UNIVERSIDAD COMPLUTENSE DE MADRID

FACULTAD DE CIENCIAS ECONÓMICAS Y EMPRESARIALES

TESIS DOCTORAL

El impacto de la Realidad Virtual en las emociones y la toma de decisiones éticas de los directivos

The impact of Virtual Reality on emotions and ethical decision-making of managers

MEMORIA PARA OPTAR AL GRADO DE DOCTOR

PRESENTADA POR

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General Index

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Glossary

AI: Artificial Intelligence

AIM: Affect Infusion Model

AR: Augmented Reality

ATF: Appraisal-Tendency Framework

BAS: Behavioral Approach System

BI: Business Intelligence

CAVE: Cave Automatic Virtual Environment

CPFM: Cognitive Person-Focused model

CAGR: Compound Annual Growth Rate

EEG: ElectroEncephaloGraphy

EIC: Emotion-Imbued Choice model

EMG: ElectroMyoGraphy

fNIRS: Functional Near-InfraRed Spectroscopy

HAPA: High-Arousal Positive Affect

HCI: Human-Computer Interaction

HMD: Head Mounted Display

HR: Human Resources

HRI: Human-Robot Interaction

IA*: Inteligencia Artificial (*Artificial Intelligence)

IS: Information System

IT: Information Technologies

LAPA: Low-Arousal Positive Affect

MTurk: Amazon Mechanical Turk

OBSE: Organizational-Based Self-Esteem

PANAS: Positive and Negative Affect Schedule

SAM: Self-Assessment Manikin

TI: *Tecnologías de la Información* (Information Technologies)

VAS: Visual Analogue Scale

VR: Virtual Reality

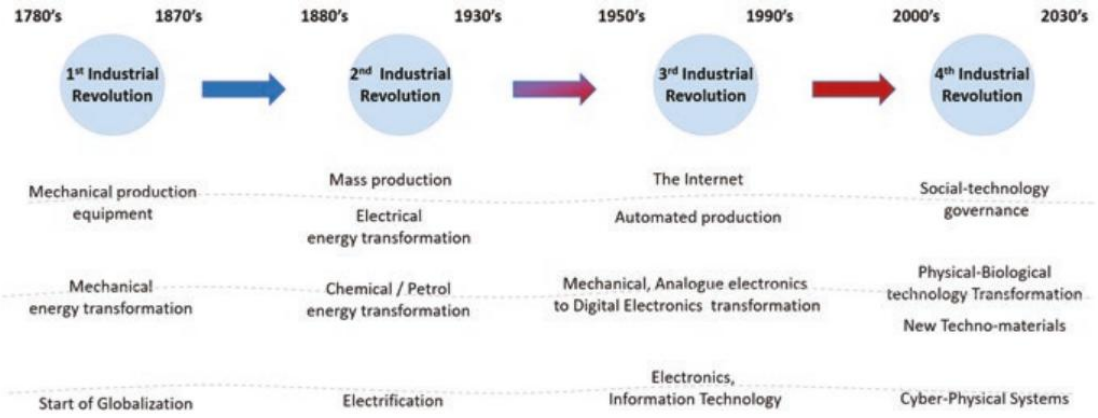
WoS: Web of Science

XR: Extended Reality

1. *Introduction and Summary*

The Fourth Industrial Revolution is reshaping the way organizations operate, introducing unprecedented technological, organizational, and managerial challenges (Horváth & Szabó, 2019) (see Figure 1). Technology has consistently pushed the boundaries of what can be achieved (Ashta & Biot-Paquerot, 2018). Today, rapid advances in technology are driving transformative shifts worldwide, bringing significant opportunities alongside substantial challenges. Compared to earlier industrial revolutions, today's emerging technologies and widespread innovations are spreading at an unprecedented pace, reshaping both economic systems and social structure (Schwab, 2024).

Figure 1*: The different Industrial Revolutions.*



Source: (Skilton & Hovsepian, 2018).

From smart technologies and automation to virtual reality (VR) and artificial intelligence (AI), digital innovation is transforming not only how businesses operate but also how they manage and engage their people (S. Kim et al., 2021). Technologies evolve continuously, and companies must adapt their business models to remain competitive in the face of constant disruption. While the technical capabilities of these innovations are well documented, far less is understood about how organizations and employees can successfully adapt to disruptive technological change (Ferreira et al., 2019; Trenerry et al., 2021). Employees' active involvement in the change process is often overlooked (Cetindamar et al., 2021). Appio et al. (2021) call for research on how firms and industries compete and organize innovation in a digital era, how digital technologies reshape product and service development, and how digital transformation affects the management of people and teams driving innovation. Companies must not only redesign strategies and

processes but also address how emerging technologies interact with employees' emotions, decisions, and performance. Understanding organizations, therefore, requires examining the mechanisms that influence people's decision-making and behavior, which are closely tied to cognition and emotions (Ashkanasy et al., 2017). In this context, companies face the dual challenge of adopting new technologies and managing their human impact. To remain competitive, they must not only redesign strategies and processes but also consider how innovations like VR specifically engage employees' emotions, shape their decision-making, and ultimately affect performance.

Examining organizational decision-making requires more than rational models; it also demands recognition of the cognitive shortcuts people instinctively employ. Behavioral economics, drawing heavily on Herbert A. Simon's concept of bounded rationality, explains that individuals rarely make perfectly rational decisions because of cognitive limitations and environmental constraints (Simon, 1997). Instead, they rely on two complementary cognitive systems: System 1, which is rapid, intuitive, and shaped by experience and biology, and System 2, which is slower, rule-based, and more deliberate (Evans, 2008; Kahneman, 2011). Within this dual-process framework, heuristics –mental shortcuts that simplify judgment by ignoring some information– play a central role (Gigerenzer & Gaissmaier, 2011).

In managerial and organizational settings, heuristics can be highly adaptive, allowing leaders and employees to make timely decisions in complex, uncertain environments. However, they can also introduce systematic biases, sometimes leading to suboptimal or even harmful outcomes. The literature identifies several categories of heuristics relevant to information systems (IS) and business decision-making, including the availability heuristic (relying on easily recalled information) (Schwarz et al., 1991; Tversky & Kahneman, 1973), representativeness heuristic (judging likelihood based on similarity to a prototype) (Kahneman & Frederick, 2002; L.-H. Lim & Benbasat, 1997), cognitive or anchoring heuristic (basing judgments on an initial reference point) (Bauer & Gill, 2024; Epley & Gilovich, 2006; Tversky & Kahneman, 1974), effort heuristic (valuing outcomes based on perceived effort) (Kruger et al., 2004), recognition heuristic (preferring familiar options) (Goldstein & Gigerenzer, 2002; Pohl, 2006), and the affect heuristic (reflecting the tendency to make judgments based on emotional reactions associated with past experiences or mental representations of an object, event, or technology) (Finucane et al., 2000; Slovic et al., 2002, 2007). While all these heuristics influence decision-making in

technology-mediated contexts, the *affect heuristic* deserves particular attention in this research, as emotions are a popular area in organizational studies (Elfenbein, 2007).

In the realm of information systems, affect heuristics influence a wide array of behaviors –from trusting automation and sharing personal data to adopting AI tools or engaging with virtual environments (Adjerid et al., 2018; Kehr et al., 2015; Shin, 2024). For instance, users' willingness to disclose private information may hinge more on the positive feelings associated with a mobile app than on objective assessments of data security (Kehr et al., 2015). Similarly, perceptions of emerging technologies like VR can be shaped by the emotional tone of prior experiences, potentially overshadowing technical specifications or cost-benefit analyses (Slater, 2018).

Understanding affect heuristics is crucial from an organizational perspective for two reasons. First, emotions can accelerate decision-making in high-pressure environments, such as managerial negotiations or crisis management, by providing quick, experience-based cues (Arnott & Gao, 2022). Second, they can bias judgments in ways that reinforce existing preferences or blind spots, for example, when evaluating new technologies (Slovic et al., 2007). The challenge for organizations is to harness the speed and efficiency of affective decision-making without falling victim to its distortions.

In fast-changing digital environments, where employees interact with complex information systems, affect heuristics can subtly but powerfully shape strategic choices (Trujillo, 2018). Recognizing this, the present study integrates insights from behavioral economics, psychology, and information systems research to explore how emotional reactions –both pre-existing and technology-induced– influence organizational decision-making. This focus sets the stage for examining the deeper role of emotions in workplace contexts, moving beyond heuristics to understand how specific affective states, such as happiness or fear, operate within organizational structures and influence ethical and strategic outcomes. If heuristics explain *how* decisions are made under cognitive constraints, emotions provide insight into *why* certain choices feel compelling or aversive in the first place. The relationship between heuristics and emotions has been explored through theories such as the Affect Infusion model (Forgas, 1995) and the Emotion-Imbued Choice model (Lerner et al., 2015).

Emotions in organizations are more than fleeting feelings; they are dynamic processes that influence cognition, behavior, and performance at multiple levels –from the individual to the group and the entire organization (Elfenbein, 2007; Frijda, 1986). The emotion process often begins at the intrapersonal level, where an individual encounters a stimulus, interprets its meaning, and experiences a physiological and psychological state (Elfenbein, 2007). These internal responses can then manifest in outward expressions, which themselves become stimuli for others, setting in motion an interpersonal emotional exchange (Elfenbein, 2007). Over time, these micro-level interactions scale up, shaping performance and job satisfaction (Weiss & Cropanzano, 1996).

Although Russell's (1980) widely cited circumplex model of affect identifies twenty-eight stimuli related to it, affect is classified along two dimensions: *valence*, which reflects the positive or negative quality of an experience, and *arousal*, which indicates the level of activation, from high (e.g., excitement) to low (e.g., calmness). Together, these dimensions provide a framework for assessing affect as it shapes "influence reflexes, perception, cognition, and behavior" (Russell, 2003, p. 145).

Research on emotions in the workplace often distinguishes between *positive* and *negative* affect, as each influences decision-making and cooperation differently (Isen, 1987). Among positive emotions, *happiness* holds a special place. Defined as a pleasurable psychological state encompassing emotions such as joy and contentment (Fisher, 2010), happiness can exist at transient, individual, or group level. Moreover, happiness is considered a stable emotion, associated with ethics and virtue, and therefore influences judgment, whereas joy is more sudden and brief and does not appear to carry inherent moral or ethical implications (Cottrell, 2016).

At the organizational level, happiness has been associated with enhanced productivity (Fang et al., 2025; Gavin & Mason, 2004), stronger cooperation, better problem-solving, and greater reliance on intuitive decision-making (Isen, 1987, 2001). Happy employees tend to show higher commitment, stronger job performance, lower turnover intentions, and reduced counterproductive work behaviors (A. Thompson & Bruk-Lee, 2021). Importantly, research suggests that managers, regardless of gender, tend to report higher happiness levels than non-managers, possibly due to factors such as life satisfaction and gratification received (Martin et al., 2024).

On the other end of the spectrum, negative emotions such as anger, fear, and sadness also shape organizational life, often in complex ways. For instance, anger, while typically associated with conflict and reduced satisfaction, can sometimes prompt positive adaptation when channeled constructively (Geddes et al., 2020; Gibson & Callister, 2010). Fear, conversely, tends to heighten risk aversion, foster pessimism, and lead to withdrawal behaviors but may also encourage positive actions, such as carrying out tasks or pursuing goals (Bugdol & Nagody-Mrozowicz, 2020; Pustovit et al., 2024).

While much research distinguishes between positive and negative emotions and their distinct consequences, individuals often experience both simultaneously. This simultaneous experience of conflicting emotions, referred to as *emotional ambivalence* (Fong, 2006; Larsen et al., 2001; Rothman et al., 2017). This ambivalence has proven to impact decision-making and performance (Fong, 2006; Pratt & Rosa, 2003; Rothman, 2011; Rothman & Wiesenfeld, 2007). While emotional ambivalence is well established in psychology and is gaining attention in management research, it has received little consideration in other fields, including technology studies. Key theoretical perspectives on emotional ambivalence and decision-making include the Appraisal-Tendency framework (Lerner & Keltner, 2000, 2001) and the "Feeling is for Doing" model (Zeelenberg et al., 2008).

Crucially, emotions in organizations are not just operational variables; they also have moral consequences. *Ethical decision-making* is strongly shaped by affective states, supporting the idea that moral reasoning is often intuitive and emotionally driven rather than purely rational (Haidt, 2001, 2003). The Cognitive-Affective model (Gaudine & Thorne, 2001) emphasizes that certain emotional states can shape the ethical decision-making process by increasing awareness of moral issues, fostering higher-level moral reasoning, guiding choices that reflect such reasoning, and encouraging follow-through. It proposes that individuals feeling arousal and positive affect are more likely to resolve ethical dilemmas using advanced moral frameworks. Furthermore, the Integrated Ethical Decision-making model (Schwartz, 2016) integrates emotion and intuition into the ethical decision-making process.

However, experimental research offers mixed results related to the impact of emotions and ethical decision-making. Positive emotions, for example, have been linked to self-reported inclinations to justify and minimize unethical action (Rainone et al., 2021). On the other hand, eliciting happiness with VR resulted in an increase in honest behavior

(Medai & Noussair, 2021). Negative emotions like guilt or shame can promote reparative actions (Levine, 2010; Van Kleef et al., 2004; Van Kleef & Lange, 2020).

Extending the link between emotions and decision-making, research highlights the influence of situational and social contexts –particularly organizational hierarchies, such as *managerial power*– in shaping emotional experiences (Levine, 2010; Van Kleef & Lange, 2020). While most research emphasizes emotional valence, theories of self-concept and organizational-based self-esteem suggest that power within organizations fosters positive emotions by enhancing self-esteem and self-efficacy (Diener et al., 2010; A. K. Korman, 1970; Pierce & Gardner, 2004). From a neurological standpoint, power activates goal-oriented attitudes and reward sensitivity through the Behavioral Approach System (Guinote, 2017). Additionally, the Approach-Inhibition theory of power (Keltner et al., 2003) explains how power affects emotions: people with more power usually show positive feelings, are more open to rewards, and take more initiative, while those with less power often feel negative emotions, are more sensitive to threats, and hold back their actions (C. Anderson & Berdahl, 2002). Recent studies extend this perspective to strategic management, showing that top managers' power promotes optimism, risk-taking, and commitment in contexts such as digital transformation (Z. Zhang et al., 2024). Drawing on the Approach-Inhibition theory of power, this dissertation examines how managerial roles influence emotional expression and behavior, testing whether managers, due to their approach orientation, are more likely to exhibit positive and proactive emotional responses, while non-managers display more inhibited and cautious patterns.

While theories of emotion and power highlight how organizational roles shape decision-making, it is equally important to consider how technology can be used to systematically study these processes. In particular, VR offers a unique opportunity to elicit emotions in controlled yet realistic settings, providing a valuable tool for examining their impact on ethical and strategic choices.

Virtual reality has emerged as a powerful technology for simulating realistic or imagined environments that elicit strong emotional responses, being the most popular immersive technology (see Figure 4). Unlike augmented reality (AR) and mixed reality (MR), VR provides full immersion and a heightened sense of presence, making it particularly effective for studying emotions in controlled yet lifelike contexts (Cummings & Bailenson, 2016; Slater & Wilbur, 1997). Advances in head-mounted displays (HMDs) have made immersive VR more accessible, enabling applications that extend beyond

gaming (Ramachandran et al., 2025) into education and healthcare (e.g., Bell et al. (2024), and organizational training (e.g., Chang et al. (2024)). Companies such as Airbus, Siemens, Kimberly-Clark, Volvo, Delta Air Lines, and UPS are already leveraging VR for training, design, and collaboration (Boyd & Koles, 2019).

Empirical studies indicate that VR can reliably induce both positive and negative emotions by engaging sensory and cognitive processes, often with greater intensity than non-immersive methods (Baños et al., 2006; Felnhofer et al., 2015; Kako et al., 2023; Medai & Noussair, 2021). This makes VR not only an effective research tool for emotion elicitation but also a practical medium for developing social, behavioral, and ethical competencies in organizational settings (Ronaghi, 2024; Sholihin et al., 2020). Despite its growing adoption, most VR research remains concentrated in fields like therapy and general affective computing, with limited attention to management and decision-making, which remains underexplored (Magalhães et al., 2023).

Therefore, the main objective of this research is to understand the impact of VR technology on emotions and ethical decision-making in managers and non-managers.

1.1. Research motivation and questions

Taken together, the literature shows that VR offers a powerful lens through which to examine the intersection of technology, emotions, and organizational behavior. Prior studies have demonstrated that heuristics, emotional states, and hierarchical dynamics all play a role in shaping decision-making, yet important questions remain unresolved. In particular, little is known about how affect heuristics translate into Information Systems (IS) contexts –more specifically how pre-existing emotions influence VR experiences, how managerial power shapes VR-induced affective responses, and how emotional changes in VR environments impact ethical decision-making. These gaps limit both theoretical advancement in IS and practical guidance for organizations adopting immersive technologies. Overall, the impact of affect heuristics in information systems research is still understudied compared to the heuristics in behavioral economics.

Despite the growing recognition of affect in decision-making, the application of affect heuristics in IS research remains significantly underexplored compared to its widespread examination in behavioral economics. The affect heuristic –where individuals make judgments based on emotional reactions tied to prior experiences– has been foundational in understanding decision-making biases in economics (Finucane et al., 2000; Slovic et al., 2002, 2007). By contrast, IS scholarship has traditionally privileged rational and cognitive models, leaving emotional and experiential dimensions relatively neglected (Arnott & Gao, 2022). This gap is particularly notable given that technology-mediated contexts are highly susceptible to affect-driven judgments. As organizations increasingly adopt digital tools, virtual realities, algorithms, and autonomous systems, users often evaluate these technologies through emotional lenses –whether in trusting automation, disclosing personal data, or engaging with AI interfaces.

Experimental studies in IS have demonstrated that affect can influence decisions concerning privacy (Adjerid et al., 2018; Dinev et al., 2015), the sharing of mobile data (Kehr et al., 2015), the adoption of AI (Constantiou et al., 2014), the exchange of knowledge (Fehrenbacher, 2017), investments in technology (Park et al., 2016), participation in electronic markets (Teubner et al., 2015), the automation of systems as in aviation (Gao et al., 2025), and interactions on social media (Yu et al., 2015). Despite this, affect heuristics have not been systematically integrated into IS theories or design frameworks. The dominance of rational models in IS has slowed the incorporation of

affective constructs, despite mounting evidence that emotional responses significantly shape technology use and acceptance.

To address this limitation, more focused research is needed to embed affect heuristics into the theoretical foundations of information systems and to explore their practical implications across emerging technologies such as VR. Therefore, we propose the following **research motivation**:

How do affect heuristics influence an individual's emotions and ethical decision-making when using emerging IS technologies such as Virtual Reality?

Exploring this motivation would close significant gaps in four different ways. First, the research would advance theoretical development in information systems by explicitly integrating affect heuristics into dominant models, challenging the longstanding focus on rational and cognitive decision-making frameworks. Second, it would offer a practical contribution by generating insights that help system designers and organizations create technologies that account for the emotional judgments users rely on when engaging with digital tools. Third, the study would provide empirical value by examining how affect-driven shortcuts shape real decisions –such as trusting AI recommendations, adopting VR, or disclosing personal data– under conditions of uncertainty and time pressure. Fourth, exploration is timely and relevant, given the rapid rise of immersive and algorithmic technologies. Understanding the role of affect heuristics will allow both researchers and practitioners to anticipate adoption barriers and build trust-enhancing interventions.

This motivation enables both experimental approaches (such as lab and field studies measuring affect, trust, and behavior) and theoretical contributions (such as embedding affect heuristics into IS frameworks) to address the three identified research gaps:

Gap 1) The impact of initial emotional states on VR induction remains insufficiently explored in existing literature.

Most IS research examines emotional responses *during or after* interactions with technology (e.g., Beaudry & Pinsonneault (2005, 2010)), but far less attention has been paid to the emotions users bring *before* engaging with IT systems. Pre-existing emotions may shape how individuals interpret, engage with, and adapt to new technologies, yet this dimension has been largely overlooked. Since emotional responses play a central role in

determining attitudes, behaviors, and adaptation strategies (Darban & Polites, 2016; Gerli et al., 2022), overlooking emotions present prior to IT interaction leaves a critical gap in IS research.

This gap becomes particularly salient in the context of VR, where heightened immersion amplifies emotional responses in controlled environments (Linares-Vargas & Cieza-Mostacero, 2024; Slater, 2018; Slater & Wilbur, 1997), as it activates both automatic physiological reactions and conscious cognitive processing (Somarathna et al., 2022). While existing work treats emotion mainly as an outcome of VR experiences, little is known about the reciprocal effect of initial emotional states on perceptions, judgments, and behaviors within immersive environments. Given VR's heightened sensitivity to emotional cues and its capacity to amplify or transform them, overlooking pre-existing emotional states risks missing a key factor in understanding users' VR experiences. Furthermore, considering VR's growing role in training, education, and decision-making, ignoring pre-stimulus affect risks missing a key driver of user experience.

This motivates the following research question:

Do initial emotional states impact the effectiveness of VR emotional induction?

Insights from IT research on anticipated emotions (Beaudry & Pinsonneault, 2005, 2010) suggest that pre-existing affective states can meaningfully shape user experiences with new technologies. Psychological perspectives highlight that the type and recognition of stimuli, as well as how emotions are assessed, affect the strength of emotional elicitation (Bornstein, 1989), while evidence from affective neuroscience shows that positive and negative emotions follow distinct physiological patterns (Phaf & Rotteveel, 2012). Furthermore, the Appraisal Tendency Framework (ATF) (Lerner & Keltner, 2000) further explains how specific emotions carry motivational properties that persist over time and influence subsequent judgments and decisions. Taken together, these findings point to the possibility that users' initial emotional states may modulate both the intensity and the direction of their emotional responses in VR, representing an overlooked but critical dimension of IS research.

Gap 2) Managerial power's impact on VR-driven emotional responses remains underexplored.

Emotions in organizations are shaped not only by individual traits but also by social and contextual factors, such as hierarchical power (Levine, 2010; Van Kleef & Lange, 2020). The Approach–Inhibition theory (Keltner et al., 2003) suggests that power fosters approach-oriented emotional states –such as positive emotions, optimism and confidence– while lack of power engenders caution and threat sensitivity. Applied in strategic management, this perspective explains why managers are often more proactive in driving digital transformation (Z. Zhang et al., 2024).

Despite VR's increasing use for emotional elicitation in experimental settings, most studies rely on student samples, with little attention to organizational diversity, as we will review in this research.

To the best of our knowledge, no systematic research has examined how VR-induced emotions differ between managers and non-managers, two groups likely to process immersive stimuli differently owing to variations in roles, responsibilities, and the degree of managerial power they exercise.

This research therefore seeks to address this gap by examining whether VR impacts the emotions of managers and non-managers differently. Specifically, the research question asks:

Does VR influence managers' and non-managers' emotions differently?

This question draws on theories such as Self-Concept theory (A. K. Korman, 1970), Organizational-Based Self-Esteem theory (Pierce & Gardner, 2004), and the Behavioral Approach System (Guinote, 2017), which collectively suggest that managerial roles are associated with enhanced self-worth, optimism, and reward sensitivity, whereas lower-power roles foster caution and inhibition.

Extending these insights into the context of VR, the dissertation hypothesizes that managers, who already experience relatively higher baseline levels of positive emotions due to their perceived power and approach-oriented mindset, will show less impact when exposed to a VR eliciting happiness. In contrast, non-managers, who begin with lower baseline levels of happiness compared to non-immersive technologies, are expected to experience a stronger positive emotional shift through VR.

Gap 3) The influence of immersive VR on ethical decision-making processes remains poorly explored in IS research.

While ethical decisions have traditionally been studied through rational models of judgment, an emerging body of literature emphasizes the central role of emotion in shaping moral behavior (e.g., Eisenberg (2000), and the Cognitive Affective model of Gaudine and Thorne (2001)). Research shows that moral judgments are strongly guided by emotional intuition, social cues, and environmental priming rather than deliberate reasoning alone (Gaudine & Thorne, 2001; Haidt, 2001, 2003). Positive affect, for example, has been linked to higher levels of moral reasoning (Rainone et al., 2021), while the valence and orientation of emotional states can bias decisions toward ethical or unethical outcomes. Furthermore, according to Escadas et al. (2024), moderate levels of positive emotions provide the most favorable ground for ethical judgments and actions. Their findings highlight that positive emotions drive ethical outcomes primarily by shaping ethical intentions, with a lesser but still significant effect on ethical behavior, underscoring their pivotal role in fostering consumer ethics.

However, the role of emotion in technology-mediated contexts such as VR remains insufficiently studied. VR is uniquely suited to this inquiry: it can elicit vivid emotions under controlled yet realistic conditions (Dozio et al., 2024; Somarathna et al., 2022), making it an ideal setting to explore whether emotions bias or reinforce moral reasoning. Yet, it remains unclear whether decisions made in VR follow the same cognitive and emotional pathways as those in non-immersive contexts, or whether immersion alters accountability perceptions and ethical outcomes. As organizations increasingly deploy VR for training and scenario-based learning, understanding its effect on ethical decision-making is both timely and necessary.

To address this gap, this research investigates the following research question:

Do emotional shifts elicited through VR influence employees' (un)ethical decision-making?

By examining how emotional shifts triggered by VR experiences affect moral behavior – and how these effects may vary across hierarchical positions– this study bridges insights from behavioral ethics, affective science, and IS research. The findings aim to advance theoretical models of ethical decision-making while offering practical guidance for the design of VR-based organizational training and ethical interventions.

1.2. Research design

Having outlined the research motivation and guiding questions from the identified gaps, the next step is to present the research design, which specifies how these questions will be empirically investigated and theoretically addressed.

This dissertation employs a quantitative experimental methodology in laboratory settings to test the propositions related to the three research questions within an organizational context. Specifically, it examines how varying levels of immersive technology influence emotional responses and ethical behavior among individuals with different levels of managerial power. The aim is to identify the causal relationship between immersive emotional elicitation and participant behavior, thereby providing a stronger understanding of the role of power in emotionally charged decision-making.

An experimental design was chosen because it allows for controlled manipulation of independent variables, random assignment to conditions, and systematic observation of outcomes. These features make it especially well-suited to test causal hypotheses in a structured and replicable way. A between-subjects design was employed, as participants' emotional states were assessed before and after exposure to a virtual stimulus, making repeated-measures designs less appropriate. Moreover, this design mirrors real-world decision-making scenarios and enhances external validity by avoiding anchoring effects (Charness et al., 2012).

Participants were recruited from diverse industries, organizations, and hierarchical levels. Following McAllister and Bigley (2002), recruitment targeted varied organizational contexts to minimize situational and contextual biases. The central classification variable was **managerial power**: individuals holding positions within their company's top management team (TMT) were categorized as *managers*, while mid-level managers and employees without supervisory responsibilities were categorized as *non-managers*. Within this framework, participants were randomly assigned to the treatment groups. The final sample consisted of 267 individuals across all treatments, including 104 managers.

Two complementary studies were conducted. The first investigated how VR influences emotional ambivalence and whether power dynamics shape differences in emotional ambivalence at the group level. The second examined how VR-induced emotions affect

ethical behavior at the individual level. Both studies applied experimental conditions that varied in immersion and video content to capture these distinct but related phenomena.

Data collection spanned twenty-three sessions between February and June 2022, with each session lasting approximately nine minutes per participant.

1.3. Research contributions

The empirical analysis of the experimental data advances our understanding of VR in management research and highlights the potential of current VR techniques as effective tools for examining how digital technologies influence individuals in organizational contexts. This dissertation makes several key contributions.

First, in the domain of emotional ambivalence, this study integrates perspectives from psychology and marketing –where emotions are actively elicited– into organizational research, which has often treated employees' emotions as exogenous. Here, emotions are framed not as external to organizations but as internal dynamics that companies can actively shape. Prior work on immersive technologies has largely overlooked the role of managerial power, despite its established importance in eliciting emotional responses. To our knowledge, this research is the first study to investigate the relationship between immersive emotional elicitation and managerial power. By employing rigorous experimental methods, the study examines how managerial power interacts with emotional responses, thereby opening a new line of inquiry at the intersection of VR, information systems, and emotional ambivalence.

Second, this study examines the relationship between VR, emotions, power dynamics, and ethical decision-making. Specifically, it investigates how VR-induced emotions affect managers and non-managers differently, and how these emotional pathways influence ethical behavior. Importantly, the data was collected from real managers and non-managers, enhancing the ecological validity of the findings.

Having outlined the key contributions of this dissertation, the following discussion presents the empirical **findings**, which provide the evidence base underpinning these contributions. VR is shown to effectively elicit emotions in employees. When happiness is induced, VR reduces emotional ambivalence more effectively than non-immersive methods, with individuals experiencing higher pre-existing ambivalence benefitting most from immersive experiences. The findings also reveal that managerial power attenuates emotional responses to VR, with those in higher-power roles showing weaker effects. Finally, results suggest that VR does not significantly influence ethical decision-making when happiness is elicited.

Finally, based on the findings, the following discussion explores their **implications** for scholarship and organizational practice.

At a theoretical level, the results are grounded in established frameworks. In relation to emotions and decision-making, three main models are particularly relevant: (1) the Affect Infusion model (Forgas, 1995), which posits that emotions influence decision-making, especially in difficult or unknown scenarios; (2) the Appraisal Tendency framework (Lerner & Keltner, 2000), which integrates motivational factors into cognitive processing; and (3) the "Feeling is for doing" model (Zeelenberg et al., 2008), which highlights emotional ambivalence, as the same emotion can produce different effects. With regard to power, the findings align with the Approach-Inhibition theory (Lerner & Keltner, 2000), which suggests that high-power individuals are more likely to experience positive emotions and act in an approach-oriented manner, whereas low-power individuals tend to experience negative affect and adopt more cautious, deliberate thinking. Lastly, in relation to emotions and (un)ethical decision-making, the results support the Cognitive-Affective model (Gaudine & Thorne, 2001), which demonstrates that emotional arousal and valence shape ethical decision-making. In particular, heightened positive arousal can enhance ethical awareness, promote more advanced reasoning, strengthen the consistency between moral judgment and action, and increase commitment to ethical behavior.

For organizational practice, the findings emphasize the value of considering managerial power when implementing immersive technologies. VR can effectively reduce emotional ambivalence –particularly among non-managers– which can foster openness to change, greater engagement, and improved job satisfaction. Positive emotional states, such as happiness, can also enhance decision-making in complex or ambiguous contexts, while reductions in fear may increase confidence, cognitive flexibility, and balanced risk-taking. For managers, whose emotional profiles remain more stable in immersive contexts, VR may be best applied in strategic simulations, leadership training, and resilience development. For non-managers, VR offers a stronger emotional impact, making it valuable for immersive learning and engagement. Organizations should tailor VR applications to hierarchical roles, as uniform approaches may reduce effectiveness or even prove counterproductive. These insights carry practical relevance for HR, leadership development, and training design. Integrating emotionally intelligent VR experiences can improve collaboration, retention, and scenario-based decision-making –particularly for remote and hybrid teams. However, in high-pressure environments, lowering emotional

ambivalence through VR may reduce creativity and innovative thinking, requiring careful implementation.

At the policy level, these results point to the need for ethical governance frameworks that address the emotional influence of immersive technologies. Beyond data privacy and security, regulation should ensure psychological safety, transparency of use, and informed consent. Given VR's potential to shape emotions and behavior, especially among those with less organizational power, responsible adoption is essential to ensure employees' well-being and fairness.

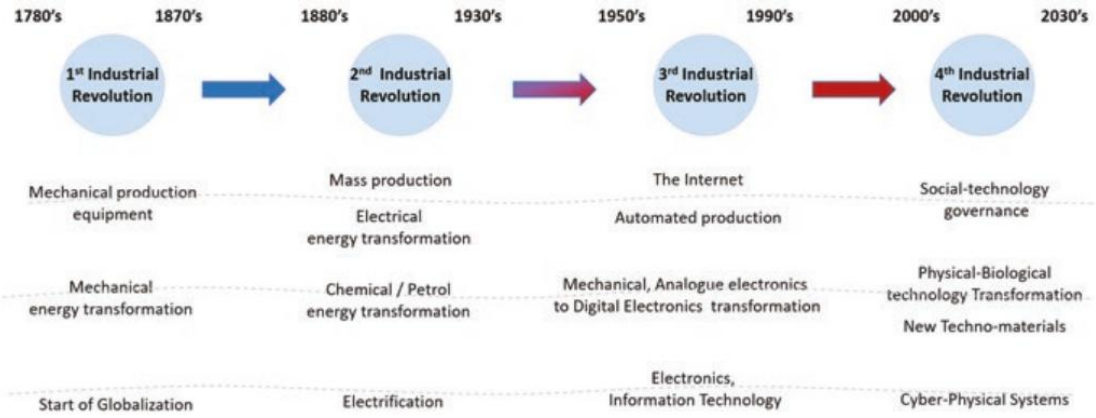
1.4. Research outline

This dissertation is organized into ten chapters. Chapters 1 and 2 present the introduction and summary –including the research motivation, questions, design, contributions, and structure– in both English and Spanish. Chapter 3 outlines the general framework, establishing the broader context of the research. Chapter 4 presents the conceptual models underpinning the two experimental studies conducted. Chapters 5 and 6 cover the methodological approach and empirical findings, detailing the experimental design, variables, and results for each study. Chapter 7 provides a comprehensive discussion of the key findings, interpreting their implications in relation to existing literature. Chapter 8 summarizes the main conclusions of the research, including managerial and policy implications. Finally, the last chapters address the study's limitations and propose directions for future research. The document ends with the Bibliography and Appendix.

2. *Introducción y Resumen*

La Cuarta Revolución Industrial está remodelando la forma en que las organizaciones operan, introduciendo desafíos tecnológicos, organizativos y de gestión sin precedentes (Horváth & Szabó, 2019) (ver Figura 1). La tecnología ha impulsado de manera constante los límites de lo que puede lograrse (Ashta & Biot-Paquerot, 2018). Actualmente, los rápidos avances en la tecnología están impulsando transformaciones a nivel mundial, trayendo consigo oportunidades significativas junto con desafíos sustanciales. A diferencia de las revoluciones industriales del pasado, las nuevas tecnologías y las innovaciones se están propagando más rápido que nunca, cambiando los sistemas económicos y la estructura social (Schwab, 2024).

Figura 1: *Las diferentes Revoluciones Industriales*



Fuente: (Skilton & Hovsepian, 2018).

Desde las tecnologías inteligentes y la automatización hasta la realidad virtual (VR) y la inteligencia artificial (IA), la innovación digital está transformando no solo cómo funcionan las empresas, sino también cómo gestionan e involucran a sus empleados (S. Kim et al., 2021). Las tecnologías evolucionan continuamente, y las compañías deben adaptar sus modelos de negocio para mantenerse competitivas frente a la disrupción constante. Sorprendentemente, mientras que las capacidades técnicas de estas innovaciones están bien documentadas, se comprende mucho menos cómo las organizaciones y los empleados pueden adaptarse con éxito al cambio tecnológico disruptivo (Ferreira et al., 2019; Trenerry et al., 2021). La participación activa de los empleados en el proceso de cambio a menudo se pasa por alto (Cetindamar et al., 2021). Appio et al. (2021) hacen un llamado a la investigación sobre cómo las empresas y las industrias compiten y organizan la innovación en una era digital, cómo las tecnologías

digitales remodelan el desarrollo de productos y servicios, y cómo la transformación digital afecta la gestión de las personas y los equipos que impulsan la innovación. En este contexto, las compañías no solo deben rediseñar estrategias y procesos, sino también abordar cómo las tecnologías emergentes interactúan con las emociones, decisiones y desempeño de los empleados. En este contexto, las compañías no solo deben rediseñar estrategias y procesos, sino también abordar cómo las tecnologías emergentes interactúan con las emociones, decisiones y desempeño de los empleados. Entender el comportamiento organizacional requiere examinar los mecanismos que influyen en la toma de decisiones y el comportamiento de las personas, los cuales están estrechamente vinculados a la cognición y las emociones (Ashkanasy et al., 2017). En este contexto, las empresas enfrentan el doble desafío de adoptar nuevas tecnologías y gestionar su impacto humano. Para seguir siendo competitivas, no solo deben rediseñar estrategias y procesos, sino también abordar cómo innovaciones como la VR interactúan con las emociones, la toma de decisiones y el desempeño de los empleados.

Analizar la toma de decisiones organizacional requiere más que modelos racionales; también exige el reconocimiento de los atajos cognitivos que las personas emplean instintivamente. La economía del comportamiento, que se basa en gran medida en el concepto de racionalidad limitada de Herbert A. Simon, explica que los individuos rara vez toman decisiones perfectamente racionales debido a limitaciones cognitivas y restricciones ambientales (Simon, 1997). En su lugar, se apoyan en dos sistemas cognitivos complementarios: el Sistema 1, que es rápido, intuitivo y moldeado por la experiencia y la biología, y el Sistema 2, que es más lento, basado en reglas y más deliberado (Evans, 2008; Kahneman, 2011). Dentro de este marco de doble proceso, las heurísticas –atajos mentales que simplifican el juicio al ignorar cierta información – desempeñan un papel central (Gigerenzer & Gaissmaier, 2011).

En entornos directivos y organizativos, las heurísticas pueden ser altamente adaptativas, permitiendo que líderes y empleados tomen decisiones oportunas en contextos complejos e inciertos. Sin embargo, también pueden introducir sesgos sistemáticos, que a veces conducen a resultados subóptimos o incluso perjudiciales. La literatura identifica varias categorías de heurísticas relevantes para los sistemas de información (IS) y la toma de decisiones empresariales, incluyendo la heurística de disponibilidad (confiar en información fácilmente recordada) (Schwarz et al., 1991; Tversky & Kahneman, 1973), la heurística de representatividad (juzgar la probabilidad basándose en la similitud con un

prototipo) (Kahneman & Frederick, 2002; L.-H. Lim & Benbasat, 1997), la heurística cognitiva o de anclaje (basar juicios en un punto de referencia inicial) (Bauer & Gill, 2024; Epley & Gilovich, 2006; Tversky & Kahneman, 1974), la heurística del esfuerzo (valorar resultados en función del esfuerzo percibido) (Kruger et al., 2004), la heurística de reconocimiento (preferir opciones familiares) (Goldstein & Gigerenzer, 2002; Pohl, 2006), y la heurística afectiva (reflejar la tendencia a emitir juicios basados en reacciones emocionales asociadas a experiencias pasadas o representaciones mentales de un objeto, evento o tecnología) (Finucane et al., 2000; Slovic et al., 2002, 2007). Si bien todas estas heurísticas influyen en la toma de decisiones en contextos mediados por la tecnología, la *heurística afectiva* merece especial atención en esta investigación, ya que las emociones son un área destacada en los estudios organizativos (Elfenbein, 2007).

En el ámbito de los sistemas de información, las heurísticas afectivas influyen en una amplia gama de comportamientos –desde confiar en la automatización y compartir datos personales hasta adoptar herramientas de IA o interactuar con entornos virtuales (Adjerid et al., 2018; Kehr et al., 2015; Shin, 2024). Por ejemplo, la disposición de los usuarios a divulgar información privada puede depender más de los sentimientos positivos asociados a una aplicación móvil que de las evaluaciones objetivas de seguridad de datos (Kehr et al., 2015). De manera similar, las percepciones sobre tecnologías emergentes como la realidad virtual pueden estar moldeadas por el tono emocional de experiencias previas, eclipsando potencialmente las especificaciones técnicas o los análisis de costo-beneficio (Slater, 2018).

Comprender las heurísticas afectivas es crucial desde una perspectiva organizativa por dos razones. Primero, las emociones pueden acelerar la toma de decisiones en entornos de alta presión, como negociaciones gerenciales o gestión de crisis, proporcionando señales rápidas basadas en la experiencia (Arnott & Gao, 2022). Segundo, pueden sesgar los juicios de maneras que refuercen preferencias o puntos ciegos existentes, por ejemplo, al evaluar nuevas tecnologías (Slovic et al., 2007). El desafío para las organizaciones es aprovechar la velocidad y eficiencia de la toma de decisiones afectiva sin caer en sus distorsiones.

En entornos digitales de rápido cambio, donde los empleados interactúan con sistemas de información complejos, las heurísticas afectivas pueden moldear las decisiones estratégicas de manera sutil pero potente (Trujillo, 2018). Tomando esto en cuenta, este estudio combina ideas de la economía del comportamiento, la psicología y la

investigación en sistemas de información para ver cómo las emociones, ya sean previas o causadas por la tecnología, afectan las decisiones en las organizaciones. Este enfoque prepara el terreno para examinar el papel más profundo de las emociones en los contextos laborales, yendo más allá de las heurísticas para comprender cómo estados afectivos específicos, como la felicidad o el miedo, operan dentro de las estructuras organizativas e influyen en los resultados éticos y estratégicos. Si las heurísticas explican *cómo* se toman decisiones bajo limitaciones cognitivas, las emociones aportan información sobre *por qué* ciertas elecciones resultan atractivas o aversivas en primer lugar. La relación entre heurísticas y emociones ha sido explorada a través de teorías como el modelo de Infusión del Afecto ("*Affect Infusion model*") (Forgas, 1995) y el modelo de Elección Imbuida de Emoción ("*Emotion-Imbued Choice model*") (Lerner et al., 2015).

Las emociones en las organizaciones son más que sentimientos pasajeros; son procesos dinámicos que influyen en la cognición, el comportamiento y el desempeño en múltiples niveles –desde el individual hasta el grupal y toda la organización (Elfenbein, 2007; Frijda, 1986). El proceso emocional a menudo comienza a nivel intrapersonal, donde un individuo encuentra un estímulo, interpreta su significado y experimenta un estado fisiológico y psicológico (Elfenbein, 2007). Estas respuestas internas pueden luego manifestarse en expresiones externas, que a su vez se convierten en estímulos para otros, poniendo en marcha un intercambio emocional interpersonal (Elfenbein, 2007). Con el tiempo, estas interacciones a nivel micro escalan, moldeando el desempeño y la satisfacción laboral (Weiss & Cropanzano, 1996).

Aunque el modelo circunflejo del afecto de Russell (1980), ampliamente citado, identifica veintiocho estímulos relacionados, el afecto se clasifica a lo largo de dos dimensiones: la valencia, que refleja la cualidad positiva o negativa de una experiencia, y la activación ("*arousal*"), que indica el nivel de activación, desde alto (por ejemplo, excitación) hasta bajo (por ejemplo, calma). Juntas, estas dimensiones proporcionan un marco para evaluar el afecto en tanto que moldea "actos reflejos de influencia, percepción, cognición y comportamiento" (Russell, 2003, p. 145).

La investigación sobre emociones en el lugar de trabajo a menudo distingue entre afecto positivo y negativo, ya que cada uno influye de manera diferente en la toma de decisiones y en la cooperación (Isen, 1987). Entre las emociones positivas, la felicidad ocupa un lugar especial. Definida como un estado psicológico placentero que abarca emociones como la alegría y la satisfacción (Fisher, 2010), la felicidad puede existir a nivel

transitorio, individual o grupal. Además, la felicidad es vista como una emoción duradera, ligada a la ética y la virtud, y por eso afecta nuestro juicio. En cambio, la alegría es más instantánea y pasajera y no parece tener implicaciones morales o éticas (Cottrell, 2016).

A nivel organizativo, la felicidad se ha asociado con una mayor productividad (Fang et al., 2025; Gavin & Mason, 2004), una cooperación más sólida, mejor resolución de problemas y una mayor dependencia de la toma de decisiones intuitiva (Isen, 1987, 2001). Los empleados felices tienden a mostrar mayor compromiso, un mejor desempeño laboral, menores intenciones de rotación y una reducción de los comportamientos contraproducentes (A. Thompson & Bruk-Lee, 2021). Es importante destacar que la investigación sugiere que los directivos, independientemente del género, tienden a reportar niveles de felicidad más altos que los no-directivos, posiblemente debido a factores como la satisfacción con la vida y la gratificación recibida (Martin et al., 2024).

En el otro extremo del espectro, las emociones negativas como la ira, el miedo y la tristeza también moldean la vida organizativa, a menudo de maneras complejas. Por ejemplo, la ira, aunque típicamente asociada con el conflicto y la reducción de la satisfacción, a veces puede impulsar una adaptación positiva cuando se canaliza de manera constructiva (Geddes et al., 2020; Gibson & Callister, 2010). El miedo, por el contrario, tiende a aumentar la aversión al riesgo, fomentar el pesimismo y conducir a comportamientos de retraimiento, pero también puede alentar acciones positivas, como completar tareas o perseguir metas (Bugdol & Nagody-Mrozowicz, 2020; Pustovit et al., 2024).

Se requieren nuevos métodos de trabajo, que podrían afectar a los trabajadores tanto de manera positiva como negativa. Asimismo, la mayoría de las personas sienten emociones positivas y negativas al mismo tiempo, lo que se conoce como *ambivalencia emocional*, (Fong, 2006; Larsen et al., 2001; Rothman et al., 2017). Esta ambivalencia ha demostrado impactar en la toma de decisiones y en el desempeño (Fong, 2006; Pratt & Rosa, 2003; Rothman, 2011; Rothman & Wiesenfeld, 2007). Aunque la ambivalencia emocional está bien reconocida en la psicología y comienza a atraer interés en la investigación en gestión, ha recibido poca atención en otros dominios, incluidos los estudios de tecnología. Las perspectivas teóricas clave sobre la ambivalencia emocional y la toma de decisiones incluyen el marco de las Tendencias de Evaluación ("*Appraisal Tendency Framework*") (Lerner & Keltner, 2000, 2001) y el modelo "Sentir es para actuar" ("*Feeling is for Doing*") (Zeelenberg et al., 2008).

De manera crucial, las emociones en las organizaciones no son solo variables operativas; también tienen consecuencias morales. La toma de decisiones éticas está fuertemente moldeada por estados afectivos, apoyando la idea de que el razonamiento moral es a menudo intuitivo y emocionalmente impulsado, más que puramente racional (Haidt, 2001, 2003). El modelo Cognitivo Afectivo ("*Cognitive Affective model*") (Gaudine & Thorne, 2001) enfatiza que ciertos estados emocionales pueden moldear el proceso de toma de decisiones éticas al aumentar la conciencia de los problemas morales, fomentar un razonamiento moral de mayor nivel, guiar elecciones que reflejen dicho razonamiento y alentar la ejecución de las decisiones. Este modelo propone que los individuos que sienten activación y afecto positivo son más propensos a resolver dilemas éticos utilizando marcos morales avanzados. Además, el modelo Integrado de Toma de Decisiones Éticas ("*Integrated Ethical Decision-making model*") (Schwartz, 2016) integra la emoción y la intuición en el proceso ético.

Sin embargo, la investigación experimental ofrece resultados mixtos relacionados con el impacto de las emociones en la toma de decisiones éticas. Por ejemplo, las emociones positivas se han vinculado con inclinaciones autodeclaradas a justificar y minimizar acciones poco éticas (Rainone et al., 2021). Por otro lado, inducir felicidad con VR resultó en un aumento del comportamiento honesto (Medai & Noussair, 2021). Emociones negativas como la culpa o la vergüenza pueden promover acciones reparadoras (Levine, 2010; Van Kleef et al., 2004; Van Kleef & Lange, 2020).

Ampliando el vínculo entre emociones y toma de decisiones, la investigación destaca el papel de los contextos situacionales y sociales –particularmente las jerarquías organizativas, como el poder directivo– en moldear las experiencias emocionales (Levine, 2010; Van Kleef & Lange, 2020). Mientras que la mayoría de las investigaciones enfatizan la valencia emocional, las teorías del autoconcepto y de la autoestima organizacional sugieren que el poder dentro de las organizaciones fomenta emociones positivas al mejorar la autoestima y la autoeficacia (Diener et al., 2010; A. K. Korman, 1970; Pierce & Gardner, 2004). Desde un punto de vista neurológico, el poder activa actitudes orientadas a objetivos y sensibilidad a las recompensas a través del Sistema de Aproximación Conductual ("*Behavioral Approach System*"*)* (Guinote, 2017). Además, la teoría de Aproximación-Inhibición *(*"*Approach-Inhibition theory*") (Keltner et al., 2003) explica cómo el poder afecta las emociones: las personas con más poder suelen mostrar sentimientos positivos, están más abiertas a las recompensas y toman más iniciativa,

mientras que aquellas con menos poder a menudo sienten emociones negativas, son más sensibles a las amenazas y frenan sus acciones (C. Anderson & Berdahl, 2002). Estudios recientes amplían esta perspectiva a la gestión estratégica, mostrando que el poder de los altos directivos promueve el optimismo, la toma de riesgos y el compromiso en contextos como la transformación digital (Z. Zhang et al., 2024). Basándose en la teoría de aproximación-inhibición del poder, esta tesis examina cómo los roles directivos influyen en la expresión emocional y el comportamiento, probando si los directivos, debido a su orientación de aproximación, son más propensos a exhibir respuestas emocionales positivas y proactivas, mientras que los no-directivos muestran patrones más inhibidos y cautelosos.

Si bien las teorías de emoción y poder destacan cómo los roles organizativos moldean la toma de decisiones, es igualmente importante considerar cómo la tecnología puede usarse para estudiar sistemáticamente estos procesos. En particular, la realidad virtual ofrece una oportunidad única para inducir emociones en entornos controlados pero realistas, proporcionando una herramienta valiosa para examinar su impacto en las elecciones éticas y estratégicas.

La realidad virtual ha emergido como una tecnología potente para simular entornos realistas o imaginados que provocan fuertes respuestas emocionales, siendo la tecnología inmersiva más popular (ver Figura 4). A diferencia de la realidad aumentada (AR) y la realidad mixta (MR), la VR proporciona inmersión total y una mayor sensación de presencia, lo que la hace particularmente efectiva para estudiar emociones en contextos controlados y realistas (Cummings & Bailenson, 2016; Slater & Wilbur, 1997). Los avances en los visores de cabeza ("*head-mounted displays"*, HMDs) han hecho que la VR inmersiva sea más accesible, permitiendo aplicaciones que van más allá del juego (Ramachandran et al., 2025) hacia la educación y la salud (por ejemplo, Bell et al., (2024)), y la capacitación organizativa (por ejemplo, Chang et al., (2024)). Compañías como Airbus, Siemens, Kimberly-Clark, Volvo, Delta Air Lines y UPS ya están aprovechando la VR para capacitación, diseño y colaboración (Boyd & Koles, 2019).

Estudios empíricos muestran que la VR puede inducir de manera confiable tanto emociones positivas como negativas, al involucrar procesos sensoriales y cognitivos, a menudo con mayor intensidad que los métodos no inmersivos (Baños et al., 2006; Felnhofer et al., 2015; Kako et al., 2023; Medai & Noussair, 2021). Esto convierte a la VR no solo en una herramienta de investigación eficaz para la inducción emocional, sino

también en un medio práctico para desarrollar competencias sociales, conductuales y éticas en contextos organizativos (Ronaghi, 2024; Sholihin et al., 2020). A pesar de su creciente adopción, la mayor parte de la investigación en VR sigue concentrada en campos como la terapia y la informática afectiva general, con poca atención a la gestión y a la toma de decisiones, que sigue siendo un ámbito poco explorado (Magalhães et al., 2023).

Por lo tanto, el objetivo principal de esta investigación es comprender el impacto de la tecnología VR en las emociones y en la toma de decisiones éticas de directivos y no-directivos.

2.1. Motivación y preguntas de investigación

En conjunto, la literatura muestra que la realidad virtual (VR) ofrece una lente potente para examinar la intersección de la tecnología, las emociones y el comportamiento organizativo. Estudios previos han demostrado que las heurísticas, los estados emocionales y las dinámicas jerárquicas desempeñan un papel en la configuración de la toma de decisiones, aunque persisten preguntas importantes sin resolver. En particular, se sabe poco acerca de cómo las heurísticas afectivas se traducen en contextos de sistemas de información (IS), cómo las emociones preexistentes influyen en las experiencias de VR, cómo el poder directivo moldea las respuestas afectivas inducidas por la VR y cómo los cambios emocionales en entornos de VR impactan en la toma de decisiones éticas. Estos "*gaps*" de investigación limitan tanto el avance teórico en sistemas de información (IS) como la orientación práctica para las organizaciones que adoptan tecnologías inmersivas. En general, el impacto de las heurísticas afectivas en la investigación en sistemas de información sigue estando poco estudiado en comparación con las heurísticas en la economía del comportamiento.

A pesar del creciente reconocimiento del afecto en la toma de decisiones, la aplicación de las heurísticas afectivas en la investigación en IS sigue estando significativamente poco explorada en comparación con su amplia examinación en la economía del comportamiento. La heurística afectiva –donde los individuos emiten juicios basados en reacciones emocionales vinculadas a experiencias previas– ha sido fundamental para comprender los sesgos en la toma de decisiones en economía (Finucane et al., 2000; Slovic et al., 2002, 2007). En contraste, la investigación en IS ha privilegiado tradicionalmente los modelos racionales y cognitivos, dejando relativamente desatendidas las dimensiones emocionales y experienciales (Arnott & Gao, 2022). Este "*gap*" es particularmente notable dado que los contextos mediados por la tecnología son altamente susceptibles a juicios impulsados por el afecto. A medida que las organizaciones adoptan cada vez más herramientas digitales, realidades virtuales, algoritmos y sistemas autónomos, los usuarios suelen evaluar estas tecnologías a través de lentes emocionales –ya sea confiando en la automatización, revelando datos personales o interactuando con interfaces de IA.

Estudios experimentales en IS han demostrado que el afecto puede influir en decisiones relacionadas con la privacidad (Adjerid et al., 2018; Dinev et al., 2015), el intercambio

de datos de los móviles (Kehr et al., 2015), la adopción de IA (Constantiou et al., 2014), el intercambio de conocimiento (Fehrenbacher, 2017), las inversiones en tecnología (Park et al., 2016), la participación en mercados electrónicos (Teubner et al., 2015), la automatización de sistemas como en la aviación (Gao et al., 2025), y las interacciones en redes sociales (Yu et al., 2015). A pesar de esto, las heurísticas afectivas no se han integrado de manera sistemática en las teorías de IS ni en los esquemas de diseño. El dominio de los modelos racionales en IS ha ralentizado la incorporación de constructos afectivos, a pesar de la creciente evidencia de que las respuestas emocionales moldean significativamente el uso y la aceptación de la tecnología.

Para abordar esta limitación, se necesita una investigación más enfocada que incorpore las heurísticas afectivas en los fundamentos teóricos de los sistemas de información y explore sus implicaciones prácticas en torno a tecnologías emergentes como la VR. Por lo tanto, proponemos la siguiente **motivación** de investigación:

¿Cómo influyen las heurísticas afectivas en las emociones y en la toma de decisiones éticas de un individuo al utilizar tecnologías emergentes de sistemas de información, como la realidad virtual?

Explorar esta motivación cerraría "*gaps*" de investigación significativos de cuatro maneras diferentes. Primero, la investigación avanzaría el desarrollo teórico en sistemas de información al integrar explícitamente las heurísticas afectivas en los modelos dominantes, desafiando el enfoque tradicional en los marcos de toma de decisiones racionales y cognitivas. Segundo, ofrecería una contribución práctica al generar perspectivas que ayuden a los diseñadores de sistemas y a las organizaciones a crear tecnologías que tengan en cuenta los juicios emocionales en los que los usuarios confían al interactuar con herramientas digitales. Tercero, el estudio proporcionaría valor empírico al examinar cómo los atajos impulsados por el afecto moldean decisiones reales –como confiar en recomendaciones de IA, adoptar la VR o revelar datos personales– bajo condiciones de incertidumbre y presión de tiempo. Cuarto, la exploración es oportuna y relevante, dado el rápido auge de las tecnologías inmersivas y algorítmicas. Comprender el papel de las heurísticas afectivas permitirá tanto a investigadores como a profesionales anticipar barreras de adopción y construir intervenciones que aumenten la confianza.

Esta motivación permite tanto enfoques experimentales (como estudios de laboratorio y de campo que midan afecto, confianza y comportamiento) como contribuciones teóricas (como la incorporación de las heurísticas afectivas en los marcos de IS) con el fin de abordar los tres "*gaps*" de investigación identificados:

"*Gap*" de investigación 1) El impacto de los estados emocionales iniciales antes de la inducción con VR sigue estando insuficientemente explorado en la literatura existente.

La mayoría de la investigación en IS examina las respuestas emocionales *durante* o *después* de las interacciones con la tecnología (por ejemplo, Beaudry & Pinsonneault (2005, 2010), pero se ha prestado mucha menos atención a las emociones que los usuarios llevan consigo *antes* de interactuar con los sistemas de TI. Las emociones preexistentes pueden moldear cómo los individuos interpretan, interactúan y se adaptan a nuevas tecnologías, sin embargo, esta dimensión ha sido en gran medida pasada por alto. Dado que las respuestas emocionales desempeñan un papel central en la determinación de actitudes, comportamientos y estrategias de adaptación (Darban & Polites, 2016; Gerli et al., 2022), ignorar las emociones presentes antes de la interacción con TI deja un "*gap*" crítico en la investigación de IS.

Este "*gap*" se vuelve particularmente relevante en el contexto de la VR, donde la inmersión intensificada amplifica las respuestas emocionales en entornos controlados (Linares-Vargas & Cieza-Mostacero, 2024; Slater, 2018; Slater & Wilbur, 1997), ya que activa tanto reacciones fisiológicas automáticas como procesos cognitivos conscientes (Somarathna et al., 2022). Si bien el trabajo existente trata la emoción principalmente como un resultado de las experiencias de VR, se sabe poco sobre el efecto recíproco de los estados emocionales iniciales en las percepciones, juicios y comportamientos dentro de entornos inmersivos. Dada la sensibilidad aumentada de la VR a las señales emocionales y su capacidad para amplificarlas o transformarlas, pasar por alto los estados emocionales preexistentes implica perder un factor clave en la comprensión de las experiencias de los usuarios en VR. Además, considerando el papel creciente de la VR en la capacitación, la educación y la toma de decisiones, ignorar el afecto previo al estímulo implica perder un motor clave de la experiencia del usuario.

Esto motiva la siguiente pregunta de investigación:

¿Afectan los estados emocionales iniciales en la efectividad de la inducción emocional mediante VR?

Perspectivas de la investigación en TI sobre emociones anticipadas (Beaudry & Pinsonneault, 2005, 2010) sugieren que los estados afectivos preexistentes pueden moldear significativamente las experiencias de los usuarios con nuevas tecnologías. Perspectivas psicológicas destacan que el tipo y el reconocimiento de los estímulos, así como la forma en que se evalúan las emociones, afectan la fuerza de la inducción emocional (Bornstein, 1989), mientras que evidencia de la neurociencia afectiva muestra que las emociones positivas y negativas siguen patrones fisiológicos distintos (Phaf & Rotteveel, 2012). Además, el marco de las Tendencias de Evaluación ("*Appraisal Tendency Framework*") (Lerner & Keltner, 2000) explica cómo emociones específicas poseen propiedades motivacionales que persisten en el tiempo e influyen en juicios y decisiones posteriores. En conjunto, estos hallazgos apuntan a la posibilidad de que los estados emocionales iniciales de los usuarios puedan modular tanto la intensidad como la dirección de sus respuestas emocionales en VR, representando una dimensión pasada por alto pero crítica en la investigación de IS.

"*Gap*" de investigación 2) El impacto del poder directivo en las respuestas emocionales impulsadas por la realidad virtual sigue poco explorado.

Las emociones en las organizaciones se moldean no solo por los rasgos individuales sino también por factores sociales y contextuales, como el poder directivo (Levine, 2010; Van Kleef & Lange, 2020). La Teoría de Aproximación–Inhibición (Keltner et al., 2003) sugiere que el poder fomenta estados emocionales orientados a la aproximación –como emociones positivas, optimismo y confianza– mientras que la falta de poder engendra cautela y sensibilidad a las amenazas. Aplicada a la gestión estratégica, esta perspectiva explica por qué los directivos suelen ser más proactivos al impulsar la transformación digital (Z. Zhang et al., 2024).

A pesar del uso creciente de la VR para la inducción emocional en entornos experimentales, la mayoría de los estudios se basan en muestras de estudiantes, con poca atención a la diversidad organizativa, como revisaremos en esta investigación.

Hasta donde sabemos, ninguna investigación sistemática ha examinado cómo difieren las emociones inducidas por la VR entre directivos y no-directivos, dos grupos que probablemente procesen los estímulos inmersivos de manera diferente debido a variaciones en roles, responsabilidades y grado de poder directivo que ejercen.

Esta investigación busca por lo tanto abordar este "*gap*" examinando si la VR impacta de manera diferente en las emociones de directivos y no-directivos. Específicamente, la pregunta de investigación plantea:

¿Influye la VR de manera diferente en las emociones de directivos y no-directivos?

Esta pregunta se apoya en conceptos como la teoría del Autoconcepto ("*Self-Concept theory*") (A. K. Korman, 1970), la teoría de la Autoestima Basada en la Organización ("*Organizational-Based Self-Esteem*") (Pierce & Gardner, 2004) y el Sistema de Enfoque Conductual ("*Behavioral Approach System*") (Guinote, 2017), que en conjunto sugieren que los roles directivos están asociados con una mayor autoestima, optimismo y sensibilidad a las recompensas, mientras que los roles de menor poder fomentan la cautela y la inhibición.

Al extender estas ideas al contexto de la VR, la tesis plantea la hipótesis de que los directivos, que ya experimentan niveles de base relativamente más altos de emociones positivas debido a su poder percibido y mentalidad orientada a la aproximación, mostrarán un menor impacto cuando se expongan a una VR que induzca felicidad. En contraste, se espera que los no-directivos, que parten de niveles de base más bajos de felicidad en comparación con tecnologías no inmersivas, experimenten un cambio emocional positivo más fuerte a través de la VR.

"*Gap*" de investigación 3) La influencia de la VR inmersiva en los procesos de toma de decisiones éticas sigue estando poco explorada en la investigación de IS.

Si bien las decisiones éticas se han estudiado tradicionalmente a través de modelos racionales de juicio, un cuerpo emergente de literatura enfatiza el papel central de la emoción en el moldeamiento del comportamiento moral (por ejemplo, Eisenberg (2000) y el modelo Cognitivo Afectivo de Gaudine y Thorne (2001)). La investigación muestra que los juicios morales están fuertemente guiados por la intuición emocional, las señales sociales y los estímulos ambientales más que por el razonamiento deliberado (Gaudine &

Thorne, 2001; Haidt, 2001, 2003). El afecto positivo, por ejemplo, se ha vinculado con niveles más altos de razonamiento moral (Rainone et al., 2021), mientras que la valencia y la orientación de los estados emocionales pueden sesgar decisiones hacia resultados éticos o no éticos. Además, según Escadas et al. (2024), niveles moderados de emociones positivas proporcionan el terreno más favorable para juicios y acciones éticas. Sus hallazgos destacan que las emociones positivas impulsan resultados éticos principalmente al moldear las intenciones éticas, con un efecto menor pero aún significativo sobre el comportamiento ético, subrayando su papel central en el fomento de la ética del consumidor.

Sin embargo, el papel de la emoción en contextos mediados por tecnología como la realidad virtual sigue siendo insuficientemente estudiado. La VR es especialmente adecuada para esta investigación: puede inducir emociones profundas bajo condiciones controladas y realistas (Dozio et al., 2024; Somarathna et al., 2022), lo que la convierte en un entorno ideal para explorar si las emociones sesgan o refuerzan el razonamiento moral. Sin embargo, aún no está claro si las decisiones tomadas en VR siguen las mismas rutas cognitivas y emocionales que aquellas en contextos no inmersivos, o si la inmersión altera las percepciones de responsabilidad y los resultados éticos. A medida que las organizaciones implementan cada vez más la VR para capacitación y aprendizaje basado en escenarios, comprender su efecto en la toma de decisiones éticas es tanto oportuno como necesario.

Para abordar este "*gap*", esta investigación indaga la siguiente pregunta de investigación:

¿Influyen los cambios emocionales provocados mediante la realidad virtual en la toma de decisiones (no) éticas de los empleados?"

Al examinar cómo los cambios emocionales desencadenados por experiencias en VR afectan el comportamiento moral –y cómo estos efectos pueden variar a través de las posiciones directivas– este estudio une perspectivas de la ética del comportamiento, la ciencia afectiva y la investigación en IS. Los hallazgos quieren mejorar los modelos teóricos de la toma de decisiones éticas y también dar consejos prácticos para el diseño de programas de capacitación organizativa basados en VR y enfoques éticos.

2.2. Diseño de la investigación

Habiendo expuesto la motivación de la investigación y las preguntas derivadas de los "*gaps*" identificados, el siguiente paso es presentar el diseño de la investigación, que especifica cómo estas preguntas serán investigadas empíricamente y abordadas teóricamente.

Esta tesis emplea una metodología experimental cuantitativa en entornos de laboratorio para poner a prueba las proposiciones relacionadas con las tres preguntas de investigación dentro de un contexto organizativo. Específicamente, examina cómo diferentes niveles de tecnología inmersiva influyen en las respuestas emocionales y en el comportamiento ético de individuos con distintos niveles de poder directivo. El objetivo es identificar la relación causal entre la inducción emocional inmersiva y el comportamiento de los participantes, proporcionando así una comprensión más sólida del papel del poder en la toma de decisiones cargadas emocionalmente.

Se eligió un diseño experimental porque permite la manipulación controlada de variables independientes, la asignación aleatoria a condiciones y la observación sistemática de los resultados. Estas características lo hacen especialmente adecuado para probar hipótesis causales de manera estructurada y replicable. Se empleó un diseño entre sujetos, ya que los estados emocionales de los participantes fueron evaluados antes y después de la exposición a un estímulo virtual, lo que hacía menos apropiados los diseños de medidas repetidas. Además, este diseño refleja escenarios de toma de decisiones del mundo real y mejora la validez externa al evitar los efectos de anclaje (Charness et al., 2012).

Los participantes fueron reclutados de diversas industrias, organizaciones y niveles jerárquicos. Siguiendo a McAllister y Bigley (2002), el reclutamiento se dirigió a contextos organizativos variados para minimizar sesgos situacionales y contextuales. La variable central de clasificación fue el poder directivo: los individuos que ocupaban posiciones dentro del equipo de alta dirección ("*top management team"*, TMT) de su empresa fueron categorizados como directivos ("*managers*"), mientras que los directivos de nivel medio y los empleados sin responsabilidades de supervisión fueron categorizados como no-directivos ("*non-managers*"). Dentro de este marco, los participantes fueron asignados aleatoriamente a los grupos de tratamiento. La muestra final consistió en 267 individuos en total a lo largo de todos los tratamientos, incluyendo 104 directivos.

Se llevaron a cabo dos estudios complementarios. El primero investigó cómo la VR influye en la ambivalencia emocional y si las dinámicas de poder moldean las diferencias en la ambivalencia emocional a nivel de grupo. El segundo examinó cómo las emociones inducidas por la VR afectan el comportamiento ético a nivel individual. Ambos estudios aplicaron condiciones experimentales que variaban en inmersión y contenido de video para capturar estos fenómenos distintos pero relacionados.

La recolección de datos abarcó veintitrés sesiones entre febrero y junio de 2022, con cada sesión teniendo una duración aproximada de nueve minutos por participante.

2.3. Contribuciones de la investigación

El análisis empírico de los datos experimentales amplía nuestra comprensión de la realidad virtual (VR) en la investigación en gestión y resalta el potencial de las técnicas actuales de VR como herramientas eficaces para examinar cómo las tecnologías digitales influyen en los individuos en contextos organizativos. Esta tesis realiza varias **contribuciones** clave.

Primero, en el área de la ambivalencia emocional, este estudio integra perspectivas de la psicología y el marketing –donde las emociones se inducen activamente– en la investigación en organizaciones, que con frecuencia ha tratado las emociones de los empleados como exógenas (externas). Aquí, las emociones se enmarcan no como factores externos a las organizaciones, sino como dinámicas internas que las empresas pueden moldear activamente. El trabajo previo sobre tecnologías inmersivas ha pasado por alto en gran medida el papel del **poder directivo**, a pesar de su importancia establecida en la configuración de las respuestas emocionales. Hasta donde sabemos, esta investigación es el primer estudio en examinar la relación entre la inducción emocional inmersiva y el poder directivo. Al emplear métodos experimentales rigurosos, el estudio examina cómo el poder directivo interactúa con las respuestas emocionales, abriendo así una nueva línea de investigación en la conexión entre la VR, los sistemas de información y la ambivalencia emocional.

Segundo, este estudio examina la relación entre la VR, las emociones, las dinámicas de poder y la toma de decisiones éticas. Específicamente, investiga cómo las emociones inducidas por la VR afectan de manera diferente a directivos y no-directivos, y cómo estas vías emocionales influyen en el comportamiento ético. Es importante destacar que los datos fueron recolectados de directivos y no-directivos reales, lo que refuerza la validez ecológica de los hallazgos.

Habiendo expuesto las contribuciones clave de esta tesis, la discusión siguiente presenta los **resultados** empíricos, que proporcionan la base de evidencia que sustenta estas contribuciones. Se demuestra que la VR puede inducir eficazmente emociones en los empleados. Cuando se induce felicidad, la VR reduce la ambivalencia emocional de manera más efectiva que los métodos no inmersivos, beneficiando más a los individuos con niveles preexistentes más altos de ambivalencia. Los hallazgos también revelan que el poder directivo atenúa las respuestas emocionales a la VR, siendo los individuos en

roles de mayor poder quienes muestran efectos emocionales más débiles. Finalmente, los resultados sugieren que la VR no influye significativamente en la toma de decisiones éticas de los empleados cuando se induce felicidad.

Finalmente, sobre la base de los hallazgos, la discusión siguiente explora sus **implicaciones** para la academia y la práctica organizativa.

A nivel teórico, los resultados se sustentan en marcos establecidos. En relación con las emociones y la toma de decisiones, tres modelos principales son particularmente relevantes: (1) el modelo de Infusión del Afecto (Forgas, 1995), que postula que las emociones influyen en la toma de decisiones, especialmente en escenarios difíciles o desconocidos; (2) el marco de las Tendencias de Evaluación (Lerner & Keltner, 2000), que integra factores motivacionales en el procesamiento cognitivo; y (3) el modelo "Sentir es para actuar" (Zeelenberg et al., 2008), que resalta la ambivalencia emocional, dado que una misma emoción puede producir efectos diferentes. Con respecto al poder, los hallazgos se alinean principalmente con la teoría de Aproximación-Inhibición (Lerner & Keltner, 2000), que sugiere que los individuos con alto poder son más propensos a experimentar emociones positivas y a actuar de manera orientada a la aproximación, mientras que los individuos con bajo poder tienden a experimentar afecto negativo y a adoptar un pensamiento más cauteloso y deliberado. Por último, en relación con las emociones y la toma de decisiones (no) éticas, los resultados apoyan principalmente el modelo Cognitivo-Afectivo (Gaudine & Thorne, 2001), que demuestra que la activación emocional y la valencia moldean la toma de decisiones éticas. En particular, una activación positiva elevada puede aumentar la conciencia ética, promover un razonamiento más avanzado, reforzar la consistencia entre el juicio moral y la acción, y aumentar el compromiso con el comportamiento ético.

Para la práctica organizativa, los hallazgos enfatizan el valor de considerar el poder directivo al implementar tecnologías inmersivas. La VR puede reducir eficazmente la ambivalencia emocional –particularmente entre los no-directivos– lo que puede fomentar apertura al cambio, mayor compromiso y mejor satisfacción laboral. Los estados emocionales positivos, como la felicidad, también pueden mejorar la toma de decisiones en contextos complejos o ambiguos, mientras que la reducción del miedo puede aumentar la confianza, la flexibilidad cognitiva y la toma de riesgos equilibrada. Para los directivos, cuyos perfiles emocionales permanecen más estables en contextos inmersivos, la VR

puede aplicarse mejor a simulaciones estratégicas, formación en liderazgo y desarrollo de resiliencia. Para los no-directivos, la VR ofrece un impacto emocional más fuerte, lo que la convierte en una herramienta valiosa para el aprendizaje por inmersión y el compromiso. Las organizaciones deben adaptar las aplicaciones de VR a los roles jerárquicos, ya que enfoques uniformes pueden reducir la efectividad o incluso resultar contraproducentes. Estos hallazgos tienen relevancia práctica para recursos humanos, el desarrollo del liderazgo y el diseño de la capacitación. Integrar experiencias de VR emocionalmente inteligentes puede mejorar la colaboración, la retención y la toma de decisiones basadas en escenarios –particularmente en equipos remotos e híbridos. Sin embargo, en entornos de alta presión, reducir la ambivalencia emocional mediante la VR puede disminuir la creatividad y el pensamiento innovador, lo que requiere una implementación rigurosa.

A nivel de política organizacional, estos resultados señalan la necesidad de marcos de gobernanza ética que aborden la influencia emocional de las tecnologías inmersivas. Más allá de la privacidad y la seguridad de los datos, la regulación debe garantizar la seguridad psicológica, la transparencia en el uso y el consentimiento informado. Dado el potencial de la VR para moldear emociones y comportamientos, especialmente entre quienes tienen menos poder organizativo, su adopción responsable es esencial para salvaguardar el bienestar de los empleados y la equidad en el lugar de trabajo.

2.4. Estructura de la investigación

La tesis está organizada en diez capítulos. Los Capítulos 1 y 2 presentan la introducción y resumen -incluye la motivación de la investigación, las preguntas, el diseño, las contribuciones y la estructura- en inglés y español. El Capítulo 3 ofrece una revisión de la literatura que explica los modelos conceptuales que sustentan los dos estudios experimentales realizados. El Capítulo 4 presenta los modelos conceptuales que sustentan los dos estudios experimentales realizados. Los Capítulos 5 y 6 abordan el enfoque metodológico y los hallazgos empíricos, detallando el diseño experimental, las variables y los resultados de cada estudio. El Capítulo 7 ofrece una discusión exhaustiva de los principales hallazgos, interpretando sus implicaciones en relación con la literatura existente. El Capítulo 8 resume las conclusiones principales de la investigación, incluyendo las implicaciones de carácter gerencial y normativo. Finalmente, los últimos capítulos abordan las limitaciones del estudio y proponen orientaciones para futuras investigaciones. El documento concluye con la Bibliografía y Anexos.

3. *General framework*

This dissertation explores the emotional impact of Virtual Reality (VR) on individuals in different organizational roles, specifically comparing managers and non-managers through the lens of managerial power. The theoretical framework begins by outlining the concept of heuristics, with a focus on affect heuristics as a key mechanism linking emotion and decision-making. It then delves into the classification of emotions, their role in organizational contexts, and their influence on decisions –particularly in ethical scenarios and under varying levels of power. Building on this foundation, the framework examines how VR technologies affect emotional responses, considering the degree of immersion and their capacity to elicit emotions.

3.1. Heuristics

Understanding how and why people make decisions in economic environments is the focus of the study of behavioral economics. Behavioral economics reinforces decision-making in organizations and offers a thoroughly researched and well-validated framework in fields associated with management and information systems. It is important to clarify that an Information System (IS) is defined by how users interact with the Information Technology (IT) delivery system, emphasizing that the key strength lies in the fact that users are human beings rather than machines (Paul, 2007). The main areas of research in behavioral economics using IS include e-commerce, social and crowd computing, and IS use/adoption (Arnott & Gao, 2022).

Behavioral economics is based on the principle defined by the Nobel Prize winner Herbert A. Simon, whose studies have influenced areas such as information systems, economics, and cognitive psychology. Simon identified in 1955 that individuals are unable to make completely rational economic choices due to cognitive constraints (Simon, 1955). In particular, individuals make decisions using two cognitive systems: System 1 and System 2, which are associated with the dual process theory (Evans, 2008; Kahneman, 2011; Sloman, 1996). System 1 is quick, instinctive, automatic, effortless, and based on natural instinctive conduct shaped by experience and biology and motivated by general heuristics. Heuristics are conscious or unconscious actions that disregard part of the information, speeding up the analysis and saving effort in the decision-making

(Gigerenzer & Gaissmaier, 2011). On the other hand, System 2 is slow, rule-based, methodical, mindful, and cognitively demanding, formed through cultural and formal schooling. In the dual process theory, decision-making takes place within and across System 1 and System 2 (Arnott et al., 2017; Bhattacherjee & Sanford, 2006; Chaiken, 1980; Stanovich & West, 2000). Nearly any inductive rule would typically act as follows: first, it would sample both options in some ratio to approximate the likelihood of receiving a reward from each. Once the estimation error fell below a certain threshold, the agent would then consistently select the option with the greater reward probability (Simon, 1955). This notion of bounded rationality, originally developed by Herbert Simon, refers to the type of rationality that individuals or organizations rely on when the environment in which they operate is too complex relative to their limited cognitive abilities, especially when multiple, potentially conflicting, objectives are present (Dequech, 2001).

Behavioral economics theories provide valuable advice about how executives make decisions and how to better support them, as System 1 decision-making is prevalent among top management (Arnott & Gao, 2022). Vuori et al. (2024) highlighted the need for management and organizational scholars to focus more on: i) how individual-level heuristics develop, ii) how these heuristics scale up to influence organizational behavior, and iii) how an organization's set of heuristics changes over time.

Moreover, senior executives encounter decision-making tasks and environments that are significantly different from those faced by other managers and professionals, so adapting and taking quick decisions is key (Arnott, 2010; M. A. Carpenter et al., 2004). Decisions made in the firm with the support of business intelligence (BI) systems represent the most critical IT-enabled decisions within organizations, possessing the potential to significantly influence organizational success or failure. The use of heuristics is influenced by cognitive processes that may result in suboptimal decisions and, in rare instances, catastrophic outcomes.

The study of heuristics in behavioral economics reinforces decision-making in organizations and offers a thoroughly researched and well-validated framework in fields associated with different areas of management, such as information systems.

Although multiple categories of heuristics exist in organizations (Vuori et al., 2024), the six main categories that impact information systems, based on how decisions are made, are outlined by Arnott and Gao (2022) (see Table 1):

i) *Availability heuristic*: refers to decisions taken based on the instances that are available in the memory of the subjects. When influenced by the availability heuristic, individuals tend to base their decisions and judgments on how readily certain information or ideas come to mind. This effect is evident in individuals' judgments of the frequency of word categories, combinatorial outcomes, and recurring events. It was introduced by Tversky & Kahneman (1973). Schwarz et al. (1991) conducted several experiments demonstrating that the impact of remembered information can depend on how easily or difficultly it comes to mind. Moreover, Piotrowski and Bünnings (2024) found in another experiment that the availability heuristic had a statistically significant association with the likelihood of customers purchasing an investment security.

ii) *Representativeness heuristic:* refers to decisions taken based on the resemblance of that event to the typical pattern of a group of similar events. This means that it refers to the tendency in certain probability judgments –such as estimating the likelihood that X belongs to category Y– to rely on assessments of similarity, specifically the extent to which X resembles or shares features with Y (Kahneman & Frederick, 2002; L.-H. Lim & Benbasat, 1997; Sunar et al., 2024).

iii) *Cognitive heuristic:* refers to decisions taken based on the anchoring on an initial value and subsequent adjustments, often resulting in final estimates that remain biased toward the original anchor point (Bauer & Gill, 2024; Epley & Gilovich, 2006; Tversky & Kahneman, 1974). It was formerly called "anchoring and adjustment heuristic." Individuals' absolute estimates are systematically influenced by the reference value used during the comparative judgment process.

iv) *Effort heuristic*: refers to decisions taken based on the magnitude of effort invested in its development (E. A. Kirk et al., 2023; Kruger et al., 2004; Magni et al., 2024; Schrift et al., 2016). People often hold a strong belief that "hard work leads to better outcomes", and they generally associate effort with quality.

v) *Recognition heuristic*: refers to decisions taken based on how easily the value of something is recognized, also referred to as the less-is-more effect. (Ahmad, 2024; Goldstein & Gigerenzer, 2002; Pohl, 2006). When recognition is relevant to the decision criteria, individuals are more likely to select a familiar option over an unfamiliar one.

vi) *Affect heuristic*: refers to decisions taken based on memories and cognitive representations of objects or events that are intertwined with prior feelings and

emotions (Finucane et al., 2000; Slovic et al., 2002, 2007). Mental representations of objects and events carry varying levels of emotional associations. Although affect is constant, and emotions arise from the cognitive appraisal of a situation (Lautenbach, 2024), affect and emotion are generally used similarly. Furthermore, affect has traditionally been viewed as the conscious, subjective dimension of emotion, distinct from physiological changes (Cacioppo et al., 1999).

Table 1: *General decision heuristics.*

Category	Definition
Availability heuristic	When a decision is taken based on the instances that are available in the memory of the subjects.
Representativeness heuristic	When a decision is taken based on the resemblance of that event to the typical pattern of a group of similar events.
Cognitive heuristic	When a decision is taken based on the anchoring on an initial value and subsequent adjustments.
Effort heuristic	When a decision is taken based on the magnitude of effort invested in its development.
Recognition heuristic	When a decision is taken based on how easily the value of something is recognized.
Affect heuristic	When a decision is taken based on memories and cognitive representations of objects or events that are intertwined with prior feelings and emotions.

The details of each heuristic mentioned above are explained subsequently, followed by the description of some examples of their application to IS literature for each of them.

The availability heuristic is related to frequency or probability. Availability bias arises when judgments based on recalled examples are influenced by factors like how concrete, dramatic, familiar, recent, relevant, similar, or vivid those examples are (Dube-Rioux & Russo, 1988). Recalling frequent events is easier than recalling rare ones (Schwarz et al., 1991). For instance, investors affected by availability bias often simplify their decision-making by linking complex outcomes to the most recent information, frequently overlooking more complete data. This tendency causes them to focus on recent

experiences while ignoring the wider, long-term trends that should guide their decisions (Tan et al., 2024). Another study explores how availability cues in online restaurant reviews influence consumers' dining intentions and menu choices (Nazlan et al., 2018). Results indicated that combining textual reviews with ratings leads to higher expectations and a greater likelihood of visiting compared to using either cue alone. Additionally, when presented with numerical ratings instead of stars, consumers tended to select menu items with images.

According to the representativeness heuristic, some probability judgments are influenced by evaluations of resemblance (how much X resembles Y) (Kahneman & Frederick, 2002; L.-H. Lim & Benbasat, 1997; Vuori et al., 2024). For instance, in a survey-based experiment, the data revealed that users often mimic the actions of others due to the interconnected nature of mobile payment technology (Sunar et al., 2024). The findings led to the development of a research model that incorporates various aspects of both rational and irrational herding behavior, influencing the ongoing use of technology.

In the cognitive heuristic (also called anchoring and adjustment heuristic), final estimates are adjusted toward an anchor, reflecting both an assimilation process and a process of adjusting from an initial value (Epley & Gilovich, 2006). In these cases, people begin with an initial value and adjust it to arrive at the final estimate (Tversky & Kahneman, 1974). For instance, an experimental study aimed at understanding how and why informing individuals about the use of algorithmic scoring processes affects their behavior found strong evidence that revealing flawed algorithmic scores triggers self-fulfilling prophecies (Bauer & Gill, 2024). These prophecies influence the behavior of scored individuals in a way that aligns with their assessment, allowing algorithms to contribute to creating the very outcomes they predict. This phenomenon has important implications for automation bias, the creation of feedback loops, and the design of transparency regulations.

In effort heuristics, individuals are more influenced by the effort involved when the quality of the object being evaluated is difficult to determine (Kruger et al., 2004). For instance, in an experimental study related to art, it was found that people occasionally – though not always– attribute less creativity to an item when they are informed that the producer is an AI rather than a human (Magni et al., 2024), which is relevant when studying AI creativity.

The recognition heuristic results in less-is-more effects, where having less knowledge can lead to more accurate inferences than having more knowledge. It is beneficial when there is a strong correlation, regardless of direction, between recognition and the criterion (Goldstein & Gigerenzer, 2002). For example, an empirical study indicated that the extent to which Swiss city names are recognized can be leveraged by predictive models to estimate population size due to the fact that the recognized object was selected more frequently than the unrecognized one when the recognition cue proved valid (Pohl, 2006).

With the affect heuristic, individuals' affective reactions interact to influence outcomes and decision-making, as well as their tendency to rely on experiential thinking –along with personal and task-related characteristics–, due to the fact that affective responses occur quickly and automatically (Slovic et al., 2007). In particular, an application of affect heuristics in IS has been proposed with inoculation messages, which has helped to reduce the negative impact of misinformation from AI chatbots on user interactions (Shin, 2024).

Even with the focus on cognition, decision researchers are increasingly acknowledging the significance of affect (Slovic et al., 2007). Affect refers to the particular quality of "goodness" or "badness" experienced as an emotional state (whether or not it is conscious) and distinguishing the positive or negative nature of a stimulus. (Slovic et al., 2002).

Given that the affect heuristic is one of the most[1] frequently referenced judgment heuristics in behavioral economics research involving information systems (Arnott & Gao, 2022), understanding its impact within organizations is crucial.

[1] Arnott and Gao (2022) did an in-depth examination of behavioral economics across the information systems discipline, grounded in quality IS research through bibliometric content analysis. This critical analysis of the articles with a major use of behavioral economics resulted in affective heuristics being the most cited (19.1%), paired with General Mention, followed by availability heuristics (6.4%).

3.2. Affect heuristics and Information Systems Research

Affect heuristics play a critical role in organizational decision-making, particularly within the frameworks of behavioral economics and technology (Sun & Zhang, 2006). The affect heuristic reveals how employees and leaders might assess investment options, policy changes, or innovation initiatives through emotional perspectives (Choi et al., 2011; Fenton-O'Creevy & Tuckett, 2022). This tendency becomes even more pronounced in technology-mediated decision-making, such as with human-computer interaction, trust in automation, the acceptance of system outputs, and the perceived credibility of algorithmic suggestions, which are all subject to affective biases that may either enhance or impair judgment (Merritt, 2011).

Under time pressure –an increasingly common condition in fast-paced, technology-driven organizational environments– individuals tend to rely on intuitive emotional responses rather than deliberate analytical thinking (Slovic & Västfjäll, 2010). In organizations, these emotionally charged perceptions influence judgments about risks and managerial styles (Moon, 2021). In his research, he confirmed the role of emotions related to emotional intelligence[2] in mitigating harmful internal biases, establishing emotional intelligence as a critical factor for success in leadership and decision-making.

Understanding the role of the affect heuristic in these contexts is essential for organizations aiming to design better systems and support better decisions. As technologies evolve to include emotionally responsive interfaces, research must explore how affect influences human-machine interaction (Picard, 2000). For example, the integration of AI in collaborative decision-making introduces new dynamics where affective responses to automation, uncertainty, or algorithmic authority may lead to significant organizational consequences (Trunk et al., 2020).

Future research is thus needed to examine how affect heuristics operate across different organizational levels, how they contribute to biases in group or leadership settings, and how systems can be designed to mitigate unhelpful emotional shortcuts while still supporting fast, intuitive reasoning when appropriate. By deepening our understanding of

[2] Emotional intelligence refers to a form of social intelligence that entails recognizing, understanding, and managing one's own emotions as well as those of others, and using this emotional information to inform thought and behavior (Mayer & Salovey, 1993; Salovey & Mayer, 1990).

affect in these domains, scholars and practitioners alike can better anticipate and guide human behavior in increasingly complex technological environments.

In this context, the theoretical framework based on the affective evaluation of perceived risk and perceived benefits proposed by Slovic et al. (2007) is the dominant one in the literature. It highlights the pivotal role of affect in shaping judgments and decisions. They focused on one of the two fundamental modes of thinking, specifically the experiential mode. The experiential mode is instinctive, automatic, and natural, driven by images that have developed positive or negative emotional associations through learning and experience. It instinctively scans its memory for related events, along with the emotions tied to them. The dependence on these feelings corresponds to the "affect heuristic." The other mode is logical, reflective, and based on reasoning. When individuals encounter complex, uncertain, or potentially risky environments, relying on affect and emotion offers a faster, simpler, and more efficient approach.

When emotions are positive, they drive actions and thoughts aimed at recreating those feelings, acting as a source of motivation. When emotions are negative, they prompt actions and thoughts intended to avoid them, triggering an alarm (Epstein, 1994). These actions enhance the accuracy and efficiency of the decision-making process, while their absence –detected in individuals with specific brain injuries– impairs decision-making performance (Slovic et al., 2002). The affective elements that stand out during judgment or decision-making processes are influenced by both the individual's characteristics and the nature of the task, along with the interaction between the two. People experiencing happiness tend to rely on heuristic modes of processing, marked by top-down thinking that draws heavily on prior knowledge while giving less weight to details of the situation (Schwarz, 2000).

Researchers have conducted empirical studies to showcase the relevance of the previous theoretical frameworks in the context of technology. For example, Alhakami and Slovic (1994) showed, through an experiment with 100 students evaluating 40 items related to activities and technology, that the inverse correlation between the perceived risk and perceived benefit of an activity is associated with the intensity of positive or negative affect linked to that activity. This finding suggests that individuals evaluate an activity or technology not solely based on their cognitive assessments but also on their emotional responses. If subjects have a favorable view of the activity, they are inclined to perceive the risks as low and the benefits as high; conversely, if they have an unfavorable view,

they are more likely to assess it as high risk and low benefit. Positive affect would be generated if the benefit is high and the risk is low (Slovic et al., 2002). On the contrary, negative affect would happen when perceived benefit is low and perceived risk is high. This effect was demonstrated in an experiment involving 54 students, in which affect was manipulated by either enhancing or reducing perceived risk and by increasing or decreasing perceived benefit (Finucane et al., 2000). To facilitate this manipulation, the researchers used a "time-pressure" approach to reduce analytical processing, thereby allowing affective responses greater influence. The results indicated that when affective states were negative, perceived risk increased, and conversely, when affect was positive, perceived risk decreased. These findings validate the theory that general affective evaluations shape judgments of risk and benefit.

Other relevant factors that influence emotions and decisions include probabilities and proportions (Slovic et al., 2007). People understand that a high likelihood of a positive outcome is favorable, while a low likelihood is unfavorable. When the quantities or outcomes associated with these probabilities are emotionally neutral, probabilities play a much larger role in judgments and decisions. However, the opposite happens when the outcomes have clear and strong emotional significance –changes in probability have much less influence.

However, experiential thinking may lead to incorrect conclusions, particularly when emotional responses are intentionally shaped by external parties aiming to influence behavior, as seen in advertising, marketing, and insurance. For instance, in an experiment involving mood[3] induction, it was shown that when individuals are motivated by enjoyment, such as deciding whether to watch a movie, their preexisting mood and the emotions they experience while thinking about the event are seen as highly relevant and are more likely to influence their behavioral intentions. In the context of insurance, research has shown that individuals are willing to pay higher insurance fees for an object if they feel a strong emotional attachment to it, even when the compensation amount remains unchanged (Hsee & Kunreuther, 2000). Another limitation of experiential thinking is that affective factors in judgment are subject to inherent biases and cognitive limitations; for example, people tend to be more influenced by emotional responses in

[3] Mood: a mood can persist for an extended period, whereas an emotion is felt momentarily (Beedie et al., 2005).

decisions involving small changes than in those involving major changes, especially when visceral[4] factors are involved (Slovic et al., 2002).

In the context of the interaction between IS and users, emotions play a pivotal role in areas such as privacy-related decisions, mobile data sharing, AI adoption, knowledge sharing, technology investments, e-market participation, automation in aviation systems, and social media interactions, among others (see Table 2).

Table 2: *Most relevant papers of affected heuristic in behavioral economics in IS.*

Paper	Research goal	Research method	Heuristics used
Adjerid et al. (2018)	Privacy	Experiment	Affect, General mention
Brink et al. (2024)	AI adoption	Theoretical study	Affect
Constantiou et al. (2014)	Mobile, IS use/adoption	Survey	Availability, Representativeness, Affect
Dinev et al. (2015)	Privacy	Theoretical study	Affect
Fehrenbacher (2017)	Knowledge sharing	Experiment	Affect
Gao et al (2025)	Autonomous equipment in cockpits	Experiment	Affect
Kehr et al. (2015)	Privacy/ Mobile	Experiment	Affect
Najjar et al. (2021)	Privacy/ Mobile	Survey	Affect
Park et al. (2016)	Investment in Technology	Case study	Affect (emotion-regret)
Shin (2024)	Misinformation/ algorithm	Experiment	Affect
Teubner et al. (2015)	e-commerce	Experiment	Affect
Yu et al. (2015)	Social network	Survey	Affect

[4] Visceral factors are primarily characterized by their immediate hedonic impact –typically negative– and their influence on how individuals evaluate the desirability of various goods and actions (G. Loewenstein, 1996). These states exert strong, pleasure- or discomfort-driven influences that significantly shape behavior (Slovic et al., 2002).

One area of Information Systems (IS) that has increasingly emphasized affective concepts is Human-Computer Interaction (HCI), particularly in the context of Information and Communication Technologies (ICTs). As the use of ICT has expanded beyond organizational and work settings with a wide array of competing products and services serving similar purposes, understanding decision-making behavior has become essential. The variety of ICT options available to users has expanded greatly, with numerous competing products and services offering similar functionalities (P. Zhang, 2013). In their paper they explain that when selecting a mobile phone, the final choice is often influenced by both cognitive factors (e.g., price, features, functionality, service, and reliability) and affective factors (e.g., the emotional response it evokes in the user). This results in practical implications going from emotional design, emotional influence in organizational communication behavior, emotional reactions to information technologies, or emotionally responsive user interfaces, among others.

Another area of IS where affect, along with decision biases and heuristics, can greatly impact outcomes is privacy decision-making related to personal data. People are more inclined to share sensitive information if they think others have shared similar details. If choice contexts involving privacy protection share similar dynamics, consumers' hypothetical assessments of high versus low levels of privacy protection (i.e., our normative manipulations) could be influenced by overly favorable attitudes toward privacy protection, as well as by the heightened perceptions of it as a social norm (Adjerid et al., 2018). Another experimental study on mobile security and privacy, which examined consumer reactions to a new smartphone app collecting driving behavior data, found that situation-specific evaluations of risks and benefits fully mediated the impact of personality traits on information disclosure (Kehr et al., 2015). The findings of Kehr et al. showed that privacy assessments are influenced by transient (i.e., short-term) emotional states, suggesting that consumers often underestimate the risks associated with disclosing personal information.

Also related to privacy, a study examining decisions to grant access to personal information on mobile devices after downloading and installing apps found that deciding whether to disclose personal information intertwines logical reasoning with emotional influences, shaping user satisfaction. In their conceptual study on drivers of privacy concerns and their effects, Dinev et al. (2015) noted that policymakers have rarely addressed the potential uses –and perceived abuses– of affective factors or the

manipulation of external influences. These influences often rely on the collection and reuse of consumer, geographical, and social data, frequently filtered through an assumed privacy calculation. Intense emotional states, such as happiness, physical arousal, fear, or anger, tend to deplete cognitive resources, which increases the likelihood of low-effort processing when it comes to affect and information processing. Therefore, it can be concluded that both affective and cognitive elements of satisfaction play a significant role, as explained by the affect heuristic.

Another area of study in information systems related to affect heuristics is the use of mobile data. An experiment studying location-based services in the German mobile telecommunications sector showed that novice smartphone users employed affect heuristics when acquiring information related to location, such as traffic data services. However, experienced smartphone users in most cases followed an availability heuristic process when making decisions, with emotions such as desire emphasizing the rewarding aspects of mobile services and motivating their use, while emotions like fear could prompt the use of specific location-based features, such as when navigating an unfamiliar city (Constantiou et al., 2014).

Further, social networks as a type of IS and affect heuristics have also been studied. A survey of 500 participants found positive correlations between affect and self-disclosure motivators on social networks. The results suggested that individuals with positive affect are more likely to overestimate the benefits of sharing personal information, which in turn shapes their decisions to adopt new technologies, accept product or service recommendations, and trust online reviews (Teubner et al., 2015).

Artificial Intelligence (AI) adoption is an information system also influenced by affect heuristics. Brink et al. (2024) highlighted that the perception of AI systems as potentially dangerous may lead some managers to develop negative attitudes, hindering the IS adoption. Related to the algorithms' effect, an experiment done with chatbots demonstrated that a positive perception of chatbot normative ethics helps individuals develop the ability to discern misinformation (Shin, 2024).

Concerning knowledge-sharing with IS, Fehrenbacher (2017) showed that emotional valence[5] can serve as an objective metric. In his study, participants' facial expressions

[5] Valence, an intrinsic qualitative aspect of experience, is a fundamental component of all affective states, which are characterized as having either a positive or negative valence (Carruthers, 2018).

were measured using Face Reader technology while they responded to knowledge-sharing requests, revealing that emotional responses significantly influenced their willingness to share information. His findings demonstrated that facial recognition technology can identify affect conveyed through facial expressions and that this affect impacts how recipients respond to knowledge-sharing requests.

IS investment decisions can also be influenced by emotions, such as regret, which may distort cognitive analyses. A case study demonstrated that feelings of regret led decision-makers to continue using existing technological tools rather than risk potential losses associated with discontinuing their use (Park et al., 2016).

Electronic markets are another type of information system where affect heuristics can also influence behavior and performance. An experiment with human subjects bidding in auctions against other human individuals or computerized bidding agents showed that participants had a significant arousal and stronger feelings when interacting with humans than when interacting with computer competitors (Teubner et al., 2015). In their study, the IS reduced the influence of emotional processes on individual behavior, leading participants to place lower bids, which in turn affected the overall negotiation performance.

Affect heuristics have also gained importance in information systems research regarding user trust in autonomous technologies. For instance, in the aviation industry, an experimental study demonstrated that negative emotional responses to flights operated by autonomous systems and a single pilot resulted in reduced trust compared to flights managed by two human pilots (Gao et al., 2025). This result highlights how affective responses can significantly shape user acceptance of intelligent systems, a concern central to IS domains involving automation, human-computer interaction, and decision-support technologies.

All these findings underscore the necessity of integrating emotional considerations into the design and implementation of IS, ensuring that systems align with users' affective responses to enhance decision-making outcomes. Moreover, although the affect heuristic is the heuristic most cited, it remains understudied across the entire set of studies employing behavioral economics within IS (6%) (Arnott & Gao, 2022).

3.3. Emotions

Building upon the concept of the affect heuristic –which highlights how immediate emotional responses can shape perceptions of risk and benefit– it's evident that emotions play a pivotal role in decision-making processes. This understanding paves the way for a more comprehensive examination of how various emotional states influence choices across different contexts. The impact of affect on decisions is based on the fact that affective responses are quick and automatic and provide information during the decision process, which originates in the emotions felt by the individual (Slovic et al., 2005).

Affect is linked to terms like emotion and feeling (Thrift, 2004). Affect can be defined "as the property of the active outcome of an encounter, taking the form of an increase or decrease in the ability of the body and mind alike to act, which can be positive –and thus increase that ability (counting as joyful or euphoric)– or negative –and thus diminish that ability (counting as sorrowful)" (Thrift, 2004, p. 64).

Research indicates that emotions are powerful, widespread, and predictable influences on decision-making, which can be both beneficial and harmful at times (Lerner et al., 2015). Immediate emotions assist in prioritizing information processing and introducing significant, albeit intangible, factors. However, they can also drive behavior in ways that go against one's self-interest (G. Loewenstein & Lerner, 2003).

Examining how emotions are categorized and processed is essential for better understanding the influence of affect heuristics on decision-making within information systems. Since affect heuristics rely on individuals' emotional impressions –often formed rapidly and subconsciously– the way emotions are classified (e.g., by valence, arousal, or discrete categories, which will be explained hereafter) provides critical insight into how these impressions guide judgments and behaviors.

3.3.1. Emotion classifications

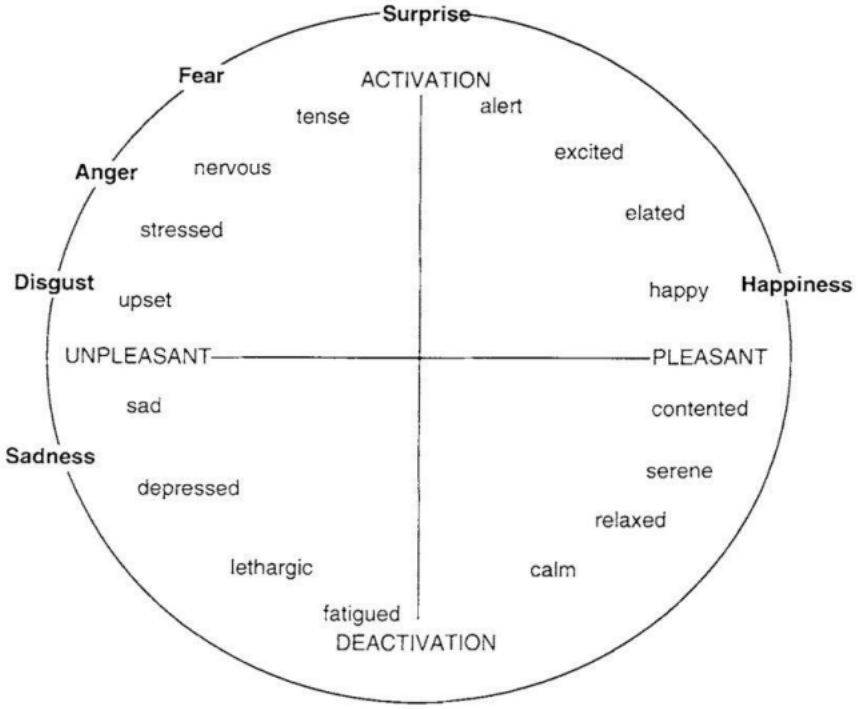
Emotions have been defined in multiple ways. Cognitive emotion theories provide a strong theoretical framework for examining the link between emotions and decision-making (Lazarus, 1999). Arnold (1960), a pioneer of this perspective, described emotions as "felt action tendencies," emphasizing that the urge to act distinguishes emotions from mere feelings of pleasure or discomfort. Each emotion is characterized by a distinct action

tendency. These tendencies –or more broadly, shifts in readiness to act– are not only essential to the experience of emotion but also fundamental to understanding the nature of emotion itself. Emotion can also be defined as the subjective experience that arises from a biological response to environmental stimuli, leading to physical and psychological changes and preparing the individual for action (Ashkanasy & Daus, 2002; Frijda, 1986).

Emotions are commonly classified using two primary models. One is the **discrete (or state) emotions** model, which posits that emotions are distinct and specific to particular moments. Discrete emotions are innate and don't change over time (Izard, 2007). This model is based on Paul Ekman's (1992) classification of six basic emotions: enjoyment or happiness, anger, fear, disgust, sadness, and surprise. These discrete emotions differ from habitual or **trait emotions**, which are more stable emotional predispositions (Schreiber et al., 1995). Research has predominantly focused on discrete emotions, as they can be measured in a specific moment. Furthermore, discrete emotions have been seen to impact cognitive components or dimensions, which link emotions to judgment and decision-making processes (Han et al., 2007).

The other model is the **circumplex model of affect** defined by Russell (1980), which characterizes emotional experiences along two axes: valence and arousal. *Valence* is a core qualitative feature of experience inherent in all affective states, ranging from positive (or high, associated with pleasantness (Cittadini et al., 2023)) to negative (low, associated with unpleasantness) valence (Carruthers, 2018). *Arousal* is defined as the perceived level of energy or activation, ranging from high activation, like excitement, to low activation, like calmness (Cittadini et al., 2023; Danner & Duerrschmid, 2018; Kuppens et al., 2013; Russell, 1980) (see Figure 2). The combination of valence and arousal helps evaluate an individual's available resources when planning or making decisions (Russell, 2003).

Figure 2: *The circumplex model of affect.*



Note: The inner circle represents a schematic map of core affect, while the outer circle illustrates the typical placement of several prototypical or basic emotions. Source: (Danner & Duerrschmid, 2018)

Therefore, high valence, high arousal emotions would be pleasure, joy, and excitement. High valence, low arousal emotions would be calm, relaxed, and peaceful. Low valence, high arousal emotions would be anger, anxiety, and fear. Low valence, low arousal emotions would be boredom and sleepiness (Cittadini et al., 2023). In high arousal situations, evaluations become more intense, and judgments are heightened (Storbeck & Clore, 2008).

However, the feeling of emotion is not monopolar, limited to being solely positive or negative, or just one emotion. Human beings frequently feel mixed emotions, understanding mixed emotions as the simultaneous presence (co-occurrence) of both positive and negative affects (Larsen et al., 2001, 2017; Picard, 2000). The fact of feeling at the same time positive and negative emotions is also called *emotional ambivalence* (Rothman et al., 2017). The same valence emotions can trigger different appraisals. For example, individuals experiencing fear tend to make more pessimistic predictions about

future events, whereas those experiencing anger are more likely to form optimistic expectations (Lerner & Keltner, 2000).

Furthermore, once activated, certain emotions (such as sadness)to more reflective thinking and may contribute to the development of a modo (Lerner et al., 2015). The main distinction between emotion and mood lies in duration: moods last longer than emotions. People in a happy mood are more inclined to use a heuristic processing strategy, which involves top-down processing, relying heavily on existing knowledge and giving less attention to details. In contrast, those in a sad mood are more likely to adopt a systematic processing strategy, characterized by bottom-up processing, with minimal reliance on prior knowledge and greater focus on the details at hand (Schwarz, 2000). Additionally, people in a happy mood often overestimate the probability of positive outcomes and underestimate the likelihood of negative ones, while the opposite is true for individuals in a sad mood.

3.3.2. Emotions in organizations

The emotion process begins at the intrapersonal level, when an individual encounters an inducing stimulus, interprets its meaning, and experiences a corresponding feeling state along with physiological changes (Elfenbein, 2007). These internal responses have downstream effects on attitudes, behaviors, and cognitions, as well as on facial expressions and other emotionally expressive cues. Additionally, emotions often trigger secondary, controlled responses aimed at regulating the emotional state. As the process shifts from intrapersonal to interpersonal, these outward emotional expressions can serve as observable signals to others, becoming new eliciting stimuli for interaction partners (Elfenbein, 2007; Frijda, 1986).

In the workplace, emotion can be examined from multiple perspectives, corresponding to five distinct levels: i) within-person, ii) between-person, iii) interpersonal behaviors, iv) group-level dynamics, and v) organizational-level influences (Elfenbein, 2007). The different effects of positive versus negative moods (Isen, 1987) start with the level of within-person, expanding the initial Affective Events theory and job satisfaction (Weiss & Cropanzano, 1996) that relate emotions to the workplace, and the influence of work events (Ashton-James & Ashkanasy, 2005).

The following section presents the basic emotions of Ekman (1992) and their impact in organizations: happiness, anger, fear, disgust, and sadness, which will be analyzed in this research based on their valence and arousal.

Regarding the positive emotions related to the workplace, **happiness** features in the models of basic emotions and can be defined as positive appraisals (attitudes) or pleasurable psychological states (including emotions, moods, and flow), as well as job satisfaction (Fisher, 2010). In her paper, she highlights that happiness happens at a transient level (i.e., states that can be measured repeatedly within individuals), including discrete emotions such as joy, pleasure, happiness, and contentment. At an organizational level, happy employees tend to exhibit higher levels of productivity in the long term (Fang et al., 2025; Gavin & Mason, 2004). Happiness also seems to promote cooperation in negotiations, improve performance, and influence problem solving and heuristics, as happy people seem to use more intuition (Isen, 1987). Moreover, employee happiness has shown a significant association with five workplace outcomes: workplace commitment, job-related performance, non-task-related contributions, employee intention to resign, and counterproductive work conduct (A. Thompson & Bruk-Lee, 2021). Regarding managerial power, experimental research shows that managers of both genders tend to experience greater happiness than those in non-managerial roles (Martin et al., 2024; Xiong et al., 2022).

Furthermore, the arousal level of positive emotions has different impacts. High-arousal positive affect (HAPA), encompasses emotions such as excitement and enthusiasm, while low-arousal positive affect (LAPA), includes states like calmness and relaxation (McManus et al., 2024). In their review, they identified that HAPA has been associated with more demanding jobs (Madrid & Patterson, 2014, 2025), greater involvement in work tasks, higher task engagement (Salanova et al., 2011; J. Schaefer, 2024), workplace proactivity (Ouyang et al., 2019), and even unethical behavior carried out to benefit others (Umphress et al., 2020). By contrast, LAPA has been linked to psychological safety (Edmondson & Lei, 2014), a sense of affiliation, prosocial behaviors such as caring for others, and emotional bonding or attachment (Gilbert, 2014; McManus et al., 2024). In general, organizational research has shown greater interest in HAPA than in LAPA.

Overall, we can conclude about happiness with a quote from the Nobel Peace winner of 1952, Albert Schweitzer: "Success is not the key to happiness. Happiness is the key to success"[6].

Within the category of negative emotions, **anger** occupies an important place. It is characterized by the attribution of blame to another individual or entity for a perceived wrongdoing generally related to feelings of unfairness, obstacles to achieving aims, and conflicts between individuals (Gibson & Callister, 2010; Silva, 2021). Usually, anger is associated with a negative consequence perceived as dysfunctional or harmful to the individuals interacting (Gibson & Callister, 2010). At the organizational level, following Gibson and Callister's review (2010), negative consequences of anger are linked to hostile emotions (Begley, 1994; Rees & Friedman, 2025), revenge-driven interactions between individuals (W. Chen et al., 2024), blame attribution (Aquino et al., 2004; Ohbuchi et al., 2004; Z. Wang et al., 2024), emergence of toxic workplace environments (Aquino et al., 2004; S. Zhang et al., 2024), decline in job satisfaction (Glomb, 2002; Williams et al., 2024), increasing workplace incivility (Andersson & Pearson, 1999; Ohana et al., 2025), and up to aggressive or violent behavior (Fox & Spector, 1999; Lochman et al., 2024). Studies reveal that while anger triggers 90% of aggressive incidents, only 10% of anger episodes truly lead to aggression (Geddes et al., 2020). Whether a manager's expression of anger leads to positive outcomes –such as increased productivity and subordinate satisfaction– depends on factors related to the social context (e.g., power distance or cultural norms) and individual differences (e.g., affective traits and personality tendencies of both the manager and the non-manager) (Geddes et al., 2020).

Although workplace anger is generally perceived as unpleasant and unfavorable, it can also lead to positive outcomes, such as facilitating successful adaptation or favorable results (Geddes et al., 2020; Geddes & Callister, 2007). At the individual level, anger is associated with concerns such as perceived injustice, experiences of unfairness, and feelings of disappointment (Fitness, 2000). In the context of incivility, targets' anger was linked to increased direct aggression toward the instigators (Porath & Pearson, 2012). Regarding managerial power, people in high-status roles are more prone to feeling anger when faced with negative results, while those in low-status positions are more likely to

[6] Schweitzer, A. Success is not the key to happiness. Happiness is the key to success. If you love What you are doing, you will be successful. http://huronshoresgs.org/hsgs/2004'10.pdf

experience emotions such as sadness and guilt (Tiedens et al., 2000). Concerning arousal, in anger it typically mobilizes the individual for action (Novaco, 1976).

Another basic negative emotion is **fear**, which includes dimensions such as apprehension, uncertainty, risk, anxiety, and horror. It plays a prominent role in managerial decision-making (Bugdol & Nagody-Mrozowicz, 2020). Individuals experiencing fear are more inclined to appraise workplace opportunities pessimistically, exhibit lower risk-taking tendencies, and are more prone to withdrawal behaviors, such as cyberloafing and delays in goal attainment (Pustovit et al., 2024). In their meta-analysis, Pustovit et al. (2024) further noted that fear diminishes task performance and organizational citizenship behaviors while simultaneously increasing the likelihood of counterproductive work behaviors. Furthermore, fear is also linked to negative appraisals of one's circumstances and to pessimistic judgments regarding risk and the likelihood of future success, producing pessimistic risk assessments and favoring risk-averse decisions, whereas anger generates more optimistic risk evaluations and engagement (Lerner & Keltner, 2001). In the context of incivility, targets' fear was associated with indirect aggression toward instigators, as well as with increased absenteeism and withdrawal from the organization, an effect that was moderated by status (Porath & Pearson, 2012). In organizational contexts, fear can take many forms, including fear of failure, fear of change, fear of risk-taking (Appelbaum et al., 1998), and fear of speaking up (e.g., Kish-Gephart et al. (2009)).

Regarding **disgust**, it is generally associated with a basic reaction to food refusal (Olatunji & Sawchuk, 2005; Rozin & Fallon, 1987), but it is also linked to physical rejection (e.g., rodents, blood, interpersonal or sexual contact) or moral violations (e.g., unethical actions) (Chapman & Anderson, 2012; Tang et al., 2022). It is identified with a wide range of stimuli, spanning from concrete drivers –such as unpleasant tastes and disease carriers– to abstract ones –including moral violations and the individuals who commit them–, triggering the social distancing of individuals who defy accepted norms (Chapman & Anderson, 2012). In relation to social norms, experimental research has shown that disgust can also be triggered by unfairness, as it acts as an intermediary mechanism connecting injustice and sensory responses (Skarlicki et al., 2013).

The primary action tendency associated with disgust is either active or passive behavioral avoidance, which functions as a protective mechanism for the individual (Olatunji & Sawchuk, 2005). Disgust has also been associated with anger (Gutierrez & Giner-Sorolla,

2007). However, experimental findings indicate that integral experiences of disgust –but not anger– predict stronger moral condemnation of behaviors that violate purity norms (Horberg et al., 2009). Related to incivility, targets' experiences of sadness were linked to increased absenteeism, with status moderating its effect (Porath & Pearson, 2012).

Lastly, **sadness** arises in response to negative events that are perceived as uncontrollable (Porath & Pearson, 2012). It has been linked to feelings of helplessness and, when experienced, activates a state of action readiness –where the individual feels a desire to act but lacks clarity on what action to take (Frijda et al., 1989; Porath & Pearson, 2012). Sadness is often associated with the perception of an unavoidable or irreversible loss, promoting the adjustment to reduced expectations (Kemper, 1991). Others perceive individuals with sadness as vulnerable, submissive, and in need of support (Tiedens, 2001; Vranjes et al., 2017). In addition to fear, sadness is linked to low power and withdrawal behavior (Vranjes et al., 2017).

In the workplace, Porath and Pearson (2012) conducted an experiment demonstrating that sadness may motivate affected individuals to disengage, as evidenced by behaviors such as absenteeism or taking personal leave. The study also found that low-status individuals exhibited higher levels of sadness than those with high status. In organizational settings, although sadness may be interpreted as a signal of avoidance, indicating reluctance to engage, docility, and shyness, and as a sign of weakness, it is also associated with positive social qualities such as kindness, concern, affiliation, and empathic response (Madera & Smith, 2009). For instance, a leader expressing sadness due to a failed product communicates concern and sympathy (Shaver et al., 1987).

3.3.3. Emotions and decisions theories

Based on how emotions are classified, they provide a foundation for exploring the theories that influence decision-making, as different emotional states can shape cognitive processes, judgments, and behavioral choices in distinct ways. Furthermore, Elfenbein stated that in reality emotion and cognition may be so closely linked that it becomes difficult to draw clear empirical distinctions in the origins of attitudes, even if they are theoretically different (Elfenbein, 2007). Rather than opposing reason, emotion plays a vital role in guiding it by regulating behavior (Bechara et al., 2000; Schwartz, 2016; Schwarz, 2000).

Several theories elucidate the multifaceted role of emotions in decision-making and behavior. Rather than mere reactions, emotions actively guide behavior, assisting individuals in navigating uncertainty, evaluating risks, and responding to social dynamics.

The most general theoretical model in this area is the **Affect Infusion Model** (AIM) (Forgas, 1995). It highlights that emotions are most likely to shape decisions in complex or unfamiliar situations where cognitive shortcuts are needed –not merely due to their valence. It proposes that the extent to which affect influences decisions depends on the type of cognitive processing involved. Affect is most likely to influence judgment when individuals engage in constructive cognitive processing, which involves actively modifying rather than merely recalling prior mental representations. AIM differentiates four types of information processing strategies: direct access, motivated reasoning, heuristic-based processing, and substantive (systematic) processing. The first two involve relatively restricted information search processes, which provide limited opportunity for affect to influence the outcome. In motivated reasoning, strong and specific motivational pressures push for a particular judgmental outcome. In contrast, heuristic processing is more likely to occur when the target is simple or familiar, the judgment holds low personal relevance, specific motivational goals are absent, the decision-maker's cognitive resources are limited, and the context does not require precision or detailed analysis. Finally, substantive processing is more probable when the task is complex or unusual and the individual making the judgment lacks a specific goal, has sufficient cognitive resources, and is driven to make an accurate assessment –potentially due to overt or subtle situational pressures.

Specifically, judgments based on heuristic or substantive processing are more susceptible to emotional influence than those based on direct retrieval or driven by motivational goals, as they require active engagement or broader information searches. Furthermore, heuristic processing is typically associated with the affect-as-information mechanism, while substantive processing is tied to affect-priming. Thus, affect is more likely to infuse decisions requiring heuristic or substantive processing. Forgas (1995) notes that happy individuals tend to make more favorable judgments than those in a negative mood, likely because positive affect is associated with increased reliance on heuristic processing. Therefore, emotionally charged information influences and becomes integrated into the judgment process, shaping the individual's deliberations and ultimately affecting the final judgment.

The **Appraisal-Tendency Framework** (ATF) integrates motivation into the cognitive process (Lerner & Keltner, 2000, 2001). It proposes that each emotion possesses distinct motivational characteristics that can influence and carry over into subsequent judgments and decision-making processes. Therefore, emotions trigger cognitive and motivational tendencies that influence how future events are evaluated, based on the same appraisal dimensions that initially elicited the emotion (Lerner et al., 2015). The framework also outlines the conditions under which emotions shape judgments depending on various influencing factors: integral or incidental emotions, valence, appraisal tendencies, matching conditions, and deactivating effects (Han et al., 2007).

In their study, Han et al. (2007) focused on incidental emotions, which arise from sources unrelated to the current judgment or decision (e.g., emotions elicited by listening to music), as they can be experimentally elicited and measured. This contrasts with integral emotions, which are associated with the decision context (e.g., emotions experienced during gambling: fear and anxiety). Regarding valence, emotions sharing the same valence may differ in their certainty levels. For example, both anger and fear are negatively valenced, yet anger is typically associated with certainty, while fear is linked to uncertainty. Moreover, emotions with opposite valence are both tied to a sense of certainty (e.g., anger and happiness), which may lead them to produce similar effects on judgment and decision-making. Appraisal tendencies often persist beyond the immediate situation and are initially intended to help individuals respond to an emotion-eliciting event. As a result, they can shape the content and depth of subsequent thought processes. Finally, in terms of matching conditions, emotional influence tends to occur when there is alignment between the emotion's core appraisal dimensions and the salient cognitive features of the judgment or decision at hand.

Furthermore, emotional ambivalence regarding the attitude towards an object may develop due to a mismatch between cognitive judgments and emotional responses or from holding contradictory beliefs at the same time (Malhotra, 2005).

Similarly, the **Risk-as-Feelings** model emphasizes that emotional reactions to risks or uncertainty often diverge from logical risk assessments, leading individuals to make decisions based on feelings rather than rational calculations (G. F. Loewenstein et al., 2001). This approach emphasizes the role of emotions experienced during the decision-making moment, distinguishing between "anticipatory" and "anticipated" emotions. Anticipatory emotions occur at the same moment of decision in reaction to present risks

or uncertainty, being visceral factors –such as fear or anxiety. In contrast, anticipated emotions refer to feelings that are not currently experienced but are projected to occur in the future, typically in response to the outcomes of one's decision.

These findings are closely related to the **Emotion-Imbued Choice** (EIC) model, which suggests that emotions are embedded in decision-making processes, particularly when choices must be made quickly without considering future consequences (Lerner et al., 2015). The EIC model is built on the Risk-as-Feeling model and the ATF. This model also includes emotions that follow when they are related to the decision-making: the feelings experienced at the moment of the decision-making ("current emotions") and those based on the perceived utility of each outcome, which forecasts one's emotional response to it ("expected emotions"). Current emotions influence outcome evaluation by shaping which attributes are emphasized, determining whether the decision maker relies on heuristic or analytical processing, and activating specific motivational goals.

Lerner et al. (2015) base the EIC model on the assumption that the decision maker is presented with a single, one-time choice among predefined alternatives, without the opportunity to explore further information or additional options. The decision-making process concludes once the choice is made and does not consider actual outcomes or emotional experiences that follow –only those anticipated in advance. While it incorporates visceral factors that influence the decision process, it does not account for automatic or reflexive behaviors. As such, the model seeks to explain both conscious and unconscious decision-making, though it does not aim to capture the full range of human behavior.

This idea aligns with the **"Feeling is for Doing"** model, which suggests that emotions serve as motivators for action, guiding individuals to prioritize behaviors that align with their concerns and goals (Zeelenberg et al., 2008). It anticipates that the same discrete emotion may lead to different behaviors across contexts, depending on the overarching goal the individual is pursuing in a given situation. Moreover, it also highlights that the most intense emotion can suppress the action tendencies and motivational influence of other co-occurring emotions. Alternatively, the dominant emotion may take precedence in guiding behavior, with less intense emotions influencing action only afterward.

The above theories highlight how emotions shape our judgments, decisions, and interactions with others (see summary in Table 3).

Table 3: *Emotions' theories.*

Theory	Definition
Affect Infusion Model (AIM)	Explains that affect most influences decisions when cognitive processing is complex or unfamiliar, prompting reliance on heuristics.
Appraisal Tendency Framework (ATF)	Proposes that each emotion has distinct motivational traits –such as valence, appraisal tendencies, and matching effects– which can influence and carry over into later judgments and decisions.
Risk-as-Feelings Model	Proposes that each emotion has unique motivational properties that influence judgments and decisions, both through present feelings and anticipated emotions tied to potential outcomes of the risk or uncertainty.
Emotion-Imbued Choice (EIC)	Explains that emotions shape decision-making, especially in quick choices where future consequences are overlooked, involving both current and anticipated feelings.
Feeling is for Doing	Suggests that emotions act as motivators, directing behavior toward personal goals and concerns, with dominant emotions often overriding the influence of other concurrent feelings.

3.3.4. Emotions and decision making's interest in literature

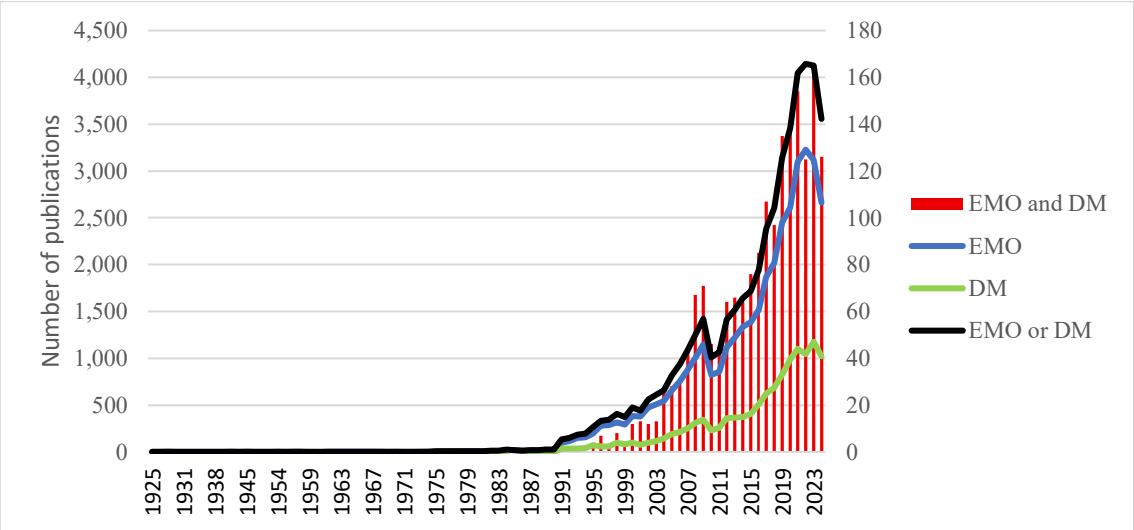
Emotions play a key role in both economics and psychology, though each discipline emphasizes different aspects of emotional influence in decision-making. Economists typically focus on anticipated emotions, which are those expected to arise in the future because of one's decisions. In contrast, psychologists tend to highlight immediate emotions, which are experienced at the moment decisions are made (Lerner et al., 2015; G. Loewenstein, 2000; G. Loewenstein & Lerner, 2003).

To assess the current relevance of emotions and decision-making, we extended the analysis conducted by Lerner et al. (2015). Using the PRISMA framework (Page et al., 2021), we performed an advanced topic search in the database of the Web of Science Core

Collection database, with the keywords "affect," "emotion*," "mood," and "decision-making." This initial search returned 2,994,898 results. We then applied a series of filters: first, limiting the results to those filtered by "reviewed articles," which reduced the pool to 196,143 results; next, we excluded publications from the current year (2025), resulting in 186,897 articles. Finally, we narrowed the search to Web of Science categories relevant to business, psychology, technology, and human sciences (see Appendix I), yielding a refined set of 48,694 results. For comparative purposes, we also conducted three separate searches: one focusing only on emotions (38,165 results), one on decision-making (12,366 results), and one combining both (emotions and decision-making, 1,837 results) (see Figure 3).

These findings confirm that emotions represent a widely researched topic. Furthermore, interest in the intersection between emotions and decision-making has grown significantly in recent years. Since 2017, the number of publications in this area has consistently exceeded 100 per year, with 2017 marking the first time this threshold was crossed (107 publications) –2.5 times higher than in 2007, which had only 43.

Figure 3: *Number of reviewed articles per publication year related to emotions and decision-making in the Web of Science Core Collection.*



Note: Results from Web of Science Core Collection database. EMO (blue line): Keywords: "emotion*", "affect", "mood", DM (green line): decision-making. Secondary axis: emotions and decision-making (red bars).

Therefore, focusing on emotions is particularly relevant for understanding the decision-making process –a fundamental aspect of both behavioral economics and organizational theory (Simon, 1987).

3.3.5. Emotions and ethical decisions

Before developing the relationship between emotions and ethical decisions, it is important to define what an ethical decision is. Following Jones (1991, p. 367) as a "decision that is both legal and morally acceptable to the larger community." Significant progress has been made in the study of ethical decision-making in recent decades, largely driven by the influence of dual-process theories of cognition –though the outcomes have been mixed (Warner et al., 2024). In Warner et al.'s review (2024), they confirm that multiple studies indicate that System 1 processes –characterized as intuitive, emotional, heuristic, or automatic– may sometimes result in more ethical decisions than System 2 processes, which are typically described as rational, controlled, and deliberative.

Although the link between emotion and ethical decision-making is not yet fully established, Haidt's (2001) **Social Intuitionist model** argues that ethical decision-making is driven not just by moral reasoning but strongly shaped by emotions, social cues, and environmental priming, which means that moral judgment ought to be examined within an interpersonal context. Intuitionism in philosophy holds that moral truths occur when individuals apprehend them not through reasoning or reflection but through a process similar to perception, without the need of an argument (Haidt, 2001). In particular, he mentions that emotions such as empathy and love, which support positive morality, and emotions like shame, guilt, and remorse, together with self-regulation capacities, relate to negative morality.

Moreover, the **Cognitive-Affective model** (Gaudine & Thorne, 2001) underscores emotion's vital role in rational ethical reasoning. It suggests that certain emotional states can affect a person's ability to recognize ethical dilemmas, support the development of advanced moral judgments, guide ethical decisions that align with those judgments, and encourage the individual to follow through with their ethical choices. Their research proposes that individuals who experience heightened arousal and positive emotions tend to resolve ethical dilemmas in ways that align with more advanced levels of moral reasoning. Furthermore, an experiment with students resulted in happiness being linked

to a greater tendency to rationalize and minimize unethical behavior (Rainone et al., 2021).

In this context, the **Integrated Ethical Decision-making** model proposed by Schwartz (2016) incorporates intuition and emotion as key factors in ethical thinking. This model integrates the main two categories of ethical decision-making: (i) rationalist, based on reasoning, and (ii) non-rationalist, driven by intuition and emotion. Non-rationalist models view moral reasoning as secondary, serving mainly to explain or justify judgments after they occur. The model proposes four stages: awareness, judgment, intention, and behavior. Emotions, together with intuition, reason, rationalization, and consultation (e.g., ethical review), are the factors that influence the moral judgment that will cause the final (un)ethical action (Schwartz, 2016). It also categorizes the emotions into three groups: i) pro-social emotions like empathy, sympathy, concern, and compassion, which encourage moral behavior; ii) self-blame emotions such as guilt and shame; and iii) other-blame emotions, including contempt, anger, and disgust.

Related to prosocial behavior and selfishness, the **Emotions and Ethics framework** (Yip & Lee, 2022) proposes that emotions can both support and obstruct moral decision-making. In particular, self-focused emotions like happiness and anger tend to promote selfish or dishonest behavior, while other-focused emotions like disgust and sadness are linked to greater honesty. They propose that happy individuals may be less considerate of others and more prone to disinhibition, increasing the likelihood of deceptive behavior.

Lastly, the **General Strain theory** (Agnew, 1992) suggests that negative emotional states –such as those arising from unmet goals, loss, or adverse conditions– can increase the likelihood of unethical behavior. The theory emphasizes negative relationships with others that obstruct the attainment of positively valued goals and identifies three primary types of strain: (1) the actual or anticipated failure to achieve positively valued goals, (2) the actual or anticipated loss of valued stimuli, and (3) the actual or anticipated exposure to negative stimuli. The theory posits that strain[7] arises when individuals are blocked or threatened from attaining desirable goals, when valuable aspects of their lives are taken away or put at risk, or when they are exposed to, or face the threat of, unpleasant or negatively perceived stimuli (Agnew & White, 1992).

[7] A strain is a force that exerts pressure by pulling or stretching something beyond its limits, potentially causing damage. Cambridge Dictionary. https://dictionary.cambridge.org/dictionary/english/strain

Furthermore, negative affective states –especially anger and related emotions– commonly arise during the decision-making process (Shalvi et al., 2013) and may create a perceived need for corrective action, which can, in some instances, lead to criminal behavior (Agnew, 1992). Additionally, an experiment indicated that anger impaired ethical decision-making and sensemaking, while fear enhanced ethical decisions compared to both anger and neutral conditions, with anger's negative impact on sensemaking and ethical choices effectively reduced with emotion regulation (Kligyte et al., 2013).

Another emotion related to unethical behavior is envy, emerging from social comparisons with more advantaged others in personally meaningful domains (Hill et al., 2011). While envy has garnered considerable attention in recent literature, less research in behavioral ethics has examined the impact of other specific emotions like guilt, shame, anger, or fear. Eisenberg's review (2000) highlights the moral emotions of guilt and shame. Although guilt and shame both involve a sense of responsibility for violating moral standards, they differ significantly in their relation to moral behavior. Guilt –described as remorse for misbehavior– is directed at the specific behavior. It is thought to decrease the likelihood of unethical behavior (Agnihotri et al., 2012). In contrast, shame involves feelings of personal devaluation and self-condemnation, focusing more on one's identity than on the act itself (Treviño et al., 2006).

An experiment studying the relationship between emotions, ethical behavior, and IT indicated that employees experiencing negative emotions are more likely to violate information security policies (Zhen et al., 2022).

Rather than dismissing emotions as irrational biases, acknowledging and reflecting on them can lead to more ethical decision outcomes, which are aligned with affect heuristics. Therefore, organizations committed to ethical practices should encourage employees to reflect on their emotional responses, as these emotions can serve as valuable cues for identifying ethical dilemmas in the workplace.

3.3.6. Emotions and managerial power

As discussed in the preceding sections, emotions play a fundamental role in decision-making processes. These emotional responses are not only relevant to individual differences but are also shaped by situational and social factors, including one's role within an organizational hierarchy (Levine, 2010; Van Kleef & Lange, 2020).

Furthermore, based on literature, most studies focus on valence (positive/ negative emotions). Building on this foundation, it is important to consider how power dynamics within organizations influence emotional experiences and, in turn, decision-making.

To better understand the difference among the different managerial levels and emotions, the **Self-Concept** theory supports the existence of a positive relationship between felt power and positive emotions (A. K. Korman, 1970). Following this theory, individuals with higher levels of self-esteem and self-efficacy are more likely to experience positive emotions (Diener et al., 2010). Expanding on this idea, **Organizational-Based Self-Esteem** (OBSE) theory suggests that managerial power enhances self-esteem, thereby contributing to the positive emotional bias often observed among powerful individuals (Pierce & Gardner, 2004).

Furthermore, the **Basic Emotions theory** (Keltner, Sauter, et al., 2019) suggests that emotions can influence social hierarchies and avoid threats. Basic Emotions Theory (BET) provides a well-established foundation for defining emotions. According to this framework, an emotion is a brief, coherent state that emerges in response to appraisals of interpersonal or intrapersonal events. It is characterized by specific antecedents, physiological patterns, signaling behaviors, and action and appraisal tendencies. These features are not only internally consistent but also observed in similar forms among non-human primates. BET has significantly influenced several research domains, including emotion regulation, neural patterns of emotion processing, emotion-specific effects on cognition, and peripheral physiological responses linked to emotion (Keltner, Tracy, et al., 2019).

Moreover, the **Approach-Inhibition theory of power** extends this understanding of emotions and decision-making to the effects of managerial power dynamics (Keltner et al., 2003). According to this theory, individuals with greater power are more likely to take action and seek rewards, whereas those with less power become more cautious and constrained due to fear of consequences. Power is defined as an individual's relative capacity to influence others' states by granting or denying resources or imposing punishments. Higher power is linked to positive emotions, a heightened focus on rewards, automatic information processing, and a lack of behavioral inhibition. Conversely, lower power tends to be associated with negative emotions, increased sensitivity to threats, punishments, and social expectations, a more deliberate approach to information processing, and restrained social behavior (C. Anderson & Berdahl, 2002; Berdahl &

Martorana, 2006; Keltner, Sauter, et al., 2019; Van Kleef & Lange, 2020). This theory is supported by a neurological perspective by the **Situated Focus Theory of Power**, which posits that power provides individuals with greater freedom to pursue rewards, activating both goal-oriented attitudes (Guinote, 2007) and the **Behavioral Approach System** (BAS), a framework that adapts in response to rewards and chances (Guinote, 2017).

In particular, C. Anderson and Berdahl (2002) conducted a quantitative study showing that participants who scored higher in personality dominance or were given control over resources were more likely to express their authentic attitudes. These individuals reported greater positive affect and lower negative affect, were more inclined to perceive rewards (e.g., believing their partner liked them), and were less likely to perceive threats (e.g., sensing anger from their partner). Perceived power significantly mediated these effects. Berdahl and Martorana (2006) discovered that subjects lacking power reported higher levels of anger compared to those in positions of power. In another experimental study done by Van Kleef and Lange (2020) where power was manipulated, high-power individuals felt and reported higher positive emotions and less anger than subjects with less power (S. Zhang et al., 2024).

Furthermore, the Approach-Inhibition theory is utilized in strategic management research to explore the impact of top managers' power on strategic choices, such as studying the influence of managerial power on digital transformation (Z. Zhang et al., 2024). Z. Zhang et al. (2024) assert that three key dimensions demonstrate the advantageous influence of high managerial power in advancing a digital transformation strategy. Firstly, executives with high power are more attuned to the potential positive outcomes of their actions and tend to prioritize the anticipated benefits of digital transformation. Secondly, executives with high power tend to experience positive emotions such as optimism and self-confidence needed to take challenging initiatives and effectively oversee the results of high-stakes decisions implied in digital transformation, demonstrating an increased propensity for action. Digital transformation extends beyond the mere adoption of digital technologies; it requires substantial organizational commitment, including timely investments in human capital and research and development.

This dissertation draws on the Approach-Inhibition theory of power to examine how managerial roles influence emotional expression and behavior. It explores whether managers, because of their heightened approach orientation, display more positive

emotions and proactive and risk-taking emotional responses compared to non-managers, who may exhibit more negative emotions and inhibited and cautious behavior.

By addressing both the role of power dynamics and the effects of heightened emotional arousal, this study aims to advance theories in affective science and decision-making while offering practical insights for leadership development and workplace performance strategies.

To our knowledge, there is no existing research examining whether individuals in different organizational roles experience distinct emotional states and if such differences impact decision-making.

3.4. Emotions and Virtual Reality

In a technological context, emotion can be triggered by a new IT stimulus event[8], characterized by a short duration and significant influence on an individual's interaction with technological artifacts (Darban & Polites, 2016; Gerli et al., 2022; Imani & Montazer, 2019). Darban and Polites (2016) posit that cognition and emotion are interconnected in an IT learning environment, with emotion shaping behavior by influencing cognitive processes, while affective mechanisms often incorporate cognitive components such as thoughts and judgments, particularly anger, which is positively associated with individuals' willingness to learn, serving as a mediator in the relationship between emotions and learning motivation. Furthermore, IT-related events can evoke emotions across three empirically demonstrated, interdependent dimensions: i) instrumentally, by enabling or hindering task completion; ii) aesthetically, through sensory reactions to the artifact's appearance; and iii) symbolically, by associating the artifact with particular ideas or concepts (Rafaeli & Vilnai-Yavetz, 2004). In their work, they conclude that emotional responses shaped by the interpretation of these combined dimensions act as a bridge between the meaning individuals assign to the artifact and their attitudes toward the organization.

In particular, Stein et al. (2015) identified that an information technology (IT) stimulus, when presenting cues that align and reinforce one another, tends to generate a consistent emotional response –referred to as uniform affect. In contrast, when such cues conflict, they produce mixed or ambivalent emotional reactions. Users typically respond to uniform emotions with straightforward adaptation strategies, while ambivalent emotions prompt a blend of adaptive behaviors, characterized by shifting focus between the stimulus's positive and negative aspects. This emotional ambivalence, along with the resulting vacillating strategies, can foster active and constructive user engagement. This type of engagement is often reflected in behaviors such as adapting to tasks or tools and engaging in improvisational technology use actions that, although they may diverge from formal usage guidelines, can yield beneficial outcomes for the organization.

Lastly, Beaudry & Pinsonneault (2005, 2010) developed a framework that classifies emotional responses introduced by new information technologies (IT) acceptance and use

[8] IT stimulus events are changes driven by IT (Darban & Polites, 2016).

following the appraisal stage (threat/ opportunity and control/ certainty), which has been widely cited.

3.4.1. Introduction to Virtual Reality

Building on the understanding that emotions can be significantly influenced by information technology (IT) stimuli, it becomes essential to explore tools capable of deliberately evoking emotional responses. Among these, VR stands out as a powerful medium, offering immersive experiences that can simulate real-life scenarios and effectively trigger a wide range of emotions. VR refers to a system that immerses users that mimic real or imagined environments through telepresence using three-dimensional space –length, width, and depth– to represent objects and surroundings (Linares-Vargas & Cieza-Mostacero, 2024).

VR is characterized by the level of immersion and presence. *Immersion* refers to the technological attributes of a medium that enable users to engage deeply with content, while *presence* denotes the psychological sensation of actually being situated within the mediated environment based on Slater and Wilbur (1997) (Cummings & Bailenson, 2016). Furthermore, immersion is commonly referred to as presence. VR enables the simulation of environments that may closely mimic the real world or be entirely imaginary, while maintaining a sense of physical presence by engaging the user's senses –such as sight and sound– to create an experience that closely resembles real-life interactions (Steuer, 1992).

The origins of VR date back nearly sixty years, when computer scientist Ivan Sutherland developed the first HMD in 1965 (Curran & Hales, 1995; Wohlgenannt et al., 2020). VR gained renewed attention in 2014, when Gartner included it in its "Hype Cycle" for Emerging Technologies[9]. Two years later, VR was moved to the "Slope of Enlightenment" phase, as its potential benefits became more widely recognized, including

[9]Gartner's 2014 Hype Cycle for Emerging Technologies Maps the Journey to Digital Business. Gartner. https://www.gartner.com/en/newsroom/press-releases/2014-08-11-gartners-2014-hype-cycle-for-emerging-technologies-maps-the-journey-to-digital-business

in enterprise contexts[10]. According to 2025 data from Fortune Business Insights, the global VR market was valued at approximately USD 16.32 billion in 2024 and is expected to expand significantly, reaching USD 123.06 billion by 2032, with a projected compound annual growth rate (CAGR) of 28.9%[11].

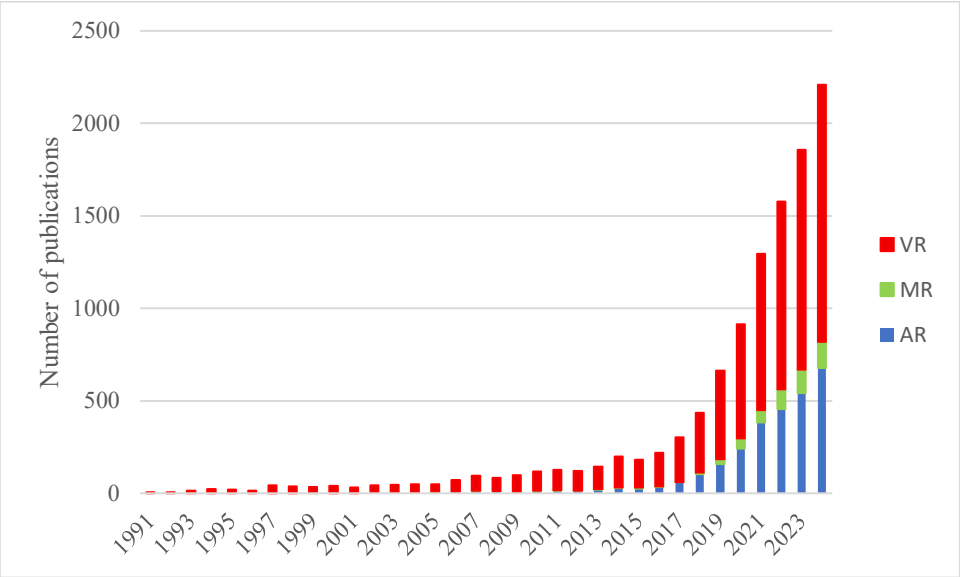
Virtual Reality (VR) has gained significant attention in recent years as a prominent topic in IT alongside Mixed Reality (MR) and Augmented Reality (AR). These technologies amplify the user's perception of their present environment or reality, enabling real-time interaction with digital elements (Brigham, 2017). However, there are notable differences among them (Brigham, 2017; Farshid et al., 2018): i) VR offers a total digital simulation that completely replaces the real world, enabling a fully immersive experience; ii) MR overlays digital content onto the physical world to reflect a potential or imagined scenario, enabling a moderate immersion; and iii) AR layers the digital information over the real, physical world, offering limited immersion.

Based on a search conducted in the Web of Science Core Collection using the topic "virtual reality," a total of 150,437 publications were identified. When filtered for peer-reviewed articles, this number is reduced to 8,503 and further narrowed to 7,279 when limiting results to publications up to the year 2024. In comparison, the corresponding numbers for augmented reality (AR) and mixed reality (MR) are 2,801 and 566, respectively, highlighting that VR remains the most extensively studied immersive technology. A closer analysis of publication trends since 2021 reveals that VR accounts for 65% of immersive technology publications, followed by AR at 29% and MR at 6% (see Figure 4).

[10] Gartner identifies three megatrends that will drive digital business into the next decade. Gartner. https://www.gartner.com/en/newsroom/press-releases/2017-08-15-gartner-identifies-three-megatrends-that-will-drive-digital-business-into-the-next-decade

[11] Virtual Reality [VR] Market Size, Growth, Share | Report, 2032. Fortune Business Insights. https://www.fortunebusinessinsights.com/industry-reports/virtual-reality-market-101378

Figure 4: *Number of reviewed articles per publication year related to VR, AR, and MR in Web of Science Core Collection.*



Note: VR: virtual reality, AR: augmented reality, MR: mixed reality

VR has a broad **application** across fields such as gaming and entertainment (e.g., Ramachandran et al. (2025)), training and education (Bala & Gupta, 2024; Conrad et al., 2024; Jongbloed et al., 2024; Radianti et al., 2020), healthcare (Bell et al., 2024; Daineko et al., 2024; Emmelkamp & Meyerbröker, 2021), and marketing and consumers (Cowan & Ketron, 2019; Meißner et al., 2020). In organizational contexts, VR tools are increasingly being adopted for a range of purposes, most notably training (Abich IV et al., 2021; Chang et al., 2024; Lau & Lee, 2021). Empirical studies highlight VR's effectiveness in enhancing knowledge retention, increasing motivation and engagement, and boosting confidence in task performance (Abich IV et al., 2021). Furthermore, VR has demonstrated validity in developing behavioral and social competencies –including interpersonal, safety-related, and professional skills (Chang et al., 2024)– as well as supporting transformative learning experiences (Lau & Lee, 2021). Research also suggests that VR can surpass traditional instructional methods in specific domains, such as business ethics education (Ronaghi, 2024; Sholihin et al., 2020) and entrepreneurship training (Ronaghi & Forouharfar, 2024). Beyond training, VR is applied in areas like product design (Fan et al., 2022; Loureiro et al., 2019) and team collaboration (Moore & Geuss, 2020).

Boyd & Koles (2019) provide examples of organizations leveraging VR, including Airbus, Siemens, and Kimberly-Clark. Airbus and Honeywell utilize VR primarily for workforce training[12]. Siemens applies VR both to enhance workforce collaboration between designers and engineers[13] and to support remote coordination in construction projects[14]. Kimberly-Clark uses VR to prototype designs, facilitating collaboration among teams and with customers[15]. Other relevant companies using VR for training are Volvo Group, Delta Air Lines, and UPS[16]. In a recent systematic review about VR training, Chang et al. (2024) found that it offers a scalable and effective solution for expanding, as tested in organizations such as Verizon, Walmart, and FedexGround[17].

Although the application of VR, including its impact on emotions, has been proven, a recent systematic review published in the journal "Multimedia Tools and Applications" found that most of the studies are related to general VR research and to therapy (30% each), with none addressing management[18] (Magalhães et al., 2023). Therefore, **investigating the impact of VR on emotions in management could help fill the gap in the literature about a potential field of interest.**

3.4.2. Virtual Reality according to immersion

VR technologies can be categorized by their level of immersion used, ranging from non-immersive to fully immersive. These include desktop-based systems, Cave Automatic

[12] Airbus brings cockpit to you with new VR trainer.https://aircraft.airbus.com/en/newsroom/web-story/2024-10-airbus-brings-cockpit-to-you-with-new-virtual-reality-flight-trainer

[13] *CES 2024: Siemens delivers innovations in immersive engineering and artificial intelligence to enable the industrial metaverse* [C2_ct_press_release]. https://press.siemens.com/global/en/pressrelease/ces-2024-siemens-delivers-innovations-immersive-engineering-and-artificial

[14] *Digitalizing the Construction Industry with Building Information Modeling (BIM)—Siemens Software Podcast Network*. https://blogs.sw.siemens.com/podcasts/next-generation-design/siemens-real-estate-digital-twin-bim/

[15] *The ICON™ Collection Design Story*. Kimberly Clark Professional. https://www.kcprofessional.com/en-gb/solutions/icon/design-story

[16]16 Companies That Are Using VR For Training. Twin Reality. https://twinreality.in/companies-that-are-using-vr-for-training/

[17] The Future of Work Is Immersive. Harvard Business School Publishing. Harvard Business Review Analytic Services. https://hbr.org/sponsored/2022/09/the-future-of-work-is-immersive

[18] The percentages found were 30% to general VR research, 30% to therapy, 19% to food research, and 3% to marketing, multimedia instruments, and uses.

Virtual Environment (CAVE) setups, augmented reality (AR), metaverse, and head-mounted displays (HMD).

Firstly**, desktop-based** systems are classified as non-immersive technologies, as they only enable participants to view content based on the orientation and movement of the device in use –PC, smartphone, or tablet (Baños et al., 2004; Ventura et al., 2019). Unlike more immersive platforms, desktop-based virtual environments lack the natural alignment between users' physical bodies and their virtual representations (Dincelli & Yayla, 2022). VR applications operated on a PC typically rely on conventional input devices such as a keyboard or mouse, which present a limitation, as they fail to accurately reflect the user's natural behavior within a virtual environment (Lee, 2018).

The following level of immersion corresponds to the **CAVE** technology. CAVE is a semi-immersive display system that projects computerized images on walls surrounding the user, having a field of view of less than 360º (Baños et al., 2004; D. Chen et al., 2024; Faralla et al., 2024; Halarnkar et al., 2012). The term "CAVE" also refers to Plato's allegory of the cave from *The Republic*, where a philosopher contemplates the nature of reality, perception, and illusion (Cruz-Neira et al., 1992). CAVE immersion displays stronger emotional responses than non-immersive settings and requires expensive technologies (Combe et al., 2023).

At a higher level of immersion, **augmented reality (**AR) represents the next technological step. It is considered less immersive than VR because it overlays virtual elements onto the user's physical environment rather than fully replacing it (Dincelli & Yayla, 2022). AR integrates real-world settings with computer-generated content via devices such as smartphones and AR glasses, thereby enhancing the user's perception of reality.

One step further on immersion is the **metaverse**, which corresponds to a virtual environment that integrates elements of both the digital and physical worlds, i.e., extended reality (XR) (Xi et al., 2022). The metaverse offers users a platform to interact and engage with others through virtual identities known as avatars. (Kumar et al., 2024). When breaking down the word "metaverse," the prefix "meta" refers to the virtual or digital aspect ("beyond"), while the suffix "verse" relates to the real or physical world (a shortened form of "universe") (Piñeiro-Chousa et al., 2025). Its XR enables applications

such as gaming, virtual office meetings, casual social interactions, trying on outfits in virtual stores, immersive learning in classrooms, real-time online medical consultations, and remote equipment maintenance in manufacturing (Z. Zhang et al., 2024). Despite rising interest in the metaverse, we still know little about how it affects people's thoughts and feelings. An experiment conducted to analyze emotions related to metaverse use found that the main emotions were of positive valence and low arousal, which were not strong enough to sustain user engagement over the long term (Suh, 2024).

Finally, the head-mounted displays (**HMD**) represent fully immersive technology. These systems provide stereoscopic imaging, expansive viewing angles, and real-time head orientation tracking, generally complemented with a haptic device or controller –typically held in the hand– designed to detect and respond to the user's physical movements (Lee, 2018). As a result, VR can generate virtual environments that influence users' cognitive processes, behavioral responses, and emotional states, while allowing for a more realistic integration of sensory and motor experiences (Diniz Bernardo et al., 2021). This makes VR a widely used tool for emotion elicitation due to its ability to both induce specific emotional states and assess their effects under controlled conditions (see Table 4). However, VR is not new. The first interactive computer graphics with external inputs were created in 1956 by Ivan Sutherland (Sutherland, 1965). Eleven years later, his student Jim Clark developed a three-degree-of-freedom position-tracking interface, the germ for the first public VR systems, such as the Oculus HMD –bought by Facebook (Meta)– (Sherman & Craig, 2018). HMD has enabled the growing adoption of VR as it facilitates the overlay of virtual elements onto the user's real environment (Barhorst et al., 2021) by presenting different visual inputs to each eye, thereby creating a stereoscopic illusion of depth (Baños et al., 2004). This makes VR a widely used tool for emotion elicitation due to its ability to both induce specific emotional states and assess their effects under controlled conditions, mainly with students' samples (see Table 4).

Moreover, HMDs have become increasingly accessible in large part due to advancements in VR hardware and software, particularly the effectiveness and cost of immersive devices (Castelvecchi, 2016; Wohlgenannt et al., 2020). Early head-mounted displays (HMDs) suffered from limited graphic capabilities and frequent motion sickness, which hindered widespread adoption. Subsequent devices, such as CAVEs, required dedicated rooms and expensive projectors. Later models of HMD offered high graphic resolution but needed

to be tethered to a PC (e.g., the Meta Oculus Rift, which was replaced by the Meta Oculus Quest in 2021). Today's latest-generation HMDs are wireless and fully self-contained, and they can track head orientation and gestures through the goggles, as well as hand movements via handheld controllers, eliminating the need for a connection to a high-performance graphics computer. Their affordability[19] also improved their use (Cordeil et al., 2016).

While both the metaverse and VR with HMDs offer immersive experiences, the metaverse is associated with a significantly higher overall workload –particularly in terms of mental demand and effort– and remains in the early stages of technological development (Xi et al., 2022). Given these limitations and the HMD affordability**, we chose to focus on VR as the more practical and established option for exploring the impact of immersion.**

Furthermore, HMD improvements have made them increasingly accessible to consumers and enabled broader use in B2C scenarios, such as gaming, fitness, and entertainment, including mixed reality experiences. Despite the proven effectiveness and cost-efficiency of VR in education, training, and healthcare, its application in organizational and workplace contexts –particularly in decision-making beyond training or health interventions– remains underexplored. This represents a promising area for further research and innovation.

3.4.3. Virtual Reality and emotion elicitation

Virtual reality (VR) has gained traction in emotion research due to its ability to simulate realistic environments within controlled laboratory conditions (Diniz Bernardo et al., 2021; Dozio et al., 2024; Vince, 2011) (see Table 4 for experimental studies using VR for emotion elicitation). It is increasingly used for emotion induction, as it addresses the

[19] Affordability cost: The average selling prices of HMDs on www.amazon.es as of July 8th, 2025, are as follows: Meta Quest 3S 512GB, €699.99; HTC Vive Pro2 full kit, €795.99; Sony HMD PlayStation PS5, €448; or PICO 4 Ultra 256GB, €599. The models vary following the resolution of the goggles (pixels per eye), field of vision, weight, working with a PC or directly with goggles, and the storage for games and apps.
Meta Quest MR, VR headsets and Accessories. https://www.meta.com/es/en/quest/
Realidad Virtual PICO [Página web oficial]. https://www.picoxr.com/es
PlayStation®VR2 | La nueva generación de realidad virtual para PS5.https://www.playstation.com/es-es/ps-vr2/
Discover Virtual Reality Beyond Imagination [VIVE European Union]. https://www.vive.com/eu

limitations of traditional affective computing techniques –such as facial expression and speech analysis– which often lack feasibility for in-field experiments (Lima et al., 2024).

Table 4: *Experimental studies related to emotion induction with VR technology.*

Authors	Year	Journal	Sample	Immersion device	Emotion induced	Emotion measurement methodology	Impact on emotions
Baños et al.	2006	Persuasive Technology: First International Conference on Persuasive Technology for Human Well-Being	students	CAVE	sadness, happiness, anxiety and relaxation	VAS, PANAS	Decrease of positive moods and increase negative ones in sad induction, and conversely with happy induction
Riva et al.	2007	CyberPsychology & Behavior	students	HMD	anxiety, relaxation	VAS, PANAS	Increase of negative emotion and decrease of positive emotions in anxiety induction
Baños et al.	2008	CyberPsychology & Behavior	students	CAVE	joy, relaxation	VAS, PANAS	Increase of positive emotions and decrease of negative emotions
Bouchard et al.	2008	Presence Teleoperators & Virtual Environments	general	HMD	anxiety	State anxiety subscale	Increase of anxiety with anxiety induction
Bouchard	2011	Virtual Reality	children	HMD	positive, negative	Brief Mood Introspection Scale	Increase of positive emotions in joy induction, and decrease of positive emotions in sad induction
Baños et al.	2012	Interacting with Computers	general	PC	joy, relaxation	VAS	Increase of positive emotions and decrease of negative emotions
Rodríguez et al.	2015	Expert Systems with Applications	general	CAVE	sadness	VAS, PANAS	Increase of negative emotions and decrease of positive emotions
Felnhofer et al.	2015	International journal of human-computer studies	students	HMD	joy, anger, boredom, anxiety, sadness	Modified Differential Emotions Scale	Increase of negative emotions and decrease of positive emotions in negative inductions, and the contrary in the positive induction.
Kugler et al.	2020	Social Psychological and Personality Science	students	HMD	disgust, sadness	PANAS	Increase of disgust in disgust induction, increase of sadness in sadness induction
Medai and Noussair	2021	Frontiers in psychology	students	HMD	happiness	PANAS	Increase of positive emotions and decrease of negative emotions

Authors	Year	Journal	Sample	Immersion device	Emotion induced	Emotion measurement methodology	Impact on emotions
Magdin et al.	2021	Virtual Reality	students	HMD	anger, disgust, fear, sadness, joy	SAM	Increase of negative emotion and decrease of positive emotion
Lemmens et al.	2022	Virtual reality	general	PC	fear	3 items	Increase of fear
Kako et al.	2023	Affective Science	general	HMD	positive	Modified Differential Emotions Scale	Increase of positive emotions and decrease of negative emotions
Loisel-Fleuriot et al.	2023	Scientific Reports	general	PC	positive, negative	SAM	Increase of positive emotion in positive induction
Bujić et al.	2023	International Journal of Human-Computer Studies	general	HMD, PC	negative	PANAS	Increase of negative emotions and decrease of positive emotions
Pavic et al.	2024	Scientific Reports	general	HMD, PC	happiness	SAM	Increase of positive emotions in the happy induction

The application of VR in **emotion elicitation** research is grounded in its capacity to elicit emotional responses by simulating contexts that closely resemble real-life situations, thereby activating both unconscious physiological reactions and conscious cognitive processes within controlled environments (Somarathna et al., 2022). Moreover, Bornstein's review about exposure and affect (1989) already highlighted that the effectiveness of emotional elicitation is influenced by factors such as type of stimulus, recognition of the stimulus, and the way emotions are rated. Furthermore, we must consider that emotional responses exhibit distinct frequency patterns depending on whether the elicited emotion is positive or negative (Phaf & Rotteveel, 2012).

Regarding experimental studies, most evidence suggests that immersive settings have a heightened ability to both detect and amplify users' emotional responses, increasing valence and arousal (Magdin et al., 2021; Tian et al., 2021). VR settings specifically designed to induce positive emotions have been shown to increase them, such as happiness and joy (Baños et al., 2006; Felnhofer et al., 2015; Kako et al., 2023; Medai & Noussair, 2021). Additionally, VR has also proven effective in intensifying negative emotional states when used to evoke adverse affective responses (Baños et al., 2006; Felnhofer et al., 2015; Kjærstad et al., 2022; Rodríguez et al., 2015).

In particular, regarding positive induction, an experimental study demonstrated that HMD VR served as an effective and enduring tool for positive mood induction, producing immediate emotional shifts through the use of immersive environments such as a virtual beach (positive condition) and an office setting (neutral condition) (Kako et al., 2023). Their results indicated that participants exposed to the positive VR environment reported significantly higher levels of positive mood compared to those in the neutral context. Moreover, participants in the positive mood condition also reported lower levels of negative mood than those in the neutral condition. Medai and Noussair (2021) also managed to increase happiness in participants after eliciting with HMD a VR video of a surfer in the sea. Felnhofer et al. (2015) also successfully elicited with an HMD the targeted emotional states (joy, anger, boredom, and anxiety) with different VR environments, adjusting variables such as lighting, weather conditions, time of day, and scene content.

Regarding the induction of negative emotions, Baños et al. (2006) managed to change participants' moods in response to the emotional induction with a CAVE technology

within a VR park environment. Specifically, the sadness induction led to a decrease in positive mood and an increase in negative mood, whereas the happiness induction produced the opposite effect. Sadness was also successfully induced in an experiment showing a VR park (Rodríguez et al., 2015). Regarding anger, Kjaerstad et al. (2022) managed to increase it after showing a VR film of an unsuccessful presentation delivered to a hostile audience. Fear was shown to be stronger in the induction of negative emotions with VR games versus non-immersive games (Lavoie et al., 2021). In line with these findings, an experiment with 145 students using an HMD (an HTC VIVE device) to view a horror film reported a significant increase in fear (Lin, 2017). The following examples illustrate results depending on the type of tool used for emotion induction. In a study involving 106 students exposed to a 20-minute film either through a CAVE immersive system or a standard wall projection (no immersion), results indicated that the CAVE condition (higher immersion) elicited more intense emotional responses –both positive and negative– compared to the non-immersive setting (Visch et al., 2010). Similarly, an experiment with 25 students comparing a CAVE system and an HMD found that the HMD (full immersion) was more effective in reducing anxiety (Juan & Pérez, 2009).

These findings can be interpreted using the **Cognitive Person-Focused model** (Takac et al., 2023), which outlines VR environments' emotional regulation mechanisms and elaborates on the evolving relationships between them. The model is grounded in Lazarus's widely cited **Cognitive-Motivational-Relational theory** (1991, 1993). This theory conducts an analysis of appraisal patterns and their corresponding core relational themes across several commonly recognized emotions, thereby facilitating the explanation and prediction of emotional responses, which are not solely determined by the stimuli.

All these results highlight **VR's significant potential as a tool for emotion induction** across various contexts.

4. *Virtual Reality, Emotions, Ethical Decision-making and Power*

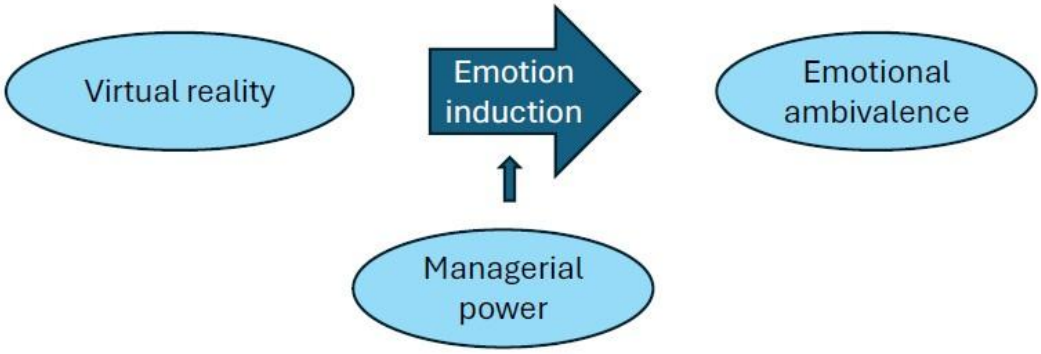
As previously discussed, emotions are characterized by two primary dimensions –valence and arousal– as outlined in Russell's (1980) circumplex model of affect. Emotional ambivalence refers to the simultaneous experience of both positive and negative emotional or cognitive responses toward a person, situation, object, task, or goal (Rothman et al., 2017). VR can influence emotions by affecting both valence and arousal (Magdin et al., 2021; Tian et al., 2021). Consequently, the degree of emotional ambivalence is expected to vary depending on the specific emotional responses elicited by VR. The primary aim of this chapter is to examine this relationship in greater detail.

4.1. Virtual Reality and Emotional Ambivalence

While immersive technologies have been widely employed in the study of emotions, their application within organizational research –particularly in technological contexts– remains relatively unexplored (Ashkanasy & Dorris, 2017; Elfenbein, 2007). This is especially true for emotional ambivalence, the commonly experienced state of feeling conflicting emotions toward the same object, individual, or situation (Fong, 2006; Rothman et al., 2017). Given that emotions have a major impact on decisions and behaviors (Bechara et al., 2000), it is important to investigate how immersive tools influence employees' emotional experiences. This research seeks to bridge that gap by specifically examining VR and its relationship to emotional ambivalence in organizational settings.

Additionally, it adds to current research by showing immersive technologies as a tool for eliciting emotionally complex organizational scenarios, thereby modulating levels of emotional ambivalence. Moreover, the study considers the role of managerial power distribution within the organization as a potential moderating factor. Managerial power has been identified as a critical determinant of employee behavior (Ashforth et al., 2014) and their emotional ambivalence (Brundin et al., 2022; Rothman & Melwani, 2017) (see Figure 5).

Figure 5: *Model of impact of emotion induction with VR on emotional ambivalence depending on managerial power.*



Sections 4.1 and 4.2 focus on the following research questions discussed earlier: (1) In what ways does VR, as opposed to non-immersive technologies, affect emotional ambivalence, given that prior research has largely examined individual emotions separately?, and (2) How does managerial power influence the connection between immersive technology use and emotional ambivalence?

4.2. Emotional Ambivalence, Power and Virtual Reality

4.2.1. How Virtual Reality influences Emotional Ambivalence

Immersive technologies have the potential to shape emotional ambivalence by eliciting both cognitive and physiological reactions through lifelike simulations of the real world (Kleinlogel et al., 2024; Somarathna et al., 2022). Immersion levels vary: VR fully engages users by aligning sensory and motor functions with the virtual world, while AR overlays digital elements onto real environments (Barhorst et al., 2021; Dincelli & Yayla, 2022). Desktop systems, lacking this alignment, offer minimal immersion (Mendes et al., 2019). These emotional dynamics can be better understood through the Cognitive Person-Focused model, which explains emotional regulation in VR by exploring the interplay between environmental cues, cognitive processing, and observable outcomes (Takac et al., 2023). This model builds on Lazarus's Cognitive-Motivational-Relational theory (1993), which proposes that emotions result from individuals' cognitive appraisals of external events. In this view, it is the subjective interpretation of a situation, not the stimulus alone, that determines the emotional response.

The emotional effects of immersive technology can be explained using the circumplex model of affect (1980), which categorizes emotions by valence (positive or negative) and arousal (intensity) (Russell, 1980). Prior research suggests immersive technologies typically trigger monovalent responses, intensifying either positive or negative emotions but rarely both. For example, immersive scenarios designed to elicit positive feelings boost joy and happiness (Baños et al., 2006; Felnhofer et al., 2015; Kako et al., 2023; Kjærstad et al., 2022), while negative induction heightens negative emotions (Baños et al., 2006; Felnhofer et al., 2015; Kjærstad et al., 2022; Lavoie et al., 2021). Although emotional ambivalence was not directly measured, we posit that the effects of immersion depend on the user's initial mood: individuals with high pre-existing ambivalence tend to experience a greater reduction in ambivalence, whereas those with lower ambivalence show mixed reactions based on their prior state. When the immersive content aligns with an existing mood (e.g., positive mood and positive stimuli), the impact may be muted, consistent with evidence that uniform emotional cues produce weaker responses (Bornstein, 1989). This conclusion suggests that eliciting a distinct emotional valence may require an initial level of neural conflict, which might not occur when the user's mood before the induction is similar to the immersive stimulus (De Vries et al., 2010; Phaf & Rotteveel, 2012).

Moreover, based on the Appraisal Tendency Framework (ATF) (Lerner & Keltner, 2000, 2001), emotions of opposite valence, such as anger and happiness, can both be associated with a sense of certainty, which may result in them having similar impacts on judgment and decision-making. This explains that emotional ambivalence toward an object can also arise from a disconnect between cognitive evaluations and emotional reactions or from simultaneously holding conflicting beliefs (Malhotra, 2005). Furthermore, the Feeling is for Doing model (Zeelenberg et al., 2008) explains that the same specific emotion can drive different behaviors depending on the individual's overarching goal in a particular context. Additionally, it posits that the most intense emotion present may override the action tendencies and motivational effects of other simultaneous emotions. Following these considerations, we can predict little change in ambivalence levels when the valence of immersive technology's emotional elicitation is similar to the pre-existing mood.

In light of these considerations, we put forward the following hypotheses:

Hypothesis 1a (H1a): Emotional elicitation via virtual reality will lead to a greater reduction in emotional ambivalence compared to non-immersive environments.

Hypothesis 1b (H1b): The decrease in emotional ambivalence resulting from VR-based elicitation will be more pronounced among individuals with higher initial levels of ambivalence.

4.2.2. The moderating role of managerial Power in the relationship between immersive Virtual Reality technology and Emotional Ambivalence

While individuals' emotional baselines influence how immersive technology affects them, managerial power emerges as another key factor in organizational settings. Various theoretical frameworks consistently link power to the experience of more positive emotions. Multiple perspectives support this positive association between perceived power and emotional states (Bombari et al., 2017; Keltner et al., 2003; P. H. Kim et al., 2017; Schmid & Schmid Mast, 2013; Silard & Dasborough, 2021).

As explained earlier, according to Self-Concept theory (A. K. Korman, 1970), individuals with higher self-esteem and self-efficacy tend to experience more positive emotions (Diener et al., 2010). Since managerial roles, which are associated with higher managerial power, are positively correlated with self-efficacy (J. V. Korman et al., 2022), those with managerial power are more likely to exhibit positive emotional responses. Expanding on this, Organizational-Based Self-Esteem (OBSE) theory explained that managerial power enhances self-esteem, which in turn contributes to a more positive emotional outlook (Pierce & Gardner, 2004). From a neurological standpoint, the Situated Focus theory of power argued that power enables individuals to focus more freely on reward-seeking behavior (Guinote, 2007), stimulating both goal-oriented mindsets and activation of the Behavioral Approach System (BAS) (C. Anderson & Galinsky, 2006; Guinote, 2017). From a more contextual perspective, the Approach-Inhibition theory argued that individuals with more power are more likely to be exposed to positive stimuli (Galinsky et al., 2003), since in their daily tasks they confront more reward-rich situations and experiences, as well as reduced negative affect, since they are less likely to perceive threats (Keltner et al., 2003). On the contrary, subjects with less power revealed higher levels of negative emotion compared to those in positions of power (Van Kleef & Lange, 2020).

Different experiments have demonstrated that immersive technology can enhance self-esteem and self-efficacy (D. Ding et al., 2020; Ferrer-Garcia et al., 2013; Nosek et al., 2016), thereby promoting approach-oriented behaviors over inhibitory ones (Latu et al., 2019; Schmid & Schmid Mast, 2013; Weick et al., 2017). However, we contend that managerial power may moderate its emotional impact. Specifically, as previously discussed, an individual's baseline level of emotional ambivalence is likely to shape their emotional response to immersive experiences. Given substantial evidence that individuals in managerial roles are more frequently exposed to positive stimuli, they are likely to exhibit lower levels of pre-existing emotional ambivalence. As a result, managerial power is expected to be associated with reduced initial conflict between existing emotional states and the positive emotions elicited by immersive technologies. In this context, the emotional impact of such stimuli may be less pronounced for managers. Thus, we propose:

Hypothesis 2 (H2): Managerial power will reduce the effect of positive stimuli through immersive technology on emotional ambivalence, resulting in a weaker effect for individuals holding higher managerial positions.

4.3. Virtual Reality and Ethical Decision-making

As mentioned before, emotions are a fundamental component of organizational behavior, shaping processes such as decision-making, social interactions, learning, and performance outcomes (Ashkanasy & Dorris, 2017; Bechara et al., 2000; Elfenbein, 2007). They also play a significant role in influencing ethical conduct. Research has shown that emotional states can impact various types of deceptive behaviors, including those driven by self-interest, Pareto[20] lies, spiteful lies, and prosocial lies (Yip & Lee, 2022). Negative emotions –especially anger and its related affective states– frequently arise during decision-making (Shalvi et al., 2013) and may foster a perceived need to take corrective or retaliatory action, which in extreme cases can escalate to criminal behavior (Agnew, 1992). In contrast, inducing positive emotions such as happiness, particularly through immersive technologies like VR, has been linked to more honest behavior (Medai & Noussair, 2021). Tackling dishonest conduct within organizations is essential, as it can lead to serious consequences: diminished long-term profitability due to reputational harm and loss of customer loyalty, as well as increased operational expenses resulting from mismatches between honest and dishonest employees. This misalignment can foster mistrust among stakeholders and necessitate costly monitoring and control mechanisms (Cialdini et al., 2004).

Misconduct within organizations –such as corruption (Fowler, 2023), insider trading (Klaw & Mayer, 2021), fraud (Fowler, 2023; Sloman, 1996), and tax evasion (Dammak & Jmal Ep Derbel, 2024; Slemrod, 2007)– has had a severe impact on corporate reputations (Eabrasu, 2020). A global report by the Association of Certified Fraud Examiners (ACFE) of 2024, covering data from 138 countries, found that the primary perpetrators of occupational fraud were managers[21] (41%), followed by non-managerial employees (37%), owners or executives (19%), and others (3%). These findings align with existing research suggesting that power significantly influences both behavior and emotional expression (Keltner et al., 2003).

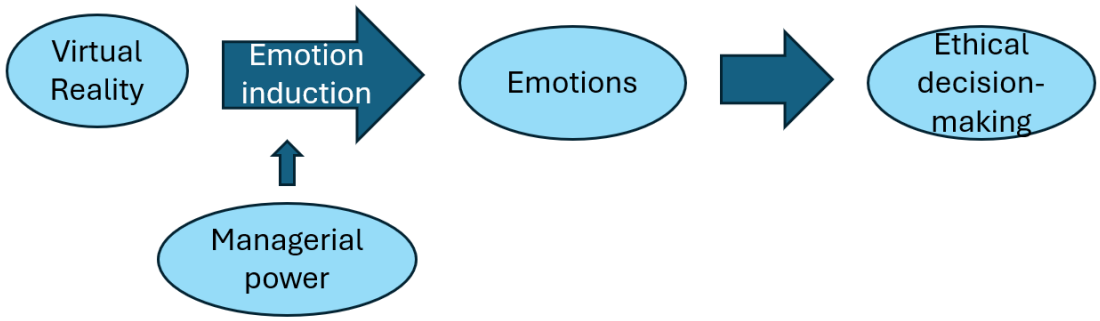
Existing literature highlights differences in ethical behavior between managers and employees. One study found that managerial attitudes significantly shape decision-

[20] Pareto deception describes a form of dishonesty in which both the deceiver and the recipient gain some benefit from the lie (Yip & Lee, 2022).
[21] Association of Certified Fraud Examiners. (2024). ACFE Report to the Nations | 2024 Global Fraud Study. https://legacy.acfe.com/report-to-the-nations/2024/

making, particularly when striving to meet earnings targets and qualify for annual bonuses under accepted accounting standards (T. D. Carpenter & Reimers, 2005). Additionally, a person's career stage or age appears to influence their values: senior managers tend to place higher importance on trust and lower importance on financial gain, while younger managers are generally more driven by achievement (Barnett & Karson, 1989). Supporting this, senior employees have been shown to interpret ethical standards more strictly (Serwinek, 1992). Comparative research has also found that managers tend to endorse more deontological, and thus more ethical, perspectives than non-managerial professionals (Siu & Lam, 2009). This finding is consistent with evidence that managerial power has a major influence on shaping moral reasoning (El Haber & Nagpal, 2024). In the context of financial decision-making, a quantitative study found that senior auditors are more likely to make judgments that align with ethical standards and accurately reflect the financial data available (Muñoz-Izquierdo & Pascual-Ezama, 2024). A similar pattern is observed in academic settings, where faculty members typically demonstrate stronger ethical orientations compared to students in their first year (Stevens et al., 1993).

Although VR is increasingly acknowledged as an effective tool for eliciting emotional responses, there remains a significant lack of empirical research specifically examining how these emotional effects unfold among managers and employees –two central figures in organizational dynamics. Their emotional engagement with VR remains underexplored. Developing a deeper understanding of how VR shapes the interaction between hierarchical power and emotion, and how this, in turn, influences ethical behavior, could offer valuable insights for organizational research and practice (see Figure 6).

Figure 6: *Model of impact of emotion induction with VR on ethical decision-making depending on managerial power.*



Investigating whether, and in what ways, immersive technology affects behavior linked

to power dynamics may help clarify its ethical implications within workplace settings.

This section, along with the following ones, aims to explore the emotional pathways through which VR may influence the ethical behavior of both managers and non-managers.

4.4. Ethical decision-making, Power and Virtual Reality

Business ethics can be broadly distinguished between normative approaches, which prescribe how individuals ought to act from philosophical or theological perspectives, and descriptive approaches, which aim to explain and predict how individuals actually behave (O'Fallon & Butterfield, 2005). Within organizations, understanding employees' ethical behavior –defined as "individual behavior that is subject to or judged according to generally accepted moral norms of behavior" (Treviño et al., 2006, p. 943)–, is particularly important. Prior research highlights the interplay of individual characteristics, organizational contexts, and different facets of ethical conduct at both individual and group levels (Treviño et al., 2006). Furthermore, business ethics scholars have emphasized the affective domain: emotions influence all stages of ethical decision-making, from awareness to judgment, motivation, and intention (Gaudine & Thorne, 2001). Building on this literature, the present study focuses on descriptive business ethics at **individual** level, with particular attention to the cognitive and affective processes underlying ethical behavior. In particular, it investigates how VR can be used to induce emotions that shape ethical decision-making.

VR scenarios have been shown to effectively elicit emotional states –amplifying both positive emotions like happiness or joy and negative emotions when purposefully induced (Baños et al., 2006; Felnhofer et al., 2015; Kako et al., 2023; Kjærstad et al., 2022; Lavoie et al., 2021; Rodríguez et al., 2015). Taking into account that happiness and fear are among the most salient discrete emotions in workplace settings (Ashkanasy & Dorris, 2017; Ashkanasy & Humphrey, 2011), these emotions are particularly relevant for examining how VR-elicited affective responses might impact differently across managerial and non-managerial roles and, in turn, shape their ethical decision-making.

While these models highlight the evaluative and regulatory functions of emotions in ethical decision-making, **Basic Emotions theory** (Keltner, Sauter, et al., 2019) provides a complementary perspective by grounding such processes in evolutionarily adaptive affective responses. According to this view, discrete emotions such as happiness and fear are expressed through consistent nonverbal patterns and tied to physiological and behavioral tendencies that have evolved to help individuals navigate social interactions, hierarchy, and threats. Because these emotional responses serve as rapid, adaptive guides for social behavior, they also carry ethical significance: they orient individuals toward cooperation, fairness, and harm-avoidance, thereby linking basic affective processes to

the emergence and reinforcement of ethical behavior in organizational contexts.

Although the connection between emotion and ethical decision-making remains complex and not yet fully clarified, several theoretical models emphasize the significant role that emotional processes play in shaping ethical behavior. As mentioned before, the Cognitive-Affective model (Gaudine & Thorne, 2001), for instance, underscores the influence of emotional arousal and valence (positive or negative) at different stages of the ethical decision-making process. According to this model, individuals experiencing heightened emotional arousal coupled with positive affect (e.g., happiness) may demonstrate enhanced ethical awareness, engage in more advanced moral reasoning, exhibit stronger alignment between moral judgment and ethical action, and show greater commitment to ethical follow-through.

Empirical studies demonstrated that high levels of ethical judgments and behaviors appear attainable primarily when positive emotions are experienced at moderate levels (Escadas et al., 2024). Escadas et al. (2024) further showed that positive emotions most strongly influence ethical intention and behavior, and are key determinants of desirable ethical outcomes, making them essential for achieving high consumer ethics. Similarly, happiness has been linked to honesty in some studies (Medai & Noussair, 2021; Van Der Zee et al., 2016).

Moreover, these emotional effects intersect with organizational hierarchies. Managers generally report higher happiness levels than non-managers (Jaworek et al., 2021), a pattern explained by the Approach-Inhibition theory (Keltner et al., 2003). As outlined previously, this theory proposes that elevated power fosters positive affect, sensitivity to rewards, automatic cognitive processing, and reduced behavioral inhibition or risk aversion. Together, this evidence provides consistent support for happiness as a driver of ethical awareness, intention, and behavior.

In contrast, individuals with lower power, who typically experience more negative affect and heightened threat sensitivity, may display different emotional dynamics when facing ethical dilemmas. These individuals are more likely to engage in deliberate cognitive processing and socially cautious behavior, which can sometimes translate into fear-driven, risk-averse, or inhibited responses. However, unlike happiness, which shows a consistent positive association with ethical outcomes, the influence of these negative

emotions is far less straightforward.

Fear, for example, has been associated with risk aversion, as fearful individuals tend to make pessimistic assessments and prefer safer choices (Lerner & Keltner, 2001). It has also been linked to ethical vigilance, reducing dishonesty and fostering more cautious decision-making (Kligyte et al., 2013; Singh et al., 2018), as well as increased moral intensity (Singh et al., 2018). However, experimental evidence offers a more ambiguous picture. Yacout and Vitell (2018) studied the impact of fear on consumer behavior, finding mixed results: no effect on moral intensity, a partial effect on ethical perception when no harm was involved, and an effect on ethical intention in only one of four scenarios (price tag changes). Fear has also been linked to risk aversion, as fearful individuals tend to make pessimistic risk assessments and favor risk-avoidant decisions (Lerner & Keltner, 2001).

Risk aversion itself shows a similarly contradictory pattern. On the one hand, it can encourage ethical conduct, such as greater adherence to academic integrity (Eshet et al., 2024). On the other hand, research on business corruption suggests that risk-averse firms may actually be more inclined to engage in unethical practices, such as offering bribes, compared to risk-neutral or risk-seeking firms (Søreide, 2009).

Inhibited behavior further illustrates this complexity, as it is associated with ethical conduct in personal contexts through self-restraint and in interpersonal contexts through harm avoidance, but in intergroup settings it can take the opposite form, manifesting as aggression or violence (Janoff-Bulman & Carnes, 2013).

Overall, the main insights of the reviewed literature suggest that happiness plays a particularly robust role in fostering ethical awareness, judgment, and behavior. Importantly, managerial position and power appear to shape the baseline affective states that individuals bring into decision-making contexts. Managers, who tend to experience higher levels of happiness due to their elevated sense of power and access to resources, may already operate at an affective threshold that sustains ethical conduct. By contrast, individuals with lower managerial power, who typically report less happiness and greater negative affect, may benefit more from affective interventions. Building on this reasoning, the following hypotheses are proposed:

Hypothesis 3 (H3a): For individuals with high managerial power, VR-induced happiness

is expected to have no significant effect on the ethical level, as their baseline levels of happiness are already elevated.

Hypothesis 3 (H3b): For individuals with low managerial power, VR-induced happiness is expected to be positively associated with ethical decision-making, since a moderate increase in happiness enhances ~~both~~ ethical behaviors.

5. *Methodology*

Building on prior literature that connects immersive technologies and VR with emotional responses –particularly emotional ambivalence– and recognizing the moderating role of managerial power, we designed a quantitative experimental study in order to study the cause-effect of eliciting emotions with varying immersive interventions to individuals with different power levels.

Doing an experimental study enabled three key features: i) the controlled manipulation of one or more independent variables; ii) the implementation of control mechanisms, such as the random assignment of participants or experimental units to different treatments; and iii) the systematic observation or measurement of one or more dependent variables (R. E. Kirk, 2009).

In addition, laboratory experiments have become an increasingly important means of generating empirical evidence in economics (Friedman & Sunder, 1994). In their book, they argue that scientific progress across disciplines depends heavily on the interplay between theoretical development and empirical testing. They distinguish between two main types of empirical data: experimental data, which are intentionally created in controlled environments for research purposes, and observational (or happenstance) data, which are collected through ongoing, uncontrolled processes. Moreover, laboratory experiments ensure a high level of internal validity (Harrison, 2005).

Although laboratory experiments can be designed using either between-subjects or within-subjects frameworks, we opted for a between-subjects design. This choice was based on the need to measure participants' emotional states both before and after VR exposure, making repeated measures inappropriate. Furthermore, in real-world contexts, decision-making scenarios are often better reflected through a between-subjects design (Charness et al., 2012). In their paper, they also highlighted that this design benefits from the absence of natural anchoring effects and offers improved external validity.

The experiment was conducted in physical laboratory settings ("Lab") at various business schools and universities in Madrid, Spain (EAE Business School, ESIC Business School, IESE Business School, and University Complutense of Madrid). We did not conduct experiments in the participants' workplaces because of the stability of their living environments.

The study was approved by the Ethical Committee of Complutense University of Madrid (see Appendix II). Before starting the experiment, each participant signed a consent form (see Appendix III). Individuals were randomly distributed across the treatments. Subjects could only participate once. The participants acted individually and privately. Before the manipulation of the variables, each participant had to complete a sociodemographic survey (see Appendix IV). Instructions were provided on paper (see Appendix V). Each task was presented sequentially and only once.

To verify that the dataset included an adequate sample size, we performed a moderation analysis in G*Power with the maximum predictors to be used (Riley et al., 2019). The results of the two-tailed T-test linear multiple regression with a priori analysis with the maximum level that our experiment would have[22] (twelve), a 0.10 f^2 effect size, and a 0.05 α-error probability showed a minimum sample size of 133 individuals, resulting in a power of 0.95.

We employed two study designs to examine the effects of inducing a positive emotion (happiness) at different levels of immersion in order to study (1) the impact on emotional ambivalence -assessed at group level-, and (2) the impact on ethical behavior - evaluated at individual level.

Emotional reactions were measured using the non-intrusive technique for self-reported emotions: the Positive Affect Negative Affect Scale (PANAS) is the most widely cited in literature (Watson & Clark, 1994). It assesses emotional states by asking individuals to rate 10 positive and 10 negative emotions at that moment on a nine-point Likert scale: from 1 (do not feel at all) to 9 (feel stronger than ever). The 20 questions were then consolidated into five feelings (happiness, anger, fear, disgust, and sadness) (Kugler et al., 2020). These basic emotions, including surprise, serve as the basis for all other emotions (Ekman, 1992). However, we excluded surprise due to its ambiguous classification as either positive or negative (Hornung & Smolnik, 2022). In our study, the emotion task was after filling out the sociodemographic survey. Participants had to report the emotions they were feeling at that moment after and before the video induction.

[22] The more predictors used, the bigger the sample needed.

Other self-reported emotion measurement techniques used in research are the Self-Assessment Manikin (SAM) tool and the Visual Analogue Scale (VAS). The Self-Assessment Manikin (SAM) scale, developed by Bradley & Lang (1994), is a non-verbal, pictorial assessment tool designed to measure individuals' subjective emotional responses across three primary affective dimensions: valence, arousal, and dominance. This instrument employs a series of stylized figures that visually represent different emotional states. Participants are instructed to evaluate their current emotional state by selecting the figure associated with an emotion that best corresponds to their current feelings. The figures vary systematically according to the emotional dimension being measured: i) valence (pleasure), illustrated by a progression from a happy, smiling figure to one with a gloomy, frowning expression; ii) arousal, represented by a range from a thrilled, wide-eyed figure to a relaxed, half-asleep one; and iii) dominance, indicated by figures with different sizes, with smaller figures denoting lower control and larger figures signifying greater dominance, implying full control over the situation. It is less cited than PANAS. Although the Visual Analogue Scale (VAS) is also frequently used, its limitation lies in being a single item that measures only the intensity of a specific feeling (especially in medical contexts for evaluating pain) (Begum & Hossain, 2019; Bijur et al., 2001). Together, these tools provide scalable and adaptable methods for measuring emotional responses in diverse research contexts, bridging the gap between controlled laboratory assessments and more in-field settings.

Other techniques for measuring emotions in experimental studies include physiological measures. Lima et al. (2024) analyzed the main physiological techniques, with the most common being electromyography (EMG), skin temperature, electrocardiogram (ECG), electroencephalography (EEG), and functional near-infrared spectroscopy (fNIRS). They described each technique as follows: Electromyography records the electrical activity of muscles, with signal amplitude increasing during muscle contraction, and is often used to measure facial expressions. Respiration signals track thoracic movement to analyze breathing patterns, particularly for assessing emotions such as happiness, anger, relaxation, and depression. Skin temperature reflects the vasodilation of peripheral blood vessels induced by heightened sympathetic nervous system activity and is mainly used to measure arousal. Electrocardiograms record the heart's electrical signals, which trigger the contraction and relaxation of the cardiac muscles, and are primarily applied to assess stress and effort—mostly associated with negative emotions. Electroencephalography

captures the cumulative electrical activity generated by neuronal excitation in the cerebral cortex, especially for measuring emotions characterized by high valence and high arousal. Functional near-infrared spectroscopy monitors changes in oxygenated and deoxygenated hemoglobin concentrations by evaluating blood flow variations and brain activity caused by neuronal firing, particularly for assessing valence and arousal. These techniques can be complex to measure in lab experiments, as they require attaching several sensors to each individual. Furthermore, Lima et al. (2024) found no statistical differences between self-reported techniques and physiological measurements.

The stimulus for emotion induction varies from movies to virtually created environments. Movies have been demonstrated to be a powerful instrument for inducing positive and negative feelings (Fredrickson et al., 2000; Fredrickson, 2001; Freeman et al., 2005; Gerrards-Hesse et al., 1994; Gross & Levenson, 1995; Hanley et al., 2017; Hewig et al., 2005; Juszkiewicz et al., 2020; Klebl et al., 2020; Kugler et al., 2020; Medai & Noussair, 2021; A. Schaefer et al., 2010; Treffers et al., 2020; Yefet & Glicksohn, 2021; W. Zhang, Gross, et al., 2021). In the context of VR, films have also been used in a variety of studies (A. Anderson et al., 2017; N. Ding et al., 2018; Freeman et al., 2005; Kugler et al., 2020; Medai & Noussair, 2021; Standen et al., 2023; Tian et al., 2021). Indeed, films are the most commonly used affect induction procedure, having around eight times more effectiveness than the least effective affective induction procedure (Joseph et al., 2020). A major advantage of film videos is that they do not involve deception, which is critical for experimental studies (Gross & Levenson, 1995). Regarding the VR stimuli for emotion in experimental designs, they vary, including scenes from sports, nature, and indoor environments. The selected videos ("surf" (Medai & Noussair, 2021) and "Hakuna Matata" (W. Zhang, Cowan, et al., 2021; W. Zhang, Gross, et al., 2021)) have been formerly used in research to elicit positive emotions. By presenting the same video in both immersive and non-immersive formats and comparing it with a different video in a non-immersive setting, we were able to isolate the effects of technology from content.

Kako et al. (2023) demonstrated that using an Oculus Rift HMD to present a beach setting was an effective and enduring method for inducing a positive mood, producing immediate shifts in emotional state and consistently high positivity ratings throughout the task. Similarly, Loisel-Fleuriot et al. (2023) used Oculus Quest 2 HMDs to present 3D videos from the C2Care database (https://www.c2.care/en/) or from websites offering free

content. These videos featured scenes from everyday situations to more stimulating and unusual ones –depicting animals, natural landscapes, and social interactions. Pavic et al. (2024) employed a Samsung HMD Odyssey+ to display real-life recordings captured with a GoPro Fusion 360 camera, divided between natural scenes (e.g., forests, beaches, waterfalls) and social contexts (e.g., people walking or attending concerts). Across these studies, participants consistently reported stronger positive emotional responses, as reflected in elevated valence scores.

For the *immersive* VR condition, we used the hardware of the Oculus Quest 2 HMD had fast-switch LCD display optics, with a resolution of 1832 x 1920 pixels per eye, and supports refresh rates of 60, 72, and 90 Hz. It was compatible with prescription glasses. The HMD included integrated 3D spatial audio, allowing users to perceive sound directionally within the virtual environment. Equipped with a six-degree-of-freedom tracking system –comprising three translational and three rotational axes[23])–, the device could track both head and body movements, with two wireless controllers to give further precision and realistic sensation[24]. The software setup was facilitated through a mobile smartphone application available via Meta's official website[25].

For the *non-immersive* desktop conditions, participants used a Lenovo Yoga 500 14IBD 80N4 laptop. This device was equipped with an Intel® Core i7 5500U processor, 512 GB of storage, and a 14-inch Full HD IPS LED LCD monitor with a resolution of 1920 x 1080 pixels. It also had an NVIDIA GeForce 920M graphics card, operated on Windows 10, and included Dolby® Home Theater® audio technology[26].

[23]Degrees of freedom | Google VR. Google for Developers. https://developers.google.com/vr/discover/degrees-of-freedom
[24] Meta Quest MR, VR headsets and Accessories. https://www.meta.com/es/en/quest/
[25]Set up your Quest: Quest, Quest 2, Link, Rift S and Rift | Meta Quest. Meta. https://www.meta.com/es/en/quest/setup/
[26] Lenovo laptops. https://pcsupport.lenovo.com/gb/en/products/laptops-and-netbooks/yoga-series/yoga-500-14ibd/80n4/80n400yrsp/r90hdpxa

5.1. Emotional ambivalence

5.1.1. Experiment design

Since we aimed to measure the difference in emotional states before and after the intervention, we did a 2 (managerial power: manager vs. non-manager) x 3 (emotion elicitation method with different immersion levels: VR with a three-dimensional video and desktop with a two-dimensional video) design. Experimental emotion induction offers the most robust causal evidence for how emotions influence psychological and physiological outcomes (Siedlecka & Denson, 2019).

To assess the influence of immersive technologies, the experimental treatments differed based on the degree of immersion and the video content used. The conditions were as follows: i) Immersive video 1 (v1), which involved the use of VR Head-Mounted Display (HMD) glasses (Oculus® Quest 2). This setup provided participants with a three-dimensional experience that allowed them to move within the scene, simulating the perspective of a surfer[27]; ii) Non-immersive video 1 (v1), which featured the same video displayed on a desktop, reducing the immersive experience by converting it from three-dimensional (3D) to two-dimensional (2D); and iii) Non-immersive video 2 (v2): which presented a two-dimensional desktop clip from Disney's *The Lion King* ("Hakuna Matata" song[28]), designed to control for content effects independent of the technology.

The final sample comprised 190 participants, of whom 69 were managers (see Table 5).

[27] *GoPro VR: Tahiti Surf with Anthony Walsh and Matahi Drollet* [Video recording]. https://www.youtube.com/watch?v=MKWWhf8RAV8

[28] BSOFilmsandGames. El Rey León—Hakuna Matata [ES-España] [HD] [Video recording]. https://www.youtube.com/watch?v=LYdG2w8jbws

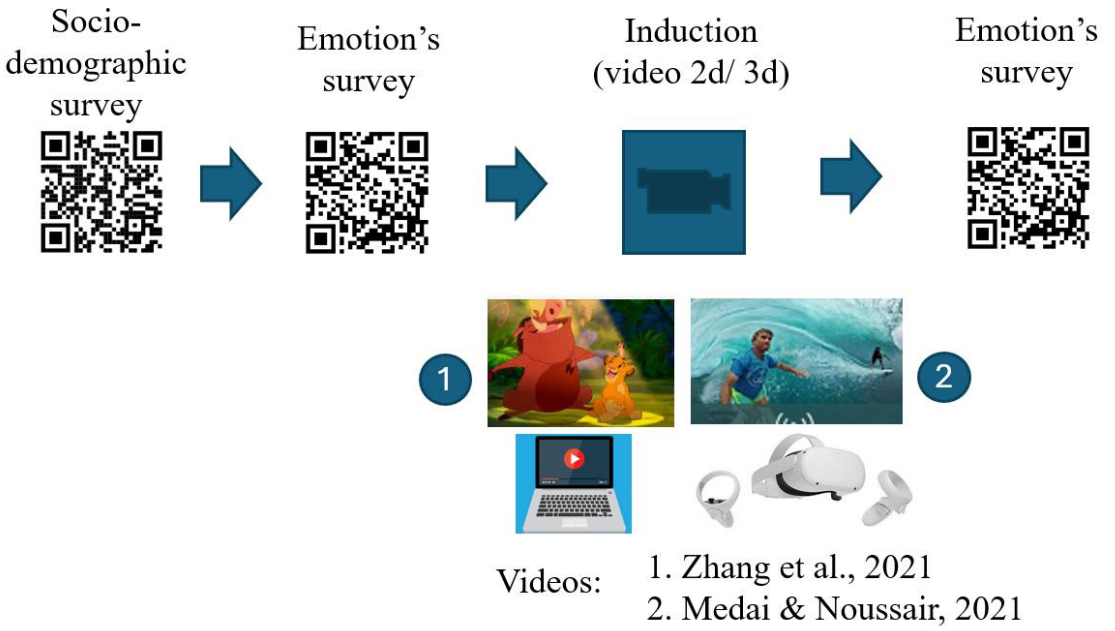
Table 5: *Description of the sample.*

Treatment	N	Mean Age	SD Age	% female	n managers	% managers
Immersive v1	64	45.1	10.2	57.8%	29	45.3%
Non-Immersive v1	64	39.3	12.4	57.8%	22	34.4%
Non-Immersive v2	62	45.2	9.3	56.5%	18	29.0%
Total	**190**	**43.2**	**11**	**57.4%**	**69**	**36.3%**

Note: v1: video 1 (Surf video), v2 (Hakuna Matata video). SD: Standard Deviation.

The design was as follows (see Figure 7):

Figure 7: *Experimental design for emotional ambivalence study.*



5.1.2. Variables

The dependent variable in this study was *emotional ambivalence*, assessed using the Similarity and Intensity Measure (SIM) originally proposed by Thompson et al. (1995) and later refined by Priester and Petty (1996). Ambivalence was calculated with the following formula: $(P + N) / 2 - |P - N|$, where P denotes the intensity of positive emotion (happiness) and N corresponds to the strongest negative emotion experienced (fear, anger, disgust, or sadness).

The independent variables in the study included the type of immersive induction, participants' ambivalence levels prior to the intervention, and managerial power (categorized as "*manager*" or "*non-manager*"). Several control variables were also recorded –including *age*, *gender*, company size (based on the number of employees, labeled "*large*"), and the subject's *wage* (see Table 6). We coded the variables as follows. Character variables were transformed into binary indicators: (i) managerial power (*manager:* 1 = senior manager or executive committee member, *non-manager:* 0 = mid-manager or employee without subordinates), (ii) *gender* (1 = female, 0 = male), and (iii) company size (*large*) (1 = more than 250 employees, 0 = 250 or fewer). *Age* was codified using natural logarithms to reduce moderate skewness and approximate normal distribution. Annual *wage* was also codified using the natural logarithm using midpoint estimates for income brackets except at the top threshold (€0 - €20,000 = 10,000, €20,001 - €50,000 = 35,000, €50,001 - €100,000 = 75,000, and more than €100,000 = 120,000). Experimental treatments were represented by three categorical variables: 1: immersive video v1 of "surf" ("*immersive v1*"), 2: non-immersive video v1 of surf ("*non-immersive v1*"), and 3: non-immersive video v2 of "Hakuna Matata" ("*non-immersive v2*"). See Table 6 for a summary of the description of the variables of this study.

This coding allowed us to conduct correlation and linear regression analyses. Presence was not measured, as prior research has indicated it does not significantly affect emotional responses to virtual environments (Felnhofer et al., 2015).

Table 6: *Description of the variables.*

Variable	Description
Pre-Ambivalence	Degree of Emotional Ambivalence before the intervention: (P+N)/2-|(P-N)|, P: Pre-Happiness and N, the maximum value of Pre-Fear, Pre-Anger, Pre-Disgust, Pre-Sadness
Post-Ambivalence	Degree of Emotional Ambivalence after the intervention: (P+N)/2-|(P-N)|, P: Post-Happiness and N, the maximum value of Post-Fear, Post-Anger, Post-Disgust, Post-Sadness
Immersive_v1	Intervention with HMD and video Surf (v1)
Non-immersive_v1	Intervention with desktop and video Surf (v1)
Non-Immersive_v2	Intervention with desktop and video Hakuna Matata (v2)
Manager	Binary Variable: 1 for subjects corresponding to managers
Age	Natural Logarithm of the age of the subject
Large	Binary variable of the size of the company: 1 for companies with more than 250 employees
Gender	Binary variable: 1 for subjects corresponding to female
Wage	Natural Logarithm of wage, based on interval midpoints, except for the highest category, which was approximated at €120,000
Happiness	Reported emotion PANAS scale (1 to 9)
Fear	Reported emotion PANAS scale (1 to 9)
Anger	Reported emotion PANAS scale (1 to 9)
Disgust	Reported emotion PANAS scale (1 to 9)
Sadness	Reported emotion PANAS scale (1 to 9)

5.2. Ethical decision-making

5.2.1. Experiment design

Drawing on existing research linking VR to emotional responses and individual ethical decision-making, we developed an experimental study to elicit emotions through varying immersive interventions among participants with different managerial roles. To assess dishonest behavior before and after the intervention, we added the treatment of no emotion induction as "control." Therefore, we implemented a 2 (managerial level: manager vs. non-manager) × 4 (emotion elicitation method: VR with 3D video, desktop with 3D video, desktop with 2D video, and no video –"control") between-subjects design. The videos were the same explained in section 5.1.1.

The initial sample included 267 participants from various sectors across Spain, distributed randomly among the four different treatments and including 104 managers (see Table 7).

Table 7: *Sample characteristics.*

Treatment	N	Mean Age	SD Age	% female	n managers	% managers
Immersive v1	64	45.1	10.2	57.8%	29	45.3%
Non- Immersive v1	64	39.3	12.4	57.8%	22	34.4%
Non- Immersive v2	62	45.2	9.3	56.5%	18	29.0%
CONTROL	77	41.5	11.3	62.3%	35	45.5%
Total	**267**	**42.7**	**11.1**	**58.8%**	**104**	**39.0%**

Note: v1: video 1 (Surf video), v2 (Hakuna Matata video). SD: Standard Deviation

33 individuals (12%) were excluded for the dishonesty analysis as they did not comple the tasks as instructed, yielding a final sample of 234.

Subjects reported their emotional level before and after the induction (in the control treatment it was only asked at the beginning) with the nine-point Likert scale modified Watson and Clark (1994) PANAS-X questionnaire that combined 20 different emotions into five (Kugler et al., 2020). After completing the emotion induction task, participants were provided with short instructions for a decision-making task, where they were asked

to roll an online die once and report the outcome digitally. This way, we could identify honesty. The decision-making task was designed as a one-shot experiment, consistent with prior findings that participants are relatively insensitive to the stated probability of being caught (Gerlach & Teodorescu, 2022).

The honesty task employed in this study was a modified version of Fischbacher and Föllmi-Heusi's die-under-the-cup cheating paradigm (2013), which has been widely used (e.g., Braut and Piovesan (2025), Chen and Zhong (2025), Pascual-Ezama et al. (2020), and Shalvi et al. (2015)). This task allows experimenters to assess honesty and dishonesty by instructing participants to privately roll a die and report the outcome, truthfully or not. Because participants' earnings were tied to the reported number, they had a financial incentive to overreport higher values, thereby enabling the detection of dishonest behavior at the aggregate level. Importantly, many individuals typically refrain from cheating to the maximum extent possible, indicating that people do not always exploit the opportunity to maximize their outcomes (Fischbacher & Föllmi-Heusi, 2013; Gneezy, 2005; Grolleau et al., 2016). A person's honesty or dishonesty thus depends on how much the expected trade-off makes a certain action worthwhile (Mazar et al., 2008).

Alternative paradigms for measuring honesty include the sender-receiver game, coin flip, and matrix tasks, with the die roll task identified as one of the most frequently used method in Gerlach et al.'s (2019) meta-analysis on unethical behavior. As outlined in the Jacobsen et al. review (2018), methods for detecting dishonesty generally fall into two categories. Firstly, population-inferred cheating tasks imply that dishonest behavior can only be detected at the aggregate level, requiring either a known statistical distribution of expected outcomes or a comparable control group with known behavior –since the experimenter does not have access to individuals' actual outcomes. Secondly, individual inferred cheating tasks can detect cheating at the individual level when actual outcomes or task performance can be matched with participants' reported responses. Separating the task from the reporting process often achieves this result, creating the illusion that detection is impossible. The use of controlled deception in such tasks is widely accepted in social psychology and is often necessary to isolate specific behavioral effects (Jacobsen et al., 2018).

We employed the innovative online adaptation paradigm developed by Pascual-Ezama et al. (2020), which utilized participants' own digital devices. Subjects could earn up to €50

based on the number they reported from their die roll. The reward structure was as follows: reporting a 1 earned €10, a 2 earned €20, a 3 earned €30, a 4 earned €40, and a 5 earned €50. Reporting 6 resulted in no reward. This incentive structure was intentionally more substantial than those typically used in student-based studies, as the sample comprised real-world managers and employees whose decision-making context more closely reflects high-stakes, workplace-relevant scenarios. While it has been suggested that higher rewards might discourage dishonesty, empirical findings generally indicate that dishonesty is not strongly influenced by reward size (Gerlach et al., 2019).

Participants were instructed to access www.behavioralexperiments.com and privately (unobservable) roll a die once on their mobile or on the laptop available for the experiment. They were encouraged to use www.rollandflip.com or a similar website, though they were explicitly informed that any die-rolling website of their choice was acceptable. Once they obtained a result, participants were required to enter that outcome on the www.behavioralexperiments.com platform. The use of external digital tools and the absence of direct supervision created an environment in which participants had the opportunity to behave dishonestly without the risk of immediate detection. Dishonest behavior was defined as either re-rolling the die to obtain a higher number (cheating) or reporting a different outcome than the one actually obtained (lying). Both websites were developed by the researchers (Pascual-Ezama et al., 2020) and are internally integrated. This integration allowed the experimenters to record and compare the actual die roll with the reported result, along with additional metadata such as the participant's IP address and the precise timestamps for task initiation and completion. Participant responses were matched using a time-stamp-based system linked to the task order and secured through an invisible identifier embedded in the signed consent form (see Appendix III). This approach enabled the detection of individual behavior across various inferred tasks while maintaining participants' belief that their actions remained anonymous and undetectable.

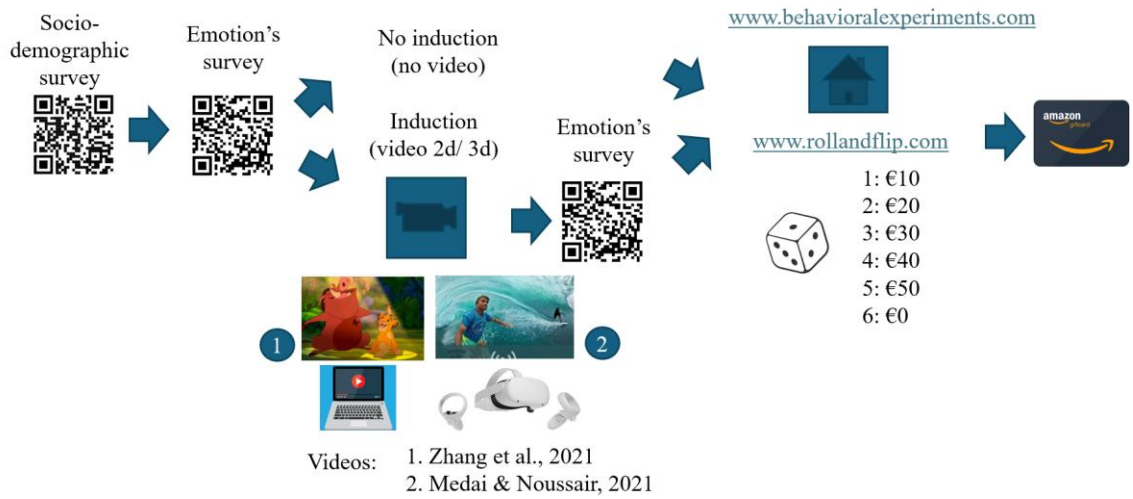
To ensure valid participation, we excluded any responses in which the reported result was entered within fewer than five seconds after the instructions were provided. Such rapid input suggests that the participant did not have sufficient time to access a website and perform the task, indicating a high likelihood of dishonest behavior (Pascual-Ezama et al., 2020). The platform www.behavioralexperiments.com is equipped with an internal system that automatically classifies (dis)honesty levels, allowing for the generation of individually inferred data. While some level of participant deception cannot be entirely

ruled out, offering flexibility in the choice of device and die-rolling websites in the instructions helped create a perception of transparency. This approach reduces suspicion and encourages more natural behavior. Moreover, complete avoidance of deception would have made it impossible to obtain individual-level inferences or fully classify dishonest behavior. The methodology, which enables individual classification, has been previously validated and used in studies published in high-ranking (Q1) journals and is considered methodologically acceptable (Jacobsen et al., 2018). Because participants used their own devices and were free to choose any online die-rolling platform, they likely felt unconstrained in their behavior, including the possibility to cheat by inflating outcomes, without perceiving a risk of detection.

To incentivize participation and simulate real-world decision-making stakes, a weekly anonymous lottery was held using the public website www.sorteados.com, involving all participants from that week. The winner received an Amazon gift card corresponding to the number they had reported. Similar lottery-based reward mechanisms have been used in prior research (e.g., Motro et al. (2018)). On average, winners received a reward of €22.60. In addition, all participants were given a participation gift –specifically, a mobile phone holder valued at approximately €4.60– regardless of their reported outcome.

The design was as follows (see Figure 8).

Figure 8: *Experimental design for ethical decision-making study.*



5.2.2. Variables

In the ethical decision-making study, the primary dependent variable was honest ethical behavior, rather than emotional ambivalence. Honesty was automatically determined following the dichotomous classification used by Pascual-Ezama et al. (2020). Participants were categorized as "*honest*" if the number they reported on www.behavioralexperiments.com matched the actual outcome generated on www.rollandflip.com, and if they rolled only once. Additional dependent variables included the five basic discrete emotions reported by participants.

The main independent variable was managerial power, coded as "*manager*" or "*non-manager*" depending on whether the individual was part of the TMT or not, as explained beforehand. Control variables, including *age, gender, company size*, and *wage*, were also documented.

6. *Results*

The primary objective of this research is to examine how immersive technology influences emotional ambivalence and ethical decision-making in relation to managerial power and the level of immersion. Data analysis was performed using IBM SPSS Statistics 27.0 for Windows and Stata 16.1 and G*Power.

6.1. Emotional ambivalence

To assess emotional ambivalence, we analyzed the full sample using Stata 15.1. The analysis included multiple linear regressions, tests for heteroskedasticity, Variance Inflation Factor (VIF) to verify multicollinearity, and correlation analyses.

Descriptive statistics revealed that happiness had the highest average score among all reported emotions, with a mean of 6.17 out of 9. Among negative emotions, sadness recorded the highest average at 3.34 (see Table 8).

Table 8: *Descriptive statistics for the variables.*

Variable	Mean	SD	Min	Max
Post-ambivalence	1.67	1.47	-2.00	7.75
Immersive v1	0.34	0.47	0.00	1.00
Non-Immersive v1	0.34	0.47	0.00	1.00
Non-Immersive v2	0.33	0.47	0.00	1.00
Manager	0.36	0.48	0.00	1.00
Age	3.73	0.28	3.04	4.29
Large	0.57	0.50	0.00	1.00
Gender	0.57	0.50	0.00	1.00
Wage	10.69	0.85	9.21	11.70
Pre-happiness	6.17	1.23	1.75	8.25
Pre-fear	2.75	1.66	1.00	8.00
Pre-anger	2.06	1.23	1.00	7.25
Pre-disgust	2.24	1.21	1.00	6.50
Pre-sadness	3.34	1.05	1.00	6.25
Pre-ambivalence	2.37	1.64	-2.00	7.00

Note: N= 190

We began by analyzing the data collected prior to the emotional induction phase. To assess the presence of heteroskedasticity, we conducted a Breusch-Pagan test, which indicated significant heteroskedasticity in the estimation of the covariance matrix (χ^2 = 6.41, p =.011) consistent with White's (1980) framework. To examine potential multicollinearity among the predictors, we calculated the Variance Inflation Factor (VIF) for each variable (Akinwande et al., 2015). The average VIF was 1.43, with all values exceeding 1.0, indicating that the regressors were moderately correlated. While no variable surpassed the threshold of 3, one predictor –*wage*– had a VIF of 2.10, suggesting a potential limitation. To address this and obtain a consistent estimation of the covariance matrix, we applied variance estimators (*vce*) following Teunissen and Amiri-Simkooei (2008). The *vce* analysis confirmed the robustness of the variables.

Additionally, correlation tests indicated that pre-ambivalence did not significantly vary across treatments, managerial role, gender, wage, company size, or pre-happiness (see Table 9). These findings indicate that there were no baseline differences in ambivalence before any treatment was introduced. The most notable correlation result was for disgust (.74, $p < .001$).

Table 9*: Correlation coefficients for pre-ambivalence.*

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Immersive v1	-												
2. Non-Immersive v1	-.51	-											
3. Non-Immersive v2	-.50***	-.50***	-										
4. Age	.13	-.28***	.15*	-									
5. Large	-.03	-.05	.09	.10	-								
6. Gender	.01	.01	-.01	-.04	.02	-							
7. Manager	.13	-.03	-.11	.31***	-.20**	-.19**	-						
8. Pre-happiness	.04	.06	-.11	-.12	-.03	-.12	.07	-					
9. Pre-fear	-.01	.02	-.01	-.20**	-.06	.07	-.12	.08	-				
10. Pre-anger	.05	-.08	.03	-.04	.04	.07	-.04	-.20**	.45***	-			
11. Pre-disgust	-.06	.00	.06	-.03	.01	.01	.01	-.13	.34***	.74***	-		
12. Pre-sadness	-.05	.06	-.01	-.19**	-.09	.01	-.10	.05	.42***	.48***	.46***	-	
13. Wage	.14	-.15	.01	.56***	.19**	-.33***	.45***	-.03	-.22**	-.08	.00	-.12	-

Note: N = 190. * p <0.05, ** p <0.01, *** p <0.001.

We conducted five models using robust regression techniques to assess the effects of immersive technology on emotional ambivalence (see Table 10). Linear regressions were selected over ANOVAs because they provide a more complete analysis of variable relationships, allowing us to see all the impact and not separately (e.g., interaction with managerial power).

The first two models examined the control variables and the primary independent variables without incorporating any intervention. To reduce potential bias from collinearity, the emotion of anger was excluded from these models.

Table 10: *Results of the five model regressions.*

Post-Ambivalence	Model 1	Model 2	Model 3	Model 4	Model 5
Manager	-.36	-.29	-.29	-.21	-.72**
Age	-1.04**	-.69*	-.53	-.40	-.46
Gender	-.08	-.10	-.08	-.13	-.12
Large	-.23	-.14	-.15	-.12	-.22
Wage	.24	.21	.18	0.15	.22
Immersive v1			-.59**	.08	-1.03**
Non-Immersive v2			-.25	-.23	-.28
Pre-happiness		.01	.01	0.02	.01
Pre-fear		-.03	-.02	-.15	-.04
Pre-disgust		.27**	.26**	.28**	.25**
Pre-sadness		.51***	.50***	0.40***	.54***
Pre-ambivalence		.18*	.18*	.29**	.14
Constant	3.34*	.12	-.46	-.30	-.87
Pre-Ambivalence_immersive_1				-.28**	
Manager_immersive_1					1.03**
R^2	.05	.28	.30	.32	.32

Note: Model 1: Manager, Model 2: Manager & Emotions, Model 3: Manager, Emotions & Immersive Intervention, Model 4: Manager, Emotions & Immersive Intervention & Pre-Ambivalence, Model 5: Manager, Emotions, Immersive Intervention & Interaction. N= 190. * p <0.1, ** p <0.05, *** p <0.01. Preanger dropped due to collinearity with Predisgust.

The model demonstrated an acceptable fit, with an R^2 of .32 for both the fourth and fifth models (full results available upon request[29]).

The third model examined the effects of immersive induction treatments on the emotional ambivalence. As outlined earlier, we employed a categorical variable to represent each induction, differentiating between *immersive v1* (three-dimensional virtual surfing clip), *non-immersive v1* (two-dimensional in a desktop of the surfing clip), and *non-immersive v2* (two-dimensional in a desktop of the "Hakuna Matata" clip). The goal was to compare immersive versus non-immersive treatments. The findings supported our first hypothesis (H1a), indicating that VR significantly reduced emotional ambivalence ($\beta = -0.59$, $p < .05$) compared to the *non-immersive video 1* treatment. Moreover, the influence on ambivalence stemming from negative emotions –specifically disgust ($\beta = 0.26$, $p < .05$) and sadness ($\beta = 0.50$, $p < .01$)– continued to demonstrate statistical significance across all models.

In the fourth model, we analyzed the interaction between ambivalence magnitude and the immersive intervention (H1b). As the coefficient for this interaction was negative and statistically significant ($\beta = -0.28$, $p < .05$), we can indicate that VR had a stronger impact in lowering emotional ambivalence among participants with higher initial ambivalence. For participants with very low baseline ambivalence, there was no significant difference between the VR and non-immersive treatments, supporting the notion that a certain degree of neural competition is necessary for immersive emotional interventions to be effective.

To examine how the impact of VR varied across different levels of emotional ambivalence prior to the induction (ranging from -2 to 7), we compared the predicted values by calculating simple slopes. Table 11 presents the differences between the predicted outcomes for VR and non-immersive technologies at each level of ambivalence prior to the intervention. The results indicate that as pre-intervention ambivalence increases, the gap in the effect of immersive technology versus non-immersive technology on post-intervention ambivalence diminishes. Furthermore, for individuals

[29] The research data cannot be made publicly available because it contains sensitive information, including participants' emotional responses and salary levels.

with very low initial ambivalence levels (specifically between -2 and 1), the difference between VR and non-immersive technologies was not statistically significant.

Table 11: *Simple slopes of the interaction between Pre-Ambivalence and Immersion Treatment.*

Pre-Ambivalence Levels for Immersive_v1=1	dy/dx
-2	.65 (0.58)
-1	.37 (0.47)
0	.08 (0.37)
1	-.20 (0.28)
2	-.48 (0.23) **
3	-.76 (0.24) ***
4	-1.05 (0.30) ***
5	-1.33 (0.39) ***
6	-1.61 (0.50) ***
7	-1.89 (0.61) ***

Note: N= 190. Dy/dx: effect, (Standard Deviation), significance: * p <0.1, ** p <0.05, *** p <0.01.

The fifth model examined the impact of managerial power between immersive technology and emotional ambivalence, addressing Hypothesis 2 (H2). The interaction term between managerial power and immersive technology produced a coefficient that was positive and statistically significant ($\beta = 0.93$, $p < .05$), suggesting that VR technology was less effective at reducing emotional ambivalence for *managers* than for *non-managers*.

Table 12 displays the estimated emotional ambivalence values based on the VR technology and managerial power variables. According to these estimates, after the VR intervention, *non-managers* reported an emotional ambivalence level of 1.13, whereas *managers* reported 1.39. To interpret this interaction, it was necessary to calculate the simple effects, representing the differences between these predicted values.

Table 12: *Simple slopes of the interaction between Managerial Power and immersion.*

Post.Ambivalence Immersive_v1	Manager	Margin
0	0	2.13 (0.17) ***
0	1	1.43 (0.21) ***
1	0	1.13 (0.21) ***
1	1	1.39 (0.29) ***

Note: Margin: effect, (Standard Deviation), significance: *** p <0.01. Post-Ambivalence Immersive_v1: 0: non-immersive, 1: VR; Manager: 1, Non-manager: 0

The findings in Table 13 indicate that the immersive technology intervention reached statistical significance exclusively for *non-managers* (p = .01). Moreover, the data show that immersive interventions lead to a greater reduction in ambivalence levels among *non-managers* than for *managers*.

Table 13: *Significance of the Interaction term between VR Technology and Managerial Power.*

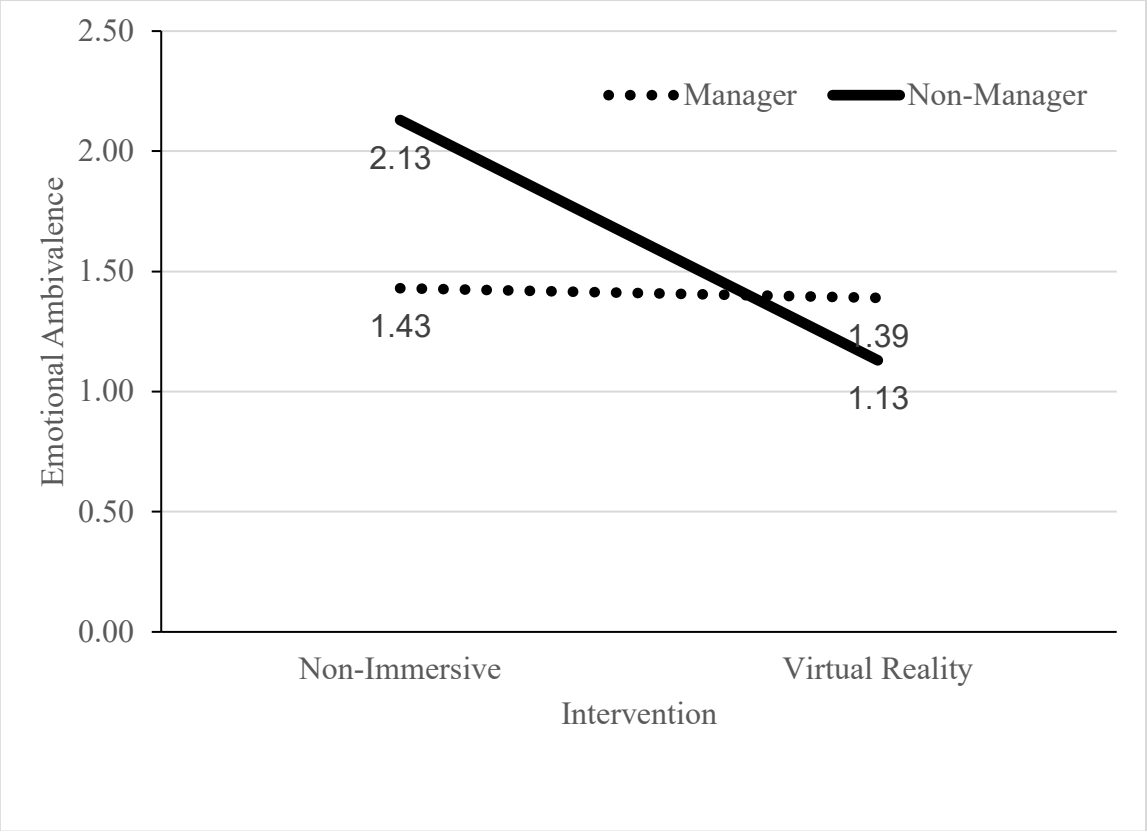
Immersive_v1=1	dy/dx
Non-Manager	-.98 (0.30) ***
Manager	-.04 (0.33)

Note: dy/dx: effect, (Standard Deviation), significance: *** p <0.01

To gain deeper insight into this interaction, Figure 8 depicts how managerial power moderates the effect of immersive interventions, aligning with the earlier predicted values and simple effects. The figure illustrates that immersive technology substantially lowers ambivalence levels among participants without managerial power, while its impact on managers is negligible and fails to reach statistical significance.

To further explore this interaction, the interaction term between power and immersive intervention is described in Figure 9, which confirms the predicted values and simple effects we found before. This demonstrates that immersive technology meaningfully decreases ambivalence for *non-managers*, while its effect on *managers* is minimal and does not reach statistical significance.

Figure 9: *Moderator effect of power on emotional ambivalence with immersive intervention (VR).*



The estimates presented in Table 14 suggest that shifts in emotional ambivalence are influenced by the increases in induced stimuli (in our case with happiness) elicited through immersive technology ($\beta = 0.18$, $p < .05$).

Table 14: *Results of auxiliary estimations.*

	Increase Happiness	Increase Ambivalence
Immersive v1	.52**	-.53
Non-Immersive v2	.10	-.16
Manager	.09	-.24
Age	.21	-.18
Large	-.01	-.06
Gender	-.01	-.45*
Wage	-.04	-.03
Pre-happiness	-.18**	.17
Pre-fear	-.01	-.58***
Pre-disgust	.07	.23
Pre-sadness	.01	-.09
constant	.76	1.22
F	2.14**	6.74***
R^2	.12	.32

Note: N= 190, $R^{2:}$ Square Root. * p <0.05, ** p <0.01, *** p <0.001.

In general, we can conclude that the interventions led to increased happiness and reduced fear across all groups, demonstrating that VR can reliably induce emotional shifts regardless of hierarchical position. These outcomes align with prior studies focused on broader populations, providing empirical validation of VR's capacity to induce emotional change within professional environments and supporting its relevance for organizational research, which has previously relied mainly on students and the general population (see Table 4 and Section 5.1).

Moreover, the VR-based interventions in our study led to increased happiness and reduced fear in both managers and non-managers, which demonstrates that emotional states –particularly fear and happiness– can be effectively influenced through VR experiences. Furthermore, these results across all the treatments confirm previous literature indicating that individuals with managerial power have higher positive emotions, which can be due to the fact that managers seem to have higher levels of positive emotions.

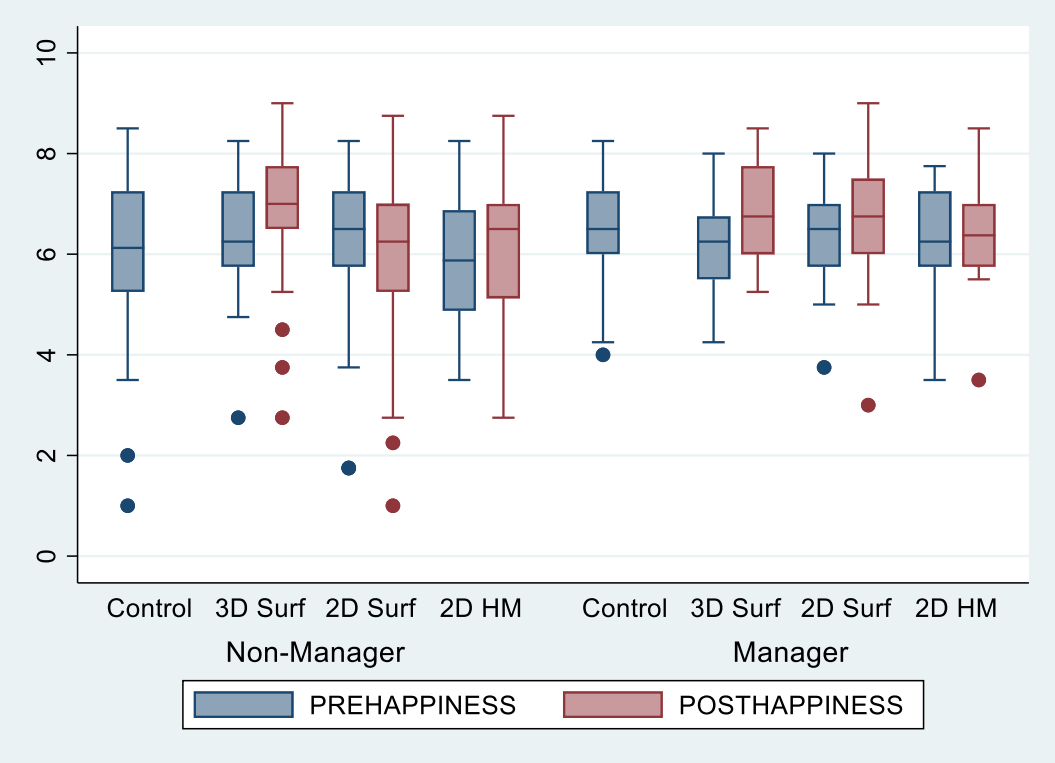
6.2. Ethical decision-making

To investigate the ethical decision-making, data were analyzed with IBM SPSS 27 and Stata 15.1. The Wilcoxon signed-rank test was employed to assess changes in emotion levels before and after the induction, while Pearson's chi-square test was used to evaluate differences in (dis)honesty across treatments as "*honesty*" was a categorical variable. Additionally, G*Power 3.1 was used to calculate statistical power. Given that each treatment condition included two proportions, a sample size of at least 26 participants per group ensured a statistical power of 80%, in line with García-García et al. (2013).

To test Hypotheses 3a and 3b, we first examined the effectiveness of emotion induction on emotional responses, focusing on self-reported levels of emotion before and after the intervention (see Table 15). The analysis concentrated on happiness and fear, as these emotions are the most frequently studied in relation to ethics and honesty (see Appendix VI).

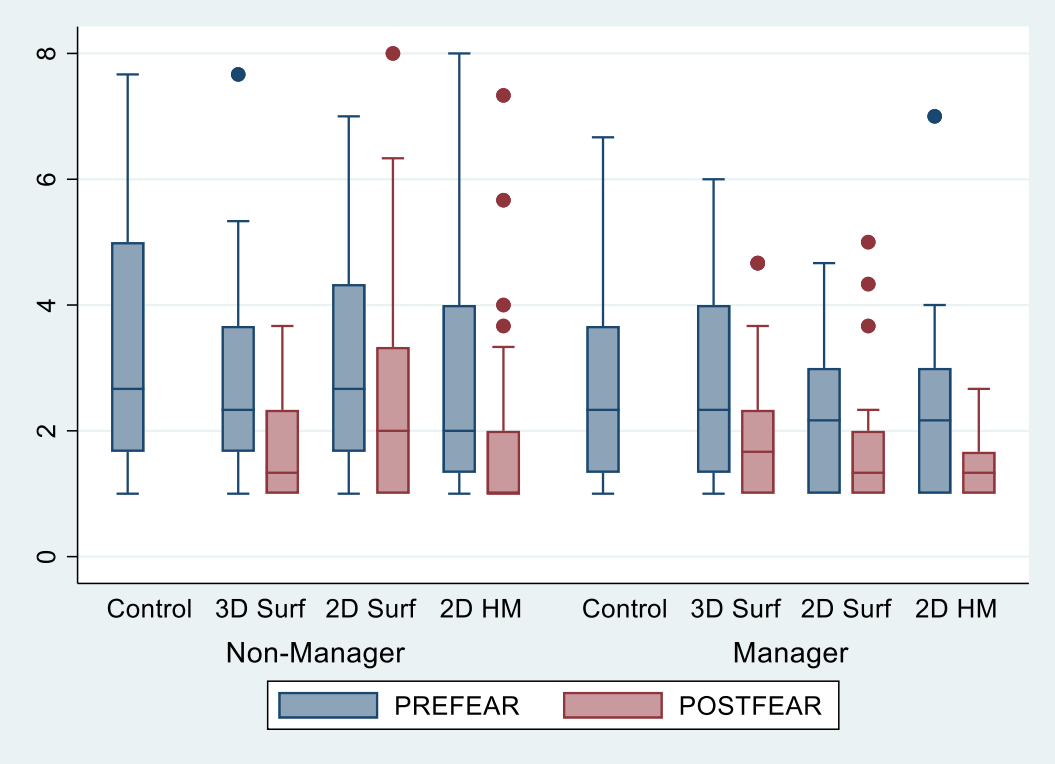
To examine the differences in self-reported emotional levels before and after the emotion elicitation task, as a function of immersion level, we conducted a box plot analysis. The visual representation provided by the box plots allowed us to compare the distribution of responses and to identify changes across conditions. Results indicated that the VR treatment (3D SURF) produced significant shifts in emotional states. In particular, participants exhibited notable increases in reported happiness as well as significant changes in fear levels across all employees (see Figure 10 and 11).

Figure 10: *Box plot comparing the variation of Happiness among the treatments (before and after induction) within managers and non-managers.*



Note: Scale: scale: 1-9, 1: not at all feeling, 9: feeling completely. Control: No induction, 3D Surf (VR immersive), 2D Surf (non-immersive v1: Surf video with a laptop), 2D HM (non-immersive v2: Hakuna Matuta video with a laptop).

Figure 11 *Box plot comparing the variation of Fear level among the treatments (before and after induction) within managers and non-managers.*



Note: Scale: scale: 1-9, 1: not at all feeling, 9: feeling completely. Control: No induction 3D Surf (VR immersive), 2D Surf (non-immersive v1: Surf video with a laptop), 2D HM (non-immersive v2: Hakuna Matuta video with a laptop).

Wilcoxon signed-rank tests confirmed that VR (immersive v1/3D SURF) significantly increased happiness and reduced fear in both *managers* and *non-managers* ($p < .002$). Non-immersive conditions were less effective: for managers, non-VR technologies did not alter happiness, while for *non-managers* they only reduced fear ($p < .05$). Prior to induction, *managers* already reported higher baseline happiness (6.36) and lower fear (2.62) than *non-managers* (6.11 and 3.02, respectively).

In contrast, the non-immersive conditions were less effective in generating emotional changes compared to VR. Specifically, non-VR technologies did not alter levels of happiness among *managers*. However, they did influence fear among *non-managers*, with both non-immersive interventions leading to significant changes ($p < .05$).

Table 15: *Emotion levels per treatment.*

Treatment	Emotion	M/W	Av. Pre	Av. Post	% Post vs Pre	*p*-value
CONTROL (no video)	Happiness	M	6.54			
		W	6.14			
	Fear	M	2.88			
		W	3.37			
2D HM	Happiness	M	6.28	6.44	2.5%	0.930
		W	5.86	6.19	5.6%	0.009
	Fear	M	2.37	1.44	-39.2%	0.004
		W	2.88	1.73	-39.9%	0.000
2D SURF	Happiness	M	6.43	6.74	4.8%	0.129
		W	6.20	6.20	0.0%	0.787
	Fear	M	2.33	1.83	-17.9%	0.049
		W	3.09	2.49	-19.4%	0.002
3D SURF	Happiness	M	6.16	6.84	11.0%	0.000
		W	6.30	6.92	9.8%	0.000
	Fear	M	2.75	1.94	-29.5%	0.006
		W	2.70	1.69	-37.4%	0.001

Note: M: Manager, W: Worker (Non-manager). Av: Average reported level; scale: 1-9, 1: not at all feeling, 9: feeling completely. Pre: before induction, Post: after induction. *p*-value by Wilcoxon test. 2D HM: Non-immersive v2, 2D SURF: Non-immersive v1: 3D SURF: Immersive v1.

Turning to ethical decision-making, chi-square tests revealed no significant differences in (dis)honesty across treatments. Among *managers*, VR had no differences on honesty as compared to non-immersive technologies ($\chi^2(1, N = 60) = 0.02$, $p = .896$), supporting H3a. For *non-managers*, VR also showed no differences ($\chi^2(1, N = 105) = 0.10$, $p = .720$), leading to a rejection of H3b. Comparisons with the control group, which provided the baseline measurement of honesty and dishonesty without emotion induction, confirmed that immersion had no significant difference on ethical outcomes (see Tables 16–17).

Table 16: *Chi-square test of the (dis)honesty following the emotion induction treatment among managers and non-managers and following power between managers or between non-managers.*

Analysis	Power	Treatments	$\chi 2$	df	*p* value	n
Per treatment	M/W	CONTROL	1.1	1	0.29	69
		2D HM	1.6	1	0.21	55
		2D SURF	0.0	1	0.93	56
		VR SURF	1.2	1	0.28	54
Per power	M	2D HM vs CONTROL	0.3	1	0.58	48
	W		0.0	1	0.88	76
	M	2D SURF vs CONTROL	0.5	1	0.46	50
	W		0.0	1	0.88	75
	M	VR SURF vs CONTROL	0.0	1	0.96	58
	W		0.0	1	0.84	65

Note: M: Manager, W: Worker (Non-manager). $\chi 2$: Pearson chi-square value, df: degree of freedom.. Non-immersive v2: 2D HM: Non-immersive v2, 2D SURF: Non-immersive v1: 3D SURF: Immersive v1.

Table 17: *Percentage of honest managers and non-managers per treatment by power level and by Honest and Dishonest classification.*

Treatments	By Power level		By Honest/ Dishonest classification	
	% Honest M	% Honest W	% Honest M	% Honest W
CONTROL	81.3%	70.3%	50.0%	50.0%
2D HM	87.5%	71.8%	33.3%	66.7%
2D SURF	72.2%	71.1%	52.5%	47.5%
VR SURF	80.8%	67.9%	52.5%	47.5%

Note: M: Manager, W: Worker (Non-manager). 2D HM: Non-immersive v2, 2D SURF: Non-immersive v1: 3D SURF: Immersive v1.

Additional analyses including gender, age, company size, and wage as covariates produced no significant effects. A robustness check with an alternative classification of managerial power –classifying individuals as managers if they supervised at least one employee– yielded similar results.

In sum, while VR was more effective than non-immersive technologies at inducing positive emotions and reducing fear, these emotional changes did not translate into differences in ethical behavior. *Managers* and *non-managers* differed in their baseline emotional states but not in their ethical responses after the induction. Thus, the results support H3a but not H3b.

7. Discussion

The primary objective of this research was to investigate the impact of immersive VR technology on emotional responses, specifically trying to understand the role of managerial power on emotional and behavioral responses to VR. To explore this, we conducted a controlled laboratory experiment using happiness as the target induced emotion. The research focused on two key studies: i) emotional ambivalence and ii) ethical decision-making.

7.1. Emotional ambivalence

This study contributes to the growing research on immersive technology by examining the impact of VR on emotional ambivalence –a physiological state commonly experienced by individuals. The experimental results reveal three findings: (1) VR is more effective than non-immersive alternatives in reducing emotional ambivalence when happiness is elicited, confirming hypothesis 1a (H1a); (2) individuals with higher pre-existing emotional ambivalence benefit more from immersive experiences, confirming hypothesis 1b (H1b); and (3) managerial power reduces emotional responses to VR, with those in higher-power roles exhibiting weaker emotional effects, confirming hypothesis 2 (H2). The following discussion interprets these findings in light of prior theoretical and empirical research.

The hypothesis (H1a) proposed that immersive VR would reduce emotional ambivalence more effectively than non-immersive technologies. The results confirmed this expectation. VR's immersive nature appears to amplify target emotions while suppressing conflicting states. This aligns with the formerly described Cognitive Person-Focused Model (Takac et al., 2023), based on Lazarus's (1993) cognitive-motivational-relational theory, which emphasizes appraisal processes in emotional generation. By providing vivid, interactive cues, VR deepens appraisal and intensifies emotions, whereas non-immersive media encourage psychological distance and weaker engagement.

Our findings are consistent with prior experimental studies demonstrating that VR can elevate positive emotions such as joy and relaxation while reducing negative affect like anxiety and sadness (Baños et al., 2006, 2008; Felnhofer et al., 2015; Magdin et al., 2021; Medai & Noussair, 2021). Importantly, this study extends existing work by linking VR's

capacity to induce affect with its ability to reduce emotional ambivalence. In line with Thompson et al. (1995), the lowest ambivalence occurs when one valence is at its highest level and the opposite valence is at its lowest. This pattern aligns with our findings, as positive emotions increased while negative emotions decreased. By heightening the dominant valence (in this case, happiness) and dampening the opposing valence, VR shifts individuals toward more coherent emotional states.

The hypothesis H1b proposed that individuals with higher pre-existing ambivalence would benefit more from VR interventions. The data confirmed this prediction. Participants with greater baseline ambivalence experienced larger reductions after the VR experience designed to elicit happiness.

This aligns with theories of ambivalence, which describe it as the coexistence of opposing evaluations or affective states (Malhotra, 2005). As Malhotra (2005) notes, ambivalence often arises when conflicting cognitive and affective evaluations coexist. Yet his research shows that people do not rely solely on reason-based assessments; they also monitor their subjective affective responses when evaluating stimuli, influencing attitude too. Compared to nonaffective, deliberative judgments, affective evaluations are typically faster, more consistent across individuals, and more predictive of the number and valence of subsequent thoughts.

In this context, VR's capacity to intensify affective cues helps override conflicting cognitive signals, reducing ambivalence most effectively in those starting from highly conflicted states. Thus, VR appears particularly powerful for individuals with higher ambivalence because it channels evaluation through affective processing, where judgments are clearer and more decisive than when grounded solely in cognitive reasoning.

The Feeling is for Doing model (Zeelenberg et al., 2008) further clarifies this effect, as emotions seem to serve as immediate action-readiness signals, guiding behavior in line with an individual's situational goals. Crucially, this framework highlights two dynamics relevant to ambivalence. First, the same discrete emotion can motivate different behaviors depending on the broader motivational context, which helps explain why ambivalent individuals –who face competing goals and conflicting evaluations– often experience hesitation or indecision. Second, the model emphasizes that the most intense emotion

tends to dominate, overriding weaker or conflicting emotional signals. Applied to our findings, VR's immersive nature amplifies the intensity of target emotions (e.g., happiness), thereby suppressing competing feelings that fuel ambivalence. As a result, individuals with higher baseline ambivalence –who have more competing signals to begin with– benefit more from VR because it helps clarify the emotional pathway that guides their action.

The results of former studies indicate that positive emotions elicited through VR tend to generate stronger emotional responses than negative ones. Our findings support this pattern, showing that high-valence (positive) emotions were associated with higher arousal levels than low-valence (negative) emotions. Specifically, participants reported greater arousal for positive emotions (6.23 out of 9 before the induction and 3.72 after) compared to negative emotions (2.54 out of 9 before the induction and 2.07 after).

This suggests that immersive experiences may be particularly effective for those starting from more complex emotional states. The findings support the broader idea that positive emotional experiences can reduce attachment to familiar stimuli, with familiarity serving merely as a heuristic indicator of safety (De Vries et al., 2010). In line with this, their results also suggested that happiness may increase the attractiveness of the unfamiliar, potentially facilitating exploration through the lens of novelty. From a neurological perspective, positive affect has been linked to high-frequency brain activity (gamma band) (Phaf & Rotteveel, 2012). This finding aligns with experimental research on VR's effects on brain waves during creativity, showing that VR enhances phases requiring divergent thinking (ideation and concept proposal) by increasing gamma activity (Y. Wang et al., 2023) –consistent with our results, where VR boosted positive emotions linked to gamma bands. Together, these insights point to the potential of immersive technology to regulate emotions more effectively when aligned with individuals' emotional baselines.

Individuals operating under time pressure –a frequent condition in today's fast-paced work environments– tend to rely more on intuitive emotional responses than on reflective, analytical thinking (Slovic & Västfjäll, 2010). Virtual reality, with its varying levels of immersion, offers a powerful tool to influence this process, as it can deliberately elicit and modulate emotional states, thereby shaping the intuitive responses that guide decision-making under such conditions. Our results align with numerous studies

demonstrating that displaying immersive scenes, such as virtual parks, through various VR setups –including retro-projected screens (Baños et al., 2006, 2008), desktop systems (Baños et al., 2012), and head-mounted displays– can effectively elevate positive emotional states like joy and relaxation while reducing negative emotions such as anxiety and sadness. In the case of head-mounted displays, Felnhofer et al. (2015) used a Sony HMZ-T1 to present a virtual park, which resulted in increased positive emotions and reduced negative emotions. Similarly, Medai and Noussair (2021) used an Oculus Rift HMD to display the same surfing video employed in our study –originally filmed with a GoPro– and found it effectively elevated happiness without triggering other emotional states. Additionally, Magdin et al. (2021) also successfully induced joy using Oculus Rift S and HTC Vive Pro HMDs to present blended video clips selected from the standardized LATEMO-E database. These consistent outcomes across different devices and scenarios confirm our results and underscore VR's potential as a tool for emotion enhancement and emotional regulation, echoing the emotional shifts observed in our own experimental framework.

The second hypothesis (H2) examined the moderating role of managerial power, predicting that managers would exhibit weaker emotional responses to VR than non-managers. The results confirmed this expectation. Managers reported higher baseline happiness and lower negative affect and consequently showed smaller emotional changes in VR.

As mentioned earlier. the Approach-Inhibition theory (Keltner et al., 2003) helps explain this pattern. Elevated power is associated with positive affect, reward sensitivity, automatic processing, and reduced behavioral inhibition. By contrast, individuals with lower power experience more negative affect, heightened threat vigilance, and deliberate, cautious processing. Consistent with this theory, managers in our study displayed greater happiness and lower ambivalence before VR exposure, which limited the technology's impact. The Organizational-Based Self-Esteem (OBSE) framework (Pierce & Gardner, 2004) further suggests that high-status roles enhance self-worth and emotional stability. Empirical evidence supports these interpretations: as mentioned before, managers generally report higher job-related happiness than non-managers (Jaworek et al., 2021), exhibit fewer negative emotional reactions (Berdahl & Martorana, 2006), and demonstrate more positive baseline affect, while individuals in lower-ranking positions

tend to experience more negative emotions (Van Kleef & Lange, 2020). Neurophysiological studies also show that high power is linked to increased activation in reward- and motivation-related brain regions (Boksem et al., 2012). Together, these insights highlight the moderating role of power in shaping emotional responses to VR.

The confirmation of H2 highlights an important implication: immersive technologies may be less effective for managers than for non-managers in eliciting emotional change. This suggests that interventions should be tailored by hierarchical status, with VR potentially playing a greater role in supporting non-managerial employees, who face higher levels of ambivalence and emotional variability.

Furthermore, the emotional impact of a VR induction can influence subsequent decision-making. Additional frameworks reinforce this interpretation. The Affect Infusion Model (AIM) (Forgas, 1995) suggests emotions shape judgments most strongly in complex, novel settings –conditions that VR replicates. Likewise, the affect heuristic (Slovic et al., 2007) shows that affective cues guide judgments quickly and intuitively. Together, these perspectives explain why immersive VR is particularly effective at reducing emotional ambivalence.

This study also contributes to emotional ambivalence literature in management, contributing more specifically to the literature on the impact of emotional ambivalence on performance. Our findings show that power is linked to different levels of emotional ambivalence. This outcome is something that was not observed before. Moreover, we have opened a new research line to explore the link between VR and IT in general and emotional ambivalence. In this sense, we improve the current view on emotional ambivalence by considering it not as an exogenous factor to the firm but as an endogenous factor that can be modulated by the organization. For instance, using VR to intentionally shape employees' experiences could provide a means to lower emotional ambivalence, which has been linked to enhanced performance by reducing risk aversion, easing resistance to change (Rothman, 2011; Rothman et al., 2017), increasing employee engagement (J. H. Lim et al., 2021), fostering goal-oriented reflection (Van Harreveld et al., 2009), and minimizing indecision during decision-making (Firfiray & Gomez-Mejia, 2021; Randerson & Radu-Lefebvre, 2021; Raza-Ullah, 2020; Rees et al., 2013; Rothman & Melwani, 2017).

VR appears to be particularly effective in decreasing emotional ambivalence, thus promoting more decisive actions. However, such emotional streamlining may involve trade-offs. While ambivalence is often linked to discomfort or hesitation, it can also foster valuable outcomes such as open-mindedness (Fenton-O'Creevy & Tuckett, 2022; Fong, 2006), enhanced creativity (Gong et al., 2024; Huang & Chang, 2023), and deeper learning and task performance (Suh & Prophet, 2018). Consequently, while VR's ability to reduce emotional conflict can enhance clarity in decision-making, it may simultaneously constrain cognitive flexibility. This aspect illustrates the value of designing VR experiences that strike a balance between emotional clarity and opportunities for thoughtful reflection and exploration.

Our findings further highlight the moderating effect of managerial power in shaping emotional responses to immersive technologies. In support of hypothesis H2, which posits that individuals in higher power positions experience a weaker emotional impact from VR, the results indicate that higher power status diminishes the impact of VR on emotions due to baseline differences: users with higher power already reported greater happiness and fewer negative emotions even before the VR elicitation

This research deepens our understanding of the interplay between power and technology in shaping emotional responses. They also highlight the importance of considering managerial power when designing and implementing VR-based interventions in the workplace, as such technologies may be less effective in eliciting emotional change among those in higher-power positions.

7.2. Ethical decision-making

This research also explores the connection between VR, emotions, managerial power, and ethical behavior. Emotions play a vital role in shaping human reactions, impacting both decision-making and interpersonal interactions. Although ethical decision-making has long been a central focus in business ethics, much of the literature remains theoretical and rational, especially regarding its functioning within organizational contexts shaped by hierarchical levels and situational factors (Deligonul & Cavusgil, 2025; Ford & Richardson, 1994). In particular, we investigated whether VR-induced happiness influences ethical behavior differently depending on managerial power and immersion level. Hypotheses 3a and 3b guided this analysis.

H3a proposed that for individuals with high managerial power, VR-induced happiness would show no significant difference in ethical decision-making because their baseline levels of happiness are already elevated. The results provide support for this hypothesis. VR induction did not significantly alter managers' ethical decision-making, since they report higher baseline happiness and lower fear than non-managers. This pattern is consistent with the Approach-Inhibition theory (Keltner et al., 2003), which links power to positive affect and approach orientation. Chi-square tests confirmed no significant differences in honesty across immersive, non-immersive, or control treatments. Managers' already elevated positive emotional state likely limited the scope for further VR-driven increases to influence ethical outcomes. As Escadas et al. (2024) demonstrated, higher positive affect is most conducive to ethical outcomes; managers may already have been within this optimal affective range prior to induction.

Beyond this affective explanation, the stability of managers' ethical responses may also reflect the way decisions are cognitively processed. Managers' choices were consistently honest, suggesting that honesty may operate as a dominant heuristic in this group, particularly among members of top management teams (TMT), where time for reflection or rationalization is often constrained (Arnott & Gao, 2022). The Dual-Process theory of decision-making (Simon, 1955) helps explain this outcome, distinguishing between fast, intuitive System 1 processes and slower, deliberate System 2 processes. System 1 may have primarily driven managers' ethical behavior, with honesty serving as the default response. This aligns with studies showing that ethical responses are often quicker and

more intuitive than dishonest ones, although some contradictory evidence exists (Liang et al., 2025).

H3b, in contrast, predicted that non-managers would exhibit more ethical behavior following VR-induced happiness, given that moderate increases in happiness were expected to enhance ethicality. This hypothesis was not supported. Non-managers, who reported lower baseline happiness and higher fear, did experience stronger emotional shifts under VR: immersive induction significantly increased their happiness and reduced their fear relative to non-immersive treatments. Yet these affective changes did not translate into differences in (dis)honesty. One explanation is that VR narrowed the emotional gap between managers and non-managers, raising non-managers' emotional state closer to that of managers. Both groups therefore entered the ethical task with similar affective profiles, resulting in convergence rather than divergence in behavior. A second explanation draws again on dual-process theories (Shalvi et al., 2013; Simon, 1955): honesty may have functioned as a heuristic across both groups, while dishonesty requires more deliberation and justification. As mentioned before, the literature suggests that ethical responses are typically quicker than dishonest ones, though contradictory evidence exists (Liang et al., 2025). Because the task immediately followed the induction, participants had limited opportunity to rationalize dishonest behavior, which may explain why honesty dominated across conditions.

Furthermore, the sample composition of this research, made of real managers and non-managers, may explain these results. Gerlach et al.'s (2019) meta-analysis suggests that much prior evidence of dishonest behavior comes from student samples, who tend to behave less honestly than broader populations. Our study, based on real managers and employees, may therefore explain why non-managers in this setting did not show the dishonesty observed elsewhere. This interpretation is consistent with Shalvi et al.'s (2013) observation that individuals who have internalized honesty show minimal variation across contexts, as truthful responses remain automatic. Finally, the absence of significant group differences may reflect the nuanced role of power in dishonest behavior, as also highlighted in the ACFE's 2024 report, which found only subtle distinctions in fraud prevalence between managerial and non-managerial roles[30].

[30] Association of Certified Fraud Examiners. (2024). ACFE Report to the Nations | 2024 Global Fraud Study. https://legacy.acfe.com/report-to-the-nations/2024/

Turning to immersion, the results underscore its effectiveness in shaping emotions but not ethical decision-making. Consistent with previous studies (Baños et al., 2006; Felnhofer et al., 2015; Lavoie et al., 2021), immersive VR produced stronger emotional effects than non-immersive treatments, increasing happiness and reducing fear among both managers and non-managers. Yet in our research, these affective differences did not carry over into different ethical outcomes. Participants behaved honestly across all conditions, suggesting that immersion influenced emotional states without altering ethical decisions.

The reduction of negative emotions under VR provides another perspective. According to General Strain theory (Agnew, 1992), negative affect can increase pressure toward unethical actions, while its alleviation may promote more ethical responses. Fear in particular has been linked to cautious decision-making but also to unpredictable outcomes in competitive contexts (Angie et al., 2011; Singh et al., 2018). Our findings indicate that immersive VR reduced fear more effectively than non-immersive treatments and that this effect was stronger among non-managers. This affective relief may have reinforced honest behavior across groups, further contributing to the absence of significant differences between conditions.

In sum, the results support H3a but not H3b. Managers' ethical behavior remained unaffected by VR induction, consistent with their elevated baseline happiness and the heuristic nature of honesty in their decision-making. Non-managers exhibited stronger emotional changes under VR but did not show corresponding differences in honesty, likely due to convergence in emotional states with managers and the dominance of honesty as a heuristic. Immersion amplified emotional responses but did not extend its influence on ethical outcomes.

Together, these findings suggest that while VR effectively modulates both positive and negative affect, these emotional shifts do not necessarily translate into variations in ethical behavior across managerial power or immersion level. Therefore, the emotional modulation through VR may not be sufficient to drive ethical action. Moreover, it could mean that the role of emotions in ethical decision-making may depend not only on the type of emotion but also on contextual factors such as the level of immersion and one's managerial power. Deeper organizational norms or contextual cues may play a more dominant role.

These findings emphasize the importance of emotional and contextual dynamics in ethical decision-making, particularly within the domain of business ethics, a core element of modern organizational practice (Omogbemi, 2023).

8. Conclusions

This research aimed to investigate the role of VR in shaping emotional responses and ethical decision-making within organizations, emphasizing the influence of hierarchical power. Through a series of controlled experimental studies, we examined emotional ambivalence and ethical behavior in immersive environments, comparing responses between managers and non-managers. Grounded in theoretical frameworks such as the affect heuristic, the approach-inhibition theory of power, and dual-process models of decision-making, the findings contribute to a deeper understanding of how digital tools influence human behavior at work. This chapter synthesizes the key outcomes, discusses theoretical and practical implications, and outlines avenues for future research and organizational application.

As organizations increasingly adopt digital tools, such as immersive technologies, users increasingly rely on emotional responses to navigate trust, privacy, and interaction with systems. Although emotional factors are increasingly recognized in decision-making, their role in information systems remains underexplored compared to other fields like behavioral economics. In particular, VR is positioned in the Gartner Hype Cycle at a phase where its benefits are widely acknowledged, including within corporate environments. Furthermore, VR accounts for 65% of related publications, compared to 29% for AR and just 6% for MR, as shown by our PRISMA-based analysis.

Despite increasing interest in the intersection of technology and emotion, several key **gaps** remain in the current literature on VR and its emotional implications within organizational contexts. Firstly, the role of affect heuristics in information systems (IS) remains underdeveloped compared to their well-established application in behavioral economics. While emotions influence decision-making, IS research has traditionally favored cognitive models, leaving emotional shortcuts and experiential processing largely unexplored. Secondly, existing studies have primarily focused on emotional responses during or after exposure to VR, overlooking how pre-existing emotional states might shape user experiences. The influence of baseline emotions on the effectiveness and reception of VR stimuli remains insufficiently addressed. Thirdly, the emotional impact of VR within organizational settings has rarely been examined through the lens of managerial power. There is limited understanding of how managerial power influences emotional reactions to immersive technologies, especially given that power dynamics are known to shape emotional expression and regulation. Fourthly, while emotions are central

to ethical decision-making, and VR is widely recognized as a tool for emotional elicitation, little research has considered how ethical behavior in immersive environments may differ based on managerial power. Most existing studies rely on general populations, failing to explore how managers and non-managers may respond differently to the same emotional or ethical stimuli in VR contexts.

Therefore, we formulated three research questions to address the identified gaps concerning the impact of VR. To answer them, we conducted an experimental study that compared different levels of immersion –using head-mounted displays (HMDs) for full immersion and desktop devices for non-immersion– to induce emotional responses among managers and non-managers. The first **research question** focused on whether individuals' initial emotional states influence VR-induced emotional responses. Knowing the impact on emotions enabled measuring emotional ambivalence –a common state in which individuals experience both positive and negative emotions simultaneously. Results demonstrated that pre-existing affective states are not passive background conditions but actively shape the reception of immersive stimuli. Emotional ambivalence, particularly in non-managers, was more malleable through immersive experiences, showing that VR can act as an amplifier or reducer of prior emotional states depending on the user's managerial role and context. This finding has important implications for understanding how technology interacts with human cognition and emotion in complex work settings.

The second question investigated whether VR affects managers and non-managers differently in emotional processing. The findings revealed that managerial position significantly moderates emotional ambivalence with VR content. Managers, due to their higher organizational power, generally demonstrated more controlled and goal-oriented emotional responses. In contrast, non-managers displayed more reactive and emotionally driven patterns. These differences align with power-based theories of affective processing, underscoring the role of status in emotional vulnerability and resilience in technologically mediated environments.

The third question explored whether emotion induced by VR could shape ethical or unethical behavior. While VR proved effective in eliciting emotional responses, its influence on ethical decision-making was more nuanced. In our study, the emotional induction with VR did not show a significant difference in managerial power nor among different immersion levels and behavior. Such results could suggest that ethical responses

in immersive environments are not purely emotional but embedded in broader role expectations, professional norms, and possibly risk perceptions associated with managerial power standing.

This research advances our understanding of how VR can be effectively used within management contexts to explore the emotional and ethical implications of digital technologies. The findings demonstrate that VR is a powerful tool for examining how immersive experiences affect individuals differently depending on their organizational roles.

In the area of emotional ambivalence, this study makes several contributions. First, it challenges the traditional view in organizational research that emotions are exogenous and largely uncontrollable. The study integrates insights from psychology and marketing to demonstrate that technological means can elicit and modulate emotions. Second, it is, to our knowledge, the first to examine how immersive emotional elicitation varies by job status, highlighting how managerial power influences affective responses. Third, the study employed rigorous experimental methods to measure and analyze how managerial power interacts with emotional outcomes, ensuring the robustness of its findings.

This research also establishes novel connections between VR, emotion, power, and ethical decision-making. It investigates how VR-induced emotional states affect both managers and non-managers, exploring the downstream influence of these emotions on ethical behavior. By conducting the study with actual managers and workers rather than the general population or student samples, the research offers a more authentic and applicable understanding of emotional and moral dynamics in organizational settings.

Together, these contributions help bridge disciplinary gaps between organizational behavior, psychology, marketing, and technology studies and offer a practical framework for organizations seeking to use immersive technologies responsibly and effectively.

Furthermore, the findings have several managerial and policy implications.

8.1. Managerial implications

The results underscore the importance of acknowledging the emotional diversity across managerial power when implementing digital technologies. Based on the proven results of emotional ambivalence and emotion theories on decision-making, our findings can have different implications depending on the immersion level and the managerial power. According to our results, immersive technology may be employed to reduce the level of emotional ambivalence of the employees, especially for non-managers, where the change is significant. This reduction could be guided to individuals to lower reluctance to take risks, increase openness to change, delay decision-making or vacillate. Moreover, organizations could use immersive technologies to boost engagement, job satisfaction, and performance, given their ability to increase happiness and decrease fear. Furthermore, promoting happiness within organizations can yield practical advantages, particularly in decision-making contexts. Research suggests that positive emotional states enhance managers' ability to navigate decisions involving complex and ambiguous information by facilitating the effective use of cognitive shortcuts and heuristics (Connelly et al., 2004; Staw & Barsade, 1993). Notably, increased happiness has been widely linked to positive outcomes in the workplace, including stronger engagement, greater job satisfaction, improved organizational commitment (Fisher, 2010), and enhanced overall performance (Adnan Bataineh, 2019) and productivity (Pavic et al., 2022). Such findings could impact ethical decision-making, especially when the problem is not clearly defined or the optimal course of action is uncertain (Connelly et al., 2004). Conversely, a reduction in fear among employees –as observed in this study– can yield positive effects such as decreased avoidance behaviors, greater cognitive flexibility, and more balanced risk evaluations. In high-pressure environments, lower levels of fear may empower individuals to make decisions with greater confidence and clarity.

Therefore, for managers, whose responses are more aligned with approach-oriented tendencies and seem to have stable emotional profiles in immersive contexts, they could leverage VR for strategic decision-making simulations, leadership training, and resilience testing. For non-managers, VR offers a powerful emotional engagement, as it increases their happiness.

These insights have direct implications for HR, training, and leadership development. Organizations should consider tailoring immersive learning experiences based on users'

positions within the hierarchy, recognizing that uniform approaches may be inefficient or even counterproductive. By integrating VR into role-specific training programs, firms can foster emotional intelligence, ethical reflexivity, and scenario-based decision-making across different organizational levels.

Companies that are incorporating VR into workplace practices –such as virtual team collaboration– stand to benefit significantly from these results. VR's expanding role in enhancing teamwork is particularly valuable for remote and hybrid teams. Its ability to evoke emotional responses makes learning experiences more engaging, improves memory retention, and better equips individuals for real-world challenges. For managers, it presents an opportunity to utilize immersive technologies to improve learning, support emotional well-being, and encourage constructive workplace behaviors particularly in today's globalized workplace. Similarly, organizations employing digital twins or virtual simulations for design training and collaboration can gain by integrating emotionally intelligent design into their VR solutions. Nonetheless, high-pressure companies must bear in mind that using VR for emotion induction may weaken creativity, diminish innovative thinking, and decrease goal-oriented focus as it lowers the level of emotional ambivalence.

By recognizing the emotional impact of different work environments and digital tools, companies can make informed choices to improve well-being, influence productivity, and create more engaging work experiences. Therefore, using VR to influence emotional ambivalence represents a promising development in the growing field of emotional management training and collaboration.

This research offers relevant information about the psychological impact of computer use on individuals, groups, and society. It advances the field of human-computer interaction by introducing emotional ambivalence and managerial power as important dimensions in the study of immersive technologies. The findings also offer practical guidance for organizations seeking to adopt VR responsibly, helping them leverage its benefits while minimizing emotional risks for employees. Additionally, the study contributes to psychological research by illustrating how personal factors –such as managerial power and baseline emotional states– influence responses to technological change.

8.2. Policy implications

These findings emphasize the importance of interdisciplinary research in understanding how technology influences organizational behavior. This study demonstrates that theories related to emotional states in organizations –such as approach-inhibition theory and organizational-based self-esteem– can be valuable in interpreting how technology affects individuals at different managerial powers. Notably, the results indicate that immersive technologies may be less effective in eliciting emotional responses from those in higher managerial positions. By incorporating emotional induction and managerial power into the examination of immersive technologies and business ethics, this research contributes to human-computer interaction and opens new paths for interdisciplinary exploration.

At the policy level, this research suggests the need to redefine how emotional technologies are evaluated and implemented in the workplace. Regulations surrounding emerging technologies typically focus on data privacy and security. However, the affective dimension of VR calls for broader ethical scrutiny. As immersive technologies become integrated into recruitment, onboarding, and performance evaluations, organizations and regulators should anticipate how emotional influence –whether intentional or incidental– may affect fairness, accountability, and employee well-being. Given its proven impact on emotions and potential to influence behavior, particularly among employees with less organizational power, there is a growing necessity to establish emotional governance frameworks. It is vital that regulators establish clear guidelines to ensure their responsible and ethical application in managing emotions.

Policymakers and organizational designers should consider guidelines that ensure psychological safety and emotional integrity in immersive work tools. This includes transparency about the purpose of VR use, informed consent, psychological support structures, and the potential for opt-out mechanisms. Moreover, training designers must recognize the emotional labor involved in VR-based modules and balance affective impact with cognitive load and behavioral goals. VR interventions should be thoughtfully designed to prevent emotional overload or unintended detachment from ethical considerations.

Workplace regulations should begin addressing these emerging scenarios by developing legal frameworks that govern emotional elicitation through technology. Rather than

depending solely on VR-based emotional interventions, our findings suggest that companies should focus on building a strong ethical culture through clear policies, robust accountability mechanisms, and exemplary leadership, as VR alone does not seem to have a significant effect on ethical behavior.

To conclude, this research enhances our understanding of how digital technologies impact psychological experiences at the individual, group, and organizational levels. The outcomes of this study make a meaningful contribution to human-computer interaction by introducing emotional ambivalence and managerial power as critical dimensions in the evaluation of immersive technologies. In addition, these findings also offer practical insights for organizations aiming to take advantage of VR benefits and reduce the risk of adverse emotional effects on employees. Additionally, the research highlights how factors such as managerial power and existing emotional states shape user responses to technological change.

9. Limitations

Despite this research's contributions, it is important to acknowledge several limitations in order to contextualize the findings and inform future research.

Regarding the experimental design, this study focused exclusively on eliciting happiness. While other basic emotions have also been shown to influence emotional responses in VR contexts, happiness was selected because it is the most frequently studied emotion – accounting for 31% of basic emotion elicitation studies, followed by sadness at 22% (see Table 4). Additionally, the study employed only one 3D VR film (a surfing video), which, to our knowledge, is the only available VR stimulus specifically validated for studying emotional impact on ethical behavior. Although other validated emotion-inducing films exist (see the review of "Emotions and affect in human factors and human-computer interaction" by Fakhrhosseini and Jeon (2017)), they are typically presented in 2D format and are thus less immersive. Additionally, this study relied solely on VR for emotional elicitation, without incorporating other immersive technologies such as Augmented Reality (AR) or Mixed Reality (MR), as VR remains more prevalent in research than AR or MR (see Figure 3). In terms of emotion measurement, the study used only the PANAS scale, which is the most frequently cited tool for assessing affect, with over 58,000 citations (see section 4.1.2). Notably, a recent experiment comparing immersive and non-immersive emotion induction using both subjective and physiological measures found similar accuracy rates (71.00% ± 7.95 with physiological signals and 69.29% ± 11.41 with subjective ratings) (Lima et al., 2024).

The sampling strategy also presents limitations. While platforms like Amazon Mechanical Turk (MTurk) could have been used to recruit participants, we deliberately chose not to use them due to several well-documented concerns. These include participant inattention, self-misrepresentation, self-selection bias, vulnerability to bots, social desirability bias, perceived researcher unfairness, and threats to internal validity (Aguinis et al., 2021). MTurk has also faced slowing participant replenishment rates and increased non-naivety, with users becoming increasingly familiar with common experimental tasks (Gerlach et al., 2019). Furthermore, a considerable proportion of MTurk participants are "professional survey takers," as they frequently take part in multiple experiments daily, which reduces their level of naivety compared to more conventional subject pools. (Esch et al., 2025; Goodman & Paolacci, 2017).

Alternative platforms such as Prolific and CrowdFlower have also been used in behavioral research. However, Prolific's participant base is smaller than MTurk's, with approximately half of its users being students (Peer et al., 2017). Students were deliberately avoided in this study, as previous research suggests they tend to display higher levels of dishonest behavior compared to more representative populations (Gerlach et al., 2019). CrowdFlower, initially catered to corporate clients, shifted focus to AI and machine learning in 2018, rebranding as Figure Eight, and was acquired by Appen in March 2025[31]. Recruiting participants from real workplace settings would have increased validity. However, conducting research on ethical decision-making in such environments is particularly challenging. Companies are often reluctant to grant researchers access to employees for studies involving sensitive topics such as ethics, due to concerns about privacy, reputational risk, and potential discomfort among staff. In fact, we contacted several companies, but none agreed to allow us to conduct our experiment with their employees. Moreover, obtaining a sufficiently diverse sample –including both managerial and non-managerial employees– is difficult when relying on company-based participant recruitment (Dziak et al., 2012).

Another possible methodological improvement would have been to adopt a within-subjects design, commonly employed in behavioral economics, where participants are exposed to multiple conditions. However, such designs are susceptible to carry-over and demand effects, which may influence participants' responses across different treatments (Charness et al., 2012).

In this study, we relied on the die-roll paradigm as our measure of dishonesty, given its prominence in the literature and the strong evidence linking behavior in this task to cheating outside the laboratory (Abeler et al., 2019; Gerlach et al., 2019). Alongside the die-roll task, the coin-flip paradigm is also frequently used, though it is often regarded as a close variation of the die-roll paradigm (Gerlach et al., 2019). Although Gerlach and Teodorescu (2022) noted that few studies have contrasted different paradigms directly, the limited comparisons available between coin-flip and die-roll tasks consistently report similar levels of dishonesty. Additionally, in our study, pre-honesty levels were not measured in the induction treatments; instead, they can be inferred from the control

[31] TechCrunch. (2019). *Appen acquires Figure Eight for up to $300M, bringing two data annotation companies together*. https://techcrunch.com/2019/03/10/appen-acquires-figure-eight/

condition, where no induction was applied. This approach was necessitated by the one-shot, between-subjects design, which allowed us to identify the causal effect of induction on honesty.

Another limitation could be that the decision was recorded just after the emotional induction. This was intentional, as the study sought to examine decision-making processes driven by heuristics –cognitive shortcuts that operate quickly, intuitively, and with minimal cognitive effort (Simon, 1955)– and which tend to dominate in top management contexts (Arnott & Gao, 2022). Emotions are closely intertwined with heuristic processing, as both function within the same fast, automatic system (Slovic et al., 2002; Toda, 1980). As noted by Toda, the emotional system is evolutionarily developed and biologically programmed to support decision-making in environments characterized by uncertainty and survival pressures. This emotional-heuristic system enables individuals to respond adaptively without the need for deliberate, rule-based reasoning, especially in complex or ambiguous situations. Furthermore, following the Appraisal Tendency framework, emotions emerge from cognitive appraisals and generate implicit predispositions to evaluate future events in line with the core appraisal patterns that define those emotions. These appraisal tendencies can extend beyond the original eliciting situation and continue to shape subsequent judgments and thought content (Han et al., 2007).

Finally, we could also have studied the role of personality traits –specifically the Big Five[32]. Little is known about how these traits influence emotional responses and ethical behavior. Kalshoven et al. (2011) conducted an experiment to explore the relationship between ethical leadership and the Big Five personality traits, finding that only agreeableness was related to ethical behavior. Moreover, relying solely on Big Five personality factors to predict behavior may significantly compromise assessment goals, as a considerable portion of the criterion variance captured by facet-level scales is not accounted for by the broader factor-level measures (Paunonen & Ashton, 2001). In terms of emotions, although all traits except neuroticism have been associated with positive emotions, only extraversion consistently shows a strong relationship across studies (Donovan et al., 2025; Letzring & Adamcik, 2015; Marengo et al., 2021; Shiota et al.,

[32] The big five traits of personality are extraversion, conscientiousness, openness, agreeableness and neuroticism (McCrae & Costa Jr, 1999).

2006). However, the literature remains unclear regarding the relationship between personality traits and emotional ambivalence.

10. Future lines of research

This research lays the groundwork for understanding how VR affects emotional states and ethical decision-making, particularly in relation to managerial power. However, several avenues remain open for future research.

First, future studies could expand the emotional scope beyond happiness. Investigating the impact of negative emotion induction, such as fear or anger, could help determine whether different emotional inductions yield consistent or divergent outcomes in decision-making across hierarchical roles. Additionally, using alternative validated immersive videos eliciting the same emotion, such as virtual park environments, could test the robustness and generalizability of current findings related to the impact of VR on ethical decision-making and managerial power. Exploring other immersive technologies, including augmented reality, mixed reality, or VR systems with different levels of immersion, could help determine the role of "presence" in emotional and ethical responses. Such comparisons would clarify whether higher immersion leads to more intense or lasting behavioral effects.

Incorporating interdisciplinary tools from psychology and neuroscience may further enrich the field. While this study relied on self-reported affect using the PANAS scale (the most frequently cited tool in the field), combining these subjective measures with physiological or neurological data would offer a more holistic understanding of emotional processing. Moreover, individual differences –such as those outlined in the Big Five personality model (openness, conscientiousness, extraversion, agreeableness, and neuroticism)– could moderate responses to immersive experiences. Future research should integrate personality traits with both self-reported and physiological data to better understand variation in emotional and behavioral outcomes in VR.

Future studies could consider including a within-subjects design to track individual-level changes over time. Although such designs require careful control of carryover and demand effects, they can provide greater statistical power because their validity does not depend on randomization, especially in contexts where decision-making occurs repeatedly or continuously rather than as a one-time event. Similarly, expanding the unit of analysis from individuals to groups –such as team-level or top management interactions– could uncover the influence of collective dynamics.

Another promising direction involves conducting research in real-world work environments. While the present study used a controlled, non-workplace setting, future studies could partner with organizations that already use VR (e.g., for training or onboarding) –counting on getting enough sample– to test whether emotional responses differ in familiar, stable environments. This would enhance validity and offer suggestions for how immersive tools function in everyday professional contexts. Additionally, the relationship between emotional ambivalence and workplace performance remains an open question. Future studies could examine how immersive technologies affect performance in collaborative or goal-oriented tasks that simulate real organizational duties. Importantly, further research should critically evaluate the ethical implications of using immersive technologies to manipulate emotional states in professional settings.

Our study measured ethical behavior immediately after the emotional induction, which allowed us to examine short-term heuristic-driven responses. Future research should explore long-term effects based on System 2 decision-making within the dual-process theory framework. This would help determine whether sustained exposure to immersive experiences produces enduring shifts in ethical behavior. Furthermore, measuring emotional responses at multiple time points, including after decision-making, can also provide valuable insights. Frameworks like the Appraisal Tendency framework and the Emotion Imbued Choice model suggest that expected emotions and emotional feedback are integral to decision-making and should be measured at different time intervals. As in real-life situations, decisions are taken during the work period, which warrants further studying the impact of emotion induction in different time lengths.

In conclusion, while VR shows promise as a tool for shaping emotional states, its role in influencing ethical behavior appears constrained without broader organizational support systems. Future research should build on these insights to develop a more nuanced view of how immersive technology can be responsibly and effectively integrated into professional environments. Managers and decision-makers should therefore view immersive technologies not as standalone solutions but as part of a broader toolkit for fostering ethical, emotionally intelligent, and resilient workplaces.

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12. Appendix

Appendix I: Web of Science categories selection for the PRISMA search related to emotion and decision making

- behavioral sciences
- business
- business finance
- communication
- computer science information system
- computer science interdisciplinary applications
- computer science theory methods
- development studies
- economics
- education educational research
- education special
- engineering industrial
- ethics
- family studies
- history
- information science library science
- international relations
- law
- management
- multidisciplinary sciences
- neuroimaging
- neurosciences
- political science
- psychiatry
- psychology applied
- psychology developmental
- psychology educational
- psychology mathematical
- public administration
- psychology multidisciplinary
- robotics
- social issues
- social sciences interdisciplinary
- social work
- sociology
- women s studies

Appendix II: Ethical Approval by Universidad Complutense of Madrid (in Spanish)

UNIVERSIDAD COMPLUTENSE MADRID

Informe Protocolo Favorable
Tesis Doctoral
Ref: CE_20211216-03_SOC

MARGARITA SAN ANDRÉS MOYA, PRESIDENTE DEL COMITÉ DE ÉTICA DE LA INVESTIGACIÓN DE LA UCM, CERTIFICA:

Que el Comité de Ética de la Investigación de la UCM, en su sesión de 16 de diciembre de 2021, ha evaluado la propuesta relativa al siguiente proyecto:

Título: **Análisis del comportamiento deshonesto en un entorno laboral competitivo.**

Investigador/es responsable/s:
FEVRE, MERCEDES
PASCUAL EZAMA, DAVID (Director de tesis)

Que en este estudio:

- Se cumplen los requisitos necesarios de idoneidad del protocolo en relación con los objetivos del estudio y están justificados los riesgos y molestias previsibles para el sujeto.
- Es adecuado el procedimiento para obtener el consentimiento informado.
- La capacidad de los investigadores y los medios disponibles son adecuados para llevar a cabo el estudio.
- Los investigadores responsables quedan comprometidos a respetar el carácter confidencial de la información obtenida y a custodiarla conforme a la legislación vigente, incluyendo la protección de datos personales.

Cualquier cambio sobre el proyecto evaluado por el comité invalida el presente informe favorable y requerirá una nueva evaluación.

Madrid, a fecha de firma

Código Seguro De Verificación	6479-6266-7230P5638-6B49	**Estado**	**Fecha y hora**
Firmado Por	Margarita San Andres Moya - Vicerrectora de Investigación y Transferencia	Firmado	13/01/2022 20:05:30
Observaciones		**Página**	1/1
Url De Verificación	https://sede.ucm.es/verificacion?csv=6479-6266-7230P5638-6B49		
Normativa	Este informe tiene carácter de copia electrónica auténtica con validez y eficacia administrativa de ORIGINAL (art. 27 Ley 39/2015).		

Appendix III: Consent form (in Spanish)

Consentimiento Informado para la Participación en Investigación

Usted ha sido elegido/a para participar en una investigación con el propósito de estudiar la toma de decisiones en las personas. El presente escrito provee información sobre el estudio. El investigador principal (la persona a cargo de esta investigación) o su representante le describirá este estudio y le contestarán todas sus preguntas una vez finalizado el mismo y con el objetivo de no afectar en el propio proceso de la toma de decisiones. Usted es bienvenido/a a ponerse en contacto en cualquier momento con cualquier personal de la investigación para aclarar cualquiera de los puntos especificados a continuación o para contestar alguna pregunta adicional que usted tenga. Por favor, lea la siguiente información y pregunte cualquier cosa que no entienda o no esté clara antes de decidir si quiere o no tomar parte en la investigación. Su participación es completamente voluntaria y puede rechazar la oportunidad de participar sin castigo alguno o pérdida de beneficios que usted merezca.

Título de la Investigación

Análisis de la toma de decisiones en un entorno laboral competitivo

Investigador Principal (incluye facultad patrocinadora, afiliación, número telefónico y correo electrónico):

Mercedes Inés Fèvre Obarrio

Facultad de CCEE y Empresariales

Universidad Complutense de Madrid

670 661 355

mfevre@ucm.es

¿Cuál es el propósito de esta investigación?

El propósito de la presente investigación es estudiar la toma de decisiones mediante la visualización de un video corto con un ordenador o con gafas de realidad virtual y sin visualizar un video, y analizar posibles diferencias.

¿Qué pasará si usted participa en esta investigación?

Si usted decide participar en la investigación, uno de los investigadores le dará las instrucciones a seguir. El tiempo máximo estimado en la consecución de la misma es de aproximadamente 5 minutos.

¿Qué tiene que hacer al finalizar la investigación?

Deberá salir de la sala nada más terminar. También es necesario que no comunique a nadie nada relativo a la investigación ya que podría alterar los resultados de futuros participantes.

¿Qué tipo de riesgos o molestias puede sufrir?

Al no utilizarse ninguna técnica invasiva que pudiera perjudicar su salud física, ésta no se verá

afectada en ningún momento. En todo momento debe saber que usted es libre de rehusar hacer cualquiera de las tareas de la investigación, así como decidir no continuar con la misma en cualquier momento que lo desee.

¿Qué material se utilizará en la investigación?

El material que se utilizará será básicamente bolígrafo. Papel, teléfono móvil y un ordenador en algunas de las pruebas.

A causa de mi participación, ¿qué beneficios son posibles para mí y/o para otras personas?

Usted tendrá la opción de recibir una retribución económica. Los participantes de cada semana entrarán en un sorteo que se realizará el último día de cada mes mediante la plataforma online www.sortea2.com o similar. Si usted no se había inscrito a la sesión de hoy, apunte su teléfono al final de esta hoja. Al participante ganador se le contactará y se le dará una tarjeta regalo de Amazon en función del resultado de su participación. El resultado del número encriptado ganador de cada sorteo será publicado el mismo día en www.linkedin.com/in/mercedes-fevre

Si usted decide participar en este estudio ¿cuánto le costará?

La investigación es gratuita para los participantes.

¿Qué pasará si me lastimo durante la investigación?

Esta investigación no tiene ningún riesgo físico.

En caso de no participar en esta investigación, ¿Qué otras opciones están disponibles para

usted?

La participación en esta investigación es completamente voluntaria. Usted es libre de oponerse a participar en esta investigación, y su oposición no influenciará la relación presente o futura con la Universidad Complutense de Madrid.

¿Cómo puede retirarse de la investigación y a quién deberá contactar si tiene alguna

pregunta?

Si desea renunciar a su participación en esta investigación por cualquier motivo o razón, usted deberá contactar con el investigador principal, cuyo teléfono y correo electrónico aparecen en la primera página del presente documento. Usted es libre de retirar su consentimiento y dejar de participar en esta investigación en cualquier momento sin ningún castigo o pérdida de beneficios previamente otorgados. A lo largo de este estudio, usted será notificado de cualquier información que surja y que pueda afectar su decisión de participar en el estudio.

Adicionalmente, si usted tiene alguna pregunta acerca de sus derechos como participante, puede contactar con Comité de Ética de la Investigación de la Universidad Complutense de Madrid de Madrid.

¿Cómo serán protegidas su privacidad y su confidencialidad en los registros de la

investigación?

Para proteger la privacidad todas las respuestas a las tareas llevadas a cabo en la presente investigación serán no sólo estrictamente confidenciales, sino totalmente anónimas. Por tanto, no será posible establecer por medios razonables el nexo entre un dato y el sujeto al que se refiere.

¿Serán beneficiados los investigadores a causa de mi participación en esta investigación?

Los investigadores no serán beneficiados por su participación más allá de la publicación o presentación en foros científicos del presente estudio.

Firmas:

Como representante de esta investigación, he explicado el propósito, el procedimiento, los

beneficios y los riesgos de estar involucrado/a en este estudio

_____

Firma y Nombre de la persona que obtiene el consentimiento Fecha

Usted ha sido informado del propósito de este estudio, el procedimiento, así como de los beneficios y riesgos posibles. Igualmente, ha recibido una copia del presente documento y se le ha dado la oportunidad de hacer preguntas antes de firmar, y ha sido informado que usted puede hacer cualquier otra pregunta en cualquier momento. Su firma indicará que usted ha leído el material presentado en las hojas previas y que ha aceptado participar en esta investigación. Usted puede renunciar al estudio en cualquier momento. Firmando esta forma, no está renunciado a ninguno de sus derechos legales.

_____

Nombre del Participante **Fecha**

_____

Firma del Participante **Fecha**

_____

Firma del Investigador Principal **Fecha**

Appendix IV: Sociodemographic Survey (in Spanish)

1. ¿Cuántos años tienes?
2. ¿Eres hombre o mujer?
3. ¿Qué nacionalidad tienes? (Elige el país)
4. ¿En qué país vives actualmente?
5. ¿Cómo definirías tu cargo actual? Elige lo que más corresponda
6. Si has contestado "desempleado", ¿cuántos meses llevas desempleado? (ponlo en formato número)
7. ¿Cuál es tu puesto actual? Si has contestado "desempleado" en la anterior pregunta, ¿cuál era tu último puesto?
8. Si estás trabajando, ¿Trabajas para cuenta ajena? En caso negativo, quiere decir que trabajas para cuenta propia
9. ¿Cuántas personas tienes a tu cargo? (pon en formato número: ninguna = 0, una: 1, ...)
10. ¿Eres el dueño de la empresa?
11. ¿Cuántas personas tiene tu empresa?
12. ¿En qué departamento estás actualmente? Si has contestado "desempleado" en la anterior pregunta, ¿cuál era tu último departamento?
13. ¿Cuál es tu nivel de responsabilidad en la empresa? Si estás desempleado, pon el nivel más reciente
14. ¿Cuál es el sector de tu empresa? Si estás desempleado, pon el de última empresa

Appendix V: Instructions (in Spanish)

3D (immersive v1- VR SURF)

¡Hola! Completa cada paso hasta que te salga la estrella. Ve dando a "enter" o en el ratón tras cada paso

Escanea con tu teléfono el siguiente código QR o pincha en el enlace. Completa las preguntas sociodemográficas. Una vez terminadas, cierra la página y vuelve al powerpoint

enlace sociodemo

Escanea con tu teléfono el siguiente código QR de la derecha o pincha en el enlace. Completa el cuestionario de emociones. Una vez terminadas, cierra la página y vuelve al powerpoint

Enlace

Ponte las gafas 3D y mira entero el video en el ordenador. Es posible que haya preguntas al final sobre él

Escanea con tu teléfono el siguiente código QR de la derecha o pincha en el enlace. Completa el cuestionario de emociones. Una vez terminadas, cierra la página y vuelve al powerpoint

Enlace

Dale al link en el icono y mira entero el video en el ordenador. Es posible que haya preguntas al final sobre él

Escanea con tu teléfono el siguiente código QR de la derecha o pincha en el enlace. Completa el cuestionario de emociones. Una vez terminadas, cierra la página y vuelve al powerpoint

Enlace post

Pincha en el icono, entra como "participant", pon el primer código y sigue las instrucciones del juego en el ordenador. En la primera página del consentimiento, dale a "I agree" directamente. Después, contesta a las preguntas (en país y nacionalidad: España = Spain). Cuando hayas metido tu resultado, cierra la ventana.

Habrá un sorteo semanal entre los participantes. En caso de que seas premiado deberás recordar el dinero que has ganado

¡Has terminado! Muchas gracias. Puedes marcharte. Recuerda no comentar con nadie esta actividad durante un mes ya que podría alterar los resultados

2D (Non-inmersive v1/v2 – 2D SURF/ 2D Hakuna Matata)

¡Hola! Completa cada paso hasta que te salga la estrella. Ve dando a "enter" o en el ratón tras cada paso

Escanea con tu teléfono el siguiente código QR (o pincha en el enlace) y completa las preguntas sociodemográficas. Una vez terminadas, cierra la página y vuelve al powerpoint

enlace sociodemo

Escanea con tu teléfono el siguiente código QR de la derecha o pincha en el enlace. Completa el cuestionario de emociones. Una vez terminadas, cierra la página y vuelve al powerpoint

Dale al link en el icono y mira entero el video en el ordenador. Es posible que haya preguntas al final sobre él

Escanea con tu teléfono el siguiente código QR de la derecha o pincha en el enlace. Completa el cuestionario de emociones. Una vez terminadas, cierra la página y vuelve al powerpoint

Enlace post

Pincha en el icono, entra como “participant”, pon el primer código y sigue las instrucciones del juego en el ordenador. En la primera página del consentimiento, dale a “I agree” directamente. Después, contesta a las preguntas (en país y nacionalidad: España = Spain). Cuando hayas metido tu resultado, cierra la ventana.

Habrá un sorteo semanal entre los participantes. En caso de que seas premiado deberás recordar el dinero que has ganado

¡Has terminado! Muchas gracias. Puedes marcharte. Recuerda no comentar con nadie esta actividad durante un mes ya que podría alterar los resultados

Control (no video)

Hola! Completa cada paso hasta que te salga la estrella. Ve dando a “enter” o en el ratón tras cada paso

Escanea con tu teléfono el siguiente código QR o pincha en el enlace. Completa las preguntas sociodemográficas. Una vez terminadas, cierra la página y vuelve al powerpoint

enlace sociodemo

Escanea con tu teléfono el siguiente código QR de la derecha o pincha en el enlace. Completa el cuestionario de emociones. Una vez terminadas, cierra la página y vuelve al powerpoint

Pincha en el icono, entra como “participant”, pon el primer código y sigue las instrucciones del juego en el ordenador. En la primera página del consentimiento, dale a “I agree” directamente. Después, contesta a las preguntas (en país y nacionalidad: España = Spain). Cuando hayas metido tu resultado, cierra la ventana.

Habrá un sorteo semanal entre los participantes. En caso de que seas premiado deberás recordar el dinero que has ganado

¡Has terminado! Muchas gracias. Puedes marcharte. Recuerda no comentar con nadie esta actividad durante un mes ya que podría alterar los resultados

Appendix VI: Search of the five basic emotions related to ethics or honesty

Search by Topic in Web of Science Core Collection, with each emotion and "*ethic*" or "*honest*", filtered by "reviewed articles", (up to 2024)

Emotion	Total	Reviewed article
Fear	3,623	225
Happiness or Joy	1,979	45
Anger	849	27
Disgust	305	10
Sadness	240	4

Appendix VII: Descriptive statistics of emotions by treatment and managerial power,

Treatment	Emotion	Manager PreInduction	Manager PostInduction	Non-manager PreInduction	Non-manager PostInduction
Immersive v1	Happiness	6.29	7.04	6.17	6.72
	Fear	2.44	1.68	3.04	1.94
	Anger	1.98	1.42	2.31	1.79
	Disgust	1.81	1.53	2.49	2.08
	Sadness	2.92	2.94	3.68	3.24
NonImmersive v1	Happiness	6.42	6.54	6.13	6.23
	Fear	2.31	2.09	3.27	2.44
	Anger	1.74	1.62	2.11	1.65
	Disgust	2.20	1.88	2.28	2.04
	Sadness	3.30	2.99	3.55	3.37
NonImmersive v2	Happiness	6.11	6.29	5.84	6.24
	Fear	2.25	1.31	3.24	2.00
	Anger	1.80	1.43	2.43	1.89
	Disgust	2.27	1.66	2.43	1.73
	Sadness	3.16	3.13	3.50	3.20
Control (no video)	Happiness	6.26		6.42	
	Fear	2.94		3.47	
	Anger	2.04		2.13	
	Disgust	2.25		2.49	
	Sadness	3.55		3.81	

Note: mean of self-reported emotion with a nine-point Likert PANAS scale , being 1: "do not feel at all" and 9 "feel stronger than ever": before ("pre") and after ("post) induction