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# How Cognitive Flexibility Affects Sense of Power in a Coffee Virtual Setting: the Moderating Role of Personality Traits

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## Abstract

In this study, we cross two sensory experiences, one with the senses of sight and sound and the other with the senses of sight, sound, and smell. The experience takes place in a Virtual Coffee and measures the impact it has on the sense of power. We analyse the concepts of Sense of Power and Cognitive Flexibility. Personality traits is analysed as a moderator in the relation between Sense of Power and Cognitive Flexibility. A sample of 125 individuals participated in the experiment. Results show that Cognitive Flexibility significantly and positively explains Sense of Power. Personality Traits moderates the relationship between Cognitive Flexibility and Sense of Power.

**Keywords:** Sense of Power, Cognitive Flexibility, Personality Traits, Sight, Sound, Smell.

## 1 Introduction

A brand should always be improved and maximized in to offer a full emotional and sensorial experience (e.g., Bilro et al., 2021; Prentice et al., 2019; Roschk et al., 2017). It is not enough to visually present a product in an advertisement. It is important to associate a sound, music for example, or words and powerful symbols. The combination of visual and audible stimulus has a much bigger impact but to keep a strong brand, it is necessary to activate consumer's five senses (Loureiro, Correia, & Guerreiro, 2022). The touch, smell and flavours are crucial in the construction of a truly relevant brand (Loureiro, Gorgus, & Kaufmann, 2017). The usage of the five senses and a multisensory atmospheric retail is also very important to and have an influence on shopping behaviour in a cognitive and affective manner (Kaufmann et al., 2016; Loureiro & Ribeiro, 2014; Rodrigues & Loureiro, 2022).

Virtual reality (VR) has several potential benefits for businesses and customers in a retail scenario (Saren et al., 2013; Bradford et al., 2017; Müller-Lankenau & Wehmeyer, 2005; Loureiro et al., 2019). For instance, the use of virtual reality in retail may blur the barrier between in-person and online purchases, owing to its qualities such as interaction, immersion, and sensory feedback (Smolentsev et al., 2017). Prior studies on VR tend to focus on engagement and interactivity (Mollen & Wilson, 2010; Loureiro; Bilro, & Angelino, 2020), telepresence (Steuer, 1992; Angelino et al., 2021), purchase behaviour (Waterlander, Jiang, Steenhuis & Mhurchu, 2015; Loureiro, Guerreiro, & Japutra, 2021) and customer experience (Novak, Hoffman, Donna, & Yung, 2000). Yet, the literature is scarce on how consumers cognitive abilities and personality traits affect the VR experience. Our study gives a contribution to the literature by exploring not only how the cognitive flexibility can affect the sense of power in a virtual environment, but also by exploring the different degrees of multisensory experience in a virtual environment and how it is affected by personality traits. Thus, the aims are: (i) explore how cognitive flexibility influences sense of power in a context of a VR coffee shop; (ii) analyse personality traits as moderator of cognitive flexibility and sense of power.

## 2 Literature Review and Hypotheses Development

Cognitive flexibility is "the ability to switch cognitive sets to adapt to a changing environmental stimulus" (Dennis & Vander Wal, 2010, p.242). It is characterized by the ability to adapt the way of thinking according to new facts and new circumstances in one's environment (Deak, 2003). In the case of a VR environment, people of higher cognitive flexibility are expected to adapt better to the immersive stimuli (Loureiro, 2020; Loureiro, Guerreiro, & Ali, 2020). and thus, we expect, tend to exhibit a higher sense of

control in such setting. Sense of power has been defined as an "asymmetric control over valued resources in social relations" (Rucker, Galinsky, & Dubois, 2012; Keltner, Gruenfeld, & Anderson, 2003; Thibaut & Kelley, 1959). Nevertheless, power is not merely the control over resources or composed just by an individual's social position. Power is a psychological state—a perception of a person's capacity to influence others (Galinsky et al., 2003). Feeling powerless is a typical uncomfortable sensation that customers want to alleviate. According to Rucker, Galinsky, & Dubois (2012), when people perceive themselves to be powerless, they put a larger premium on products and particular characteristics that aid in their power restoration efforts. This is because – when it comes to consumption – power-compensatory behaviour is exemplified by a preference for status-type things. Rucker, Dubois and Galinsky (2011) support that consumer spending (whether it is for their own benefit or the benefit of others) can be considerably affected by current psychological states of power. Given that cognitive flexibility is defined as the capacity to adapt one's style of thinking to changing circumstances, we claim that cognitive flexibility has a beneficial influence on one's feeling of power, generating the following hypothesis:

**H1: Cognitive Flexibility has a positive and significant effect on Sense of Power in a VR environment**

Specific personality traits can benefit individuals to obtain higher levels of influence and control in their relationships, contributing to each personal sense of power (Buss & Craik, 1980). For example, dominating persons have a better capacity to influence others than introverted, shy, or submissive ones. Personality characteristics are uncontrollable elements, yet they are flexible and may be altered over time.

These traits vary from higher or lower openness to experience, neuroticism, consciousness, agreeableness, and extroversion. These variations define not only a person's personality, but they will have impact on their sense of power. For example, an individual that scores higher in consciousness, is likely to have a greater sense of power than one low in consciousness. Therefore, we suggest that the same effect can occur in a VR environment. Hence:

**H2: Personality traits will moderate the relationship between cognitive flexibility and sense of power in a VR environment**

## 3 Methodology

A virtual coffee was created using silent avatars as customers to create a more realistic experience (using unity programming language) (see Fig. 1). Background music was playing, to set an environment. The participant sat in a chair, inserted the VR Goggles, and found him/herself sitting in a café table. In one condition, there was only the presence of vision and hearing. On the second condition an ambient scent of coffee was inserted, adding to the existing senses of vision and hearing. The two conditions were shown to different groups of people. The participants were finally asked to fill in a questionnaire. Participant's sense of power (Anderson, John, & Keltner, 2012); an evaluation of their cognitive flexibility (Martin & Rubin, 1995); and an analysis of their personality traits (Guido et al., 2015) were measured using tested scales. There were 125 participants in the study (78 females and 47 males). 63 participants completed the sight and sound condition, while 62 participants explored the VR experience with sight, sound, and scent.

**Fig. 1.** Virtual Coffee

## 4 Results

A multi-regression analysis was conducted to test H1 and H2. Globally, the results show that cognitive flexibility significantly predicts sense of power. Therefore, the H1 is supported. The findings on Table 1 also show that H2 was supported.

**Table 1.** Moderation analysis total results – Sense of power as dependent variable and personality traits and cognitive flexibility as predictors

| Model | B | Std. Error | ß | t | Sig | $R^2$ |
|---|---|---|---|---|---|---|
| 1.(Constant) (Sensory Experience | | | | | | |
| Sight + Sound + Smell) | 3.137 | 0.492 | | 6.377 | 0.000 | |
| Cognitive Flexibility | 0.417 | 0.109 | 0.325 | 3.809 | 0.000 | 0.105 |
| a. Dependent Variable: Sense of Power | | | b. Predictors: (Constant). Cognitive Flexibility | | | |
| 2.(Constant) | 2.703 | 0.640 | | 4.223 | 0.000 | |
| Cognitive Flexibility | 0.379 | 0.115 | 0.296 | 3.301 | 0.001 | |
| Personality Traits | 0.180 | 0.169 | 0.095 | 1.062 | 0.291 | 0.114 |
| 3.(Constant) | 2.826 | 0.631 | | 4.479 | 0.000 | |
| Cognitive Flexibility | 0.356 | 0.113 | 0.278 | 3.143 | 0.002 | |
| Personality Traits | 0.181 | 0.166 | 0.096 | 1.088 | 0.279 | |
| CF_x_PT | -0.134 | 0.058 | -0.195 | -2.323 | 0.022 | 0.152 |
| a. Dependent Variable: Sense of Power | | | b. Predictors: (Constant). Personality Traits, Cognitive Flexibility | | | |

## 5 Conclusion and Implication

The positive effect of cognitive flexibility on sense of power can be partially supported by the study of Anderson, John and Keltner (2012). Personal sense of power is organized in several levels of abstraction and may continuously change depending on the situation and one's relationship with others. This means that people with higher sense of power easily adjust that power according to the group, the situation, the type of relationship. Essentially, these individuals adjust easily and so they possess a higher cognitive flexibility. The findings show that the cognitive flexibility influences the sense of power in a VR environment. However, participants' responses were more positive when in a sensory experience with sigh, sound and smell then in an experience with just the senses of sight and sound. This finding goes in line with studies by Lindtrom (2008) that concluded that the more senses associated with a brand the more relevant a brand becomes.

Additionally, individuals that that have a high extroversion tend to be more sociable, energetic, outgoing, and enthusiastic (Costa & McCrae, 1992; Thomas, Moore, & Scott, 1996). Individuals with high and low extroversion, are both significant in explaining the relationship between cognitive flexibility and sense of power. However, participants who are less agreeable play a more significant role in explaining the relationship between cognitive flexibility and sense of power than those who are more agreeable. Participants with lower consciousness are better in explaining the relation between cognitive flexibility and sense of power in the model. Both, individuals with high and low openness, were found to be significant in explaining the relationship between the variable's cognitive flexibility and sense of power.

Brand managers should be aware about the importance of the customer's cognitive flexibility and how they adapt to the environment, this can be very important when designing a VR store, for example.

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