UNIVERSIDADE CATÓLICA PORTUGUESA

AWE – EXPLORING ITS ROLE IN WORK SATISFACTION, TASK PERFORMANCE AND PRO-ENVIRONMENTAL BEHAVIOR INTENTIONS

Dissertation to Universidade Católica Portuguesa to obtain a Master's Degree in Psychology in Business and Economics

By

Leonie Vogelbacher

Faculdade de Ciências Humanas

September 2024

UNIVERSIDADE CATÓLICA PORTUGUESA

AWE – EXPLORING ITS ROLE IN WORK SATISFACTION, TASK PERFORMANCE AND PRO-ENVIRONMENTAL BEHAVIOR INTENTIONS

Dissertation/Internship Report/Project to Universidade Católica Portuguesa to obtain a Master's Degree in Psychology in Business and Economics

Leonie Vogelbacher

Faculdade de Ciências Humanas

Under the supervision of Professor Augusta Gaspar

September 2024

Acknowledgments

First and foremost, I would like to express my thanks to my supervisor, Professor Augusta Gaspar. She has been the best supervisor I could have wished for, and I am beyond grateful for her support, characterized by mentorship and collaboration. During the second year of my master's, she was a source of motivation and inspiration, and always believed in me.

Secondly, I want to thank my family and friends for always supporting me and believing in me. I appreciate that you all patiently listened to me when I didn't stop talking about *Awe*.

Lastly, I want to thank everyone who contributed to my experiments. All the participants that participated in my research, with whom my research would not have been possible. Ju Pinto who has video and sound edited of the film clips, as part of a joint project. And the CRC-W, with special thanks to Professor Augusta Gaspar and Professor Francisco Esteves, for their advisory and letting me carry out the experiments in the research center's psychology laboratory.

Abstract

Awe arises in the presence of vastness and challenges people's current frame of reference, resulting in the need for accommodation. Awe is a powerful and complex emotion that significantly affects numerous outcomes related to well-being, cognition, and behavior. Despite increasing popularity in psychology, awe has largely been overlooked in the organizational domain. Even so, positive emotions predict organizational outcomes like job satisfaction and performance. There are suggestions on the elicitors and outcomes of awe in the workplace, but little is known about its effectiveness towards work satisfaction and task performance. Awe is also associated with pro-environmental behavior, but inconsistency in the current literature regarding causal factors of sustainable behavior merits further investigation. In the organizational context, it is suggested that work satisfaction is a predictor of employees' sustainable behavior. Pro-environmental behavior contributes to individual and organizational performance and, ultimately, to human society. The present work aims to investigate the role of awe in the workplace. A comparison with amusement is drawn, offering insight into the potential of awe toward well-being and efficacy. An experimental design involving the presentation of emotion-evoking video stimuli is followed, requiring the validation of awe evoking video stimuli, which is done in Study 1. Study 2 explores the effects of awe on work satisfaction, task performance, and pro-environmental behavior intentions. The relationship between domain satisfaction and intentions towards pro-environmental behavior is also assessed. While no significant relationship was found between awe and work satisfaction, task performance and pro-environmental behavior intentions, a positive trend in the data could be observed, which has implications and supports further investigation. Domain satisfaction was found to be positively related to pro-environmental behavior intentions. FFindings offer insight into the potential role of awe and highlight the role of awe towards individuals, organizations, and society.

Keywords: Awe in the workplace, work satisfaction, job performance, pro-environmental behavior intentions, experimental methodology.

Resumo

A experiência de "Awe" surge em presença da vastidão e desafia o atual quadro de referência das pessoas, resultando na necessidade de acomodação. Awe é uma emoção poderosa e complexa que afecta significativamente vários aspetos do bem-estar, da cognição e do comportamento. Apesar da sua crescente popularidade em psicologia, esta emoção tem sido largamente ignorada no domínio organizacional. Ainda assim, já se sabe que as emoções positivas são preditoras de resultados organizacionais como a satisfação e o desempenho. Existem sugestões sobre os factores desencadeantes, e as consequências de sentir Awe no local de trabalho, mas pouco se sabe sobre a sua eficácia em termos de satisfação no trabalho e desempenho de tarefas. Awe também está associada ao comportamento pró-ambiental, mas a inconsistência na literatura relativamente aos factores causais do comportamento sustentável merece uma investigação mais aprofundada. No contexto organizacional, sugere-se que a satisfação no trabalho é um fator de previsão do comportamento sustentável dos trabalhadores. O comportamento pró-ambiental contribui para o desempenho individual e organizacional e, em última instância, para a sociedade humana. O presente trabalho tem por objetivo investigar a experiência de Awe no local de trabalho. É feita uma comparação com a emoção "divertimento", oferecendo uma perspetiva importante sobre o potencial de sentir Awe para o bem-estar e para a eficácia. É seguido um desenho experimental que envolve a apresentação de estímulos vídeo indutores de emoções, o que requer a validação de estímulos vídeo que provocam Awe, o que é feito no Estudo 1. O Estudo 2 explora os efeitos do Awe na satisfação no trabalho, no desempenho da tarefa e nas intenções de comportamento pró-ambiental. A relação entre a satisfação no domínio e as intenções de comportamento pró-ambiental também é avaliada. Apesar de não ter sido encontrada uma relação significativa entre sentir Awe e a satisfação no trabalho, o desempenho nas tarefas e as intenções de comportamento próambiental, foi possível observar uma tendência positiva nos dados, o que tem implicações e sugere uma investigação mais aprofundada. Verificou-se que a satisfação no domínio está positivamente relacionada com as intenções de comportamento próambiental. Os resultados contribuem para a compreensão potencial do sentimento de Awe em relação aos indivíduos, às organizações e à sociedade.

Palavras-chave: Sentir "Awe" no trabalho, satisfação no trabalho, desempenho profissional, comportamento pró-ambiental, metodologia experimental

Table of Contents

List of Tables

List of Figures

1. Introduction

What happens if we are confronted with something so vast that feels bigger than ourselves and exceeds our current understanding of the world? We feel *Awe*.

Awe is a complex and powerful emotion, experienced when in the presence of vastness challenging our current knowledge structures (Keltner & Haidt, 2003). The most typical sources of awe experiences are other people and nature, like seeing the Niagara Falls, walking through the Grand Canyon, or simply witnessing other people's kindness. Awe experiences are not necessarily a response to an extraordinary event, but can be found in everyday life, like a walk in the park or listening to music (Keltner, 2023). When feeling awe, our focus is shifted away from ourselves towards others, as like other so-called self-transcendent emotions, it originates from other relevant appraisals rather than one's own. Thus, awe is thought to have great effects on several outcomes (e.g. Keltner 2023).

In the past, awe has not received much attention from psychologists but recently studying the emotion has gained increasing popularity (Keltner & Haidt, 2003). Although awe can be both a positive and negative state, the modern definition of awe is predominantly positive (Keltner & Haidt, 2003, Liu et al. 2023). Positive emotions, according to the broaden- and-build theory, are drivers for human wellbeing and flourishing. They widen people's attention, linger negative emotions and build psychological resilience (Fredrickson, 2001). Thereby, they appear to have a flourishing effect not only on individuals, but also communities and society (Fredrickson, 2001). Traditionally research focused on positive emotions, such as joy or contentment (e.g. Fredrickson, 2001), rather than self-transcendent emotions like awe. Therefore, the research on awe is comparatively new.

Nonetheless, awe, like other positive emotions, has been found to have effects on a number of outcomes related to wellbeing, behaviors and cognition. Awe experiences appear to lead to greater life satisfaction (Liu et al, 2023; Zhao et al., 2019) and better mental and physical health (Monroy & Keltner, 2023; Stellar et al, 2017; Upenieks & Krause, 2024). Feeling awe is associated with a greater sense of meaning and has the potential to diminish rumination, linger negative emotions and reduce stress (Sun et al., 2023). It is also associated with enhanced perception of available time and meaningfulness (Monroy & Keltner; 2022; Rudd et al., 2012). Rooted in a shift in focus and diminished self, awe also influences individuals' attitudes and actual behaviors, for instance prosocial behavior, and pro-environmental behavior. (Chirico et al., 2023; Isham et al., 2022; Keltner, 2023; Lopes et al., 2020; Rudd et al., 2012; Yang et al.,

2018). It remains unclear if the effects on pro-environmental behaviors results from awe itself or from nature, a key elicitor of awe (Ambrose et al., 2021). Nevertheless, among positive emotions, awe seems to be particularly effective in relation to several outcomes (Keltner & Haidt, 2003; Stellar et al., 2017).

One area that seems to be lacking research on awe and its potential outcomes is the work environment. Although there are some studies on work-related awe, little is known on the role of awe in the workplace. While some research revealed elicitors of awe in the work context (Hu & Meng, 2022; Meng & Wang, 2023), outcomes of work-related awe are largely unexplored. Research on positive emotions, however, provides implications on a potential role of awe at work. In organizational psychology, positive emotions are considered drivers for several outcomes and behaviors. According to the affective events theory (AET), emerging from work-related events and impacting behavior, positive emotions predict higher work satisfaction and job performance (Diener et al., 2020; Sahu & Srivastava, 2017; Weiss & Croponzano; 1996). Thereby, positive emotions are usually studied as one construct rather than individual emotions. Yet, it is urged that positive emotions should be studied individually, as they are related to different outcomes (Hu & Kaplan, 2009; Weiss & Croponzano, 1996).

Contributing to closing this gap, the present work aims to explore potential effects awe might have in the workplace. Specifically, the role of awe on work satisfaction and task performance are investigated. Additionally, the effects of awe on pro-environmental behavior intentions are assessed, with the goal to shed light on whether awe or other underlying factors are leading to enhanced behavior intentions.

Based on the suggested power of the emotion, we propose that awe shows to be more effective in impacting work satisfaction, job performance and pro-environmental behavior intentions, than other positive emotions. We therefore draw comparison with amusement, offering insight into the potential of awe towards wellbeing and efficacy, highlighting the role of awe towards individuals, organizations and society.

2. Why Awe Might Matter in the Workplace and in Pro-environmental Behavior

Emotions, as a core aspect to people's well-being, psychological health and human behavior (Fredrickson, 2001), have long been of interest in psychological research and have gained increasing attention from organizational psychologists, especially in regard to potential effects on organizational outcomes, i.e. performance, effectiveness or organizational citizenship behaviors (e.g. Diener et al., 2020; Fox & Spencor, 2002; Reizeret al., 2019, Sahu & Srivastava, 2017; Weiss & Croponzano, 1996). Notably, research on emotions has traditionally focused on negative rather than positive emotion (Fredrickson, 2004). With negative emotions negatively impacting health they have received higher research attention (Fredrickson, 2001, 2004). More recent research suggests that contrary to negative emotions, positive emotions, such as pride, joy, love, and contentment, are markers of human well-being and flourishing (Fredrickson, 2001).

One emotion that has gained increasing attention over the past years in psychology is awe, a self-transcendent emotion that seems to have striking effects on a number of outcomes (Keltner & Haidt, 2003; Keltner, 2023). Until now, the research on awe, however, has been predominantly focused on general aspects of our lives. The role of emotion in the workplace, a central part of people's lives, appears to be largely unexplored.

This chapter aims to introduce awe along the framework of positive emotions by providing insight into the existing research landscape through a systematic review. An introduction of the role of positive emotions in the organizational context is followed by an integration of the key aspects of awe into the work context to contextualize awe. The role of emotions in human attitude and behavior, specifically pro-environmental behavior, is also touched. Based on the theoretical framework, the potential role of awe in the organizational context and in pro-environmental behavior intentions is hypothesized.

2.1.Systematic Literature Review

For the present work a systematic literature review has been conducted. To this end the databases EBSCO and Google Scholar have been used to retrieve information.

In EBSCO the search has been conducted based on subject terms relevant to the work. Further, only peer reviewed papers have been taken into consideration. To keep track of the subject term search, an overview has been created using Excel. This overview contains information on the subject terms used, the total number of entries found based on the search, and the number of relevant entries for the present topic. In a second step all duplicates have

been removed from the overview. A total number of 419 entries have been identified through the systematic search on EBSCO. After screening for relevance and checking for accessibility, 65 articles were included in the review. Lastly, all references have been reviewed, and information on the methods and conclusions has been added to the overview.

For the systematic search on Google Scholar a similar approach has been applied. The search strategy was also developed using key words relevant to the research question. Because of high numbers of entries and different filter functionalities compared to EBSCO, further filters were set in the advanced search menu: (i) the keywords need to be in the title of the article with the exact phrase, (ii) publication date is between 2013 and 2023, (iii) publication language is either German or English, and (iv) review articles. Since for some of the keywords no entries were returned, the development of and the final keywords used for the search on Google Scholar, differed slightly from the ones used on EBSCO. Other than the filters applied to the search, the approach has been the same as for EBSCO. Through the search on Google Scholar a total number of 188 entries have been identified, of which 29 have been classified as relevant to this work and were accessible.

The aim of the systematic review was to create a broad and structured overview of existing literature relevant to the research question and gather as much information as possible to have a good understanding of the topic. Based on the pre-selection the articles were screened in-depth for relevance to the present work. Therefore, only the literature relevant to building understanding of the field and applicable to the chosen variables were included in the current work.

In Table 1 the most relevant articles from EBSCO and Google Scholar are presented along with their main methods and findings in alphabetical order.

Table 1 – *Overview of most relevant papers identified throughout the Systematic Literature Review.*

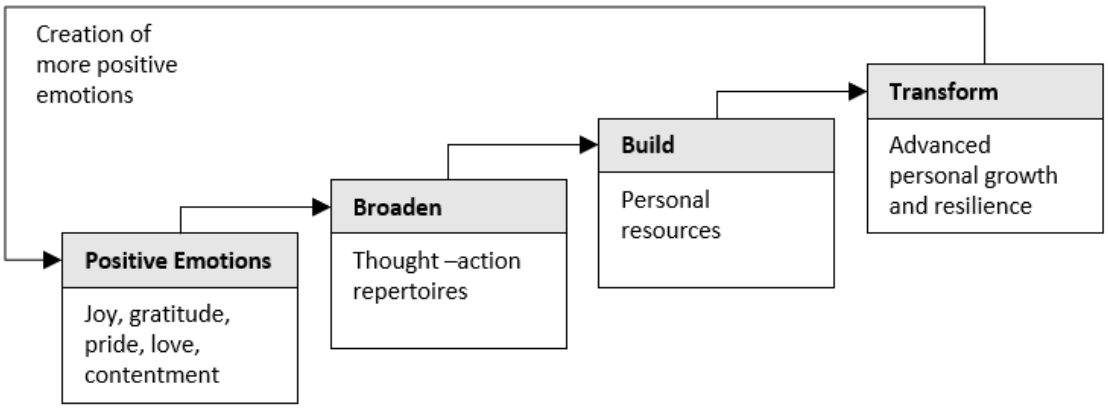
Author	Year	Methodology	Key Findings
Anderson, C. L., Monroy, M., & Keltner, D.	2018	Experimental	Awe, in extraordinary and daily nature experiences, predicts unique longitudinal improvements in well-being and stress related symptoms. Experiencing nature daily leads to higher levels of awe, more life satisfaction.
Bai, Y., Ocampo, J., Jin, G., Chen, S., Benet-Martinez, V., Monroy, M., Anderson, C., & Keltner, D.	2021	Experimental	Awe plays an important role in buffering stress and enhancing well-being, whereby the intensity of awe feelings is associated with stress levels.
Büssing, A., Recchia, D.R., & Baumann, K.	2022	Survey	Awe & gratitude are related to well-being, mediated by the perception of nature and reflective times of silence. However, they could not fully buffer the negative effects of the pandemic on people's psychological well-being.
Chirico, A., Pizzolante, M., Borghesi, F., Bartolotta, S., Sarcinella, E. D., Cipresso, P., & Gaggioli, A.	2023	Experimental	Awe has the ability to mediate between concerns towards the environment and actual behaviors
Collado, S., & Manrique, H. M.	2020	Experimental	Being presented with awe-evoking scenes, did have significantly higher positive effects in terms of attention, compared to mundane scenes. When awe and beauty are equally matched, everyday natural environments show higher effects than built ones.
Dong, R., & Ni, S. G.	2020	Survey	Extraversion and openness are predictors of dispositional awe suggesting that individuals with less fixed knowledge structures are more likely to experience awe, as accommodation is one of the key features of awe. Dispositional awe in turn predicts subjective well-being.
Dong, X., & Geng, L.	2023	Correlational	A positive link between dispositional awe and life satisfaction, significantly mediated by mindfulness and tendencies towards meaning in life in adolescents was identified. While meaning positively impacts life satisfaction, the search for meaning is negatively correlated with life satisfaction. Mindfulness shows the strongest mediating role, and gender differences were identified.
Isham, A., Jackson, T., & Elf, P.	2022	Literature review	Self-transcendent experiences are linked to higher levels of environmental concern, sustainable behaviors and human well-being.
Isham, A., Mair, S., & Jackson, T.	2021	Literature review	One’s level of wellbeing (physical & metal health, stress) affects productivity. Thereby, higher levels of wellbeing increase productivity, whereas lower levels of wellbeing decrease productivity.
Liu, J., Huo, Y., Wang, J., Bai, Y., Zhao, M., & Di, M.	2023	Experimental	While positive awe significantly improved one's well-being threatening awe did not have significant effects on well-being. The positive relationship between awe and well-being is mediated by nature connectedness. For threatening awe, nature connectedness and powerlessness were mediators.
Liu, Y., Yu, C., & Damberg, S.	2022	Survey	In outdoor sports perceived vastness of the environment, perceived professionalism and self-image congruity are conditions for awe. Awe positively affects satisfaction and behavioral intention.

Lopes, S., Lima, M., & Silva, K.	2020	Experimental	Nature has the potential to shift distraction from self, improving mood and reducing rumination. The higher the levels of awe experienced, the higher the reduction in negative affect, which in turn resulted in disengagement from ruminative thinking. The indirect effect of nature on rumination through awe was not significant but was through mood.
Monroy, M., & Keltner, D.	2023	Literature review	Awe can be beneficial to both mental and physical health through 5 pathways: neurophysiology, a diminished focus on the self, increased prosocial relationality, greater social integration, heightened sense of meaning. Threat-based awe may have negative effects on mental and physical health
Pipera, M., & Fragouli, E.	2021	Literature review	Positivity at work impacts productivity and an organization's success. Work-related wellbeing influences performance, whereby healthy and happy employees show greater performance and productivity. Supporting the suggestion that positive emotions impact behaviour and performance based on the broaden-and-build theory.
Rudd, M., Hildebrand, C., & Vohs, K. D.	2018	Experimental	Experiencing awe creates a greater desire for experiential creation which is found to be mediated by openness to learning and moderated by the need for closure.
Rudd, M., Vohs, K. & Aaker, J.	2012	Experimental	Feeling awe leads to greater perceived time availability, reduced feelings of impatience, altered willingness to volunteer time, greater life satisfaction and enhanced decision making.
Sadick, A. M., & Kamardeen, I	2020	Literature review	Indoor nature exposure impacts on a worker's health and motivation and thus contributes to social sustainability. Outdoor nature exposure impacts a worker's restoration, stress reduction and stress coping and thus contributes to economic, environmental and social sustainability"
Sahu, A., & Srivastava, K. B.	2017	Exploratory	Social relations, transformational leadership and group emotions significantly predict positive emotions, whereas role conflict and role ambiguity predict negative emotions. Positive emotions significantly predict job satisfaction, work motivation and individual performance and negatively predict stress.
Shah, N. P., Cross, R., & Levin, D. Z.	2018	Survey	Providing problem-solving assistance to others does positively affect the provider's own work performance. Higher frequency of assistance amplified the effect on the provider's performance. It is proposed that these benefits come from the provider's possibility to learn from the interaction and is only beneficial when the assistance is not disrupted by additional venting assistance.
Tee, E.Y.J.; binti Raja Reza Shah, R.I.A.	2023	Literature Review	Self-transcendent emotions motivate pro-social behaviors and thus contribute to problem solving within groups and communities, which also is crucial for organizational effectiveness.
Thompson, J.	2023	Semi-structured interview	Reflecting on awe experiences can result beneficial effects such as finding meaning and purpose in life, evoking gratitude, increasing social connectedness and optimism etc.
Yin, M., & Lee, E. J.	2023	Experimental	Individuals' consumption is increasingly eco-friendly when exposed to climate crisis messages mediated by experiences of awe.
Zelenski, J. M., Murphy, S. A., & Jenkins, D. A.	2008	Survey	While positive affect might lead to higher productivity, negative affect does not impact productivity. Job Satisfaction is found to be a predictor of productivity; however, it did not predict productivity significantly when other happiness indicators were considered. Life Satisfaction was not found an independent predictor of productivity.
Zhao, H., Zhang, H., Xu, Y., He, W., & Lu, J.	2019	Correlational	People with high Dispositional awe interpret their life as more meaningful and thus experience happiness more easily in life.

2.2. Introducing Positive Emotions and the Broaden-and-Build Theory

For long negative emotions have been known to negatively impact health (Fredrickson, 2001, 2004), but recent research suggests that contrary to negative emotions, positive emotions, such as pride, joy, love, and contentment, are markers of human wellbeing and flourishing (Fredrickson, 2001). According to the broaden-and-build theory (Figure 1) developed by Fredrickson (2001), positive emotions broaden people's attention, cognition, and action. They buffer negative emotions and build psychological resilience, creating an upward spiral of positive emotions. Today, the broaden-and-build theory developed by Fredrickson (2001), is the basis for many emotion studies. Positive emotions have an impact on psychological health and well-being (e.g. Ryff & Singer, 2001; Ryff et al., 2002). Fredrickson (2001) suggests that positive emotions foster a sense of meaningfulness in life, which is understood to be connected to improved subjective well-being (Zhao et al., 2019). Stellar et al. (2015) propose that discrete positive emotions predict lower levels of inflammatory cytokines, whereas negative emotions predict higher levels. Ultimately, it is understood that positive emotions not only have a momentary effect on well-being but long-lasting effects (Fredrickson, 2001; Keltner, 2023).

Figure1 – *The broaden-and-build theory of positive emotions (Fredrickson, 2001).*



Grounded in the broaden-and-build theory the role of positive emotions has been investigated in various life domains, primarily focused on emotions like joy, amusement, or contentment. The exploration of the so-called "self-transcendent emotions", specifically awe, has only recently begun to receive attention of researchers. Thus, knowledge in this field is still comparably little (see Stellar et al. 2017). Nonetheless, it is known that, as a category of positive emotions, self-transcendent emotions such as gratitude, compassion and awe (Stellar et al., 2017), have similar outcomes like other positive emotions. They, for instance, broaden people's attention and build resources (e.g. in Fredrickson, 2001; Rudd, et

al., 2012; Liu et al., 2023; Stellar et al., 2017; Sun et al., 2023; Zhao et al., 2019). Yet, they differ from other positive emotions in the sense that they stem in other-focused appraisals, shifting one's focus towards others, rather than on the self (Stellar et al. 2017). The attention on other's needs and concerns of self-transcendent emotions, results in increased prosocial tendencies, revealing particularly great outcomes (Stellar et al., 2017). Among the self-transcendent emotions, especially awe seems to have unique effects (Stellar et al., 2015; 2017).

2.3. The Power of Awe

Awe is a complex and powerful emotion, a "feeling of being in the presence of something vast that transcends your current understanding of the world "(Keltner, 2023). Initially, psychologists did not devote much attention to awe, as it was mainly considered a negative state related to fear (Keltner & Haidt, 2003). The emotion, however, has gained popularity, and the amount of research conducted on the nature, elicitors, and outcomes of awe has grown. Although awe can be distinguished both positive and negative, in contemporary research, it is predominantly defined as a positive emotional state (Keltner & Haidt, 2003). Like other self-transcendent emotions, it stems from other relevant appraisals rather than one's own and moves one's conscious away from self-focused defensive emotions and thoughts (e.g. Keltner, 2023).

According to Keltner & Haidt (2003) there are two core features underlying the emotion: perceived vastness and accommodation. Perceived vastness can be defined as the confrontation with a stimulus large of scale that is transcending one's ordinary frame of reference and current knowledge. Vastness can involve both social and physical size and is often related to power (Keltner & Haidt, 2003). Shiota et al. (2007) stress that the perceived vastness of the stimulus must be expanding one's current understanding making accommodation necessary. Accommodation is the process of adjusting mental structures as a response to stimuli, to make sense of the confrontation with something vast and powerful (Keltner & Haidt, 2003).

2.3.1. Sources of Awe

The most typical sources of awe-inspiring events can be found in nature, i.e., mountains or oceans, and other people, i.e., their strength or courage (Keltner & Haidt, 2003; Keltner, 2023; Stellar et al., 2017). Generally, the sources of awe are to be found in beauty, ability, virtue, supernatural causality, and threat (Keltner & Haidt, 2003). Keltner & Haidt (2003) suggest that experiences of awe can be put into different categories, the "Eight

Wonders of Awe", that along with moral beauty and nature, include spirituality and religion, collective effervescence, music, art, life and death, and epiphany (Keltner, 2023). One might think that awe can only stem in intense or life-changing events and thus would be limited in accessibility, yet, awe can be found in our everyday lives, such as a walk in nature, dancing, or an act of kindness (Keltner, 2023). It can also be found in others' personal achievements (Shiota et al., 2007), which seems to be relevant to social hierarchies and the reinforcement and justification of social orders and commitment to leaders (Keltner & Haidt, 2003).

2.3.2. Outcomes of Awe

Research in positive psychology has shown that experiencing awe, like other positive emotions, greatly affects various outcomes (see Keltner & Haidt, 2003; Shiota et al., 2007). Previous research primarily focused on investigating the emotional states and effects of joy, contentment, love, or pride rather than self-transcendent emotions like awe (e.g. Fredrickson, 2001). Emerging research suggests that awe has similar outcomes; some appear to be unique to awe (e.g. Stellar et al. 2015).

Well-being & Life Satisfaction. In recent years, the effects of awe on various components of well-being have received distinct attention, providing strong evidence of its striking effects on well-being and satisfaction. Awe widens people's perception of available time, affecting people's well-being, decision-making, and prosocial behavior (Rudd et al., 2012). Awe has also been found to have great impacts on both mental and physical health, possibly through a heightened meaning, enhanced prosociality, or a diminished self (Monroy & Keltner, 2023; Upenieks & Krause, 2024). Among positive emotions, awe has been shown to be particularly health protective (Stellar et al, 2015; 2017). For instance, Stellar et al. (2017) found that lower inflammatory levels are positively associated with positive emotions, whereas awe demonstrates the strongest outcomes.

Further, awe can buffer negative emotions, relieve stress (e.g. Anderson et al., 2018; Bai et al., 2021; Dong & Geng, 2023; Sun et al., 2023), decrease depression (Upenieks & Krause, 2024) and ruminative thinking (Lopes et al., 2020). Compared to other positive emotions, awe has unique longitudinal improvements in well-being and stress-related symptoms (Anderson et al., 2018). Decreased stress is related to state awe, whereas the intensity of the experience is associated to stress levels and ultimately, reduced stress contributes to greater life satisfaction (Bai et al., 2021; Liu et al., 2023). Studies found that awe and gratitude, another self-transcendent emotion, were one of the most significant contributors to well-being during the Covid-19 pandemic, even though they were not fully

able to buffer the adverse effects of the pandemic (Büssing et al., 2022). Albeit awe has shown unique effects on well-being, it is argued that those might not root in awe alone. For instance, Lopes et al. (2020), found that by shifting one's focus away from the self towards the environment typically evoked by awe, exposure to natural scenes leads to decreased levels of ruminative thoughts and improved mood. Yet, they stress that those effects might not be dependent on awe since nature alone affects mood and rumination, too. It is broadly understood, however, that as an emotion arising from other focused appraisals, awe directs the conscious mind away from defensive, self-focused feelings and thoughts (e.g. Keltner 2023). Contrary to the suggestion made by Lopes et al., more recent research revealed unique lingering effects of awe among other positive emotions, as shown in a study investigating the potential of awe to buffer negative affect in self-threatening situations (Sun et al., 2023).

Additional research suggests that mindfulness and meaning in life mediate the relationship between awe and life satisfaction (Dong & Geng, 2023; Upenieks & Krause, 2024). Meaningfulness is a significant predictor of life satisfaction and subjective happiness (Zhao et al., 2019). Contrary to the findings on the effects of awe on life satisfaction through a sense of purpose, the search for meaning in life has been found to be negatively related to life satisfaction. (Dong & Geng, 2023). Fredrickson (2001) suggests that positive emotions build personal resources that ultimately lead to personal growth. Awe seems particularly powerful in impacting personal change and growth (Keltner & Haidt, 2003).

Attitude & Behavior. Beyond the flourishing effects of awe on human well-being, its role in attitudes, intentions and behaviors have been of interest to researchers. Stemming from other-focused appraisals, awe leads to a diminished sense of self, an increased sense of interconnectedness and perception of available time (Keltner, 2023; Rudd et al., 2012; Shiota et al., 2007). It thus has the capability to motivate individuals to focus on others, facilitating prosociality and pro-environmental behavior (Rudd et al., 2012; Stellar et al., 2017).

Stellar et al. (2017) investigated the effect of self-transcendent emotions on prosociality, including awe, gratitude and contentment, suggesting that they strengthen social bonds by fostering connection, commitment, and attachment to others. In turn, prosociality seems to be a pathway to better physical and mental health (Monroy & Keltner, 2022). Further research suggests that through motivating pro-social behaviors, self-transcendent emotions have the potential to solve problems within groups and communities (Tee & binti Raja Reza Shah, 2023), which is crucial to human society (Stellar et al., 2017).

Also, the interest in studying green behaviors related to awe is growing. Nature is one of the key elicitors of awe, and research has revealed that the outcomes of awe are often related to nature exposure and connectedness (see Liu et al., 2023; Lopes et al., 2020; Keltner, 2023). Paired with awe's capability to influence behavior, it appears only logical that awe could motivate pro-environmental attitudes. Recent research on awe and sustainability suggests that there is indeed a correlation between awe and pro-environmental behavior intentions, mediated by connectedness to nature and environmental concerns (Isham et al., 2022; Yang et al., 2018). However, it is not yet fully understood if awe is the causal factor in the relationship with pro-environmental behavior or if pleasant affect might be enough. Studies propose that experiencing awe does predict pro-environmental attitudes, but so does pleasant affect (Ambrose et al., 2021). Other studies suggest otherwise. For example, Li et al. (2023) propose a positive relationship between awe, connectedness to nature, and pro-environmental behavior intentions. Thereby, the correlation was found to be higher for awe elicitors related to religion compared to nature. These findings are supported by further studies, stressing that self-transcendent experiences, for instance, through awe, are linked to higher concerns towards the environment, which in turn can be assumed to lead to more sustainable attitudes and behavior intentions (Isham et al., 2022).

Other research explores the attitude-behavior gap and studies if awe experiences can impact actual behavior rather than behavior intentions. Yin & Lee (2023) found that awe mediates the positive effect climate crisis messages have on people's consumption and actions towards the environment. They argue that this effect results from the shift of attention from the self to the environment typical for awe. What has not been investigated in this study, however, is the valence of awe resulting from climate crisis messages and if it might be threatening awe. A study conducted by Chirico et al. (2023) using stimuli exposure through virtual reality (VR) revealed that awe can mediate between concerns about the environment and actual behaviors. Liu et al. (2022) have studied the effect of awe on both behavior intentions and actual behaviors of tourists. Their findings revealed that awe positively affects pro-environmental behavior intentions, mediated by the sense of connectedness to nature. Further, they demonstrate that beyond simply amplifying behavior intentions, awe encourages actual pro-environmental behavior.

Cognitive Performance. While negative emotions have a narrowing effect on cognitive processes, positive emotions extend the scope of attention, cognition, and action, building physical, intellectual, and social resources (Fredrickson, 2001). However, the

possible effects of awe on cognition have received less attention than other outcomes of awe. Nevertheless, the ability to captivate one's attention, challenging one's current knowledge structures (Keltner & Haidt, 2003), paired with the shift in focus resulting from awe (Stellar et al., 2017), provide implications on the potential effects of awe on cognitive processes. One potential pathway of awe towards cognitive performance might be rooted in nature exposure and connectedness. Nature is generally thought to enhance cognitive performance and attention (Stenfors et al., 2019) and to have restorative effects on cognitive resources (Collado & Manrique, 2019). Recent research found positive effects of experiencing awe on cognitive performance through nature exposure (Collado & Manrique, 2019).

Moreover, awe has been demonstrated to affect cognition components, for example, enhancement of time perception and decision making (Rudd et al., 2012). Awe is also related to an individual's analytical and creative thinking (Chirico et al., 2018b¸ Darbor et al., 2016), whereby key components of creativity such as fluidity, flexibility, and elaboration seem to be impacted by awe (Chirico et al., 2018b). Consistent with the view on knowledge structures as a central part to the emotion (Keltner & Haidt, 2003), it was found that people experiencing awe tend to be more aware of knowledge gaps, which in turn is linked to interest in acquiring new knowledge and the desire for learning (McPhetres, 2019; Rudd et al., 2018). McPhetres (2019), however, did not find any other effects than on knowledge.

2.4.The Potential Role of Awe in Organizational Outcomes

Positive emotions have long been neglected in the organizational domain but have gained increasing attention over the years (Cameron et al., 2003; Diener et al., 2020). The Affective Events Theory (AET) suggests that understanding emotions as responses to events and causes for organizational outcomes in the work domain is crucial (Weiss & Croponzano, 1996). With emotions having substantial outcomes on many parts of our lives, including well-being, behavior, and cognition (see Fredrickson, 2001; 2004; Keltner & Haidt, 2003; Mc Phetres, 2019; Rudd et al., 2018; 2019; Stellar et al., 2017) it seems implicit that understanding the role of emotions in organizational attitudes and behaviors is fundamental to create a positive work environment benefitting both the employee and employer. However, the view of job satisfaction as an equivalent construct to well-being and a source of organizational outcomes seems to dominate the organizational research landscape (Ashkanasy & Dorris, 2017; Diener et al., 2020; Fox & Spector, 2002).

Increasingly, researchers have devoted their attention to the role of emotions, affect, feelings, and mood in the work context, merely building on the AET proposed by Weiss &

Cropanzano (1996) and the broaden-and-build theory suggested by Fredrickson (2001). Yet, most of the research evolves around the view of positive emotions as one construct rather than exploring the roles of individual emotions (Hu & Kaplan, 2015; Weiss, 2002; Weiss & Croponzano, 1996). Knowledge on the role of awe in organizational psychology is little. This can be explained by the novelty of field and the assumption that awe, compared to other emotions such as pride, contentment or gratitude, does not occur in the work context as frequently (see Hu & Kaplan, 2009). We argue otherwise, as the recent body of literature on awe in the work context has identified numerous elicitors of awe in the workplace (Hu & Meng, 2022; Meng & Wang, 2023). Nevertheless, one area that is at its beginning is the outcomes of awe in the workplace. Existing literature on awe in general and positive emotions in the workplace, however, provides implications for the potential of awe at work.

In this chapter, we touch on the research landscape of affective experiences at work as a cause for organizational outcomes, specifically job satisfaction and performance, grounded on the AET and the broaden-and-build theory. Moreover, we aim to integrate awe into these frameworks to elaborate on its potential role in the organizational context.

2.4.1. Positive Emotions at Work

Positive emotions are drivers for several organizational outcomes, like job satisfaction and performance, organizational attitudes and behaviors (e.g., turnover intentions, organizational citizenship, and withdrawal behaviors; see in Diener et al., 2020; Isham et al., 2021; Pipera & Fragouli, 2021; Weiss & Croponzano, 1996). Traditional research, however, is dominated by the assumption of job satisfaction as an equivalent to positive affect, resulting in most of the research evolving around this idea rather than the investigation of the role of positive emotions in an organizational context (see Fisher, 2000; Isham et al., 2021; Pipera & Fragouli, 2021.

More recent research is merely grounded on the definition of job satisfaction as an evaluative judgment of one's job. This means that it is not equivalent to affect but results from a combination of one's affective experiences at work and beliefs about one's job, as proposed by the AET (Weiss & Croponzano, 1996). It is thought that positive and negative emotions are predictors of job satisfaction, whereas contrary to negative emotions, positive emotions positively contribute to job satisfaction (Fisher, 2000; Sahu & Srivastava, 2017; Weiss & Croponzano, 1996). In turn, job satisfaction has been found to impact several outcomes including job engagement, job performance, and organizational citizenship behaviors (OCB) (Isham et al. 2021; Pipera & Fragouli, 2021; Weiss & Croponzano, 1996).

Moreover, emotions are associated with job performance, with positive affect having a positive impact on performance (Diener et al., 2020; Kaplan et al., 2009; Reizer et al., 2019; Sahu & Srivastava, 2017). Research found that positive emotions predict performance through job satisfaction and are critical mediating processes for the link between motivation and performance (Reizer et al., 2019, Sahu & Srivastava, 2017). Further, positive emotions are related to lower stress, which in turn is positively associated with task performance (Sahu & Srivastava, 2017) and act as a mediator for counterproductive work behaviors (CWB), e.g., presenteeism or absenteeism (Chen et al., 2024; Kaplan et al., 2009).

As individual emotions impact different dimensions of organizational outcomes, some researchers stress the need for differentiation between distinct emotions rather than studying positive emotions as one construct (Hu & Kaplan, 2015; Weiss, 2002; Weiss & Croponzano, 1996). While some positive emotions have been subject of investigation within organizational psychology, knowledge of the role of awe in organizational psychology is little. Pride, for example, predicts psychological empowerment, interest impacts work satisfaction, and gratitude correlates with satisfaction with supervisors and colleagues (Hu & Kaplan, 2015). Humor and amusement have been found to indirectly affect employee engagement but not work behavior and performance (Goswami et al., 2016).

2.4.2. Sources of Awe in the Workplace

As research on awe in organizational outcomes has only recently begun to receive attention, knowledge on sources and outcomes of awe in the workplace is comparatively little. Contrary to previous suggestions on awe experiences being less frequent in the work context than other emotions (see Hu & Kaplan, 2009), several sources of awe have been revealed. Consistent with research conducted by Keltner & Haidt (2003) on the sources of awe, organizational elicitors of the emotion include the beauty of the workplace, virtue and achievements of the organization, and charisma and achievements of colleagues. Among these, colleague-related sources seem to be the most common. In addition to other related elicitors, Hu & Meng (2022) suggest that in the work context awe can also be triggered by oneself, involving personal growth and achievements, as well as the perception of meaningfulness.

Besides research on the role of in- and outside nature exposure at work (Sadick & Kamardeen; 2020) offering some implications on an additional potential source of awe, to our knowledge, until today, there is only one study that specifically investigated the elicitors of awe in the workplace, highlighting the need for further exploration and replication.

2.4.3. Awe and Organizational Outcomes

Despite growing interest of organizational researchers in awe and evolving research on the sources of awe at work, knowledge of potential outcomes related to employee well-being, job satisfaction, belongingness, or productivity is little. Although literature suggests unique effects of awe in different areas, to our knowledge those findings have not yet been explored in organizational psychology. The few studies on work related awe, paired with the role of positive emotions in the work context and awe in general, provide reason to suggest that the outcomes of awe potentially apply to the organizational context, as well.

Work Satisfaction. In spite of the gap in literature on potential effects of awe on work satisfaction, there are some studies on other self-transcendent emotions. Research suggests that work-related gratitude predicts burnout and work satisfaction (Hu & Kaplan, 2016; Lanham et al., 2012). As both awe and gratitude are self-transcendent emotions, awe might similarly affect work satisfaction. It was found that awe has restorative effects after receiving negative feedback and reduces negative mood toward imagined negative feedback (Atamba, 2019). Thereby, awe and joy are the most significant predictors of coping effectiveness. Further, awe negatively predicts performance stressors, as it enhances the perception that a performance stressor is more manageable (Le et al., 2019). Stress is positively related to burnout, which in turn predicts lower employee commitment, diminished job satisfaction and performance, and absenteeism (Halbesleben & Buckley, 2004). In contrast, the presence of positive emotions is negatively related to absenteeism and presenteeism, which in turn might contribute to higher organizational productivity (Chen et al., 2024). Notably, awe has restorative effects and the capability to buffer negative emotions (Anderson et al., 2018; Bai et al., 2021; Dong & Geng, 2023; Fredrickson, 2001; Lopes et al., 2020; Sun et al., 2023).

While the positive association of awe on life satisfaction has been extensively studied, the relationship between awe and satisfaction has been largely overlooked in organizational psychology. Even though research suggests that life and domain satisfaction are closely intertwined and predict each other (Lent et al., 2005; 2007). Based on these assumptions paired with the suggestions on awe as a particular powerful emotion, we propose the following:

H1: People experiencing awe report higher domain satisfaction levels, compared to people experiencing amusement.

Task Performance. Given that job satisfaction is positively associated with job performance, it might seem logical that awe would have the potential to enhance performance through greater satisfaction. Albeit the absence of research on the link between awe and performance, existing research on awe as an epistemic emotion (Keltner & Haidt, 2003; McPhetres, 2019) impacting several cognitive processes, i.e. attention (Keltner & Haidt, 2003), analytical (Darbor et al., 2016) and creative thinking (Chirico et al., 2018b), knowledge and learning (McPhetres, 2019; Rudd et al., 2018), paired with suggestions grounded in the AET, indicate that there might be different pathways through which awe could impact job performance. For instance, research suggests a positive link between positive emotions and satisfaction, resulting in reduced withdrawal behaviors, which contributes to higher organizational productivity (Chen et al., 2024).

Further, there is some research on the impact of meaning, prosociality and nature exposure on performance at work. Exposure to nature has been shown to affect motivation, health, restoration, stress, and performance. Specifically, outdoor nature exposure leads to amplified cognitive functioning and supports the completion of tasks and the generation of new ideas (Sadick & Kamardeen, 2020, Stenfors et al., 2019). With nature being a key elicitor of awe, this research might provide implications on the potential role of awe towards job performance.

Consistent with previous research on enhanced prosociality after experiencing awe, work-related awe is suggested to motivate behavior and increase prosocial behavior in the workplace. In turn, prosocial behavior at work, i.e., problem-solving assistance among coworkers, is beneficial for individual performance by generating new ideas and knowledge and improving perception of meaningfulness (Shah et al., 2015). Perceived meaning of work alone is also associated with higher job performance (Fürstenberg et al., 2020). Although no studies have examined the effect of awe on job performance, one study was found, revealing positive effects of experiencing awe on cognitive performance (Collado & Manrique, 2020). Even though their study did not aim to detect this relationship but rather the effects on mental restoration; their findings have implications for the potential relationship between awe and task performance.

Given the lack of conclusive findings paired with implications from other studies related to nature exposure, prosociality, and meaningfulness, further research is needed to explore the potential role of awe towards job performance. Further, with the epistemic nature of awe and building on the broaden-and-build and the affective event theory, we propose:

H2: Task performance is higher with an experience of awe, in comparison to amusement.

Pro-environmental Behavior Intentions. Due to climate emergency and increasing environmental concern, environmental sustainability is a critical topic in global society and different fields of society (Allen et al., 2018). According to IPCC (Intergovernmental Panel on Climate Change), human activities are the main contributor to climate change (Allen et al., 2018, p. 53). Investigating this topic has become an emerging topic in behavioral and organizational psychology (e.g. Yin & Lee, 2023, Zacher, et al., 2018).

As a result from the significant environmental impact of corporations and legal frameworks requiring them to reduce it, corporations have defined strategies for environmental performance and impact reduction (OECD, 2022). In achieving overall environmental performance and organizational sustainability, employees' engagement in green behaviors (EGB) is an important contributor to overall individual and organizational performance (Chen et al., 2015; Zacher et al., 2022). Engagement in pro-environmental behaviors not only positively impacts overall organizational sustainability but appears to result in other organizational outcomes, such as employee engagement and perceived meaningfulness (Zacher et al., 2022). Job satisfaction thereby seems to play an essential role in motivating EGB (Kim et al., 2019; Zacher et al., 2022). As positive emotions are predictors of job satisfaction, they are key facilitators for sustainable behaviors (see Ambrose et al., 2021; Isham et al, 2022). Awe, being linked to nature and associated with nature connectedness, has also been found to be effective in facilitating pro-environmental attitudes and behaviors (e.g. Chirico et al, 2023; Li et al, 2023; Liu et al., 2023; Lopes et al., 2020; Yin & Lee, 2023). Thereby, nature exposure and connectedness, and the diminished self seems to be an important mechanism, as awe enhances individuals' prosociality through the sense of small self (Rudd et al., 2012).

Given the inconsistency in the findings related to the causal factors of proenvironmental behaviors, further investigation is needed. As awe has been shown to strongly predict pro-environmental behavior, we propose the following, intending not only to replicate previous findings but to contribute to them with implications through the lense of organizational psychology:

H3a: People experiencing awe are more likely to show pro-environmental behavior intentions, compared to amusement.

H3b: Domain Satisfaction is positively associated with pro-environmental behavior intentions.

Our hypothesis was tested through an experimental design. In the following chapters the two studies that were conducted to test our hypothesis are explained. Study 1 aimed to validate video stimuli for future research. Study 2 tested participants post-stimuli exposure emotional responses, self-reported satisfaction, task performance and pro-environmental behavior intentions.

3. Study 1: Characterization and Validation of Video Stimuli

In Study 1 pre-selected videos were validated as stimuli to elicit awe and amusement, as to our knowledge no validated stimuli exist for awe in contemporary literature. One possible explanation for this is that research on awe in the realm of psychology has begun comparatively recently (Keltner & Haidt, 2003). Furthermore, testing emotions in a laboratory setting is generally challenging, and awe seems to be even more difficult. This can be ascribed to the complexity of the emotion and the relatively little understanding of it, resulting from the novelty of the field (Keltner, 2023). In current literature, different approaches to study awe are followed. Common practices include narrative, diary and recalling methods or emotion manipulation (e.g. in Rudd et al., 2012; Bai et al., 2021). In experimental studies, participants are often presented with scenes using photos or videos (e.g. in Bai et al., 2021, Collado & Manrique, 2019) based on the sources of awe according to Keltner (2023) and Keltner & Haidt (2003), e.g., of nature, landscapes, or space. Field studies outside the laboratory, involving either taking the participants to awe-inspiring places or recruiting people directly at the scenes, are also used (e.g. Anderson et al., 2018; Rudd et al., 2018). A particularly effective method to manipulate emotions in laboratory settings is the use of virtual reality (VR; Chirico et al., 2016; 2018a).

Unlike for awe, there are validated stimuli for amusement existent in current literature (see Schaefer et al., 2010). Yet, our pilot study encompassing 25 participants showed that those did not successfully evoke amusement in the present study's sample population, resulting in the need to validate further stimuli.

3.1.Methodology

3.1.1. Participants

Awe. 58 participants at the Catholic University of Portugal in Lisbon, were recruited in classrooms. Participants were provided with a brief description of the study, including the aim and procedure. Participants received an incentive in the form of course credits. The experiment was conducted over a total period of five weeks. During the first week a pilot study was run. The results from the pilot were excluded from the final dataset, resulting in a final sample of 20 participants (N=20; F=90%, M=10%; *M*age = 21.4 years, *SD* = 8.08; undergraduate = 85% postgraduate = 10%, other = 5%; PT = 95%, PT/PL = 5%).

Amusement. 15 Psychology students at Catholic University of Portugal in Lisbon participated in a classroom experiment (N=15; F=56.3%, M=37.5%; M_{age} = 25.21 years, *SD* = 4.40, 12.5% did not report their age; undergraduate = 18.8%, postgraduate = 68.8%, doctorate = 6.3%; PT = 37.5%, DE = 31.3%, IT = 12.5%; AT = 6.3%, IN = 6.3%). Like in the awe condition, participants received information about the study and procedure.

3.1.2. Study Design

For the validation of the selected videos as stimuli, an experimental study was performed. This was accomplished through a within-subject repeated measures design, across two conditions: awe and amusement. Participants were truthfully informed about the purpose of the study, being to understand how certain scenes can be incorporated into a portable app to induce mood changes that might help people go through their working days with less stress. Although this does not apply to the present study, this was true to a separate study that was done by the research team at the same time, for which the stimuli needed to be validated as well.

Throughout the pilot study language barriers were identified. Thus, the experiments in the awe condition have been conducted in both Portuguese and English, depending on the participant's native language and preference. All materials were translated to Portuguese and scales validated in Portuguese were used. This was only done for the awe condition, as the experiment for amusement was conducted in the classroom with collective presentation of the stimuli, in a course that consisted of both Portuguese and international students.

3.1.3. Measures

To measure the emotional responses of the participants towards the stimuli and determine if the stimuli successfully elicited the target emotions, the Self-Assessment

Manikin (SAM) and the positive affect subscale of the short Positive and Negative Affect Schedule (PANAS-S) with two additional items were used.

Self-Assessment Manikin. The Self-Assessment Manikin (SAM, Bradley & Lang, 1994), is a useful and simple instrument to assess people's emotional response towards a stimulus and was tested among different sample populations. The instrument contains three dimensions: pleasure, arousal and dominance. Across the dimensions, subjective affective response is rated using picture-oriented scales ranging from one to five. Each scale shows five pictures of a figure with different expressions according to the level of intensity of the respective dimensions. The dimension of pleasure reflects the tendency to approach a stimulus from being *unhappy* (1) to being *happy* (5). The rating on arousal shows the level of vigor from being *calm* (1) to being *excited* (5). The dominance dimension describes the perceived control of oneself over the situation from feeling *controlled* (1) to feeling *in control* (5) (Bradley & Lang, 1994). As a picture-oriented instrument SAM is well suited to use across different populations and languages (e.g. Pinto & Esteves, 2009). In our study both the English and Portuguese versions of SAM were used, according to the participant's native language

Positive and Negative Affect Schedule. Participants' self-reported levels of positive affect were assessed through the short Positive and Negative Affect Schedule (PANAS-S). Thereby the short version of the Positive Affect (PA) subscale was used (Mackinnon et al.,

1999; Thompson et al., 2007). PA is a 10-item subscale of PANAS (Mackinnon et al., 1999; Thompson et al., 2007) and is widely used to assess emotional responses to stimuli (e.g. in Stellar et al., 2015). Since its development, the instrument has been adapted in many studies, validated in various languages, and proofed to be robust, as well as show both internal and external validity (i.e. Kercher, 1992; Galinha et al., 2014; Mackinnon, et al., 1999; Stellar et al., 2015; Thompson, 2005). While the PA subscale only assesses positive affect, the original PANAS is a 20-item scale measuring the extent to which people feel positive and negative affect on a 5-point Likert type scale from not at all (1) to extremely (5). The correlation between the two dimensions has been found to be low or nonsignificant, which is why the two scales can be used independently (Kercher, 1992; Watson et al., 1988). Short versions of the two scales have been developed containing 5 items each instead of 10 items as in the full scales (Mackinnon et al., 1999¸Thompson, 2007). In the present study, the 5 item PA scale asked participants to what extent they felt inspired, alert, interested, enthusiastic, and determined. Like SAM, in the present work, alongside the English version,

the Portuguese version of the short PA scale was used (Galinha et al., 2014). Further, since the scale is limited to five items and does not include amusement nor awe, two items were added for awe and amusement.

3.1.4. Data Collection Procedure & Materials

Awe. The experiments for the awe condition were conducted in the Psychology and CRC-W research center Laboratory Unit at FCH-UCP. Upon arrival individual participants were welcomed at the entrance, asked to provide their names for incentivization purposes and led to the laboratory room by the experimenter. The participants were briefed and received informed consent including a verbal description as well as a written consent. After providing the participants with the instructions the experimenter left the room. Besides informed consent and study description, participants were provided with instructions on the scales alongside definitions of the emotions assessed in the study. The experiment protocol consisted of a test trial, during which the participants were presented with an image. They were then asked to report on their emotional response, aiming to make them familiar with the scales used throughout the experiment. After this test trial, the experiment consisting of two trials started with a mountain landscape and a space video. Within each trial the participants were exposed to (a) an "X" for 5 seconds to neutralize their minds, thoughts and feelings (as in Shiota et al., 2011), and (b) a video with a length of 1.30-2.30 min. After each video the participants were asked to report their affective response towards the stimuli in a survey using Qualtrics. This was done using SAM (Bradley & Lang, 1994) and short version PA scale (Mackinnon et al., 1999, Thompson, 2007) with the two additional items for amusement and awe

To avoid any distractions and achieve high levels of immersion of the stimuli to which participants were exposed during the study, the light in the center's experimental laboratory room was dimmed. The experiments were performed using a Philips 242S1 monitor with a size of 23.8". To ensure the best quality of sound and, again, achieve high levels of immersion, headphones of the model Jabra Evolve2 65 were used.

Videos from the documentaries Cosmos (National Geographic) and The Green Planet (BBC) were used as stimuli. The scenes were carefully selected under consideration of the features and elicitors of awe according to Keltner & Haidt (2003), and all scenes showing people or human built objects were removed. Nature, including forests, mountains, and space, are considered one of the main sources for awe experiences (Keltner, 2023; Shiota et

al., 2007) and natural scenes are commonly used as awe stimuli in laboratory experiments (e.g. in Bai et al., 2021; Chirico et al., 2023; Collado & Manrique, 2020). The video and sound editing of the video clips were part of another ongoing project related to awe that was done by the research team at the same time.

Amusement. While for awe high levels of immersion towards the stimuli were aimed to be achieved in individual laboratory sessions, this was not necessary for amusement. The study for the amusement condition has thus been conducted as an in-class experiment.

Besides the setting and collective rather than individualistic testing, the procedure of the experiment was the same as in the awe condition. In the amusement group participants were presented with a total of four videos. The video clips were selected under consideration of the clip length and characteristics of the population sample, such as cultural context, age, and language. The final selection comprised of one clip from *Friends* and three clips from *Saturday Night Live*. Like the awe stimuli, the individual length of the clips was 1.30-2.30 minutes.

3.1.5. Analytical Procedure

First, the data was checked for normality, central tendency and variability. In the next step, the distribution and levels of valence, arousal and dominance across the videos were assessed. To test if the stimuli evoked the respective target emotion, within-subjects repeated measures ANOVAs with the mean emotional scores as unit of analysis were performed. The levels of awe and amusement were compared with the mean scores of all other emotions.

3.2.Results

Study 1 tests the emotional response of participants towards different video stimuli. Given that the stimuli have been pre-selected under careful consideration of the literature body, we propose the videos elicit their target emotions: awe and amusement. While the assumption checks and mean comparisons are presented together, the results of the main analysis are presented separately by video.

3.2.1. Awe Stimuli

Assumption Checks. Shapiro-Wilk Tests showed a significant departure from normality in all PA measures ($p < .05$) and SAM measures ($p < .05$), except for dominance in the Forest video ($p > .06$), using the mean emotion scores across the two video categories. Skewness and kurtosis values were reviewed, except for Enthusiasm and Awe in the *Cosmos* video were found to be within an acceptable range for normality (±1 to ±2).

The median test scores for the SAM measures were 4.00 for both videos on the pleasure dimension, 3.50 (*Cosmos*) and 2.00 (*Forest*) for arousal, and 2.00 (*Cosmos*) and

2.50 (*Forest*) for dominance. Both videos showed identical interquartile ranges (IQR) for pleasure and dominance dimensions, suggesting consistency. As for the arousal dimension, the IQR for *Cosmos* was narrower compared to the wider IQR in *Forest*. Long whiskers were observed in all dimensions across both videos, except for pleasure in *Forest*, showing lower variability. A total of 13 outliers were identified in the pleasure dimension only, with 1 outlier in *Cosmos* and 3 outliers in *Forest*. To remain statistical power outliers were retained.

As for the PA measures, the median test scores for awe and amusement were 4.50 and 3.00, respectively for *Cosmos*, and 4.00 and 2.00, respectively for *Forest*. Among all measures awe has the highest median score, suggesting that it might be most affected by the stimuli. *Cosmos* had a narrower interquartile range (IQR) for awe, suggesting more consistency, while *Forest* showed greater variability with a wider IQR and long whiskers. Outliers were identified using boxplots and z-scores; no outliers were found in *Forest*, but 13 outliers were present in *Cosmos*. Given the small sample size (N = 20) and the continuous nature of the variable, the outliers were retained to maintain statistical power.

Despite these deviations, ANOVA was deemed appropriate due to its robustness against moderate violations of normality (Blanca et al., 2017; 2018). Results were interpreted with these considerations in mind.

Descriptive Statistics. To provide an overview of the distribution of the emotion scores across the PA and SAM dimensions, descriptive statistics were calculated.

While, in SAM, levels for average arousal were relatively moderate, the mean levels of pleasure reported are high and average dominance levels are comparatively low across both video stimuli (see Table 2). Given the context of the study and the conceptual independence of the SAM dimensions, they are assessed separately from each other and no further statistical test to compare them has been carried out.

Table 2 - *Mean comparison of SAM dimensions across videos.*

Measure	Cosmos		Forest	
	M	*SD*	*M*	*SD*
Pleasure	3.60	1.10	4.00	1.12
Arousal	3.25	1.33	2.40	1.54
Dominance	2.30	1.38	2.65	1.27

For PA, mean comparison across the two stimuli categories showed that participants on average reported higher levels of awe (*Cosmos*: $M = 4.35$, $SD = .81$; *Forest*: $M = 3.55$,

SD = 1.98) than other emotions, except for inspiration. While in the *Cosmos* video the participants reported higher levels of awe compared to all other measures, in *Forest* inspiration was rated highest followed by awe. An overview of the means and standard deviation values across all emotion measures are presented in Table 3 (see p. 25; and Appendix A for visual presentation of data distribution across PA measures for each video).

Main Analysis. To assess if the two video stimuli elicited levels of awe in the participants and to test potential differences on the emotion items reported by the participants, a repeated measures ANOVA for each video was conducted using the mean emotion scores of PA and additional items for awe and amusement. Given that the assumption of normality and homogeneity variances was violated, Friedmans tests were conducted additionally, as a precautionary measure to ensure robustness of the results. As predicted, both video categories elicited awe in the participants, whereby the average level reported for awe was higher for the *Cosmos* compared to the *Forest* stimulus.

Cosmos Video. Mauchly's Test of Sphericity was not significant ($\chi^2(6, N=20) = 19.87$, $p = .475$), indicating that the assumption of sphericity has been met. Therefore, no correction to the degrees of freedom was necessary. Bonferroni-corrected pairwise comparisons revealed a significant main effect of the stimuli, $F(6,20) = 12.22$, $p < .001$, $\eta_p^2 = .39$, on the emotional measures. The effect size, $f^2 = .80$, indicates a strong effect. Pairwise comparisons show that the level of awe, $M = 4.35$, $SD = .81$, differs significantly, $p < .001$, from the level of amusement, $M = 2.75$, $SD = 1.18$, and alert, $M = 3.05$, $SD = .76$. However, there was no statistically significant difference between awe and the measures of inspired, interested, enthusiasm and determined (Table 3, p. 25)

Friedmans test was used to follow up the findings, revealing significant differences across the measures, $\chi^2(6, N=20) = 48.02$, $p < .001$. Post-hoc analysis with the Dunn-Bonferroni test revealed that awe, mean rank = 5.28, was significantly different from amusement, mean rank = 2.20, $p = .00$, and alert, mean rank = 2.63, $p = 0.02$, but not significantly different from all other measures.

Forest Video. Unlike in *Cosmos*, Mauchly's Test of Sphericity was significant, $\chi^2(6, N=20) = 41.88$, $p=.003$, indicating that the assumption of sphericity was violated. Consequently, a Greenhouse-Geisser correction was applied to adjust the degrees of freedom. Bonferroni-corrected pairwise comparisons revealed a significant main effect of the stimuli, $F(6,20) = 5.89$, $p=.001$, $\eta_p^2 = .237$, on the emotional measures. The effect size indicates a strong effect, $f^2 = .56$. Despite the overall significance of the model, pairwise

comparison does not show a significant difference between mean levels of awe and other measures (Table 3, p. 25).

Friedmans test was applied and reveals significant differences across the measures, $\chi^2(6, N = 20) = 32.45$, $p < .001$. Dunn-Bonferroni post-hoc analysis revealed that awe, mean rank = 4.7, did not significantly differ from any of the other measures, supporting the findings of the pairwise comparison of the repeated measures ANOVA.

Table 3 - Mean comparison of Awe with PA-scale items across the videos.

Measures	Cosmos				Forest			
	M	*SD*	*MD*	*p*	*M*	*SD*	*MD*	*p*
Inspired	4.25	0.85	0.10	1.00	3.90	0.97	-.35	1.00
Alert	3.05	0.76	1.30*	0.00	2.50	0.95	1.50	0.07
Excited	4.15	0.75	0.20	1.00	3.40	1.14	0.15	1.00
Enthusiasm	3.85	0.99	0.50	1.00	3.10	1.12	0.45	1.00
Determined	3.45	1.00	0.90	0.07	2.95	0.89	0.60	1.00
Amusement	2.75	1.12	1.60*	0.00	2.55	1.43	1.00	1.00
Awe	4.35	0.81			3.55	1.32		

Note. Based on estimated marginal means

*. The mean difference is significant at the ,05 level.

3.2.2. Amusement Stimuli

Assumption Checks. A Shapiro-Wilk Test showed an overall significant departure from normality as the test revealed a significance $p < .05$ for most of the measures of both SAM and PA across the four video categories using the emotion scores. Skewness and kurtosis values were reviewed and found to be within an acceptable range for normality (±1 to ±2), except for awe in *Friends* with a kurtosis of 2.10.

Median test scores for the SAM measures for the pleasure dimension were 4.00 for *Man Park, Friends* and *BeReal* and 3.00 for the *Male Straight Friend*. For arousal they were 2.50 for *Man Park*, 2.00 for *Friends*, 4.00 for *BeReal* and 3.00 for *Straight Male Friend*. On the dominance dimensions median test scores were 3.00 for *Man Park, Friends* and *Male Straight Friend* and 2.50 for *BeReal.*

With some exceptions, identical interquartile ranges (IQR) in all videos were identified across all dimensions, suggesting consistency. While in pleasure and dominance the IQR was wider for *Straight Male Friend*, *Man Park* showed a narrower IQR in arousal. Long whiskers were observed in all dimensions across all videos, except for pleasure in *Man Park*, showing lower variability. Outliers were identified in pleasure and dominance for *Man Park*,

Friends and *BeReal*, with 3 outliers in pleasure for *Man Park* and 1 each for *Friends* and *BeReal*, and 1 in each measure for the dominance dimension. All outliers were retained to remain statistical power.

The median test scores for amusement were 5.00, 4.50, 4.00 and 4.00 respectively for the *Man Park*, *Friends*, *BeReal* and *Straight Male Friend*. Among all measures, amusement yielded the highest median score, suggesting that it is the most affected measure by the stimuli. Further, for amusement the *Man Park*, *Friends* and *BeReal* video stimuli had a narrower interquartile range (IQR), suggesting more consistency than the wider IQR with long whiskers in the *Straight Male Friend* video, which showed greater variability. While *Straight Male Friend* does not show any whiskers for the amusement measure, *Friends* and *BeReal* also showed whiskers. In total 10 outliers were identified across all measures and videos. For amusement 3 outliers were present in *Man Park* and 1 outlier was present in *BeReal*. Given the small sample size (N = 15) and the continuous nature of the variable, the outliers were retained to maintain statistical power.

Again, ANOVA was deemed appropriate due to its robustness against moderate violations of normality (Blanca et al., 2017, 2018) and results were interpreted with these considerations in mind.

Descriptive Statistics. To provide an overview of the distribution of the emotion scores across the PA and SAM dimensions, descriptive statistics were calculated.

Thereby, for SAM, the levels of pleasure reported are relatively high across all video stimuli, while arousal levels are moderate, except for *BeReal* video and dominance levels are comparatively low, as can be seen in Table 4.

Table 4 - *Mean comparison of SAM dimensions across videos.*

Measure	Man Park		Friends		BeReal		Straight Male Friend	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Pleasure	3.27	1.33	3.47	1.19	3.43	1.02	3.13	1.25
Arousal	2.50	0.94	2.67	1.18	3.14	1.17	2.73	1.03
Dominance	2.60	1.12	2.80	1.08	2.43	1.09	2.67	1.23

Among the PA measures, mean comparison showed that reported levels of amusement were highest across all video categories (see Table 5, p. 29; and Appendix B for visual presentation of data distribution across PA measures for each video).

Main Analysis. Repeated measures ANOVAs were performed to identify if the four stimuli categories elicited amusement in the participants and to assess potential differences

across all emotions of the PA scale. The analysis has been performed for each video using the average emotion scores. Like for the awe stimuli, as the assumption of normality and homogeneity variances was violated, Friedmans tests, were additionally conducted as a precautionary measure for robustness.

As proposed, for all four video categories participants reported having felt amusement after being presented with the stimuli exposure, whereby the average level of amusement reported by the participants was highest after being presented with the *Friends* video, M = 4.33, SD = 0.72. Across all videos reported levels of amusement were highest compared to other emotions (see Table 5, p.29).

Man Park Video. Two participants did not submit complete responses, which is why they are excluded from the analysis resulting in a final sample of N = 13.

An ANOVA with repeated measures shows that the emotional response reported was significantly affected by the stimulus, $F(6,20) = 6.67$, $p < .001$, $\eta_p^2 = .36$. Mauchly's test indicated that the assumption of sphericity had not been violated, $\chi^2(20) = 27.10$, $p = .151$, therefore no correction to the degrees of freedom was necessary. The effect size, $f^2 = .75$, indicates a large effect. Bonferroni-corrected pairwise comparisons show that the mean level of amusement, $M = 3.93$, $SD = 1.38$, differs significantly, $p < .001$, from the level of all other measures, as can be seen in Table 5. (p. 29)

Friedmans tests were used to follow up these findings, revealing significant differences across the measures, $\chi^2(6, N=13) = 24.60$, $p < .001$. Post-hoc analysis with the Dunn-Bonferroni test revealed that amusement, mean rank = 6.35, was significantly, $p < .001$, different from awe, mean rank = 3.08, $p = .002$, inspired, mean rank = 3.08, $p = .002$, and enthusiasm, mean rank = 3.69, $p = .036$, but not significantly different from all other measures.

Friends Video. Incomplete data in the response of one participant led to their exclusion from the analysis, resulting in a final sample of N = 14

A repeated measures ANOVA reveals that the emotional response reported was significantly affected by the stimulus, $F(6,20) = 20.66$, $p < .001$, $\eta_p^2 = .61$. Mauchly's test indicated that the assumption of sphericity had been met, $\chi^2(20) = .11$, $p = .287$), therefore no correction to the degrees of freedom was necessary. The effect size, $f^2 = 1.25$, indicates a very strong effect. Bonferroni-corrected pairwise comparisons show that the level of amusement, $M = 4.33$, $SD = .72$, differs significantly, $p < .001$, from the level of all other measures (see Table 5, p. 29).

Friedmans tests was carried out as a follow up, showing significant differences across the measures, $\chi^2(6, N=14) = 51.495$, $p < .001$. Dunn-Bonferroni post-hoc analysis revealed that amusement, mean rank = 6.57, significantly differed from all measures except for enthusiasm.

BeReal Video. The ANOVA with repeated measures shows that the stimuli significantly affected the participants emotional response reported, $F(6,20) = 7.40$, $p < .001$ $\eta_p^2 = .35$. Mauchly's test indicated that the assumption of sphericity had not been violated ($\chi^2(20) = .11$, $p = .191$), therefore no correction to the degrees of freedom was necessary. The effect size indicates a strong effect, $f^2 = .73$. Bonferroni-corrected pairwise comparisons show that the average level of amusement, $M = 3.80$, $SD = 1.15$, differs significantly, $p < .001$, from the level of awe and inspiration, but not from alert, excitement, enthusiasm and determination (Table 5).

Friedmans tests were used to follow up these findings, revealing significant differences across the measures, $\chi^2(6, N = 15) = 32.00$, $p < .001$. Post-hoc analysis with the Dunn-Bonferroni test revealed that amusement, mean rank = 5.57, was significantly different from awe, mean rank = 2.53, $p = .003$, and inspired, mean rank = 2.70, $p = .006$, but did not significantly differ from all other measures.

Straight Male Friend Video. The repeated measures ANOVA reveals that the emotional response reported was significantly affected by the stimulus, $F(6,20) = 7.30$, $p < .001$, $\eta_p^2 = .36$. Mauchly's test indicated that the assumption of sphericity had been met, $\chi^2(20) = .155$, $p = .473$, therefore correction to the degrees of freedom was not necessary. The effect size, $f^2 = .75$, indicates a large effect. Bonferroni-corrected pairwise comparisons show that the mean for amusement differs significantly, $M = 3.60$, $SD = 1.24$, $p < .001$, from the level of awe and inspiration, but not from alert, excitement, enthusiasm and determination (Table 5).

Friedmans tests were used to follow up these findings, revealing significant differences across the measures, $\chi^2(6, N = 14) = 30.70$, $p < .001$. Dunn-Bonferroni post-hoc analysis test revealed that amusement, mean rank = 6.14, was significantly different from awe, mean rank = 2.68, $p = .00$, inspired, mean rank = 3.39, $p = .016$) and determined, mean rank = 3.36, $p = 0.014$, but not from all other measures.

Table 5 - *Mean comparison of PA-scale items across videos.*

Video	Man Park				Friends				BeReal				Straight Male Friend			
	M	*SD*	*MD*	*p*	*M*	*SD*	*MD*	*p*	*M*	*SD*	*MD*	*p*	*M*	*SD*	*MD*	*p*
Inspired	2.07	1.07	1.92*	0.01	2.20	0.86	2.07*	0.00	2.13	1.13	1.67*	0.02	2.20	0.68	1.29*	0.01
Alert	2.71	1.20	1.38	0.27	2.57	1.02	1.79*	0.00	3.40	0.91	0.40	1.00	2.43	1.09	1.14	0.09
Excited	2.43	1.16	1.54*	0.03	3.07	1.28	1.14*	0.01	3.40	1.06	0.40	1.00	2.47	1.13	1.00	0.10
Enthusiasm	2.62	1.04	1.39*	0.02	3.50	1.16	.86*	0.02	2.93	1.33	0.87	0.21	2.80	1.08	0.71	0.39
Determined	2.50	0.76	1.54*	0.03	2.13	0.83	2.21*	0.00	2.53	1.06	1.27	0.23	2.20	0.94	1.29	0.20
Amusement	3.93	1.38			4.33	0.72			3.80	1.15			3.60	1.24		
Awe	2.14	1.03	1.92*	0.00	1.93	1.16	2.50*	0.00	1.93	1.22	1.87*	0.01	1.80	1.01	1.86*	0.01

Note. Based on estimated marginal means

*. The mean difference is significant at the ,05 level.

3.3. Discussion

Study 1 tested the effectiveness of a total of six video stimuli to elicit emotions through an experimental design across two conditions: awe and amusement. Thereby two videos were assessed for awe and four videos for amusement using repeated measures ANOVAs followed by Friedman tests to ensure test robustness.

3.3.1. Awe Condition

In the awe condition, 20 participants rated their post-stimuli emotional response towards two videos, *Cosmos* and *Forest*. The videos were pre-selected under careful consideration of the features and elicitors of awe (e.g. Keltner, 2023; Keltner & Haidt, 2003).

Results indicated that the *Cosmos* video efficiently elicited expected significant levels of awe in laboratory sessions. Although the *Forest* video did elicit awe in the participants and the overall model yielded significance, contrary to our prediction, the levels of self-reported awe were not significantly different from those of other emotions. While acknowledging that emotions are subjective and thus differ among individuals (e.g. in Dong & Ni, 2019) we suggest several reasons for the insignificance of the results for the *Forest* video. Firstly, the small sample size might have impacted the power of the model. Besides the sample size, our sample is highly homogenic, given that the study was run at the university with the majority being female (90%), Portuguese (85%) undergraduate students. Although research suggests that people in early development, due to unfixed knowledge structures, are more prone to experience awe (Keltner & Haidt, 2003), individual differences in awe experiences related to age and gender seem largely unexplored. Future research might consider delving into this area. Further, the presentation of the videos was not counterbalanced, and the *Forest* video was always viewed second by participants, which might have led to order effects. Scenes of space, due to their great vastness, are understood to have a "Overlooking effect" (Keltner, 2023). Thus, the *Cosmos* video could either generally be more successful in triggering awe, or the high levels of awe felt after watching *Cosmos* might have diminished the feeling of awe towards *Forest*. Furthermore, fatigue effects might have had an impact on the affective response towards the second video. It is noteworthy to mention that declining emotion scores have indeed been identified for awe and all other emotion items.

While among all emotions awe was rated highest in *Cosmos*, for *Forest* it was inspiration, followed by awe. This finding is not surprising, as according to existing research both awe and inspiration are positive emotions involving a sense of wonder. Sometimes, when experiencing awe, one would use the term "being inspired" to describe this experience (Keltner, 2023).

Generally, the distribution of the emotional scores follows the same trend for both videos. Further, the assessment of the dimensions of SAM is in line with the above-described findings. Specifically, the low levels of dominance reported support the diminishment of the self as an effect of awe (Shiota et al., 2007).

In summary, the overall significance of the analytical model, combined with the same trend in distribution as observed for *Cosmos*, and the low reported levels of dominance, provide implications for the *Forest* video's capacity to evoke awe. Consequently, this research enhances the current literature by offering video stimuli for awe, as it is anticipated that both video categories included can effectively evoke state levels of awe during laboratory session.

3.3.2. Amusement Condition

In a classroom session 15 participants rated their post-stimuli emotional response towards four videos, *Man Park, Friends, BeReal* and *Straight Male Friend*. The videos were preselected under careful consideration of different factors including cultural context, age, and language.

As expected, all videos included in this condition significantly elicited affective states of the target emotion amusement. The *Friends* video was the strongest elicitor for amusement, followed by *Man Park, BeReal* and *Straight Male Friend.* Like in the awe condition, declining scores can be observed for the last two videos, indicating fatigue effects. In this condition, since the experiment was performed collectively in the classroom, no counterbalancing was possible. It is noteworthy that this experiment was longer as the participants were presented with four videos and they were asked to report on their emotions four times, increasing the probability of fatigue effects.

Albeit the results of the video *Man Park* showed second highest levels of amusement, we suggest that it is not suitable for studies comparing awe and amusement. The reasons for this suggestion are threefold: First and foremost, the mean ranks reported for awe were highest in this video compared to all other videos, while arousal levels were lowest. The comparatively high level of awe can be explained by natural scenes present in the video, given that nature is one of the key sources of awe (Keltner, 2023). Despite the significant difference between awe and amusement ratings in this video, we do have concerns in terms of potential interference with awe conditions due to the small sample and high number of outliers. For studies involving the assessment of awe, we therefore suggest the usage of the *BeReal* stimulus, which also yielded significant difference compared with awe.

All four evaluated videos considerably evoke amusement. Alongside our theoretical contribution of newly validated video stimuli, we have offered implications for their potential use within the study domain.

3.3.3. Limitations & Future Research

Despite the valuable findings of this study, it is not without limitations. Apart from the statistical significance of our results, except for the *Forest* video, it is noteworthy that the sample was small and homogenic which may have impacted the power of our models. A larger sample size in future studies might lead to more definitive results. Further, individual differences related to age and gender in experiencing awe should be examined as to the best of our knowledge, this topic has not yet been addressed.

Further, even though the levels of awe reported were high and the overall model was significant, the levels of awe in the *Forest* video did not differ significantly from other emotions. Although we were able to provide implications, the need to validate a nature-related video as an awe stimulus remains for future studies.

As we did not control for order effects we suspect that fatigue has confounded our results. This could be prevented by randomizing the order of the videos. In this regard it would certainly be valuable to examine potential differences between the videos for awe and assess if the *Forest* video would then have yielded significant differences between awe and other emotions. This could provide valuable insight into whether space or nature is more successful in eliciting awe in a laboratory context.

4. Study 2: Assessment of the Role of Awe in the Workplace & in Pro-environmental Behavior Intentions

Study 2 aims to explore the role of awe in the workplace through the assessment of its potential effects on different organizational outcomes. Further, as awe shows unique effects in other fields (see Keltner, 2023), our goal is to assess the potentially unique effects of awe compared to other positive emotions in the organizational domain. To do so, a comparison to amusement is drawn. Amusement provides a critical comparison with awe, as along with joy, contentment, and interest, amusement has many desirable outcomes (Fredrikson, 2001). Yet it is not clear whether it qualifies as self-transcendent or not, as Stellar et al (2017) exclude them from this category and Keltner (2023, see page 28) does not. It is also much more elicitable in an experimental setting than joy. Further, including amusement allows drawing comparisons between awe and happiness towards well-being in the workplace and helps to understand whether awe potentially could be more effective compared to other positive emotions. Given

the proposed effects of positive emotions on organizational outcomes by existing literature and our principal goal to assess the differences between awe and other positive emotions, there was no neutral condition included in the study.

4.1. Methodology

4.1.1. Participants

67 participants, mainly Portuguese (AL = 2.9%, BE = 2.9%, DE = 2.9%, PK = 2.9%, PL = 2.9%, PT = 79.4%, PT/BR = 2.9%, PT/US =2.9%) students (undergraduate = 82.4%, postgraduate = 8.8%, doctorate = 5.9%, others = 2.9%) at the Catholic University of Portugal in Lisbon, were recruited in the classroom and on campus using flyers and posters. Students were provided with a brief description of the study, including the aim and procedure. After signing up for participation students were informed about their timeslot and randomly assigned to one of the two conditions, awe and amusement. The final sample consists of 34 participants (N=34; F=85.29%, M= 14.71%; M_{age} = 21.59 years, *SD* = 4.13).

The experiment was conducted over a total period of six weeks and participants were incentivized with a declaration of participation issued by the research center. Undergraduate psychology students received an additional incentive in the form of course credits.

4.1.2. Study Design

Following an experimental study design, Study 2 aims to test the relationship between awe and work satisfaction, task performance and pro-environmental behavior intentions. This is accomplished through a between-subject emotion elicitation experiment with two conditions: awe and amusement. The setting and procedure of the study were similar to the experiments of Study 1 for the awe condition, with some exceptions.

4.1.3. Measures

Emotion Manipulation Check. To assess if the emotion manipulation was successful according to the condition, the same measures as in Study 1, SAM and PA with two additional items for amusement and awe were used (see Chapter 3.1.3.).

Satisfaction Measure. To assess participant's academic satisfaction the academic domain satisfaction scale developed by Lent et al. (2005) was used. Along the 7-item scale the participants' levels of satisfaction in different aspects of their academic life is assessed (e.g. "For the most part, I am enjoying my coursework.", see full scale in Appendix 1). Responses are given along a 5-point Likert type scale, from *strongly disagree* (1) to *strongly agree* (5). For the experiments conducted in Portuguese, the Portuguese version of the scale adapted by Lent et al. (2009) was used. Both the English and Portuguese scale yield adequate reliability

for the measure with values of α = .86-.87 and α = .85-.89 respectively (Lent et al., 2005; 2009). Further, Lent et al. (2005) report correlations with positive affect, social satisfaction, and overall life satisfaction. The instrument is widely used to study domain satisfaction whereas academic domain satisfaction has proven to being suitable to draw conclusions for the work context (Lent & Brown, 2006).

One question on global academic life satisfaction ("I feel satisfied with my life at the university."), was added as a separate measure, as this item was not part of the version used in the present work, however it was included in other scales adapted from Lent et al. (2005).

Performance Measure. To determine participants' performance the Digit Backward Span Task (DBS), an attention- and working memory-demanding task, was used. The task has been chosen as it has previously been used to study cognition and performance in the domain of awe (e.g. Collado & Manrique, 2019). The DBS is part of the Wechsler Memory Scale (cited in Ryan& Lopez, 2001) and involves the presentation of sequences of digits to the participant with increasing length of the sequences. The test usually involves the presentation of two consecutive sequences of the same length. After being presented with the sequence the participant needs to repeat the sequence in reverse order.

In the present study, to avoid any obstacles related to language, the sequences were visually presented on the monitor. Thus, only visual attention and memory were involved. A total of 14 sequences were displayed starting with lengths of four digits and extending to sequences of 10 digits, and two consecutive subsequences with identical lengths (see full task in Appendix D; Sternberg & Sternberg, 2012). The sequences were presented to the participants for 3 seconds each, with 10 seconds pause between the sequences for the participants to enter their responses into the questionnaire. The time range each sequence was displayed has been determined considering an adequate time for participants to memorize the sequence while not presenting them for too long, so participants would not be able to type it while reading it. The sequences were presented in white digits on black background in font size 115. To prevent participants moving to the previous or next slide the slides were locked. The participants gave their responses in the Qualtrics survey. Finally, the task was followed by two questions for the participants to rate their task ("I am satisfied with the task") and their performance satisfaction ("I am satisfied with my task performance") on a 5-point Likert scale, from *strongly disagree* (1) to *strongly agree* (5).

Pro-environmental Behavior Intention Measure. The participants' intentions to take pro-environmental actions were assessed through whether they sign a petition and take flyers

related to sustainability. This approach is used as a measurement of pro-environmental behavior intentions in other studies related to awe's role in pro-environmental behavior intentions (e.g. Chirico et al., 2023). The materials used were: one sustainability related petition (recycling bin petition, see Appendix E), one non-sustainability, but prosociality related petition (plant-based food petition, see Appendix F), flyers on study programs in general and environmental studies, a poster to sign up for a newsletter and a psychology brochure.

4.1.4. Apparatus & Data Collection Procedure

The procedure of the experiments for Study 2 was similar to the experiments conducted for the awe condition in Study 1, with some exceptions mostly related to the measures as well as the apparatus. The following briefly outlines the procedure with reference to Study 1. Like in Study 1, the experiments were conducted in the Psychology and CRC-W research center Laboratory Unit at FCH-UCP. In addition to the monitor, the laboratory room was equipped with a headset (T'nB HS-500). The usage of the headset along with dimmed light ensured good sound quality and high levels of immersion during the experiment.

The participants were briefed and received verbal and written informed consent prior to the experiment. To not compromise the results and ongoing data collection a cover story was shared with the participants. Despite the participants being truthfully informed about the study, they were told that the research purpose is to investigate how watching certain videos could potentially improve performance and satisfaction with tasks. Once the research has been finalized, the participants are debriefed about the actual goal of the research.

Further they were presented with a study description, instructions on the scales and emotion definitions. The experiments consisted of two trials with one video each. Within each trial the participants were exposed to (a) a slide showing a "X" for five seconds and (b) a video with a length of 1.30 to 2.30 minutes (see Study 1). Following the approach of Study 1, participants were then asked to self-report their post-stimuli exposure emotional state and affect on SAM (Bradley & Lang, 1994) and the short version of the PA scale (Mackinnon et al., 1999) with two additional items for amusement and awe (see Chapter 3.1.2). After reporting their emotional responses towards the stimuli, participants performed on the DBS to measure performance levels. The DBS was followed by two questions related to the participants' task and performance satisfaction. Finally, the participants were asked to report their satisfaction with their academic life using Lent's (2005) academic domain satisfaction scale and one additional question on global academic life satisfaction.

Once the participants had answered the satisfaction related questions, they were informed that the experiment was finished, and they could leave the laboratory room. They were then asked by the experimenter to wait in the laboratory's multipurpose room. The room was decorated with sustainability and non-sustainability related material (see Appendix G). The materials in the room were both informative and interactive, and included posters and flyers, two petitions and a sign-up form for the research center's newsletter. The petitions and flyers were placed on the table, with the aim of measuring the participants' pro-environmental behavior intentions.

The video clips from Study 1 served as emotion eliciting stimuli. To prevent order effects and being able to identify potential differences in the elicitation of emotions across the videos the stimuli were presented in counterbalanced order. The final selection of the videos concluded of the clips *Cosmos* and *Forest* for awe, and *Friends* and *BeReal* for amusement. All videos, with an exception for the *Forest* video, were proven to elicit emotions with statistical significance in Study 1 (see Chapter 3.2). Given the implications provided in Study 1, *Forest* was still considered an appropriate stimulus for this study (see Chapter 3.3.1.).

4.1.5. Analytical Procedure

The study determines the potential effects of awe on work satisfaction, task performance and pro-environmental behavior intentions. First, the data is tested for normality, central tendency and variance. In the next step an emotion manipulation check is performed using Wilcoxon signed-rank test. To identify potential relationships between the independent variable and dependent variables, correlations and regressions. This is followed by a MANOVA to inspect the impact of the conditions and the dependent variables, work satisfaction (H1) and task performance (H2). Lastly, the effect of the condition (H3a) and domain satisfaction (H3b) on pro-environmental behavior intentions, a logistics regression is performed.

Thereby the unit of analysis for task performance is the total amount of sequences correctly completed. For satisfaction a variable has been computed using the sum of all reported scores along the scale divided by the number of items of the scale (Lent, 2005). Lastly, the measure of pro-environmental behavior intentions is a binary variable based on whether the participants have signed the petition or not, and whether they have taken a flyer or not.

4.2.Results

4.2.1. Assumption Checks

A Shapiro-Wilk Test showed that overall normality was met across the measures of PA, task performance and domain satisfaction (p > .05) but not the dimensions of SAM, proenvironmental and prosocial behavior intention measures. Normality was also not met across the measures on task, performance and academic life satisfaction (p < .05). Skewness and kurtosis values were reviewed and found to be within an acceptable range for normality (±1 to ±2). Outliers were identified using boxplots and z-scores; and a total of 12 outliers were present. Given the sample size (N = 34) and the continuous nature of the variables, the outliers were retained to maintain statistical power.

As correlation analysis is performed to assess the relationship between the emotions and task performance and work satisfaction pro-environmental and prosocial behavior intentions measures, assumption tests were performed for the respective variables within each condition. Normality was met with DBS performance and academic satisfaction (p > .05) across both conditions, but not with pro-environmental and prosocial behavior intentions measures (p < .05). While normality was met with average awe scores in the awe condition (p > .05), it was not met for average amusement scores in the amusement condition (p = .001). Skewness and kurtosis values were reviewed and found to be within acceptable ranges for normality (±1 to ±2) across the relevant measures in both conditions. Two outliers were present in each condition. To maintain statistical power outliers were retained.

4.2.2. Emotion Manipulation Check

Using the mean emotion scores for awe and amusement as a unit of analysis, a manipulation check was conducted. Given the sample size, the presence of outliers and the violation against normality in the amusement condition, Wilcoxon signed-rank test was used.

The Wilcoxon signed-rank test revealed that emotion manipulation was successful for both groups. Results show that participants in the awe condition reported statistically significant higher average levels of awe (Mdn = 4.00) than participants in the amusement condition (Mdn = 1.50), z = -3.14, p< .001, just as participants in the amusement condition reported statistically significant higher average levels of amusement (Mdn = 4.50) compared to participants in the awe condition (Mdn = 2.50), z = -3.63, p<.001.

4.2.3. Descriptive Analysis

Descriptive statistics were calculated to provide an overview of the data distribution and identify patterns and trends across groups, with 17 participants each (N = 34).

Work Satisfaction. Descriptives show that in average participants in the amusement condition report higher on academic satisfaction (*M*= 3.65, *SD* =0.75), compared to participants in awe condition (*M* = 3.4, *SD* = 0.59), as can be seen in Table 7. The average academic life satisfaction has been rated equally by participants in both conditions.

Table 7– *Descriptive statistics of academic satisfaction measures across conditions.*

Measure	**Awe**			**Amusement**		
	N	*M*	*SD*	*N*	*M*	*SD*
Total academic satisfaction	17	3.40	0.59	17	3.65	0.75
Academic life satisfaction	17	3.47	0.62	17	3.47	0.94

Task Performance. Descriptively, participants assigned to the amusement condition, on average, achieved higher performance (DBS) than participants in the awe condition. While the mean DBS score in the awe condition is 6.06 (*SD* = 2.41), with scores ranging from 1 to 11, mean DBS scores in the amusement condition are 6.76 (*SD* = 2.91) ranging from 2 to 12. The task and performance satisfaction were rated higher by participants in the awe condition compared to participants in the amusement condition. In Table 8 the mean and standard deviation values for all measures across the two conditions, awe and amusement, are presented.

Table 8– *Descriptive statistics of performance and performance-related satisfaction measures across conditions.*

Measure	**Awe**			**Amusement**		
	N	*M*	*SD*	*N*	*M*	*SD*
DBS score	17	6.06	2.41	17	6.76	2.91
Task satisfaction	17	3.76	.97	17	3.59	1.18
Performance satisfaction	17	2.71	1.16	17	2.65	.93

Pro-environmental Behavior Intentions. Descriptive analysis revealed that more participants in the amusement condition signed the petitions than participants in the awe condition did. While 52.9% of participants in the amusement condition signed the Recycling bin petition, only 35.3% of participants in the awe condition did. The same trend can be observed for the Plant-based food petition. In general, most participants in the awe condition did not sign any of the petitions, while in the amusement condition more participants signed the petition than not, as can be seen in Table 9. The remaining pro-environmental behavior measures were not successful and are thus not presented.

Table 9 – *Frequencies of pro-environmental and pro-social behavior intentions.*

Measure		**Awe**		**Amusement**	
		Frequency	*Percent*	*Frequency*	*Percent*
Recycling bin petition	Yes	6	35.3	9	52.9
	No	11	64.7	8	47.1
Plant-based food petition	Yes	5	29.4	9	52.9
	No	12	70.6	8	47.1

4.2.4. Hypothesis testing

To test the effects of the emotional response towards the stimuli on participants' task performance and academic satisfaction a MANOVA was performed. The effect of the condition and domain satisfaction on pro-environmental behavior intentions was examined through a Logistics Regression.

The effects of awe on domain satisfaction. Our first hypothesis predicted that, H1: *People experiencing awe report higher domain satisfaction levels, compared to people experiencing awe*.

First, correlations were performed to assess the relationships between the emotion scores and the academic satisfaction rating within the two conditions awe and amusement. Pearson coefficient was conducted to assess the relationship between awe and academic satisfaction, using mean awe scores. To evaluate the relationship between amusement and academic satisfaction, Spearman's correlation was conducted with mean amusement scores as a unit of analysis. Contrary to our prediction, no statistically significant relationship between self-reported levels of awe and academic satisfaction was found, $r(15) = 0.16$, $p = .270$. For self-reported levels of amusement, however, a strong positive relationship with academic satisfaction was found, $rs(15) = 0.50$, $p = .02$. The same was found for the relationship between average self-reported emotions and academic life satisfaction. While there was no significant relationship between academic life satisfaction and awe, $rs(15) = -.51$, $p = .42$, there was with amusement, $rs(15) = .50$, $p = .02$. Further the correlation between the two satisfaction measures, total and global, have been tested using Spearman's correlation. Expectedly, there was a strong positive relationship between academic and academic life satisfaction, $rs(32) = .50$, $p = .002$. Due to the absence of significance in the correlation between awe and academic satisfaction, as well as our hypothesis suggesting differences between groups rather than investigating predictors, no regression analysis was performed.

To examine potential differences in total scores of reported academic satisfaction between the two conditions, awe and amusement, a MANOVA was performed. Using Pillai's

trace, there was no significant effect of the condition on the reported levels of satisfaction across groups, $V = 0.65$, $F(2, 31) = 1.08$, $p = .352$. Further, contrast results and pairwise comparisons reveal that there is no significant effect of the conditions on satisfaction ($p = .300$), This reveals that although there was a significant relationship between amusement and satisfaction but not awe and satisfaction, there was no significant difference examined between the two groups. Thus, our first hypothesis is not supported.

The effects of awe on task performance. The second hypothesis proposed that, H2*: Task performance is higher after an experience of awe, in comparison to amusement.*

To test our hypothesis the same approach as for academic satisfaction was followed. Assessing the relationship between awe and task performance Pearson correlation, and between amusement and task performance Spearman's correlation were calculated, using average emotion scores and DBS scores per condition. Against our expectations, there was no statistically significant relationship between average scores of awe and DBS score, $r(15) = .72$, $p = .391$, and mean amusement scores and DBS score, $rs(15) = -.12$, $p = .321$, found. While there were no significant relationships assessed between awe and amusement and any of the additional measures, moderate positive relationships between performance satisfaction and DBS score, $rs(32) = .40$, $p = .02$, and task satisfaction , $rs(32) = .37$, $p = .03$. Due to the absence of significance in the correlation between our main variables, no regression was performed.

Through MANOVA, potential differences in task performance between the two conditions were assessed. Using Pillai's trace, there was no significant effect of the condition on the total DBS score, $V = 0.65$, $F(2, 31) = 1.08$, $p = .35$. Contrast results and pairwise comparisons reveal that there is no significant effect of the conditions on the levels of performance ($p = .45$). The findings, showing that there are no significant differences between the two conditions, are contrary to what we proposed, rejecting our second hypothesis

The effects of awe on pro-environmental behavior intentions. With our third hypothesis we predicted that, H3a: *People experiencing awe are more likely to show pro-environmental behavior intentions, compared to amusement.*

Given the violations of normality assumption, Spearman's correlations was conducted to evaluate the relationship between the mean emotion scores of awe and amusement, and pro-environmental behavior intentions.

Against our hypothesis, Spearman's correlation coefficient reveals that there is neither a significant relationship between the tendency to sign the Recycling bin petition and awe scores, $rs(15) = -.18$, $p = .24$, nor amusement scores, $rs(15) = .38$, $p = .14$. There were also no

significant relationships between signing the plant-based food petition and average awe scores, $rs(15) = -.10$, $p = .36$, and average amusement scores, $rs(32) = .25$, $p = .34$. Considering that none of the correlations for the main variables yielded significance, logistics regression was not performed.

To inspect potential associations between the condition and the frequencies with which the petitions were signed, we have conducted a Chi-Square analysis of independence. Findings suggest that there is no association between the condition and the number of petition signed, for neither the recycling bin petition, $\chi 2\ (1) = 1.074$, $p = .300$, $n = 34$, nor the plant-based food petition, $\chi 2\ (4) = 1.121$, $p = .290$, $n = 34$, which does not support H3a.

We further predicted that, *H3b: Domain Satisfaction is positively associated with domain-related pro-environmental behavior intentions.*

Spearman's correlations were run to evaluate the relationship between academic satisfaction and each petition. A significant moderate positive relationship between domain satisfaction and both signing the recycling petition, $rs(32) = .47$, $p = .005$, and the plant-based food petitions, $rs(32) = .37$, $p < .034$, has been revealed, indicating that participants rating higher on domain satisfaction tended to engage in both prosocial and pro-environmental behavior intentions, confirming H3b.

To assess the effect of academic satisfaction on the likelihood of signing the petitions binary Logistics Regressions were performed. The overall model was not statistically significant when compared to the null model for both the recycling petition, $\chi 2\ (1) = 7.36$, $p = .007$, and the plant based food petition, $\chi 2\ (1) = 4.23$, $p = .04$, indicating that academic satisfaction did not predict the likelihood to sign the petition.

Beyond testing the relationship between emotion scores and the tendency to sign a petition, recycling and plant-based food, additional Spearman's correlations have been run to evaluate the relationships between the recycling and plant-based petition. Thereby, a significant strong positive relationship between signing the two petitions was found, $rs(32) = .89$, $p < .001$, indicating that participants signing one petition tended to sign the other petition, as well.

4.3. Discussion

Positive emotions are known to be predictors of organizational outcomes, including satisfaction and performance (Ashkanay & Dorris, 2017; Diener et al., 2020); Isham, Mair & Jackson, 2021; Pipera & Fragouli, 2021; Weiss & Croponzano, 1996). They are also associated with pro-environmental behavior and intention (Ambrose et al., 2021; Chirico et al., 2016; 2018a; Isham, Jackson & Elf, 2022). Given that research on awe within psychology has only

started comparatively recently, the knowledge on the effects of awe on organizational outcomes appears to be limited. Grounded on the AET (Weiss & Croponzano, 1996), the broaden-and-build theory of positive emotions (Fredrickson, 2001), and the assumption of awe being a particularly powerful emotion (Keltner & Haidt, 2003; Stellar et al., 2017), we hypothesized that in comparison to amusement, experiences of awe would result in greater work satisfaction, enhanced task performance and increased pro-environmental behavior intentions.

Through experimental design, Study 2 tests the effects of post-stimuli emotional responses across two conditions: awe and amusement on work satisfaction and task performance. Further, the effects of the emotional responses and domain satisfaction towards pro-environmental behavior are assessed. Correlations and regressions were performed to assess the relationships and their extent between the variables. Further, MANOVA was conducted to identify potential differences in the relationship between awe and amusement and the predicted outcomes across the two groups. It is noteworthy that the results need to be interpreted under careful consideration of a small sample size and violations of normality.

4.3.1. Hypothesis 1: Awe and work satisfaction

Contrary to our prediction, unlike amusement, awe did not have a significant effect on domain satisfaction. Thus, our first hypothesis was not confirmed. It is not surprising that amusement, as a positive emotion, positively influenced domain satisfaction, as suggested by current research (Fisher, 2000; Sahu & Srivastava, 2017; Weiss & Croponzano, 1996). The results on the effects of awe, on the other hand, are surprising, since they are not in line with existing research on the relationship between awe and satisfaction (Dong & Geng, 2023; Upenieks & Krause, 2024; Zhao et al., 2019). Moreover, as positive emotions are predictors of work satisfaction, it seems implicit that awe being a positive emotion would also be associated to satisfaction at work (Fisher, 2000; Sahu & Srivastava, 2017; Weiss & Croponzano, 1996). Although the results were not significant, the data indicates that the relationship between awe and domain satisfaction would be positive. This can be supported by the positive trend observed in the descriptive statistics. Descriptively, the average domain satisfaction reported by participants in the awe condition is only slightly lower to the average level in the amusement condition. Therefore, we suggest that a possible reason for the absence of statistical significance could be the sample size and that a larger sample may yield more definitive results. The trend in the data paired with existing literature indicates that the effect of awe on work satisfaction is worth exploring in future research.

Another possible explanation for the absence of significance in the relationship between awe and domain satisfaction is that lower performance might have had an impact on the satisfaction rating, especially since the task was performed prior to reporting satisfaction. However, with awe having buffering effects on negative emotions (Anderson et al., 2018; Atamba, 2019; Bai et al., 2021; Dong & Geng, 2023; Sun et al., 2023), even if a participant might have performed poorly on the task, according to literature, it can be assumed that awe would linger possible negative effects of low task performance towards domain satisfaction.

There was also no significant difference between the two groups examined, showing that neither of the conditions had a stronger effect on domain satisfaction compared to the other. This contradicts the findings of a significant effect of amusement and a non-significant relationship between awe and domain satisfaction, providing implications that amusement would be more effective compared to awe. We suspect that besides awe and amusement, other emotions could have influenced the results of our study. In the awe condition, for instance, despite the emotion manipulation being successful, other emotions, i.e. inspiration, indeed were rated higher than awe. Thus, the results might not be representative of awe, but of positive emotions in general. The explanation for this observation is threefold. Firstly, albeit a definition of the emotions used in our scales was provided at the beginning of the experiment, there might have been language related obstacles. Given that there is no adequate translation for awe in Portuguese the definition of the emotion might have not been fully understood by the participants potentially resulting in that the reported levels not properly representing levels of awe that were actually felt. Secondly, despite the limited size of our sample, it exhibits a high degree of homogeneity given that most of the participants were female Portuguese undergraduate students. To the best of our knowledge there is no research on the emotional development of awe over the lifespan. Although it is suggested that people early in their development and with less fixed knowledge structures might be more likely to feel awe (Dong & Ni, 2020; Keltner & Haidt, 2003), according to the Greater Good Science Center, older people tend to experience it more often (Springer, 2017). This gap in literature could be rooted in the novelty of the field, suggesting avenues for further exploration. Thirdly, emotions are subjective with individual differences in experiencing them, e.g. some people might experience them with higher intensity than others. As an example, research suggests that dispositional awe is predicted by extraversion and openness to experience (Dong & Ni, 2019). As far as we are aware, knowledge of individual differences in experiencing awe is limited, warranting further exploration.

4.3.2. Hypothesis 2: Awe and task performance

Further, we hypothesized that participants experiencing awe would achieve higher job performance levels, compared to amusement. Unexpectedly, no evidence for a relationship between awe nor amusement, and task performance, nor any differences between groups have been found. Therefore, our second hypothesis has also been rejected. These findings are contrary to existing literature, suggesting that positive emotions predict job performance (Diener, et al., 2020; Kaplan et al., 2009; Reizer, Brender-Ilan & Sheaffer, 2019; Sahu & Srivastava, 2017). Nonetheless, the findings have implications as the trend in the data suggests that, if significant, awe and performance would positively correlate, whereas amusement and performance would not. The observed positive trend in the data for awe is in line with the existing literature suggesting that positive affect is positively related to attention and job performance (Fredrickson, 2001; Lopes, Lima & Silva, 2020; Weiss & Croponzano, 1996). One explanation for the absence of statistical significance in our results could be that in our study awe was not found to be positively associated with satisfaction (H1). Job satisfaction is considered a mediator of the relationship between positive emotions and job performance (Isham, Mair & Jackson, 2021; Pipera & Fragouli, 2021; Weiss & Croponzano, 1996). Yet, our findings did not reveal a significant relationship between task performance and satisfaction and the trend of the data indicates a negative relationship which is highly contradictive to existing literature as usually the relationship is found to be positive (Weiss & Croponzano, 1996). Additionally, as amusement was associated with higher satisfaction, this would not explain why it did not also result in higher performance levels. In fact, the trend in the data suggests that the relationship between amusement and performance would be negative. Thus, as one variable would increase the other one would decrease. This is not in line with what can be observed in the descriptives, showing levels of performance are higher for participants in the amusement condition than participants in the awe condition. Ultimately, we suspect that although the task was chosen under careful consideration and in line with existing literature, it should have been easier. Thus, task performance levels were lower but might not necessarily have impacted the overall satisfaction. Yet, considering the mean scores of task satisfaction across the two conditions participants, it appears that participants were satisfied with the task.

Lastly, contrary to our hypothesis, no differences across the groups were identified, despite descriptive levels of task performance being higher for amusement than for awe. This could again be related to the potential influence of other emotions, language obstacles, subjectivity of emotions, and the limited size and homogeneity of the sample.

4.3.3. Hypothesis 3: Awe and pro-environmental behavior intentions

With our third hypothesis we suggested that awe would have higher effects on pro-environmental behavior intentions than amusement (H3a) and that domain satisfaction would be associated with pro-environmental behavior intentions (H3b). Contrary to our expectations based on existing literature, H3a was not supported. No significant relationships between emotional experience and pro-environmental behavior intentions (recycling petition), and pro-social behavior intentions (plant-based food petition) were found. Contemporary literature provides evidence on effects of awe on both pro-environmental (e.g. Chirico et al., 2016; 2018a; Li et al., 2023) and pro-social behaviors (e.g. Meng & Wang, 2022; Rudd, Vohs & Aaker, 2012, Stellar et al., 2017). We suggest that failing to support the hypothesis might result from the small sample size paired with the subjectivity of emotional experiences (as described for H1). Descriptively, however, more people in the amusement condition signed the petitions compared to the participants in the awe condition, indicating that positive affect alone might be enough to trigger pro-environmental behavior intentions and self-transcendence is not necessary. This is in line with existing literature suggesting pleasant affect alone being the driver for pro-environmental rather than awe (Ambrose et al., 2021). Nevertheless, the pattern in the data shows that amusement might be more effective in triggering behavior intentions. Future exploration of this topic might enhance our understanding of amusement.

A moderate positive and statistically significant relationship between academic satisfaction and both petitions have been found, supporting H3b. Thus, participants that reported higher satisfaction levels tended to sign the petitions. This supports the observed pattern of more participants in the amusement condition, with higher average satisfaction levels, signing the petitions, than participants in the awe condition, with lower average satisfaction levels. However, due to lack of significance in the overall model, satisfaction was not found to be a predictor for behavior intentions. Nonetheless, findings suggest that people with higher satisfaction levels are more likely to show pro-environmental and pro-social behavior intentions, replicating findings of existing literature.

Furthermore, within both conditions, the distribution of the data across the two petitions was equal. This leads to the impression that there is either no difference across the petitions or that the availability to sign a petition might have influenced the participants' behavior intentions. Despite the absence of relationships between the emotional states and the individual petitions, a significantly strong positive relationship between the two petitions was observed,

supporting the latter. The significant relationship between the two petitions suggests that people that sign one petition tend to sign the other petition, too.

4.3.4. Limitations & Implications for Future Research

While the study offers valuable insights into a comparatively new research field, it also has limitations. Even though the findings provide implications on the effects of awe on work satisfaction, task performance and pro-environmental behavior intentions, the results lack statistical significance. A larger sample could have resulted in more conclusive findings. The sample size presented a significant challenge to the study. In total 67 participants were recruited but 49.25% did not partake in the experiments. An insufficient incentive for participation could possibly explain the small number of participants.

Moreover, our sample exhibits high degrees of homogeneity, which mirrors the context in which the study was conducted. Paired with the possibly insufficient incentivization and the additional incentive for undergraduate Psychology students, resulted in the sample mainly consisting of Portuguese undergraduate students.

Further, we suggest that individual differences might have impacted on the results. Given the subjectivity of emotions, not everyone might experience an emotion in the same way or the same intensity. Therefore, it is essential to mention that we only tested affective states and did not take emotional dispositions into consideration. Although it is understood that some people might be more prone to experiencing awe than others (e.g. Dong & Ni, 2019; Keltner & Hiatd, 2003), in general, to the extent of our knowledge, there is limited research on individual differences in experiences of awe, such as age, gender or personality, which are worth further exploration.

Along with the limitations related to the sample, we suggest there might also be language-related obstacles when studying awe. Most of our participants were non-native English speakers, so they might not know, and thus perhaps not understand, the term “awe”. As this is something we already identified during Study 1, the experiments have been conducted in either Portuguese or English, depending on the participant's native language. However, as there appears to be no adequate translation of awe in Portuguese, we used "Feeling of Awe" ("Sentimento de Awe" in Portuguese). In addition, we provided a definition of awe along with definitions of other emotions in the experiment protocol. It would be beneficial to understand the linguistic differences. Notably, cultural differences have already been identified regarding the experience of awe related to others or oneself (Keltner et al. as cited in Keltner, 2023, p. 23-25). Nevertheless, future research could provide valuable insight into cultural differences

in the view on the emotion, the experiences and underlying factors of awe related to how the emotion is verbally expressed.

Beyond the constraints associated with the sample and differences in emotional experiences, further limitations are associated with the study design and measure. Given the absence of significance and contradictory results in testing task performance, we suggest that perhaps the DBS task, as a memory test, might not be the most suitable instrument to measure performance. Even though it is a commonly used measure for attention, despite being a measure for memory (e.g. Collado & Manrique, 2019). Further, the measure allowed adaptation to our study, to avoid language-related obstacles. The DBS task procedure followed a visual presentation approach involving the presentation of the sequence on a screen for a short amount of time. Given that many participants have raised concerns about their performance after their experiment ended, we conclude that the task might have been too challenging. We assume this might be related to the time the sequences were presented to the participants. As they were presented visually, it needed to be ensured that the participants could not type their responses simultaneously to looking at the sequence on the screen. This would have resulted in results not representative of actual performance. Thus, the time the sequences were presented needed to be kept to a minimum. Further, as a visual presentation of the DBS was used, only visual memory was assessed. On the other hand, if the DBS sequences are presented verbally, the test also only assesses verbal memory, so impacts are unclear. Nonetheless, this should be considered for the research question and field of study.

Further, a trend in our data potentially related to fatigue has been observed. Despite the order of the stimuli being counterbalanced, across all measures the response to the second stimuli yielded lower average levels compared to the first one, except for arousal, alert and determined. Therefore, we suspect that fatigue has led to lower average emotion scores across both studies, and thus impacted the results.

Lastly, according to our assessment, no scale for the assessment of the state levels of awe is available, which is why we added an item for awe to the PA-scale. Although PA has proven to be robust and shows high internal and external validity, we cannot be sure that this extends to the items we have added. Considering the growing interest in studying awe and its effect on various outcomes, the development of a scale measuring state levels of awe might be beneficial to the advancement of the field.

5. General Discussion

Work satisfaction and task performance are fundamental organizational outcomes contributing to overall organizational effectiveness (Diener et al., 2020; Weiss & Croponzano, 1996). Those outcomes are thought to result from affective responses towards events experienced by individuals at work. Thereby, negative and positive emotions predict job performance and satisfaction. While negative emotions are negatively related to those outcomes, positive emotions are positively associated with them (Diener, et al., 2020; Fisher et al., 2020; Kaplan et al., 2009; Reizer, Brender-Ilan & Sheaffer, 2019; Sahu & Srivastava, 2017; Weiss & Croponzano, 1996). Emotions are also drivers for people's attitudes and behaviors (Ambrose et al., 2021; Fredrickson, 2001; Rudd et al., 2012). Positive emotions lead to enhanced prosocial and pro-environmental attitudes and behaviors, and thus have the capability to foster social bonds and solve problems in communities. This provides implications that positive emotions not only contribute to organizational effectiveness but climate actions (Stellar et al., 2017; Tee & binti Raja Reza Shah, 2023).

In the present work we explored how awe, as a distinct positive emotion with unique effects on several outcomes (Keltner & Haidt, 2003; Stellar et al., 2017), could potentially affect organizational outcomes and behaviors, and thereby be particularly effective. Our research focused on the effects of work satisfaction, task performance and pro-environmental behavior intentions.

As literature lacks validated stimuli for awe, we aimed to pre-validate video stimuli for awe and amusement in Study 1. Thereby the validation of one out of two videos was successful as an elicitor for awe. Under consideration of various limitations, a trend in the second video could be observed indicating that it might also be effective in evoking awe in the laboratory. Thus, our research adds to current literature with a validated video stimuli for awe, and contributes to the understanding of studying awe in laboratory settings.

This was followed by an investigation into the role of awe in the workplace in Study 2. Contrary to our expectations, that were grounded in existing literature, only one of our hypotheses was supported. Thereby, it was confirmed that domain satisfaction is positively related with pro-environmental behavior prosocial behavior intentions. However, it was not supported that awe might influence work satisfaction, task performance and pro-environmental behavior intentions. Except for work satisfaction, there were also no significant relationships between amusement and the outcomes. As this is contrary to existing research suggesting that positive emotions are positively related with work satisfaction, task performance (Diener, et

al., 2020; Fisher et al., 2020; Kaplan et al., 2009; Reizer, Brender-Ilan & Sheaffer, 2019; Sahu & Srivastava, 2017; Weiss & Croponzano, 1996) and pro-environmental behaviors (Ambrose et al., 2021; Fredrickson, 2001; Rudd et al., 2012), we suspect that our sample size was not big enough to ensure power and robustness and that a larger sample would have yielded significance. Notably, we confirmed that amusement has great effects on satisfaction. Further, the measures of pro-environmental and prosocial behavior intentions were strongly related to each other, indicating that people having pro-environmental attitudes are more likely to show prosocial attitudes as well. This might be due to the availability given to the participants to show behavior intentions.

Having drawn the comparison with amusement we aimed to elaborate if awe might be particularly effective. Our findings revealed that awe did not yield unique effects. In fact, there were no differences between awe and amusement, indicating that positive affect alone might be sufficient. This, however, is not in line with existing literature suggesting awe as a particularly powerful emotion (Keltner & Haidt, 2003; Stellar et al., 2017). Yet, our results need to be interpreted carefully under considerations of some limitations, like the sample size.

Nonetheless, our research brings relevant implications. Firstly, this research adds to our understanding of the complexity of emotions, especially awe, and studying them through experimental designs. Awe appears to be particularly challenging to study in the laboratory. Secondly, the individual differences in experiencing awe seem to be greater than in other emotions. Exploration of individual differences in future research might be beneficial to enhance our understanding of the emotion. Furthermore, beyond the accessibility of awe, it seems like it might not be fully understood. We suspect that feelings of awe might often be interpreted as being inspired, due to the connectedness of the two states on an affective but also linguistic level. Both emotions involve a sense of wonder and awe experiences are often described with words like “inspired”, or “awe-inspired”. Also, there appears to be a lack of understanding of the term “awe” for non-native English speakers, as in Portuguese there is no adequate translation.

Given the overall absence of significance across most of our results and several limitations, the potential role of awe in organizational outcomes and specifically its effects on work satisfaction and task performance remain unanswered. Therefore, additional studies are needed to further explore the relationships between awe and organizational outcomes. The positive trend observed in the data offers strong motivation for future research to investigate and enhance our knowledge on the role of awe in the workplace.

6. Conclusion

Positive emotions, as predictors of human wellbeing and flourishing, are understood to play a fundamental role in all aspects of people's lives and are crucial to human society. Positive emotions are also associated with outcomes in the work context. As an affective response to events related to the work context, they predict job satisfaction performance, ultimately leading to greater organizational efficiency. Thereby, although it is suggested that distinct emotions have different outcomes, the research landscape is dominated by the view of positive emotions as one construct rather than investigating the role of individual emotions.

Moreover, positive emotions influence behavior, as they predict prosocial and pro-environmental attitudes and behaviors. While some studies suggest that distinct positive emotions have individual effects, other studies propose that positive affect alone is a predictor of behavior.

Awe, as self-transcendent emotion, evoked when presented with vastness and resulting in accommodation of current mental structures, has only recently gained attention from psychologists. Thus, knowledge is comparatively little. Nonetheless, research suggests that awe has striking effects on various outcomes, including wellbeing, psychological resources, attitude and behavior. One area that appears to be unexplored in relation to awe is the organizational domain.

The present work aimed to investigate the role of awe in the workplace, and thus contribute to the gap in the current literature body. Thereby the investigation focused on the effects of awe on (a) work satisfaction, (b) task performance and (c) pro-environmental behavior intentions. Additionally, the goal was to identify if awe potentially would be more effective compared to other positive emotions. Thus, amusement was included in the study, allowing to draw comparisons between awe and happiness in relation to workplace well-being.

Surprisingly, awe did not play a role in work satisfaction, task performance, and pro-environmental behavior intentions. There were also no effects unique to awe compared to amusement assessed. Although, overall, there were no significant relationships between awe and the organizational and attitudinal outcomes identified, a trend could be observed, indicating that awe, in fact, might have an impact on them. As proposed, domain satisfaction is positively associated with prosocial and pro-environmental behavior intentions. Since awe, according to previous research, can influence satisfaction, this might be a pathway to motivate prosocial and pro-environmental behavior. Additional research is required to comprehend the impact of awe on organizational outcomes and behavior intentions.

7. References

Allen, M. R., Dube, O. P., Solecki, W., Aragón-Durand, F., Cramer, W., Humphreys, S., Kainuma, M., Kala, J., Mahowald, N., Mulugetta, Y., Perez, R., Wairiu, M., & Zickfeld, K. (2018). Framing and context. In V. Masson-Delmotte, P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P. R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J. B. R. Matthews, Y. Chen, X. Zhou, M. I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, & T. Waterfield (Eds.), *Global warming of 1.5°C: An IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty* (pp. 49–92). Cambridge University Press. https://doi.org/10.1017/9781009157940.003

Ambrose, L. E., Wiezel, A., Pages, E. B., & Shiota, M. N. (2021). Images of nature, nature-self representation, and environmental attitudes. *Sustainability*, *13*(14), 8025. https://doi.org/10.3390/su13148025

Anderson, C. L., Monroy, M., & Keltner, D. (2018). Awe in nature heals: Evidence from military veterans, at-risk youth, and college students. *Emotion*, 18(8), 1195–1202. https://doi.org/10.1037/emo0000442

Ashkanasy, N. M., & Dorris, A. D. (2017). Emotions in the workplace. *Annual Review of Organizational Psychology and Organizational Behavior*, *4*(1), 67-90. https://doi.org/10.1146/annurev-orgpsych-032516-113231

Atamba, C. (2019). Restorative effects of awe on negative affect after receiving negative performance feedback. *Journal of Psychology in Africa*, 29(2), 95-103. https://doi.org/10.1080/14330237.2019.1594640

Bai, Y., Ocampo, J., Jin, G., Chen, S., Benet-Martinez, V., Monroy, M., Anderson, C., & Keltner, D. (2021). Awe, daily stress, and elevated life satisfaction. *Journal of Personality and Social Psychology*, 120(4), 837–860. https://doi.org/10.1037/pspa0000267

Blanca-Mena, M. J., Arnau, J., García-Castro, F. J., Alarcón-Postigo, R., & Bono Cabré, R. (2022). Non-normal Data in Repeated Measures ANOVA: Impact on Type I Error and Power. https://dx.doi.org/10.7334/psicothema2022.292

Blanca, M. J., Alarcón, R., Arnau, J., Bono, R., & Bendayan, R. (2018). Effect of variance ratio on ANOVA robustness: Might 1.5 be the limit?. *Behavior Research Methods*, *50*, 937-962. https://doi.org/10.3758/s13428-017-0918-2

Büssing A, Recchia DR and Baumann K (2022) Experience of nature and times of silence as a resource to cope with the COVID-19 pandemic and their effects on psychological well-being—Findings from a continuous cross-sectional survey in Germany. Front. *Public Health* 10:1020053. https://doi.org/10.3389/fpubh.2022.1020053

Bradley, M. M., & Lang, P. J. (1994). Measuring emotion: the self-assessment manikin and the semantic differential. *Journal of behavior therapy and experimental psychiatry*, 25(1), 49-59. https://doi.org/10.1016/0005-7916(94)90063-9

Cameron, K. S., Dutton, J. E., & Quinn, R. E. Positive Organizational Scholarship: Foundations of a New Discipline.

Chen, Y., Tang, G., Jin, J., Li, J., & Paillé, P. (2015). Linking market orientation and environmental performance: The influence of environmental strategy, employee's environmental involvement, and environmental product quality. *Journal of Business Ethics*, *127*, 479-500. https://doi.org/10.1007/s10551-014-2059-1

Chen, C., Okubo, R., Hagiwara, K., Mizumoto, T., Nakagawa, S., & Tabuchi, T. (2024). The association of positive emotions with absenteeism and presenteeism in Japanese workers. *Journal of Affective Disorders*, *344*, 319-324. https://doi.org/10.1016/j.jad.2023.10.091

Chirico, A., Yaden, D. B., Riva, G., & Gaggioli, A. (2016). The potential of virtual reality for the investigation of awe. *Frontiers in psychology*, 7, 1766. https://doi.org/10.3389/fpsyg.2016.01766

Chirico, A., Ferrise, F., Cordella, L., & Gaggioli, A. (2018a). Designing awe in virtual reality: An experimental study. *Frontiers in psychology*, 8, 2351. https://doi.org/10.3389/fpsyg.2017.02351

Chirico, A., Glaveanu, V. P., Cipresso, P., Riva, G., & Gaggioli, A. (2018b). Awe enhances creative thinking: An experimental study. *Creativity Research Journal*, 30(2), 123-131. https://doi.org/10.1080/10400419.2018.1446491

Chirico, A., Pizzolante, M., Borghesi, F., Bartolotta, S., Sarcinella, E. D., Cipresso, P., & Gaggioli, A. (2023). "Standing Up for Earth Rights": Awe-Inspiring Virtual Nature for Promoting Pro-Environmental Behaviors. *Cyberpsychology, Behavior, and Social Networking*, 26(4), 300-308. https://doi.org/10.1089/cyber.2022.0260

Collado, S., & Manrique, H. M. (2020). Exposure to awe-evoking natural and built scenes has positive effects on cognitive performance and affect. *Environment and Behavior*, *52*(10), 1105-1132. https://doi.org/10.1177/0013916519868733

Costa Galinha, I., Pereira, C. R., & Esteves, F. (2014). Versão reduzida da escala portuguesa de afeto positivo e negativo - PANAS-VRP: Análise fatorial confirmatória e invariância temporal. *PSICOLOGIA*, 28(1), 53–65. https://doi.org/10.17575/rpsicol.v28i1.622

Darbor, K. E., Lench, H. C., Davis, W. E., & Hicks, J. A. (2016). Experiencing versus contemplating: Language use during descriptions of awe and wonder. *Cognition and Emotion*, *30*(6), 1188-1196. https://doi.org/10.1080/02699931.2015.1042836

Diener, E., Thapa, S., & Tay, L. (2020). Positive emotions at work. *Annual review of organizational psychology and organizational behavior*, *7*(1), 451-477. https://doi.org/10.1146/annurev-orgpsych-012119-044908

Dong, R., & Ni, S. G. (2020). Openness to Experience, Extraversion, and Subjective Well-Being Among Chinese College Students: The Mediating Role of Dispositional Awe. *Psychological Reports*, 123(3), 903-928. https://doi.org/10.1177/0033294119826884

Dong, X., Geng, L. The role of mindfulness and meaning in life in adolescents' dispositional awe and life satisfaction: the broaden-and-build theory perspective. *Curr Psychol* 42, 28911–28924 (2023). https://doi.org/10.1007/s12144-022-03924-z

Fox, S., & Spector, P. E. (2002). Emotions in the workplace: The neglected side of organizational life introduction. *Human resource management review*, *12*(2), 167-171. https://doi.org/10.1016/S1053-4822(02)00044-X

Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist, 56(3), 218–226*. https://doi.org/10.1037//0003-066x.56.3.218

Fredrickson, B. L. (2004). The broaden–and–build theory of positive emotions. Philosophical transactions of the royal society of London. *Series B: Biological Sciences*, 359(1449), 1367-1377. https://doi.org/10.1098/rstb.2004.1512.

Fredrickson, B. L., & Branigan, C. (2005). Positive emotions broaden thought-action repertoires: Evidence for the broaden-and-build model. *Cognition and Emotion*, 19(3). DOI 10.1080/02699930441000238.

Fürstenberg, N., Alfes, K., & Shantz, A. (2021). Meaningfulness of work and supervisory-rated job performance: A moderated-mediation model. *Human Resource Management*, *60*(6), 903-919. https://doi.org/10.1002/hrm.22041

Galinha, I. C., Pereira, C. R., & Esteves, F. (2014). Versão reduzida da escala portuguesa de afeto positivo e negativo-PANAS-VRP: Análise fatorial confirmatória e invariância temporal. *Psicologia*, *28*(1), 53-65. https://doi.org/10.17575/rpsicol.v28i1.622

Goswami, A., Nair, P., Beehr, T. and Grossenbacher, M. (2016), "The relationship of leaders' humor and employees' work engagement mediated by positive emotions: Moderating effect of leaders' transformational leadership style", *Leadership & Organization Development Journal*, Vol. 37 No. 8, pp. 1083-1099. https://doi.org/10.1108/LODJ-01-2015-0001.

Halbesleben, J. R., & Buckley, M. R. (2004). Burnout in organizational life. *Journal of management*, *30*(6), 859-879. https://doi.org/10.1016/j.jm.2004.06.004

Hu, X., & Kaplan, S. (2015). Is "feeling good" good enough? Differentiating discrete positive emotions at work. *Journal of Organizational Behavior*, *36*(1), 39-58. https://doi.org/10.1002/job.1941

Hu, B., & Meng, L. (2022). Understanding awe elicitors in the workplace: a qualitative inquiry. *Journal of Managerial Psychology*,37(8), 697-715. https://doi.org/10.1108/JMP-04-2021-0257

Isham, A., Elf, P., & Jackson, T. (2022). Self-transcendent experiences as promoters of ecological wellbeing? Exploration of the evidence and hypotheses to be tested. *Frontiers in psychology*, *13*, 1051478. https://doi.org/10.3389/fpsyg.2022.1051478

Isham, A., Mair, S., & Jackson, T. (2021). Worker well-being and productivity in advanced economies: Re-examining the link. *Ecological Economics*, *184*, 106989. https://doi.org/10.1016/j.ecolecon.2021.106989

Kaplan, S., Bradley, J. C., Luchman, J. N., & Haynes, D. (2009). On the role of positive and negative affectivity in job performance: a meta-analytic investigation. *Journal of Applied psychology*, *94*(1), 162.

Keltner, D. (2023). *Awe. The transformative Power of everyday wonder*. Allen Lane of Penguin books.

Keltner, D., & Haidt, J. (2003). Approaching awe, a moral, spiritual, and aesthetic emotion. Cognition and emotion, 17(2), 297-314. https://doi.org/10.1080/02699930302297

Kercher, K. (1992). Assessing subjective well-being in the old-old: The PANAS as a measure of orthogonal dimensions of positive and negative affect. *Research on Aging*, *14*(2), 131-168. https://doi.org/10.1177/0164027592142001

Kim, A., Kim, Y., & Han, K. (2019). A cross level investigation on the linkage between job satisfaction and voluntary workplace green behavior. *Journal of Business Ethics*, *159*, 1199-1214. https://doi.org/10.1007/s10551-018-3776-7

Lanham, M., Rye, M., Rimsky, L., & Weill, S. (2012). How gratitude relates to burnout and job satisfaction in mental health professionals. *Journal of Mental Health Counseling*, *34*(4), 341-354. https://doi.org/10.17744/mehc.34.4.w35q80w11kgpqn26

Le, P. Q., Saltsman, T. L., Seery, M. D., Ward, D. E., Kondrak, C. L., & Lamarche, V. M. (2019). When a small self means manageable obstacles: Spontaneous self-distancing predicts divergent effects of awe during a subsequent performance stressor. *Journal of Experimental Social Psychology*, *80*, 59-66. https://doi.org/10.1016/j.jesp.2018.07.010

Lent, R. W., & Brown, S. D. (2006). Integrating person and situation perspectives on work satisfaction: A social-cognitive view. *Journal of Vocational Behavior*, *69*(2), 236–247. https://doi.org/10.1016/j.jvb.2006.02.006

Lent, R. W., Singley, D., Sheu, H.-B., Gainor, K. A., Brenner, B. R., Treistman, D., & Ades, L. (2005). Social Cognitive Predictors of Domain and Life Satisfaction: Exploring the Theoretical Precursors of Subjective Well-Being. *Journal of Counseling Psychology*, 52(3), 429–442. https://doi.org/10.1037/0022-0167.52.3.429

Lent, R. W., Singley, D., Sheu, H.-B., Schmidt, J. A., & Schmidt, L. C. (2007). Relation of Social-Cognitive Factors to Academic Satisfaction in Engineering Students. *Journal of Career Assessment*, 15(1), 87-97. https://doi.org/10.1177/1069072706294518

Lent, R. W., do Céu Taveira, M., Sheu, H. B., & Singley, D. (2009). Social cognitive predictors of academic adjustment and life satisfaction in Portuguese college students: A longitudinal analysis. *Journal of vocational behavior*, 74(2), 190-198. https://doi.org/10.1016/j.jvb.2008.12.006

Li, J. J., Huang, L. M., He, M., & Ye, B. H. (2023). Understanding pro-environmental behavior in tourism: Developing an experimental model. *Journal of Hospitality and Tourism Management*, *57*, 213-224. https://doi.org/10.1016/j.jhtm.2023.10.005

Liu, J., Huo, Y., Wang, J., Bai, Y., Zhao, M., & Di, M. (2023). Awe of nature and well-being: Roles of nature connectedness and powerlessness. *Personality and Individual Differences*, 201, 111946. https://doi.org/10.1016/j.paid.2022.111946

Liu, Y., Yu, C., & Damberg, S. (2022). Exploring the drivers and consequences of the "awe" emotion in outdoor sports–a study using the latest partial least squares structural equation modeling technique and necessary condition analysis. *International Journal of Sports Marketing and Sponsorship*, 23(2), 278-294. https://doi.org/10.1108/IJSMS-12-2020-0232

Lopes, S., Lima, M., & Silva, K. (2020). Nature can get it out of your mind: The rumination reducing effects of contact with nature and the mediating role of awe and mood.

Journal of Environmental Psychology, 71, 101489. https://doi.org/10.1016/j.jenvp.2020.101489

Mackinnon, A., Jorm, A. F., Christensen, H., Korten, A. E., Jacomb, P. A., & Rodgers, B. (1999). A short form of the Positive and Negative Affect Schedule: Evaluation of factorial validity and invariance across demographic variables in a community sample. *Personality and Individual differences*, 27(3), 405-416. https://doi.org/10.1016/S0191-8869(98)00251-7.

McPhetres, J. (2019). Oh, the things you don't know: awe promotes awareness of knowledge gaps and science interest. *Cognition and Emotion*, *33*(8), 1599–1615. https://doi.org/10.1080/02699931.2019.1585331

Meng, L., & Wang, X. (2023). Awe in the workplace promotes prosocial behavior. *PsyCh Journal*, 12(1), 44-53. https://doi.org/10.1002/pchj.593

Monroy, M., & Keltner, D. (2023). Awe as a Pathway to Mental and Physical Health. *Perspectives on Psychological Science*, 18(2), 309-320. https://doi.org/10.1177/17456916221094856

OECD (2022), *Climate Change and Corporate Governance*, Corporate Governance, OECD Publishing, Paris, https://doi.org/10.1787/272d85c3-en.

Pinto, C., & Esteves, F. (2009). Avaliação de estímulos emocionais em Ex-Combatentes de Guerra com e sem PTSD. *Psychologica*, (51), p. 209-226. https://doi.org/10.14195/1647-8606_51_13

Pipera, M., & Fragouli, E. (2021). Employee well-being, employee performance & positive mindset in a crisis. *The Business & Management Review*, *12*(2), 1-15.

Reizer, A., Brender-Ilan, Y. & Sheaffer, Z. (2019). Employee motivation, emotions, and performance: a longitudinal diary study. *Journal of Managerial Psychology*, Vol. 34 No. 6, pp. 415-428. https://doi.org/10.1108/JMP-07-2018-0299

Rudd, M., Vohs, K. D., & Aaker, J. (2012). Awe expands people's perception of time, alters decision making, and enhances well-being. *Psychological science*, 23(10), 1130-1136. https://doi.org/10.1177/0956797612438731

Rudd, M., Hildebrand, C., & Vohs, K. D. (2018). Inspired to create: Awe enhances openness to learning and the desire for experiential creation. *Journal of Marketing Research*, *55*(5), 766-781. https://doi.org/10.1177/0022243718802853

Ryff, C. D., & Singer, B. H. (Eds.). (2001). *Emotion, social relationships, and health*. Oxford University Press. https://doi.org/10.1093/acprof:oso/9780195145410.001.0001

Ryff, C., Singer, B. H., Davidson, R., Scherer, K., & Goldsmith, H. (2002). The role of emotion on pathways to positive health. *Handbook of Affective Science*.

Sadick, A. M., & Kamardeen, I. (2020). Enhancing employees' performance and well-being with nature exposure embedded office workplace design. *Journal of Building Engineering*, *32*, 101789. https://doi.org/10.1016/j.jobe.2020.101789

Sahu, A., & Srivastava, K. B. (2017). Antecedents and consequences of positive emotions in the workplace. *International Journal of Work Organisation and Emotion*, *8*(2), 99-117. https://doi.org/10.1504/IJWOE.2017.086428

Shah, N. P., Cross, R., & Levin, D. Z. (2018). Performance benefits from providing assistance in networks: Relationships that generate learning. *Journal of Management*, *44*(2), 412-444. https://doi.org/10.1177/0149206315584822

Shiota, M. N., Keltner, D., & Mossman, A. (2007). The nature of awe: Elicitors, appraisals, and effects on self-concept. *Cognition and emotion*, 21(5), 944-963. https://doi.org/10.1080/02699930600923668

Stellar, J. E., John-Henderson, N., Anderson, C. L., Gordon, A. M., McNeil, G. D., & Keltner, D. (2015). Positive Affect and Markers of Inflammation: Discrete Positive Emotions Predict Lower Levels of Inflammatory Cytokines. *Emotion*. Advance online publication. http://dx.doi.org/10.1037/emo0000033

Stellar, J. E., Gordon, A. M., Piff, P.K., Cordaro, Andersn, C.K., Bai, Y, Maruskin, L.A. & Keltner, D. (2017). Self-Transcendent Emotions and Their Social Functions: Compassion, Gratitude, and Awe Bind Us to Others Through Prosociality. *Emotion Review*, 9(3),1-8 https://doi.org/10.1177/1754073916684557

Stenfors, C. U., Van Hedger, S. C., Schertz, K. E., Meyer, F. A., Smith, K. E., Norman, G. J., ... & Berman, M. G. (2019). Positive effects of nature on cognitive performance across multiple experiments: Test order but not affect modulates the cognitive effects. *Frontiers in psychology*, *10*, 1413. https://doi.org/10.3389/fpsyg.2019.01413

Springer, A. (2017). Who Experiences the Most Awe? Greater Good Science Centre at UC Berkeley. https://greatergood.berkeley.edu/article/item/who_experiences_the_most_awe

Sun, Z., Hou, Y., Song, L., Wang, K., & Yuan, M. (2023). The buffering effect of awe on negative emotions in self-threatening situations. *Behavioral Sciences*, 13(1), 44. https://doi.org/10.3390/bs13010044

Tee, E. Y., & binti Raja Reza Shah, R. I. A. (2023). Self-transcendent emotions and their influence on organizational effectiveness: A literature review and synthesis. *Asian Journal of Social Psychology*, *26*(1), 146-163. https://doi.org/10.1111/ajsp.12550

Thompson, E. R. (2007). Development and validation of an internationally reliable short-form of the positive and negative affect schedule (PANAS). *Journal of cross-cultural psychology*, 38(2), 227-242. https://doi.org/10.1177/0022022106297301.

Upenieks, L., & Krause, N. (2024). Transcendental awe of God and dimensions of well-being: Exploring the mediating role of meaning in life. *Journal of religion, spirituality & aging*, 36(1), 5-25., https://doi.org/10.1080/15528030.2022.2114575

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, 54(6), 1063–1070. https://doi.org/10.1037/0022-3514.54.6.1063

Weiss, H. M. (2002). Deconstructing job satisfaction: Separating evaluations, beliefs and affective experiences. *Human resource management review*, *12*(2), 173-194. https://doi.org/10.1016/S1053-4822(02)00045-1

Weiss, H. M., & Cropanzano, R. (1996). Affective events theory. *Research in organizational behavior*, *18*(1), 1-74.

Yin, M., & Lee, E. J. (2023). Planet earth calling: unveiling the brain's response to awe and driving eco-friendly consumption. *Frontiers in Neuroscience*, *17*, 1251685. https://doi.org/10.3389/fnins.2023.1251685

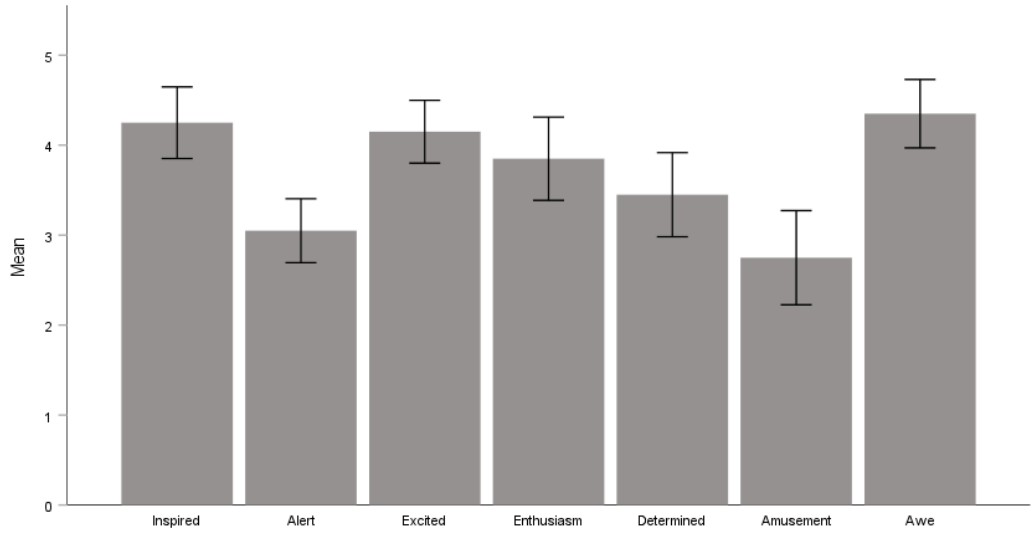
Zacher, H., Rudolph, C. W., & Katz, I. M. (2023). Employee green behavior as the core of environmentally sustainable organizations. *Annual Review of Organizational Psychology and Organizational Behavior*, *10*(1), 465-494. https://doi.org/10.1146/annurev-orgpsych-120920-050421

Zhao, H., Zhang, H., Xu, Y., He, W., & Lu, J. (2019). Why are people high in dispositional awe happier? The roles of meaning in life and materialism. *Frontiers in psychology*, 10, 1208. https://doi.org/10.3389/fpsyg.2019.01208

8. Appendices

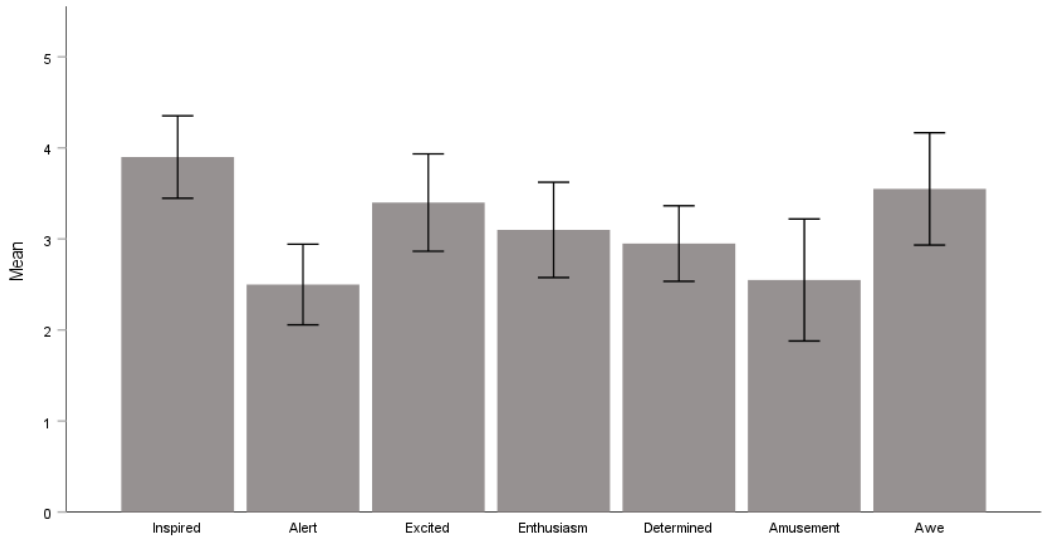
Appendix A – *Results Study 1 – Awe Stimuli*

Figure A1 – *Mean motion scores & error bars across PA in "Cosmos" video.*



Note. Error Bars 95%CI

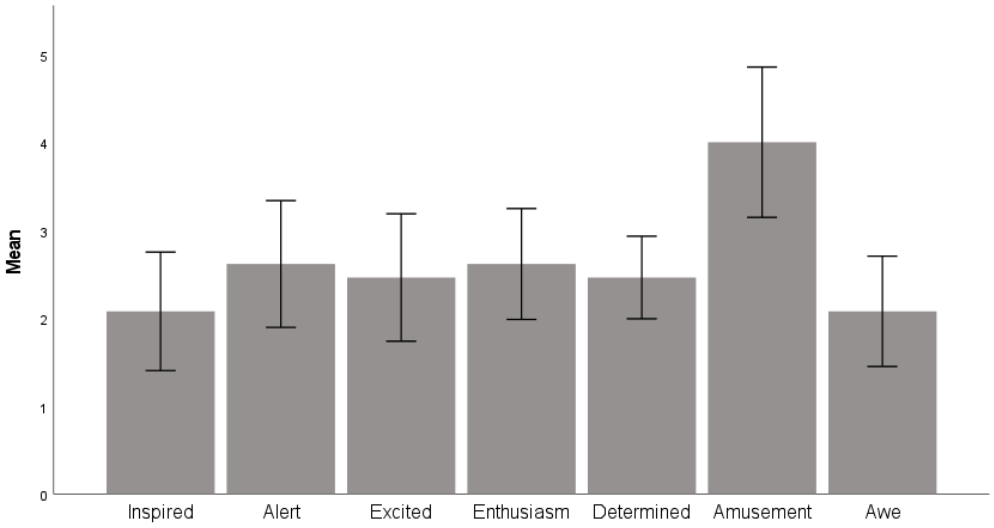
Figure A2 – *Mean motion scores & error bars across PA in "Forest" video.*



Note. Error Bars 95%CI

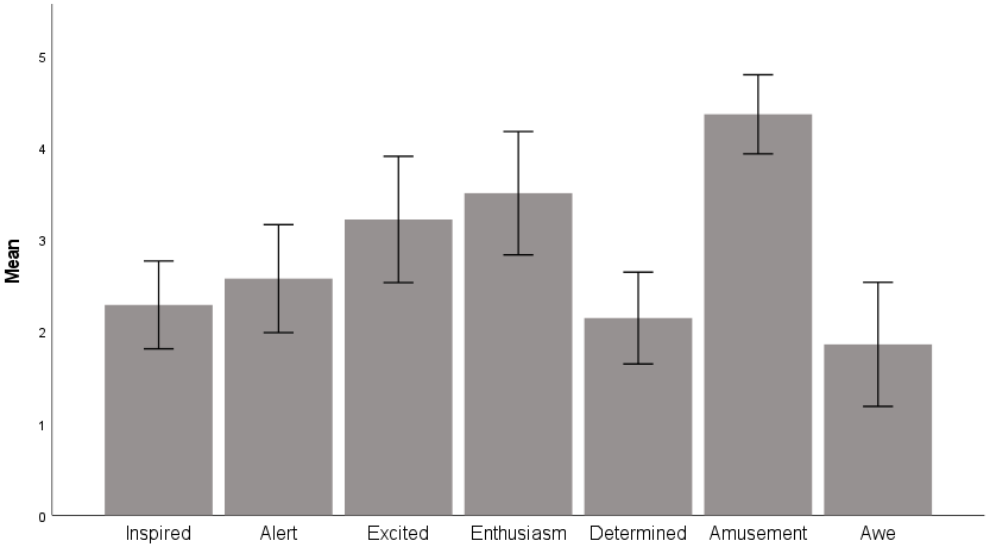
Appendix B – *Results Study 1 – Amusement Stimuli*

Figure B1 – *Mean motion scores & error bars across PA in "Man Park" video.*



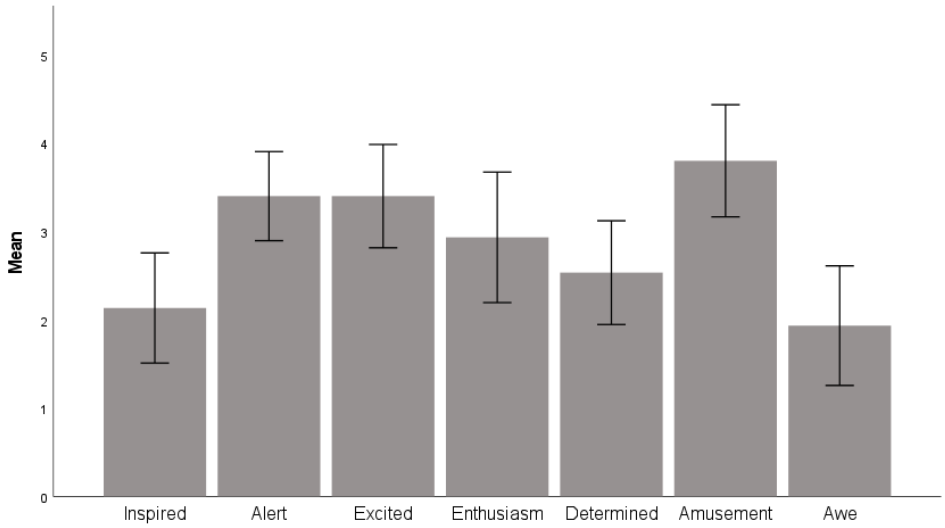
Note. Error Bars 95%CI

Figure B2 – *Mean motion scores & error bars across PA in "Friends" video.*



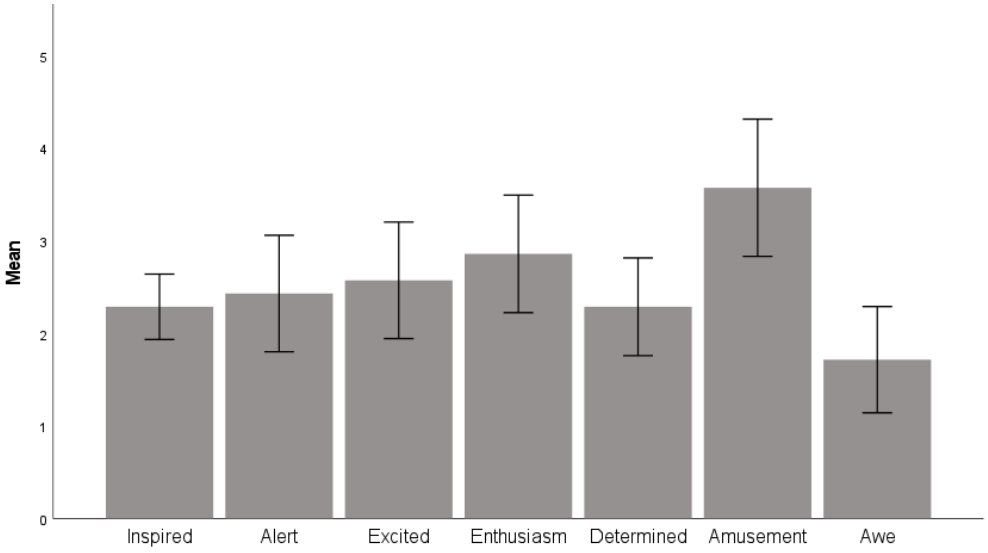
Note. Error Bars 95%CI

Figure B3 – *Mean motion scores & error bars across PA in "BeReal" video.*



Note. Error Bars 95%CI

Figure B4 – *Mean motion scores & error bars across PA in "Straight Male Friend" video.*



Note. Error Bars 95%CI

Appendix C - *Academic Satisfaction Scale*

Please rate your level of agreement with the below statements on your satisfaction with your academic/school life, with this scale:

1 = Strongly disagree

2 = Disagree

3 = Neither

4 = Agree

5 = Strongly agree

	1	2	3	4	5
I feel satisfied with the decision to major in my intended field	○	○	○	○	○

	1	2	3	4	5
I am comfortable with the educational atmosphere in my major field.	○	○	○	○	○

	1	2	3	4	5
For the most part, I am enjoying my coursework.	○	○	○	○	○

	1	2	3	4	5
I am generally satisfied with my academic life.	○	○	○	○	○

	1	2	3	4	5
I enjoy the level of intellectual stimulation in my courses.	○	○	○	○	○

	1	2	3	4	5
I feel enthusiastic about the subject matter in my intended major.	○	○	○	○	○

	1	2	3	4	5
I like how much I have been learning in my classes.	○	○	○	○	○

Appendix D – *Digits Backward Span Test*

Instructions*:*

Instructions - Task

You will now see several sequences of digits. You will see each sequence one after another, starting with four digits and continuing up to nine.

Each sequence will be presented onscreen for three seconds. **Following each sequence you will be asked to repeat the sequence (in reverse order) and type it in the appropriate space in the questionnaire.**

For example, if the sequence is "3657" you should type "7563" in the questionnaire. You will have ten seconds to fill in the digits in the questionnaire before the next sequence is displayed on the screen.

Please pay attention while the sequence is displayed on the screen, so you can memorize the digits. **Once the sequence disappears, go back to the survey and type the sequence (in reverse order) in the appropriate space.**

Continue doing this for each sequence until you see an onscreen message informing you that the task is over.

18

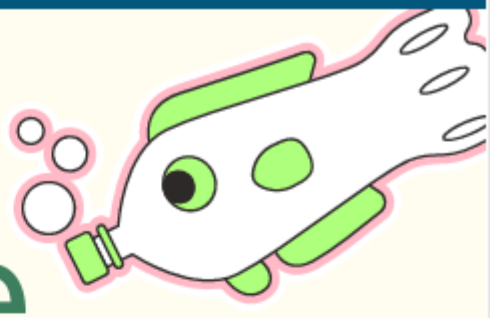
Sequences:

1.	9 7 5 4
2.	3 8 2 5
3.	9 4 3 1 8
4.	6 8 2 5 9
5.	9 1 3 8 2 5
6.	6 4 8 3 7 1
7.	7 9 5 8 4 2 3
8.	5 3 1 6 8 4 2
9.	8 6 9 5 1 3 7 2
10.	5 1 7 3 8 8 2 6
11.	7 1 9 3 8 4 2 6 1
12.	1 6 3 8 7 4 9 5 2
13.	9 1 5 2 4 3 8 1 6 2
14.	7 1 5 4 8 5 6 1 9 3

Appendix E – *Material to pro-environmental behavior intentions measures.*

CATOLICA
CRC-W - CATOLICA RESEARCH CENTRE FOR PSYCHOLOGICAL, FAMILY AND SOCIAL WELLBEING
LISBON

Reuse
Reduce
Recylce



400
million tonnes

of plastic are produced globally per year. 50% of it being designed for single use purposes and thus going to landfill after being used - once.

Besides reusing and reducing, **recycling** is one possible initative to tackle plastic waste and take responsibility for environmental protection.

But why do we not have ANY Recycling Bins on UCP campus?

We want to make a change and contribute to a greener campus & planet!!

Take action now & sign the petition for recycling bins at UCP!

Contact: crcw@ucp.pt

CATOLICA
CRC-W - CATOLICA RESEARCH CENTRE FOR PSYCHOLOGICAL, FAMILY AND SOCIAL WELLBEING
LISBOA

Petição dos estudantes Ecopontos na FCH

Nos últimos 50 anos, a produção de plástico aumentou muito, reflectindo um crescimento semelhante dos resíduos de plástico. Anualmente, são produzidas cerca de 400 milhões de toneladas de resíduos de plástico a nível mundial. No total, metade de todo o plástico produzido é concebido para fins de utilização única, sendo depositado em aterros depois de ter sido utilizado - só uma vez (ONU, n.d.).

Para evitar que os produtos vão para os aterros, devem ser reciclados. Para além da reutilização e da redução, a reciclagem é uma acção importante na proteção do ambiente (EPA, 2023).

A reciclagem traz vários benefícios para o ambiente, economia e comunidades:

- Conservar os recursos naturais,
- Alterações climáticas,
- Poupança de energia,
- Redução dos resíduos e da poluição (EPA, 2023)

Um pré-requisito para a reciclagem é ter contentores de reciclagem - algo que não temos no campus da UCP em Lisboa. É por isso que é quase impossível assumir a nossa responsabilidade de proteger o ambiente.

Queremos mudar esta situação e queremos ser capazes de reconhecer o nosso papel na proteção do ambiente!

Assim, criámos esta petição para levar esta nossa preocupação à Srª reitora da UCP e solicitar a instalação de ecopontos no campus de Lisboa.

Reconheça a sua responsabilidade para um campus e um planeta mais verde e assine já a nossa petição!

Se tiver alguma dúvida, não hesite em contactar-nos: crcw@ucp.pt
Muito obrigado/a pela sua ajuda!

Cumprimentos, os estudantes associados ao CRC-W
Católica Research Centre for Psychological, Family and Social Wellbeing

CATÓLICA
CRC-W - CATÓLICA RESEARCH CENTRE FOR PSYCHOLOGICAL, FAMILY AND SOCIAL WELLBEING
LISBOA

Student Petition
Recycling Bins at FCH

Over the past 50 years the production of plastic has increased immensely, reflecting a similar growth in plastic waste. Annually approx. 400 million tonnes of plastic waste is produced globally. In total, half of all plastic produced is designed for single-use purposes that goes to landfill after having been used - once (UN, n.d.).

To avoid products going to landfill they should be recycled. Besides reusing and reducing, recycling is an important action in environmental protection (EPA,2023).

Recycling brings numerous benefits for the environment, economy and communities:

- Conserve natural resources,
- Climate change,
- Energy savings,
- Waste and pollution reduction (EPA, 2023)

One prerequisite for recycling is having recycling bins - something that we do not have on UCP campus, making it almost impossible to take on our responsibility to protect the environment.

We want to change this and want to be able to recognize our role in environmental protection!

Thus, we, the students at CRC-W, have created this petition to take our concern to the Rector of UCP and request the installation of recycling bins on the UCP Lisbon campus.

Recognise your responsibility towards a greener campus and planet, and sign the petition now!

If you have any questions, feel free to reach out: crcw@ucp.pt
Thanks for your support!!

Sincerely, the student members of CRC-W
Católica Research Centre for Psychological, Family and Social Wellbeing

Appendix F – *Material to pro-social behavior intentions measure.*

CATÓLICA
CRC-W · CATÓLICA RESEARCH CENTRE FOR PSYCHOLOGICAL, FAMILY AND SOCIAL WELLBEING

Petição dos estudantes Mais opções veganas no bar da FCH!

Hoje em dia, muitas pessoas adotam uma dieta vegetariana ou vegana. Infelizmente, as opções no bar da FCH são muito limitadas: quase não há opções vegetarianas e veganas disponíveis no bar da FCH. Isto torna muito difícil para os estudantes com dietas restritas ou alergias tomarem as suas refeições na universidade. São obrigados a trazer a sua própria comida todos os dias ou a escolher apenas os acompanhamentos disponíveis. Além disso, não podem comprar refeições ligeiras durante os intervalos devido à falta de opções disponíveis.

O aumento das opções vegetarianas e veganas beneficiaria todos os estudantes da FCH, uma vez que uma dieta à base de plantas traz inúmeros benefícios:

- Benefícios para a saúde
- Considerações éticas
- Benefícios ambientais

O aumento das opções veganas e vegetarianas iria satisfazer diferentes necessidades alimentares e promover hábitos alimentares saudáveis.

Assim, nós, os estudantes membros do CRC-W, criámos esta petição para abordar esta questão junto do Diretor da FCH, solicitando a incorporação destas opções dietéticas na cafetaria da FCH.

Mostre o seu apoio à nossa iniciativa assinando a nossa petição!

Se tiver alguma dúvida, não hesite em contactar-nos: crcw@ucp.pt
Muito obrigado/a pela sua ajuda!

Cumprimentos,
os estudantes membros do CRC-W
Católica Research Centre for Psychological, Family and Social Wellbeing

CATOLICA
CRC-W - CATOLICA RESEARCH CENTRE FOR PSYCHOLOGICAL, FAMILY AND SOCIAL WELLBEING
LISBOA

Student Petition Increase Plant-Based choices at FCH Bar!

Today, many people are following a vegetarian or vegan diet. Unfortunately, the options at the FCH bar are very limited: there are barely any vegetarian and no vegan options available in the FCH Bar/cafeteria. This makes it very hard for students with restricted diets or allergies to have their meals at university. They are forced to bring their food every day or only choose the available sides. Also, they are not able to buy any snacks during their breaks due to a lack of available options.

Increasing vegeterian and vegan options would benefit all FCH students since a plantbased diet brings numerous benefits:

- Health related benefits
- Ethical Considerations
- Environmental benefits

The increase in vegan and vegetarian options would cater to different dietary needs and promote healthy eating habit.

Thus, we, the student members of CRC-W, have created this petition to take this issue to the Dean of The faculty of Human Sciences and request the incorporation of plant-based options at the bar/cafeteria.

Show support for our initiative by signing our petition!

If you have any questions, feel free to reach out: crcw@ucp.pt
Thanks for your support!!

Sincerely,
the student members of CRC-W
Católica Research Centre for Psychological, Family and Social Wellbeing

Appendix G – *Further decorative materials used during the experiment*


CATOLICA
CRC-W - CATOLICA RESEARCH CENTRE FOR
PSYCHOLOGICAL, FAMILY AND SOCIAL WELLBEING
LISBOA
HAPPY
EARTH
DAY
april 22

Appendix H – *Full Questionnaire incl. informed consent (English)*

Informed Consent

Dear Participant,

Thank you for participating in this study.

This study aims to investigate if watching certain videos might improve performance and satisfaction with tasks.

You will be asked to answer a few questions related to some short videos you are about to watch. Further, you will perform a task after which you will be answering some related questions. You will be asked to answer truthfully, and as spontaneously as possible. You will also be asked a few additional questions about yourself, which you will answer anonymously.

The total duration of this experiment will be approximately 20-30 minutes.

Please be assured that your answers will be treated confidentially and in accordance with the General Data Protection Regulation (GDPR) guidelines of the European Union. The individual responses are only restricted to the research team and will not be published. Furthermore, all data will be used only for scientific research, will be coded and quantified, and will not be personalized.

Your involvement in this research project is fully voluntary and you are not obliged to take part. If you choose to participate, you have the freedom to withdraw your participation at any point. To discontinue your involvement, you may simply interrupt responding to the survey.

If you have further questions, please do not hesitate to contact me: s-lvogelbacher@ucp.pt

Do you consent participating in this study?

- ○ Yes
- ○ No

Demographic data

Please indicate your age.

_____

Please select your gender.

- ○ Male
- ○ Female
- ○ Non-binary / third gender
- ○ Prefer not to say

Please select your current education level.

- ○ Undergraduate/Bachelor (1)
- ○ Postgraduate/Master (2)
- ○ Doctorate/PhD (3)
- ○ Other (4)

Please indicate your nationality.

_____

SAM – Video 1

The video I have just seen makes me feel.. (please rate from 1 to 5)

Pleasure:

1 = Unhappy

5 = Happy

	1	2	3	4	5
Pleasure	○	○	○	○	○

Arousal:

1 = Calm

5 = Excited

	1	2	3	4	5
Arousal	○	○	○	○	○

Dominance:

1 = Controlled

5 = In control

	1	2	3	4	5
Dominance	○	○	○	○	○

PA-Scale – Video 1

The video I have just seen makes me feel.. (please rate from 1 to 5)

1 = not at all

2 = a bit

3 = moderately

4 = quite a bit

5 = a lot

	1	2	3	4	5
Inspired	○	○	○	○	○

	1	2	3	4	5
Alert	○	○	○	○	○

	1	2	3	4	5
Excited	○	○	○	○	○

	1	2	3	4	5
Enthusiasm	○	○	○	○	○

	1	2	3	4	5
Determined	○	○	○	○	○

	1	2	3	4	5
Amusement	○	○	○	○	○

	1	2	3	4	5
Awe	○	○	○	○	○

SAM – Video 2

The video I have just seen makes me feel.. (please rate from 1 to 5)

Pleasure:

1 = Unhappy

5 = Happy

	1	2	3	4	5
Pleasure	○	○	○	○	○

Arousal:

1 = Calm

5 = Excited

	1	2	3	4	5
Arousal	○	○	○	○	○

Dominance:

1 = Controlled

5 = In control

	1	2	3	4	5
Dominance	○	○	○	○	○

PA-Scale – Video 2

The video I have just seen makes me feel.. (please rate from 1 to 5)

1 = not at all

2 = a bit

3 = moderately

4 = quite a bit

5 = a lot

	1	2	3	4	5
Inspired	○	○	○	○	○

	1	2	3	4	5
Alert	○	○	○	○	○

	1	2	3	4	5
Excited	○	○	○	○	○

	1	2	3	4	5
Enthusiasm	○	○	○	○	○

	1	2	3	4	5
Determined	○	○	○	○	○

	1	2	3	4	5
Amusement	○	○	○	○	○

	1	2	3	4	5
Awe	○	○	○	○	○

Digit Backward Span Task

In a next step you will perform a task. Please wait for the instructions to be displayed on the screen.

As soon as you have read the insructions go to the next page to begin the task.

1. Sequence:

Please type the digits of the sequence you have just seen in **reverse order**.

_____

2. Sequence:

Please type the digits of the sequence you have just seen in **reverse order**.

_____

3. Sequence:

Please type the digits of the sequence you have just seen in **reverse order**.

_____

4. Sequence:

Please type the digits of the sequence you have just seen in **reverse order**.

_____

5. Sequence:

Please type the digits of the sequence you have just seen in **reverse order**.

_____

6. Sequence:

Please type the digits of the sequence you have just seen in **reverse order**.

_____

7. Sequence:

Please type the digits of the sequence you have just seen in **reverse order**.

_____

8. Sequence:

Please type the digits of the sequence you have just seen in **reverse order**.

_____

9. Sequence:

Please type the digits of the sequence you have just seen in **reverse order**.

_____

10. Sequence:

Please type the digits of the sequence you have just seen in **reverse order**.

_____

11. Sequence:

Please type the digits of the sequence you have just seen in **reverse order**.

_____

12. Sequence:

Please type the digits of the sequence you have just seen in **reverse order**.

_____

13. Sequence:

Please type the digits of the sequence you have just seen in **reverse order**.

_____

14. Sequence:

Please type the digits of the sequence you have just seen in **reverse order**.

_____

You have completed the task!

In the next step you will be asked to answer some questions related to the task and your academic life.

Task Satisfaction

Please rate your level of agreement with the below statements on your satisfaction related to the task you have just performed (digit task), with this scale:

1 = Strongly disagree

2 = Disagree

3 = Neither

4 = Agree

5 = Strongly agree

	1	2	3	4	5
I am satisfied with the task	○	○	○	○	○

	1	2	3	4	5
I am satisfied with my task performance	○	○	○	○	○

Domain Satisfaction

Please rate your level of agreement with the below statements on your satisfaction with your academic/school life, with this scale:

1 = Strongly disagree

2 = Disagree

3 = Neither

4 = Agree

5 = Strongly agree

	1	2	3	4	5
I feel satisfied with my life at the university.	○	○	○	○	○

	1	2	3	4	5
I feel satisfied with the decision to major in my intended field	○	○	○	○	○

	1	2	3	4	5
I am comfortable with the educational atmosphere in my major field.	○	○	○	○	○

	1	2	3	4	5
For the most part, I am enjoying my coursework.	○	○	○	○	○

	1	2	3	4	5
I am generally satisfied with my academic life.	○	○	○	○	○

	1	2	3	4	5
I enjoy the level of intellectual stimulation in my courses.	○	○	○	○	○

	1	2	3	4	5
I feel enthusiastic about the subject matter in my intended major.	○	○	○	○	○

	1	2	3	4	5
I like how much I have been learning in my classes.	○	○	○	○	○

End of survey

We thank you for your time spent taking this survey.

Your response has been recorded.