



**Prince Teye**

## **Behavioral Biases and Nudges in Auditing**

---

TEYE, Prince. *Behavioral Biases and Nudges in Auditing* **[en ligne]**. Sous la codirection de Jean-François GAJEWSKI et de Marco HEIMANN. Thèse de doctorat : Sciences de gestion. Lyon : Université Jean Moulin Lyon 3, 2023.

**Disponible** sur : <https://www.theses.fr/2023LYO30050>

---



Document diffusé sous le contrat *Creative Commons* « **Attribution – Pas d'utilisation commerciale - Pas de modification** »

Vous êtes libre de le reproduire, de le distribuer et de le communiquer au public à condition d'en mentionner le nom de l'auteur et de ne pas le modifier, le transformer, l'adapter ni l'utiliser à des fins commerciales.



N° d'ordre NNT : 2023LYO30050

# THÈSE DE DOCTORAT DE L'UNIVERSITÉ JEAN MOULIN LYON 3

Membre de l'université de Lyon

École doctorale n° 486 - SEG, Sciences économiques et de gestion

Discipline : **Sciences de gestion**

Soutenue publiquement le 11/12/2023, par

**Prince TEYE**

---

## **Behavioral Biases and Nudges in Auditing**

---

Laboratoire de recherche : **Centre de recherche Magellan**

Codirecteurs de thèse : **M. Jean-François GAJEWSKI** et **M. Marco HEIMANN**

Devant le jury composé de :

**M. Jean-François GAJEWSKI**

Professeur des universités, université Jean Moulin Lyon 3, France. Codirecteur de thèse

**M. Marco HEIMANN**

Maître de conférences, université Jean Moulin Lyon 3, France. Codirecteur de thèse

**Mme Emmanuelle NÈGRE**

Professeure des universités, université de Bordeaux, Talence, France. Présidente du jury

**Mme Nathalie GONTHIER-BESACIER**

Professeure des universités,  
université Grenoble Alpes, Saint-Martin-d'Hères, France. Rapporteure

**M. Yves MARD**

Professeur des universités,  
université Clermont Auvergne, Clermont-Ferrand, France. Rapporteur

**M. Pierre-Majorique LÉGER**

Professeur titulaire, HEC Montréal, Québec, Canada. Examineur



## **Acknowledgment**

It is in the realm of impossibility for an individual to single-handedly realize a doctoral thesis. In this light that I want express my deep gratitude to everyone who helped me, in some way or another, through this journey.

First of all, I wish to profoundly thank my doctoral thesis directors, Professor Jean-François Gajewski and Associate Professor Marco Heimann for accepting to supervise this research. I am thankful for their guidance, support, and involvement in my research and professional choice. Their dynamism, expertise, vast network, and responsiveness made it possible for me to develop my research, scientific, and pedagogical qualities.

During my master's program at Grenoble Ecole de Management, I expressed my strong desire to continue my career path in the field of research and academia. Therefore, I am thankful to Professor Luc Meunier and Professor Nhu-Tuyen Le for introducing me to the academic world and helping me develop vital research skills through my master's dissertation and various training programs, all of which eventually led me to secure a position as a doctoral student.

I would like to express my sincere thanks to the members of my thesis defense jury: Nathalie Gonthier-Besacier, Pierre-Majorique Léger, Yves Mard, Emmanuel Nègre, and my thesis directors. I appreciate your interest in my work and the time and effort expended in reviewing it.

A notable aspect of my doctoral program was a research visit to Tech3Lab HEC Montreal, Canada which enabled me to develop competence in the use of neurophysiological tools in management research. The application of these techniques was central to my doctoral research. In this regard, I thank Professor Pierre-Majorique Léger and his team for making this possible.

Furthermore, I wish to express my gratitude to the ANR REMOTAUDIT Team composed of Jean-François Gajewski, Marco Heimann, Pierre-Majorique Léger, Luc Meunier, Claire Bassin, and Eunice Yaa Cudjoe for their support.

Again, I wish to thank all researchers who provided their input during the presentation of my work at various conferences, such as the French Finance Association (AFFI), European Accounting Association (EAA), American Accounting Association (AAA) and the Francophone Accounting Association (AFC).

My thanks goes out to the members of the Magellan Research Laboratory of Université Jean-Moulin Lyon 3, more particularly to the finance group. I extend my appreciation to Professor Valerie Revest-Arliand and Professor Pierre-Majorique Léger for being a part of the monitoring committee of my thesis. I would also like to thank the Doctoral School of Economics and Management Sciences (EDSEG) of the University of Lyon.

Finally and very importantly, I would like to acknowledge my family. I thank them for their love and unwavering support all throughout my life. I would also like to thank my friends for their support.

## **Abstract: Behavioral Biases and Nudges in Auditing**

This doctoral work studies the impact of cognitive biases and remote audits on professional skepticism, a marker of audit quality, and proposes novel tools to remedy these biases. The first chapter seeks to identify the impact of the framing bias and the optimism bias on professional skepticism. Furthermore, eye-tracking technology is used to develop an understanding of a mechanism underlying the interaction of these cognitive biases and professional skepticism. Using a laboratory user experimental approach, results show that these cognitive biases unnecessarily increase cognitive load and processing levels, as measured by the total duration of fixation metric such that auditor's professional skepticism is negatively affected. The second chapter explores the impact of remote audit on professional skepticism. Using a qualitative approach based on semi-structured interviews, results indicate that remote audits negatively impact situational components of professional skepticism through the effect of media richness. The third chapter of the thesis looks at the potential of nudges to increase professional skepticism. It contextualizes nudge theory in financial audit settings and presents experimental evidence of the effects of social norms and justification nudges on audit behavior. A between-subject experiment (2 social norms x 2 justification) demonstrates that nudges positively impact professional skepticism. Then an eye-tracking experiment during an audit task helps reveal the cognitive mechanism at play: nudged conditions lead to increased visual attention during assessments of audit evidence, which may lead to enhanced professional skepticism. This thesis extends the accounting literature, as it relates to professional skepticism, detailing the effect of remote audit and the potential for improvement through the use of nudges. In practice, findings can inform the design of nudges that specifically target visual attention by designing nudges that direct auditors' attention to important information.

**Keywords:** behavioral audit, remote audit, professional skepticism, cognitive biases, optimism bias, framing bias, cognitive load, eye-tracking, visual attention, nudge,

## **Résumé : Biais Comportementaux et Nudges en Audit**

Cette thèse étudie l'impact des biais cognitifs, et l'audit en distanciel sur le scepticisme professionnel des auditeurs, un marqueur de la qualité de l'audit, et propose ensuite des outils novateurs pour remédier à ces biais. Le premier chapitre examine l'impact du biais de cadrage, et du biais d'optimisme sur le scepticisme. A cet effet, en utilisant la technologie d'oculométrie, il s'agit de comprendre le mécanisme sous-jacent à l'interaction entre les biais cognitifs et le scepticisme. A partir d'expériences utilisateur en laboratoire, les résultats prouvent que ces biais cognitifs augmentent la charge cognitive mesurée par la durée totale de fixation, de sorte que le scepticisme est affecté négativement. Le deuxième chapitre explore l'impact de l'audit en distanciel sur le scepticisme professionnel. Utilisant une approche qualitative basée sur des entretiens semi-directifs, les résultats indiquent que les audits en distanciel impactent négativement les composantes situationnelles du scepticisme professionnel par l'effet de la richesse des médias. Le troisième chapitre examine le potentiel des nudges (coup de pouce) pour augmenter le scepticisme. Il contextualise la théorie du nudge dans l'audit financier et présente des preuves expérimentales des effets de deux nudges, les normes sociales, et la justification sur le comportement des auditeurs. Une expérience inter-sujets (2 normes sociales x 2 justification) prouve que les nudges ont un impact positif sur le scepticisme professionnel. Ensuite, une expérience utilisant l'oculométrie au cours d'une tâche d'audit permet de révéler le mécanisme cognitif : les nudges conduisent à une attention visuelle accrue lors de l'évaluation des éléments probants, ce qui peut conduire à un scepticisme professionnel accru. Cette thèse contribue à la littérature sur le scepticisme professionnel en détaillant l'effet de l'audit en distanciel et le potentiel d'amélioration grâce aux nudges. Sur le plan managérial, les résultats peuvent éclairer la conception des nudges qui ciblent l'attention visuelle en la dirigeant vers des informations importantes.

**Mots-clés :** audit comportemental, audit en distanciel, scepticisme professionnel, biais cognitifs, biais d'optimisme, biais de cadrage, charge cognitive, oculométrie, attention visuelle, théorie du nudge

## Synopsis

Chapter 1: General Introduction- Setting the Stage on Cognitive Biases and Professional Skepticism.....	1
Chapter 2: Through the Auditor’s Lens: Unveiling the Effects of Cognitive Biases on Professional Skepticism.....	17
Chapter 3: The Remote Frontier: Investigating the Impacts of Distance Auditing on Professional Skepticism.....	41
Chapter 4: Nudging Towards Better Auditing: Empirical Insights From an Eye-Tracking Experiment.....	69
Chapter 5: General Conclusion- Drawing the Blueprint for Future Auditing: Conclusions and Pathways Forward.....	95
References.....	101
List of Tables and Figures.....	127
Appendix.....	145
Résumé en français.....	167





## Table of Contents

Acknowledgment .....	iii
Abstract: Behavioral Biases and Nudges in Auditing.....	v
Résumé : Biais Comportementaux et Nudges en Audit.....	vi
Synopsis .....	vii
Table of Contents .....	ix
List of Figures .....	xii
List of Tables.....	xiii
List of Appendices .....	xiv
List of Abbreviations.....	xv
Chapter 1: General Introduction- Setting the Stage on Cognitive Biases and Professional Skepticism.....	1
1.1. Overview.....	1
1.2. Theoretical Background and Research Questions .....	6
1.3. Eye-tracking in this Thesis.....	10
1.4. Thesis Contents.....	14
1.4.1. First Study- Through the Auditor’s Lens: Unveiling the Effects of Cognitive Biases on Professional Skepticism.....	14
1.4.2. Second Study- The Remote Frontier: Investigating the Impacts of Distance Auditing on Professional Skepticism.....	14
1.4.3. Third Study- Nudging Towards Better Auditing: Empirical Insights from an Eye-Tracking Experiment.....	15
Chapter 2: Through the Auditor’s Lens: Unveiling the Effects of Cognitive Biases on Professional Skepticism.....	17
Abstract.....	17
2.1. Introduction.....	18
2.2. Literature Review and Hypotheses .....	21
2.2.1. Heuristics and Biases .....	21
2.2.2. Mediating Role of Cognitive Load .....	25
2.3. Methods.....	28
2.3.1. Participants.....	28
2.3.2. Design .....	28
2.3.3. Material.....	29
2.3.4. Eye-Tracking Equipment .....	29
2.3.5. Procedure .....	30
2.3.6. Variables.....	31
2.4. Results.....	31
2.4.1. Descriptive Statistics of Variables .....	31
2.4.2. Auditor’s Susceptibility to Cognitive Biases.....	32
2.4.3. Impact of Cognitive Bias on Professional Skepticism.....	33

2.4.4.	Cognitive Biases and Cognitive load.....	34
2.4.5.	The Mediating Effect of Cognitive Biases on Professional Skepticism .....	35
2.5.	Discussion.....	36
2.6.	Conclusion .....	37
2.7.	Transition: Professional Skepticism from a Cognitive Standpoint to the Remote Frontier.....	39
Chapter 3: The Remote Frontier: Investigating the Impacts of Distance Auditing on Professional Skepticism.....		41
Abstract.....		41
3.1.	Introduction.....	42
3.2.	Literature Review and Research Questions .....	45
3.2.1	Remote Work and Media richness .....	45
3.2.2.	Media Richness and Professional Skepticism.....	48
3.2.3.	Professional Skepticism Contextualized in Remote Audits.....	49
3.3.	Methods.....	51
3.4.	Results.....	53
3.4.1.	The Consolidation of Remote Work in Audit Practice .....	54
3.4.2.	Perception of Professional Skepticism by Auditors.....	55
3.4.3.	Impact of Remote Work on Professional Skepticism .....	57
3.4.4.	Improving Professional Skepticism in Remote Work.....	62
3.5.	Discussion.....	64
3.6.	Conclusion .....	66
3.7.	Transition: From Factors Impacting Professional Skepticism to Novel Tools for Improving Professional Skepticism .....	68
Chapter 4: Nudging Towards Better Auditing: Empirical Insights From an Eye-Tracking Experiment.....		69
Abstract.....		69
4.1.	Introduction.....	70
4.2.	Literature Review and Hypotheses .....	73
4.2.1.	Professional Skepticism and Aggressive Reporting .....	73
4.2.2.	Social Norms.....	74
4.2.3.	Justification .....	76
4.2.4.	Nudges and Visual Attention .....	78
4.3.	The Online Experiment.....	80
4.3.1.	Methods.....	80
4.3.1.1.	Participants .....	80
4.3.1.2.	Experimental design .....	80
4.3.1.3.	Material.....	81
4.3.1.4.	Manipulation Checks.....	82

4.3.1.4.	Procedure .....	83
4.3.2.	Results.....	83
4.3.2.1.	Effect of Nudges on Professional Skepticism .....	83
4.4.	The Eye-tracking Experiment in the lab .....	85
4.4.1.	Methods.....	85
4.4.1.1.	Participants .....	85
4.4.1.2.	Experimental design .....	85
4.4.1.3.	Material.....	86
4.4.1.4.	Procedure .....	87
4.4.1.5.	Variables .....	87
4.4.2.	Results.....	88
4.4.2.1.	Effect of Nudges on Skepticism .....	88
4.4.2.2.	Nudges and Visual Attention .....	89
4.4.2.3.	Mediating Effect of Visual Attention on Professional Skepticism .....	90
4.5.	Discussion .....	92
4.6.	Conclusion .....	93
Chapter 5: General Conclusion- Drawing the Blueprint for Future Auditing: Conclusions and Pathways Forward.....		95
5.1.	Main Findings and Contributions .....	95
5.1.1.	Academic Contribution.....	95
5.1.2.	Managerial Contribution.....	97
5.2.	Limits and Further Research .....	98
5.2.1.	Limits of this Thesis.....	98
5.2.2.	Avenues for Further Research.....	99
References .....		101
List of Tables and Figures .....		127
Appendix.....		145
Résumé en français .....		167

## List of Figures

Figure 1.1. Structure of the Three Studies Comprising this Doctoral Research .....	2
Figure 1.2. Research Questions Addressed by this Doctoral Study .....	7
Figure 1.3. A Heat Map extracted from the First Study Indicating Participants' Visual Attention on Experimental Material .....	12
Figure 1.4. A Gaze Plot Extracted from the First Study Indicating the Order of Visual Attention of Participants on Experimental Material .....	13
Figure 2.1. Path Model of Mediation of the Effect of the Optimism Bias on Skepticism through Total Duration of Fixations .....	131
Figure 4.1. Path Model of Mediation of the Effect of Nudges on Skepticism through Visual Attention .....	144

## List of Tables

Table 1.1: Eye-Tracking Metrics and their Associated Psychological Constructs.....	11
Table 2.1: Descriptive Statistics.....	127
Table 2.2: Frequency Distribution of Cognitive Biases.....	128
Table 2.3: Direct Effect of Cognitive Biases on Professional Skepticism.....	129
Table 2.4: Cognitive Biases and Cognitive Load.....	130
Table 2.5: Mediation Analysis.....	132
Table 2.6: Summary of Results.....	133
Table 3.1: Demographic Data of Participants.....	134
Table 3.2: Interview Themes.....	135
Table 4.1: Socio-Demographic Information of Participants.....	137
Table 4.2: Descriptive Statistics by Nudge Condition.....	138
Table 4.3: Post-Hoc Comparisons of Skepticism Under the Nudge Versus the Control Condition.....	139
Table 4.4: Descriptive Statistics for Experiment 2.....	140
Table 4.5: Effect of Social Norms and Justification Nudges on Visual Attention.....	141
Table 4.6: Path of Visual Attention (Dwell-to-Revisits) to Professional Skepticism.....	142
Table 4.7: Direct Path of Nudge to Skepticism.....	143

## List of Appendices

Appendix 2.1. Informed Consent Form: .....	145
Appendix 2.2. Audit Task.....	146
Appendix 2.3. Audit Task Questions.....	147
Appendix 2.4. Hurtt’s Professional Skepticism Scale.....	147
Appendix 2.5. Cognitive Biases.....	150
Appendix 2.6. Demographic Questions .....	150
Appendix 3.1. Interview Guide.....	152
Appendix 4.1. Experiment 1 .....	154
Appendix 4.2. Experiment 2 .....	159
Appendix 4.1.1. Informed Consent Form .....	154
Appendix 4.1.2. Attention Check.....	155
Appendix 4.1.3. Nudges.....	155
Appendix 4.1.4. Audit Task.....	156
Appendix 4.1.5. Audit Task Question .....	157
Appendix 4.1.6. Manipulation Check .....	158
Appendix 4.1.7. Demographic Questions .....	159
Appendix 4.2.1. Informed Consent form .....	159
Appendix 4.2.2. Attention check.....	160
Appendix 4.2.3. Nudges.....	160
Appendix 4.2.4. Audit Task.....	160
Appendix 4.2.5. Audit Task Questions.....	166
Appendix 4.2.6. Manipulation Check .....	166
Appendix 4.2.7. Demographic Questions .....	166

## List of Abbreviations

AICPA	American Institute of Certified Public Accountants
AOI	Area of Interest
C	Control Nudge
HPSS	Hurtt's Professional Skepticism Scale
ISA	International Standards on Auditing
J	Justification Nudge
S	Social Norm Nudge
SJ	Combined Nudge of Social Norms and Justification
TTF	Time-to-first fixation



# **Chapter 1: General Introduction- Setting the Stage on Cognitive Biases and Professional Skepticism**

## **1.1. Overview**

The pivotal role of financial auditing in assessing the truthfulness and accuracy of a firm's financial statements is very important in protecting the interests and instilling confidence in the financial records of an economic system. Thus, a failure in financial audit has far-reaching consequences for the audit firm, the audit client, and in certain cases the wider economy. In speaking of audit failures, their recurrence over the years as seen in various examples that have marked recent history such as Worldcom (2002), Wirecard (2020), and Grenke (2020) illustrate the fact that despite efforts to improve financial audit practice and make it impervious to failure, there still exists room for improvement. An important element evoked by regulators in the wake of audit failures is the absence of professional skepticism (Ray, 2015; Grenier, 2017). Therefore, the central focus of this doctoral thesis is on professional skepticism. More specifically, this doctoral research aims to identify factors which could diminish auditors' professional skepticism and propose suitable remedies.

Professional skepticism, according to the International Standard on Auditing (ISA 200), is a key part of auditing and is a requirement in the planning and performance of the audit. It is further defined as "an attitude that includes a questioning mind, being alert to conditions which may indicate possible misstatement due to error or fraud, and a critical assessment of audit evidence". As a testament to its importance, professional skepticism has been widely studied in accounting and auditing literature (McMillan and White, 1993; Shaub and Lawrence, 2002; Nelson, 2009; Hurtt, 2010; Hurtt, Brown-Liburd, Earley, and Krishnamoorthy, 2013; Nolder and Kadous, 2018; Robinson, Curtis and Robertson, 2018). In the literature, a focus has been placed on identifying various components of professional skepticism (Nelson, 2009; Hurtt, 2010; Hurtt, Brown-Liburd, Earley and Krishnamoorthy, 2013; Robinson, Curtis, and

Robertson, 2018; Nolder and Kadous, 2018; Mohammad and Oczkowski, 2021), factors that could impact it and its effects (McMillan and White, 1993; Brazel, Leiby and Schaefer, 2022; Cross, Moroney and Phang, 2023), how it can be enhanced (Glover and Prawitt, 2014; Bauer, 2015; Nolder, Christine, Sakel, Nicole, Ratzinger, and Theis, 2022). Despite the existing literature, this thesis research fills three gaps related to professional skepticism. The three articles in this thesis address these three gaps. This is illustrated in Figure 1.1

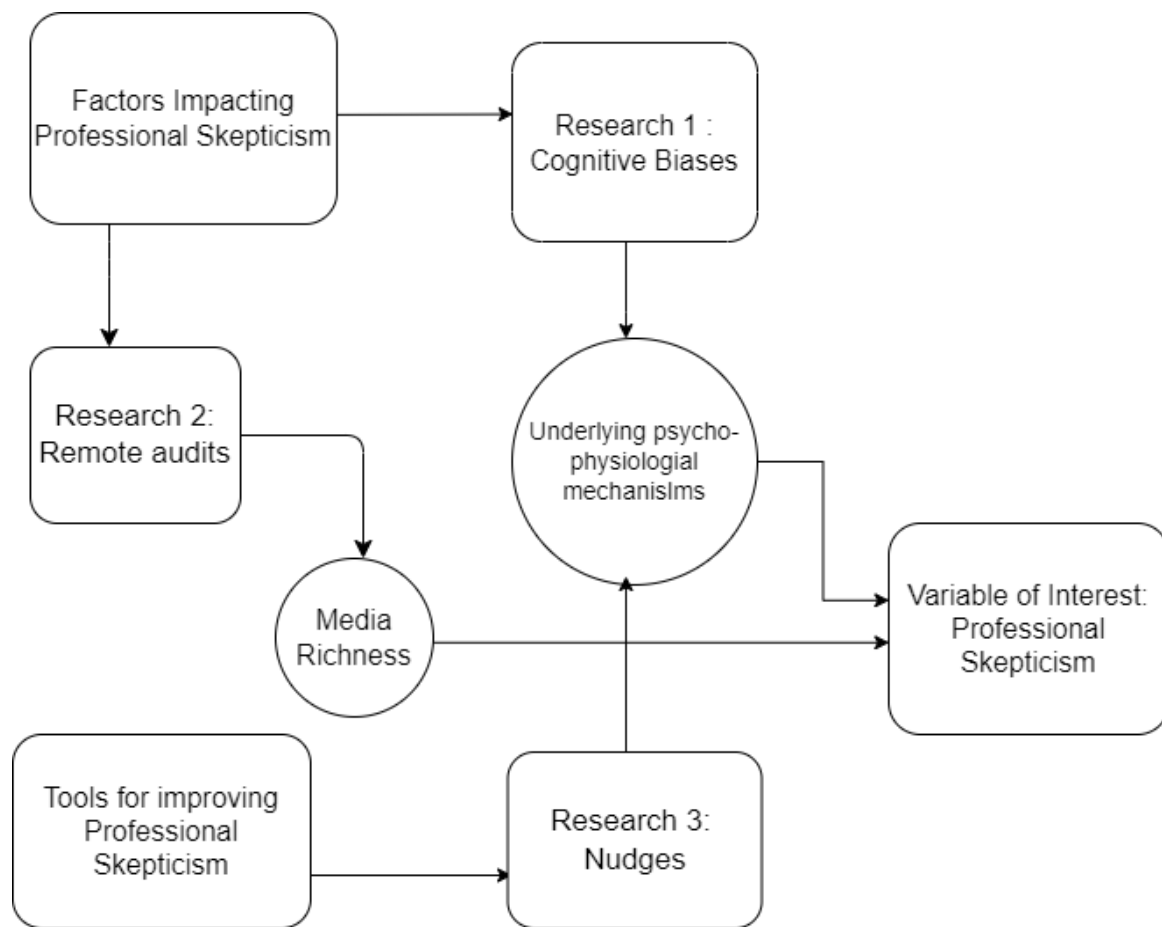


Figure 1.1. Structure of the Three Studies Comprising this Doctoral Research

A first gap in the existing literature addressed by this thesis research is the understanding of a mechanism through which cognitive biases could negatively affect professional skepticism. Lynch and Andiola (2019) call for the use of non-intrusive technology such as eye-tracking in

developing an understanding of such phenomena. Thus, in the first study of this doctoral research, I use eye-tracking technology to develop an understanding of how underlying psychological constructs measured by eye-tracking metrics interact between cognitive biases and professional skepticism.

Heuristics and biases refer to thought processes used to assess probabilities, make predictions, and eventually arrive at decisions based on bounded rationality (Simon, 1959; Tversky and Kahneman, 1974). Such biases generally lead to suboptimal decisions in auditing Libby (1985); Biggs, Mock, and Watkins (1988); Presutti (1995); Bigus (2016); Henrizi, Himmelsbach and Hunziker (2021). Again, the explanation of audit failures from the point of view of cognitive biases has gained traction in recent times, leading to a growing interest in the study of cognitive biases in auditing (Knapp and Knapp, 2012; Brewster, Butler, and Watkins, 2019). In view of this, I concentrate on two cognitive biases, namely the optimism bias and the framing bias. The framing bias is of interest because it has been identified as an important bias in auditing (Fukukawa and Mock, 2011; Mock and Fukukawa, 2016). Furthermore, in conditions of increased remote work, as has been the case since the COVID-19 pandemic, the risk of error regarding ongoing judgment concerns is high as a result of equivocality in communication (Daft and Macintosh, 1981; Agoglia, Hatfield, and Brazel, 2009). In such cases, changes in description of a task that does not alter its normative meaning but could eventually alter decisions signal the framing bias (Kahneman and Tversky, 1984; Jamal, Johnson, and Berryman, 1995). The optimism bias, on the other hand, is relatively unexplored in the auditing literature (Johnston, Lindsay, and Phillips, 2003). Again, the optimism bias could lead to the inefficient use of audit technology (Owhoso and Weickgenannt, 2009). Given that technology is heavily relied on in remote work, this bias becomes of interest.

I first identify the impacts that the framing bias and the optimism bias have on professional skepticism. Following this, I develop an understanding of a psychophysiological mechanism

through which they interact with professional skepticism with the aid of eye-tracking technology. As indicated in the preceding paragraph, the existence of equivocality in communication in situations of remote audits has the possibility of leading to cognitive biases Daft and Macintosh (1981); Agoglia, Hatfield and Brazel (2009); Teeter, Alles and Vasarhelyi (2010). This transitions to the second research in this doctoral thesis.

A second gap in the existing literature that corresponds to the second research of this doctoral thesis is the effect of remote audits on professional skepticism. In audit practice, the beginning of the millennium was characterized by digitalization, and thus a gradual reduction in the reliance on physical material and contact. Even more recently, the COVID 19 pandemic led to mandatory lockdowns in many countries around the world and remote work. This has established the use of remote audits. Remote audit is defined as the process by which auditors couple information and communication technology (ICT) with analytical procedures to gather electronic evidence, interact with the auditee, and report on the accuracy of financial data and internal controls, independent of the physical location of the auditor (Teeter, Alles and Vasarhelyi, 2010). Although remote audits have its benefits, an important issue which has not been addressed is its impact on an important behavioral component of auditors, professional skepticism. Thus, my objective is to understand what effects remote audits have on the professional skepticism of auditors.

A key distinction between remote and onsite audits is the nature of communication. Fundamental to the audit process is communication both within the audit team and between the audit team and the audit client. Communication is central to an auditor's set (Bee, Jafry and Saucedo, 2018), which further impacts the quality of audits (DeAngelo, 1981). An important element influencing the levels and quality of communication is the richness of the communication mediums. Media richness theory, proposed by Daft and Lengel (1986), refers to the ability of a communication medium to accurately reproduce the information sent through

it. This impacts information processing and cognition (Balzer, Sulsky, Hammer and Sumner, 1992; Earley, 2001). Less rich communication media lead to problems of uncertainty and equivocality (Daft and Macintosh, 1981; Daft and Lengel, 1986). However, remote audits depend largely on less rich communication media (Teeter, Alles and Vasarhelyi, 2010). This has possible implications on the situational factors affecting professional skepticism (Nelson, 2009; Robinson, Curtis and Robertson, 2018). After investigating in the first two studies the factors which could negatively impact professional skepticism, the final study looks at a novel approach to remedy such pitfalls.

The approach used in this doctoral research to improve professional skepticism is nudges. Nudges refer to elements in choice architectures that gently alter people's behavior, such as encouraging them to adopt responsible behaviors, without forbidding any specific options or significantly changing economic consequences (Thaler and Sunstein, 2008). In accounting and auditing literature, various techniques have been used to improve financial auditor behavior, including strategic prompts and decision aids (Bowlin, 2011; Kachelmeier and Messier, 1990), mindset manipulations (Griffith, Kadous and Young, 2021) and priming (Durkin, Rose and Thibodeau, 2020). However, nudges differ from these approaches by using the heuristics and biases of the individual auditor, subtly and without coercion with no harm resulting in case they fail (Thaler and Sunstein, 2008). Although nudges have been widely successful in various domains such as economics, finance, marketing, and psychology (Dogruel, 2019; Gane, 2021; Gajewski Heimann and Meunier, 2022), their application in accounting and auditing remains fairly limited. In this study, I first identify the effects of the social norms nudge, the justification nudge and a combination of these two nudges on professional skepticism. Following this, I identify a psychophysiological mechanism underlying the interaction between nudges and professional skepticism. I employ these nudges because they have been identified to be very effective in guiding individuals to take responsible decisions (Dolan Hallsworth,

Halpern, King, Metcalfe and Vlaev, 2012). The incremental contribution of this paper beyond (Nolder, Christine, Sakel, Nicole, Ratzinger, and Theis, 2022) is that it explores a mechanism which explains the effectiveness of nudges in auditing.

## **1.2. Theoretical Background and Research Questions**

When assessing the impacts of cognitive biases and remote audits on professional skepticism, as well as the use of nudges to improve professional skepticism, the ultimate objective is to improve the quality of audits. As such, the underlying theory of this research is the theory of audit quality (DeAngelo, 1981). According to DeAngelo (1981), audit quality is the joint probability that a given auditor will both discover a breach in the client's accounting system and report the breach based on the auditor's independence and competence. Although independence has been defined as the avoidance of any relationship that would be likely, even subconsciously, to affect the auditor's objectivity (Carey and Doherty, 1966), competence refers to skills, knowledge and experience required to perform an audit (Schandl, 1978).

Professional skepticism is part of an auditor's competency set of competencies (Nelson, 2009; Hurtt, Brown-Libur, Earley and Krishnamoorthy, 2013) which eventually impacts audit quality (DeAngelo, 1981). Furthermore, professional standards require auditors to consider the professional competence of other auditors when delegating, directing, supervising, and reviewing audit work (Harding and Trotman, 2009). This indicates that there is an individual aspect relating to competence as well as the audit team objectives. In the various studies which comprise this thesis, there exist aspects relating to the individual auditor as well as those relating to the audit team. As a result, the research questions addressed in this thesis center around the notion of professional skepticism as a means of improving audit quality first at the individual auditor level and, more generally at the level of the audit team. Figure 1.2 illustrates the research questions.

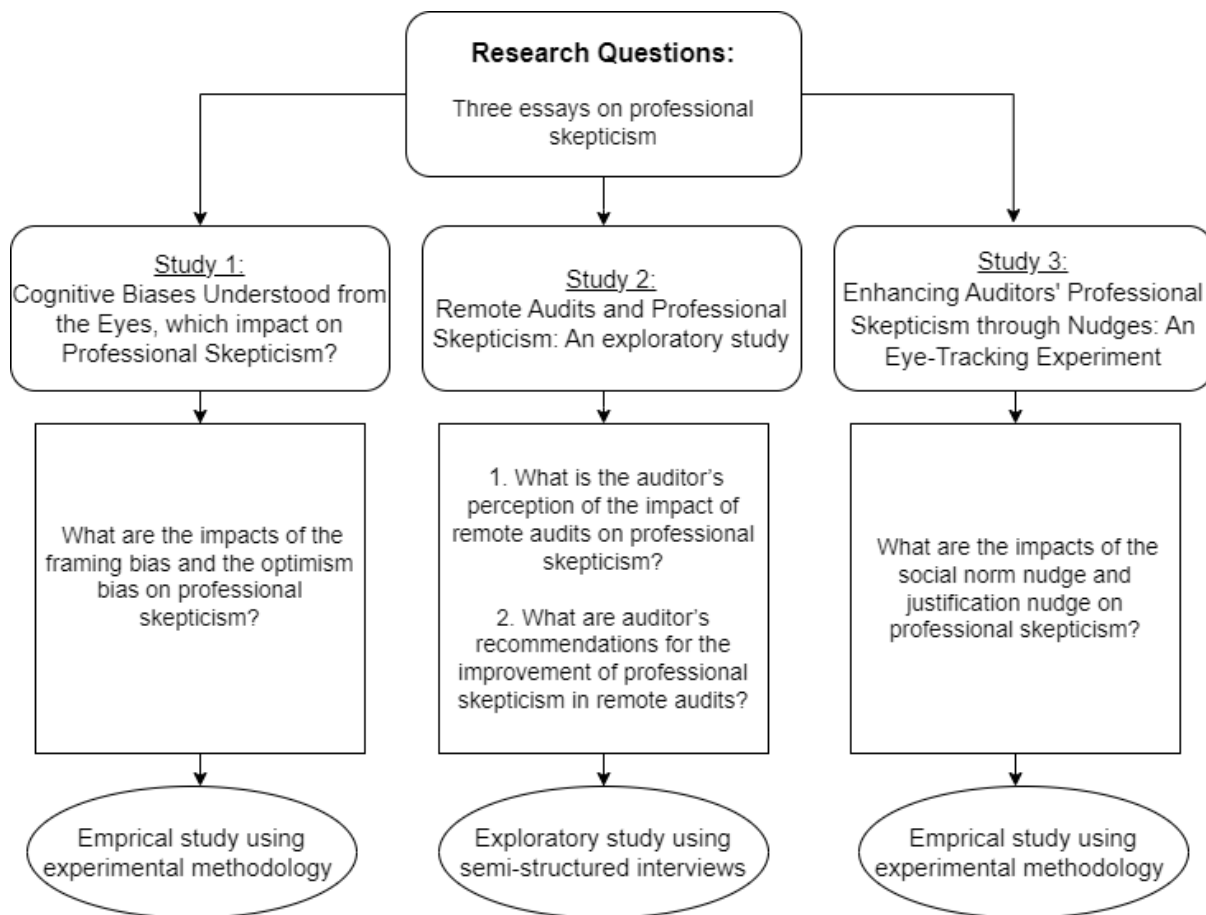


Figure 1.2. Research Questions Addressed by this Doctoral Study

As illustrated in Figure 1.2 above, there are four fundamental research questions which this doctoral thesis seeks to provide answers to. The first research question relates to the first study, the second pair relate to the second study, and the third research question relates to the third study.

In the first study, the research question is to determine the impacts of the framing bias and the optimism bias on professional skepticism. The aim is to provide empirical evidence of these effects using an experimental methodology. Regarding optimism bias, Bigus (2016), finds that under strict liability (auditors are held liable when they cause damages to investors), optimism makes the auditor overestimate the chances of finding material mistakes, and thus induces suboptimal care. Also, Owhoso and Weickgenannt (2009) found that auditors, regardless of

their rank, systematically overrate their ability to detect material errors in financial reports. Johnston, Lindsay and Phillips (2003) also find that auditors, in their use of highly structured workpapers for tests of controls, performed less effectively and less efficiently than they perceived. This leads me to hypothesize that optimism bias leads to less professional skepticism. Regarding the framing bias, although Asare (1992) found no impact of framing moderating the recency effects of going concern judgments Johnson, Jamal and Berryman, (1991) show that a manager can deceive an auditor by creating a frame. This also leads me to hypothesize that the framing bias leads to less professional skepticism.

Following this I aim to identify the psychophysiological mechanism underlying the interaction between professional skepticism and the aforementioned cognitive biases. More specifically, for the framing bias, Levin, Schneider, and Gaeth (1998) found that individuals prone to a negative frame focused more on and were more influenced by negative information relative to positive information. This shows that framing bias, in influencing decisions, impacts information seeking (Dong, De Beuckelaer and Zhou, 2017; Dondzilo, Reiger, Shao and Bell, 2020). Cognitive load is used as a measure of information seeking and processing effort Hu, Ma and Chau (1999). Therefore, I hypothesize that the cognitive biases lead to a higher cognitive load in the examination of audit evidence.

The second pair of research questions is about the impact of remote audits on professional skepticism and relate to the second study. Professional skepticism is composed of traits (relatively stable, enduring, and individual aspect) and a state (a temporary condition evoked by the situation variables) (Hurt, 2010). Remote audits modify the audit situation and context, thus potentially having an effect on professional skepticism (Teeter, Alles and Vasarhelyi, 2010). Robinson, Curtis, and Robertson (2018) identify three dimensions of state skepticism, namely, search for knowledge (desire to understand the true state of a condition, which would prompt auditors to go beyond verification of assertions to find the correct answer), questioning



mind (refers to the ongoing questioning of whether information and evidence is indicative of material misstatement) and suspension of judgment (the characteristic of withholding judgment until there is an appropriate level of evidence on which to base a conclusion. Through the theory of media richness (Daft and Lengel, 1986) explained in the overview, the less media rich environment as found in remote audits makes it more difficult to search for audit evidence. This signals a possible effect on professional skepticism. Following this, I examine what impact remote audits on professional skepticism as the well as auditors' recommendations of improving professional skepticism in remote audits. Thus in responding to these questions, I employ a qualitative design based on semi-structured interviews.

The third research question which corresponds to the third study is about enhancing the professional skepticism of auditors using nudges. I use social norms and justification as nudges. I focus on these two nudges because they have been identified to be effective debiasing tools (Hilton, 2001; Larrick, 2004; Dolan, Hallsworth, Halpern, King, Metcalfe, and Vlaev, 2012). Social norms refer to a shared understanding of what constitutes appropriate behavior (Thøgersen, 2006). In the literature, we find various contexts in which social norms affect the behavior of accountants and auditors. Firstly, Bobek, Roberts and Sweetney (2007) find that social norms affect tax compliance. Also, Kelly and Murphy (2021) show that social norms influence decisions related to aggressive accounting. According to Blay, Gooden, Mellon and Stevens (2019), social norms that prioritize honesty and responsibility can capture an auditor's potential for moral reasoning. Therefore, I hypothesize that implementing a social norm nudge will cause an increase in the level of professional skepticism. Regarding the second nudge implemented, justification techniques require people to offer reasoned explanations of their choices (Hilton, 2001) which should prompt more careful analysis and reduce reliance on cognitive shortcuts. Misra, Sugiri, Suwardi and Nahartyo (2019) identify its influence for leading tax consultants to perform deeper searches. According to Tetlock and Boettger (1989),

people also adjusted their opinions to reflect the views of the source of justification. When auditors are subject to justification demands compared with those who are not, Lord (1992) finds that they issued more qualified opinions. This leads me to hypothesize that implementing a justification nudge will cause an increase in the level of professional skepticism.

Consequently I identify a mechanism underlying the interaction between nudges and professional skepticism. According to eye-mind theoretical predictions, humans can process information only if an eye fixation occurs (Just and Carpenter, 1980). In turn, fixation is a relevant metric for tracking visual attention (Rose, Rose, Rotaru, Sanderson and Thibodeau, 2022). Enhanced information processing demands more fixations (Just and Carpenter, 1980) and nudges can increase these fixations (Dwoskin and Ramsey, 2016). This leads me to hypothesize that visual attention is a mediator between nudges and professional skepticism.

To verify the research questions related to psychophysiological mechanisms in both Study 1 and Study 2, I have recourse to eye tracking technology. In the subsequent subsection, I give an overview of this technology and how it is applied in this research.

### **1.3. Eye-tracking in this Thesis**

The use of eye tracking in this doctoral research responds to the call of (Lynch and Andiola, 2019) to conduct further studies in accounting and auditing using this technology. This is as a result of the possibility of eye-tracking to give insights into various psychological constructs in a nonintrusive way.

Eye tracking is a technology used to track the movement of the eye and changes in pupil size of an individual at a specific point in time usually by reflecting a non-visible infrared light off the eyes of a participant (Lynch and Andiola, 2019; Manzon, 2020). Eye-tracking data can be used as proxies for various constructs. Among these constructs are cognitive load, emotional arousal, expertise, levels of processing, mental states, and perceptual fluency (Wedel and

Pieters, 2008; Holmqvist, Marcus, Richard, Richard, Halszka and Van de Weijer, 2011; Meissner and Oll, 2019). Table 1.1 explains the various eye-tracking metrics used in this study and their associated psychological constructs.

The eye tracking equipment used in this doctoral research were Tobii pro nano, and Red 250 SensoMotoric Instruments GmbH Teltow Germany for studies one and three, respectively. Both were used at a sampling frequency of 60 Hz. This allowed me to collect the various eye tracking metrics listed in Table 1.1.

The eye-tracking metrics employed in this research are the time-to-first fixation, and fixation count to show the attention directed to stimuli, expertise, and perceptual fluency in the cases of nudges influencing professional skepticism. Furthermore, the dwell-to-revisits ratio

Table 1.1. Eye-Tracking Metrics and their Associated Psychological Constructs

Metric	Description	Psychological Construct
Time-to-first fixation	The time period from entering an area of interest (AOI) until the first fixation is made	Attention directed to stimuli, expertise, perceptual fluency
Fixation Count	The total count of fixations in an AOI	Attention directed to stimuli, expertise, perceptual fluency
Total Fixation Duration	Total time of fixations within an AOI	Attention directed to stimuli, cognitive load, level of processing, mental states
Revisits	The total number of times an individual returns to an AOI	Attention directed to stimuli,
Dwell Time	The amount of time an individual fixates within an AOI	Attention directed to stimuli, perceptual fluency
Dwell to revisit ratio	The amount of time an individual fixates within an AOI divided by revisits	Attention directed to stimuli, perceptual fluency

Source: Lynch and Andiola (2019)

which expresses the time elapsed between two revisits, or the time a participant takes before returning to an area of interest, was used to support the findings of previous metrics. Concerning the first study, with the psychological construct of interest being the cognitive load, the metric employed was the total fixation duration.

After extracting the numerical data related to these metrics for analysis, I extracted visual representations of these data. These are the heat map and the gaze plot. Heat maps show the specific fixation points of a participant's gaze path while viewing stimuli (Manzon, 2020). More intense brighter areas represent greater attention to a specific area based on fixation count (Sirois Bédard, and Bera, 2018) while the gaze plots show in which order they were viewed. Figure 1.3 and Figure 1.4 show the heat map and gaze plot extracted from the first study.

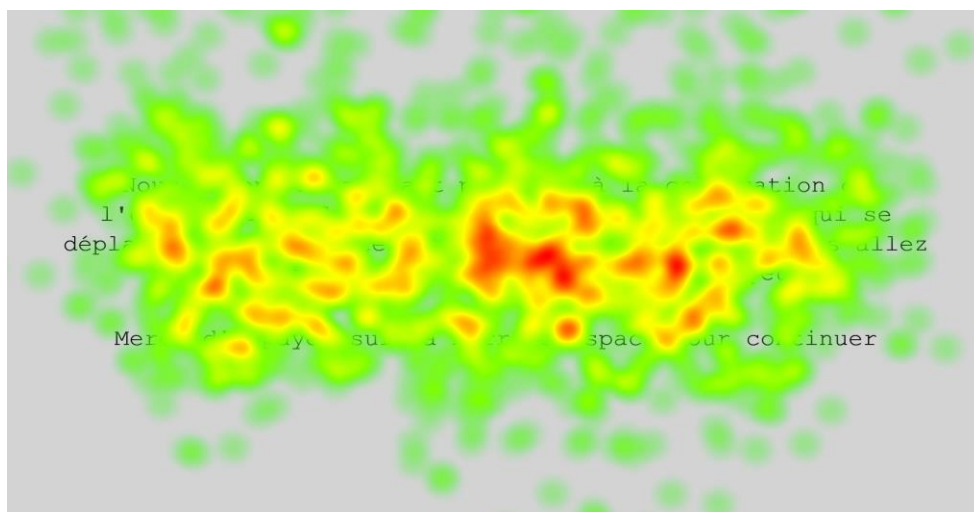


Figure 1.3. A Heat Map extracted from the First Study Indicating Participants' Visual Attention on Experimental Material

The heat map above illustrates participants' visual attention on the experimental material of the first study. It could be observed that participants' focus appeared to be fairly evenly distributed around the center of the screen. This appears normal since not much information can be found in the extremities of the screen. Also, in order to prevent biased results, the pieces of information of interest were systematically randomized for each participant. In order to fully understand which specific information participants focused on, I construct areas of interest (AOIs) of the same sizes to be placed on the specific pieces of information I seek to analyze.

The areas of interest (AOIs) are boundaries drawn around these pieces of information. Thereafter, I extract from the areas of interest the necessary quantitative information described in Table 1.1. Details of the quantitative analysis of the eye-tracking data can be found in the results section of Chapter 2.

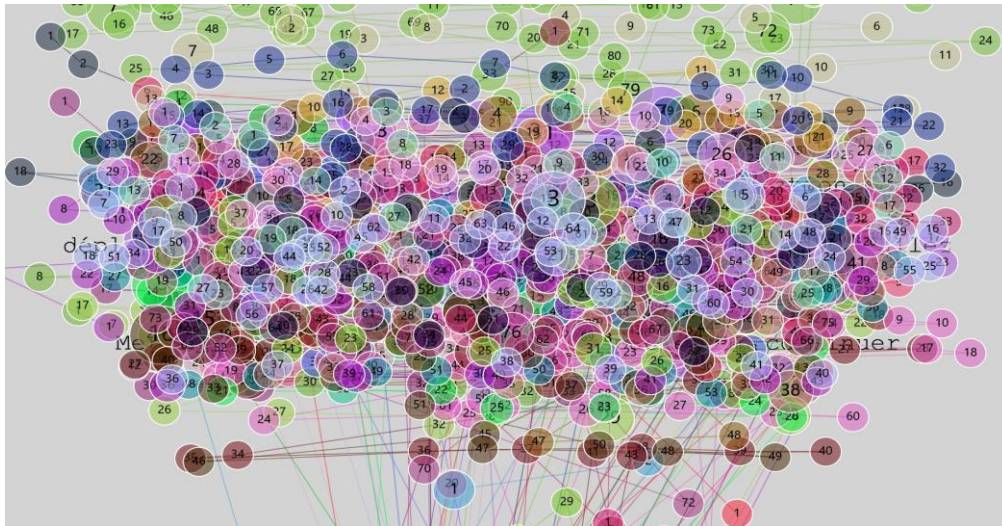


Figure 1.4. A Gaze Plot Extracted from the First Study Indicating the Order of Visual Attention of Participants on Experimental Material

The gaze plot above illustrates the order in which participants' looked at the information contained in the experimental material presented to them for the first experiment. Although it might be difficult to immediately identify a pattern compared the heat map especially when there are many participants, the order of visual analysis of the information is necessary for the revisits metric as we shall see later on this thesis. Again, as with the heat map explained previously, it could be observed that participants' focus appeared to be fairly evenly distributed around the center of the screen. This appears normal since not much information can be found in the extremities of the screen. The order of presentation of information on the screen was systematically randomized to prevent biased results. Statistical analysis in Chapter 2 enable us to fully understand the significance of this gaze plot

## 1.4. Thesis Contents

Specifically, the research in this thesis is developed through three studies. This is illustrated in Figure 1.1. First, I focus on factors that can reduce professional skepticism and the underlying mechanism with an emphasis on cognitive biases. Second, I focus on factors that can reduce professional skepticism, however this is from the perspective of remote audits. After studying factors that can reduce professional skepticism, in the third study, I focus on innovative techniques to improve professional skepticism and the underlying mechanism. These three studies are briefly described below.

### 1.4.1. First Study- Through the Auditor's Lens: Unveiling the Effects of Cognitive Biases on Professional Skepticism.

As a result of their adverse effects on decision making and audit quality, cognitive biases are a subject of disquietude in audit practice. This paper first examines the effect of framing bias and the optimism bias on professional skepticism. Following this, I use eye-tracking to determine an underlying mechanism of the interaction between these two cognitive biases and professional skepticism. This study contributes to the prior literature, particularly on professional skepticism, by providing empirical evidence of factors that could diminish it. From a managerial standpoint, this paper provides a guide of visual attentional behavior that could be indicative of the aforementioned biases. As such audit firms should be guided by such visual attentional behavior of auditors, more especially when working remotely.

### 1.4.2. Second Study- The Remote Frontier: Investigating the Impacts of Distance Auditing on Professional Skepticism.

Dwelling on the theme of the first study, the second study also aims to investigate another phenomenon with the possibility of reducing professional skepticism. Thus, this paper studies the effects of remote audits on professional skepticism. The use of remote audits has been entrenched in audit practice in recent times, firstly due to the wave of digitalization at the beginning of the millennium followed by the recent COVID-19 pandemic which led to

compulsory confinements. With regard to its contributions to literature, the study expands the literature on professional skepticism in audits by examining it from the remote audit perspective. More specifically, it provides insight into the situational variables impacting professional skepticism. A managerial contribution is that this research provides recommendations to help standard setters and audit firms put measures in place to help promote professional skepticism in remote situations.

#### 1.4.3. Third Study- Nudging Towards Better Auditing: Empirical Insights from an Eye-Tracking Experiment

After the first two studies that focused on factors which could negatively impact professional skepticism, this study concentrates on innovative techniques to improve it. Although nudges have been used in various domains such as economics, finance, psychology, and marketing to encourage responsible behavior, its application in accounting and auditing remains largely unexplored. In this study, I first investigate the impact of the social norm nudge and the justification nudge on professional skepticism. After this, I use eye-tracking to determine an underlying mechanism of the interaction between these nudges and professional skepticism. This study contributes to the professional skepticism literature by providing empirical evidence of the effects of these nudges. From a managerial perspective, this study highlights the need to identify the cognitive composition of individual auditors, which should inform efforts to personalize the choice architecture they encounter in their work interfaces.





## **Chapter 2: Through the Auditor’s Lens: Unveiling the Effects of Cognitive Biases on Professional Skepticism<sup>1</sup>**

### **Abstract**

Although cognitive biases have been widely linked to poor quality decisions in auditing, their effect on certain behavioral variables critical to audit quality has not been fully verified. Previous studies have laid the groundwork by identifying the impact of cognitive biases on hypothesis generation, compliance testing, and other decision-making contexts. In this study, the impact of the framing bias and the optimism bias on professional skepticism, a marker of audit quality, is sought. Furthermore, I use eye tracking technology in order to develop an understanding of how cognitive load may interact with these cognitive biases and professional skepticism. Using a laboratory user experimental approach, I find that these cognitive biases unnecessarily increase cognitive load and processing levels, as measured by the total duration of fixation metric such that auditor’s professional skepticism is negatively affected.

**JEL Codes:** G41, M42.

**Keywords:** eye-tracking, behavioral auditing, cognitive biases, professional skepticism.

---

<sup>1</sup> This chapter has led to a research paper titled “**Cognitive Biases Understood from the Eyes: What Impact on Professional Skepticism?**”, Teye P.. I have presented it at the following academic conferences: French Finance Association (AFFI) Congress at Bordeaux (2023), American Accounting Association/Deloitte Foundation/J. Michael Cook Doctoral Consortium at Westlake, Texas (2023), Francophone Accounting Association Congress (AFC) at Lyon (2023), Journal of Accounting, Auditing and Finance Conference (JAAF) at Helsinki in Finland (2023), The paper is currently under review at the journal Accounting Auditing Control (CCA°

## 2.1. Introduction

Cognitive biases have been a topic of increasing concern in auditing. This is a result of their adverse effects on decision making and the quality of audits as highlighted in several studies (Libby, 1985; Knapp and Knapp, 2012; Henrizi Himmelsbach and Hunziker, 2021). Again, recent studies have shown that despite the increased awareness of cognitive biases and their effects, the search for a deeper understanding of the processes that underlie these biases remains fairly limited (Levin, Schneider, and Gaeth, 1998; Cho, Phillips, Hageman, and Patten, 2009)

In view of this limitation in the literature, I first seek to identify the impacts that the framing bias and the optimism bias have on audit quality. These two cognitive biases are of particular interest due to their importance in auditing. In conditions of increased remote work, as has been the case since the COVID-19 pandemic, the risk of error regarding ongoing judgment concerns is high as a result of equivocality in communication (Daft and Macintosh, 1981; Agoglia, Hatfield, and Brazel, 2009). In such cases, changes in description of a task that does not alter its normative meaning but could eventually alter decisions signal the framing bias (Kahneman and Tversky, 1984; Jamal, Johnson, and Berryman, 1995). Again, the optimism bias could lead to the inefficient use of audit technology (Owhoso and Weickgenannt, 2009). Given that technology is heavily relied on in remote work, this bias becomes of interest. Therefore, it will be interesting to study these two biases.

In this effort, I use professional skepticism as a proxy for audit quality. Furthermore, given that cognitive biases are related to cognition (Daft and Lengel, 1986), I seek to identify whether cognitive load has an association with the particular cognitive biases tested. This will enable us to understand the trends of certain eye-tracking metrics which could be possible indicators of the existence of particular cognitive biases.

Cognitive bias refers to a systematic pattern of thinking based on mental shortcuts that could lead to errors in judgment and deviations from rationality (Tversky and Kahneman, 1973; Frederick, 2002; Gilovich and Griffin, 2013). Research on cognitive biases, fundamentally emanating from the field of psychology (Tversky and Kahneman, 1974; Carroll, 1978; Arkes, Faust, Guilmette and Hart, 1988; Epley and Gilovich, 2006), has been widely applied to many other fields of study. As such, although many cognitive biases have been identified and cataloged, not all of them have been tested in auditing. Therefore, one of the aims of this paper is to test the existence of the aforementioned biases and their impacts on professional skepticism.

According to the International Auditing and Assurance Standards Board (IAASB), professional skepticism is at the heart of a quality audit (IAASB, 2019). Nelson (2009) defines professional skepticism as *"indicated by auditor judgments and decisions that reflect a heightened assessment of the risk that an assertion is incorrect, conditional on the information available to the auditor."* This paper adopts this stance for its working definition of professional skepticism. This study also takes into consideration the trait (relatively stable, enduring, individual aspect) component of skepticism, and the state (a temporary condition evoked by the situation variables) component of skepticism (Robinson, Curtis and Robertson, 2018; Hurtt, 2010). Given the possibility of certain cognitive biases to affect judgment, (Bhattacharjee, Moreno and Riley, 2012; Pike, Curtis and Chui, 2013; Henrizi Himmelsbach and Hunziker, 2021), I posit that in general, the cognitive biases studied will reduce the level of professional skepticism. Following from this, I use eye-tracking to study the psychophysiological behaviors of auditors subject to these biases.

Eye-tracking is a technology that tracks eye movements and changes in pupil size, at specific points in time (Léger, Sénécal, Courtemanche, de Guinea, Titah, Fredette and Labonte-LeMoyne, 2014). By employing this tool in studying behaviors of biased auditors, this paper

responds to the call by (Birnberg and Shields, 1984; Lynch and Andiola, 2019) for the use of eye tracking in accounting and auditing research. Eye tracking data provides information about various cognition-related constructs, such as processing levels, mental states, and cognitive load (Meissner and Josua, 2019; Holmqvist and Andersson, 2017). I posit that cognitive biases lead to an increase in cognitive load. That is, the reliance on mental shortcuts will lead to a suboptimal cognitive analysis in the assessment of audit evidence.

To test these predictions, I conduct a laboratory test<sup>2</sup>. This study adopts the replication approach in measuring cognitive biases (Shanteau, 1989). I find that these cognitive biases unnecessarily increase cognitive load and processing levels, measured by the total duration of the fixation metric such that the professional skepticism is negatively affected.

With these findings, I offer a number of notable contributions. Firstly, this paper studies one bias that has been largely understudied in the auditing literature, namely the optimism bias. It must be noted that though optimism bias has garnered sufficient recognition in professional bulletins and newsletters (Knapp and Knapp, 2012; ACCA, 2017), very little can be found in terms of empirical studies. Second, the incremental contribution of the paper beyond the already existing studies on cognitive biases in auditing (Kinney Jr. and Uecker, 1982; Presutti, 1995; Emby and Finley, 1997; Henrizi Himmelsbach and Hunziker, 2021) has to do with the behavioral perspective as measured by eye-tracking. Eye-tracking is a very useful tool in information search and decision-making (especially in complex settings) (Lynch and Andiola, 2019; Meissner and Josua, 2019). In this regard, eye-tracking is an effective non-intrusive tool in identifying patterns in visual behavior, which might be indicative of the existence of certain cognitive biases. Third, from a managerial standpoint, this paper underscores the need, in the

---

<sup>2</sup> I conducted the tests using human participants. For this purpose, I obtained approval from my institution's ethical committee in charge of experiments

pursuit of high quality audits, to understand the cognitive make-up of individual auditors. Audit managers should be guided by the impacts of these biases on audit quality.

The remainder of the paper is organized as follows. The next section reviews the relevant literature and establishes the hypotheses. The third section addresses the research methodology, while the fourth section presents the empirical results of the study followed by the discussion of these results and conclusion.

## **2.2. Literature Review and Hypotheses**

### **2.2.1. Heuristics and Biases**

The pursuit of the most appropriate decision based on the available evidence is at the core of audits. The specific decision of interest in this study is the auditor's recognition of a potential problem that may exist, thus necessitating more work, review or effort. Such decisions reflect professional skepticism of auditors (Hurt, Brown-Liburd, Earley and Krishnamoorthy, 2013). According to the Nelson (2009) model of professional skepticism, cognitive limitations affect professional skepticism in predictable ways, with some of these limitations offering opportunities to increase professional skepticism. Cognitive limitations lead to bounded rationality.

According to Simon (1957), decision-makers resort to rules of thumb as a result of bounded rationality. This limited rationality as a result of cognitive limitations could lead to systematic errors (Tversky and Kahneman, 1974; Frederick, 2002). As various studies have revealed, financial auditors are not exempt from the effects of cognitive biases (Biggs, Mock, and Watkins, 1988; Fay, Jenkins and Popova, 2015).

As stated above, the study of cognitive biases emanates from the psychology literature (Simon, 1957; Tversky and Kahneman, 1974; Gilovich and Griffin, 2013). In adapting these studies to the auditing context, Shanteau (1989) identifies three approaches, namely;

replication studies (accurate reproduction of the original studies but using auditors as subjects), adaptation studies (spin-offs from the original studies but concepts modified to reflect accounting/auditing issues), and problem-driven studies (uniquely concentrate on accounting/auditing issues and differ methodologically from original studies and cannot be considered as spin-offs). Regardless of the approach, there is evidence that auditors are subject to cognitive biases, although the effects may differ from one bias to another (Joyce and Biddle, 1981; Abdolmohammadi and Wright, 1987; Holt, 1987; Bucaro, 2019).

Numerous cognitive biases have been identified, each having different effects on judgment and decision making. In this study, I focus on two of these biases namely; the framing bias and the optimism bias. These two biases are of interest because of their importance in relation to remote work. In remote work situations, as has been accentuated since the COVID-19 pandemic, the risk of error regarding ongoing judgment concerns is high as a result of equivocality in communication (Daft and Macintosh, 1981; Agoglia, Hatfield, and Brazel, 2009). In such cases, the change in the description of tasks through less quality communication media which do not alter normative meanings of tasks but could eventually alter decisions signal the framing bias (Kahneman and Tversky, 1984; Jamal, Johnson, and Berryman, 1995). Again, the optimism bias could lead to the inefficient use of audit technology (Owhoso and Weickgenannt, 2009). Given that technology is heavily relied on in remote work, this bias becomes of interest. Therefore, it will be interesting to study these two biases.

### *Framing Bias*

A framing bias is said to occur when a change in the description of a task, which does not alter its normative meaning, changes the decision that is made (Kahneman and Tversky, 1984; Jamal, Johnson and Berryman, 1995). The framing effect is thus characterized by inconsistencies in decisions across tasks which remain fundamentally unchanged. According

to (Tversky and Kahneman, 1981), rational choice requires that the preference between options should not reverse with changes of frame. Furthermore, they explain that these violations can be traced to the psychological principles that govern the perception of decision problems and the evaluation of options.

Despite the vast body of literature on framing bias, populations considered to be experts on the issue and should thus be resistant to framing effects still exhibit it. Gächter, Orzen, Renner and Starmer (2009), in a natural field experiment, find that while the behavior of junior experimental economists was affected by the description of the decision task they faced, this was not the case for the more senior members. More specifically, regarding the early registration for a conference, they found that 67 percent of junior experimentalists responded to the discount frame, whereas 93 percent responded to the penalty frame. Thus, it is possible that despite advances in research and high levels of awareness created about the framing bias in auditing, these effects might still persist among a segment of the auditor population.

In auditing, various studies have been carried out on framing effects, primarily focusing on its existence, effects, or debiasing techniques. Consistent with Fukukawa and Mock (2011), Mock and Fukukawa (2016) find that the assessed risks are significantly higher and relatively more skeptical when negative versus positively stated assertions are made. Again, Emby (1994) finds that auditors who received the risk versions of the experimental instrument on average chose a higher revised level of substantive testing and that there was an interaction effect between presentation mode and frame. These findings indicate the existence of framing bias in audits.

The existence of this bias could affect the quality of audits. Although Asare (1992) found no impact of framing moderating the recency effects of going concern judgments, Johnson, Jamal, and Berryman (1991) show that a manager can deceive an auditor by creating a frame that induces the activation of nonirregularity hypotheses. To mitigate the detrimental impacts

of framing bias, (Jamal, Johnson and Berryman, 1995) demonstrate that auditors who used a standard representation (using a single hypothesis and a common unit of analysis) successfully detected management's frames. Therefore, I hypothesize that

**H1a:** Framing bias leads to less professional skepticism.

The second bias studied is the optimism bias.

### *Optimism Bias*

The optimism bias refers to the tendency of individuals to overestimate their chances of experiencing positive events and underestimating their chances of experiencing negative events compared to the average of the others (Weinstein, 1987; Hoorens and Smits, 2001; Cossette, 2015). According to Shepperd, Carroll, Grace and Terry (2002), three other terms have been used to describe this phenomenon, namely unrealistic optimism, optimistic bias (Weinstein, 1980), and illusions of unique invulnerability (Perloff, 1987). What makes the optimism bias irrational is that it is not formed on the basis of sufficiently robust evidence (Jefferson, Bortolotti and Kuzmanovic, 2017).

Within the general population of which auditors are a part, optimism bias has been found to have negative consequences for individuals. Optimism bias has been found to be problematic as a result of its tendency to induce risky behavior or inadequate precautionary behavior such as exercise and diet (Weinstein and Lachendro, 1982; Radcliffe and Klein, 2002). Again, the optimism bias of entrepreneurs has been found to have a negative impact on the quality of their strategic decisions, and firm performance (Koellinger, Minniti and Schade., 2007; Hmieleski and Baron, 2009; Mehrabi and Kolabi, 2012).

Compared to other cognitive biases, optimism bias has remained largely unexplored in accounting and auditing research. Several papers find evidence of the optimism bias among auditors. According to Bigus (2016), under strict liability (auditors are held liable when they



cause damages to investors), optimism makes the auditor overestimate the chances of finding material mistakes and thus induces suboptimal care. Due care, as defined by the auditing standards (AU Section 230), is an important element of quality audits (Ewert and Breuer, 1999; Willekens and Simunic, 2007). Thus, optimism bias could lead to a reduction in audit quality. Owhoso and Weickgenannt (2009) found that auditors, regardless of their rank, systematically overrate their ability to detect material errors in financial reports. Johnston, Lindsay and Phillips (2003) found that auditors, in their use of highly structured workpapers for tests of controls, performed less effectively and less efficiently than they perceived. Following from these findings, I posit the following:

**H1b:** Optimistic bias leads to less professional skepticism

Given that cognitive biases influence the way individuals process stimuli in their environment and the eventual decisions they make, it is important to understand in the auditing context how cognitive biases affect the cognitive load of auditors.

#### 2.2.2. Mediating Role of Cognitive Load

Cognitive load, also sometimes referred to as mental workload (Na, 2021), according to Wickens (2008), is the portion of the limited capacities or resources that are required to perform a particular task. Cognitive load is used as a measure of information seeking and processing effort (Hu, Ma, and Chau, 1999). A lower cognitive load in information seeking and processing effort is associated with higher efficiency and a higher user satisfaction (Back and Oppenheim, 2006).

Regarding the effort to find information associated with cognitive loads, cognitive biases impact the attention paid to stimuli (Hertel, Benbow, and Geraerts, 2012; Bistricky, Atchley, Ingram, and O'Hare, 2014; Van Bockstaele, Saleminck, Bögels, and Wiers, 2017). Particularly

with the framing bias, Levin, Schneider and Gaeth, (1998) found that individuals prone to a negative frame focused more on, and were more influenced by, negative information relative to positive information. This shows that framing bias, in influencing decisions, impacts information seeking (Dong, De Beuckelaer and Zhou, 2017; Dondzilo, Rieger, Shao and Bell, 2020). Knight, Smith, Knight and Ellison (2015) identify the role of cognitive biases in guiding cognition, however, they notice that this has almost exclusively been studied within abnormal psychology. As such, individuals with various cognitive related issues such as anxiety, depression, and specific phobias all appear to preferentially process items related to their concerns (Constantine, McNally, Hornig, 2001; Gotlib, Krasnoperova, Yue, and Joorman, 2004; Mogg and Bradley, 2005). The aforementioned effects of cognition on attention can be observed using eye-tracking (Leber and Egeth, 2006; Belopolsky and Theeuwes, 2010; Kawahara, 2010). Based on this evidence that cognitive biases have a negative impact on cognitive load, I formally posit the following:

**H2a:** Cognitive biases lead to a higher cognitive load.

When exercising professional skepticism, a higher level of awareness on audit evidence is indispensable. An overload of cognition levels could turn out to be detrimental for appropriate levels of professional skepticism. Although professional skepticism has been defined in various ways in both academic research and in professional standards (Cushing and Ahlawat, 1996; Shaub, 1996; Nelson, 2009; Hurtt, 2010), an element which seems to run through all these definitions is that of a critical assessment of audit evidence.

Evaluation of audit evidence plays a central role in the audit process (Felix Jr. and Kinney Jr., 1982; Hammersley, Bamber and Carpenter, 2010). The level of attention paid in the evaluation and assessment process impacts the quality of the audits (Gillett and Peytcheva, 2011; Mubako and O'Donnell, 2018). Eye movements captured by the Total duration of

fixation metric can be used as a proxy for cognitive load (Léger, Sénécal, Courtemanche, de Guinea, Titah, Fredette and Labonte-LeMoyne, 2014; Lynch and Andiola, 2019).

Fixation duration is the length of time of a single fixation, and some psychological constructs it represents are cognitive load and processing levels (Lynch and Andiola, 2019). Various studies have highlighted that attributes with greater importance to the decision maker receive more fixation duration (Glöckner, Fiedler, Hochman and Hilbig, 2012; Menon, Sigurdsson, Larsen, Fagerstrm, and Foxall, 2016). Given that higher levels of professional skepticism are associated with heightened attention in the assessment of audit evidence (Robinson, Curtis, and Robertson, 2018), in eye-tracking terms, this could represent higher levels fixations (Wedel and Pieters, 2007; Sirois Bédard, and Bera, 2018). However, this should in turn associated with optimal decisions. Optimal decisions in this case refer to decisions taken with more skepticism. Based on this evidence, I formally hypothesize that

**H2b:** A higher cognitive load leads to less professional skepticism.

Following from the connection of cognitive load and cognitive biases as well as the connection of cognitive load with professional skepticism as reviewed above, I hypothesize that

**H2c:** The cognitive load is a mediator between cognitive biases and professional skepticism.

To verify these hypotheses, I perform a laboratory test using eye-tracking in order to understand the underlying mechanism at play.

## 2.3. Methods

### 2.3.1. Participants

I develop a user experiment<sup>3</sup> testing the framing bias and the optimism bias for their effects on professional skepticism. Participants are young professionals with varying levels of work experience, ranging from three months to one year, from various auditing firms of different sizes in France. To ensure that these young professionals had sufficient levels of knowledge in auditing, I selected only auditors who had a first degree and a master's degree in accounting and auditing. The use of young professionals for this study is justified as a result of various studies indicating the higher likelihood of young nonexperienced auditors being subject to cognitive biases compared to their more experienced counterparts (Joyce and Biddle, 1981; Butler, 1986; Henrizi, Himmelsbach, and Hunziker, 2021), and exhibit a lesser degree of skepticism compared to their more experienced colleagues (Knechel, Salterio, and Kochetova-Kozloski, 2010; Olsen and Gold, 2018; Gao and Zhang, 2019). I received a total of 40 responses, all of whom were aged between 21 to 25 years. 40 percent were female.

### 2.3.2. Design

To test the hypotheses, I conducted a computerized test in which participants had to examine pieces of audit evidence. I presented the framing and the optimism bias in a randomized order. I do not introduce any manipulation conditions. The presentation order of the audit evidence is also fully randomized.

---

<sup>3</sup> It should be noted that the study does not have manipulation conditions as is the case of a classical experiment, but it however follows an experimental approach in the sense that I use laboratory equipment to estimate the neurophysiological measurements of gaze

### 2.3.3. Material

The material for testing the framing bias was obtained from (Tversky and Kahneman, 1981) on the framing of acts. It indicates that there are two decisions to be made, and each decision point having two options. The options in both decision points indicate either risk aversion or risk tolerance.

The material for optimism bias was adapted from (Puri and Robinson, 2007) miscalibration of life expectancy. I indicated the actuarial life expectancy at the time of the experiment. Then I ask participants to indicate their expected life expectancy, as well as that of an average person of the same age and gender as themselves.

The audit evidence material, adapted from Phillips (1999), refers to two cases of aggressive financial reporting. Trueblood Case 91-1 (Touche, 1991) and United States Surgical Corporation (Johnson, Jamal and Berryman, 1991). I constructed six pieces of audit evidence that summarize the main findings of each client's financial statements; each piece of evidence can be understood and analyzed independently. Among the six pieces of evidence, two indicate aggressive financial reporting and the remaining four nonaggressive financial reporting.

### 2.3.4. Eye-Tracking Equipment

Eye movements were recorded using a screen-based eye tracker (Tobii pro nano) at a sampling frequency of 60 Hz. The computerized test was conducted in a light-controlled room. At the beginning of the test, the eye tracker was calibrated using a nine-point fixation technique, thus adjusting for participants' individual differences in eye characteristics (Just and Carpenter, 1976; Rose, Rose, Rotaru, Sanderson, and Thibodeau, 2022). Six Areas of Interest (AOI) on the page reflecting the six financial account items. Due to the randomization on the page, these AOIs could have different representations for each participant and each attempt.

### 2.3.5. Procedure

Participants took the test in the laboratory; they had to read and accept the terms and conditions of participation. Subsequently, participants read the instructions for the audit exercise, which required them to perform a self-paced review of audit evidence about a fictitious company. The instructions for the audit exercise were preceded by background information about the company and key information about the audit, such as the level of materiality and the accounting year.

Participants carefully and at their own pace (see Appendix 2.2). The order of appearance of the audit evidence was fully randomized. After this, they developed a general assessment, on a scale of 1-10, of the level of financial reporting, where 1 = 'not aggressive at all' and 10= "very aggressive" (see Appendix 2.3), on the next page. The participants also identified the financial reporting items that they adjudged aggressive. Following this, participants responded to the Hurtt's Professional Skepticism Scale (see Appendix 2.4).

Subsequently, participants responded to tasks testing their cognitive biases. The order of appearance of the cognitive biases is randomized. Regarding the framing bias (see Appendix 2.5), participants faced with a pair of concurrent decisions. They were instructed to examine both decisions, after which they were to indicate which option they preferred. The first decision had two options; one option was a sure gain of \$240 while the other option was a 25% chance to gain \$1000 and 75% chance to gain nothing. The second decision had two options; one option being a sure loss of \$750 while the other option was 75% chance to lose \$1000 and 25% chance to lose nothing.

Regarding optimism bias (see Appendix 2.5), participants were provided with their actuarial life expectancy. They were then asked to estimate their life expectancy, and then that of an average person of the same gender and age as themselves. After the optimism bias, demographic data of participants.

### 2.3.6. Variables

The independent variables are the framing bias and the optimism bias. The dependent variable is professional skepticism, while the eye-tracking metric serves as mediating variables. For the dependent variable, professional skepticism, I develop two measures. The first (Skepticism 1), which is the overall assessment on a scale of 1 to 10 of the level of aggressiveness of the audit items (Bauer, 2015), and the second (Skepticism 2), which is the identification of aggressive financial reporting elements (Phillips, 1999). I use two measures of skepticism because the first measure represents a self-declarative form of skepticism, whereas the second measure is an objective form of measuring the construct.

## 2.4. Results

### 2.4.1. Descriptive Statistics of Variables

Demographic information presented in Table 2.1 serves as control variables. On average, the participants had audit work experience in 3 months to 1 year, indicating experience at the novice level. Regarding the experience related to tasks on cognitive biases, 10% of the participants had previous experience with such tasks. Again, I measure the level of trait skepticism using the Hurtt's Professional Skepticism Scale (HPSS). It could be seen that the mean score on the HPSS was 25.12 with a standard deviation of 2.73. In verifying the internal validity of the HPSS, I obtain a Cronbach Alpha of 0.82

Insert Table 2.1. here

The total duration of fixations (measured in milliseconds), which is the eye tracking metric measuring cognitive load presented in Table 2.1. A mean of 4678.70 and a standard deviation of 1873.89 could be observed.

Following this, we present the descriptive statistics for the dependent variable according to the various independent variables. It was observed that for the first measure of professional skepticism, with respect to the framing bias, the unbiased participants had a mean of 6.64 (SD=1.80) compared to the biased conditions (mean=5.30; SD=1.92). Regarding optimism bias, a mean of 6.03 (SD=1.98) for unbiased participants and a mean of 4.5 (SD=1.29) for the biased participants could be observed. It could be seen that in both cases, the unbiased participants had on average a higher score for professional skepticism compared to their counterparts who were subject to cognitive biases.

Concerning the second measure of professional skepticism, results could be seen consistent with that of the first measure. Firstly, for the framing bias, a mean of 1.53 (SD = 0.62) could be seen for the unbiased participants, while the biased participants had a mean of 1.09 (SD=0.73). Regarding optimism bias, We can observe a mean of 1.28 (SD=0.70) for the unbiased participants, while the biased participants had a mean of 1.25 (SD=0.96). Again in both cases, unbiased participants had on average a higher score for professional skepticism compared to their biased counterparts.

#### 2.4.2. Auditor's Susceptibility to Cognitive Biases

First, I consider whether auditors are subject to cognitive biases. The first cognitive bias to be considered is the framing bias. Following from the task from (Tversky and Kahneman, 1981), participants can be categorized into one of four groups; risk takers, risk averse, optimal decision takers, and biased. Risk takers consistently prefer the riskier prospects of equal or greater expected value at both decision points, whereas the risk averse consistently prefer the less risky prospects at both decision points. The optimal decision-makers, although neither consistently risk-takers nor risk averse in both decision points, choose the combination of options that maximizes their expected value. These first three groups represent unbiased participants. The fourth group who are the biased decision takers, on the other hand, are neither



consistently risk takers nor risk-averse in both decision points, but however choose the combination of options that does not maximize their expected value.

Insert Table 2.2 here

Table 2.2 shows the descriptive statistics for the various categories. It could be observed that the biased position has a frequency of 57.5%, compared to the unbiased position of 42.5%. This supports the hypothesis that auditors are subject to cognitive biases. Concerning optimism bias, I measure the life expectancy miscalibration of participants compared to an average person of the same gender and age as themselves (Puri and Robinson, 2007). Participants self-reporting a life expectancy higher than that of an average person of the same gender and age as themselves exhibit the optimism bias and are categorized as biased. These represent 35% of participants while the unbiased group represents 65%. This shows that in contrast to the framing bias, the majority of participants do not exhibit the optimism bias.

#### 2.4.3. Impact of Cognitive Bias on Professional Skepticism

For the test of H1, I consider whether cognitive biases exercise significant effects on professional skepticism using a linear regression with random intercepts model, controlling for the participant's trait skepticism, measured by the Hurtt's professional skepticism scale, as well as prior experience of related experiments.

Insert Table 2.3 here

The results in Table 2.3 indicate a significant effect of the framing bias on professional skepticism (estimate=-0.49,  $p$ -value=0.03) for the second measure of professional skepticism, thus validating H1a. Although we can observe this significant effect on the first measure of

skepticism (estimate=-1.35,  $p$ -value=0.03), the overall model is not significant. This indicates that the framing bias reduces the level of professional skepticism when skepticism is considered in an objective manner rather than in a declarative form.

Regarding optimism bias, we do not observe any significant effects on the level of professional skepticism regardless of the measure. This seems to indicate that the effect of the optimism bias on skepticism may not be direct and may necessitate an inquiry into a possible mediating variable, which I investigate in the subsequent subsection.

I perform the variance inflation factor test to verify multicollinearity among the independent variables. I obtain the following factors; 1.02, 1.31 and 1.29 for the framing bias, experiment experience, and the HPSS respectively, thus indicating the absence of multicollinearity among the independent variables.

#### 2.4.4. Cognitive Biases and Cognitive load

For H2a, it is hypothesized that cognitive biases lead to a higher cognitive load. To test this, I conducted t-tests on the differences between the partial and unbiased participant's Total duration of fixations. The results are reported in Table 2.4

Insert Table 2.4 here

It could be observed that participants subject to the framing bias are associated with a longer total duration of fixations ( $t=1.98$ ,  $p$ -value=0.06). Again, we could observe that optimism bias is associated with a longer total duration of fixations( $t=3.82$ ,  $p$ -value<0.01). It could therefore be seen that both cognitive biases are associated with higher Total duration of fixations.

A longer total duration of fixations in this situation could indicate a higher cognitive load and levels of processing (Lynch and Andiola, 2019). Higher cognitive load and processing levels that result in suboptimal decisions is indicative of ineffective searches for target

information (McMillan and White, 1993; Holmqvist and Andersson, 2017). Therefore, we could conclude that the existence of cognitive biases leads to an ineffective approach in the review of audit evidence.

To verify the impact of this observed longer total fixation duration in the presence of cognitive biases on professional skepticism, I conduct mediation analysis in the following subsection.

#### 2.4.5. The Mediating Effect of Cognitive Biases on Professional Skepticism

In H2c, I hypothesize that cognitive load is a mediator between cognitive biases and professional skepticism. To verify this hypothesis, I perform a mediation analysis (Baron and Kenny, 1986)

Insert Figure 2.1 here

Insert Table 2.5 here

We could observe from Table 2.5 that the total duration of fixations serves as mediator between optimism bias and skepticism. More specifically, the presence of the optimism bias leads to a significant increase in the total duration of fixations, and this increase in total duration of fixations is associated with a significant decrease in skepticism.

Insert Table 2.6 here

## 2.5. Discussion

In general, the results indicate that auditors are susceptible to the framing bias and the optimism bias and these biases reduce the auditors level of professional skepticism. The effect appears to be direct for the framing bias however this effect is mediated by cognitive load with regards to the optimism bias. This means that in the assessment of audit evidence, the optimism bias increases cognitive load which leads to less professional skepticism.

The first observation is the susceptibility of auditors to the framing bias and the optimism bias. It was found in this study that auditors are susceptible to both of these biases. This finding corroborates existing literature for the framing bias (Jamal, Johnson and Berryman, 1995; Fukukawa and Mock, 2011; Mock and Fukukawa, 2016) and the optimism bias (Owhoso and Weickgenannt, 2009; Bigus,2016). The results also indicate that auditors are more susceptible to the framing bias than the optimism bias. This could explain the reason why there are more papers focussing on the framing bias compared to than the optimism bias. Again, the finding of the susceptibility of auditors to cognitive biases indicates that despite the awareness of these biases in academia and practice, studying these biases still remains relevant in order to be aware of the potential detrimental effects.

A third finding is the impact of these biases on professional skepticism. This constitutes the major contribution of this paper to existing literature. Although papers have studied the impact of these biases on various constructs such as hypotheses generation and compliance testing (Johnson, Jamal, and Berryman, 1991; Mock and Fukukawa, 2016; Bigus, 2016), this paper is one of the first to examine this from the perspective of professional skepticism. I find that the framing bias and the optimism bias reduce the auditors level of professional skepticism. The effect appears to be direct for the framing bias however this effect is mediated by cognitive load with regards to the optimism bias.

This leads to the fourth finding of this paper which is the effect of both biases leading to a higher cognitive load. This increase in cognitive load mediates the effect of the optimism bias on professional skepticism. As explained previously, the total duration of fixation which is indicative of cognitive load and processing levels is exacerbated by the presence of optimism bias. However, this higher processing level does not translate into appropriate decisions, as should be the case with a higher level of skepticism. Therefore, we could conclude that cognitive biases unnecessarily increase the cognitive load such that auditor's professional skepticism is negatively affected.

## **2.6. Conclusion**

The aim of this paper is to examine the effect of cognitive biases on professional skepticism. More specifically, I concentrate on the framing bias and the optimism bias. The interest in studying these two biases is due to their importance in leading to suboptimal decisions, as identified in various literature. The results indicate that the auditors are subject to framing bias and the optimism bias. When comparing the level of subjection to these two biases, auditors were observed to be more likely to fall for the framing bias than the optimism bias. Again, for both cognitive biases that they have a negative effect on skepticism. Furthermore, these biases increase cognitive load and processing levels, as indicated by the total duration-to-fixation metric. For optimism bias, it is this metric mediates its effect on professional skepticism.

This study contributes to the prior literature, particularly on professional skepticism, by providing empirical evidence of factors that could diminish it. Specifically, this study fills the gap between understanding a mechanism underlying the interaction between cognitive biases and skepticism in the auditing context. In doing so, this article responds to the call by Lynch and Andiola (2019) for the application of eye tracking in accounting and auditing research.

More precisely, these findings elucidate the psychological construct involved in the reduction of professional skepticism by the aforementioned cognitive biases.

However there are some limits to these findings. The participants in this study were young auditors in the early stages of their careers. The effects of cognitive biases on individuals could differ based on levels of experience (Gächter, Orzen, Renner and Starmer, 2009). Therefore, the findings of this study may not hold for more experienced auditors and thus may not be completely generalizable. Furthermore, the homogeneous nature of the sample may not take cultural differences into account, a factor that can influence the effects of cognitive biases (Loibl, Sunstein, Rauber, and Reisch, 2018), into account. I do well to include two measures of skepticism to capture the broad nature of the concept, but I am cognizant that there exist many approaches to the measurement of skepticism (Shaub and Lawrence, 2002; Robinson, Curtis, and Robertson, 2018). More generally, as a limitation of experiments, the method used in this study is that results are hardly generalizable beyond the specific circumstances used in the study.

These limitations nonetheless, and these results have many practical implications. Firstly, the study shows how the subject of cognitive biases should be paid more attention in audit and accounting programs in schools and professional bodies. Many current audit curricula at universities follow a traditional-based approach focusing on auditing techniques and procedures. Although this is very necessary, issues related to behavioral auditing such as cognitive biases, should become more mainstream. Referring to audit firms, many aptitude tests utilized in the selection of candidates for employment include a number of tests for cognitive biases. Despite this, studies show the existence of cognitive biases even among highly experienced auditors. It is therefore necessary that audit firms highlight the effect of cognitive biases in in-service training for auditors.

Finally, I provide avenues for further research. The most important phenomenon in recent times to significantly impact the way audits are organized is the increased recourse to remote work, which was spurred by the global pandemic of COVID 19. Various studies have shown that remote work is associated with a less media rich environment, with this leading poorer quality communication eventually having adverse impacts on cognition (Daft and Lengel, 1986; Andres, 2002). Further experimental research could empirically verify whether the level of cognitive biases for on-site work situations versus remote work situations.

## **2.7. Transition: Professional Skepticism from a Cognitive Standpoint to the Remote Frontier**

Chapter 2 examined the effects of cognitive biases on professional skepticism. Cognitive biases are one of the factors that impact professional skepticism. Chapter 3 follows in this theme of examining factors that could affect professional skepticism. This time however, the focus is on remote audits. Remote audits in this thesis is defined as the situation where the auditor works in isolation from colleagues and clients without any physical contact. In Chapter 3, I shall therefore be examining the impact of remote audits on professional skepticism and how this occurs.





## **Chapter 3: The Remote Frontier: Investigating the Impacts of Distance Auditing on Professional Skepticism<sup>4</sup>**

### **Abstract**

In recent times, the phenomenon of remote audits has been on a steady increase and reinforced by the recent COVID 19 pandemic. Previous studies have notably sought to understand the effect of remote audits on audit efficiency and coverage. In this study, we explore the impact of the remote audit on professional skepticism, a marker of audit quality. Using a qualitative approach based on semi-structured interviews, I find that the remote audit negatively impacts professional skepticism through the effect of media richness. Again, I find that a measure to bolster the overall level of skepticism for the audit team in the remote audit setting is through better support and guidance of junior level staff.

**JEL Codes:** G41, M42.

**Keywords:** remote audit, professional skepticism, media richness

---

<sup>4</sup> This chapter has led to a research paper entitled “**Remote Audits and Professional Skepticism: An exploratory Study**”, Teye P.. I have presented it at the following workshops: Research seminar on Finance at Magellan Lyon (2023) and Workshop on Remote Audit at ESSCA Lyon (2023).

### **3.1. Introduction**

At the passing of each day, technology keeps improving bringing with it some changes in the way things are done, both personally and at the organizational level. More concretely in the field of audit, the beginning of the millennium was characterized by digitalization and thus a gradual reduction in a brick and mortar form of auditing. Even more recently, the COVID -19 pandemic led to mandatory lockdowns in many countries around the world and a recourse to remote work. This has entrenched the use of remote audits, at varying degrees, in the practice of audits. A central issue arising from this trend is the impact of remote audits on an important behavioral component of auditors, professional skepticism. This paper thus aims to understand what effects remote audits have on the professional skepticism of auditors.

Teeter, Alles and Vasarhelyi (2010) define the remote audit as “the process by which internal auditors couple information and communication technology (ICT) with analytical procedures to gather electronic evidence, interact with the auditee, and report on the accuracy of financial data and internal controls, independent of the physical location of the auditor”. The major distinction between the remote audit and an on-site audit is the absence of physical contact between members of the audit team as well as the audit client. More operationally for this paper, I define remote audit as the situation where the auditor works in isolation from colleagues and clients without any physical contact. This excessive reliance on information technology for the audit process, despite its advantages is not without its drawbacks. Such electronic work environments have been found in various studies to be more cognitively complex thus negatively impacting performance (Bible, Graham, and Rosman, 2005; Rosman, Biggs and Bible, 2007). In understanding the effect of such impacts on auditors, this study uses the models of professional skepticism proposed by Nelson (2009) and Robinson, Curtis and Robertson (2018).

Professional skepticism has been defined by the International Auditing and Assurance Standards Board (IAASB) as “an attitude that includes a questioning mind, being alert to conditions which may indicate possible misstatement due to error or fraud, and a critical assessment of evidence”. Professional skepticism is described both as a state (a temporary condition evoked by situational variables) or a trait (relatively enduring individual aspect, see Hurtt, Brown-Liburd, Earley and Krishnamoorthy, 2013). Remote audits more directly impact the audit context and work situation (Robson, Humphrey, Khalifa and Jones, 2007; Vasarhelyi and Romero, 2014). Thus in analysing the possible impacts of remote audits on professional skepticism, I focus more on the situational factors of professional skepticism.

In responding to this research objective, I examine both Big 4 and non-Big 4 auditors’ experiences in working in remote audit conditions, using a semi-structured interview approach involving a diverse sample of 18 experienced auditors (72% of the auditors interviewed had a minimum work experience of 10 years) from France, Luxembourg, the United Kingdom and the United States. I include audit firms of all sizes, and from four different countries in order to generate a broader and more inclusive variety of experiences (Patton, 2015; Ramirez, Stringfellow and Maclean, 2015; van Buuren, Koch, van Nieuw Amerongen, and Wright, 2018). Consequentially, this study provides an in-depth analysis of how auditors perceive remote audits as influencing their levels of professional skepticism. Also, this research is designed provide make recommendations to reinforce professional skepticism in remote audit situations.

I come up with a number of findings. A first finding is that overall, auditors perceive remote work to have a negative impact on professional skepticism. This is as a result of the reduction in quality of the communication caused by the media used both within the audit team as well as with the client. This is the effect of media richness (Daft and Lengel, 1986). Following this,

I also find that more junior audit staff with less experience, working remotely distances them from their supervisors making it more difficult to inculcate skeptical behavior.

Secondly, in trying to understand the aforementioned results from the perspective of the state skepticism model (Robinson, Curtis and Robertson, 2018), I observe that remote audits negatively impact the search for knowledge dimension while the questioning mind, and suspension of judgment dimensions largely remain unaffected. This further supports the observation that the ease of obtaining information which is largely degraded in remote audit settings compared to onsite settings plays a negative role on professional skepticism.

This study comes up with a number of recommendations to help reinforce professional skepticism in remote audit situations. It must be noted that while ISA 200 provides guidelines for professional skepticism, remote audit context recommendations seem to be lacking. I therefore asked auditors for their recommendations. As a first recommendation, there should be a fine balance between remote work and onsite work. It was expressed that in an audit engagement, an over-reliance on remote work as mostly was the case during the peak of the COVID 19 pandemic is unhealthy. A second recommendation is for the improved guidance and assistance of more junior audit staff with less experience when such personnel work in remote audit situations.

This study offers various contributions. First, it extends the literature on professional skepticism in audits by examining it from the remote audit perspective. More specifically I offer insights into the situational variables impacting professional skepticism. Secondly, This research provides recommendations to help standard setters and audit firms to put measures in place to help promote professional skepticism in remote situations.

The remainder of the paper is organized into four sections. The next section contains a review of the relevant literature and the development of the research questions. The subsequent

section describes the research method, followed by a presentation of the results. In the final section, I describe the results and its implication for practice and future research.

## **3.2. Literature Review and Research Questions**

### **3.2.1 Remote Work and Media richness**

The audit process requires communication both within the audit team, as well as between the audit team and the audit client. According to the Institute of Internal Auditors Research Foundation, a survey of 3300 chief audit executives revealed that the second most desired skill in an audit is communication (IIARF, 2015). Communication is central to an auditor's competency set (Bee, Jafry and Saucedo, 2018), which further impacts the quality of audits (DeAngelo, 1981).

An important element influencing the levels and quality of communication is the richness of the communication media. Media richness theory, proposed by Daft and Lengel (1986), refers to the ability of a communication medium to accurately reproduce the information sent through it. This impacts information processing and cognition (Balzer, Sulsky, Hammer and Summer, 1992; Earley, 2001). In using the media richness framework, the basic assumption is that the organization is an open social system that must process information but has limited capacity (Mackenzie, 1984; Daft and Lengel, 1986; Schnackenberg and Tomlinson, 2016). This applies to audit firms undertaking audits.

Thus in decreasing order of richness, Daft and Lengel (1986) put forward the following classification; face-to-face<sup>5</sup>, telephone, personal documents such as letters and memos, impersonal written documents, and numeric documents. I however observe that for remote audits there is much more reliance on the less rich communication media (Shaikh, 2005; Julisch, Suter, Woitalla and Zimmermann, 2011) as opposed to an onsite interaction. Delayed

---

<sup>5</sup> Face-to-face here refers to physical meetings, not meetings through interposed screens

feedback, loss of body language expression and cues, connectivity and technical issues, and professional isolation are some of the concerns associated with communications in remote settings. Again, Shockley, Gabriel, Robertson, Rosen, Chawla, Ganster and Ezerins. (2021), find that virtual meetings are linked to feelings of fatigue, being drained, and a reduction in engagement. Through the media richness framework, we understand that the two major issues arising with less rich media are uncertainty, and equivocality.

Uncertainty in this framework refers to the absence of information (Ishii, Lyons and Carr, 2019; Pazos, Chung and Micari, 2013). The effects of uncertainty on cognition have been widely studied in the psychology literature (Tversky and Kahneman, 1974; Arkes, Faust, Guilmette and Hart, 1988; Epley and Gilovich, 2006; Glöckner, Fiedler, Hochman, Ayal and Hilbig, 2012). Biggs, Mock and Watkins (1988) found evidence that auditors adapted to uncertainty by making tentative judgments and assumptions during their reasoning process. This makes auditors forgo exhaustive data analyses and rather depend on mental 'shortcuts' in the decision-making process (Hayibor and Wasieleski, 2009). The use of such judgment heuristics and biases in the auditing context could result in decision errors (Rose, Rose, Rotaru, Sanderson, and Thibodeau, 2022). Furthermore, uncertainty places an increasingly difficult, and sometimes unrealistic, burden on auditors (Christensen, Glover and Wood, 2012). We therefore observe that uncertainty increases the possibility of suboptimal decisions.

With regards to the coping mechanisms in the face of uncertainty, according to Emsfors and Holmberg (2015), this is done primarily through casual conversations with colleagues and friends in order to make sense of the situation, known as sense-making. Through this informal interaction process, participants compare ideas of what reality should be like based on intuition (Beach and Mitchell, 1998; Stacey and Rance, 2001; Tsoukas, 2003). This indicates that communication media still have a role to play in dealing with the issues that may arise from

uncertainty. Then again it will appear that remote audits will be less effective in dealing with uncertainty than onsite audits.

The other issue concerning media richness is equivocality. Equivocality refers to the existence of multiple and conflicting interpretations about a situation (Daft and Lengel, 1986). Equivocality leads to ambiguity, lack of understanding and confusion (Daft and Macintosh, 1981; Nelson and Kinney Jr., 1997). In auditing, equivocal situations are pervasive (Miledi, 2022). Among others, this could arise from complex estimations, interpretation and application of accounting principles and auditing standards, relying on internal controls (Beasley, Carcello and Hermanson, 2001; Kassem, 2022).

In the face of equivocality when the risk of error is high, Agoglia, Hatfield and Brazel (2009) find that face-to-face reviewers are more accurate than electronic reviewers in regard to ongoing judgment concerns. Also, Trotman, Bauer and Humphreys (2015), observe that face-to-face review method as opposed to an electronic method is associated with audit effectiveness and higher quality of judgment. This again showcases the importance of the communication medium with regards to equivocality.

Furthermore, Brazel, Agoglia and Hatfield (2004) finds that auditors performing in-person reviews are less susceptible to the anchoring effect. The anchoring and adjustment heuristic has been found to have a detrimental effect on auditor judgment inferences (Kinney Jr. and Uecker, 1982; Henrizi, Himmelsbach, and Hunziker, 2021). This therefore seems to indicate that media richness affects the cognition of auditors. Having reviewed the interactions of media richness and remote audits, I seek to understand how this feeds into a key behavioral component of the auditor's competence, professional skepticism. I therefore review the interplay between media richness and professional skepticism in the subsequent subsection.

### 3.2.2. Media Richness and Professional Skepticism

We understand from the professional skepticism model proposed by Nelson (2009) that auditors' knowledge, traits, and incentives potentially trade off or interact to affect the level of professional skepticism. Understanding from the literature how media richness affects these individual elements of the professional skepticism model will help give a better appreciation of the impacts of remote audits on professional skepticism.

Firstly regarding knowledge within the model, higher levels are associated with a higher propensity to identify high frequency errors and complex patterns of evidence that indicate error (Nelson, 2009). Also, audit firms value experienced auditors with higher tacit knowledge (Hun-Tong and Libby, 1997). Consequently, we understand that a higher level of knowledge is preferred to lower levels. Knowledge is acquired (Wagner and Sternberg, 1987; Vera-Muñoz, Ho, and Chow, 2006; Crook, Todd, Combs, Woehr and Ketchen, 2011). Generally, novice auditors are most in need of knowledge acquisition since they lack experience and specialization. Regarding novice auditors, Earley (2001) finds that, combining explanatory feedback, and self-explanation provides more benefit for knowledge acquisition in complex auditing tasks. Explanatory feedback requires communication (Bennett and Hatfield, 2013, Bennet and Hatfield, 2018). As reviewed in the previous subsection, a richer medium of communication diminishes equivocality and the improves the sense-making process in the face of uncertainty (Daft and Macintosh, 1981; Daft and Lengel, 1986; Emsfors and Holmberg, 2015). In this sense, a richer communication medium aids in a better acquisition of professional skepticism. This leads to the first interview theme "acquisition of knowledge".

Secondly, (Nelson, 2009) identifies incentives as another element in the professional skepticism model. These incentives could either favor or reduce professional skepticism (King, 2002; Nelson, Elliot, and Tarpley, 2002). Incentives favoring professional skepticism include regulatory enforcement, litigation and consequent reputation loss (Nelson, 2005). Also, pressure from clients and competition serve as a disincentive for professional skepticism



(Bazerman, Moore, Tetlock and Tanlu, 2006). These incentives as identified in the professional skepticism model do not appear to change in situations of remote audit. It is thus highly unlikely that remote audits affect professional skepticism through this dimension.

Thirdly, (Nelson, 2009) identifies traits as an element in the professional skepticism model. It must be noted however that professional skepticism is generally considered as both a trait and a state (Hurt, Brown-Liburd, Earley and Krishnamoorthy, 2013; Khan and Oczkowski, 2021). As opposed to traits, states are more malleable and influenced by a particular situation or context (Steyer, Schmitt and Eid, 1999; Robinson, Curtis, and Robertson, 2018). Given that remote audits have more to do with the particular audit context and situation rather than auditors' traits (Robson, Humphrey, Khalifa and Jones, 2007; Vasarhelyi and Romero, 2014), it is necessary to understand how remote audit affects state skepticism.

Adapted from the trait skepticism scale developed by Hurt's (Hurt, 2010), Robinson, Curtis and Robertson (2018) specified a framework for state scale development. Three dimensions that were identified as pertinent for measuring state skepticism are search for knowledge, questioning mind, and suspension of judgment. These are reviewed in the subsequent subsection.

### 3.2.3. Professional Skepticism Contextualized in Remote Audits

Search for knowledge defined by Robinson, Curtis and Robertson (2018) refers to the "desire to understand the true state of a condition, which would prompt auditors to go beyond verification of assertions to find the correct answer". This thus translates into auditors' willingness and ability to dig deeper for audit evidence in order to resolve issues encountered during a particular audit mission. Evidently, performing an audit being isolated in front of the computer and not having direct physical contact with the terrain, as is the case in remote audits will not yield the same possibilities of retrieving audit evidence as in onsite audits (Teeter, Alles and Vasarhelyi, 2010; Vasarhelyi and Romero, 2014). Again, technical difficulties associated

with digital media could hamper efforts to effectively search for knowledge. This leads to the second interview theme “search for audit evidence”

The next dimension, questioning mind, refers to the ongoing questioning of whether information and evidence is indicative of material misstatement (Hurtt, 2010). This captures how auditors respond to various situational factors in the audit. In contexts where the auditor does not have a direct and spontaneous access to information and evidence (remote audits) (Teeter, Alles and Vasarhelyi, 2010; Vasarhelyi and Romero, 2014), this might hamper the ability of the auditor to feed his questioning mind and base it on the reality on the ground (Ford, Smith and Swasy, 1990; Koslow, 2000). This translates to the third interview theme “questioning mind”.

A third dimension, suspension of judgment, is defined by (Hurtt, 2010) as the “the characteristic of withholding judgment until there is an appropriate level of evidence on which to base a conclusion.” Regarding this dimension Robinson, Curtis and Robertson (2018) assess whether auditors rushed through decision making for particular cases. It is however unclear from literature that remote work causes auditors to rush through decisions. This leads us to our fourth interview theme ”suspension of judgment”.

As outlined above, prior research has provided models through which professional skepticism can be understood. Approaching remote audits in light of these frameworks will enable auditors understand what possible impacts remote audits will have on professional skepticism. Thus as an important first step, reconciling these two elements leads to ask the following research question.

**R1:** What is the auditor’s perception of the impact of remote audits on professional skepticism?

After understanding the impacts of remote audits on professional skepticism, the next step is to arrive at solutions to keep professional skepticism at acceptable levels in such contexts. The ultimate aim of this paper is to develop guidelines which will enable practitioners maintain the right levels of skepticism. This leads to the second research question stated as follows.

**R2:** What are auditor's recommendations for the improvement of professional skepticism in remote audits?

### **3.3. Methods**

I investigate the experiences of Big 4 and non Big 4 auditors regarding remote audits. Since nation-wide confinements were largely imposed during the period of the Covid 19 pandemic in 2020-2021, and thus remote work generally became the primary form of conducting audits, this provided us the opportunity to investigate the issue having the context of intense remote audits and less intense remote audits. The research method employed is qualitative in order to enable auditors to more freely express themselves and capture their experiences (Power and Gendron, 2015). Furthermore, I mobilize theory as a lens in the interpretation of the results (Malsch and Gendron, 2013; van Buuren, Koch, van Nieu Amerongen and Wright, 2018)

To address the research questions, I utilize a semi-structured interview approach involving 18 auditors. Of the 18, 7 were partners, 4 were associates, 5 were managers, and 2 were head of missions. Again, 3 of the participants were from Big 4 firms. Regarding the countries of practice of the auditors, 14 were from France, 1 from Luxembourg, 2 from the United Kingdom, and 1 from the United States. I include audit firms of all sizes, and from four different countries in order to generate a broader and more inclusive variety of experiences (Patton, 2015; Ramirez, Strigfellow and Maclean, 2015; van Buuren, Koch, van Nieu Amerongen and Wright, 2018). Concerning their level of audit experience, 3 had more than 20 years of experience, 10 had 10-20 years of experience and 5 had less than 10 years of experience. More

importantly for this study all participants had experienced remote audits. See Table 3.1 for details on demographic information of participants.

Insert Table 3.1 here

Participants were identified using the lists of registered auditors made available by Regional Associations of statutory auditors in France, as well as the networks of the researchers. All interviews were carried out in 2022 between June and August. For most interviews, at least two researchers were present. The interviews had an average duration 49 minutes with a standard deviation of 14 minutes. All interviews were recorded with the consent of participants<sup>6</sup> and transcribed word for word by a professional transcription institution.

The interview guide had 3 sections: demographic questions, general information concerning remote audits in the participant's firm, followed by questions relating to remote audits and professional skepticism. I commenced the interview by introducing the researchers as well as the objective and source of funding for the study. Participants were then reminded and assured of the anonymity of their responses including audit firms and clients that come up during the interview. I then sought consent from the participants for recording the interviews after which I proceeded to the questions in the interview guide.

The interview guide was designed with open ended questions to allow for interviewees to freely share their experiences. Concerning the section related to the general information of remote audits, questions focused on how this was implemented for audit activities in their firms, the share of activity that it represented at the height of the Covid 19 pandemic and after

---

<sup>6</sup> I conducted the interviews using human participants. For this purpose, I obtained approval from my institution's ethical committee.

the pandemic, the difficulties and benefits derived in remote audits, as well as questions relating to the clients' remote audits.

The second section of the interview guide which centered on professional skepticism began with questions related to participants' general perception of professional skepticism and the role it plays in the quality of audits. This was followed by questions relating to the contextualization of professional skepticism in remote audit settings (Nelson, 2009; Robinson, Curtis and Robertson, 2018). The final part of this section focused on questions relating to the recommendations to improve professional skepticism in remote work.

The coding scheme was developed using the framework described in the literature review (Nelson, 2009; Robinson, Curtis and Robertson, 2018) for research question 1 (RQ1), and based on participants' responses for RQ2. The final coding structure therefore contains 7 themes (see Table 3.2). Coding was carried out by the principal researcher and verified by an independent coder. Inter-rater agreement on the coding of interview responses was 80%, suggesting reliable intercoder accuracy.

Insert Table 3.2 here

### **3.4. Results**

I organize participants' responses in relation to the principal research questions (RQs). The first addressed by RQ1, considers auditors' perception of the impact of remote work on professional skepticism. The second, addressed by RQ2 considers auditors' recommendations for the improvement of professional skepticism in remote work. However, before I present these two main results, I provide results concerning the nature of remote work carried out by the auditors as well as auditors' interpretation of professional skepticism in order to provide some context to the results.

#### 3.4.1. The Consolidation of Remote Work in Audit Practice

In recent times, the single most important phenomenon that has impacted remote audits is the confinement linked to the COVID 19 pandemic (Appelbaum, Budnik and Vasarhelyi, 2020; Kljajić, Mizdraković, Zekić, 2022). This section aims to identify the evolution of the intensity of remote work and more importantly, the future of remote work in audit practice. The operational definition I give to remote work in this paper is "the situation where the auditor works in isolation from colleagues and clients without any physical contact."

5 out of 17 participants indicated that although remote audits were in place before the COVID 19 pandemic, this was on a fairly limited scale or in some cases non-existent. All 18 of the participants pointed out that remote audits became the main form of carrying out audits during the pandemic period. Then participants intimated that remote audits have been maintained and its place in audit practice appears to be well established going forward. As follows are three verbatims which illustrate that although remote audits barely existed pre-pandemic, its place in audit practice has been consolidated moving forward.

*"Before the mandatory confinement, there was some remote audit to allow for some flexibility... afterwards, with COVID it was imposed in full. It was 100% remote audit. ... Afterwards, remote audits have been maintained. The objective has been to have two, three days working in the office and at the client's premises, and two or three days working from home."* (Participant 1)

*"Remote work was done during the COVID pandemic, I would say. There was no real remote work in my company before. Currently, there is an agreement between the employees and management. We have set up two days of remote work per week".*  
(Participant 2)

*“From memory, yes. It existed before the pandemic, under the acceptance of your superior. However this was very rare. We have maintained remote work after the pandemic.... we currently have in place two days of remote work a week subject to customer constraints” (Participant 3)*

To summarize, remote work has now largely been established as an integral component of modern day audit practice. Thus, understanding how this impacts various components of audit practice is an important avenue for audit research. In this study, the focus is how this impacts professional skepticism.

#### 3.4.2. Perception of Professional Skepticism by Auditors

To investigate the question of the impact of remote work on professional skepticism, I first seek out the perception of auditors regarding professional skepticism. Given that remote audits have more to do with the particular audit context and situation (Rosman, Biggs, Graham and Bible, 2007; Teeter, Alles and Vasarhelyi, 2010) rather than auditors’ traits, I group these perceptions of skepticism as traits or states.

In evoking the concept of professional skepticism, 3 of 18 participants emphasize situational factors whereas 11 of 18 participants put emphasis on character traits. Below are two verbatims of auditors who emphasize situational factors.

*“It’s a concept that’s always a bit fuzzy for me. Basically, it’s when you’re in what’s called a gray zone. According to our knowledge of the situation, according to our risk analysis, what is the procedure that we will have to carry out and that it is the most adapted to risk.” (Participant 3)*

*“Because here, we take a subject and we really get into the process. I find that’s really when professional skepticism is most acute. Because that’s where we try to give recommendations, possible solutions... Where we will really have audit points is after discussions with the client, with managers where they are given different possible scenarios. Afterwards, despite everything it really depends on the client”* (Participant 7)

On the other hand, the auditors who emphasize traits put the focus more on themselves rather than the client and their peculiar situations. Below are two verbatims of auditors who emphasize trait factors.

*“The other word that seems to me to portray the term more positively is curiosity. It’s the curiosity of understanding why customers do things one way and not another... I see it (professional skepticism) in junior staff, depending on their youth and characteristics”* (Participant 11)

*“I think professional skepticism is basically having an open mind that in the audits that you perform, you may identify certain things that could be fraudulent or the result of error. I think it’s basically about being mindful while you’re doing your job, so you can see all of these things.”* (Participant 12)

I observe that in evoking professional skepticism, the overwhelming majority of the participants evoke trait factors. This could indicate that auditors pay lesser attention to situational factors which could equally be more impacting. This paper fills this gap by shining the light on an important contextual factor which could impact professional skepticism. In so doing, auditors are well equipped for most eventualities.



### 3.4.3. Impact of Remote Work on Professional Skepticism

The first research question addresses the impact of remote audits on professional skepticism. To help respond to this question I make use of professional skepticism models (Nelson, 2009; Robinson, Curtis and Robertson, 2018). Thus I identify 4 themes. These are acquisition of knowledge, search for audit evidence, suspension of judgment, and a questioning mind.

#### *Acquisition of Knowledge*

Knowledge, described as specialization and experience is an important element in the professional skepticism model (Nelson, 2009). Generally, novice auditors lack such knowledge which they eventually acquire from their more experienced colleagues (Vera-Muñoz, Ho and Chow, 2006; Crook, Todd, Combs, Woehr and Ketchen, 2011). With this theme, I investigate auditors' perception of the acquisition of knowledge in remote audit situations.

50% of participants highlight remote audits as a hindrance to the effective acquisition of knowledge by novice colleagues. As follows are 2 quotes which underline these concerns.

*“Everyone gets distracted (in remote audits)... I usually turn off my phone to focus on the person speaking, but that’s the risk. It’s that we can’t get on board, whereas when you have the same 10 people in the same (physical) audit room, you are going to crack a joke, or share a story with the one who is working on stocks. Then there is the one who works on human resources, you will do the same things later. It’s all about training. People don’t realize it but it’s training. It’s experience sharing” (Participant 16)*

*“Like I said, new employees don’t get the kind of coaching and mentoring they would ideally get in a pre-COVID setting (specifically for participant 14, pre-COVID setting was no remote audits while post COVID setting is a mix of remote and on-site audits) where you’re still with the seniors, with the manager, so no matter the problems you encounter, you can seek their guidance. But now, you have people doing the work on*

*their own from home because they have to deal with clients on their own. For the more experienced staff, I don't think it has much impact, but for the newer ones, yes."*

(Participant 14)

Auditors believe that the less dynamic exchange of information between senior level staff and junior level staff, as a result of the less media rich context of remote work, hampers the acquisition of knowledge by junior level staff.

### *Search for Audit Evidence*

The willingness and ability to dig deeper for audit evidence in order to resolve issues encountered during an audit mission falls under the ambit of this theme (Hurtt, 2010). I thus interrogated the auditors on the ease with which they were able to obtain the client information they needed as well as communication in general with the client when working remotely.

A few auditors expressed that remote audits had no impacts on the ease of obtaining the client information needed, with the majority offering a different opinion. 12 auditors disclosed that they found the search for knowledge more difficult when they worked remotely. 3 quotes expressing their disclosure are seen below.

*"...because with video-calls, when you organize them with a client, you have a lot of people including superiors and juniors, and so on. So people are less comfortable to say things. When you are face-to-face, you have time for your meeting and then you have time to walk down the hall, go have a coffee, and then listen to your customer on the difficulties, on something that happened, and your brain makes the link with the accounts, so all this is lost."* (Participant 10)

*“Well, that makes things more difficult, for example when your are with the client, you may have access to more information than you probably need. Maybe my client is someone who says, “Oh, you let me bring everything so you don’t come back to me.” When you ask for something remotely, you get that feeling that someone is bringing it to you. There is corroborating evidence that they could have found in other documents that a person would have brought but you do not have the opportunity to obtain it.”*

(Participant 13)

*“It was much more complicated. It required us to organize in advance... It’s true that when you’re there, it’s easier to follow up with the accountant. We can say to him: “By the way, I didn’t receive that. Can you send it to me?” When we are remote, it is always more difficult. Following up with someone by e-mail, I always find that more difficult than going to the person’s office, talking for two minutes and asking them. Sending e-mails does not facilitate discussions”* (Participant 17)

These disclosures from the auditors make us understand that the most effective way of obtaining client information is being physically present and requesting for it. The various alternatives presented by remote audits fail to match up to this thus making it more difficult to obtain audit evidence,

### *Suspension of Judgment*

For this theme, I investigate whether auditors held judgment until there is an appropriate level of evidence on which to base a conclusion or whether on the contrary, auditors rushed through decisions. I therefore asked auditors whether they felt more pressure to take decisions in remote audits.

The majority of the interviewees indicated that they did not experience more pressure to take decisions in remote audits. This represented 55% of participants.

Individuals who expressed that remote audits led to more pressure in taking decisions pointed out to the fact that remote work is slower given the non dynamic nature of the exchange of information however the deadlines remain the same. This in their opinion increased the pressure to work and take decisions (Participants 12 and 14). It was also indicated that given that remote audits are filled with uncertainty, this increased the pressure on professional judgment and consequently led auditors to question whether they had taken the right decision or not (Participant 10)

As earlier indicated, the majority of the auditors interviewed were in disagreement that remote audits increased the pressure to take decisions. Below are 3 quotes expressing their view points.

*“I can't give a general answer. If remote work creates additional pressure, then we've got it all wrong. But then I can't put myself in everyone's shoes. Precisely the goal is not to reduce the workload nor exigencies, definitely not. It remains the same, but to alleviate a certain number of external constraints. Extra pressure (in remote audits), no!”* (Participant 18)

*“I know that there are people who can't work remotely, they need to be in the office. It's really I think, case by case. Personally, I do not feel any particular pressure with remote work.”* (Participant 4)

*“Today, we have more restrictions when we need to see a client, we tell them, we're coming and we see each other. If we are in a digital context, which I was telling you about, we know that it works. I would like to say that we are not under pressure in*

*relation to remote audits. I don't feel particularly pressured with regard to this notion of remote audit"* (Participant 15)

I thus observe that in general, auditors are of the opinion that remote audits do not necessarily bring about any negative effects on their suspension of judgment.

### *Questioning Mind*

This theme explores whether remote work influences the auditors' ongoing questioning of information and evidence as indicative of material misstatement. Consequently, I solicit participants to share their experience on whether remote audits influence their level of confidence in client's assertions.

The majority of auditors intimate that remote audits have no influence regarding their level of questioning mind. Only 3 auditors gave some signal that remote audits heightened their level of interrogations. Some reasons participants gave concerning the heightened level of questioning mind in remote audits include the anxiety linked to the non-exhaustiveness of information relayed in remote audits (Participant 11). This is mainly linked to the inability to observe in real-time certain operations and controls of clients. The other participants shared that this is the case when dealing with new clients (Participants 14 and 4). The remainder of the participants were of the opinion that remote audits had no effects on questioning mind. As follows are three verbatims that express their viewpoints.

*"Personally, I would say that there isn't much of a problem about it, even if there is lack of information. What they tell us, for us, is true."* (Participant 6)

*"I don't know if there is a real influence because in any case, even if by chance we work remotely, if we are on an issue, we ask for information and we have written and oral discussions. For me, the issue is resolved. So I don't think there is an influence"* (Participant 8)

*“This has remained at the same level as remote work or not. But then with the less experienced staff, and with our clients, it requires more work in advance which is a little more detailed than before.... To obtain information in order to be completely comfortable with the assertions or the elements of analysis that people transmit to us, that takes a little more organization than before.” (Participant 18)*

Again, it appears that auditors are generally of the opinion that remote audits do not have negative effects on their level of questioning mind.

#### 3.4.4. Improving Professional Skepticism in Remote Work

The second research question follows from the first and aims at providing suggestions to help remedy the potential negative effects of remote audits on professional skepticism. I identify three major suggestions namely, improved guidance and supervision of junior staff with less experience, maintaining a good balance between remote work and onsite work, and improved communications. Other than these, there were also a few minor suggestions.

A first suggestion was improved guidance and supervision of junior staff with less experience as indicated by 50% of the auditors interviewed. As put by Participant 11, “it is really about inculcating into the young staff this curiosity, if they do not have it naturally, to know how to dig, to ask the right questions and to question themselves in the right way.” They further indicated that is because the younger staff who are generally new to the job lack the necessary skills to work in isolation with very little contact with their superiors. Since remote audits take away the physical proximity that may exist in an office onsite setting, there should be a deliberate effort to closely guide these younger staff in remote work with the aim of inculcating into them the spirit of professional skepticism.

A second suggestion, as indicated by 28% of the auditors, is to have an optimum balance between working remotely and onsite verifications at the client's place of work. In the words of Participant 12, "I think for every audit, whether it's remote or not, there should be physical face-to-face meetings at least once or twice with the clients to be able to see them, have these kinds of conversations, observe their behavior among others." This is due to the fact that carrying out audit procedures remotely is not without its limits thus a remedy is to always have an appropriate level of physical presence with the client. This provides a richer environment to search for information.

A third recommendation, suggested by 3 auditors is to reinforce communication within the audit team. According to Participant 1 "we must create these climates of communication. That's a real role of the manager, that is to say that it demands a lot of energy. However, we must continue to constantly maintain the link between team members. You have to set up "moments of discussion" by teams as often as possible, but not too often either. For example, this "moment of discussion" could be for half an hour, once or twice a day." The major effect of remote audits is the reduction in the level of communication quality. The aim here is to consciously compensate for this drawback by putting emphasis on the quality and quantity of communication among audit team members.

Other than the three recommendations stated in the preceding paragraphs, there were a few other recommendations that were not repeated by the other auditors. Notable among these is the "right to disconnect". According to Participant 10, "The right to disconnect, I discovered it with remote working. That is perhaps also an advantage. When you realize that you've been online for 12 hours, You ask yourself "when have I taken a step back to reflect and to let my brain rest... Leave free time slots, free to read documents, free to take a step back and free just to do nothing and allow ideas to be forged in the mind. For us, it's a job of knowledge. We need

to take a step back and put things into perspective.” This appears to be a suggestion that encourages more reflection and may help improve suspension of judgment.

### **3.5. Discussion**

The main finding of this study is that remote audits reduce the level of professional skepticism. The mechanism through which this occurs is through the acquisition of knowledge, and the search for audit evidence. This is as a result of the less media rich environment in which remote audits are carried out. This study also finds that a better way to remedy this situation of less professional skepticism in remote work situations is mainly through is better and closer guidance less experienced junior audit staff.

The first finding establishes the consolidation of remote audits in modern audit practice. This is as a result of digitalization in audits and more recently the COVID-19 pandemic. This observation made by the auditors interrogated in this study is in line with existing literature concerning the recent changes in audit practice. (Appelbaum, Budnik and Vasarhelyi, 2020; Kljajić, Mizdraković, Zekić, 2022). Remote audits are now an integral part of audit practice going forward.

Secondly, I find that remote audits reduce the level of professional skepticism. through the acquisition of knowledge, and the search for audit evidence. With the acquisition of knowledge, described as specialization and experience by Nelson (2009), novice auditors gain such experience from their more experienced counterparts. Given that in remote situations novice auditors are isolated and not in close proximity with their superiors, this hinders the dynamic exchange of information needed for experience sharing. Secondly, search for audit evidence defined as the willingness and ability to dig deeper for information in order to resolve issues encountered in an audit (Hurt, 2010; Robinson, Curtis and Robertson, 2018), is compromised. Auditors intimate that the most effective way of obtaining client information is being physically



present and requesting for such information. The various alternatives presented by remote audits fail to match up to this thus making it more difficult to effectively obtain information.

Media richness framework gives us the conceptual structure for interpreting the result that remote audits reduce the level of professional skepticism as exposed in the preceding paragraph. Media richness theory, proposed by Daft and Lengel (1986), refers to the ability of a communication medium to accurately reproduce the information sent through it. The theory gives the following classification of media in decreasing order of richness; face-to-face, telephone, personal documents such as letters and memos, impersonal written documents, and numeric documents. Again, the theory makes us understand that the less rich the media, the higher the possibility for uncertainty and equivocality in communication. Remote audits rely heavily on the less rich communication media compared to onsite audits (Bible, Graham and Rosman, 2005; Rosman, Biggs, Graham and Bible, 2007; Teeter, Alles and Vasarhelyi, 2010) The two components of skepticism affected by remote audits, namely the acquisition of knowledge, and the search for audit evidence are two areas that require the exchange of information through communication media. Thus they are impacted by less rich media.

Faced with these shortcomings of professional skepticism in remote audits, the study comes up with a few recommendations. A first recommendation is the improved guidance of junior staff with less experience. There should be a deliberate effort to closely guide and communicate with less experienced staff working remotely with the aim of inculcating professional skepticism into them. A second recommendation is an optimum balance between working remotely and onsite verifications at the client's place of activity. This provides a richer environment to search for the requisite client information needed.

A third recommendation is the right to disconnect. The right to disconnect is more suited to more experienced auditors. This enables the auditors to take a step back to reflect and put things into perspective in order to arrive at appropriate judgments.

### **3.6. Conclusion**

As a result of its impacts on the outcome of audits, professional skepticism has been a subject of intensive study by regulators and researchers in recent years (Hurt, 2010; Stevens, Moroney and Webster, 2019; Brazel, Leiby and Schaefer, 2022). Professional skepticism is an important element to assure the quality of audits and regulators regularly cite the absence of it for audit failures (Ray, 2015; Grenier, 2017). Most recently, the phenomenon of remote audits spurred on by the recent COVID-19 pandemic has brought about notable changes in audit practice. These changes in situational factors as a result of remote work signal possible effects on professional skepticism (Robinson, Curtis and Robertson, 2018).

Motivated by these occurrences, I use a qualitative interview approach to obtain the experiences of both Big 4 and non-Big 4 auditors in order to ascertain the impact of remote audits on professional skepticism. Furthermore, I investigate possible solutions which could help remedy the potential problems posed by remote audits on professional skepticism. In this study, Nelson (2009) and Robinson, Curtis and Robertson (2018) serve as a lens to understand the experiences of auditors about the impact of remote audits on professional skepticism. While there has been prior research related to professional skepticism on the one hand, and remote audits on the other hand, this is the first study to take an in-depth look into how the latter affects the former.

I come up with a number of findings. The main finding is that remote audits reduce the level of professional skepticism through the acquisition of knowledge, and the search for audit evidence. This is as a result of the less media rich environment in which remote audits are carried out. This study also finds that a better way to remedy this situation of less professional skepticism in remote work situations is mainly through is better and closer guidance less experienced junior audit staff. This result can be explained by the media richness theory Daft

and Lengel (1986) which makes us understand that the less rich the media, the higher the possibility for uncertainty and equivocality in communication. Remote audits rely heavily on the less rich communication media compared to onsite audits (Bible, Graham and Rosman, 2005; Rosman, Biggs, Graham and Bible, 2007; Teeter, Alles and Vasarhelyi, 2010) The two components of skepticism affected by remote audits, namely the acquisition of knowledge, and the search for audit evidence are two areas that require the exchange of information through communication media. Thus they are impacted by less rich media

This study provides several notable contributions. From a theoretical perspective, this study extends auditing literature as it relates to professional skepticism. Although remote work has progressively been entrenched in audit practice, few studies relate this phenomenon to behavioral components essential to audit quality, such as professional skepticism, More specifically, this study explains the mechanism through which remote audits negatively affects professional skepticism. From a practical standpoint, this study provides recommendations for improving levels professional skepticism in remote audits. This should guide audit firms and regulators in the practice of audits remotely.

As in all studies, this study has limitations that provide opportunities for future research. While the use of a qualitative research approach allowed us to put together detailed experiences of auditors about remote audits and professional skepticism, this method implies limitations in terms of the scope of the experiences. Future research employing approaches allowing for a wider coverage such as questionnaires is needed to corroborate these findings. Again, this study of skepticism was on situational variables. However, professional skepticism is composed of both trait and situational components (Hurt, Brown-Liburd, Earley and Krishnamoorthy, 2013). Thus future research, utilizing an experimental approach, could address how remote audits affect traits and cognitive biases.

### **3.7. Transition: From Factors Impacting Professional Skepticism to Novel Tools for Improving Professional Skepticism**

Chapter 2 and Chapter 3 examined factors that could reduce the level of professional skepticism of auditors. After identifying such factors, the next chapter aims to propose novel tools that may help improve the level of professional skepticism in order to achieve high quality audits. The novel tool used is the nudge. Chapter 4 thus examines experimentally the use of nudges in improving professional skepticism.

## Chapter 4: Nudging Towards Better Auditing: Empirical Insights From an Eye-Tracking Experiment<sup>7</sup>

### Abstract

This article explores the potential of employing nudges to augment the quality of audits. While the utility of nudges is well-established in behavioural sciences, their applicability and efficacy in accounting and auditing sectors have yet to be thoroughly investigated. To bridge this knowledge gap, the present study leverages nudge theory into the context of financial audits, offering experimental substantiation on the impact of social norms and justification nudges on auditor behaviour. A factorial between-subject experiment (2x2: social norms and justification) underscores that nudges amplify professional skepticism, a critical indicator of audit quality. Subsequently, an eye-tracking experiment during an audit task elucidates the cognitive mechanism underlying this effect. The results suggest that nudged scenarios promote heightened visual attention during the audit task, thereby enhancing professional skepticism. These findings imply that nudges may effectively heighten auditors' attention to pertinent information, thereby refining the evaluation of audit evidence.

**Keywords:** eye-tracking, behavioral auditing, nudge, professional skepticism.

**JEL Classifications:** G41, M42

---

<sup>7</sup> The experiments in this chapter were carried out as part of a 7 months research visit to Tech3Lab HEC Montréal, Canada. This chapter has led to one book chapter and one research paper. The book chapter has been co-written by **Gajewski J.-F., Heimann M., Léger P.-M., Teye P., 2020**, « **Nudging to Improve Financial Auditors' Behavior: Preliminary Results of an Experimental Study** », F. D. Davis et al. (Eds.): *NeuroIS 2020*, LNISO 43, 191–197, Springer Nature Switzerland. [https://doi.org/10.1007/978-3-030-60073-0\\_22](https://doi.org/10.1007/978-3-030-60073-0_22)

The research paper is entitled “**Enhancing Auditors' Professional Skepticism through Nudges: An Eye-Tracking Experiment**” **Gajewski J.-F., Heimann M., Léger P.-M., Teye P.** It has been presented at European Accounting Association (EAA) Congress at Bergen in Norway (2022), Francophone Accounting Association Congress (AFC) at Bordeaux (2022), French Finance Association (AFFI) at Saint-Malo (2022), European Institute for Advanced Studies in Management (EIASM) Workshop on Audit Quality at Milan, Italy (2022) and also in research seminars (Dijon, 2022, Lyon, 2022) and is in the revision process of a publication at the third turn in *Accounting and Business Research*.

## 4.1. Introduction

Despite changes to regulatory frameworks designed to improve audit quality, audit deficiencies remain a persistent issue, as underscored by regulators (PCAOB 2022). This statement finds resonance in recurrent auditing debacles, epitomized by notable scandals such as WireCard and Carillion. Regulatory authorities frequently attribute these persistent audit deficiencies to a shortfall in the auditors' exercise of professional skepticism, thereby emphasizing its crucial role in ensuring audit quality (PCAOB, 2018; PCAOB, 2023). This correlation underscores the need to induce professional skepticism in the auditing process.

Despite the various definitions of professional skepticism in academic research and professional standards, the International Auditing and Assurance Standards Board (IAASB) defines it clearly as *“an attitude that includes a questioning mind, being alert to conditions which may indicate possible misstatement due to error or fraud, and a critical assessment of evidence”*. While professional skepticism is a multifaceted construct encompassing both trait and state characteristics (Hurtt, Brown-Liburd, Earley and Krishnamoorthy, 2013; Eutsler, Norris and Trompeter, 2018; Mohammad and Oczkowski, 2021), I posit that it necessitates visual attention as a fundamental component. The practice of skepticism demands a heightened concentration, rendering visual attention indispensable. Consistent with the postulations of the eye-mind hypothesis, visual attention operates as a cardinal component in information processing (Just and Carpenter, 1980; Rose, Rose, Rotaru, Sanderson and Thibodeau, 2022). To bolster the auditors' capacity for efficacious information assimilation, nudges could be employed to amplify visual focus on critical aspects of decision-making. This process suggests the potential for nudges to serve as an integral strategy for enhancing auditor performance and, by extension, improving overall audit quality.

Nudges refer to elements in choice architectures that gently alter people's behavior, such as encouraging them to adopt responsible behaviors, without forbidding any specific options

or significantly changing the economic consequences (Thaler and Sunstein, 2008). As Schubert (2017) explains, the influence of nudges depends on agents' cognitive biases. Through the design of the choice environment, they attract a person's attention to certain factors that then incite the person to make predictable decisions, usually without much expense (Hilton, Treich, Lazzara, and Tendil 2018). If a nudge fails, no harm results (Thaler and Sunstein, 2008). Thus, in addition to strategic prompts, decision-aids (Bowlin, 2011; Kachelmeier and Messier, 1990), mindset manipulations (Griffith, Hammersley, Kadous, and Young, 2015) and priming (Durkin, Rose and Thibodeau, 2020), nudges improve auditors' performance by using the heuristics and biases of the individual auditor, subtly and without coercion (Thaler and Sunstein, 2008). For this study, I focus on two effective debiasing nudges that might improve auditors' professional skepticism; the social norms nudge. and the justification nudge (Hilton, 2001; Larrick, 2004; Dolan, Hallsworth, Halpern, King, Metcalfe, and Vlaev, 2012).

In societies where social norms exist, the auditors are likely to be aware of the need for accountability, objectivity and integrity in their audit task. By fear of misconduct reporting, they are incited to strengthen their professional skepticism to uncover potential misstatements due to error or fraud. As far as justification, it refers to the process by which auditors validate their critical judgments in a rational and evidence-based manner. The concept of justification plays a crucial role in reinforcing auditors' professional skepticism because it ensures that auditors' skepticism is not based on biases, heuristics or assumptions, but on objective evidence and sound reasoning. Together, social norms and justification might contribute to auditors' commitment to enhancing their professional skepticism.

To test these predictions, I conduct two experiments, one online and another one in a laboratory. With the former experiment, I establish that nudges exert strong effects on professional skepticism. The eye-tracking experiment in the lab then reveals that the effect of

nudges on professional skepticism is mediated by visual attention. Across the two experiments, I thus identify a positive effect of nudges on professional skepticism, which is considered a marker of audit quality. The nudged conditions are associated with greater visual attention, measured as higher fixation counts and revisits to assessments of the audit evidence. They also feature a lower time-to-first-fixation. The increased visual attention then exerts a significant positive impact on professional skepticism; in detail, I demonstrate that nudges improve professional skepticism through a mediating effect of visual attention.

With this evidence, I offer several notable contributions to the auditing literature. Firstly, noting the lack of research on the impact of nudges in auditing, I establish a foundation for novel research into how nudges can be used in the field of auditing. The incremental contribution of this paper beyond Nolder, Ratzinger-Sakel and Theis (2022) is that I explore a mechanism which explains the effectiveness of nudges in auditing. Secondly, the findings add to the rich literature pertaining to professional skepticism in auditing, by providing a perspective on professional skepticism from a visual attention standpoint. In this effort, I demonstrate how concepts and techniques from other disciplines such as psychology and neuroscience can be applied to improve auditing practices. Third, from a managerial perspective, this study highlights the need to identify the cognitive make-up of individual auditors, which should inform efforts to personalize the choice architecture they encounter in their work interfaces, using nudges to encourage acceptable levels of professional skepticism. Furthermore, managers and partners in audit firms should be aware of how informal social norms in the professional environment likely affect the activities of audit firms. Audits, require a great deal of concentration, and this highlights the increasing need for applications of nudges to enhance visual attention. To establish these contributions, the study is organised as follows: I review prior literature to frame and inform the hypotheses in Section 2; then



Section 3 reports the results of the online experiment, while Section 4 develops the eye-tracking experiment in the lab; finally, section 5 concludes.

## **4.2. Literature Review and Hypotheses**

### **4.2.1. Professional Skepticism and Aggressive Reporting**

Skeptical judgments by auditors occur when they recognize a potential issue that may exist, thus requiring more work, review, or effort (Hurtt, Brown-Libur, Earley and Krishnamoorthy, 2013). For example, auditors likely exhibit skepticism if they find evidence of aggressive financial reporting, so they devote more effort to investigating the reports. I acknowledge that some research assumes that professional skepticism entails presumptive doubt or a conservatism bias (McMillan and White, 1993; Nelson, 2009), but for this study, I characterize skepticism as the propensity of auditors to require sufficient support and evidence, in a timely manner (Hurtt, 2010). The International Standards on Auditing even require that audits be performed with professional skepticism (ISA 200) and following audit failures, regulators regularly cite a lack of such professional skepticism (Ray, 2015; Grenier, 2017). In this sense, professional skepticism in audits is indispensable.

I further define aggressive financial reporting as accounting practices designed to overstate a company's performance, which fall outside of generally accepted accounting principles (Johnstone, Bedard and Biggs, 2002). It might manifest as early revenue recognition, extensive cost capitalization, lengthy amortization periods, or understatement of expenses (AICPA, 1988). Regardless of the form it takes, effects of aggressive financial reporting are devastating for the firm, its managers, and auditors. As Feroz, Park, Pastena, DeFond and Smith (1991) find, a firm engaging in aggressive financial reporting likely underperforms in the market, suffers negative market returns following the announcement of accounting irregularities, and is subject to negative market perceptions and regulatory investigations.

Sanctions on the auditors who miss such reporting can either be monetary, including temporary or even permanent suspension of licenses (De Fuentes, Illueca and Pucheta-Martinez, 2015). Therefore, appropriate levels of professional skepticism are critical to avoid such negative outcomes.

In avoiding such negative outcomes, I propose the use of nudges. The overarching theory for the use of nudges in this paper is grounded in the auto-motive theory (Bargh and Barndollar, 1996). That is, the environment can directly activate a goal and this goal can become operative and guide cognitive processes within the environment.

#### 4.2.2. Social Norms

Because people are fundamentally social in nature, they generally organize their work activities in groups (Young, 2008), which in turn feature social norms, or shared understanding of what constitutes appropriate behavior (Thøgersen, 2006). People tend to conform with the values and norms of the groups to which they belong, to avoid rejection (Young, 2013).

But this influence of social norms first requires the person to become part of a group and develop a sense of attachment to it. For an individual to be influenced by social norms, they must firstly be part of a group and have a legitimate sense of attachment to it (Asch, 1956; Cialdini, Reno and Kallgren, 1990), as outlined by the social identity theory, which describes how people group themselves with others based on their similarities (Tajfel, 1978; Bauer, 2015). In turn, they are more likely to internalize the group's norms (Bamber and Iyer, 2007). According to Tajfel (1978), people also develop a sense of who they are based on their group membership. Therefore, I predict that social norms exert cognitive impacts on auditors, who belong to professional groups and identify themselves accordingly. In particular, most audits are performed by teams of auditors, who pool their knowledge and expertise to accomplish various audit tasks.

The group as a whole then should influence each individual auditor, consciously or unconsciously, willingly or unwillingly. Most audit teams also adopt a hierarchical structure, so the influence could be vertical or horizontal. Although audit teams usually are constituted specifically to meet the needs of a particular project, a resource-based theoretical perspective (Gardner, Gino and Staats, 2012) also acknowledges that each firm can be defined by the resource it controls (Litz, 1996). The distinct human resources available to audit firms thus could lead to unique social norms developing and being applied across firms or their teams. Finally, beyond the teams and firms to which auditors belong, many auditors join professional bodies that also can be sources of influence, such as the American Accounting Association, American Institute of Certified Public Accountants or the Association of Chartered Certified Accountants.

Across these settings, social norms should lead to compliance and conformity in various contexts. For example, Bobek, Roberts and Sweetney (2007) find that social norms affect tax compliance, and Kelly and Murphy (2021) show that they influence decisions related to aggressive accounting. According to Blay, Gooden, Mellon and Stevens (2019), social norms that prioritize honesty and responsibility can capture an auditor's potential for moral reasoning. Callen and Xiaohua (2020) also found evidence that firms located in U.S. counties with more liberal local gambling norms exhibit higher audit fees. According to Westermann, Bedard and Earley (2015), during the early years of auditors' professional careers, they undergo a process of professional socialization and learn the social norms that exist in their employing firms. Furthermore, Cardinaels and Jia (2016), determine that, social norms have strong effects on the level of truthful reporting when reporting decisions are audited.

Among this diverse evidence of the impact of social norms on accounting and auditing though, the mechanism by which compliance with social norms functions remains somewhat controversial. For Dolan, Hallsworth, Halpern, King, Metcalfe and Vlaev (2012), the

operation of social norms is partly conscious and deliberate but also partly unconscious, due to a lack of awareness or rationality among people engaged in conformist behavior. According to Young (2013), social norms work through a heuristic process similar to herding, but also might involve a more elaborate cognitive process, mediated by persuasiveness. Melnyk, van Herpen, Fischer and van Trijp (2011) add that people who are cognitively invested in the process of understanding social norms messages are less susceptible to their influence, and Bauer (2015) finds that professional identity, which is a construct similar to social norms, can improve professional skepticism in auditors. On the basis of this combined evidence, I hypothesize:

**H1a:** Implementing a social norms nudge will cause an increase in the level of auditors' professional skepticism.

#### 4.2.3. Justification

Justification techniques require people to offer reasoned explanations of their choices (Hilton, 2001) which should prompt more careful analysis and reduce reliance on cognitive shortcuts. Justification also has been referred to as accountability or, reasoned based choice (Buchman, Tetlock and Reed 1996; Lerner and Tetlock, 1999; Hilton, 2001; Geoffroy and Eliaz, 2012; Dalla Via, Perego and Van Rinsum, 2019). It might be internal, related only to oneself, or external and involve other people (Simonson, 1989). But because optimal decision-making generally entails a complex process, accounting for systematic reasoning in audits should be a beneficial effort.

In more detail, when executing an audit, various decisions take place, either individually or collectively, which reflect various criteria and or dimensions. Even in the presence of rules, guidelines, or best practices to aid the decision-making process, dimensions need to be taken into consideration, and this dilemma regarding conflict about how much to trade one dimension off against another is difficult for decision makers to resolve. Therefore people

often resort to simple heuristics (Geoffroy and Eliaz, 2012), but requirements for justification prevent such shortcuts.

Kramer, Pommerenke and Newton (1993), cite an impressive body of empirical evidence that justification improves individual decision-making behavior. For example, Pilkington and Parker-Jones (1996) show that trainee doctors learn more when they are required to offer justifications, and Misra, Sugiri, Suwardi and Nahartyo (2019) identify its influence for leading tax consultants to perform deeper searches. According to Tetlock and Boettger (1989), people also adjusted their opinions to reflect the views of the source of justification. When auditors are subject to justification demands compared with those who are not, Lord (1992) finds that they issued more qualified opinions.

In addition, decision makers can use various means to justify their decisions, and these sources they select likely influence the decision, due to the differences in their levels of clarity, pressure, or preference (Bagley, 2010). Seta, Seta, Crisson and Wang (1989) even caution that the use of multiple justifications in auditing can lead to negative emotions that harm task performance in low-complexity audits, though not for high complexity ones. For a justification nudge effectively to improve the level of professional skepticism, it appears relevant to include a source that traditionally advocates for professional skepticism, with an emphasis on end-results.

In combination with this consideration, I note that several factors can influence auditors' professional skepticism, including their knowledge, competency and expertise (De Angelo, 1981; Nelson, 2009). I propose that nudges can be used to evoke auditors' expertise, by increasing their concentration on decision relevant factors and thus their professional skepticism. Formally:

**H1b:** Implementing a justification nudge will cause an increase in the level of auditors' professional skepticism.

#### 4.2.4. Nudges and Visual Attention

Attention is defined as the cognitive process of selectively focusing on one aspect of the environment while ignoring other elements (Posner, 2012). The attentional process involves a set of cognitive operations that enable one to process relevant information while filtering out non-essential stimuli. The eye-mind theory posits that human information processing is contingent upon the occurrence of eye fixation (Just and Carpenter, 1980). Consequentially, fixations are critical for gauging visual attention (Rose, Rose, Rotaru, Sanderson, and Thibodeau, 2022). Increased information processing necessitates more fixations (Just and Carpenter, 1980).

Nudges serve as subtle cues or changes in how choices are presented that can unconsciously direct our attention toward certain elements. Studies have shown that nudges can enhance visual attention and, consequently, improve decision-making quality. For example, in the automobile industry, nudges have enhanced drivers' focus on road conditions and safety parameters (Dwoskin and Ramsey, 2016). On the basis of such insights, I predict:

**H2a:** Implementing a social norms nudge will cause an increase in the level of auditors' visual attention.

**H2b:** Implementing a justification nudge will cause an increase in the level of auditors' visual attention.

Diminished visual attention toward a focal target could denote a heightened level of distraction (Büttner, Florack, Leder, Paul, Serfas and Schulz, 2014), thereby diminishing an individual's capacity to concentrate and leverage their competencies for conducting high-quality audits (Breger and Edmonds, 2016). This may, in turn, result in diminished professional skepticism (Glover and Prawitt, 2014). This manifestation of heightened distraction aligns with the ramifications of decreased professional skepticism. Viewed from

another perspective, distraction, indicated by increased fixations on diverse stimuli, could suggest inefficient pursuit of target information (McMillan and White, 1993; Holmqvist, Marcus, Richard, Richard, Halszka and Van de Weijer, 2011). In contrast, financial auditors displaying high professional skepticism often exhibit an elevated degree of information search (Robinson, Curtis and Robertson, 2018).

The theoretical foundation for these aforementioned empirical findings lies in the concept of covert attention, as proposed by Posner and Petersen (1990). Covert attention encompasses three core abilities:

- a. The capacity to orient and reorient attention
- b. The readiness to anticipate and remain alert for forthcoming events
- c. The ability to manage attention

In leading auditors to more professional skepticism, I propose that nudges fulfill these three functions: guide auditors to concentrate on the task at hand, encourage auditors to maintain alertness while evaluating audit evidence, and aid auditors in controlling their attention. As per Collings and Eaton (2019), covert attention orienting and oculomotor control processes appear to be interdependent systems that select specific targets and steer saccades (Awh, Armstrong and Moore, 2006; MacLean, Klein and Hilchey, 2015). Such oculomotor movements can be monitored using eye-tracking methodologies. Combining this evidence, I predict:

**H3:** The positive effect of nudges on auditors' professional skepticism is mediated by visual attention.

In order to test these hypotheses, I conducted two experiments: an online experiment and then an in-depth, eye-tracking laboratory study, designed to uncover the attentional mechanisms underlying the predicted processes.

### 4.3. The Online Experiment

#### 4.3.1. Methods

##### 4.3.1.1. Participants

I recruited 100 young professional auditors from France aged 23 years (SD=.5) 44% of which were women and I included attention checks to ensure their attention during the experiment following Hauser and Schwarz (2016) recommendations.

Insert Table 4.1 here

From Table 4.1, all participants had a masters' degree with specializations in accounting and auditing. Again, participants all had work experiences ranging from three months to one year in the field of auditing. Because the experiment involved human subjects, I received approval from the institution where the experiment took place (Comité d'Ethique de la Recherche, HEC Montréal, 2020-3791 - 186 - Largo Winch). Participants were remunerated a fixed fee of 10 euros. The use of a fixed fee for all participants was to prevent the money from being an influencing factor of skepticism

##### 4.3.1.2. Experimental design

To test the hypotheses, I conducted a fully randomized experiment using a two-by-two between-subject design. Participants were presented with pieces of audit evidence and assigned to one of four experimental conditions: control (C), social norms nudge (S), justification nudge (J), and social norms and justification (SJ). The social norms nudge employed in this experiment reads "*Very important Information: A recent study in accounting indicates that individuals of your age perform very well on audits. The study explains that this is the case because individuals of this age range pay a great deal of attention to detail*



*and take note of evidence of aggressive financial reporting when conducting audits*". The choice of nudging based on age groups of auditors, rather than other specialized groups, appeared appropriate to the experimenters because they did not have full information of all the groups the participants belonged to and their level of attachment to these groups. Recall from the literature review that for the social norms nudge to be effective, the individual must firstly be part of a group and have a legitimate sense of attachment to it (Asch, 1956; Cialdini, Reno and Kallgren, 1990). The justification nudge used in this study reads "*Very Important Information: Audits are scrutinized by your superiors and the regulators. In similar audit tasks, some auditors have recently been sanctioned for not being able to identify items indicative of aggressive financial reporting. Imagine for this exercise that you will be accounting personally for your audit opinion to the top hierarchy and possibly the regulators*". The idea behind this nudge is that in encouraging participants to reason thoroughly through their decision-making process, they have recourse to a source which advocates more professional skepticism, that is top hierarchy or regulators. The order of presentation for the audit evidence was also fully randomized.

I measure professional skepticism, the dependent variable, by asking: "Please evaluate the client's financial reporting as a whole" followed by a description of aggressive financial accounting practices (cf. Appendix 4.1.5). Participants answered on a 10-point scale ranging from "Not aggressive at all" to "Very aggressive". Because of the aggressive items that participants had read previously and in line with previous research (Bamber and Bylinski, 1987; Cohen and Kida, 1989; Bauer, 2015), I use higher response scores as proxies for skepticism.

#### 4.3.1.3. Material

The audit evidence material used in this study is based on two well-known cases of aggressive financial reporting: Trueblood Case 91-1 (Touche, 1991) and United States

Surgical Corporation (Johnson, Grazioli and Jamal, 1993). I developed 14 items of evidence that capture the key features of each client's financial statements, with each item being self-contained and able to be analyzed independently. Of the 14 items, three were identified as indicative of aggressive financial reporting (trade receivables, shareholders' equity, accounts payable and accrued liabilities), one served as an attention check, and the remaining ten were indicative of non-aggressive financial reporting. This approach to constructing audit evidence material is adapted from Phillips (1999).

#### 4.3.1.4. Manipulation Checks

To verify that the nudges manipulated the intended concepts, I submitted our materials to a sample of 40 auditing professionals recruited online. I asked if they agreed that the text of each nudge was effectively evoking the underlying concept I intended to manipulate (social norms and justification). In addition, I asked to judge two filler items. For each concept, participants chose their level of agreement with the concepts on a scale of 1 (Not at all) to 7 (Completely). Participants correctly indicated a higher level of agreement to the concept associated with the nudge to which they were exposed compared to the other options. Answers for the social norms nudge averaged 4.17, were well above the mid response and significantly higher than the filler items ( $t=2.02$ ;  $p=0.05$ ). Answers for the justification nudge averaged 5.13, again well above the mid response and significantly higher than the filler items ( $t=2.63$ ;  $p=0.01$ ).

The approach to manipulation check used in this experiment follows from Oppenheimer, Meyvis and Davidenko (2009). This gives an indirect measure of satisficing and is well suited to our experiment in that the materials are relatively basic and the level of expertise of participants is well suited.

#### 4.3.1.4. Procedure

Participants in this study accessed an online experiment via a link that was provided to them. Prior to participating, they were required to read and accept the terms and conditions. Participants were then presented with instructions for an audit exercise that involved reviewing audit evidence about a fictitious company at their own pace. Background information about the company and the audit, including the level of materiality and the accounting year, was provided before participants proceeded with the exercise. After reading the instructions and background information, participants were randomly assigned to one of four experimental conditions. During the audit task, participants carefully examined 14 pieces of audit evidence and provided a general assessment of the level of financial reporting on a scale from 1 (not aggressive at all) to 10 (very aggressive). Demographic data was also collected from participants. Please refer to Appendix 4.1.4 for more details on the audit task instructions and Appendix 4.1.5 for the financial reporting scale used in this study.

#### 4.3.2. Results

##### 4.3.2.1. Effect of Nudges on Professional Skepticism

The average duration of the experiment was 36 minutes. I employed a 2x2 between subjects ANOVA to examine the impact of the social norms nudge (S) and the justification nudge (J) on professional skepticism. Descriptive statistics for each condition are presented in Table 4.2.

Insert Table 4.2 here

The ANOVA revealed a significant effect of the nudges on professional skepticism,  $F(3, 81) = 2.4, p = .07$ , indicating that the nudges influenced professional skepticism at a 10% level of significance. More specifically, the combined nudge condition (SJ) exhibited the highest

mean level of professional skepticism ( $M = 7.19$ ,  $SD = 1.33$ ), followed by the social norms nudge (S:  $M = 6.50$ ,  $SD = 1.36$ ), the control (C:  $M = 6.43$ ,  $SD = 1.71$ ), and finally the justification nudge (J:  $M = 6.20$ ,  $SD = 1.80$ ).

Tukey HSD post-hoc comparisons in Table 4.3 show that the mean score for the double nudge condition (SJ) differed significantly from the no nudge control condition. However, neither the social nudge nor the justification condition differed significantly from the control condition. I therefore offer some evidence in support of H1a and H1b that the social norm nudge, and the justification nudge can increase professional skepticism, but only if they are used conjointly.

Insert Table 4.3 here

In order to consolidate our findings and to gain a deeper understanding of the underlying mechanisms that drive the observed effects of nudges, I conducted a second experiment in a laboratory setting and used eye-tracking technology during the audit task. This approach allowed me to gain insight into the attentional mechanisms involved, as I was able to observe how auditors responded to nudges during their audit tasks. In addition, the lab experiment addresses the limitation of declarative measures and uses a more objective measure of skepticism based on the detection of aggressive financial reporting elements. By combining these objective measures with eye-tracking data, I aim to provide a more precise understanding of the mechanisms underlying the effects of nudges on skepticism.

The results of the online experiment present a number of limits which I address in the lab experiment. Firstly, given the subjective nature of the skepticism measure used (this approach is comparable to Griffith, Hammersley, Kadous, and Young, 2015; Nolder, Ratzinger-Sakel and Theis, 2022), it might be difficult to establish a normative reference point. Thus, it could

be argued that higher scores might not necessarily indicate higher professional skepticism. However, the baseline on which I measure the effectiveness of the nudges is the control condition and I thus consider it to be the normative reference point. Moreover, this measure of professional skepticism appeared appropriate to the experimenter since it was carried out online making it impossible to supervise participants.

#### **4.4. The Eye-tracking Experiment in the lab**

##### 4.4.1. Methods

##### 4.4.1.1. Participants

Participants in the lab experiment are young auditing professionals based in Canada with varying levels of work experience. From Table 4.1, of the 20 participants, 70 percent are women. Because the experiment involved human subjects, I received approval from the institution where the experiment took place (Comité d’Ethique de la Recherche, HEC Montréal, 2020-3791 - 186 - Largo Winch). All participants had a masters’ degree with specializations in accounting and auditing. Again, participants all had work experiences ranging from three months to one year in the field of auditing. Participants were remunerated a fixed fee of 30 Canadian dollars. The use of a fixed fee for all participants was to prevent the money from being an influencing factor of skepticism.

##### 4.4.1.2. Experimental design

The participants again examine pieces of audit evidence, but the experimental design differs somewhat from that of the online experiment. In particular, I use a 2 x 2, within-subject design in a controlled laboratory setting. To avoid cross contamination of the nudges, I use a semi-randomized design, i.e. I first presented the control condition with no nudge, followed by the three manipulations of the social norms nudge, justification nudge and a combined nudge which were randomized for each participant. All participants saw the control condition

before being exposed to the nudge conditions. The manipulation conditions are in Appendix 4.1.3.

#### 4.4.1.3. Material

The materials used in this experiment are those detailed in the online experiment, with two changes. As in the online experiment, the audit task consisted of the 14 pieces of evidence, 3 of which represent cases of aggressive financial reporting (Task A: Fixed Assets, R&D and Engineering Expenses, Intangible and Other Assets; Task B: Inventories, Cost of Goods Sold, Sales; Task C: Trade receivables, Shareholders' Equity, Accounts Payable and Accrued Liabilities; Task D: Inventories, Fixed Assets, Marketing and Administration Expenses) and 11 are cases of non-aggressive financial reporting. The texts used for the social norm and justification nudge were also the same as in the online experiment. The first change to the materials was to adopt a behavioral measure of professional skepticism instead of the declarative measure. I followed Glover and Prawitt, (2014) and Nelson (2009) and asked participants to detect aggressive items in the audit task.

The second change was to measure visual attention during the experiment by using eye-tracking technology (Red 250, SensoMotoric Instruments GmbH, Teltow, Germany). Therefore, I defined areas of interest (AOIs) corresponding to each piece of evidence. Specifically, the eye-tracking technology tracks eye movements and changes in pupil size, at specific points in time (Manzon, 2020; Lynch and Andiola, 2019) in relation to the AOIs. The resulting data provide measures of various constructs, including processing levels, mental states, and perceptual fluency (Wedel and Pieters, 2008; Holmqvist, Marcus, Richard, Richard, Halszka and Van de Weijer, 2011; Meissner and Oll, 2019; Lynch and Andiola, 2019), each of which helps reveal people's cognitive processes.

I recorded measures at a sampling frequency of 60 Hz throughout the experiment. Fourteen AOIs were placed on the page, reflecting the 14 financial account items. Due to randomization of the items on the page, the AOIs varied across participants and attempts. Prior to each

session, participants underwent a calibration process using a 9-point predefined calibration grid (Just and Carpenter, 1976) to ensure an average deviation of no more than 0.5. The use of eye-tracking technology and AOIs allowed me to precisely capture participants' visual attention to specific aspects of the financial account items.

To quantify participants' visual attention during the audit task, I used a ratio of dwell time to revisits. Dwell time was defined as the total viewing time of the areas of interest (AOIs), while revisits referred to the number of times the participant returned to those AOIs. This ratio allowed me to consider both time and count metrics (Lynch and Andiola, 2019; Yusuf, Kagdi and Maletic, 2007) in the analysis. By measuring the time spent viewing an AOI and the frequency with which the AOI was revisited, I was able to capture the dynamics of participants' visual attention during the audit task.

#### 4.4.1.4. Procedure

Each participant inspected a series of four sets of 14 items of audit evidence, reflecting 14 distinct accounts in the financial statements. To prepare participants and mitigate learning effects, each series started with a short presentation of the company in question, as well as basic information needed for the audit, such as materiality and the audit year. After having examined all 14 pieces of audit evidence for the first series at their own pace, participants moved to the next page to identify financial reporting items they adjudged aggressive (see Appendix 4.2.4. Audit Task & Appendix 4.2.5). To mitigate any effect of prior knowledge of the business or anchoring effects from initial first attempts, the four descriptions featured different fictitious businesses. After the four series I obtained demographic data for control purposes and also provided remuneration for their participation

#### 4.4.1.5. Variables

The dependent variable, professional skepticism, is measured by the total number of aggressive items detected ranging from 0 to 3 detections. The independent variables are the

social norms and justification nudge conditions as in the online experiment. In addition, to account for visual attention, I included the dwell-to-revisit ratio from the eye-tracking measures as a mediating variable, reflecting both the fixation count and the time elapsed between two revisits of an AOI (Doherty, O'Brien and Carl, 2010; Hofmaenner, Herling, Klinzing, Wegner, Lohmeyer, Schuepbach and Buehler, 2021). Dwell time quantifies the amount of time that subjects spend looking at a particular AOI. The number of revisits (number of times a subject returned their gaze to an AOI) can be useful, because the higher the number of revisits, the larger the interest in the AOI. The dwell-to-revisits ratio captures the average time elapsed between two revisits of an AOI. It is also the average time the subject takes before returning to an AOI. The shorter this time is, the greater the auditor's concentration on an AOI and the stronger the visual attention. As noted, it thus provides a measure of participants' cognitive effort in performing the audit task and the complexity of acquiring information.

#### 4.4.2. Results

##### 4.4.2.1. Effect of Nudges on Skepticism

The average duration of the experiment was 41 minutes. To consolidate the findings from the online experiment, I conducted, in the lab experiment a one tailed t-test to evaluate the effect of the social norms nudge and the justification nudge on professional skepticism. The results show that there was a significant increase of professional skepticism in the nudged conditions ( $M=1.4$ ,  $SD= 1.06$ ) as compared to the control condition ( $M=0.93$ ,  $SD= 0.8$ ) at the 5% level,  $t(39) = 1.72$ ,  $p = .04$ . I find that nudges are also effective using a behavioral measure of skepticism and a Canadian sample, as compared to the online experiment (declarative measure and French sample) To consolidate the findings from the online experiment, in the lab experiment I conducted a one tailed t-test to evaluate the effect of the social norms nudge and the justification nudge on professional skepticism. The results show that there was a



significant increase of professional skepticism in the nudged conditions ( $M=1.4$ ,  $SD= 1.06$ ) as compared to the control condition ( $M=0.93$ ,  $SD= 0.8$ ) at the 5% level,  $t(39) = 1.72$ ,  $p = .04$ . I find that nudges are also effective using a behavioral measure of skepticism and a Canadian sample, as compared to the online experiment (declarative measure and French sample).

#### 4.4.2.2. Nudges and Visual Attention

Descriptive statistics in Table 4.4 indicate increased skepticism and decreased dwell-to-revisits for all nudged conditions. For the test of H2a and H2b, I consider whether nudges exert significant effects on visual attention, using linear regression with a random intercept model of the dwell-to-revisits ratio.

Insert Table 4.4 here

Insert Table 4.5 here

The results in Table 4.5, consistent with our hypothesis, reveal that, after being nudged, the auditors exhibit better visual attention in their audit tasks. Compared with the no nudge condition, all nudged conditions produce significantly lower dwell-to-revisits ratios: social norms nudge condition ( $p = 0.02$ ), justification nudge condition ( $p < 0.01$ ), and combined nudge ( $p = 0.01$ ). It appears that nudged participants return more quickly to an AOI, than if they have not been nudged. Recall that the ratio expresses the time elapsed between two revisits, or the time a participant takes before returning to an AOI. The shorter this time is, the greater the auditor's concentration on an AOI.

To verify the robustness of these findings, I analyzed three more eye-tracking measures: fixation counts, revisits and time-to-first fixation (TTFF). The metrics used in the robustness

checks apply to all the AOIs. I included fixation counts ( $M= 16.81$ ,  $SD = 14.04$ ) and revisits ( $M= 3.98$ ,  $SD = 3.40$ ) in negative binomial regression models because both are counts and overdispersed. I included TTFF in the linear regression with a random intercept.

The results show that nudges impact TTFF. Compared with the no nudge condition, all nudged conditions lead to significantly lower TTFF: social norms nudge ( $p = 0.01$ ), justification nudge ( $p < 0.01$ ), and combined nudge ( $p = 0.01$ ). Therefore, in nudged conditions, less time elapses before the participants fixate on audit items, which may be interpreted as an efficient use of time, because the time gets maximized for fixations.

Furthermore, I observe higher fixation counts when audit tasks follow nudges: social norms nudge ( $p = 0.01$ ), justification nudge ( $p < 0.01$ ), and combined nudge ( $p = 0.01$ ), compared with no nudge condition.

This result is corroborated by the revisits metric. Compared with the no nudge condition, all nudged conditions prompt significantly more revisits: social norms nudge ( $p = 0.01$ ), justification nudge ( $p < 0.01$ ), and combined nudge ( $p = 0.01$ ).

Overall then, the findings imply that in the presence of nudges, more visual attention centers on elements that the auditor examines during an audit task. This outcome is very important; heightened visual attention to audit items should reduce the possibility that the auditor misses key details that determine the quality of the report. After having examined all these elements initially, subsequent reexaminations occurred, which also are important, as a way to build a general picture of the audit undertaken.

#### 4.4.2.3. Mediating Effect of Visual Attention on Professional Skepticism

Having observed that nudges increase visual attention, I also seek to ascertain if increased visual attention mediates the link between nudges and professional skepticism. In H3, I predict that the positive effect of nudges on professional skepticism is mediated by visual attention. To test this mediating effect, I use the Baron and Kenny's statistical approach

(Baron and Kenny, 1986). A path analysis was conducted to determine if visual attention mediated, at least in part, the effect of nudges on professional skepticism. Then, in accordance with Kenny, Kashy and Bolger (1998), path coefficients (standardized beta weights) were estimated using regression analyses. As shown in Figure 4.1, the paths from nudges to visual attention (Table 4.5) and from visual attention to professional skepticism (Table 4.6) were both significant. The direct path from nudge to professional skepticism (after partialing out the effect of visual attention) remained significant (Table 4.7). Overall, then, the path analysis confirms that visual attention acts as a mediator of the nudges.

Insert Figure 4.1 here

Insert Table 4.6 here

Insert Table 4.7 here

As I previously reported in Table 4.7, nudges increase visual attention, such that the TTFF and dwell-to-revisit ratio both decrease when auditors see nudges. The fixation count and number of revisits also seem to increase when participants are nudged. These relations are coherent, although the significant effects of mediation are limited to the dwell-to-revisits ratio. As detailed in Table 4.5 and Table 4.6, auditors also exhibit greater professional skepticism when they are nudged, seemingly because they devote more visual attention to the audit task.

## 4.5. Discussion

In general, the results indicate that the social norm nudge and the justification nudge improve auditors' visual attention and by extension their professional skepticism.

This finding of the role of visual attention substantiates the prediction based on covert attention theory (Posner and Petersen, 1990). The theory emphasizes the crucial functions of orienting and reorienting attention, remaining alert for impending events, and controlling attention, which the implemented nudges appear to fulfill. As a result, auditors can maintain focused attention, remain vigilant while examining audit evidence, and effectively manage their attention, reducing distractions and enhancing their professional skepticism. The finding also aligns with the notion proposed by Just and Carpenter (1980), that humans process information with eye fixations, and the increase in fixations induced by the nudges consequently amplifies information processing.

In this context, the results echo the arguments of Mrkva, Westfall, and Van Boven (2019) that the degree of visual attention varies among auditors and that focused attention is important for effective information processing. This is further corroborated by research on oculomotor control (Awh, Armstrong and Moore, 2006; MacLean, Klein and Hilchey, 2015) and the studies by Robinson, Curtis, and Robertson (2018), demonstrating that financial auditors with high levels of professional skepticism exhibit a higher degree of information search. Thus, the results contribute to this body of literature by elucidating the mechanism by which nudges enhance auditors' professional skepticism.

The evidence of the importance of social norms corroborates the professional identity construct proposed by Bauer (2015). Also, the evidence that justification nudges increase professional skepticism confirms previous studies (Misra, Sugiri, Suwardi and Nahartyo, 2019) in different context, namely auditing. A possible interpretation of the effect is provided by economics of convention (Boltanski and Thévenot, 1987; Thévenot and Boltanski, 1991),

i.e. one system of reciprocal expectations between people about their behavior. An auditor who justifies their behavior generates expectations from others, and this increase in expectations, in turn, has an effect on the auditor's own professional skepticism. Because others are now more demanding in regards to this behavior, the auditor will try to meet those demands by becoming increasingly skeptical.

#### **4.6. Conclusion**

With this study, I sought to evaluate the impacts of nudges on the professional skepticism exhibited by financial auditors. Specifically, I focus on how a social norms nudge, a justification nudge, and combined nudges might influence exhibitions of professional skepticism. The results consistently indicate that nudges can enhance visual attention of auditors and, by extension, their professional skepticism.

This study extends accounting literature, especially as it relates to professional skepticism, detailing the potential for improvement through the use of nudges. Although nudge theory is widely popular and extensively applied in economics and finance, I find few parallel applications in behavioral auditing settings. In addition to showing that social norms and justification nudges help improve professional skepticism, this study reveals the mechanism through which this improvement occurs namely, through visual attention.

Of course, this study does not come without limitations. The sample includes Canadian and French participants, offering some variations across the experiments, though the findings might not hold for auditors with different cultural values. Reactions to nudges tend to vary across cultures (Loibl, Sunstein, Rauber, and Reisch, 2018; Pe'er, Feldman, Gamliel, Sahar, Tikotsky, Hod and Schupak, 2019), such that I anticipate the effects of nudges observed here might not be completely generalizable. Another limitation pertains to the nature of the experimental instrument. Although it is firmly grounded in real-life occurrences, the

simplification and its abstract nature may constrain the generalizability of the results. Furthermore, participants reviewed the provided pieces of evidence but could not search freely for other evidence (Phillips, 1999), nor did they have any opportunity for interactions with the client, which may have relevant impacts on auditors' skepticism. Finally, I also acknowledge that there are various other approaches to measuring skepticism (Choo, 2000; Shaub and Lawrence, 2002; Nelson, 2009; Robinson, Curtis and Robertson, 2018).

These limitations notwithstanding, these results have practical implications. It is important for auditors to know that the effect of nudges is mediated by visual attention because it helps them to understand the underlying mechanism through which nudges affect their behavior. By understanding that their visual attention is being influenced by these nudges, auditors can become more aware of their susceptibility to bias and take steps to mitigate it.

With such insights, they can also better personalize the choice architectures available through their work user interfaces, using nudges to help achieve acceptable levels of professional skepticism. The findings can inform the design of nudges that target visual attention specifically. By designing nudges that direct auditors' attention to important information, for example, auditors can potentially improve their professional skepticism and decision-making.

Finally, I note some opportunities for further research. Knowing how important heuristics and cognitive biases are to nudge theory (Thaler and Sunstein, 2008; Sunstein, 2015), I recommend tests to examine which specific cognitive biases get influenced by nudges and how they subsequently influence professional skepticism. Audit research also might explore the visual attention characteristics associated with auditors who appear subject to particular cognitive biases.

## **Chapter 5: General Conclusion- Drawing the Blueprint for Future Auditing: Conclusions and Pathways Forward**

### **5.1. Main Findings and Contributions**

Professional skepticism is a key element in the undertaking of a financial audit and the lack thereof has been largely cited by regulators as a cause of audit failures (Ray, 2015; Grenier, 2017). This thesis focuses on professional skepticism. This research on professional skepticism is broken down into three studies constituting Chapter 2, Chapter 3 and Chapter 4 respectively.

From a macroscopic viewpoint, the three studies paint a coherent picture. That is to say that professional skepticism being an important attribute for the performance of quality audits could be diminished by various factors. This is proven in this thesis empirically using experimental methods and addressed qualitatively by way of interviews. Again this thesis shows that it is possible to intervene to improve professional skepticism through subtle and noncoercive techniques.

#### **5.1.1. Academic Contribution**

This thesis offers four major contributions to the financial accounting, financial auditing and behavioral finance literature as a whole.

The first academic contribution of this thesis is that it examines professional skepticism from a the standpoint of cognitive biases. Although cognitive biases and professional skepticism have been studied on their own in the literature, this thesis connects the two concepts. The choice of the two cognitive biases studied in this thesis are as a result of their pertinence to remote audit situations. In remote work situations, as has been accentuated since the COVID-19 pandemic, the risk of error regarding ongoing judgment concerns is high as a result of equivocality in communication (Daft and Macintosh, 1981; Agoglia, Hatfield, and

Brazel, 2009). In such cases, the change in the description of tasks through less quality communication media which do not alter normative meanings of tasks but could eventually alter decisions signal the framing bias (Kahneman and Tversky, 1984; Jamal, Johnson, and Berryman, 1995). Again, the optimism bias could lead to the inefficient use of audit technology (Owhoso and Weickgenannt, 2009). Given that technology is heavily relied on in remote work, this bias becomes of interest. This thesis provides empirical verification of the negative effect of these cognitive biases on professional skepticism.

The second academic contribution of this thesis is that it explains the effect of remote audits on professional skepticism. I find that remote audits are a factor that could diminish auditors level of professional skepticism. This occurs through acquisition of knowledge, and the search for audit evidence. Firstly, with the acquisition of knowledge, described as specialization and experience by Nelson (2009), novice auditors gain such experience from their more experienced counterparts. Given that in remote situations novice auditors are isolated and not in close proximity with their superiors, this hinders the dynamic exchange of information needed for experience sharing. Secondly, search for audit evidence defined as the willingness and ability to dig deeper for information in order to resolve issues encountered in an audit (Hurt, 2010; Robinson, Curtis and Robertson, 2018), is compromised. Auditors intimate that the most effective way of obtaining client information is being physically present and requesting for such information. The various alternatives presented by remote audits fail to match up to this thus making it more difficult to effectively obtain information.

The third academic contribution of this thesis is the application of nudge theory in accounting and auditing. Although nudges have been widely successful in various domains such as economics, finance, marketing, and psychology (Dogruel, 2019; Gane, 2021; Gajewski Heimann and Meunier, 2022), their application in accounting and auditing remains fairly limited. I find that the social norms nudge and the justification nudge improve professional



skepticism. The evidence of the importance of social norms corroborates the professional identity construct proposed by Bauer (2015). The evidence that justification nudges increase professional skepticism confirms previous studies (Misra, Sugiri, Suwardi and Nahartyo, 2019) in different context, namely auditing. The use of these nudges is particularly necessary when remote audits are more prevalent because research indicates more limited attention in remote situations (Nolder and Kadous, 2018).

The fourth academic contribution of this thesis is that it explains a mechanism by which professional skepticism could be diminished, as well as a mechanism through which it could be improved. With the aid of eye-tracking technology, I observe that the framing bias and the optimism bias increase cognitive load and processing levels as indicated by the total duration to fixation metric. Furthermore with the optimism bias, this increase in cognitive load mediates its interaction with professional skepticism. With regards to a mechanism through which professional skepticism could be improved, it was observed that nudges enhance visual attention as measured by the fixation counts, time-to-first fixation, and the dwell to revisits ratio. Furthermore, I find that visual attention is a mediator between nudges and professional skepticism. This indicates that nudges can enhance the visual attention of auditors and, by extension, their professional skepticism.

#### 5.1.2. Managerial Contribution

The paper offers two major managerial contributions. First, this thesis exposes two cognitive biases which are important in remote audit conditions. It was found that the optimism bias and the framing bias reduce auditors' level of professional skepticism. Audit staff should therefore be aware of these biases and how they can materialise in situations where less rich communication media is used in the work environment. This thesis also proposes general recommendations on how professional skepticism could be improved despite these biases. A first recommendation is the improved guidance of junior staff with less experience. There

should be a deliberate effort to closely guide and communicate with less experienced staff working remotely with the aim of inculcating professional skepticism into them. A second recommendation is an optimum balance between working remotely and onsite verifications at the client's place of activity. This provides a richer environment to search for the requisite client information needed. This should guide audit firms and regulators in the practice of audits remotely.

Second, this thesis shows ways to design human interventions within the auditors' choice architecture in order to improve professional skepticism without having recourse to coercion. Audit managers and seniors should not hesitate to employ such nudge techniques described in this thesis to improve professional skepticism in their firms. A first example is the use of a social norms nudge to create and develop group norms which promote professional skepticism through the individuals' social identity. In turn individuals are more likely to internalize the groups' norms. Again, managers and partners should encourage decision making techniques which require staff to offer reasoned explanations of their choices which should prompt more careful analysis and reduce reliance on cognitive shortcuts.

## **5.2. Limits and Further Research**

As in all studies, the three studies comprising this doctoral research have limitations which also provide opportunities for future research.

### **5.2.1. Limits of this Thesis**

A first limit of the thesis is that participants were young auditors at the early stages of their careers. The effects of cognitive biases on individuals could differ based on levels of experience (Gächter, Orzen, Renner and Starmer, 2009). The findings may therefore not hold for more experienced auditors. Furthermore, the homogeneous nature of the sample may not take

cultural differences, a factor which may influence the effects of cognitive biases as well as nudges (Loibl, Sunstein, Rauber, and Reisch, 2018), into account. I do well to include two measures of skepticism to capture the broad nature of the concept but I am cognizant that there exists many approaches to the measurement of skepticism (Shaub and Lawrence, 2002). More generally as a limitation of experiments, the method used in this study, is that results are hardly generalizable beyond the specific circumstances used in the study.

The second limit relates to the qualitative research approach used for the second study of this thesis. Although this allowed me to put together detailed experiences of auditors about remote audits and professional skepticism, this method implies limitations in terms of empirical verification of cause and effect.

#### 5.2.2. Avenues for Further Research

Future research studying the effects of remote audits on professional skepticism could employ a quantitative approach such as the use of questionnaires to complement the qualitative approach used in this study. This would allow for a wider coverage and provide statistical corroboration to my findings. Again, the study of skepticism was on situational variables. However, professional skepticism is composed of both trait and situational components (Hurt, 2010). Thus future research, utilizing an experimental approach, could address how remote audits affect auditor personality traits.

Secondly, future research could conduct the two quantitative studies of this thesis using more experienced audit staff. Given that the findings of this thesis relate to more junior and less experienced staff, it would be interesting to investigate whether these findings hold for more experienced auditors.



## References

- Abdolmohammadi, M. and A. Wright (1987). An examination of the effects of experience and task complexity on audit judgments. *Accounting Review* 62(1), 1 – 13.
- ACCA (2017). *Banishing bias? Audit, objectivity and the value of professional scepticism*. The Association of Chartered Certified Accountants.
- AICPA (1988). Statement on auditing standards no. 53: The auditor's responsibility to detect and report errors and irregularities. *American Institute of Certified Public Accountants New York: AICPA. 1988*.
- Agoglia, C. P., R. C. Hatfield, and J. F. Brazel (2009). The effects of audit review format on review team judgments. *Auditing* 28(1), 95–111
- Andres, H. (2002). A comparison of face-to-face and virtual software development teams. *Team Performance Management* 8, 39–48.
- Appelbaum, D., S. Budnik, and M. Vasarhelyi (2020). Auditing and accounting during and after the covid-19 crisis. *CPA Journal* 90(6), 14 – 19.
- Arkes, H. R., D. Faust, T. J. Guilmette, and K. Hart (1988). Eliminating the hindsight bias. *Journal of Applied Psychology* 73(2), 305-307.
- Asare, S. K. (1992). The auditor's going-concern decision: Interaction of task variables and the sequential processing of evidence. *The Accounting Review* 67(2), 379-393.
- Asch, S. E. (1956). Studies of independence and conformity: I. A minority of one against a unanimous majority. *Psychological monographs: General and applied* 70(9), 1-70.
- Awh, E., Armstrong, K. M. and T. Moore, (2006). Visual and oculomotor selection: Links, causes and implications for spatial attention. *Trends in Cognitive Sciences* 10, 124–130.
- Back, J. and C. Oppenheim (2006). A model of cognitive load for information retrieval: implications for user relevance feedback interaction. *Information Research* 6(2), .

- Balzer, W. K., L. M. Sulsky, L. B. Hammer, and K. E. Sumner (1992). Task information, cognitive information, or functional validity information: Which components of cognitive feedback affect performance? *Organizational Behavior and Human Decision Processes* 53(1), 35–54.
- Baron, R. M. and D. A. Kenny (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of personality and social psychology* 51(6), 1173-1182.
- Bagley, P. L. (2010). Negative affect: A consequence of multiple accountabilities in auditing. *Auditing: A Journal of Practice & Theory* 29(2), 141–157.
- Bamber, E. M. and J. H. Bylinski (1987). The effects of the planning memorandum, time pressure and individual auditor characteristics on audit managers' review time judgments. *Contemporary Accounting Research* 4(1), 127 – 143.
- Bamber, E. M. and V. M. Iyer (2007). Auditors' identification with their clients and its effect on auditors' objectivity. *Auditing: A Journal of Practice & Theory* 26(2), 1–24.
- Bargh, J. A. and K. Barndollar (1996). Automaticity in action: The unconscious as repository of chronic goals and motives. In P. M. Gollwitzer & J. A. Bargh (Eds.), *The psychology of action: Linking cognition and motivation to behavior* (457–481). The Guilford Press.
- Bauer, T. D. (2015). The effects of client identity strength and professional identity salience on auditor judgments. *The Accounting Review* 90(1), 95–114.
- Bazerman, M. H., D. A. Moore, P. E. Tetlock, and L. Tanlu (2006). Reports of solving the conflicts of interest in auditing are highly exaggerated. *Academy of Management review* 31(1), 43–49.
- Beach, L. R. and T. R. Mitchell (1998). The basics of image theory: Theoretical and empirical foundations. *Lawrence Erlbaum Associates, Mahwah, NJ*, 3–18.

- Beasley, M., J. Carcello, and D. Hermanson (2001). Top 10 audit deficiencies. *Journal of Accountancy* 191, 63–66.
- Bee, S., S. I. Jafry, and G. Saucedo (2018). Accounting conversations: A case study in auditor communications. *Review of Business* 38(2), 1 – 12.
- Belopolsky, A. V. and J. Theeuwes (2010). No capture outside the attentional window. *Vision Research* 50(23), 2543–2550.
- Bennett, G. B. and R. C. Hatfield (2013). The effect of the social mismatch between staff auditors and client management on the collection of audit evidence. *The Accounting Review* 88(1), 31–50.
- Bennett, G. B. and R. C. Hatfield (2018). Staff auditors’ proclivity for computer-mediated communication with clients and its effect on skeptical behavior. *Accounting, Organizations & Society* 68, 42 – 57.
- Bhattacharjee, S., K. K. Moreno, and T. Riley (2012). The interplay of interpersonal affect and source reliability on auditors’ inventory judgments\* the interplay of interpersonal affect and source reliability on auditors’ inventory judgments. *Contemporary Accounting Research* 29(4), 1087 – 1108.
- Bible, L., L. Graham, and A. Rosman (2005). The effect of electronic audit environments on performance. *Journal of Accounting, Auditing & Finance* 20, 27–42.
- Biggs, S. F., T. a. Mock, and P. R. Watkins (1988). Auditor’s use of analytical review in audit program design. *Accounting Review* 63(1), 148-161.
- Bigus, J. (2016). Optimism and auditor liability. *Accounting and Business Research* 46(6), 577-600.
- Birnberg, J. G. and M. D. Shields (1984). The role of attention and memory in accounting decisions. *Accounting, Organizations & Society* 9(3/4), 365 – 382.

- Bistricky, S. L., R. A. Atchley, R. Ingram, and A. O'Hare (2014). Biased processing of sad faces: An ERP marker candidate for depression susceptibility. *Cognition & Emotion* 28(3), 470 – 492.
- Blay, A. D., E. S. Gooden, M. J. Mellon and D. E. Stevens (2019). Can social norm activation improve audit quality? evidence from an experimental audit market. *Journal of Business Ethics* 156(2), 513–530.
- Bobek, D. D., R. W. Roberts and J. T. Sweeney (2007). The social norms of tax compliance: evidence from Australia, Singapore, and the United States. *Journal of Business Ethics* 74(1), 49–64.
- Boltanski, L. and L. Thévenot (1987). Centre d'études de l'emploi (Paris). Programme de recherche et d'opérationnalisation sur les thématiques de l'équité et de l'équivalence. Les économies de la grandeur. Paris: Presses Universitaires de France.
- Bowlin, K. (2011). Risk-based auditing, strategic prompts, and auditor sensitivity to the strategic risk of fraud. *The Accounting Review* 86(4), 1231–1253.
- Brazel, J. F., C. P. Agoglia, and R. C. Hatfield (2004). Electronic versus face-to-face review: The effects of alternative forms of review on auditors' performance. *Accounting Review* 79(4), 949 – 966.
- Brazel, J. F., J. Leiby, and T. J. Schaefer (2022). Do rewards encourage professional skepticism? it depends. *Accounting Review* 97(4), 131 – 154.
- Breger, D. and M. Edmonds (2016). The impact of audit room noise on audit quality: A theoretical inquiry. *The Journal of Theoretical Accounting Research* 11(2), 78–93.
- Brewster, B., J. B. Butler, and A. Watkins (2019). Eliminating biases that jeopardize audit quality. *Journal of Accountancy* 228(2), 42–47.
- Bucaro, A. C. (2019). Enhancing auditors' critical thinking in audits of complex estimates. *Accounting, Organizations and Society* 73, 35–49.



- Buchman, T. A., P. E. Tetlock and R. O. Reed (1996). Accountability and auditor's judgments about contingent events. *Journal of Business Finance & Accounting* 23(3), 379-398.
- Butler, S. A. (1986). Anchoring in the judgmental evaluation of audit samples. *Accounting Review* 61(1), 101-111.
- Büttner, O. B., A. Florack, H. Leder, M. A. Paul, B. G. Serfas and A. M. Schulz (2014). Hard to ignore: Impulsive buyers show an attentional bias in shopping situations. *Social Psychological and Personality Science* 5(3), 343–351.
- Callen, J. L. and F. Xiaohua (2020). Local gambling norms and audit pricing. *Journal of Business Ethics* 164(1), 151–173.
- Cardinaels, E. and Y. Jia (2016). How audits moderate the effects of incentives and peer behavior on misreporting. *European Accounting Review* 25(1), 183-204.
- Carey, J. L. and W. O. Doherty (1966). *Ethical standards of the accounting profession*. AICPA Professional Standards.
- Carroll, J. S. (1978). The effect of imagining an event on expectations for the event: An interpretation in terms of the availability heuristic. *Journal of Experimental Social Psychology* 14, 88–96.
- Christensen, B. E., S. M. Glover, and D. A. Wood (2012). Extreme estimation uncertainty in fair value estimates: Implications for audit assurance. *Auditing: A Journal of Practice & Theory* 31(1), 127 – 146.
- Cho, C. H., J. R. Phillips, A. M. Hageman, and D. M. Patten (2009). Media richness, user trust, and perceptions of corporate social responsibility: An experimental investigation of visual web site disclosures. *Accounting, Auditing & Accountability Journal* 22(6), 933–952.
- Choo, F. (2000). Instruction, skepticism, and accounting students' ability to detect frauds. *Journal of Business Education* 1, 72–87.

- Cialdini, R. B., R. R. Reno and C. A. Kallgren (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology* 58(6), 1015-1026.
- Cohen, J. and T. Kida (1989). The impact of analytical review results, internal control reliability, and experience on auditors' use of analytical review. *Journal of Accounting Research* 27(2), 263 – 276.
- Collings, R. D. and L. G. Eaton (2019). Covert Attention, Temperament, and Looking: A Novel Approach to Studying Attention in the Social World. *Psychological Reports* 122(6), 2220–2241.
- Constantine, R., R. McNally, and C. Hornig (2001). Snake fear and the pictorial emotional stroop paradigm. *Cognitive Therapy and Research* 25, 757–764.
- Cossette, P. (2015). Heuristics and cognitive biases in entrepreneurs: a review of the research. *Journal of Small Business and Entrepreneurship* 27(5), 471–496.
- Crook, T. R., S. Y. Todd, J. G. Combs, D. J. Woehr, and D. J. Ketchen (2011). Does human capital matter? a meta-analysis of the relationship between human capital and firm performance. *Journal of Applied Psychology* 96(3), 443-456.
- Cross, J. M., R. Moroney, and S.-Y. Phang (2023). Is it all in the mind(fulness)? an exploratory study assessing the impact of mindfulness on professional skepticism. *Accounting Horizons* 37(1), 25-41.
- Cushing, B. E. and S. S. Ahlawat (1996). Mitigation of recency bias in audit judgment: The effect of documentation. *Auditing: A Journal of Practice & Theory* 15(2), 110 – 122.
- Daft, R. L. and R. H. Lengel (1986). Organizational information requirements, media richness and structural design. *Management Science (1986-1998)* 32(5), 554-571.

- Daft, R. L. and N. B. Macintosh (1981). A tentative exploration into the amount and equivocality of information processing in organizational work units. *Administrative Science Quarterly* 26, 207-224.
- Dalla Via, N., P. Perego, Van Rinsum M. (2019). How accountability type influences information search processes and decision quality. *Accounting, Organizations and Society* 75, 79–91.
- DeAngelo, L. E. (1981). Auditor size and audit quality. *Journal of accounting and economics* 3(3), 183–199.
- DeFuentes, C., M. Illueca and M. Pucheta-Martinez (2015). External investigations and disciplinary sanctions against auditors: the impact on audit quality. *Journal of the Spanish Economic Association SERIEs* 6(3), 313-347.
- Dogrueel, L. (2019). Privacy nudges as policy interventions: comparing Us and German media users' evaluation of information privacy nudges. *Information, Communication & Society* 22(8), 1080–1095.
- Doherty, S., S. O'Brien and M. Carl (2010). Eye tracking as an MT evaluation technique. *Machine Translation* 24, 1–13.
- Dolan, P., M. Hallsworth, D. Halpern, D. King, R. Metcalfe and I. Vlaev (2012). Influencing behaviour: The mindspace way. *Journal of Economic Psychology* 33(1), 264-277.
- Dondzilo, L., E. Rieger, R. Shao, and J. Bell (2020). The effectiveness of touchscreenbased attentional bias modification to thin body stimuli on state rumination. *Cognition & Emotion* 34(5), 1052 – 1058.
- Dong, Y., A. De Beuckelaer, L. Yu, and R. Zhou (2017). Eye-movement evidence of the time-course of attentional bias for threatening pictures in test-anxious students. *Cognition & Emotion* 31(4), 781 – 790.

- Durkin, M. P., J. M. Rose and J. C. Thibodeau (2020). Can simple metaphors be used as decision aids to promote professional skepticism? *Journal of Information Systems* 34(1), 47 – 60.
- Dwoskin, E. and M. Ramsey (2016). Car makers test technology to make you pay attention to the road, *The Wall Street Journal*, March 11, 2016.
- Emby, C. (1994). Framing and presentation mode effects in professional judgment: Auditors' internal control judgments and substantive testing decisions. *Auditing: A Journal of Practice & Theory* 13(1), 102 – 115.
- Earley, C. E. (2001). Knowledge acquisition in auditing: Training novice auditors to recognize cue relationships in real estate valuation. *Accounting Review* 76(1), 81 – 97.
- Emby, C. and D. Finley (1997). Debiasing framing effects in auditors' internal control judgements and testing decisions. *Contemporary Accounting Research* 14(2), 55–77.
- Emsfors, E. and L. Holmberg (2015). Uncertainty, information practices and accounting in small firms. *Small Business Institute Journal* 11(1), 49–64.
- Epley, N. and T. Gilovich (2006). The anchoring-and-adjustment heuristic: Why the adjustments are insufficient. *Psychological science* 17, 311–318.
- Eutsler, J., A. E. Norris and G. M. Trompeter (2018). A live simulation-based investigation: Interactions with clients and their effect on audit judgment and professional skepticism. *Auditing: A Journal of Practice & Theory* 37(3), 145-162.
- Ewert, R. and W. Breuer (1999). Auditor liability and the precision of auditing standards. *Journal of institutional and theoretical economics* 155(1), 181–213.
- Fay, R., J. G. Jenkins, and V. Popova (2015). Effects of awareness of prior-year testing strategies and engagement risk on audit decisions. *Managerial Auditing Journal* 30(3), 226 – 243.

- Felix Jr., W. L. and W. R. Kinney Jr. (1982). Research in the auditor's opinion formulation process: State of the art. *Accounting Review* 57(2), 245-271.
- Feroz, E. H., K. Park, V. S. Pastena, M. L. DeFond and D. B. Smith (1991). The financial and market effects of the SEC's accounting and auditing enforcement releases; discussion. *Journal of Accounting Research* 29, 107-142.
- Ford, G. T., D. B. Smith, and J. L. Swasy (1990). Consumer skepticism of advertising claims: Testing hypotheses from economics of information. *Journal of Consumer Research* 16(4), 433 – 441
- Frederick, S. (2002). *Heuristics and biases: The psychology of intuitive judgment*. Cambridge University Press.
- Fukukawa, H. and T. J. Mock (2011). Audit risk assessments using belief versus probability. *Auditing: A Journal of Practice & Theory* 30(1), 75 – 99.
- Gächter, S., H. Orzen, E. Renner, and C. Starmer (2009). Are experimental economists prone to framing effects? a natural field experiment. *Journal of Economic Behavior & Organization* 70(3), 443–446.
- Gajewski, J.-F., M. Heimann, and L. Meunier (2022). Nudges in SRI: The power of the default option. *Journal of Business Ethics* 177(3), 547–566.
- Gane, N. (2021). Nudge economics as libertarian paternalism. *Theory, Culture & Society* 38(6), 119–142.
- Gao, P. and G. Zhang (2019). Auditing standards, professional judgment, and audit quality. *Accounting Review* 94(6), 201 – 225.
- Gardner, H. K., F. Gino and B. R. Staats (2012). Dynamically integrating knowledge in teams : Transforming resources into performance. *Academy of Management Journal* 55(4), 998-1022.

- Geoffroy, D. C. and K. Eliaz (2012). Reason-based choice: A bargaining rationale for the attraction and compromise effects. *Theoretical Economics* 7(1), 125-162.
- Gillett, P. R. and M. Peytcheva (2011). Differential evaluation of audit evidence from fixed versus sequential sampling. *Behavioral Research in Accounting* 23(1), 65 – 85.
- Gilovich, T. and D. Griffin (2013). *Introduction – heuristics and biases: then and now*”, in *Gilovich, T., Griffin, D. and Kahneman, D. (Eds), Heuristics and Biases*. Cambridge University Press, New York, pp. 1-18.
- Glöckner, A., S. Fiedler, G. Hochman, S. Ayal, and B. Hilbig (2012). Processing differences between descriptions and experience: A comparative analysis using eyetracking and physiological measures. *Frontiers in psychology* 3, 173.
- Glover, S. M. and D. F. Prawitt (2014). Enhancing auditor professional skepticism: The professional skepticism continuum. *Current Issues in Auditing* 8(2), 1-10.
- Gotlib, I., E. Krasnoperova, D. Yue, and J. Joormann (2004). Attentional biases for negative interpersonal stimuli in clinical depression. *Journal of abnormal psychology* 113, 121–35.
- Grenier, J. H. (2017). Encouraging professional skepticism in the industry specialization era: *Journal of Business Ethics* 142(2), 241–256.
- Griffith, E. E., J. S. Hammersley, K. Kadous and D. Young (2015). Auditor mindsets and audits of complex estimates. *Journal of Accounting Research* 53(1), 49–77.
- Griffith, E. E., K. Kadous, and D. Young (2021). Improving complex audit judgments: A framework and evidence. *Contemporary Accounting Research* 38(3), 2071– 2104.
- Hammersley, J. S., E. M. Bamber, and T. D. Carpenter (2010). The influence of documentation specificity and priming on auditors’ fraud risk assessments and evidence evaluation decisions. *The Accounting Review* 85(2), 547–571.
- Harding, N. and K. Trotman (2009). Improving assessments of another auditor’s competence. *Auditing* 28(1), 53–78.

- Hauser, D. J. and N. Schwarz (2016). Attentive turkers: Mturk participants perform better on online attention checks than do subject pool participants. *Behavior Research Methods* 48(1), 400–407.
- Hayibor, S. and D. Wasieleski (2009). Effects of the use of the availability heuristic on ethical decision-making in organizations. *Journal of Business Ethics* 84, 151 – 165.
- Henrizi, P., D. Himmelsbach, and S. Hunziker (2021). Anchoring and adjustment effects on audit judgments: experimental evidence from switzerland. *Journal of Applied Accounting Research* 22(4), 598 – 621.
- Hertel, P., A. Benbow, and E. Geraerts (2012). Brooding deficits in memory: Focusing attention improves subsequent recall. *Cognition & Emotion* 26(8), 1516 – 1525.
- Hmieleski, K. M. and R. A. Baron (2009). Entrepreneurs' optimism and new venture performance: A social cognitive perspective. *Academy of Management Journal* 52(3), 473-488.
- Hilton, D., N. Treich, G. Lazzara and P. Tendil (2018). Designing effective nudges that satisfy ethical constraints: the case of environmentally responsible behaviour. *Mind & Society* 17(1-2), 27–38.
- Hilton, D. J. (2001). The psychology of financial decision-making: Applications to trading, dealing, and investment analysis. *Journal of Psychology & Financial Markets* 2(1), 37 – 53.
- Hofmaenner, D., A. Herling, S. Klinzing, S. Wegner, Q., Lohmeyer., R. A. Schuepbach and P., Buehler (2021). Use of eye tracking in analyzing distribution of visual attention among critical care nurses in daily professional life: an observational study. *Journal of Clinical Monitoring and Computing* 35(6), 1511-1518.

- Holmqvist, K., N. Marcus, A. Richard, D. Richard, J. Halszka and J. Van de Weijer (2011). *Eye Tracking: A Comprehensive Guide to Methods and Measures*. United Kingdom: Oxford University Press.
- Holmqvist, K. and R. Andersson (2017). *Eye-tracking: A comprehensive guide to methods, paradigms and measures*. Lund Eye-Tracking Research Institute, Lund, Sweden.
- Holt, D. L. (1987). Auditors and base rates revisited. *Accounting, Organizations and Society* 12(6), 571–578.
- Hoorens, V. and T. Smits (2001). Why do controllable events elicit stronger comparative optimism than uncontrollable events? *Revue Internationale de Psychologie Sociale* 14, 11–44.
- Hu, P. J.-H., P.-C. Ma, and P. Y. Chau (1999). Evaluation of user interface designs for information retrieval systems: a computer-based experiment. *Decision Support Systems* 27(1), 125–143.
- Hun-Tong, T. and R. Libby (1997). Tacit managerial versus technical knowledge as determinants of audit expertise in the field. *Journal of Accounting Research (WileyBlackwell)* 35(1), 97 – 113.
- Hurtt, R. K. (2010). Development of a scale to measure professional skepticism. *Auditing: A Journal of Practice & Theory* 29(1), 149–171.
- Hurtt, R. K., H. Brown-Liburd, C. E. Earley, and G. Krishnamoorthy (2013). Research on auditor professional skepticism: Literature synthesis and opportunities for future research. *Auditing: A Journal of Practice & Theory* 32, 45 – 97.I
- IAASB (2019). *Professional Skepticism Focus*. International Auditing and Assurance Standards Board url: <https://www.iaasb.org/publications/focus-professionalskepticism>.
- IIARF (2015). *2015 Global Internal Audit Common Body of Knowledge Report* (2015 ed.). FL: Institute of Internal Auditors Research Foundation.



- ISA 200. Overall objective of the independent auditor, and the conduct of an audit in accordance with international standards on auditing statement on auditing standards. *International Auditing and Assurance Standards Board*.
- Ishii, K., M. M. Lyons, and S. A. Carr (2019). Revisiting media richness theory for today and future. *Human Behavior and Emerging Technologies 1*(2), 124–131.
- Jamal, K., P. E. Johnson, and R. G. Berryman (1995). Detecting framing effects in financial statements. *Contemporary Accounting Research 12*(1), 85 – 105.
- Jefferson, A., L. Bortolotti, and B. Kuzmanovic (2017). What is unrealistic optimism? *Consciousness and cognition 50*, 3–11.
- Johnson, P. E., S. Grazioli and K. Jamal (1993). Fraud detection: Intentionality and deception in cognition. *Accounting, Organizations and Society 18*(5), 467-488.
- Johnson, P. E., K. Jamal, and R. G. Berryman (1991). Effects of framing on auditor decisions. *Organizational Behavior & Human Decision Processes 50*(1), 75.
- Johnston, H., W. D. Lindsay, and F. Phillips (2003). Undetected deviations in tests of controls: Experimental evidence of nonsampling risk. *Canadian Accounting Perspectives 2*(2), 113 – 134.
- Johnstone, K. M., J. C. Bedard and S. F. Biggs (2002). Aggressive client reporting: Factors affecting auditors’ generation of financial reporting alternatives. *Auditing: A Journal of Practice & Theory 21*(1), 47–65.
- Johnston, H., W. D. Lindsay, and F. Phillips (2003). Undetected deviations in tests of controls: Experimental evidence of nonsampling risk. *Canadian Accounting Perspectives 2*(2), 113 – 134.
- Joyce, E. J. and G. C. Biddle (1981). Are auditors’ judgments sufficiently regressive? *Journal of Accounting Research 62*, 120–145.

- Julisch, K., C. Suter, T. Woitalla, and O. Zimmermann (2011). Compliance by design- bridging the chasm between auditors and it architects. *Computers & Security* 30, 410–426.
- Just, M. and P. Carpenter (1976). Eye fixations and cognitive processes. *Cognitive Psychology* 8, 441–480.
- Just, M. and P. Carpenter (1980). A theory of reading: from eye fixations to comprehension. *Psychology Review* 87, 329–354.
- Kachelmeier, S. J. and J. Messier, William F. (1990). An investigation of the influence of a nonstatistical decision aid on auditor sample size decisions. *The Accounting Review* 65(1), 209–226
- Kahneman, D. and A. Tversky (1984). Choices, values, and frames. *American Psychologist* 39(4), 341–350.
- Kassem, R. (2022). How could external auditors assess the rationalization of fraud? *Journal of Financial Crime* 29(4), 1458–1467
- Kawahara, J.-I. (2010). Identifying a “default” visual search mode with operant conditioning. *Acta Psychologica* 135(1), 38–49.
- Kelly, K. and P. R. Murphy (2021). Reducing accounting aggressiveness with general ethical norms and decision structure. *Journal of Business Ethics* 170(1), 97 – 113.
- Kenny D., Kashy D.A., Bolger N. (1998), Data Analysis in Social Psychology, In D.T. Gilbert, S.T. Fiske, G. Gardner, *The Handbook of Social Psychology*, 4th ed., Boston, Oxford University Press, 233-265.
- Khan, M. J. and E. Oczkowski (2021). The link between trait and state professional skepticism: A review of the literature and a meta-regression analysis. *International Journal of Auditing* 25(2), 558 – 581.
- Kinney Jr., W. R. and W. C. Uecker (1982). Mitigating the consequences of anchoring in auditor judgments . *Accounting Review* 57(1), 55-69.

- King, R. R. (2002). An experimental investigation of self-serving biases in an auditing trust game: The effect of group affiliation. *Accounting Review* 77(2), 265 – 284.
- Kljajić, M., V. Mizdraković, and B. H. Zekić (2022). Internal audit in the covid-19 environment: Key aspects and perspectives of remote auditing. *European Journal of Applied Economics* 19(1), 30 – 41.
- Knapp, M. C. and C. A. Knapp (2012). Cognitive biases in audit engagements. *CPA Journal* 82(6), 40 – 45.
- Knechel, W. R., S. E. Salterio, and N. Kochetova-Kozloski (2010). The effect of benchmarked performance measures and strategic analysis on auditors' risk assessments and mental models. *Accounting, Organizations & Society* 35(3), 316 – 333.
- Knight, H., D. Smith, D. Knight, and A. Ellison (2015). Altering attentional control settings causes persistent biases of visual attention. *Quarterly journal of experimental psychology* (2006) 42, 1–46.
- Koellinger, P., M. Minniti, and C. Schade (2007). "i think i can, i think i can": 44 Overconfidence and entrepreneurial behavior. *Journal of Economic Psychology* 28(4), 502-527.
- Koslow, S. (2000). Can the truth hurt? how honest and persuasive advertising can unintentionally lead to increased consumer skepticism. *Journal of Consumer Affairs* 34(2), 245.
- Kramer, R. M., P. Pommerenke and E. Newton (1993). The social context of negotiation effects of social identity and interpersonal accountability on negotiator judgment and decision making. *The Journal of Conflict Resolution (1986-1998)* 37(4), 633-654
- Larrick, R. P. (2004). Debiasing. In D. J. Koehler & N. Harvey (Eds.), *Blackwell handbook of judgment and decision making* (316–337). Blackwell Publishing.
- Leber, A. and H. Egeth (2006). It's under control: Top-down search strategies can override attentional capture. *Psychonomic bulletin & review* 13, 132–138.

- Lerner, J. S. and P. E. Tetlock (1999). Accounting for the effects of accountability. *Psychological Bulletin* 125(2), 255–275.
- Levin, I. P., S. L. Schneider, and G. J. Gaeth (1998). All frames are not created equal: A typology and critical analysis of framing effects. *Organizational Behavior and Human Decision Processes* 76(2), 149–188.
- Libby, R. (1985). Availability and the generation of hypotheses in analytical review. *Journal of Accounting Research* 23(2), 648–667.
- Litz, R. A. (1996). A resource-based-view of the socially responsible firm: Stakeholder interdependence, ethical awareness, and issue responsiveness as strategic assets. *Journal of Business Ethics* 15(12), 1355–1363.
- Loibl, C., C. R. Sunstein, J. Rauber, and L. A. Reisch (2018). Which europeans like nudges? approval and controversy in four european countries. *The Journal of Consumer Affairs* 52(3), 655–688.
- Lord, A. T. (1992). Pressure: A methodological consideration for behavioral research in auditing. *Auditing: A Journal of Practice & Theory* 11(2), 89-108.
- Lynch, E. J. and L. M. Andiola (2019). If eyes are the window to our soul, what role does eye-tracking play in accounting research?. *Journal of Information Systems* 33(3), 107 – 133.
- Léger, P.-M., S. Sénécal, F. Courtemanche, A. O. de Guinea, R. Titah, M. Fredette, and E. Labonte-LeMoyne (2014). Precision is in the eye of the beholder: Application of eye fixation-related potentials to information systems research. *Journal of the Association for Information Systems* 15(10), 651–678.
- Mackenzie, K. D. (1984). Organization structures as the primal information system. *Plenum Publishing Corporation S.K. Chang(Ed.)(New York)*, 27–46.

- MacLean, G. H., R. M. Klein and M. D. Hilchey (2015). Does oculomotor readiness mediate exogenous capture of visual attention? *Journal of Experimental Psychology: Human Perception and Performance* 41, 1260–1270.
- Malsch, B. and Y. Gendron (2013). Re-theorizing change: Institutional experimentation and the struggle for domination in the field of public accounting. *Journal of Management Studies (John Wiley & Sons, Inc.)* 50(5), 870 – 899.
- Manzon, E. (2020). Eye tracking technology in the marketing classroom: An experiential learning method. *Marketing Education Review* 30(2), 105 – 111.
- McMillan, J. J. and R. A. White (1993). Auditors' belief revisions and evidence search: The effect of hypothesis frame, confirmation bias, and professional skepticism. *The Accounting Review* 68(3), 443-465.
- Mehrabi, R. and A. M. Kolabi (2012). Investigating effect of entrepreneur's personal attributes and cognitive heuristics on the quality of entrepreneurial strategic decision making. *Global Business & Management Research* 4(2), 178 – 192.
- Meissner, M. and O. Josua (2019). The promise of eye-tracking methodology in organizational research: A taxonomy, review, and future avenues. *Organizational Research Methods* 22(2), 590–617.
- Melnyk, V., E. van Herpen, A. Fischer and H. C. M. van Trijp (2011). To think or not to think: The effect of cognitive deliberation on social norm influence. *Advances in Consumer Research* 38, 495 – 496.
- Menon, R. V., V. Sigurdsson, N. M. Larsen, A. Fagerstrøm, and G. R. Foxall (2016). Consumer attention to price in social commerce: Eye tracking patterns in retail clothing. *Journal of Business Research* 69(11), 5008 – 5013.
- Miledi, A. (2022). The construction of audit partner's judgment. *Journal of Financial Reporting and Accounting* 20(1), 24–52.

- Misra, F., S. Sugiri, E. Suwardi and E. Nahartyo (2019). Accountability pressure as a debiaser for confirmation bias in information search and tax consultant's recommendations. *Journal of Indonesian Economy and Business* 34(1), 57–74.
- Mock, T. J. and H. Fukukawa (2016). Auditors' risk assessments: The effects of elicitation approach and assertion framing. *Behavioral Research in Accounting* 28(2), 75 – 84.
- Mogg, K. and B. Bradley (2005). Attentional bias in generalized anxiety disorder versus depressive disorder. *Cognitive Therapy and Research* 29, 29–45.
- Mohammad, J. K. and E. Oczkowski (2021). The link between trait and state professional skepticism: A review of the literature and a meta-regression analysis. *International Journal of Auditing* 25(2), 558–581.
- Mrkva, K., J. Westfall and L. Van Boven (2019). Attention drives emotion: Voluntary visual attention increases perceived emotional intensity. *Psychological Science* 30(6), 942 – 954.
- Mubako, G. and E. O'Donnell (2018). Effect of fraud risk assessments on auditor skepticism: Unintended consequences on evidence evaluation. *International Journal of Auditing* 22(1), 55 – 64.
- Na, K. (2021). The effects of cognitive load on query reformulation: mental demand, temporal demand and frustration. *Aslib Journal of Information Management* 73(3), 436–453.
- Nelson, M. W. (2009). A model and literature review of professional skepticism in auditing. *Auditing: A Journal of Practice & Theory* 28(2), 1 – 34.
- Nelson, M. W. (2005). *A Review of Experimental and Archival Conflicts-of-Interest Research in Auditing*. Cambridge and New York: Cambridge University Press.
- Nelson, M. W., J. A. Elliott, and R. L. Tarpley (2002). Evidence from auditors about managers' and auditors' earnings management decisions. *Accounting Review* 77(4), 175-202.

- Nelson, M. W. and W. R. Kinney Jr. (1997). The effect of ambiguity on loss contingency reporting judgements. *Accounting Review* 72(2), 257-274.
- Nolder, C. J., N. V. S. Ratzinger-Sakel and J. C. Theis. (2022). “Nudging Auditors’ Unconscious to Improve Performance on an Accounting Estimate Task.” *International Journal of Auditing* 26 (2), 78–93.
- Nolder, C. J. and K. Kadous (2018). Grounding the professional skepticism construct in mindset and attitude theory: A way forward. *Accounting, Organizations & Society* 67, 1 – 14.
- Olsen, C. and A. Gold (2018). Future research directions at the intersection between cognitive neuroscience research and auditors’ professional skepticism. *Journal of Accounting Literature* 41, 127 – 141.
- Oppenheimer, D., T. Meyvis and N. Davidenko (2009) Instructional manipulation checks: Detecting satisficing to increase statistical power. *Journal of Experimental Social Psychology* 45(4), 867-872.
- Owhoso, V. and A. Weickgenannt (2009). Auditors’ self-perceived abilities in conducting domain audits. *Critical perspectives on accounting* 20(1), 3–21.
- Patton, M. Q. (2015). *Qualitative research and evaluation methods / Michael Quinn Patton* (4th ed. ed.). Thousand Oaks: Sage Publications.
- Pazos, P., J. Chung, and M. Micari (2013). Instant messaging as a task-support tool in information technology organizations. *Journal of Business Communication* 50, 68–86.
- Pe’er, E., Y. Feldman, E. Gamliel, L. Sahar, A. Tikotsky, N. Hod and H. Schupak (2019). Do minorities like nudges? the role of group norms in attitudes towards behavioral policy. *Judgment and Decision Making* 14(1), 40–50.
- Perloff, L. S. (1987). *Social Comparison and Illusions of Invulnerability to Negative Life Events*. Boston, MA: Springer US.

- Phillips, F. (1999). Auditor attention to and judgments of aggressive financial reporting. *Journal of Accounting Research (Wiley-Blackwell)* 37(1), 167 – 189.
- Pilkington, R. and C. Parker-Jones (1996). Interacting with computer-based simulation: The role of dialogue. *Contemporary Accounting Research* 27(1), 1–14.
- Pike, B. J., M. B. Curtis, and L. Chui (2013). How does an initial expectation bias influence auditors' application and performance of analytical procedures? *The Accounting Review* 88(4), 1413-1431.
- Posner, M. I. (2012). *Attention in a social world*. Oxford University Press.
- Posner, M. I., and S. E. Petersen (1990). The attention system of the human brain. *Annual Review of Neuroscience*, 13, 25–42.
- Power, M. K. and Y. Gendron (2015). Qualitative research in auditing: A methodological roadmap. *Auditing: A Journal of Practice & Theory* 34(2), 147 – 165.
- Presutti, Anthony H., J. (1995). Anchor and adjustment heuristic effect on audit judgement. *Managerial Auditing Journal* 10(9), 13-21.
- Public Company Accounting Oversight Board (PCAOB) (2018). Auditing accounting estimates, including fair value measurements and amendments to PCAOB auditing standards. Retrieved from [https://pcaobus.org/Rulemaking/Docket\\_043/2018-005-estimates-final-rule.pdf](https://pcaobus.org/Rulemaking/Docket_043/2018-005-estimates-final-rule.pdf)
- Public Company Accounting Oversight Board (PCAOB) (2022). Staff Update and Preview of 2021 Inspection Observations. Retrieved from [https://pcaob-assets.azureedge.net/pcaob-dev/docs/default-source/documents/staff-preview-2021-inspection-observations-spotlight.pdf?sfvrsn=d2590627\\_2/](https://pcaob-assets.azureedge.net/pcaob-dev/docs/default-source/documents/staff-preview-2021-inspection-observations-spotlight.pdf?sfvrsn=d2590627_2/)
- Public Company Accounting Oversight Board (PCAOB). (2023). Professional Competence and Skepticism Are Essential to Quality Audits. Retrieved from <https://pcaobus.org/documents/competence-and-skepticism-spotlight.pdf>



- Puri, M. and D. T. Robinson (2007). Optimism and economic choice. *Journal of Financial Economics* 86(1), 71 – 99.
- Ramirez, C., L. Stringfellow, and M. Maclean (2015). Beyond segments in movement: a “small” agenda for research in the professions. *Accounting, Auditing & Accountability Journal* 28(8), 1341 – 1372.
- Radcliffe, N. M. and W. M. P. Klein (2002). Dispositional, unrealistic, and comparative optimism: Differential relations with the knowledge and processing of risk information and beliefs about personal risk. *Personality and Social Psychology Bulletin* 28(6), 836–846.
- Ray, T. (2015). Auditors still challenged by professional skepticism: Certified public accountant. *The CPA Journal* 85(1), 21–27.
- Robinson, S. N., M. B. Curtis, and J. C. Robertson (2018). Disentangling the trait and state components of professional skepticism: Specifying a process for state scale development. *Auditing: A Journal of Practice & Theory* 37(1), 215-235.
- Robson, K., C. Humphrey, R. Khalifa, and J. Jones (2007). Transforming audit technologies: Business risk audit methodologies and the audit field. *Accounting, Organizations & Society* 32(4/5), 409 – 438.
- Rose, A. M., J. M. Rose, K. Rotaru, K.-A. Sanderson, and J. C. Thibodeau (2022). Effects of uncertainty visualization on attention, arousal, and judgment. *Behavioral Research in Accounting* 34(1), 113 – 139.
- Rosman, A., S. Biggs, L. Graham, and L. Bible (2007). Successful audit workpaper review strategies in electronic environments. *Journal of Accounting, Auditing & Finance* 22(1), 57 – 83.
- Schandl, C. (1978). *Theory of Auditing*. Scholars Book Co.

- Schnackenberg, A. K. and E. C. Tomlinson (2016). Organizational transparency: A new perspective on managing trust in organization-stakeholder relationships. *Journal of Management* 42(7), 1784–1810.
- Schubert, C. (2017). Exploring the (behavioural) political economy of nudging. *Journal of Institutional Economics* 13(3), 499–522.
- Schwartz, R. (1998). Auditors' liability, vague due care, and auditing standards. *Review of Quantitative Finance & Accounting* 11(2), 183 – 207.
- Seta, J. J., C. E. Seta, J. E. Crisson and M. A. Wang (1989). Task performance and perceptions of anxiety: Averaging and summation in an evaluative setting. *Journal of Personality and Social Psychology* 56(3), 387-396.
- Shaikh, J. (2005). E-commerce impact: Emerging technology - electronic auditing. *Managerial Auditing Journal* 20, 408–421.
- Shanteau, J. (1989). Cognitive heuristics and biases in behavioral auditing: Review, comments and observations. *Accounting, Organizations & Society* 14(1/2), 165 – 177.
- Shaub, M. K. (1996). Trust and suspicion: The effects of situational and dispositional factors on auditors' trust of clients. *Behavioral Research in Accounting* 8, 154-174.
- Shaub, M. K. and J. E. Lawrence (2002). A taxonomy of auditors' professional skepticism. *Research on Accounting Ethics* 9, 167–194.
- Shepperd, J., P. Carroll, J. Grace, and M. Terry (2002). Exploring the causes of comparative optimism. *Psychologica Belgica* 42, 65–98.
- Shockley, K., A. Gabriel, D. Robertson, C. Rosen, N. Chawla, M. Ganster, and M. Ezerins (2021). The fatiguing effects of camera use in virtual meetings: A within-person field experiment. *Journal of Applied Psychology* 106, 1137–1155.
- Simon, H. (1957). *Models of Man: Social and Rational*. Wiley, New York.

- Simon, H. A. (1959). Theories of decision-making in economics and behavioral science. *The American Economic Review* 49(3), 253–283.
- Simonson, I. (1989). Choice based on reasons: The case of attraction and compromise effects. *Journal of Consumer Research* 16(2), 158–174.
- Sirois, L.-P., J. Bédard, and P. Bera (2018). The informational value of key audit matters in the auditor's report: Evidence from an eye-tracking study. *Accounting Horizons* 32(2), 141 – 162.
- Stacey, R. D. and C. K. Rance (2001). Complex responsive processes in organisations, learning and knowledge creation. *Group analysis* 34(4), 567–568.
- Stevens, E., R. Moroney, and J. Webster (2019). Professional skepticism: The combined effect of partner style and team identity salience. *International Journal of Auditing* 23(2), 279 – 291.
- Steyer, R., M. Schmitt, and M. Eid (1999). Latent state-trait theory and research in personality and individual differences. *European Journal of Personality - EUR JPERSONALITY* 13, 389–408.
- Sunstein, C. R. (2015). The ethics of nudging. *Yale Journal on Regulation* 32(2), 413–450.
- Tajfel, H. (1978). Differentiation between social groups: Studies in the social psychology of intergroup relations. London: Academic Press.
- Teeter, R. A., M. G. Alles, and M. A. Vasarhelyi (2010). The remote audit. *Journal of Emerging Technologies in Accounting* 7, 73 – 88.
- Tetlock, P. E. and R. Boettger (1989). Accountability: A social magnifier of the dilution effect. *Journal of Personality and Social Psychology* 57(3), 388-398.
- Tetlock, P. E., L. Skitka, and R. Boettger (1989). Social and cognitive strategies for coping with accountability: Conformity, complexity, and bolstering. *Journal of personality and social psychology* 57(4), 632-640.

- Thaler, R. H. and C. R. Sunstein (2008). *Nudge: Improving decisions about health, wealth, and happiness*. Yale University Press.
- Thévenot, L. and Boltanski, L. (1991). De la justification. Les économies de la grandeur. P.: Gallimard.
- Thøgersen, J. (2006). Norms for environmentally responsible behaviour: An extended taxonomy. *Journal of Environmental Psychology* 26(4), 247–261.
- Touche, D. . (1991). The Robert M. Trueblood accounting and auditing case study series. wilton, conn. *Deloitte & Touche Foundation* .
- Trotman, K. T., T. D. Bauer, and K. A. Humphreys (2015). Group judgment and decision making in auditing: Past and future research. *Accounting, Organizations and Society* 47, 56-72.
- Tsoukas, H. (2003). Forms of knowledge and forms of life in organized contexts. *In The Realm Of Organization: Essays for Robert Cooper* .(.), 43–66.
- Tversky, A. and D. Kahneman (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology* 5(2), 207–232.
- Tversky, A. and D. Kahneman (1974). Judgment under uncertainty: Heuristics and biases. *Science* 185(4157), 1124–1131.
- Tversky, A. and D. Kahneman (1981). The framing of decisions and the psychology of choice. *Science* 211(4481), 453–458.
- Van Bockstaele, B., E. Salemink, S. M. Bögels, and R. W. Wiers (2017). Limited generalisation of changes in attentional bias following attentional bias modification with the visual probe task. *Cognition & Emotion* 31(2), 369 – 376.
- van Buuren, J., C. Koch, N. van Nieuw Amerongen, and A. M. Wright (2018). Evaluating the change process for business risk auditing: Legitimacy experiences of non-big 4 auditors. *Auditing: A Journal of Practice & Theory* 37(2), 249 – 269.

- Vasarhelyi, M. A. and S. Romero (2014). Technology in audit engagements: a case study. *Managerial Auditing Journal* 29(4), 350–365.
- Vera-Muñoz, S. C., J. L. Ho, and C. W. Chow (2006). Enhancing knowledge sharing in public accounting firms. *Accounting Horizons* 20(2), 133 – 155.
- Wagner, R. K. and R. J. Sternberg (1987). Tacit knowledge and managerial success. *Journal of Business & Psychology* 1(4), 301 – 312.
- Wedel, M. and R. Pieters (2007). Informativeness of eye movements for visual marketing: Six cornerstones. *Visual marketing: From attention to action* 01, 43–47.
- Weinstein, N. D. (1980). Unrealistic optimism about future life events. *Journal of Personality and Social Psychology* 39, 806–820.
- Weinstein, N. D. (1987). Unrealistic optimism about susceptibility to health problems: Conclusions from a community-wide sample. *Journal of Behavioral Medicine* 10, 481–500.
- Weinstein, N. D. and E. Lachendro (1982). Egocentrism as a source of unrealistic optimism. *Personality and Social Psychology Bulletin* 8(2), 195–200.
- Wedel, M. and R. Pieters (2008). A review of eye-tracking research in marketing. *Review of Marketing Research* 4, 123–147.
- Westermann, K. D., J. C. Bedard, and C. E. Earley (2015). Learning the "craft" of auditing: A dynamic view of auditors' on-the-job learning. *Contemporary Accounting Research* 32(3), 864–896.
- Wickens, C. (2008). Multiple resources and mental workload. *Human factors* 50, 449–455.
- Willekens, M. and D. A. Simunic (2007). Precision in auditing standards: effects on auditor and director liability and the supply and demand for audit services. *Accounting and Business Research* 37(3), 217–232.
- Young, S. N. (2008). The neurobiology of human social behaviour: an important but neglected topic. *Journal of psychiatry & neuroscience* 33(5), 391–392.

Young, D. (2013). *Anticipating Human Behavior: How Social Norms and Social Ties Influence Compliance with Financial Reporting Standards*. Ph. D. thesis, Emory University.

Yusuf, S., H. Kagdi and J. I. Maletic (2007). Assessing the comprehension of uml class diagrams via eye tracking. In *15th IEEE International Conference on Program Comprehension (ICPC '07)*, 113

## List of Tables and Figures

Table 2.1: Descriptive Statistics

<b>Demographic Variables</b>		
Number of participants	40	
Gender: % Female	0.40	
Prior experiment Experience (%)	0.10	
	<b>Mean</b>	<b>SD</b>
Age (years)	21-25	
Work Experience (years)	0.25-1	
HPSS	25.12	2.73
<b>Mediating Variable</b>		
Total duration of Fixations	4678.70	1873.89
<b>Dependent Variables</b>		
Skepticism1:		
<i>Framing biased</i>	5.30	1.92
<i>Framing unbiased</i>	6.64	1.80
<i>Optimism biased</i>	4.5	1.29
<i>Optimism unbiased</i>	6.03	1.98
Skepticism2: <i>Framing</i>		
<i>biased</i>	1.09	0.73
<i>Framing unbiased</i>	1.53	0.62
<i>Optimism biased</i>	1.25	0.96
<i>Optimism unbiased</i>	1.28	0.70

Notes: This table shows the descriptive statistics of the various variables. HPSS is the Hurtt's professional skepticism scale

Table 2.2: Frequency Distribution of Cognitive Biases

<b>Description</b>	<b>Frequency</b>	<b>Percentage</b>
Unbiased	17	42.50%
Biased	23	57.50%
Total	40	100.00%

<b>Optimism Bias</b>		
<b>Description</b>	<b>Frequency</b>	<b>Percentage</b>
Biased	14	35.00%
Unbiased	26	65.00%
Total	40	100.00%

Notes: This table shows the percentage of participants who are subject to the cognitive biases tested.



Table 2.3: Direct Effect of Cognitive Biases on Professional Skepticism

Variables	Skepticism1	Skepticism2
	(1)	(2)
<b>Framing Bias</b>		
Intercept	3.57 (0.26)	3.13 (<0.01)***
Framing Bias	-1.35 (0.03)**	-0.49 (0.03)**
Experiment Experience	0.16 (0.89)	0.63 (0.14)
HPSS	0.73 (0.33)	-0.39 (0.16)
F-Statistic	2.13	2.38
DF	36	36
R-squared	0.15	0.17
Adjusted R-squared	0.08	0.10
<i>p-value</i>	0.11	(0.09)*
<b>Optimism Bias</b>		
Intercept	3.09 (0.35)	2.74 (0.03)**
Optimism Bias	-1.38 (0.20)	-0.06 (0.87)
Experiment Experience	-0.24 (0.84)	0.50 (0.26)
HPSS	0.70 (0.38)	-0.36 (0.22)
F-Statistic	1.02	0.66
DF	36	36
R-squared	0.08	0.05
Adjusted R-squared	0.01	<-0.03
<i>p-value</i>	0.40	0.58

Notes: The number of observations equals 40. Each line corresponds to a multiple regression model,  $Y_i = \beta_0 + \beta_1 * \text{Cognitive Bias} + \beta_2 * \text{Experiment Experience} + \beta_3 * \text{HPSS} + \epsilon_i$ , where HPSS is the Hurtt's Professional Skepticism Scale *p*-values in parentheses. Estimates not in parentheses. \*, \*\*, and \*\*\* indicate, significance at the 10%, 5% and 1% levels, respectively.

Table 2.4: Cognitive Biases and Cognitive Load

<b>Variable</b>	<b>Total Duration of fixations</b>					
	<b>Frequency</b>	<b>Mean</b>	<b>SD</b>	<b>t</b>	<b>DF</b>	<b>p-value</b>
<b>Framing Bias</b>				1.98	37.94	0.06
Biased	42.5%	5333.26	2195.58			
Unbiased	57.5%	4044.72	1523.34			
<b>Optimism Bias</b>				3.82	8.18	<0.01
Bias	35.00%	6101.00	667.31			
Unbiased	65.00%	5011.97	2101.47			

This table shows the effect of the optimism and framing bias on the Total duration of fixations metric.

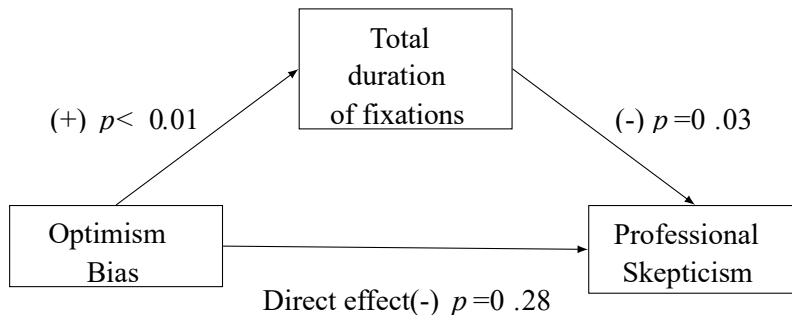


Figure 2.1. Path Model of Mediation of the Effect of the Optimism Bias on Skepticism through Total Duration of Fixations

Table 2.5: Mediation Analysis

<b>Effect</b>	<b>Estimate</b>	<b>Std. Err</b>	<b>z-value</b>	<b>p-value</b>
Skepticism1 ~ Optimism Bias (c)	-0.827	0.760	-1.088	0.28
Total duration of fixations ~ Optimism Bias (a)	1870.33	439.28	4.26	<0.01***
Skepticism1 ~ Total duration of fixations (b)	<-0.01	<0.01	-2.12	0.03**
ab	-0.70	0.38	-1.84	0.07*

Notes: Each line reflects the outcome of a linear regression model. \*, \*\*, and \*\*\* indicate, significance at the 10%, 5% and 1% levels, respectively.

Table 2.6: Summary of Results

<b>Finding</b>	<b>Related Hypothesis</b>
The framing bias leads to less professional skepticism	H1a validated
The optimism bias leads to less professional skepticism	H1b validated
Total duration of fixations is a mediator between the optimism bias and professional skepticism	H2 validated

Table 3.1: Demographic Data of Participants

<b>Demographic Data</b>	<b>n</b>	<b>Percentage of the Total Sample</b>
<u>Gender</u>		
Male	13	72%
Female	5	28%
Total	18	100%
<u>Years of Auditing Experience</u>		
Less than 10 years	5	27%
10-20 years	10	56%
More than 20 years	3	<u>17%</u>
<u>Country of Practice</u>		
France	14	77%
Luxembourg	1	6%
UK	2	11%
USA	1	<u>6%</u>
<u>Position of auditor</u>		
Head of mission	2	11%
Manager	5	28%
Associate	4	22%
Partner	7	<u>39%</u>
<u>Audit firm</u>		
Big Four	3	17%
Non Big Four	15	<u>83%</u>

Notes: This table shows the demographic data of participants

Table 3.2: Interview Themes

Panel A: Themes Related to RQ1- Impact of Remote Audits on Professional Skepticism

Theme	Number of Participants who mention the theme	Number of times theme was discussed	Source
Acquisition of knowledge- Auditors' consideration of the difficulty in transferring knowledge and experience from well experienced to less experienced staff in remote audits	9	9	Nelson (2009)
Search for audit evidence- The difficulty presented by remote audits in digging deeper for audit evidence in order to resolve issues encountered during an audit mission	12	16	Hurtt (2010) Robinson et al. (2018)
Suspension of judgment- The pressure presented by remote audits to take decisions or work	4	4	Hurtt (2010) Robinson et al. (2018)
Questioning mind- The influence of remote work in questioning clients' assertions	3	3	Hurtt (2010) Robinson et al. (2018)

**Panel B: Themes Related to RQ2- Recommendations for Improving Professional Skepticism in Remote Audits**

Improved guidance and supervision of junior staff with less experience	9	11	
Optimum balance between remote work and onsite work	5	5	
Reinforcing communication within the audit team	3	3	

Notes: For Panel A, the themes were developed based on Nelson (2009) and Robinson et al. (2018) model of professional skepticism. For Panel B, the themes were developed based on participants' responses. Number of Participants who mention the theme= the number of participants (out of 18) that mentioned the variable in their interview; Number of Times Theme was discussed= the number of times the variable is mentioned across all 18 of the interviews; and Source= how the theme was developed.





Table 4.1: Socio-Demographic Information of Participants

<b>Participants</b>	<b>Online Experiment</b>	<b>Lab Experiment</b>
Total Number	100	20
Gender : Female	44%	70%
Geographical Location of work	France	Canada
Age	21-25	21-25
Educational Level	Masters	Masters
Educational Specialization	Accounting and Auditing	Accounting and Auditing
Work Experience	3 months-1year	3 months-1year

Notes: Participants were relatively homogenous. In collecting data about age in the experiments, we grouped ages, example 18-20, 21-25,26-30 etc. The same applied to work experience, example 3 months-1 year, 1 year- 5 years etc.

Table 4.2: Descriptive Statistics by Nudge Condition

<b>Nudge Condition</b>	<b>Nb Obs</b>	<b>Mean</b>	<b>SD</b>
C	28	6.43	1.71
J	20	6.20	1.80
S	26	6.50	1.36
SJ	26	7.19	1.33

Notes: This table shows the descriptive statistics by nudge condition. C= control, S= social norms nudge, J= justification nudge, SJ= combined nudge.

Table 4.3: Post-Hoc Comparisons of Skepticism Under the Nudge Versus the Control Condition

<b>Nudge Condition</b>	<b>Estimate</b>	<b>Std.Err.</b>	<b>T</b>	<b>p-value</b>
J	0.20	0.54	0.38	0.70
S	0.18	0.46	0.39	0.70
SJ	0.97	0.45	2.15	0.03**

Notes: The number of observations equals 100. This table displays the results of the post-hoc comparisons of the nudge conditions against the control condition using the Tukey HSD test.

S= social norms nudge, J= justification nudge, SJ= combined nudge. T corresponds to Student's statistic. \*, \*\*, and \*\*\* indicate, significance at the 10%, 5% and 1% levels, respectively. The degrees of freedom equal 3 for all analyses.

Table 4.4: Descriptive Statistics for Experiment 2

<b>Conditions</b>	<b>Variable</b>	<b>Mean</b>	<b>SD</b>
C	Dwell-to-Revisits	2978.33	1118.98
	Skepticism	0.93	0.80
S	Dwell-to-Revisits	2723.12	1159.93
	Skepticism	1.40	0.99
J	Dwell-to-Revisits	2230.36	950.20
	Skepticism	1.33	1.05
SJ	Dwell-to-Revisits	2312.50	736.76
	Skepticism	1.40	1.06

Notes: Skepticism is measured by the detection of aggressive financial reporting items. Dwell-to-revisits is a measure of total viewing time (dwell time) divided by the number of revisits to AOIs. Its unit of measurement is milliseconds. C= control, S= social norms nudge, J= justification nudge, SJ= combined nudge.

Table 4.5: Effect of Social Norms and Justification Nudges on Visual Attention

<b>Condition</b>	<b>Estimate</b>	<b>Std.Err.</b>	<b>DF</b>	<b>t-Value</b>	<b>p-value</b>
J > C	-615.38	141.77	1404	4.34	<0.01***
S > C	-390.47	139.03	1404	2.81	0.02**
SJ > C	-438.71	140.12	1404	3.13	<0.01***

Notes: Outcome of the linear regression model  $Y_i = \beta_0 + \beta_1 \{ \text{Nudge Conditions} \} + \epsilon_i$ , where Y = dwell-to-revisits ratio. The conditions are C = control, S = social norms nudge, J = justification nudge and SJ = combined nudge. \*, \*\*, and \*\*\* indicate, respectively, significance at the 10%, 5% and 1% levels. DF is the degrees of freedom.

Table 4.6: Path of Visual Attention (Dwell-to-Revisits) to Professional Skepticism

Effect	Estimate	Std.Err.	t-Value	p-value
Dwell-to-Revisits	<-0.01	<0.01	-2.35	0.02**

Notes:  $Y_i = \beta_0 + \beta_1 \{ \text{Dwell-to-revisits ratio} \} + \epsilon_i$ , where Y= skepticism. Skepticism is measured by the detection of aggressive financial reporting items. \*, \*\*, and \*\*\* indicate, respectively, significance at the 10%, 5% and 1% levels.

Table 4.7: Direct Path of Nudge to Skepticism

Conditions	Estimate	Std.Err.	DF	t-Value	p-value
SJ	1.24	0.72	39	1.72	0.09*

Notes:  $Y_i = \beta_0 + \beta_1 * \text{Nudge Condition} + \epsilon_i$ , where Y = skepticism. Skepticism is measured by the detection of aggressive financial reporting items. \*, \*\*, and \*\*\* indicate, respectively, significance at the 10%, 5% and 1% levels.

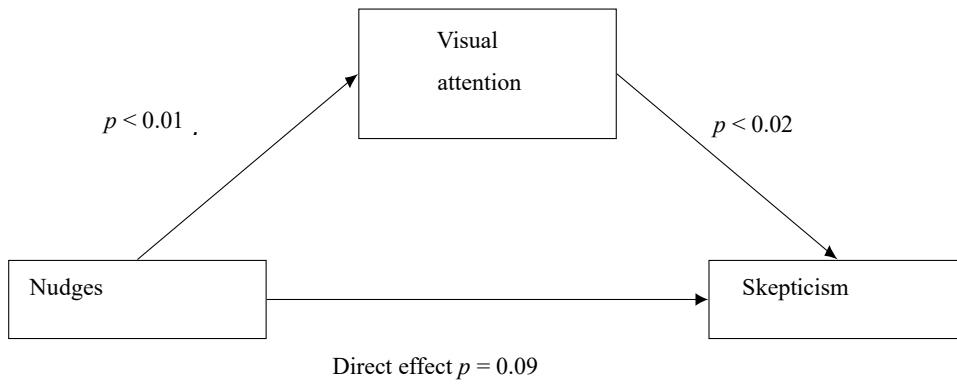


Figure 4.1. Path Model of Mediation of the Effect of Nudges on Skepticism through Visual Attention



## Appendix

### Appendix 2.1. Informed Consent Form:

Dear Participant,

This study was developed as part of a research program conducted by Jean Moulin Lyon III University in collaboration with researchers at HEC Montréal. It deals with practices related to financial auditing. Your answers will remain strictly anonymous and will only be used for academic purposes. The accuracy and sincerity of your answers are crucial to the quality of this work. We thank you in advance for your kind cooperation.

This study attempts to gather information on the differences in individual performances during auditing tasks among professionals. You will be presented with a series of questions about an auditing task, your preferences, and your personality. The questionnaire lasts about 15 minutes. The risks of participation are minimal in this study. However, you may feel emotionally uncomfortable when you have to make judgments. We hope that thanks to your participation, researchers at Jean Moulin Lyon III University and HEC Montréal will know more about the relationship between contextual and personal factors impacting performance during auditing tasks. All data obtained from participants will be kept confidential and will only be reported in a global format (ie only combined results and never individual reports on a particular person). All the questionnaires will be anonymous and know that the research team will have access to them. The collected data will be stored on a secure server of the Qualtrics company until the principal investigator removes them. There is compensation for complete and valid participation. You should have validated all attention checks to receive compensation. Participation in this study is entirely voluntary. You have the right to withdraw at any time or refuse to participate fully. If you wish to withdraw, please inform the principal researcher at this email address: prince.teye1@univ-lyon3.fr. If you have any questions about this study, you can contact the principal researcher. HEC Montréal Ethics Board has

determined that the data collection related to this study meets the ethics standards for research involving humans. If you have any questions related to ethics, please contact the Research and Ethics Board secretariat at (514) 340-6051 or by e-mail at cer@hec.ca

I consent to participate in this study a. Yes b. No

## Appendix 2.2. Audit Task

You will now proceed to a self-paced review of audit evidence of Meter-Tek Company reported in 6 sentences, categorized into one of various financial statement accounts.

Meter-Tek is a manufacturer and marketer of water, electricity and natural gas meters and you are their auditor. Materiality as with other audits is set at \$100,000.

Meter-Tek's accounting year is from 1st January to 31st December. The accounting year being audited is 2021.

The audit evidence will be displayed one at a time

**Cash:** The staff accountant noted that bank accounts are reconciled monthly

**Trade Receivables:** An examination of year-end customer balances indicates that the December 31, 2021 allowance for doubtful accounts is inadequate.

**R&D and Engineering Expenses:** Total engineering expenses decreased by \$40,000 from 2020

**Inventories:** Test counts conducted at the December 31, 2021 inventory observation did not reveal exceptions and were subsequently agreed to the final inventory listing.

**Investments in Affiliated Companies:** Meter-Tek continues to hold equity interests of 25% in two profitable companies that are accounted for using the equity method.

**Accounts Payable and Accrued Liabilities:** The search for unrecorded liabilities involved an examination of payments and invoices processed subsequent to year-end and revealed significant understatements.

### Appendix 2.3. Audit Task Questions

Please evaluate the client's financial reporting as a whole.

Aggressive financial reporting refers to accounting practices that are designed to overstate a company's financial performance. It includes but is not limited to

1. Sharp rises in incomes or sharp decreases in expenses from previous years
2. Manipulations or violations of accounting principles, policies or standards to enhance financial performance
3. Misreporting

Not aggressive at all    1 2 3 4 5 6 7 8 9 10    Very aggressive

Of the following 6 accounts you have read on the previous page, which warrant further examination?

- |                                       |   |
|---------------------------------------|---|
| a. Cash                               | e. Accounts Payable and Accrued Liabilities |
| b. Trade Receivables                  | f. R&D and Engineering Expenses             |
| c. Inventories                        | g. None                                     |
| d. Investments in Affiliate Companies |   |

### Appendix 2.4. Hurtt's Professional Skepticism Scale

Statements that people use to describe themselves are given below. Please circle the response that indicates how you generally feel. There are no right or wrong answers. Do not spend too much time on any one statement.

	<b>Strongly Disagree</b>						<b>Strongly Agree</b>
I often accept other people's explanations without further thought	1	2	3	4	5	6	
I feel good about myself.	1	2	3	4	5	6	
I wait to decide on issues until I can get more information	1	2	3	4	5	6	
The prospect of learning excites me.	1	2	3	4	5	6	
I am interested in what causes people to behave the way that they do.	1	2	3	4	5	6	
I am confident of my abilities.	1	2	3	4	5	6	
I often reject statements unless I have proof that they are true	1	2	3	4	5	6	
Discovering new information is fun	1	2	3	4	5	6	
I take my time when making decisions.	1	2	3	4	5	6	
I tend to immediately accept what other people tell me.	1	2	3	4	5	6	
Other people's behavior does not interest me.	1	2	3	4	5	6	
I am self-assured.	1	2	3	4	5	6	
My friends tell me that I usually question things that I see or hear	1	2	3	4	5	6	
I like to understand the reason for other people's behavior.	1	2	3	4	5	6	
I think that learning is exciting.	1	2	3	4	5	6	

I usually accept things I see read or hear at face value	1	2	3	4	5	6
I do not feel sure of myself	1	2	3	4	5	6
I usually notice inconsistencies in explanations	1	2	3	4	5	6
Most often I agree with the others in my group	1	2	3	4	5	6
I dislike having to make decisions quickly	1	2	3	4	5	6
I have confidence in myself	1	2	3	4	5	6
I do not like to decide until I've looked at all of the readily available information	1	2	3	4	5	6
I like searching for knowledge	1	2	3	4	5	6
I frequently question things that I see or hear	1	2	3	4	5	6
It is easy for other people to convince me	1	2	3	4	5	6
I seldom consider why people behave in a certain way	1	2	3	4	5	6
I like to ensure that I've considered most available information before making a decision	1	2	3	4	5	6
I enjoy trying to determine if what I read or hear is true	1	2	3	4	5	6
I relish learning	1	2	3	4	5	6
The actions people take and the reasons for those actions are fascinating	1	2	3	4	5	6

## Appendix 2.5. Cognitive Biases

### Framing Bias

Imagine that you face the following pair of concurrent decisions. First examine both decisions, then indicate the options you prefer.

Decision (i). Choose between: A. a sure gain of \$240      B. 25% chance to gain \$1000, and 75% chance to gain nothing

Decision (ii). Choose between: C. a sure loss of \$750      D. 75% chance to lose \$1000, and 25%

### Optimism Bias

In 2020, the Covid-19 pandemic caused the French to lose around half a year of life expectancy. Life expectancy at birth reaches 79.2 years for men and 85.3 years for women, according to INSEE.

In your opinion what is the life expectancy of: a. yourself      b. an average person of the same gender and age as you

## Appendix 2.6. Demographic Questions

1. What is your gender? a. Male      b. Female
2. In which age range (in years) are you? 18-20; 21-25; 26-30; 31-35; 36-40; 41-45; 46-50; 51-55; 56-60; 61-65; 66-70; 71-75; 76-80; 81-85
3. What is the highest level of education you have attained? a. No higher education degree  
b. Undergraduate      c. Graduate      d. PhD
4. What is your undergraduate major? Finance; Economics; Accounting; Marketing; HRM; Strategy; Supply Chain/logistics; Management; Other
5. Do you have any audit work experience (including internships)? Yes; No

6. Do you currently any accounting or auditing professional designation? CA; CGA;CMA;  
CPA; CFA; No

7. Prior to this experiment, have you participated in either accounting, finance, auditing,  
economics, or psychology experiments? Yes; No

## Appendix 3.1. Interview Guide

### A. Demographic questions

- Date
- Mode: face-to-face, telephone, videoconference
- Location
- Name of respondent
- Firm of respondent
- Interviewee:
- Profile (Partner, etc...)
- Gender
- Date of commencement of practice
- Type of practice: Size, Type of clients, sector of activity

### B. General Information on Remote Work in your Audit Firm

#### 1.1. How did you implement remote work for your audit activities?

- What files?
- Everyone confined?
- What tasks have you maintained in the office?

#### 1.2. How much do you estimate the share of remote work in your firm's activity?

- at the peak of the COVID \_19 crisis?
- at the moment?

#### 1.3. Have you encountered any particular difficulties in remote working?

- Technological?
- Financial cost?
- Barriers to change?



-management?

1.4. What benefits have you gained from remote working?

1.5. How much do you estimate the share of remote work among your clients?

1.6. What particular difficulties did you encounter as a result of clients also remote working?

### C. Impact of Remote Work on Professional Skepticism

2.1. What do you think of professional skepticism?

-How would you define professional skepticism?

-What role does it play in your work?

-How does professional skepticism manifest itself in your work?

2.2. What role do you think professional skepticism plays in the quality of an audit?

2.3. a. What role does remote work play in the ease of finding the client information you need?

b. To what extent does remote working influence the pressure to make decisions or to work?

c. Given the impact of remote working on communication with the client, how does remote working influence your level of confidence in client's assertions?

2.4. Do you think the effect of remote work on skepticism is the same for all audit staff?

-What factors influence the difference?

2.5. What measures would you recommend to reinforce professional skepticism in remote work?

2.6. Do you think you are more or less skeptical in a remote work situation compared to an onsite situation?

## Appendix 4.1. Experiment 1

### Appendix 4.1.1. Informed Consent Form

Dear Participant,

This study was developed as part of a research program conducted by researchers in Jean Moulin University in collaboration with researchers at HEC Montréal. It deals with practices related to financial auditing.

Your answers will remain strictly anonymous and will only be used for academic purposes. The accuracy and sincerity of your answers are crucial to the quality of this work. We thank you in advance for your kind cooperation.

Informed consent form This study attempts to gather information on the differences in individual performances during auditing tasks among professionals. You will be presented with a series of questions about an auditing task, your preferences, and your personality. The questionnaire lasts about 15 minutes. The risks of participation are minimal in this study. However, you may feel emotionally uncomfortable when you have to make judgments. We hope that thanks to your participation, researchers at Jean Moulin University and HEC Montréal will know more about the relationship between contextual and personal factors impacting performance during auditing tasks. All data obtained from participants will be kept confidential and will only be reported in a global format (i.e. only combined results and never individual reports on a particular person). All the questionnaires will be anonymous and know that the research team will have access to them. The collected data will be stored on a secure server of the Qualtrics company until the principal investigator removes them. There is compensation for complete and valid participation. You should have validated all attention checks to receive compensation. Participation in this study is entirely voluntary. You have the right to withdraw at any time or refuse to participate fully. If you wish to withdraw, please inform the principal researcher at this email address: prince.teye1@univ-lyon3.fr. If you have

any questions about this study, you can contact the principal researcher. HEC Montréal Ethics Board has determined that the data collection related to this study meets the ethics standards for research involving humans. If you have any questions related to ethics, please contact the Research and Ethics Board secretariat at (514) 340-6051 or by e-mail at cer@hec.ca

I consent to participate in this study a. Yes      b. No

#### Appendix 4.1.2. Attention Check



Please indicate the color of the fruit in the square located in the third row of the last column (that is 3rd row, 3rd column) a. Red b. Blue c. Green d. Yellow

#### Appendix 4.1.3. Nudges

##### **Social Norm Nudge**

Very important Information: A recent study in accounting indicates that individuals of your age perform very well on audits. The study explains that this is the case because individuals of this age range pay a great deal of attention to detail and take note of evidence of aggressive financial reporting when conducting audits.

##### **Justification Nudge**

Very Important Information: Audits are scrutinized by your superiors and the regulators. In similar audit tasks, some auditors have recently been sanctioned for not being able to

identify items indicative of aggressive financial reporting. Imagine for this exercise that you will be accounting personally for your audit opinion to the top hierarchy and possibly the regulators.

#### Appendix 4.1.4. Audit Task

You will now proceed to a self-paced review of audit evidence of BronzeStone Company reported in 14 sentences, categorized into one of various financial statement accounts.

BronzeStone is a manufacturer and marketer of water, electricity and natural gas meters and you are their auditor. Materiality as with other audits is set at \$100,000.

BronzeStone's accounting year is from 1st January to 31st December. The accounting year being audited is 2018.

The audit evidence will be displayed one at a time

Cash: The staff accountant noted that bank accounts are reconciled monthly

Trade Receivables: An examination of subsequent receipts on year-end customer balances older than 90 days and a discussion of delinquent accounts with the controller indicate that the December 31, 2018 allowance for doubtful accounts was not significantly adjusted to reflect current year financial conditions.

Inventories: A review for obsolescence was conducted by examining prices on shipments made subsequent to year-end, with finished goods inventory noted as being valued at the lower of cost and net realizable value.

Sales: Sales cutoff tests indicate that sales recorded in December had been shipped by BronzeStone prior to December 31, 2018

Shareholders' Equity: Cash dividends of \$250,000 were declared, paid, but not charged to retained earnings.

Long-Term Debt: The bank confirmation indicated that BronzeStone owes \$7,500,000 in long-term promissory notes, as reported on the 2018 financial statements

Marketing and Administration Expenses: All individual marketing and administration costs in excess of \$5,000 were vouched to invoice, with no exceptions being noted

Investments in Affiliated Companies: In December 2018, BronzeStone sold its 25 % equity interest in Grandco, and realized a \$10,000 gain on the transaction

R&D and Engineering Expenses: Total engineering expenses increased \$40,000 from 2017.

Accounts Payable and Accrued Liabilities: The search for unrecorded liabilities involved an examination of payments and invoices processed subsequent to year-end and revealed no understatements. Substantial records of these liabilities were recorded in the income statement.

Contingencies and Commitments: BronzeStone rents manufacturing facilities under non-cancelable operating leases that expire at various dates through 2022

Intangibles and Other Assets: BronzeStone incurred and capitalized \$20,000 in external legal costs to successfully defend the patent for a line of automated meter reading systems

Cost of Goods Sold: BronzeStone uses the FIFO inventory costing method to determine standard costs.

Tangible Assets: Tangible assets are used to verify your attention to this survey.

Obligatorily select Yes to validate your attention to the items of the study.

#### Appendix 4.1.5. Audit Task Question

Please evaluate the client's financial reporting as a whole.

Aggressive financial reporting refers to accounting practices that are designed to overstate a company's financial performance. It includes but is not limited to

1. Sharp rises in incomes or sharp decreases in expenses from previous years
  2. Manipulations or violations of accounting principles, policies or standards to enhance financial performance
  3. Misreporting
- Not aggressive at all 1 2 3 4 5 6 7 8 9 10 Very aggressive

#### Appendix 4.1.6. Manipulation Check

**a.**

Carefully read the following statement :

”Very important Information: A recent study in accounting indicates that individuals of your age perform very well on audits. The study explains that this is the case because individuals of this age range pay a great deal of attention to detail and take note of evidence of aggressive financial reporting when conducting audits.”

Please indicate if the text above evokes each of the following concepts

Not at all 1 2 3 4 5 6 7. Completely

Social norms

Justification

Optimism

Skepticism

**b.**

Carefully read the following statement :

”Very Important Information: Audits are scrutinized by your superiors and the regulators. In similar audit tasks, some auditors have recently been sanctioned for not being able to identify items indicative of aggressive financial reporting. Imagine for this exercise that you

will be accounting personally for your audit opinion to the top hierarchy and possibly the regulators.”

Please indicate if the text above evokes each of the following concepts

Not at all 1 2 3 4 5 6 7. Completely

Social norms

Justification

Optimism

Skepticism

#### Appendix 4.1.7. Demographic Questions

1. What is your gender? a. Male b. Female
2. In which age range (in years) are you? 18-20; 21-25; 26-30; 31-35; 36-40; 41-45; 46-50; 51-55; 56-60; 61-65; 66-70; 71-75; 76-80; 81-85
3. What is the highest level of education you have attained? a. No higher education degree b. Undergraduate c. Graduate d. PhD
4. What is your undergraduate major? Finance; Economics; Accounting; Marketing; HRM; Strategy; Supply Chain/logistics; Management; Other
5. Do you have any audit work experience (including internships)? Yes; No
6. Do you currently any accounting or auditing professional designation? CA; CGA; CMA; CPA; CFA; No
7. Prior to this experiment, have you participated in either accounting, finance, auditing, economics, or psychology experiments? Yes; No

#### Appendix 4.2. Experiment 2

##### Appendix 4.2.1. Informed Consent form

This is the same as in Experiment 1. See section 4.1.1

#### Appendix 4.2.2. Attention check

This is the same as in Experiment 1. See section 4.1.2

#### Appendix 4.2.3. Nudges

This is the same as in Experiment 1. See section 4.1.4

#### Appendix 4.2.4. Audit Task

*a.*

You will now proceed to a self-paced review of audit evidence of Meter-Tek company reported in 14 sentences, categorized into one of various financial statement accounts. Meter-Tek is a manufacturer and marketer of water, electricity and natural gas meters and you are their auditor. Materiality as with other audits is set at \$100,000. Meter Tek's accounting year is from 1st January to 31st December. The accounting year being audited is 2018. The audit evidence will be displayed one at a time

Cash: The staff accountant noted that bank accounts are reconciled monthly

Trade Receivables: An examination of subsequent receipts on year-end customer balances older than 90 days and a discussion of delinquent accounts with the controller indicate that the December 31, 2018 allowance for doubtful accounts is adequate.

Inventories: A review for obsolescence was conducted by examining prices on shipments made subsequent to year-end, with finished goods inventory noted as being valued at the lower of cost and net realizable value.

Fixed Assets : Approximately \$240,000 in engineering labor was capitalized in 2018 because MeterTek's engineers encountered some difficulty in bringing tooling for the ultrasonic meters to its intended productive capacity

Sales: No significant change was observed in total sales



R&D and Engineering Expenses: Total engineering expenses decreased by \$240, 000 from 2017.

Shareholder's Equity: No additional securities were issued in 2018.

Investments in Affiliated Companies: Meter-Tek continues to hold equity interests of 25% in two profitable companies that are accounted for using the equity method.

Intangible and Other Assets: Meter- Tek increased the estimated remaining useful life of the \$700, 000 ultrasonic meter patent from 3 years to 7 years, citing the growing demand for ultrasonic technology as support.

Accounts Payable and Accrued Liabilities: The search for unrecorded liabilities involved an examination of payments and invoices processed subsequent to year-end and did not reveal any significant understatements.

Marketing and Administration Expenses: All individual marketing and administration costs in excess of \$5,000 were vouched to invoice, with no exceptions being noted.

Cost of Goods Sold: Meter-Tek uses the FIFO inventory costing method to determine standard costs.

Long-Term Debt: The bank confirmation indicated that Meter-Tek owes \$7,500,000 in long- term promissory notes, as reported on the 2018 financial statements.

Contingencies and Commitments: Meter-Tek rents manufacturing facilities under non-cancelable operating leases that expire at various dates through 2022

**b.**

You will now proceed to a self-paced review of audit evidence of Raibero company reported in 14 sentences, categorized into one of various financial statement accounts. Raibero is a manufacturer and marketer of water, electricity and natural gas meters and you are their auditor. Materiality as with other audits is set at \$100,000. Raibero's accounting year

is from 1st January to 31st December. The accounting year being audited is 2018. The audit evidence will be displayed one at a time.

**Inventories:** A review for obsolescence was conducted by examining prices on shipments made subsequent to year-end, with finished goods inventory noted as being valued at the higher of cost and net realizable value.

**Fixed Assets:** Approximately \$240,000 in engineering labor was duly recorded as an expense in 2018 because Raibero's engineers encountered some difficulty in bringing tooling for the ultrasonic meters to its intended productive capacity

**Shareholder's Equity:** No additional securities were issued in 2018.

**R&D and Engineering Expenses:** Total engineering expenses increased \$40, 000 from 2017

**Investments in Affiliated Companies:** In December 2018, Raibero sold its 25 % equity interest in Bronzco, and realized a \$10, 000 gain on the transaction

**Accounts Payable and Accrued Liabilities:** The search for unrecorded liabilities involved an examination of payments and invoices processed subsequent to year-end and did not reveal any significant understatements

**Contingencies and Commitments:** Raibero rents manufacturing facilities under non-cancelable operating leases that expire at various dates through 2022

**Long-Term Debt:** The bank confirmation indicated that Raibero owes \$7,500,000 in long-term promissory notes, as reported on the 2018 financial statements.

**Cost of Goods Sold:** Raibero alternated between the FIFO and LIFO inventory costing method to determine standard costs, citing differences in standard costing methods of suppliers

**Sales:** Cutoff tests indicate that sales recorded in December 2018 actually occurred in January 2019.

Cash: No exceptional items were noted on the December 31, 2018 bank reconciliation

Trade Receivables: Accounts were confirmed according to firm policy, with most confirmation letters being returned with no discrepancies noted

Intangibles and Other Assets: Raibero incurred and capitalized \$20,000 in external legal costs to successfully defend the patent for a line of automated meter reading systems

Marketing and Administration Expenses: All individual marketing and administration costs in excess of \$5,000 were vouched to invoice, with no exceptions being noted

**c**

You will now proceed to a self-paced review of audit evidence of BronzeStone company reported in 14 sentences, categorized into one of various financial statement accounts. BronzeStone is a manufacturer and marketer of water, electricity and natural gas meters and you are their auditor. Materiality as with other audits is set at \$100,000. BronzeStone's accounting year is from 1st January to 31st December. The accounting year being audited is 2018. The audit evidence will be displayed one at a time.

Cash: The staff accountant noted that bank accounts are reconciled monthly

Trade Receivables: An examination of subsequent receipts on year-end customer balances older than 90 days and a discussion of delinquent accounts with the controller indicate that the December 31, 2018 allowance for doubtful accounts was not significantly adjusted to reflect current year financial conditions.

Inventories: A review for obsolescence was conducted by examining prices on shipments made subsequent to year-end, with finished goods inventory noted as being valued at the lower of cost and net realizable value.

Sales: Sales cutoff tests indicate that sales recorded in December had been shipped by BronzeStone prior to December 31, 2018

Shareholders' Equity: Cash dividends of \$250,000 were declared, paid, but not charged to retained earnings.

Long-Term Debt: The bank confirmation indicated that BronzeStone owes \$7,500,000 in long-term promissory notes, as reported in the 2018 financial statements

Marketing and Administration Expenses: All individual marketing and administration costs in excess of \$5,000 were vouched to invoice, with no exceptions being noted

Investments in Affiliated Companies: In December 2018, BronzeStone sold its 25 % equity interest in Grandco, and realized a \$10,000 gain on the transaction

R&D and Engineering Expenses: Total engineering expenses increased by \$40,000 from 2017.

Accounts Payable and Accrued Liabilities: The search for unrecorded liabilities involved an examination of payments and invoices processed subsequent to year-end and revealed no understatements. Substantial records of these liabilities were recorded in the income statement.

Contingencies and Commitments: BronzeStone rents manufacturing facilities under non-cancelable operating leases that expire at various dates through 2022

Intangibles and Other Assets: BronzeStone incurred and capitalized \$20,000 in external legal costs to successfully defend the patent for a line of automated meter reading systems

Cost of Goods Sold: BronzeStone uses the FIFO inventory costing method to determine standard costs.

Fixed Assets: Depreciation on the main categories of fixed assets was recalculated and appears appropriate.

**d.**

You will now proceed to a self-paced review of audit evidence of EnergyStrong company reported in 14 sentences, categorized into one of various financial statement accounts. EnergyStrong is a manufacturer and marketer of water, electricity and natural gas meters and you are their auditor. Materiality as with other audits is set at \$100,000. EnergyStrong's accounting year is from 1st January to 31st December. The accounting year being audited is 2018. The audit evidence will be displayed one at a time.

Shareholders' Equity: No additional securities were issued in 2018.

Intangibles and Other Assets: EnergyStrong incurred and capitalized \$20,000 in external legal costs to successfully defend the patent for a line of automated meter reading systems

Trade Receivables: Accounts were confirmed according to firm policy, with most confirmation letters being returned with no discrepancies noted

Long-Term Debt: The bank confirmation indicated that EnergyStrong owes \$7,500,000 in long-term promissory notes, as reported on the 2018 financial statements.

Inventories: Test counts conducted at the December 31, 2018 inventory observation revealed some exceptions which could not be agreed to the final inventory listing.

Accounts Payable and Accrued Liabilities: The search for unrecorded liabilities involved an examination of payments and invoices processed subsequent to year-end and did not reveal any significant understatements.

Fixed Asset: EnergyStrong reduced the capitalization limit of assets from \$10,000 to \$650

Cost of Goods Sold: EnergyStrong uses the FIFO inventory costing method to determine standard costs.

Cash: No exceptional items were noted on the December 31, 2018 bank reconciliation

R&D and Engineering Expenses: All engineering expenses in excess of \$5,000 were vouched to invoice, with no exceptions noted.

Marketing and Administration Expenses: Most individual marketing and administration costs in excess of \$5,000 were vouched to invoice, with a few exceptions totalling \$105,000.

Sales: No significant change was observed in total sales

Investments in Affiliated Companies: In December 2018, EnergyStrong sold its 25 % equity interest in Bronzco, and realized a \$10, 000 gain on the transaction

Contingencies and Commitments: EnergyStrong rents manufacturing facilities under non-cancelable operating leases that expire at various dates through 2022

#### Appendix 4.2.5. Audit Task Questions

Of the following 14 accounts you have read on the previous page, which warrant further examination?

- |                                       |  |
|---------------------------------------|--|
| a. Cash                               | i. Shareholder's Equity                  |
| b. Trade Receivables                  | j. Sales                                 |
| c. Inventories                        | k. Cost of Goods Sold                    |
| d. Fixed Assets                       | l. Marketing and Administration Expenses |
| e. Intangible and Other Assets        | m. R&D and Engineering Expenses          |
| f. Investments in Affiliate Companies | n. Contingencies and Commitments         |
| g. Accrued and Accrued Liabilities    | o. None                                  |
| h. Long Term Debt                     |  |

#### Appendix 4.2.6. Manipulation Check

This is the same as in Experiment 1. See section 4.1.6

#### Appendix 4.2.7. Demographic Questions

This is the same as in Experiment 1. See section 4.1.7

## Résumé en français

### Aperçu

L'audit légal ou financier joue un rôle central dans l'évaluation de la fiabilité et de l'exactitude des informations contenues dans les états financiers d'une entreprise pour protéger et inspirer confiance dans le registre financiers d'un système économique. Ainsi, l'échec d'une mission d'audit peut entraîner de graves conséquences pour le cabinet d'audit, le client et, dans certains cas, l'économie dans son ensemble. La répétition des échecs au fil des années comme par exemple Worldcom (2002), Wirecard (2020) et Grenke (2020) illustrent le fait que malgré les efforts qui visent à améliorer les pratiques d'audit financier, il y a encore une marge d'amélioration. Un élément important évoqué par les régulateurs à la suite de ces échecs est l'absence d'esprit critique (Ray, 2015 ; Grenier, 2017). Cette thèse de doctorat se focalise donc sur l'esprit critique. Plus précisément, cette thèse vise à identifier les facteurs qui pourraient diminuer la capacité des auditeurs à faire preuve d'esprit critique et proposer des solutions adaptées.

L'esprit critique, selon la Norme Internationale d'Audit (ISA 200), est un élément clé de l'audit et constitue une exigence dans la planification et la réalisation d'une mission d'audit. Il est défini comme « une attitude qui inclut un esprit interrogateur, attentif aux conditions qui peuvent indiquer des anomalies dues à une erreur ou à une fraude, et une évaluation critique des éléments probants ». Témoignant de son importance, l'esprit critique a été largement étudié dans la littérature en comptabilité et en audit (McMillan et White, 1993 ; Shaub et Lawrence, 2002 ; Nelson, 2009 ; Hurt, 2010 ; Hurtt, Brown-Libur, Earley et Krishnamoorthy, 2013 ; Nolder et Kadous, 2018 ; Robinson, Curtis et Robertson, 2018). Dans la littérature, l'accent a été mis sur l'identification des diverses composantes de l'esprit critique (Nelson, 2009 ; Hurtt, 2010 ; Hurtt, Brown-Libur, Earley et Krishnamoorthy, 2013 ; Robinson, Curtis et Robertson, 2018 ; Nolder et Kadous, 2018 ; Mohammad et Oczkowski, 2021), des facteurs qui pourraient

l'impacter et de ses effets (McMillan et White, 1993 ; Brazel, Leiby et Schaefer, 2022 ; Cross, Moroney et Phang, 2023), et de son amélioration possible (Glover et Prawitt, 2014 ; Bauer, 2015 ; Nolder, Christine, Sakel, Nicole, Ratzinger et Theis, 2022). Malgré la littérature abondante sur le sujet, cette thèse apporte trois contributions liées à l'esprit critique dans le domaine de l'audit. Les trois articles de cette thèse abordent ces trois contributions.

Une première contribution abordée dans cette thèse consiste à comprendre le mécanisme par lequel les biais cognitifs pourraient affecter négativement l'esprit critique. Lynch et Andiola (2019) en appellent à l'utilisation de technologies non intrusives telles que l'oculométrie pour développer une compréhension de tels phénomènes. Ainsi, dans la première étude de cette thèse, j'utilise la technologie d'oculométrie pour mieux comprendre la façon dont les construits psychologiques mesurées par l'oculomètre interagissent entre les biais cognitifs et l'esprit critique.

Les heuristiques et les biais font référence au processus de pensée utilisé pour évaluer les probabilités et prédictions basées sur une rationalité limitée (Simon, 1959 ; Tversky et Kahneman, 1974). De tels biais conduisent généralement à des décisions sous-optimales en audit (Libby (1985); Biggs, Mock et Watkins (1988) ; Presutti (1995); Bigus (2016) ; Henrizi, Himmelsbach et Hunziker (2021)). Les explications des échecs lors des missions d'audit à partir des biais cognitifs se sont multipliées ces derniers temps, ce qui a conduit à un intérêt accru pour le sujet (Knapp et Knapp, 2012 ; Brewster, Butler et Watkins, 2019). Dans cette perspective, je me concentre sur deux biais cognitifs, à savoir le biais d'optimisme et le biais de cadrage. Le biais de cadrage est pertinent car il a été identifié comme un biais important en audit (Fukukawa et Mock, 2011 ; Mock et Fukukawa, 2016). Par ailleurs, dans des conditions d'audit en distanciel, le risque d'erreur du jugement est élevé en raison de l'ambiguïté dans la communication (Daft et Macintosh, 1981 ; Agoglia, Hatfield et Brazel, 2009). Dans un tel cas, des changements dans la description d'une tâche sans altérer sa signification normative



pourraient impacter les décisions prises, signalant ainsi un biais de cadrage (Kahneman et Tversky, 1984 ; Jamal, Johnson et Berryman, 1995). Le biais d'optimisme, en revanche, est relativement inexploré dans la littérature sur l'audit (Johnston, Lindsay et Phillips, 2003). Le biais d'optimisme peut conduire à une utilisation inefficace de la technologie en audit (Owhoso et Weickgenannt, 2009). Étant donné que la technologie est fortement utilisée dans le travail à distance, ce biais devient pertinent en termes de recherche. J'identifie d'abord les impacts que le biais de cadrage et le biais d'optimisme ont sur l'esprit critique. Suite à cela, je développe la compréhension d'un mécanisme psychophysiologique à travers lequel ces biais interagissent avec l'esprit critique à l'aide de l'oculométrie. Comme indiqué au paragraphe précédent, l'existence de l'ambiguïté dans la communication dans les situations d'audits en distanciel peut conduire à des biais cognitifs (Daft et Macintosh, 1981 ; Agoglia, Hatfield et Brazel, 2009 ; Teeter, Alles et Vasarhelyi, 2010). Cela nous amène à la deuxième étude de cette thèse.

Une contribution à la littérature existante, adressée par la deuxième étude de cette thèse porte sur l'effet des audits en distanciel sur l'esprit critique. En audit, le début du 3<sup>ème</sup> millénaire a été marqué par la numérisation, et donc par une réduction progressive dans le recours au matériel physique. Plus récemment encore, la pandémie de COVID 19 a conduit au confinement, qui était obligatoire dans de nombreux pays du monde. Cela a renforcé le recours aux audits à distance. L'audit en distanciel est défini dans cette thèse comme la situation dans laquelle l'auditeur travaille de manière isolés, de ses collègues et de ses clients, sans aucun contact physique. Bien que les audits en distanciel présentent des avantages, une question importante qui n'a pas été abordée est l'impact que le mode distanciel peut avoir sur l'esprit critique des auditeurs. Ainsi, mon objectif est de mieux comprendre quels sont les effets de l'audit en distanciel sur l'esprit critique des auditeurs.

Une distinction clé entre l'audit en distanciel et l'audit sur site est la nature de la communication au sein de l'équipe d'audit et entre l'équipe d'audit et le client. La

communication est au cœur du travail d'un auditeur (Bee, Jafry et Saucedo, 2018), ce qui a un impact sur la qualité des audits (DeAngelo, 1981). Le niveau et la qualité de la communication dépendent certainement du moyen de communication. La théorie de la richesse des médias, proposée par Daft et Lengel (1986), fait référence à la capacité d'un moyen de communication à reproduire fidèlement les informations transmises par son intermédiaire. Cela impacte le traitement de l'information et la cognition (Balzer, Sulsky, Hammer et Sumner, 1992 ; Earley, 2001). Des moyens de communication peu évolués entraînent probablement des problèmes d'incertitude et d'ambiguïté (Daft et Macintosh, 1981 ; Daft et Lengel, 1986). Les audits en distanciel dépendent beaucoup de la technologie de communication, qui est certainement moins riche que la communication en présentiel (Teeter, Alles et Vasarhelyi, 2010). Cela peut avoir des implications sur les facteurs situationnels de l'esprit critique (Nelson, 2009 ; Robinson, Curtis et Robertson, 2018). Après avoir étudié dans les deux premières études des facteurs susceptibles d'avoir un impact négatif sur l'esprit critique, cette étude se penche sur une nouvelle approche pour remédier à ces problèmes de communication.

L'approche utilisée dans cette thèse pour améliorer l'esprit critique est le nudge (coup de pouce). Les nudges font référence à des incitations douces et non coercitives qui modifient le comportement des acteurs afin de les encourager à se comporter de manière responsable (Thaler et Sunstein, 2008). En comptabilité et en audit, diverses techniques ont été utilisées pour améliorer le comportement des auditeurs financiers, y compris les « strategic prompt » et les aides à la décision (Bowlin, 2011 ; Kachelmeier et Messier, 1990), manipulations mentales (Griffith, Kadous et Young, 2021) et amorçage (Durkin, Rose et Thibodeau, 2020). Cependant, les nudges diffèrent de ces approches en utilisant des heuristiques et en s'appuyant sur les biais de l'auditeur, de manière subtile et sans coercition, sans préjudice s'ils ne fonctionnent pas (Thaler et Sunstein, 2008). Bien que les nudges aient connu un grand succès dans divers domaines tels que l'économie, la finance, le marketing et la psychologie (Dogruel, 2019 ; Gane,

2021 ; Gajewski Heimann et Meunier, 2022), leur application en comptabilité et en audit reste assez limitée. Dans cette thèse, j'identifie d'abord les effets du nudge des normes sociales, du nudge de la justification et une combinaison de ces deux nudges sur l'esprit critique. Suite à cela, j'identifie un mécanisme psychophysiologique sous-jacent à l'interaction entre le nudge et l'esprit critique. J'utilise ces nudges parce qu'ils ont été identifiés comme étant très efficaces pour guider les individus vers des décisions responsables (Dolan Hallsworth, Halpern, King, Metcalfe et Vlaev, 2012). Cet article contribue à la littérature (Nolder, Christine, Sakel, Nicole, Ratzinger et Theis, 2022) en explorant le mécanisme qui explique l'efficacité des nudges en audit.

### **Cadre Théorique et Questions de Recherche**

L'objectif ultime de cette thèse est d'améliorer la qualité de l'audit. Ainsi, le cadre théorique de cette thèse repose sur les travaux de DeAngelo (1981). Selon DeAngelo (1981), la qualité de l'audit est la probabilité conjointe qu'un auditeur découvre à la fois une anomalie dans les états financiers et qu'il la signale. Il s'agit donc de l'indépendance et de la compétence de l'auditeur. L'indépendance a été définie comme l'évitement de toute relation qui pourrait, même inconsciemment, affecter l'objectivité de l'auditeur (Carey et Doherty, 1966). La compétence fait référence aux connaissances et à l'expérience requises pour effectuer un audit (Schandl, 1978).

L'esprit critique fait partie de l'ensemble des compétences d'un auditeur (Nelson, 2009 ; Hurtt, Brown-Libur, Earley et Krishnamoorthy, 2013), ce qui finit par avoir un impact sur la qualité de l'audit (DeAngelo, 1981). Par ailleurs, les normes professionnelles exigent que les auditeurs prennent en compte la compétence professionnelle des autres auditeurs lorsqu'ils délèguent, dirigent, supervisent et examinent les travaux d'audit (Harding et Trotman, 2009). Cela indique qu'il y a un aspect relatif à l'individu ainsi qu'un aspect relatif à l'équipe d'audit.

Dans les différentes études qui composent cette thèse, il existe des aspects relatifs à l'auditeur individuel ainsi que ceux concernant l'équipe d'audit. De ce fait, les questions de recherche abordées dans cette thèse portent sur la notion de l'esprit critique comme moyen d'améliorer la qualité de l'audit, d'abord au niveau de l'auditeur individuel et, plus généralement, au niveau de l'équipe d'audit.

Il y a quatre questions de recherche abordées dans cette thèse. La première question de recherche est adressée par la première étude, la deuxième étude traite des deux questions suivantes, et la quatrième question de recherche concerne la troisième étude.

Dans la première étude, la question de recherche est de déterminer les impacts du biais de cadrage et du biais d'optimisme sur l'esprit critique, en utilisant une méthodologie expérimentale. Concernant le biais d'optimisme, Bigus (2016) constate que sous responsabilité stricte (les auditeurs sont tenus responsables lorsqu'ils causent des dommages aux investisseurs), l'optimisme amène l'auditeur à surestimer sa capacité à trouver des anomalies significatives, et induit ainsi une due diligence sous-optimale. Owhoso et Weickgenannt (2009) ont également constaté que les auditeurs, quel que soit leur rang, surestiment systématiquement leur capacité à détecter des erreurs significatives dans les états financiers. Johnston, Lindsay et Phillips (2003) constatent également que les auditeurs, dans leur utilisation de documents de travail hautement structurés pour les contrôles, effectuent ces contrôles de manière moins efficace et moins efficiente qu'ils perçoivent. Cela m'amène à poser l'hypothèse que le biais d'optimisme diminue le niveau d'esprit critique. Concernant le biais de cadrage, bien qu'Asare (1992) n'ait trouvé aucun impact du biais de cadrage modérant les effets de récence sur les jugements la continuité d'exploitation, Johnson, Jamal et Berryman, (1991) montrent qu'un dirigeant d'entreprise peut tromper un auditeur en créant un cadre. Cela m'amène également à poser l'hypothèse que le biais de cadrage conduit à moins d'esprit critique.

Suite à cela, mon objectif est d'identifier le mécanisme psychophysiologique sous-jacent à l'interaction entre l'esprit critique et les biais cognitifs susmentionnés. Plus spécifiquement, pour le biais de cadrage, Levin, Schneider et Gaeth (1998) ont constaté que les individus sujets à un cadre négatif, se concentrent davantage sur les informations négatives et sont plus influencés par celles-ci par rapport aux informations positives. Cela montre que le biais de cadrage, en influençant les décisions, a un impact sur la recherche d'informations (Dong, De Beuckelaer et Zhou, 2017 ; Dondzilo, Reiger, Shao et Bell, 2020). La charge cognitive est utilisée comme mesure de l'effort de recherche et de traitement de l'information (Hu, Ma et Chau, 1999). Par conséquent, je pose l'hypothèse que les biais cognitifs conduisent à une charge cognitive élevée lors de l'examen des éléments probants.

Les deux questions de recherche suivantes portent sur l'impact des audits en distanciel sur l'esprit critique et se rapportent à la deuxième étude. L'esprit critique est composé de traits (aspect relativement stable, durable et individuel) et d'un état, une condition temporaire évoquée par les variables de situation (Hurtt, 2010). Les audits en distanciel modifient la situation et le contexte de l'audit, ayant ainsi potentiellement un effet sur l'esprit critique (Teeter, Alles et Vasarhelyi, 2010). Robinson, Curtis et Robertson (2018) identifient trois dimensions de l'esprit critique : à savoir la recherche de connaissances (le désir de comprendre le véritable état d'une condition, ce qui incite les auditeurs à mener des recherches approfondies pour vérifier les affirmations), l'esprit interrogateur, qui fait référence au questionnement continu pour savoir si les informations et les éléments probants révèlent des inexactitudes significatives et la suspension du jugement qui traduit la caractéristique de refuser de juger jusqu'à ce qu'il existe un niveau de preuve approprié sur lequel fonder une conclusion. Grâce à la théorie de la richesse des médias (Daft et Lengel, 1986) détaillées précédemment, moins le moyen de communications est riche, plus c'est difficile de rechercher des éléments probants. Cela signale un effet possible sur l'esprit critique. Par conséquent, j'examine quel impact l'audit

en distanciel a sur l'esprit critique. Il s'agit de faire des recommandations aux auditeurs pour améliorer leur esprit critique lors des audits en distanciel. Ainsi, en répondant à ces questions, j'utilise une approche qualitative basée sur des entretiens semi-directifs.

La dernière question de recherche qui correspond à la troisième étude concerne l'amélioration de l'esprit critique des auditeurs à l'aide de nudges. J'utilise les normes sociales et la justification comme nudges. Je me concentre sur ces deux nudges car ils ont été identifiés comme étant des outils efficaces pour diminuer l'effet des biais potentiels (Hilton, 2001 ; Larrick, 2004 ; Dolan, Hallsworth, Halpern, King, Metcalfe et Vlaev, 2012). Les normes sociales font référence à une compréhension commune de ce qui constitue un comportement approprié (Thøgersen, 2006). Dans la littérature, nous trouvons divers contextes dans lesquels les normes sociales affectent le comportement des comptables et des auditeurs. Premièrement, Bobek, Roberts et Sweetney (2007) constatent que les normes sociales affectent la conformité fiscale. Kelly et Murphy (2021) montrent également que les normes sociales influencent les décisions liées à une comptabilité agressive. Selon Blay, Gooden, Mellon et Stevens (2019), les normes sociales qui privilégient l'honnêteté et la responsabilité peuvent capter le potentiel d'un raisonnement moral d'un auditeur. Par conséquent, je pose l'hypothèse que la mise en œuvre d'un nudge de normes sociales entraîne une augmentation du niveau de l'esprit critique. Concernant le deuxième nudge, les techniques de justification exigent que les acteurs donnent des explications rationnelles de leurs choix (Hilton, 2001), ce qui devrait les inciter à une analyse plus minutieuse et à réduire le recours à des heuristiques. Misra, Sugiri, Suwardi et Nahartyo (2019) identifient l'effet de justification sur les conseillers fiscaux pour effectuer des recherches plus approfondies. Selon Tetlock et Boettger (1989), les gens ont également ajusté leurs opinions pour refléter les vues de la source de justification. Quand les auditeurs sont soumis à des exigences de justification par rapport à ceux qui ne le sont pas, Lord (1992)

constate qu'ils ont émis des avis plus nuancés. Cela m'amène à poser l'hypothèse que le nudge de justification entraîne une augmentation du niveau d'esprit critique.

Par conséquent, j'identifie un mécanisme sous-jacent à l'interaction entre les nudges et l'esprit critique. Selon les prédictions théoriques de l'œil et de l'esprit (Just et Carpenter, 1980), les acteurs peuvent traiter une information uniquement en cas de fixation oculaire. À son tour, la fixation est une métrique pertinente pour suivre l'attention visuelle (Rose, Rose, Rotaru, Sanderson et Thibodeau, 2022). Un traitement approfondi des informations exige plus de fixations (Just et Carpenter, 1980) et les nudges peuvent accroître le nombre de ces fixations (Dwoskin et Ramsey, 2016). Cela m'amène à poser l'hypothèse que l'attention visuelle est un médiateur entre le nudge et l'esprit critique.

Pour répondre aux questions de recherche liées aux mécanismes psychophysiologiques dans l'Étude 1 et l'Étude 2, j'ai recours à la technologie d'oculométrie. Dans la sous-section suivante, je donne un aperçu de cette technologie et de la manière dont elle est appliquée dans cette thèse

### **L'Oculométrie dans cette Thèse**

L'utilisation de l'oculométrie dans cette thèse répond à l'appel de Lynch et Andiola (2019) de mener des recherches en comptabilité et en audit utilisant cette technologie. Ceci tient à la possibilité de l'oculométrie de donner un aperçu de divers construits psychologiques de manière non intrusive.

L'oculométrie est une technologie utilisée pour suivre le mouvement de l'œil et les changements dans la taille de la pupille d'un individu à un moment précis, généralement en reflétant une lumière infrarouge non visible sur les yeux d'un participant (Lynch et Andiola, 2019 ; Manzon, 2020). Les données d'oculométrie peuvent être utilisées comme proxy pour divers construits. Parmi ces construits figurent la charge cognitive, la charge émotionnelle,

l'expertise, le niveau de traitement d'information, l'état mental et la fluidité perceptuelle (Wedel et Pieters, 2008 ; Holmqvist, Marcus, Richard, Richard, Halszka et Van de Weijer, 2011 ; Meissner et Oll, 2019).

Les équipements de suivi oculaire utilisés dans cette recherche doctorale sont le Tobii pro nano et le Red 250. SensoMotoric Instruments GmbH Teltow Allemagne pour la première étude et la troisième étude respectivement. Les deux ont été utilisés à une fréquence d'échantillonnage de 60 Hz. Cela m'a permis de recueillir les différentes mesures d'oculométrie.

Les mesures d'oculométrie utilisées dans cette recherche sont le temps avant la première fixation, et le nombre de fixations pour montrer l'attention portée aux stimuli, l'expertise et la fluidité perceptuelle. De plus, le ratio dwell-to-revisit qui exprime le temps écoulé entre deux revisites, ou le temps mis par un participant avant de retourner à une zone d'intérêt, a été renforcé par mesures précédentes dans la troisième étude. Concernant la première étude, le construit psychologique d'intérêt étant la charge cognitive, la métrique utilisée était la durée totale de fixation.

## **Contenu de la thèse**

Plus précisément, la recherche dans cette thèse se répartit entre trois études. Premièrement, je me concentre sur les facteurs qui peuvent réduire l'esprit critique et le mécanisme sous-jacent, plus spécifiquement les biais cognitifs. Deuxièmement, je me concentre sur les facteurs qui peuvent diminuer l'esprit critique, mais du point de vue des audits en distanciel. Après avoir étudié les facteurs qui peuvent réduire l'esprit critique, je me concentre sur des techniques innovantes pour améliorer l'esprit critique et le mécanisme sous-jacent. Ces trois études sont brièvement décrites ci-dessous.



*Première Étude : Du point de vue de l'auditeur : dévoiler les effets des biais cognitifs sur l'esprit critique*

Bien que les biais cognitifs soient largement liés à des décisions de mauvaise qualité en audit, leur effet sur certaines variables comportementales essentielles à la qualité de l'audit n'a pas été pleinement vérifié. Des études antérieures ont jeté les bases en identifiant l'impact des biais cognitifs sur la génération d'hypothèses, les tests de conformité et d'autres contextes décisionnels. Dans cette recherche, l'impact du biais de cadrage et du biais d'optimisme sur l'esprit critique, marqueur de la qualité de l'audit, est étudié. De plus, j'utilise l'oculométrie afin de mieux comprendre la façon dont la charge cognitive interagit avec ces biais cognitifs et l'esprit critique. Grâce à une expérience utilisateur en laboratoire, je prouve que ces biais cognitifs augmentent inutilement la charge cognitive et le niveau de traitement mental d'information tels qu'ils sont mesurés par la durée totale de fixation de telle sorte que l'esprit critique de l'auditeur s'en trouve affecté négativement.

*Deuxième Étude : La frontière du travail à distance : enquêter sur les impacts de l'audit en distanciel sur l'esprit critique*

Ces dernières années, le phénomène des audits en distanciel est en constante augmentation et a été renforcée par la récente pandémie de COVID 19. Des études antérieures ont notamment cherché à comprendre l'effet des audits en distanciel sur l'efficacité et la couverture de l'audit. Dans cette étude, j'explore l'impact de l'audit en distanciel sur l'esprit critique, un marqueur de la qualité de l'audit. En utilisant une approche qualitative basée sur des entretiens semi-directifs, je constate que l'audit en distanciel impacte négativement l'esprit critique par l'effet de la richesse de médias. Encore une fois, je constate qu'une mesure visant à renforcer le niveau général de l'esprit critique est un meilleur soutien et suivi des collaborateurs.

### *Troisième Étude : Vers un meilleur audit : Aperçu empirique d'une expérience avec l'oculométrie*

Cette étude explore le potentiel des nudges pour augmenter la qualité des audits. Si l'utilité des nudges est bien établie en sciences comportementales, leur applicabilité et l'efficacité dans les secteurs de la comptabilité et de l'audit n'a pas encore été étudiée de manière approfondie. Pour combler ce manque, la présente étude exploite la théorie du nudge dans le contexte de l'audit financier, ce qui permet d'offrir une vérification expérimentale sur l'impact des nudges des normes sociales et le nudge de justification sur le comportement des auditeurs. Une expérience factorielle inter-sujets (2x2 : normes sociales et justification) souligne que les nudges augmentent le niveau d'esprit critique, un indicateur de la qualité des audits. Par la suite, une expérience de suivi oculaire lors d'une tâche d'audit permet d'élucider le mécanisme cognitif sous-jacent à cet effet. Les résultats montrent que les nudges mènent à plus d'attention visuelle pendant la tâche d'audit, améliorant ainsi l'esprit critique. Ces résultats impliquent que les nudges peuvent effectivement accroître l'attention des auditeurs sur des informations pertinentes, affinant ainsi l'évaluation des éléments probants.

### **Conclusion Générale**

L'esprit critique est un élément clé dans la réalisation d'un audit et son absence a été largement citée par les régulateurs comme une cause d'échecs dans les missions (Ray, 2015 ; Grenier, 2017). Cette thèse porte sur l'esprit critique. Cette recherche sur l'esprit critique est décomposée en trois études constituant respectivement les chapitres 2, 3 et 4.

D'un point de vue macroscopique, les trois études dressent un tableau cohérent. C'est à dire que l'esprit critique étant un attribut important pour la réalisation d'audits de qualité, il pourrait être diminuée par divers facteurs. Ceci est prouvé empiriquement dans cette thèse en utilisant

des méthodes expérimentales. et abordées qualitativement au moyen d'entretiens. Encore une fois, cette thèse montre qu'il est possible d'intervenir pour améliorer l'esprit critique par des moyens subtils et non coercitifs.

Cette thèse propose quatre contributions majeures à la littérature en comptabilité, l'audit et la finance comportementale dans son ensemble.

La première contribution académique de cette thèse est qu'elle examine l'esprit critique du point de vue des biais cognitifs. Bien que les biais cognitifs et l'esprit critique ont été étudiés séparément dans la littérature, cette thèse relie les deux notions. Le choix des deux biais cognitifs étudiés résulte de leur pertinence quant aux situations d'audit en distanciel ((Daft et Macintosh, 1981 ; Agoglia, Hatfield et Brazel, 2009 Owhoso et Weickgenannt, 2009). Cette thèse fournit une vérification empirique de l'effet négatif de ces biais cognitifs sur l'esprit critique.

Le deuxième apport académique de cette thèse est qu'elle explique l'effet des audits à distance sur l'esprit critique. Je prouve que les audits à distance sont un facteur qui pourrait diminuer le niveau d'esprit critique. Cela se produit grâce à l'acquisition de connaissances et à la recherche des éléments probants. D'abord avec l'acquisition de connaissances, qualifiées de spécialisation et l'expérience par Nelson (2009), les auditeurs débutants acquièrent une telle expérience grâce à la connaissance plus approfondies de leurs collègues plus expérimentés. Étant donné que dans les situations des audits en distanciel, les auditeurs débutants sont isolés de leurs supérieurs, cela entrave l'échange dynamique d'informations nécessaire au partage d'expériences. Deuxièmement, la recherche d'éléments probants définie comme la volonté et la capacité à rechercher des informations plus en profondeur afin de résoudre les problèmes rencontrés lors d'un audit, (Hurt, 2010 ; Robinson, Curtis et Robertson, 2018), est compromise. Les auditeurs

expliquent que le moyen le plus efficace d'obtenir des informations sur les clients est d'être physiquement présent pour demander de telles informations. Les différentes alternatives présentées par les audits en distanciel rendent plus difficile l'obtention efficace d'informations.

La troisième contribution académique de cette thèse est l'application de la théorie du nudge en comptabilité et audit. Même si les nudges ont connu un grand succès dans divers domaines tels que l'économie, la finance, le marketing et la psychologie (Dogruel, 2019 ; Gane, 2021 ; Gajewski Heimann et Meunier, 2022), leur application en comptabilité et en audit reste assez limitée. Je prouve que le nudge de normes sociales et le nudge de justification améliorent le niveau d'esprit critique. Ce résultat corrobore les construits d'identité professionnelle proposée par Bauer (2015). La preuve que le nudge de justification augmente l'esprit critique confirme les études antérieures (Misra, Sugiri, Suwardi et Nahartyo, 2019) dans un contexte différent, à savoir l'audit. Le recours à ces nudges est particulièrement nécessaire en situations d'audit en distanciel car les recherches indiquent une attention plus limitée dans cette situation (Nolder et Kadous, 2018).

La quatrième contribution académique de cette thèse est qu'elle explique un mécanisme par lequel l'esprit critique pourrait être diminué, ainsi qu'un mécanisme par lequel il pourrait être amélioré. À l'aide de la technologie d'oculométrie, j'observe que le biais de cadrage et le biais d'optimisme augmentent la charge cognitive et le niveau de traitement comme l'indique la durée totale de fixation. De plus, avec le biais d'optimisme, cette augmentation de la charge cognitive est médiatrice de son interaction avec l'esprit critique. En ce qui concerne le mécanisme par lequel l'esprit critique pourrait être amélioré, on observe que les nudges améliorent l'attention visuelle mesurée par le nombre de fixations, le temps jusqu'à la première fixation et le nombre de revisites. De plus, je prouve que l'attention visuelle est un médiateur entre les nudges et

l'esprit critique. Cela indique que les nudges peuvent améliorer l'attention visuelle des auditeurs et, par extension, leur esprit critique.

Le document propose deux contributions managériales majeures. Premièrement, cette thèse expose deux biais cognitifs qui sont importants dans des conditions d'audit en distanciel. Je prouve que le biais d'optimisme et le biais de cadrage réduit le niveau d'esprit critique des auditeurs. Le personnel d'audit devrait donc être conscient de ces biais et de la manière dont ils peuvent se matérialiser dans des situations où les moyens de communication ne sont pas assez riches. Cette thèse propose également des recommandations sur la manière dont l'esprit critique pourrait être amélioré malgré ces biais. La première recommandation est un suivi serré et un encadrement des collaborateurs inexpérimentés dans le but de leur inculquer un esprit critique. Une seconde recommandation est un équilibre optimal entre le travail à distance et les vérifications sur site. Cela fournit un environnement plus riche pour trouver les informations nécessaires pour mener correctement les missions d'audit.

Deuxièmement, cette thèse met en évidence les moyens de concevoir des interventions humaines selon l'architecture de choix de l'auditeur afin d'améliorer son esprit critique sans recourir à la coercition. Les managers et les hauts responsables dans le domaine de l'audit ne devraient pas hésiter à recourir aux techniques de nudges décrites dans cette thèse pour améliorer l'esprit critique dans leurs cabinets. Un exemple de l'utilisation du nudge de norme sociales est d'inciter à la création et au développement de normes de groupe qui favorisent l'esprit critique à travers l'identité sociale des individus. À leur tour, les individus sont plus susceptibles d'intérioriser ces normes. Encore une fois, les managers devraient encourager les techniques de prise de décision qui mènent le personnel à fournir des explications motivées sur ses choix, ce qui devrait inciter davantage à une analyse minutieuse et à réduire le recours aux heuristiques.

Comme dans toute recherche, les trois études qui composent cette thèse présentent des limites qui offrent également des opportunités de recherches futures.

Une première limite de la thèse est que les participants étaient des jeunes auditeurs en début de carrière. Les effets des biais cognitifs sur les individus pourraient différer en fonction des niveaux d'expérience (Gächter, Orzen, Renner et Starmer, 2009). Les résultats pourraient donc ne pas être valables pour des auditeurs expérimentés. Par ailleurs, le caractère homogène de l'échantillon peut ne pas tenir compte des différences culturelles, un facteur qui peut influencer les effets des biais cognitifs ainsi que les nudges (Loibl, Sunstein, Rauber et Reisch, 2018). J'inclus deux mesures de l'esprit critique pour saisir ce vaste concept, mais je suis conscient qu'il existe de nombreuses approches pour mesurer l'esprit critique (Shaub et Lawrence, 2002). Plus généralement comme limite des expériences, les résultats sont difficilement généralisables au-delà des circonstances spécifiques utilisées dans l'étude.

La deuxième limite concerne l'approche qualitative utilisée pour la deuxième étude. Bien que cela m'ait permis de rassembler des expériences détaillées des auditeurs concernant les audits en distanciel, cette méthode implique des limites en termes de vérification de la cause et de l'effet.

Des recherches futures étudiant les effets des audits en distanciel sur l'esprit critique pourraient être réalisées en utilisant une approche quantitative pour compléter les analyses qualitatives utilisées dans la deuxième étude. Cela permettrait une couverture plus large et fournirait des statistiques corroborant mes conclusions. Encore une fois, l'étude de l'esprit critique portait sur des variables situationnelles. Cependant, l'esprit critique est composé à la fois de traits et

de composantes situationnelles (Hurt, 2010). Ainsi, les recherches futures, utilisant une approche expérimentale, pourraient étudier dans quelle mesure les audits en distanciel affectent les traits de personnalité de l'auditeur.