significant body of research is being done to examine the role of the visual in the domain of accounting communication. Yet, the role of the visual as an element of communication seems to have gone largely unattended not only by academic researchers, but also by regulators and standard-setters in the field of accounting (Davison 2015). Admittedly, some critical accounting research studies have been published that highlight the increased presence of visual elements in accounting reports (e.g. Lee 1994; Graves et al. 1996; McKinstry 1996). However, research has given little consideration to how these visual elements may interplay with the formal language of accounting (numbers and text) and whether multimodal presentation formats can impact the semantic interpretation of reported corporate performance, thus altering accounting-related judgment and decision-making. Whereas the visual has been recognized as a powerful, expressive, and performative media in the field of humanities (e.g. Sontag 2001; Berger 2008; Mitchell 1995, 2015) and some other social science disciplines such as psychology (e.g. Wade & Swanston 2013; Balcetis & Lassiter 2010) and anthropology (e.g. Alfonso et al. 2004; Pink 2013), this kind of interest has been slow to infiltrate the accounting domain where the visual predominantly seems to be regarded either as empty decoration or as transparent information (Davison 2010, 2014, 2015). As proposed by Davison (2015), the explanation for this delay may, at least partly, be due to the apparent occupation of polar positions by the disciplines involved: at least conventionally, accounting is associated with objectivity and rigor, while visual culture is linked with subjectivity and imagination. This suggestion is also in line with the argument by Macintosh (2004), who suggests that part of the reason for the neglect of the visual lies in the dominance of the information paradigm in accounting where reports have been seen as neutral carriers of messages rather than documents that in themselves constitute perceived reality and meaning.

In stark contrast to this apparent lack of consideration (among e.g. accounting academics, regulators and standard-setters) for the perceptual influence of the visual, certain stakeholders, such as the producers of accounting reports, seem to have come significantly further in recognizing the potential power of
the visual as a communication device. Where corporate reports once relied solely on numerical and textual information, many of today’s publicly listed companies allocate substantial budgets towards creative graphic designs for their accounting communications (Davison 2015). The increasingly large abundance of visual material is reflected not least in external documents, such as annual reports (Lee 1994; Graves et al. 1996; McKinstry 1996; Davison 2011) and corporate social responsibility (CSR) disclosures (Rämö 2011; Davison 2015; Usmani 2018). Consequently readers of contemporary accounting reports, more than ever before, are exposed to multimodal presentation formats where they need to navigate between aggregated data and vivid small-scale illustrations while processing information.

At the same time that accounting discourse has taken this ‘visual turn’, information technology has developed in such a way that there has been an information explosion, and vast amounts of business information are now being produced and presented to corporate stakeholders, often in the form of numbers and statistics (Slovic & Slovic 2015; Beath et al. 2012). This general abundance of numerical data in today’s information society has given rise to an emerging stream of psychological research identifying human phenomena referred to collectively as ‘numerical numbness’ (Maier et al. 2017; Slovic & Slovic 2015) and ‘statistics fatigue’ (Slovic 2007). These terms give name to the human tendency to struggle to discern the most essential facets of all the information available to them in contemporary society (Eppler & Mengis 2004; Shenk 1997) as well as our innate inability to grasp the meaning of large numbers (Slovic 2010). As proposed by Slovic & Slovic (2015), numbers – in and of themselves – typically lack the ability to move us. Aggregated numbers convey little about the people they represent – what they feel, how they sound and look. Thus, numbers tend to leave audiences numb and render messages devoid of meaning. The human mind’s difficulty in attaching visceral, emotional meaning to numbers, thus potentially leading to the numbing effects of numerical discourse, has not received much consideration in the accounting literature.

In this dissertation, I introduce the theoretical argument that, given the potentially desensitizing effect of aggregated data (which often characterizes the formal language of accounting), the supplementary use of more vivid visual elements, such as photographic images or specific color schemes, may in fact function as powerful framing devices in accounting discourse, because visuals tend to strike us emotively much more than pallid alphanumerical data. From the vantage point of psychology and with a focus on the emotive power of visual representations, this thesis then explores this hypothesis by empirically investigating whether the presence of supplementary visual elements in the communication of accounting information may influence human judgment regarding reported corporate performance.
1.1 Overall objective and research question

The objective of this dissertation is to highlight the relevance of the visual to both accounting theory and practice by empirically demonstrating that, in corporate reports, visual elements juxtaposed with accounting information can significantly impact report readers’ evaluative judgments regarding reported corporate performance. Based on a series of empirical studies in different accounting reporting contexts, this thesis addresses the overall research question about whether visual elements (that do not provide any additional facts) have the power to change the semantic interpretation of communicated accounting information in a corporate reporting context. In a larger perspective, the objective of this thesis is to help develop accounting policy and practice through increasing our knowledge about the role of human psychology in accounting information processing. A central line of argument is that in an increasingly visual society, it is essential to gain a more nuanced understanding about the psychological effects of visual graphics in accounting discourse in order to advance our understanding of accounting-related judgment and decision making. As mentioned, the potential judgmental effects of visuals in accounting communication has so far received little systematic attention in accounting research and is not addressed in policy guidelines, and from a regulatory perspective, the display of visuals is currently not considered by general corporate reporting guidelines (Davison 2015). My overall motivation here is to address this incompleteness in extant accounting research and practice.

1.2 Intended research contributions

First, this thesis intends to advance extant accounting research by addressing the seemingly common assumption that accounting information is objective and factual rather than (to varying degrees) subjective and value-laden. Specifically, the empirical research studies included in this dissertation show that supplementary visual elements are potential sources of cognitive bias in performance evaluations based on information provided in accounting reports. This research thus aims to bring various literatures on the power of the visual into the accounting domain, focusing predominantly on the emotive power of visual form. Both the role of the visual and the role of emotion (affect) are topics that so far have been highly understudied in accounting or economic theory (Davison 2015; Kahneman 2003a; Elster 1998). In this thesis, I link these two factors together based on the hypothesis that visuals often tend to carry an emotional salience that can make these elements particularly powerful in influencing human judgment, also in an accounting communication context. To my knowledge, the empirical studies included in this dissertation are the first that explicitly connect psychology theory and visual research to specific accounting communication practices, and the first that experimentally
investigate the impact of visual elements such as photographs and color on human evaluative judgment of reported corporate performance. Although much still remains to be discovered about how, and under what circumstances, supplementary visual material can affect human judgment and decision-making in accounting discourse, the empirical results reported here show that visual elements commonly used in corporate reporting may have significant bearing on the semantic interpretation of corporate performance, thus affecting accounting-related judgment and decision-making. These results therefore bear directly on the foundations of accounting theory.

Second, because the theoretical foundation of this thesis is on behavior economics and framing theory (see chapter two for more details), the thesis also contributes to (psychology-rooted) framing research. To date, framing research has predominantly focused on the judgmental effects of altering the formulation (presentation) of alphanumerical information (Geise 2017; Reese et al. 2001); the potential judgmental effects of altering the presentation of alphanumerical information through the supplementary use of visuals remains relatively unexamined (Rodriguez & Dimitrova 2011). By integrating extant literature on framing with findings in visual research, this dissertation adds to an emerging body of research focusing explicitly on visual elements as potential devices for framing. This thesis contributes to framing theory in general and visual framing theory in particular by exploring boundaries of the framing effect; that is, the conditions under which framing effects occur, and the contextual factors that may moderate the effect of framing on human information judgment.

Finally, this thesis aims to contribute methodologically to both behavioral accounting research and framing research by demonstrating potential benefits from using a mixed-methods research approach, not just between empirical studies but also within individual studies conducted. The first two empirical studies reported here show that complementing quantitative data from controlled experiments with qualitative interview data can add substantial value to this type of behavioral research, not only in terms of validation of obtained experimental results, but also in terms of generating narratives that illustrate and nuance these findings, thus improving the basis for developing more refined hypotheses to formally test for in future research.

1.3 Outline of empirical studies I – IV

This dissertation comprises four empirical studies that are briefly outlined below. Empirical Study I and II are studies developed and performed solely by myself where I am the single author. Empirical Study III and IV are dual-
authored\(^1\) studies where I am the main author. All empirical data presented in Empirical Study III were both collected and analyzed solely by myself. The empirical data presented in Empirical Study IV were collected in collaboration between both authors but the data have been analyzed solely by myself.

**Empirical Study I**

*Imag(in)ing the Benefit of CSR: The Judgmental Effect of Affect-laden Visual Imagery in Social Accounting Reports*

Using a mixed-methods sequential design consisting of a controlled experiment and retrospective interviews, this study investigates the judgmental effect of affect-laden visual imagery in accounting reports. More specifically, the study examines the impact of affect-laden photographic images in a corporate social responsibility (CSR) report on readers’ appraisal of reported company activities in the area. The results of the controlled experiment (conducted in the first phase of the study) suggest that the display of visual imagery amplifies a reader’s perceived benefit of the reported CSR work, but that there are boundaries to this effect depending on the profile of the company to which the report relates. The retrospective interviews (performed in the second phase of the study) identify some key themes that tentatively explain this difference in framing effect. Generally, pictures seem to evoke an emotional response, but this effect can be either enhanced or discounted depending on perceived source credibility and whether the picture content is in congruence or in conflict with the reader’s pre-disposed attitude towards the specific profile of the company. The implications of these findings are discussed in light of current theory and practice of accounting communication.

**Empirical Study II**

*The Effect of CEO Facial Portraits in Financial Reporting: A Study of Performance Judgments Using the Annual Report*

Using a mixed-methods sequential design consisting of two controlled experiments and the supplementary use of retrospective interviews and eye-tracking, this study investigates the role of affect-laden photography in evaluative judgment of corporate performance information provided in accounting reports. More specifically, the study examines the judgmental impact of CEO facial displays in proximity to financial information presented in an annual report format. The results of the study suggest that when the semantic meaning of the presented performance information is ambiguous in valence, the presence of a happy facial display (compared to a neutral facial display or no pho-

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\(^1\) Empirical studies III and IV were developed in collaboration with my supervisor Professor Frank Hartmann, Rotterdam School of Management, Erasmus University.
tographic display at all) significantly increases a reader’s inclination to perceive the reported corporate performance as positive rather than negative. Supplementary empirical analyses based on eye-tracking and retrospective interviews indicate that the visual portrait of the CEO draws visual attention, but that readers do not acknowledge either its presence or influence when verbally accounting for their evaluative judgments. The implications of these findings are discussed in light of current theory and practice of accounting communication.

**Empirical Study III**

*The Effect of Color use in Management Reports: A Study of Performance Judgments Using the Balanced Scorecard*

Using a between-subjects experimental design, this study investigates the effect of adding color cues to quantitative performance information presented in an internal accounting report. More specifically, the study examines whether the supplementary use of both green and red colors to signify above and below target performance levels could have a polarizing effect and systematically affect performance evaluations in a Balanced Scorecard (BSC) reporting context. In the experiment, participants were provided with scorecards that either had no colors (baseline), or green and red colors superimposed on the presented financial metrics. The results show that the combined use of green and red colors to signify above and below target performance levels in a BSC report can have a polarizing effect on perceived performance difference between business units, thus implying that the display of color can systematically influence the evaluation of business performance in an accounting reporting context. The implications of these findings are discussed in light of current theory and practice of accounting communication.

**Empirical Study IV**

*The Judgmental Effect of Traffic-Light Colors in Balanced Scorecard Reports: An Experimental Study Among Professional Controllers*

Using a full factorial experimental design, this study also investigates the effect of adding traffic-light colors to quantitative performance information presented in an internal accounting report such as the Balanced Scorecard (BSC). This study however extends the work of Empirical Study III in two distinct ways. First, this study tests whether the polarizing effect of the combined use of green and red colors, which was found significant in the sample of business students used in Empirical Study III, also appears in a sample of professional controllers. Second, this study tests for a potential asymmetry in the individual effect of the color green and the color red on performance judgments among these professional subjects. The experimental results of this study do not lend
statistical support for red and green color cues (either in isolation or in combination) having a significant effect on BSC performance ratings in this latter sample. The difference in results across samples (business students versus business professionals) suggests that the effect of color cues on evaluative judgment in a BSC context may be moderated by certain user profile characteristics. The implications of these findings are discussed in light of current theory and practice of accounting communication.

1.4 Motivation and disposition

The underlying motivation for my studies has been to identify and design a number of commonly used business reporting documents for accounting information communication where the overall research question about whether juxtaposing information-redundant but affect-laden visual cues may affect human perception of reported corporate performance could be tested. In some respect, the studies can also be seen as theoretical extensions of one another. The results of Empirical Study I show that visual imagery surrounding non-financial performance information, at least under certain conditions, can have a significant impact on readers’ evaluative judgments of corporate performance. This result motivated the subsequent exploration in Empirical Study II as to whether the presence of affect-laden visual imagery could also influence evaluative judgment of ‘harder’ financial performance information. The focus in Empirical Study III, like Empirical Study II, is to test for the judgmental effect of affect-laden visual cues on the valuation of financial performance information. However, in this study, attention is shifted to another type of visual cue, namely color, and its possible effect on corporate performance judgment. Furthermore, the effect of color is explored in an internal, rather than external, accounting reporting context. Empirical Study IV extends the work of Empirical Study III and examines additional nuances by examining potential asymmetries between individual color effects (green versus red respectively) and whether color also affects perception if report readers have professional experience with accounting information processing.

The dissertation is organized as follows. In the next chapter, I provide an overview of and discuss the theoretical domain in which I position my research. In chapter three, I account for and reflect upon the methods used in conducting the empirical studies making up this dissertation. The fourth chapter provides a brief summary of the main empirical findings and then proceeds with a concluding discussion where the insights from the different studies are brought together and discussed in light of the overarching aim of the dissertation. Finally, in chapter five, I outline the theoretical and practical implications of the dissertation, which are followed by some suggestions for future research.
2. Theoretical foundation

This chapter is intended to provide a framework of the theoretical domain in which I position my research. In essence, my ambition with this chapter is to clarify the common theoretical bases on which the empirical studies of this thesis are built, to explain the common, underlying logic behind each of the four empirical studies, and to demonstrate the principal theoretical contribution of the dissertation. It should be noted that this chapter does not provide an exhaustive overview of all relevant accounting literature related to the particular themes and contexts in the empirical studies – for those specific, in-depth discussions, the reader is referred to theoretical frameworks presented in each empirical study – rather the intended purpose of this chapter is to serve as a foundation and complement to the theoretical sections of the individual empirical studies.

2.1 Definition of concepts

Accounting can be studied using different theoretical perspectives (Riahi-Belkaoui 2012). In this thesis, I adopt an information perspective in the sense that I study the impact of the presentation format on accounting information judgment. Like the field of economics, contemporary accounting research has been strongly impregnated by decision theory originating from the Von Neumann-Morgenstern expected utility theorem using axioms of rational behavior (Von Neumann & Morgenstern 1947). From an information perspective, these objectivist philosophical assumptions presume that accounting-related decisions constitute neutral and mechanical responses to signals from the accounting information system (Lavoie 1987). This may, at least partly, explain why mainstream accounting research, to a great extent, has departed from the type of communication models originally brought forward by Shannon-Weaver (1949), thus placing much larger focus on the technical and syntactic properties of accounting information rather than on the possible semantic interpretations that can be made in the human processing of this information (Boland 1993; Macintosh 1985). This thesis focuses on the latter aspect by examining whether visual elements juxtaposed with accounting information can significantly influence evaluative judgment regarding reported corporate performance. In advance of presenting the choice of theoretical basis for this thesis work, some central concepts relevant to this dissertation are explained.
Accounting information

First, there is the question of what *accounting* information is. As pointed out by Pitkänen and Lukka (2011), this has long been seen as information, often financial, produced as part of a regular feedback loop intended for following up plans and goals (e.g. Otley & Berry 1980). For the past few decades, a number of broader approaches to accounting information have been introduced, including both financial and nonfinancial aspects, e.g. the balanced scorecard (Kaplan & Norton 1996) and integrated reporting (Rinaldi et al. 2018). In this thesis, I adopt this broader definition of accounting information. Thus, both financial and nonfinancial periodic information used to evaluate and hold people accountable are here included under the umbrella term accounting information. Using this broader definition, accounting information can furthermore have both a quantitative dimension (numbers) and a qualitative dimension (narratives), as long as the information fits the criteria of taking a feedback-oriented approach, that is, that the information is periodic and intended to evaluate and hold people accountable.

Second, there is the question of what *information* is. Due to its manifold nature, there is a plethora of different interpretations of what information actually is (Floridi 2010). In certain fields of research, a strong differentiation is made between data and information (Frické 2009) and some scholars argue that information can be seen as the refined product of data, or as abstractions that have been interpreted and endowed with meaning (e.g. Boland 1993). In the information systems literature, Langefors (1995) discusses two steps of interpretation, from data to information, and from information to inference. In this dissertation, I do not use the words ‘data’ or ‘information’ to signal that I am referring to different stages of the interpretation process. I sometimes use the word ‘data’ when referring to something that is encompassed in an information system, such as the balanced scorecard, but apart from that, I use the terms data and information interchangeably. In that sense, I tend to use the word information in a fairly colloquial sense when discussing human processes of judgment and decision-making.

Visuals

Attributes such as drawings, illustrations, photographs, color displays, and other graphic devices are commonly and collectively referred to as *visuals* in this thesis. The foci of the empirical examinations comprising this dissertation are however limited to static, non-interactive presentation formats and the specific visuals of photographic imagery and traffic light colors.

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2 Strictly speaking, accounting information can serve more purposes than holding people accountable. As outlined in Simon et al. (1954), accounting information can also be used for attention focus, decision support, and score keeping.
Evaluative judgment
This thesis examines whether visual elements that are juxtaposed with accounting information in corporate reports can significantly alter report readers’ evaluative judgments regarding reported corporate performance. From a more general perspective, the term judgment can be defined as the assessment of an external or internal stimulus on an internal scale (e.g., subjective brightness of a light, pain, perceived saltiness of certain food, etc.) which is considered a fundamental pre-requisite for decision-making and other cognitive processes (Bazerman & Moore 2009). An evaluative judgment (e.g., ‘I find performance of organization X satisfactory; yes/no’) is a special type of judgment in which the internal scale is related to a person’s value system, including preferences and norms (Zysset et al. 2002; Jacobsen et al. 2006). This type of judgment plays an important role in people’s everyday activities and is a central component of any choice process where the decision-maker has to evaluate alternatives, attributes, risks, etc. Evaluative judgments are not restricted to decision-making situations. They can also be made in connection with attitudes and in the context of personal preferences (e.g. ‘I like this organization’) or religious, aesthetic, social, or other values (Winkielman et al. 2003; Zysset et al. 2002).

It should be noted that this thesis focuses on the type of evaluative judgments that are made under uncertainty and relates to what Simon (1947) refers to as non-programmed decision making. In other words, the type of evaluative judgments addressed in this thesis do not have any identifiable rules or pre-programmed decision procedures. The term evaluative judgment is elaborated on in further detail in section 2.3.2.

Affect and emotion
While most people can relate to and intuitively give examples of different kinds of emotions, such as happiness, anger, fear, and sadness, it is more difficult to give a general definition of what emotions actually are. Unlike other instinctive factors, such as hunger, and tiredness, emotions are typically triggered by beliefs (e.g. Lewis et al. 2010; Elster 2009). Emotions are also generally considered to have an intentional object: they are about something, for example a person or a state of affairs (e.g. Deonna & Scherer 2010). Emotional states can cause physiological changes to hormone levels and the automatic nervous system (e.g. Frijda 1986; Levenson 2014), and can also result in characteristic, observable expressions such as bodily posture (e.g. Dael et al. 2012; Coulson 2004), voice pitch (e.g. Kamiloğlu et al. 2020; Murray & Arnott 1993), and facial expression (e.g. Ekman 1984, 1993, 1999). Although one can describe some central characteristics, the concept of emotion is still inherently fuzzy, and there is no generally agreed-upon scientific definition of it in academic discourse (Fox 2018; Frijda 2016; Mulligan & Scherer 2012; Sander & Scherer 2009; Scherer 2005). This lack of consensus may, at least in part,
be due to emotion being a multicomponential phenomenon regardless of which perspective emotion is being studied from (Lewis et al. 2010).

In this thesis, the concept of emotion is approached from the vantage point of psychology, using a working definition of emotion that does not stray too far from the way in which the word is used in ordinary language. Emotion is here referred to as a complex psychological event that may involve a mixture of reactions: a physiological reaction (usually arousal), an expressive reaction (distinctive facial expression, body posture, or vocalization), and some kind of subjective experience (internal thoughts and feelings) (Nairne 2000). In psychology, the term ‘valence’ is often used in relation to emotion in order to denote the fact that emotions can be located on a pleasure-pain scale, with a neutral zero point of emotional indifference (e.g. Colombetti 2005; De Houwer & Hermans 2001). This term is also used in this thesis work to categorize potential emotion(s) evoked from visual cues in accounting reports as either positive (pleasant) or negative (unpleasant). In this thesis, I furthermore use the term affect in relation to this broader categorization of specific emotions, using the definition of Slovic et al. (2007) where affect is described as “the specific quality of “goodness” or “badness” experienced as a feeling state (with or without consciousness) that demarks whether the emotive quality of a stimulus is positive or negative. In section 2.3.2, the concepts of affect and emotion are further elaborated on in relation to human judgment and decision-making.

2.2 Choice of theoretical perspective

Broadly speaking, I consider this research to be in the field commonly defined as ‘behavioral accounting research’ (BAR), a branch of accounting that strives to develop an understanding of both cognitive and affective elements of human behavior that influence judgment and decision making in accounting contexts and settings (Birnberg and Shields 1989; Birnberg 2011). Specifically, I position my research within the sub-field of BAR that focuses on accounting information processing and which predominantly draws on behavioral economics to address how noneconomic dimensions may affect individual accounting-related judgment and decision-making (Birnberg 2011). Having said that, this labelling of my research must to some degree be considered subjective and non-exclusive, in the sense that another type of research classification system may assign a somewhat different label for this type of research (see for e.g. the mapping by Luft & Shields 2003). Therefore, studies focusing on the role of presentation format in judgment and decision-making relevant to accounting behavior can also be found in a number of literatures formally categorized under other research labels, such as ‘mainstream’ accounting, behavioral finance, behavioral economics, and management information systems (e.g., Thaler 2005; Barberis and Thaler 2003; Birnberg 2011).
2.3 Bounded rationality and behavioral economics

In virtually all real-life situations related to accounting information processing, humans are likely to make judgments and decisions under various constraints such as limitations in available information, cognitive capacity, and time allowance. Yet models of rational decision making, that traditionally have largely formed the basis for explaining and predicting human behavior in the economic literature, tend to ignore these actual constraints (Thaler 2016; Doucouliagos 1994). Increasingly, the idea of ‘bounded rationality’, a concept originally introduced by Herbert Simon (1955) as a shorthand protest of the neoclassical economic school, has come to impregnate the economic sciences in the last two decades. Unlike the expected utility-based approach underlying models of so-called ‘rational choice’ (Von Neumann & Morgenstern 1947), the concept of bounded rationality builds on cognitive psychology and implicates that decision-makers, due to limitations in time, cognitive ability, and tractability of decision problems, act de facto as decision makers seeking a ‘good enough’ solution rather than an optimal one (Simon 1955). Since the inception of the concept of bounded rationality, the meaning of ‘rationality’ itself has been a topic in academic discussions (e.g. Sugden 1991; Read 2007; Milkman et al. 2009), some of which arguably fall outside the scope of this dissertation. In this thesis, the idea of ‘bounded rationality’ is viewed neither as optimization under constraints nor as a fallacy in human reasoning. Rather, the concept serves as a theoretical point of reference for my research hypothesis, which is that non-economic factors may influence people’s evaluative judgment of accounting information. Bounded rationality represents a fundamental idea about human psychology underlying the emergence of the field behavioral economics, which constitutes the theoretical foundation on which the empirical studies of this thesis rest.

‘Behavioral economics’ refers to the study of observed economic behavior and, in contrast to the standard economic model, does not assume that people always fulfill the strong assumptions regarding rationality. From a practical perspective, behavioral economics is often concerned with empirical tests of the standard economic model on humans, examining when it works and when it does not, and asking whether it can be tweaked, or given an overhaul, to better fit what is observed (Wilkinson & Klaes 2012). More specifically, behavioral economics is typically about applying insights from laboratory experiments, psychology, and other social sciences in economics in order to get

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3 In 2002, psychologist Daniel Kahneman received the Nobel Memorial Prize in Economic Sciences for having integrated insights from psychological research into economic science, especially concerning human judgment and decision-making under uncertainty. In 2013, economist Robert J. Shiller was awarded the Nobel Memorial Prize in Economic Sciences for his empirical analyses of asset prices within the field of behavioral finance. In 2017, economist Robert Thaler was awarded the Nobel Memorial Prize in Economic Sciences for his contributions to behavioral economics and his pioneering work in establishing that people are predictably irrational in ways that defy economic theory. (Sanderson & Siegfried 2019).
a better understanding of economic behavior (Thaler 2016). While some psychological issues treated in behavioral economics can be traced all the way back to Adam Smith and his *The Theory of Moral Sentiments* (1759), it was first in the 1960s onwards that psychology gradually started gaining substantial influence in the field of economics (Ashraf et al. 2005; Wilkinson & Klaes 2012; Thaler 2016). In his work, Simon (1955) seriously questioned whether people, in real-life situations of any complexity, would be able to perform the kind of computations proposed by standard economic theory. For his ‘pioneering research into the decision-making process within economic organizations’, Simon was awarded the Nobel Prize in Economics in 1978 (Sanderson & Siegfried 2019).

Still, one thing lacking in much of Simon’s work was empirical evidence for his theoretical arguments that *Homo Economicus* is not a good approximation of how people behave (Wilkinson & Klaes 2012). Substantial empirical evidence was provided in the late 1970’s, when psychologists Daniel Kahneman and Amos Tversky (1979) started to conduct a series of controlled experiments, in the vein of Simon’s work, in order to empirically map out ways in which people’s preferences and decision choices deviated from outcomes predicted by normative models of rational decision-making. Starting with the assumption that rational choices must satisfy some minimal requirements of consistency and coherence, Kahneman and Tversky were able to demonstrate that people by default do violate these requirements, depending on how the decision problem is presented, or in other words, how information is ‘framed’.

### 2.3.1 The role of framing in judgment and decision-making

Framing is a concept that since the late 1970s has been of interest to scholars in a variety of fields – not only in psychology and behavioral economics, but also in disciplines like communication studies, political science, and sociology (Cacciatore et al. 2016; Cornelissen & Werner 2014). Scholars in these different disciplines have however conceptualized, and consequently operationalized, the term ‘framing’ in different ways (Scheufele & Iyengar 2012), which has created a great deal of ambiguity about what framing actually means in the management literature (Cornelissen & Werner 2014) and in the social science literature at large (Entman 1993). Definitions have varied, and still vary, from the relatively narrow one in psychology where frames are described as informationally equivalent labels (e.g. Kahneman 2003a; Kahneman & Tversky 1984; Tversky & Kahneman 1981, 1986), to a significantly looser definition in sociology (e.g. Gamson and Modigliani 1987, 1989; Goffman 1974), where the distinction between frames and other informational or persuasive features of messages become less clear (Scheufele & Iyengar 2012). It should therefore be stressed that the conceptual treatment of framing in this dissertation is in the vein of the psychology-rooted tradition.
Framing, from the theoretical perspective taken in this thesis, builds on a tradition of thinking in psychology stemming from the pioneering work on prospect theory by Kahneman and Tversky (1979, 1984). In a series of controlled experiments, they gave people choices that had identical expected economic values, but that differed in the terms used to describe the choice options (e.g., choices between X probability of “winning” or 1-X probability of “losing” some amount of money). The results of the experiments showed a systematic variation in people’s preferences and choices depending on how the information was formulated, or framed. When presented with outcomes defined as potential gains, people showed risk aversion and chose a more certain payoff. In contrast, when the identical expected outcome was defined in terms that suggested potential losses instead of gains, people became more risk-seeking and made choices with a less certain payoff (for a more detailed overview, see Kahneman 2003a). In subsequent works, Kahneman and Tversky (1981, 1984, and 1986) found that judgmental effects stemming from presentation format could be produced across a variety of issues and choice problems. Based on these findings, they concluded that human choice is contingent on the description of choice problems, or how information is contextualized or formulated, rather than just the expected economic utility of those options. Thus, prospect theory came to constitute a descriptive alternative to Von Neumann and Morgenstern’s (1947) expected utility theory which, according to most economists characterized how a rational agent should make risky choices (Thaler 2016). Because Kahneman and Tversky’s first article (in 1979) on this psychological phenomenon was published in an economic journal, their work – and psychological theory at large – came to add a ground-breaking dimension to economics, where models of rational decision making had long been the axiom, assuming at least implicitly that individuals were immune to any kind of information framing. The impact of their work on the field of economics was further cemented when Kahneman was awarded the Nobel Prize in Economics in 2002 for “having integrated insights from psychological research into economic science, especially concerning human judgment and decision-making under uncertainty” (Sanderson & Siegfried 2019, p. 174).

Providing a complete exposition of the psychological models proposed since then to explain the variety of underlying cognitive and emotional mechanisms that could work behind a framing effect is beyond the scope of this thesis (for a detailed overview see Kahneman 2003b). Instead, I will present here a somewhat simplified theoretical account of how the framing phenomenon is accounted for in the behavioral economics literature. A general explanation for the framing effect is that the manner in which information is presented influences the schema or mental strategies called upon to process that information (e.g. Vessey 1991; Kumar & Benbasat 2004). As humans have

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4 Amos Tversky died in 1996 and was therefore not eligible for the Nobel Prize since its rules prohibit posthumous awards (Shefrin & Statman 2003).
selective attention (Simon 1986) as well as other boundaries in our perceptions (e.g. Baumard & Starbuck 2005), people tend to rely on simplifying strategies or mental short-cuts (in the behavioral economics literature often referred to as heuristics) as a way of handling information complexity in their decision-making (Bazerman & Moore 2009; Payne et al. 1993; Tversky & Kahneman 1974). Therefore, the presentation format of information, and especially more complex information, may play a significant role in human information processing (Bazerman & Moore 2009). Depending on how information is presented, certain elements of the information are emphasized, making some aspects of the communication more accessible, visible, or salient to an audience (Gitlin 1980; Bazerman & Moore 2009). Framing thus involves selection and salience in the sense that the deliberate action of framing involves the selection of some aspects of a given piece of information and making those aspects more salient in the communication in order to promote a particular problem definition, causal interpretation, evaluation outcome, or attitudinal judgment (Entman 1993). Research about this psychology-rooted approach to framing is sometimes called ‘equivalence framing’ because it relies on different but logically equivalent presentations to produce the framing effect (Scheufele & Iyengar 2012). My research is in this vein, as each of the empirical studies operationalize framing as a variation in how certain accounting information is presented to readers, and not a difference in what accounting information is being communicated in these documents.

2.3.1.1 Emerging research on visual frames

In the last few decades, more research has focused on framing, but the vast majority of experimental research on the role framing plays in judgment and decision-making has examined the potential judgmental effects of frames applied mainly through manipulations of words and/or numbers that can be used to express logically equivalent information in a given context (Rodriguez & Dimitrova 2011). More recently, some scholars have started to investigate whether the sample of frames should also include non-verbal, visual cues (Geise 2017; Scheufele & Iyengar 2012; Reese et al. 2001). Still, the judgmental effects of letting visual attributes (like images and color) accompany textual or numerical information remains relatively under-researched from an empirical standpoint (Rodriguez & Dimitrova 2011), an imbalance that is unjustified considering that visuals as modes of communication, have properties

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5 Because of the interdisciplinary roots of framing in sociology (Gamson and Modigliani 1987, 1989), linguistics (Lakoff and Johnson 1981) and psychology (Kahneman 2003a, Kahneman and Tversky, 1979, 1984), this latter, psychology-rooted, tradition of framing research is sometimes given the more specific label of ‘equivalence framing’ as it typically uses a more narrow definition of framing that only allows for variations in presentational mode between logically equivalent statements. (Scheufele and Iyengar 2012).
that could potentially both enhance and mitigate or possibly even override the messages embedded in the text (Messaris & Abraham 2001; Wishmann 1987).

This thesis focuses explicitly on this relatively new and unexplored category of visual framing research. A central aspect I consider in this research is that the supplementary display of certain visual cues, in this case specific photographic images or colors, can elicit and evoke emotion, thus influencing how the reader ‘feels’ about the accounting information provided in a corporate reporting context, which ultimately may alter his or her semantic interpretation and evaluative judgment of this information. In all four empirical studies included in this dissertation, differential effects of visual framing are investigated by manipulating the presentation format of an accounting report, specifically, by supplementing alphanumerical performance data with information-redundant but potentially affect-laden visual cues in the form of photographic imagery (Empirical Study I), photographic facial displays (Empirical Study II) and color cues (Empirical Study III and IV). None of the aforementioned visual elements provide any additional facts to the accounting information, but the mode of presentation is changed (made more emotive) through these visual displays being juxtaposed with the presented accounting information.

2.3.2 The role of emotion (affect) in judgment and decision-making

The concept of emotion, or affect, has long been recognized in many behavioral theories, but the main focus of descriptive decision research has traditionally been cognitive rather than affective (Bazerman & Moore 2009). In recent decades, researchers have increasingly noted that the incorporation of affect in models of decision making can greatly increase explanatory power (for reviews, see e.g. Clore et al. 2001; Schwarz 2001, 1990; Lerner & Keltner 2000; Forgas 1995). For example, a growing stream of psychological research suggests that affective reactions to stimuli occur rapidly and are evoked automatically prior to cognition, and that these reactions subsequently guide analytical information processing and judgment (Slovic et al. 2002, 2007; Damasio 1994; Loewenstein & Lerner 2003; Peters and Slovic, 2000). A strong early proponent of the importance of affect in decision making was Zajonc (1980), who argued that all perceptions contain some affect. For example, we do not just see ‘a house’, rather we see a handsome house, a pretentious house, or an ugly house. Zajonc (1980) further argued that people tend to delude themselves, and believe that they proceed in a cognitive manner with all the factual pros and cons of various decision choices, but that this is seldom the

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6 By information-redundant, I mean that the visual elements do not provide any additional facts (in this case regarding corporate performance) to the information already provided in the words or numbers.
actual case, as people tend to justify choices in line with their emotional responses. Since then, empirical, laboratory studies have demonstrated that information must convey affect to be meaningful; without perceived meaning, the information will not be used for judgment and decision-making, thus making affect a key ingredient in this process (Zajonc 1998; Slovic et al. 2002). Furthermore, contemporary psychological research posit that people use their present feelings when forming judgments, even when those feelings may have little or nothing to do with the object under evaluation (e.g. Clore et al. 2001; Lerner et al. 2004; Schwarz 2001, 1990).

There are many empirical examples of these general phenomena. For instance, it has been shown that emotions produced by listening to music or experiencing certain type of weather seem to be able to influence human judgments on a series of unrelated topics and objects (e.g. Bodenhausen et al. 1994; Schwarz & Clore 1983), including situations with concrete economic outcomes at stake (Lerner et al. 2004). If the evoked emotion stemming from a stimuli (e.g. music, weather, etc.) happens to be positive, then the decision maker’s evaluation of specific options are likely to be relatively positive, and vice versa for negative feelings (Schwarz 2001, 1990; Schwarz & Clore 1983). Similarly, people in good moods have been found to make more optimistic judgments and choices, while people in bad moods tend to make more pessimistic judgments and choices (Johnson & Tversky 1983; Schwarz & Clore 1983; Wright & Bower 1992).

At least part of the explanation for emotion affecting judgment seems to be that immediate emotions, regardless of their sources and triggers, can systematically bias the interpretation of decision-relevant cues, and decision makers selectively encode and retrieve emotion-relevant information (e.g. Bower 1992; Hansen et al. 1994). Some studies of selective processing suggest that emotional valence (positivity versus negativity) can trigger different strategies for subsequent information processing (e.g. Forgas 1995; Forgas & Moylan 1991; Isen 1993), where some negative emotions tend to trigger more systematic processing than positive emotions do (see Schwarz 1990, 1991; Schwarz et al. 1991). One possible explanation for this is that emotions serve as an adaptive function by signaling situations that demand increased attention; happy feelings signal that “all is well”, whereas negative feelings alert the body to the fact that a problem needs attention (Schwarz & Bless 1991). In line with this theory, several studies find that happiness is associated with relatively heuristic processing, indicating categorical rather than piecemeal processing (Bodenhausen et al. 1994; Forgas 1998).

The last few decades have witnessed quite a dramatic burst of research on emotions by psychologists. Also in the field of economics, (where the concept of emotion has been largely neglected due to the dominance of neoclassical economics), a growing revival of interest in emotion has been seen (Loewenstein 2000; Elster 1998). This tendency is also noticeable in accounting where empirical studies on the role of emotion, particularly in audit and financial
judgments, have emerged in recent years (e.g., Bhattacharjee & Moreno 2013; Chung et al. 2008; MacGregor et al. 2000).

As mentioned previously, this thesis focuses on the potential impact of affect-laden visuals on the type of evaluative judgment that relates to what Simon (1947) refers to as non-programmed decision making. In other words, the type of judgments that are empirically studied in this thesis project are not meant to have any identifiable rules or pre-programmed decision procedures. In certain streams of the psychology literature, a distinction is made between two types of thinking: System 1 and System 2. System 1 refers to our intuitive system which often builds on the use of heuristics. This mode of thought is typically fast, automatic, effortless, and affect-driven. System 2, on the other hand, refers to a type of thinking that is slower, conscious, effortful, and logical. (Bazerman & Moore 2009; Kahneman 2003b). In the management literature, March (1991; 1994) and March and Simon (1993) have used the concept of bounded rationality to make similar types of differentiations between various decision making styles using a different terminology. Other scholars have simply referred to the former type of judgment (System 1) as “intuition” (e.g. Dane & Pratt 2007). Regardless of terminology used, the fundamental idea here is that in non-programmed decisions, which constitute the focus of this thesis, people are more prone to be influenced by emotion, and therefore more receptive to the use of framing (Bazerman & Moore 2009).

To sum up, affect has been increasingly recognized as an important component in human judgment, and the interplay between affect and information processing has been acknowledged for some time in the behavioral sciences. However, the role of affect in the particular context of accounting information processing is still understudied.

2.3.3 Linking the roles of visual frames and emotion in information judgment

The basic tenet of this dissertation is that visual cues (likely to evoke affect) can come to guide judgment and decision making in an accounting information context. In psychological research and other social science domains, several studies have suggested that one of the most noteworthy distinctions between the effects of alphanumerical versus visual messages concerns their potential emotive impact (Joffe 2008; Sojka & Giese 2006; Slovic & Slovic 2015). Visuals are more prone to send people along emotive pathways, whereas textual material is more likely to leave people in a more rational, logical and linear pathway of thought (Joffe 2008). As an empirical example, Iyer and Oldmeadow (2006) found that people presented with visual material of a real-life kidnapping drama, drawn from national newspapers, felt significantly more fear than those who solely read about the kidnapping from newspaper
texts. Other empirical studies have shown that not only fear, but other emotional responses, such as engagement and concern, can also be stirred more strongly by visuals than by texts (Slovic & Slovic 2015; Boholm 1998). These results are in line with the study by Nisbett and Ross (1980), who concluded that vivid, concrete information tends to have greater influence on perceptions and inferences than abstract and technical information. Furthermore, decision makers have been found to increase their estimates of relative frequency or probability if presented with more vivid information (Sherman et al. 1985). As an empirical example, it has been found that people are willing to pay more for airline travel insurance covering death from “terrorist acts” (a highly imaginable event) than for insurance against death from “all possible causes” (which, of course, implicitly subsumes terrorist acts, in addition to a range of other causes, but is more pallid and does not bring spontaneous mental images to mind) (Johnson & Tversky 1983). Empirical research has also shown that people place greater importance on identifiable victims than statistical victims, which could be explained by the fact that identifiable victims produce more vivid imagery (Kogut & Ritov 2005; Loewenstein et al. 2006). This vividness effect is related to the mental strategies of the “salience effect”, which posits that when people’s attention is differentially directed to one portion of the environment, they tend to remember and hold that portion central when making subsequent judgments (Jarvenpaa 1990).

Reliance on affect to aid judgment and decision making can enable efficient and adaptive responses, but it also comes with potential weaknesses or fragilities (Finucane et al. 2000). For example, a fragility might be that we can be misguided as a result of deliberate manipulation of our affective reactions by those who wish to control our behaviors and influence our judgments and decisions. Entertainers and marketers of consumer products are highly aware of the powerful influence of affect; in commercials, there is a strong tendency to link stimuli likely to evoke positive affect with products being sold (Hasford et al. 2015; Argo et al. 2008). Using similar underlying explanatory models from cognitive psychology (but with somewhat different terminology), a series of empirical studies in consumer marketing research has identified a so-called product ‘contagion’ effect, where consumer evaluations of a product may change based on the emotional response elicited by unrelated visual objects presented in the proximity of the product being evaluated (e.g. Morales & Fitzsimons 2007; Hagtvedt & Patrick 2008; Howard & Gengler 2001).

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7 The term ‘vividness’ typically refers to the extent that information can be deemed emotionally interesting, imagery provoking, and proximate in a sensory, temporal, or spatial way (McGill & Anand 1989).
2.3.3.1 Emotion and numbers
Of relevance to the realm of accounting discourse, a related stream of empirical research in the veins of psychology and behavioural economics has shown that people often do not respond in ways predicted by the normative, rational models of decision making and instead tend to succumb to psychic numbing in a series of information situations involving large, aggregated numbers (Slovic & Slovic 2015). This behavior has for example been observed in the valuation of human lives (e.g. Kogut & Ritov 2005; Small et al. 2007; Västfjäll et al. 2014) and in the perception of impact of social and environmental disasters that threaten people and nature on a mass scale (Slovic 2007; Slovic et al. 2012). Research in this area suggests that large numbers, in and of themselves, tend to lack meaning and therefore tend to be undervalued in decisions unless they convey affect, that is, unless they also move us by triggering some emotion (Slovic & Slovic 2015). This stream of research thus presents an additional factor that challenges the neoclassical models of human judgment and decision making that many implicit assumptions in accounting theory and practice are based on. As accounting discourse is often characterized, at least in part, by aggregated, numerical data, the area of corporate reporting and accounting communication may therefore constitute an information environment in which organizational stakeholders may be particularly receptive or vulnerable to judgmental framing effects stemming from affect-laden visual stimuli. From a human information processing perspective, it may be far easier to use an immediate, readily available affective impression than to weigh the pros and cons, or to retrieve the relevant examples from memory, especially when the required judgment or decision is cognitively more complex.

2.4 Summary
Using the above-outlined section as a basic framework for the theoretical theme of this thesis, the fundamental, overall hypothesis in this research work is that information-redundant but affect-laden visual elements surrounding accounting information may function as powerful framing devices, guiding information processing and ultimately influencing semantic interpretation and evaluative judgment. While scholars have recognized that theories of rational choice, (as reflected in game theory and other economic models based on the expected utility theorem), are incomplete and misleading in describing accounting-related judgment and decision making (e.g. March 1978; Moore & Flynn 2008; Mouritsen & Kreiner 2016), hardly any studies have empirically investigated the judgmental effect of framing, or the psychological impact of visuals, in an accounting information processing context (Davison 2015).
3. Methodology

The previous chapter introduced the theoretical domain of this study and included my reflections on choice of theoretical perspective. This chapter will give an account of the research methods applied in this thesis work, (primarily experimentation), and also some insight into my reasoning, choices, and personal learning curve throughout this part of the research process. Finally, this chapter provides some post-study reflections regarding the reliability and the validity of the empirical results of the four studies in this dissertation.

3.1 Experimental method

3.1.1 What is experimentation?

Most people have an intuitive understanding of what experimentation entails, that it means to deliberately vary something so as to discover what happens to something else later. We experiment naturally in our everyday life, for example when we try a new recipe or assess what happens to our body if we suddenly start exercising more. Scientific experimentation8, however, is more strictly defined and can be described as a test performed under controlled conditions for the purpose of demonstrating a known truth, examining the validity of a hypothesis, or determining the efficacy of something previously untried (Cook et al. 2002). More specifically, experimentation involves testing for the effect of (at least) one variable (a variable that can be manipulated) on some other variable, in order to assess whether the independent variable(s) in some way caused the dependent variable to occur (Goupy & Creighton 2007).

To many historians and philosophers, the increased emphasis on this type of deliberate action followed by systematic observation of what occurred afterwards is what marks the emergence of modern science from natural philosophy (Cook et al. 2002). For example, Francis Bacon, influential philosophical advocate and practitioner of the scientific method during the scientific revolution in the 16th and 17th centuries, taught that “not only must we observe nature in the raw, but that we must also ‘twist the lion’s tale, that is, manipulate our world in order to learn its secrets” (Hacking 1983, p.149). Experimenters recognized early on the desirability of controlling for extraneous influences

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8 In this methods chapter, I limit the description and discussion of experiments to only include controlled experiments, not field experiments or natural experiments.
that might limit or bias observations, but these controls were originally developed for the natural sciences, where interest for experimentation first bloomed (Cook et al. 2002). The experimental method gained ground also in social sciences, where extraneous influences are more difficult to control, and so new methods of dealing with extraneous influence, such as random assignment (Fisher 1925) or adding a nonrandomized control group (Coover & Angell 1907) were developed. Over time, as the number of experimental studies in nonlaboratory settings have accumulated, more sources of bias\(^9\) have been identified, as well as more methods to cope with those issues (Dehue 2000).

3.1.2 Why experimentation?

While epistemological debates sometimes surround the application and justification for experimentation as a research method (Cook et al. 2002), my choice of using experiments for collecting the empirical data was not the outcome of sophisticated, philosophical reasoning. On the contrary, it was a pragmatic choice based on the practical ability of experimentation to illuminate potential causal inferences, a central aspect of my overall research question. More specifically, carefully designed experiments can offer several types of support evidence on which to assess whether a causal relationship is likely to exist between variables of interest, in this case between various visual cues and accounting information judgments. First, an experiment considers the time order of the occurrence of the variables being studied (they may occur almost simultaneously or the independent variable can occur before the dependent variable, but the dependent variable must not precede the independent variable). Second, an experiment allows for control of extraneous\(^{10}\) variables to a much greater extent than in other designs. In scientific research, these qualities of temporal precedence and elimination of extraneous variables, which uniquely characterize the experimental method, are often considered necessary statistical criteria for moving beyond the empirical establishment of correlation to statements about causation. (Cooper & Schindler 2010; Cook et al. 2002) The intended objective of my research work is to explore causation — that is, not merely whether the display of visual cues is correlated with changes in judgment of accounting information, but whether those cues cause the change. For this particular research purpose, the experimental method seemed better warranted than any other research method.

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\(^9\) In this methodological context, bias is defined as a systematic error in an estimate or an inference (Cook et al. 2002).

\(^{10}\) An extraneous variable is here defined as an undesired variable that has an unintended influence on the results of the study. Extraneous variables distort the results if they change systematically with the variables of interest that are being studied (Cook et al. 2002).
3.1.3 Designing the experiments

This research was undertaken as part of a doctoral studies program in business studies at a university department where research has not traditionally relied on experimental methods. Therefore, one of the key challenges early in my doctoral work was to learn the general principles of this research method in order to design my experiments. For these purposes, I enrolled and completed two doctoral courses in experimental methods (at the department of psychology at Stockholm University). Within the framework of each course, I was given the opportunity to individually develop and present an experimental design with my own particular research question in mind. Then, at the end of each course, I was provided feedback on my design from both teacher and fellow course participants. These methods courses proved particularly valuable for the development of my first experimental works, presented in empirical studies I and II, as these designs were the ones I focused explicitly on throughout these courses. A noteworthy revelation for me was that although analysis of experimental work is characterized by pre-established statistical principles and formal criteria, the design phase of experimental research method can, depending on the research topic, allow for significant amounts of creativeness. The hiring of a model and a photographer to create a series of authentic looking CEO facial portraits for my second study (Empirical Study II) illustrates this and reflects my realization that the potential of an experiment is not only determined by the successful rigidity of internal controls, but also on the imagination of the researcher.

The experiments performed for this thesis work had several methodological design features in common. Specifically, all my experiments used between subjects designs and are based on judgments tasks with a focus on the behavior of subjects in response to the presentation format of various accounting reports. In each experiment, the manipulation involved adding an information-redundant but potentially affect-laden visual cue to the presentation of a fictive but authentic looking corporate performance report while keeping the alphanumerical accounting information constant across the different reporting formats. Within each sample, the report versions were then distributed randomly to subjects assigned to make an evaluative judgment regarding a certain aspect of corporate performance based on the material provided. Through the use of control groups and formal statistical tests, I could empirically examine whether the display of a certain visual cue seemed to cause any observable

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11 With information-redundant I mean, as clarified also in section 2.3.1.1, that the visual element does not provide any additional ‘facts’ to the information already provided using words or numbers.

12 Control group here means a group of subjects who are not exposed to the independent variable(s) in contrast to those who receive the experimental treatment (manipulation of the independent variable(s)).
differences in report readers’ judgments. In some of the empirical studies included in this dissertation, I extended this basic experimental design to include differentiation of additional factors for the purpose of exploring possible interaction effects, thus mapping out potential moderator variables in the relationship between visuals and human judgment in an accounting information context.

In the following sections of this chapter, some of my major methodological considerations in the overall design work of my experiments are outlined and reflected upon.

3.1.3.1 Selecting relevant variables and measures of scale
An experiment tests whether a hypothesis, i.e. a tentative statement describing the relationship between two or more variables, gets enough empirical support that it can be considered to hold true. However, when carrying out an experiment, the conceptual variables in the hypothesis must be operationalized into variables that make them measurable and subject to testing. If the planned experimental study has ties to a research question that has been properly investigated previously, or has links to prior, well-established research for other reasons, it is often valuable to review and consider the available literature and instruments in the selection of measures for testing (Cooper et al. 2010). This investigation was done, especially in the design phases of studies III and IV, because several experimental studies examining (other) judgmental effects of the Balanced Scorecard (BSC) have previously been conducted using similar types of case material, judgment tasks and measurement scales of the dependent variable (corporate performance judgment). In the design of studies III and IV, I therefore used the same measurement scale of the dependent variable as that already established in some prior experimental BSC studies (e.g. Cardinaels & van Veen-Dirks 2010), but adapted the content of the case material and the specifics of the experimental task to allow for effective manipulation (adding color as a supplementary marker in the BSC presentation format) in line with the intended purpose of my particular research. In the design of studies I and II, it was not possible to base my selection of variables and measurements of scale on previous studies in the same way, simply because I did not identify any studies experimentally examining potential judgmental effects of juxtaposing affect-laden visual imagery to alphanumerical information in an accounting (economic) information context. In studies I and II, then, the selection of variables and measures of scale was based on a more general, less systematic review of how the relationship between visuals and information judgment had been operationalized in other research domains, such as advertising and political communication. In the design of response scales for the dependent variable (evaluative judgment of corporate performance) in empirical studies I and II, I developed bipolar (instead of unipolar) scales based on recommendations and insights from an interdisciplinary course focusing on
cognitive and communicative processes in asking and answering survey questions (course held in collaboration between Professor Norbert Schwarz (Department of Psychology at University of Southern California), Statistics Sweden, and Örebro University)\textsuperscript{13}.

### 3.1.3.2 Controlling the experimental environment

In the design of my experiments, several considerations were made to ensure that the environment in which each experiment took place was the same for all participants. For example, all participants within a study received the same instructions, and because each experiment was conducted in a lecture hall during class hours, the physical environment as well as the time of administration and my general introduction to the research study could also be held constant for all subjects. Because humans tend to actively interpret new situations that they enter (Willis 2004), subjects were asked to participate in a study, but I did not explain that there was a variation in the handout material, i.e. that it was an experimental study. The reason for this was to avoid probing participants to think in terms of possible treatments or manipulations, a reaction that could potentially create undesired psychological effects that could distort the effect of the treatment on the dependent variable (Rosenzweig 1933; Orne 1969; Norbert Schwarz & Sudman 2012). In order to reduce the scope for evaluation apprehension\textsuperscript{14} (Rosenberg 1969), I clearly stressed that all questions were to be answered anonymously and kept strictly confidential on an individual basis.

In addition to factors in the physical environment and the experimental situation, there are also other extraneous variables (in my studies, e.g. differences in age, gender, knowledge and prior experience) that could potentially bias the observations in an experiment. These factors cannot be eliminated, but their threats to internal validity can be significantly reduced using various techniques (Cook et al. 2002). In the design of my experiments, I controlled for these extraneous variables through random assignment so that, overall, those subjects assigned to the experimental treatment(s) were likely to be similar to those assigned to the control group. Of course, random assignment does not guarantee that the groups were identical in all the aforementioned areas, but per definition, it eliminates selection bias, which at least assures that any potential differences remaining are randomly distributed (Cook et al. 2002). Through random assignment, I was hence able to reduce the plausibility of

\textsuperscript{13} Part of the course material consisted of articles and book extracts by Norbert Schwarz et al. as outlined in the list of references.

\textsuperscript{14} Evaluation apprehension can be described as an anxiety felt by an individual who is performing a task in front of others or being judged by others. The anxiety arises from the thought of being negatively rated or not receiving positive feedback (Rosenberg 1969). This can cause issues in research situations as evaluation apprehension can cause participants to not respond in a manner that they normally would.
alternative explanations for my observed effects of the treatment (manipulation of presentation format) on the dependent variable (evaluative judgment), as any initial between-group differences in terms of other characteristics ought to be due solely to chance.

3.1.3.3 Selecting and assigning participants
The participants selected for an experiment should, logically, be representative of the population to which the researcher wishes to generalize the study’s results. In statistics, the classic method for constructing generalizable knowledge is formal probability sampling (Keller & Warrack 2003). However, such sampling is rarely feasible in social science explorations, and experimental researchers in this discipline often face a trade-off between selecting subjects who are relatively accessible and subjects who provide the best generalizing power (Vehovar et al. 2016). In the field of behavioral economics, it is commonplace to use students as subjects in various experiments. This prevalence of using university students in psychological experiments is a debated topic where critics have argued that students often are not representative of the general population and that a broadening of the bases for selecting subjects for experiments is therefore merited (e.g. Sears 1986; Benz & Meier 2008; Schultz 1969; Smart 1966). Other scholars have argued for a much more nuanced perspective, suggesting that albeit not all research topics fit this category, there are many research areas, also within the field of behavioral accounting, in which students are adequate, and sometimes even particularly suitable, surrogates for the real-world individuals of more direct interest to the researcher (e.g. Druckman & Kam 2011; Mortensen et al. 2012; Ashton & Kramer 1980). These scholars point towards studies comparing students’ responses with those of other groups, where studies on the particular theme of accounting-related decision-making have found considerable similarities in the decisions and underlying information-processing behavior between student and non-student groups (e.g. Liyanarachchi 2007; Liyanarachchi & Milne 2005; Copeland et al. 1973; Alpert 1967). Considering these different aspects and perspectives in the design phase of my own research work, I first tried to precisely pin down my target population, and then tried to select participants on the grounds of being both sufficiently accessible and representative of this target audience.

In empirical studies I and II, the information context relates to external accounting communication, such as the corporate annual report. The primary audiences of these reports are arguably current shareholders and potential investors, although employees, customers, suppliers, community leaders, and the community-at-large may also constitute organizational stakeholders (Freeman et al. 2010) and are potentially also a target audience. It could thus be argued that this type of accounting communication targets both professionals and the (initiated) general public. In empirical studies I and II, I choose to focus on the latter group, i.e. on lay readers, rather than professional analysts.
Mainly, this perspective was taken based on the argument that the general public is plausibly more prone to making judgments based on exposure to corporate external reporting documents in their original layout and format. (Professionals however, should in theory be more likely to use advanced analytical software programs which give more alternatives for viewing and evaluating externally communicated accounting information that has been stripped of graphical elements displayed in the original report version). Based on the choice of making initiated lay readers of annual reports the target audience for empirical studies I and II, I decided to recruit university undergraduate business students as subjects for these studies. This decision was a combination of convenience- and judgmental sampling (Taherdoost 2016) — convenience because students were relatively accessible, judgmental, because the particular students approached were business scholars enrolled in financial accounting courses. I deemed this category of students an appropriate proxy for the initiated general public, that is, people with an interest in the subject of accounting and a basic understanding of the type of performance data that typically goes into annual reports. In other words, individuals likely to engage in processing information from annual report documents in real life\(^{15}\).

In empirical studies III and IV, the information context relates to internal accounting communication, and more specifically the Balanced Scorecard (BSC). In contrast to the annual report, the primary audience of corporate BSC reports are not external stakeholders, like the general public, but rather, the target is decision-makers in various types of managerial roles within an organization who are likely to engage in processing information understood from the report. The profile of the target population in these later studies is hence distinct from the first two studies. In order to obtain a sample that was a better proxy for professional managers rather than the general public, master students specializing in accounting and finance were recruited as participants for Empirical Study III and professional controllers were used as subjects in Empirical Study IV. Again, participants were selected based on a combined choice of convenience and judgment (Taherdoost 2016) — convenience because students enrolled at the particular universities to which my research position was linked were approached, judgment because these particular individuals were either business students at an advanced level with prior theoretical understanding of the BSC\(^{16}\) (Empirical Study III) or professionals with both theoretical and practical experience of using the BSC (Empirical Study IV).

\(^{15}\) In the sample, 74% reported that they had read annual reports prior to taking part in the study and 54% reported that they had owned shares in a company.

\(^{16}\) In the sample, 97% reported that they were familiar with the BSC prior to taking part in the study.
3.1.3.4 Pilot testing and revising
In preparation for the implementation of each experiment, I pilot-tested the
relevant research instrument on a small number of individuals who demo-
graphically matched the profile of the subjects in my respective samples. The
purpose here was to check for potential errors in my experimental design that
could be adjusted before the experiment(s) proper began. Specifically, I
checked if everyone in the pilot group understood the provided material and
associated questions, and also whether they all understood material and the
questions in a similar way. Insight about within-group similarity was gained
through a procedure based on the idea of the think aloud method (Ericsson &
Simon 1993). Each subject was individually provided the experiment material
and then asked to verbalize his or her thoughts while going through the mate-
rial including the questions associated to the judgment task. For me as a re-
searcher, the verbal protocols of this exercise served as an important confirm-
atory indicator that the material that I had developed was consistently under-
stood the way it was intended and that subjects did not seem to be sensitized
to the independent variable (the visual) by any other unexpected factors. By
also paying attention to observable subtleties, such as if, and if so when, a
slight hesitation occurred in a subject’s information uptake process, I was fur-
thermore able to identify and subsequently marginally refine a few words and
phrases in the materials in order to further increase clarity of meaning.

3.1.4 Implementing the experiments
The design of an experiment is crucial for the quality of experimental research,
but successful implementation of an experiment typically also requires coping
with several practical issues (Cook et al 2002). In the following sections, I
elaborate on two of these issues that I found particularly noteworthy: the re-
cruitment of participants for the studies, and some ethical aspects of my ex-
periments.

3.1.4.1 Recruiting participants
As previously mentioned, this research took place in an academic context
where experimental methods have not been part of the research tradition;
therefore, there was no infrastructure, such as designated lab rooms or estab-
lished systems for recruiting participants. Instead, recruitment of participants
was made possible through more informal channels, such as good working
relationships with teacher colleagues that, upon my request, proved willing to
give me access to pools of students within the frameworks of various business
courses held at my department. These colleagues granted me a guest appear-
ance in their courses and allowed me to recruit subjects among course partic-
ipants. Furthermore, teachers permitted me to implement actual experiments
during, or in conjunction with, scheduled lecture hours. Admittedly, the local
absence of generally established routines for involving students in empirical research did pose some additional practical challenges for me in the research process, such as having to renegotiate access to student participants with course teachers for every new experiment, or adjusting the timings of my empirical data collections to suit various course schedules. At the same time, I genuinely believe that my thesis project, in the end, also benefited from me conducting experimental research in a previously “experiment-free” university environment. For example, I did not experience any competition in the recruitment of student subjects, and there was minimum risk of bias from experiment awareness or experiment fatigue in the pool of students from which my samples were drawn.

3.1.4.2 Ethical considerations

As the type of experiments performed in this dissertation do not involve any kind of treatments that are generally considered potentially harmful or intrusive, my main ethical concern was to make certain that all subjects experienced that participation was strictly voluntarily, even though the experiments were taking place in a classroom setting and during, or in conjunction to, lecture hours. To address this concern, I clearly explained to all students that participation was fully optional and that all participation (or lack thereof) would be completely anonymous. In order to minimize risk of compliance due to social pressure (e.g., not wanting to publicly show non-participation by leaving the class room), I furthermore emphasized that all subjects had full freedom to either leave the classroom or hand in the material blank should they not want to take part in the study.

3.1.5 Some statistical considerations related to my experiments

A personal goal for me as a researcher has been to increase my knowledge of statistical methods and applications, an ambition I pursued through studying undergraduate-level courses in statistics parallel to my Ph.D. education program. From these courses (which largely focused on probability theory and statistical inference), I have gradually gained a better understanding of some of the assumptions behind the statistical methods used in this research study. As my statistical knowledge improved during the research process, I also came to (re)consider certain methodological choices in my empirical studies, such as the type of statistical techniques used and the adequate level of detail in the reporting of statistical results. These insights are reflected in the appendix of each empirical study, where I have attempted to provide a relatively extensive account of how I have reasoned and dealt with various statistical issues associated to the particular study. On an over-arching level, there are mainly two methodological aspects that are seldom addressed in academic business research publications, which I have purposely and explicitly taken into consideration in the empirical work of this dissertation.
First, I report on the assumptions fulfilment of each statistical test in the results section of the experiment so that the reader may take this aspect into consideration when interpreting and assessing the statistical validity of my empirical results. Furthermore, in the instances that my experimental data did not meet all the assumptions of parametric testing, I use the non-parametric equivalence of relevant statistical tests (Pallant 2013). In this regard, I chose to follow stricter guidelines (recommended in statistics handbooks such as Pallant 2013) than what to me seems to constitute the norm within the academic field in which I position my research. The general reason for this more conservative approach is that whenever one or several basic assumptions of parametric testing are violated (or at least open to debate), the validity of the obtained results may come into question. In order to diminish these concerns, I therefore decided to use non-parametric tests, either as method substitutes or method supplements, when the data assumptions of parametric testing were not fulfilled.

Second, I calculated and reported on estimated effect sizes rather than just emphasizing obtained p-values. By doing this, I purposely tried to move away from a solely dichotomous description of my results that can lead to overly simplistic conclusions that either “there is an effect” (p < .05) or “there is no effect” (p ≥ .05). This choice of accounting for estimated effect sizes in relation to reported p-values has its roots in an ongoing methodological debate where growing criticism has been raised against the extensive use of statistical significance testing (e.g. Ziliak & McCloskey 2008; Amrhein et al. 2019) without supplementing this categorical test with methods that also estimate the practical significance, i.e. whether the size of the statistically significant effect is large enough to have any real-world impact (Kirk 1996). Based on the aforementioned arguments, I thus try to present my empirical results in a more nuanced way by displaying sensitivity to not just whether the effect tested for is statistically significant, but also whether the magnitude of this effect is large enough to have any practical significance.

3.2 Using a mixed-methods research design
3.2.1 Interviews
The strength of experimentation as a research method is its ability to illuminate causal inference. However, insight about the effects of manipulable causes does not necessarily shed light on how and why those effects occur. Therefore, the complementary use of qualitative methods can provide an important avenue for discovering and exploring causal explanations, which can reveal under which mechanisms, and conditions, a causal relationship seems to hold (e.g. Tashakkori & Teddlie 2003; Creswell et al. 2003). In this thesis project, I complemented some of my experiments with qualitative interviews
for several reasons. First, the post-experiment interviews served as a way of assessing the validity of the experimental results (Hamilton et al. 1997). Second, the open-ended format of the interviews allowed for the creation of narrative descriptions that could be used to illustrate and expand the quantitative experimental results (Ivankova et al. 2006). Third, the interview data could potentially be used to further specify, or even re-specify, a certain part of the causal theory behind the examined causal relationships and thereby generate new hypotheses for causal testing in future research (Creswell et al. 2003).

To interview people about their thoughts, reasoning, and choices without asking leading questions is not an easy task (Willis 2004). In order to build up some basic skills in qualitative interview techniques before collecting this type of empirical data, I enrolled and completed a doctoral course in qualitative interview method (at the department of psychology at Stockholm University). This applied course covered the principles and practice of conducting qualitative interviews and analyzing the resulting data using thematic analysis techniques. The course included several practical exercises for participants, such as video recording ourselves, both in the role of interviewer and in the role of respondent, in various interview sessions. These recordings were then viewed in group feedback sessions with the purpose of illustrating and improving our understanding of various verbal probing techniques. As course participants, we were also given the exercise of transcribing our interview data and then coding and categorizing the material in order to identify patterned meaning. The course literature (Patton 2002; Langemar 2008), practical demonstrations, and the personal feedback provided on my video recordings and my thematic analyses served as a practical guide for the interviews conducted and analyzed in Empirical Study I.

3.2.2 Eye-tracking

During this thesis work, I learnt about the potential value of using methods of eye-tracking in empirical research conducted in behavioral accounting. While the use of eye-tracking is relatively new and unexplored in academic business research, the method of observing eye movements has been used in the field of psychology already since the end of the 19th century (Koller et al. 2012). A central aspect of this method is the assumption that the human eye provides information through several visual pathways to different areas in the brain (Holmqvist et al. 2011; Koller et al. 2012). For this reason, the recording of eye movements during the visual capturing of objects is associated with mental processes, predominantly with cognitive processing (Holmqvist et al. 2011; Rayner 1998). Empirical data on eye movements, especially using increasingly sophisticated eye-tracking tools and techniques, can therefore contribute to our understanding of human information processing behavior (e.g. Mele & Federici 2012; Van Gog et al. 2009). This theoretical insight about the poten-
tial for using eye-tracking for capturing reading patterns motivated me to enroll and complete a doctoral course in eye-tracking methodology at the Humanities Lab at Lund University. In addition to this course, I also completed a personally customized training course at the eye tracker manufacturer company Tobii in order to learn how to practically operate the specific eye-tracking equipment used to illustrate accounting reports readers’ attention to visual cues in Empirical Study II. My overall, more long-term ambition with these training sessions was to learn more about eye-tracking as a means of collecting additional empirical data that can shed light on human mental processes leading up to variances in certain judgment and decision outcomes.

In these training courses, I also learnt that eye tracking can serve several additional purposes in an empirical research process. For example, the recording of eye movements in the pre-testing of an experimental design can facilitate the identification of potential methodological issues (for instance, eye tracking can show if a subject was confused by a text), and in some instances this type of data can also serve as a control tool for manipulation checks in experimental research (Koller et al. 2012). In the research included in this dissertation that uses eye-tracking (Empirical Study II), I used this method to validate my experimental results by indicating that accounting report readers tend to regard (that is, give visual attention to) the visuals when making evaluative judgments regarding corporate performance.

3.3 Some reflections regarding the reliability and validity of my empirical results

In all empirical research, there is always the question about whether the obtained results are valid, that is, whether the measures have justified the knowledge claims. However, validity assessments are never absolute, as they entail human judgments that are inevitably fallible (Cook et al. 2002). Still, by reflecting on potential validity threats during the design phase, implementation, and statistical analysis in my empirical studies, I have tried to rule out, or at least reduce the plausibility of, some of these threats. Some of these considerations regarding the internal, statistical, and external validity of my results are outlined below, preceded by some reflections regarding the general challenge of evaluating replicability of research (yet) not replicated.

There is currently a general concern regarding research reproducibility in academic research, particularly in the social sciences, as it has been found that many studies are difficult or impossible to replicate or reproduce (Camerer et al. 2016; Maniadis & Tufano 2017). Admittedly, it is first when replication studies have been conducted that the reliability of obtained results can be properly evaluated. Therefore, this research would benefit from future studies testing the reproducibility of the results presented in this thesis.
In regards to the validity of the research studies conducted, various considerations were made. First, several contemplations were made to guard the internal validity of my empirical results. Internal validity reflects the extent to which it is plausible to conclude that the experimental stimulus, in my case the display of a certain visual cue, had some significant effect on a measure of judgment in the specific experimental instance (e.g. Campbell 1957; Campbell & Stanley 1963). To support such an inference, (i.e., for my empirical results to be considered internally valid), no other explanations for this observed causal relationship should be plausible. In my experiments, this risk of extraneous influence was guarded for through the random assignments of subjects to treatment conditions. Because groups were randomly formed, any initial differences between participants of different groups ought to be due only to chance. Any other factor should be experienced equally over conditions within the limits of chance, thus reducing the plausibility of alternative explanations for observed effects. In some of my studies, potential threats to the internal validity of my experimental results were examined through the use of mixed methods, where the outcome of the interviews were matched with the experimental results to see if there was a consistency in quantitative and qualitative findings. My assessment is that the interviews, albeit minor in analytical scope, were consistent with the experimental results, thus making a more convincing case of the internal validity of these results.

Second, statistical validity was guarded through examination of my empirical data to confirm that it fulfilled the assumptions for the statistical test used. In the instances that my experimental data did not meet the assumptions of parametric testing, I used non-parametric alternatives (to the extent possible) to ensure that my empirical data fulfilled the formal requirements of the statistical procedures and tests used.

Third, some reflections regarding the external validity of my empirical results should also be discussed. While internal validity addresses the plausibility of conclusions about whether a particular relationship is likely to be causal in the unique research context in which it is tested, external validity considers the generalization power of these causal connections and to what extent any conclusions reached can be extrapolated to all types of people, settings and times (Cook et al. 2002). Critics of experimentation as a method in social science research often claim that observing subjects in a contrived environment is a principal disadvantage of the method (Cooper & Schindler 2010). However, the magnitude of this issue should vary depending on whether the experimental tasks appear natural and realistic. In my research, I have based the experiment material largely on authentic accounting reports with the purpose of making this aspect of experimental conditions as similar as possible to those expected in real life.

Another general threat to the external validity of experimental results is that an experiment uses a limited set of operations to represent units, treatments, outcomes, and settings, and for this reason most experiments, including the
ones presented in this thesis, are inevitably localized and particular (Cook et al. 2002). For example, my empirical results have only been tested in a certain type of setting, using nonprobabilistic samples of people who have only been exposed to a particular operationalization of the conceptual variable of interest. Having said that, it can be argued that all causal relationships are context dependent to varying degrees (Cook et al. 2002), so in that sense, the generalization of experimental results will always be at issue. As mentioned earlier, several measures have been taken to increase the plausibility that my empirical results can be generalized beyond the particular context of my experimental studies. How broadly applicable my results are to variations in operationalizations of visual cues, measures of human judgment, and participant profiles, is a question that can be best answered by further research, where every new future study could offer an incremental extension of both theory and experiment into untested realms. The demonstration of robust causal results across multiple studies over heterogeneous instances, such as different settings, exact methods use, and profile of subjects, would of course have provided a more solid foundation for unconditional claims of wide generalizability. In this thesis, however, my aim has predominantly been to address and challenge a seemingly common implicit assumption in accounting communication research and regulatory practices, namely that visuals do not matter. This assumption has been tested through empirical examinations, predominantly experiments, to see whether the display of visual cues, such as visual imagery and color, could influence the interpretation and evaluative judgment of accounting information. Overall, my empirical results suggest that, at least under certain conditions, this is indeed the case — visuals can influence interpretation. My findings are thus an important principal contribution to accounting communication theory and practice, and the empirical demonstrations offer insights that can improve understanding of general trends despite not considering all the contingencies that might pertain those trends.

To conclude, many controls have been made in experimental design choices and statistical procedures in order to guard the overall validity of my empirical results. Having said that, some of my design choices have also constituted methodological trade-offs with multiple consequences for overall validity, where the internal validity has been prioritized over the external validity of this research. Therefore, further research in this area is recommended if we are to draw more far-reaching inferences about the general applicability of these results, for instance, by testing if the observed relationships still hold when changing the environmental conditions or other contingencies.

17 For example, the CSR photos displayed in the experiment material of empirical study I constitute only a few of all possible types of photos that could have operationalized the construct of ‘visual imagery’. Similarly, the CEO model displayed in the experiment material of empirical study II is just one example of all possible types of models that could have operationalized the construct of ‘visual imagery’.
4. Summary and main findings of empirical studies

This chapter provides an overview and a summary of the findings of each empirical study. These insights are then brought together in a concluding chapter that provides an extended discussion about the combined, overall empirical results presented in this thesis and the implications of these findings for accounting theory and practice.

4.1 Empirical Study I

Imag(in)ing the Benefit of CSR: The Judgmental Effect of Affect-laden Visual Imagery in Social Accounting Reports

Using a mixed methods sequential design consisting of a controlled experiment and retrospective interviews, this empirical study demonstrates that adding information-redundant but affect-laden visual imagery (i.e. images that are likely to evoke emotion but do not provide any additional facts to the accounting information provided) to the presentation format of social accounting reports can impact a report reader’s appraisal of reported company activities. The results of the controlled experiment, conducted in the first phase of the study, demonstrate that visual imagery can systematically amplify a reader’s perception of the benefit reported by corporate social responsibility (CSR) initiatives. The magnitude of this effect depends however on the source of the frame, in this case the type of company profile to which the report relates. Retrospective interviews conducted among a selection of experiment participants during the second phase of the study lend support to the experimental results, and also generate additional insights about underlying explanations for the differences between experimental treatment groups. A key theme that emerged from the interviews is that visual images, due to their potential salience and emotive power, are influential nonverbal communication devices, but that readers (to varying degrees) also are aware of the potential visual rhetoric. A report reader’s stance on whether visual imagery displayed in accounting reports should be regarded as visual evidence or mere visual embellishment seems to depend on contextual factors, such as the perceived credibility of the source, and perceived congruence between the picture itself and the
reader’s pre-disposed attitude towards the particular company. Visual images perceived of as authentic seem to have more emotive power to systematically alter readers’ evaluation of corporate performance in this area. In more general terms, this result suggests that for a framing effect to occur in this context, the frame needs to be accepted by the reader in the first place. Taken together, both the quantitative and qualitative results of this empirical study suggest that the display of affect-laden pictures in social accounting reports can significantly alter readers’ evaluations of corporate performance in this area. However, this effect on reader’s judgment can be enhanced or discounted depending on the perceived credibility of the source of the pictures.

4.2 Empirical Study II

The Effect of CEO Facial Portraits in Financial Reporting: A Study of Performance Judgments Using the Annual Report

This empirical study, consisting of two controlled experiments and supplementary interviews and eye-tracking recordings, demonstrate that adding affect-laden photography in the form of CEO facial displays to financial information presented in a corporate annual report can alter report readers’ semantic interpretations of communicated performance information. More specifically, the experimental results show that when the evaluative meaning of the presented performance is ambiguous in valence, the presence of a happy facial display of a CEO, compared to a neutral facial display or no photographic display at all, significantly increases a report reader’s inclination to perceive the communicated financial performance information as positive rather than negative. Furthermore, supplementary empirical examinations consisting of eye-tracking and retrospective interviews indicate that a CEO portrait generally seems to draw the visual attention of report readers, but that these readers do not consciously take this element into consideration when verbally accounting for their evaluative judgments. Thus, visuals in the form of CEO facial displays seem to have the emotive power to systematically alter readers’ evaluation of corporate performance. However, similar to the findings of Empirical Study I, this study also shows that this visual framing effect does not occur under all conditions: the CEO portrait only significantly alters report readers’ semantic evaluations of corporate financial performance when the evaluative message of the communicated accounting information is ambiguous. From an overall research perspective, this study extends the scope of Empirical Study I by demonstrating that visuals in the form of affect-laden imagery can alter the derived meaning of communicated accounting information, not only when it comes to ‘soft’, non-financial performance (like the CSR disclosure in Empirical Study I), but also when it comes to quantitatively described financial performance.
4.3 Empirical Study III
The Effect of Color use in Management Reports: A Study of Performance Judgments Using the Balanced Scorecard

This empirical study, consisting of a controlled experiment, differs from the first two empirical studies by focusing on color (rather than photographic imagery) as a visual attribute. Furthermore, it examines the effect of this visual attribute on performance judgments in an internal rather than external accounting communication context. The empirical results of this study demonstrate that using traffic light colors (green and red) as supplementary qualitative performance markers may affect evaluative judgment in a management accounting report context, such as a balanced scorecard (BSC). More specifically, the empirical results demonstrate that superimposing variations of green or red (to highlight above or below target performance) onto the financial metrics of a BSC can have a polarizing effect on evaluation scores of overall managerial performance. This study extends the scope of empirical studies I and II by demonstrating that supplementary, information-redundant but potentially affect-laden visual cues, in the form of specific color hues, could systematically influence the interpretation and consolidated evaluative judgment of quantitatively described financial and non-financial accounting information.

4.4 Empirical Study IV
The Judgmental Effect of Traffic-Light Colors in Balanced Scorecard Reports: An Experimental Study Among Professional Controllers

This empirical study, consisting of a controlled experiment, builds on Empirical Study III because it also investigates the judgmental effect of adding traffic-light colors (green and red) to quantitative performance information presented in a Balanced Scorecard (BSC) report. However, this study extends the work of Empirical Study III in two distinct ways. First, it tests whether the combined use of green and red colors has a significant polarizing effect in a sample of professional controllers (which it did in the sample of university business students in my previous work, Empirical Study III). Second, it tests for a potential asymmetry in the individual effect of the color green and the color red on performance ratings in this sample of professional subjects. The experimental results of this study do not lend statistical support for red and green color cues (in isolation or in combination) having a significant effect on BSC performance ratings among professional controllers. The difference in results across the samples of novices (Empirical Study III) and experienced...
business professionals (Empirical Study IV) may partly have methodological explanations (such as insufficient statistical power and participant awareness of the experimental manipulation). However, the mixed results also generate a hypothesis to be tested in future research, namely that the potential framing effect of color on accounting information judgment may be moderated by user profile characteristics, possibly in the areas of numerical literacy and/or prior practical experience in making consolidated performance judgments based on multidimensional accounting information.
5. Concluding discussion

As outlined in the introduction of this dissertation, my ambition with this research has been to move beyond the rational-economic assumptions still permeating accounting theory and practice in order to highlight the relevance of visual presentation for accounting-related judgment and decision making. More specifically, the aim of this dissertation has been to inject new thought and perspectives into accounting research by assimilating different streams of extant visual research in accounting and psychology with a special focus on emotion and potential framing effects. The fundamental, over-arching hypothesis postulated and examined in this thesis is that visuals presented in conjunction with accounting information can function as framing devices, thus influencing human interpretation and evaluative judgment regarding communicated corporate performance.

The combined results of the empirical studies comprised in this dissertation demonstrate that supplementary visual elements, despite not conveying any additional facts, can indeed influence report readers’ evaluative judgments regarding various aspects of communicated corporate performance. This conclusion lends support to the idea that visuals, on the one hand, can be considered denotative systems but, on the other hand, they can also function as connotative systems. In other words, visual representations of persons and objects may not only denote a particular individual, thing or place, but also the ideas or concepts attached to them. Thus, visuals can also be seen as signs and their relationships with other signs can create joint social meaning that lead to different interpretations than the ones that would have been made in their absence. These results suggest that the concept of visual framing provides an important direction for theory building and future research in the field of accounting communication. In line with psychology-based theoretical propositions that frames can promote different interpretations, the empirical studies of this thesis suggest that the presentation format of accounting information does matter, and that information-redundant but affect-laden visual cues in accounting discourse can systematically affect stakeholders’ understanding. Furthermore, the empirical results give rise to the question as to whether the presentation format of accounting information, and more specifically the presence of visuals, can trigger different schemas or styles of human information processing, which in turn impacts the sense-making of the accounting information and associated judgment outcomes.
From a broader perspective, what emerges most poignantly in these empirical studies is that “information” is not the same as “meaningful information”. Report readers may derive the meaning, not only from the alphanumerical accounting data, but also from their own imaginative interpretations and associations from the visual elements juxtaposing this accounting data, which implies that there may be room for both imagination and factual precision in the human information processing of accounting communications. While numbers can crystallize aggregated data, visual attributes can energize these numbers by giving them an emotional salience that has the potential power to impact the affective valence (good-bad, like-dislike) that stakeholders assign to this accounting data, thus changing the derived meaning of the communicated information. Based on these empirical findings, this research thus makes a principally important theoretical contribution to the field of accounting, namely that the presence of visuals in accounting communications may have significant bearing on the semantic interpretation of corporate performance. Visual elements in accounting discourse should therefore not be treated as empty decorations or transparent aesthetics. Furthermore, the results contribute to the more general theory on framing by highlighting the relevance of visuals in the creation of frames and associated potential boundaries of visual framing effects. The empirical results of this study indicate that people are differentially receptive to visual frames and that perceived source credibility, message ambiguity and level of domain expertise could be critical moderating factors in the effect of visuals on evaluative judgment in this type of information context. From a methodological point of view, the combined empirical results also highlight and demonstrate the potential synergy value in mixing quantitative and qualitative methods, not only across research works but also within the same empirical study, in order to develop a more profound and nuanced understanding of this interplay between variables and the underlying mechanisms behind visual framing effects.

5.1 Theoretical implications
The empirical studies making up this dissertation contribute to extant accounting literature by showing that visuals are a potential source of cognitive bias in performance evaluations based on information provided in various types of accounting information communications. This study also adds to the more general stream of behavioral accounting research that uses theory derived from cognitive psychology in order to advance our understanding of accounting-related judgment and decision making. To my knowledge, the experiments conducted within the framework of this thesis are among the first to empirically demonstrate that visual cues presented with accounting information can change a human’s judgment of that information in systematic and
perhaps even predictable ways. To that effect, much still remains to be discovered about the way, and under which conditions, visual elements such as pictures and color markers, can function as devices for visual framing in accounting communication. However, the combined results of these studies underline the relevance for proceeding research on this topic. Evaluation is a fundamental psychological process underlying a host of accounting-related judgments and choices, and understanding those could have many important implications for understanding human behavior in this area.

A theoretical perspective that the research studies comprising this dissertation do not explore, but that is still relevant to reflect upon in relation to the theoretical implications of the obtained empirical results, is if, and if so under which conditions, visual elements tend to ‘distort’ or ‘improve’ human judgment in a given situation. The designs of the empirical studies comprised in this thesis do not allow for any such conclusions, as such inferences would require having some baseline measure of the known “correct” evaluation outcome, which is not the case in any of the experimental scenarios. Whether the presence of visuals in accounting discourse is to be regarded as favorable or unfavorable for human judgment and decision making is thus beyond the scope of this thesis because this interpretation is arguably contingent on a series of contextual factors as well as underlying motives and perspectives. My research objective — and research contribution — is thus not to provide a normative view on whether supplementary visual cues, such as color and visual imagery, should have a place in accounting communication. Instead, the motivation behind these studies has been to explore whether juxtaposing visuals with accounting information can cause systematic deviations in accounting-related judgments relative to what would have been the judgment outcomes had these visual elements not been part of the presentation format. Thus, this research is descriptive rather than normative in scope and the underlying research ambition is to increase awareness and understanding of potential psychological effects that multimodal presentation formats may have on human information processing and associated judgments in the domain of accounting. In other words, regardless of stance on the adequacy of visuals in accounting communication practice, the empirical findings of this thesis expand on an emergent but growing part of the behavioral accounting literature by taking a series of steps to deepen knowledge about the role presentation formats have in accounting discourse in relation to human judgment and decision-making.

The empirical findings presented in this thesis suggest that visuals constitute a potentially powerful mode of communication in the realm of accounting, not least for their potential to bring salience and evoke emotional meaning in an information landscape that otherwise consists of pallid alphanumerical data. The syntax of the accounting language in the form of aggregated numbers and other standardized accounting statements requires some kind of interpretation in order to carry semantic, evaluative meaning in human judgment
and decision-making processes. Based on the empirical results of this dissertation, which corroborate empirical findings in visual research in other human information behavior domains (e.g. cognitive psychology, consumer marketing, and political communication studies), I thus argue that supplementary visual elements, such as photographic imagery, displays of facial expressions, and specific color cues, which are all prevalent in contemporary accounting discourse, may play an underestimated role in forming the semantic interpretations that we humans make of the syntax that is commonly referred to as the language of accounting. In terms of theoretical implications, I therefore argue that one way of advancing accounting behavioral research would be to start taking a broader, more all-encompassing view of accounting as communication, instead of simply pursuing the traditional, syntax-oriented approach that has largely defined accounting discourse in academic research. The empirical results of this dissertation demonstrate this need for more understanding about how humans take in and interpret accounting information.

5.2 Practical implications

The abundance of supplementary visual attributes in the presentation of internal and external corporate reports seems to be a steady, continuing trend. As the discretionary use of these visual cues, at least under certain conditions, seem to significantly impact stakeholders’ evaluative judgments regarding corporate performance, these findings have essential implications for accounting practice. More specifically, if visual messages have the potential to entice, exhort, and give visceral, emotional meaning to perfunctory performance information presented in accounting reports, regulators and policy makers should re-evaluate their approach to visuals in external accounting communications. The empirical findings of the first two studies of this dissertation provide basis for the argument that visuals should not be treated as mere decorations or transparent information, but rather as potentially powerful communication devices that can, and most certainly already are, used in corporate acts of impression management and legitimacy-seeking communications. By extension, organizations that have already reached a relatively high level of public credibility may find the display of visual elements particularly powerful in shaping or maintaining public opinion, because the emotive, symbolic qualities of the visual are then less likely to be called into question (see the results and discussion in Empirical Study I).

From a regulatory perspective, the results suggest that elements that are currently not regulated by general corporate reporting guidelines (Davison 2015), but still prevalent in corporate reporting practice, can significantly influence stakeholders’ perception of company performance in both financial and non-financial areas. Again, this dissertation does not take a normative stand against the use of visual material in accounting reporting practice, but
argues that the presence of these materials strongly justifies increased attention and an awareness that visual, peripheral cues, can also carry meaning that spills over onto the semantic interpretation of communicated accounting information. What cannot be communicated through numbers or narratives (because of regulations or difficulties in quantification), may then instead be manifested through visual elements such as photographic images, CEO facial displays, and specific color associations. These elements may provide not only visual evidence and affirmation for illustrative purposes, but they may also bolster or in other ways alter a recipient’s perception and semantic interpretation of the perfunctory accounting information presented. In an accounting landscape where multimodality and integrated reporting are increasingly becoming the norm, it may therefore be more important than ever before to deepen and broaden our understanding of the meaning of visuals and their potential effects on human perception and behavior. Visual elements do not only have denotative meaning, but also connotative meaning, and may even serve ideological functions, which may create an emotional frame that forms an imaginary contact between the reader and the content of the report. For this reason, I propose that the accounting community at large, including a broad spectrum of stakeholders such as end-users, policy makers, and academics, develop a more critical approach to the messages conveyed through these visual elements. One way of doing this would be to extend the responsibility of auditors to control for whether these supplementary cues can be deemed to frame or emphasize certain aspects that unjustly polarize, ambiguate, or even obfuscate the accounting information presented. Another possibility would be to assign stricter regulation on what type of material is allowed to be included in external accounting reports in the first place. Greater readership clarity on what is audited content compared to discretionary material in corporate reports could also be demanded through regulation. These recommendations would however require fundamental changes to contemporary accounting practice, and would only follow the prior establishment of a deeper awareness about the role of visuals in accounting communication.

5.3 Limitations and future research

The aforementioned results should also be interpreted in light of the limitations of the empirical studies in this thesis. A general concern with controlled social science experimentation, which has been the predominant research method in this thesis work, is the uncertainty about whether particular results extrapolate to non-laboratory practices. I kept this external validity aspect in mind while designing my experiments and, in order to make the experiment materials as realistic as possible (both in terms of content and layout), I used material adapted largely from real-life accounting reports. Only future research, with more empirical studies across different experimental settings, can
show whether there will be a stronger basis for more far-reaching assessments and discussions of the empirical findings presented in this thesis.

In terms of conditions for theory development, this thesis adopts a relatively narrow, psychology-rooted definition of framing, which means that the results can only extend the framing literature that departs from this same definition, and not necessarily other framing literature that uses a different or looser definition of this phenomenon. Based on my review of various literatures in social science (all of which claim to explore the phenomenon of ‘framing’), I would argue that there is a general need for increased conceptual clarity regarding this term both within and across related research fields. It is only through the use of a consistent definition of ‘framing’ in these various contextual domains that a larger, interdisciplinary framework that generates cross-disciplinary knowledge can be properly developed over time.

Another general limitation of extant research on framing, regardless of the exact definition, concerns temporal specificity. Almost all studies conducted so far, including the ones in this thesis, examine emotional impacts on judgment and choice outcomes at one single, relatively immediate point in time (Lerner & Keltner 2007). Therefore, future research should arguably be extended to also consider the extent to which emotions triggered by (visual) stimuli can also have a more permanent influence on human perception and interpretation of (accounting) information.

The concept of ‘valence’ (positive versus negative) is the organizational principle used in this thesis for emotion effects on judgment and decision making. Valence is recognized in contemporary psychology literature as a powerful but not fully understood dimension for predicting the effects of emotion (e.g., Shuman et al. 2013; Lerner & Keltner 2000). The emerging picture of emotions’ influences on judgment and decision making appear to be more complex, and recent psychological studies have started studying emotion beyond valence to map out patterns of emotion-specific appraisal patterns (e.g. DeSteno et al. 2000). These studies reveal that emotions that share the same valence – such as fear and anger – can influence judgment in different ways, that is, in ways that follow emotion-specific tendencies (Lerner & Keltner 2007). While a few studies have explored the effect of specific emotions in contexts such as assessing monetary value (e.g. Lerner et al. 2004; Cryder et al. 2008), the role of specific emotions still remains largely understudied in economic contexts (Lerner et al. 2007). Therefore, behavioral accounting research may benefit from future studies adopting a greater specificity both when it comes to the content of different visual stimuli and the emotion(s) they may evoke.

Furthermore, the distinction in experimental results between studies III and IV touches on the potential dichotomy between novices and experts, and suggests that more behavioral studies should be done considering potential variations in framing effects stemming from this particular aspect. Based on pre-tests and interview data collected through this research project, there is also
reason to consider that the associations and emotional meaning conveyed by a certain visual symbol may not only be contingent on level of domain expertise, but also on personal characteristics and cultural factors. It may therefore be relevant to further examine the influence of these potentially moderating variables in future research.

Finally, the overall empirical results of this thesis raise the question as to whether variations in presentation format (i.e. frames) of accounting information can trigger different schemas of human information processing, which in turn affect human sense-making of the accounting information presented. Eye-tracking could become a powerful technique for advancing insights about this.

To conclude, this thesis takes a number of steps towards a more multifaceted understanding of the judgmental effects of visual cues in accounting communication. Of course, many aspects still remain to be explored if we are to discover more definitive theoretical and practical implications. It is my hope that the empirical findings and related discussions presented in this thesis will inspire further research on these topics.
References


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