



Higher or Lower? Examining Germany's Susceptibility to Anchoring Bias on the Basis of Cultural Dimensions

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ABSTRACT

Title: Higher or Lower? Examining Germany's Susceptibility to Anchoring Bias on the Basis of Cultural Dimensions

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As the intercultural environment in organizations increases, so does the importance of understanding how cultural factors influence human behavior. That cognitive biases sometimes hinder people from making rational decisions is widely known. Certain biases are particularly important for managers, both to avoid them or to use them to their advantage. For example, anchoring can steer negotiations in the desired direction.

Literature showed that biases vary from culture to culture. However, the understanding of how cultural dimensions predict susceptibility to anchoring is still limited. Existing literature in this area is subject to ecological fallacy of inferring individual behavior from aggregate data. Instead, this dissertation is the first to measure five culture dimensions at the individual level and link it to anchoring bias through primary data.

This study, conducted in Germany with over 1,000 participants, used a correlational approach to show that susceptibility to anchoring bias can increase with higher levels of Power distance and Uncertainty avoidance as well as lower levels of Long-term orientation. Masculinity and Collectivism were also examined but showed no significant effect on Anchoring. Managers can use these insights to identify the culture's susceptibility to anchoring and target markets exhibiting these patterns to improve pricing, negotiation strategies, and marketing campaigns.

Keywords: Decision Making, Cognitive Bias, Anchoring Bias, Culture, Cultural Dimensions, Hofstede

SUMÁRIO

Título: Mais alto ou mais baixo? Examinando a suscetibilidade da Alemanha ao enviesamento de ancoragem com base nas dimensões culturais

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À medida que o ambiente intercultural nas organizações aumenta, também aumenta a importância de compreender como os fatores culturais influenciam o comportamento humano. O facto de os enviesamentos cognitivos impedirem por vezes as pessoas de tomarem decisões racionais é amplamente conhecido. Certos preconceitos são particularmente importantes para os gestores, tanto para os evitar como para os utilizar em seu benefício. Por exemplo, a ancoragem pode orientar as negociações na direção desejada.

A literatura mostrou que os preconceitos variam de cultura para cultura. No entanto, a compreensão da forma como as dimensões culturais preveem a suscetibilidade à ancoragem é ainda limitada. A literatura existente nesta área está sujeita à falácia ecológica de inferir o comportamento individual a partir de dados agregados. Em vez disso, esta dissertação é a primeira a medir cinco dimensões culturais a nível individual e a associá-las ao enviesamento de ancoragem através de dados primários.

Este estudo, realizado na Alemanha com mais de 1,000 participantes, utilizou uma abordagem correlacional para mostrar que a suscetibilidade ao enviesamento da ancoragem pode aumentar com níveis mais elevados de distância ao poder e de evitamento da incerteza, bem como com níveis mais baixos de orientação a longo prazo. A Masculinidade e o Coletivismo também foram examinados, mas não revelaram efeitos significativos na Ancoragem. Os gestores podem utilizar estes conhecimentos para identificar a suscetibilidade da cultura à ancoragem e visar os mercados que exibem estes padrões para melhorar os preços, as estratégias de negociação, e as campanhas de marketing.

Palavras-chave: Tomada de decisões, preconceito cognitivo, preconceito de ancoragem, cultura, dimensões culturais, Hofstede

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LIST OF ABBREVIATIONS

CA	Cronbach's Alpha
DV	Dependent Variable
M	Mean
P	P-value
SD	Standard Deviation
TA	Transformed Anchoring Value

CHAPTER 1: INTRODUCTION

1.1 Topic Presentation

The decision-making process is a core element of the human thought process that influences our daily lives. This process happens so constantly that research suggests it can happen up to 35,000 times a day (Krockow, 2018). Everyday decisions like which shirt to wear and life-changing decisions of how to evaluate job offers alike keep our minds busy. But how many of these do we make rationally? How many are we the sole owners of and how many are the result of unintended influence? And does this influence differ between cultures?

In today's fast-growing and cross-cultural environment of business and society, it is of great importance for managers to understand the behavior of diverse cultures. One phenomenon that significantly influences human actions within this context is cognitive biases (Kahneman, 2011).

One of the most powerful of these biases is that of anchoring, which uses initial (mostly numerical) information to influence judgments (Epley & Gilovich, 2006). This bias can vary from person to person based on their level of motivation (Epley & Gilovich, 2006), emotions (Englich & Soder, 2009), knowledge and experience in the field (Eroglu & Croxton, 2010) as well as source credibility (Wegener et al., 2010).

But to what extent does susceptibility vary based on cultural factors? Understanding the susceptibility to anchoring by virtue of their measured cultural dimensions can help to make strategic decisions like market entries or marketing campaigns more successful. This study examines the relationship between Hofstede's cultural dimensions, namely power distance, uncertainty avoidance, masculinity, long-term orientation, and anchoring bias, analyzing the influence of anchoring values in Germany.

1.2 Problem Statement & List of Research Questions

Many studies have shown the extent to which humans can be misled by cognitive biases into making suboptimal decisions and that this varies across different cultures (Anderson et al., 2011; Baack et al., 2015; Bettencourt et al., 2001; Czerwonka, 2017; Weisbuch & Ambady, 2009). However, the current understanding about the influence of cultural factors remains limited. Existing literature does address the relationship between culture and biases, for example, home- (Anderson et al., 2011), nonverbal- (Weisbuch & Ambady, 2009), in-group (Bettencourt et al., 2001) and confirmation bias (Baack et al., 2015) but the knowledge about

the relationship with anchoring does not seem to be sufficiently researched so far. The only research that can be found that has looked at the link between Hofstede's cultural factors and anchoring (see, Wang et al., 2022) neglects the criticism of generalizing Hofstede's findings in the form of the culture compass, which shows the values of each country, and conducting research based on these measures rather than collecting the values themselves or measuring them with reliable scales (Yoo et al., 2011). In doing so, the correlation is focused on the country level instead of the individual level, which does not circumvent the ecological fallacy of generalization (Blodgett et al., 2008; Sharma, 2010). Another limitation is that their findings are solely based on three dimensions (power distance, uncertainty avoidance, and individualism).

Therefore, the problem of several research papers investigating cultural dimensions is that they simply adapt the numbers measured on average but neglect the individual level (Yoo et al., 2011), which this research paper aims to measure to then find a possible relationship between susceptibility to anchoring and the measured cultural dimensions. The goal of this research is then to identify which cultural dimensions predict susceptibility to anchoring bias.

The study aims to answer the following research question:

How does culture impact the expression of anchoring bias?

To address the primary research question, the following sub-questions are formulated:

- *Which cultural dimensions are related to the susceptibility of anchoring biases?*
- *Which cultural dimensions may help reduce anchoring bias?*
- *To what extent is a person's confidence level related to the level of anchoring bias?*
- *Does the susceptibility to the anchoring effect vary when a high or low anchor is given?*

1.3 Managerial and Academic Relevance

A significant phenomenon that influences human behavior in a suboptimal way is cognitive biases. Anchoring is one of the most intensively studied biases (Sapoznik et al., 2016), being influenced by it in all kinds of situations which often arise in the business context like pricing strategies (Cho et al., 2017).

Yoo and collaborators (2011) highlight the fundamental issue that managers face in their daily decisions when trying to define strategies in an emerging market inhabited by people from different cultures (Blodgett et al., 2008). Understanding human actions and thinking in the

target market is valuable for understanding the customers in the market, establishing successful cooperation with new trading partners, or creating an understanding working climate in the office (Yoo et al., 2011).

Therefore, understanding the extent to which cultural factors contribute to anchoring susceptibility could be of great importance. In the form of the widely established cultural dimensions of Hofstede, the recognition of patterns could be particularly valuable for managers in a business context. Psychologists have also long been concerned with the extent to which culture influences human behavior (Brislin, 1993), and it has also been established that certain patterns in cultures show varying degrees of susceptibility to certain heuristics and cognitive biases (e.g., Anderson et al., 2011; Baack et al., 2015; Bettencourt et al., 2001; Weisbuch & Ambady, 2009). By measuring the dimensions at the individual level, this study is, to the best of my knowledge, the first to address one of the major criticisms of the typical use of Hofstede's established model, namely that people differ significantly from one another within a country and that their behavior cannot be generalized across all people living in the explored country. Using this type of measurement is expected to make it possible to establish reliable correlations between the dimensions and anchoring bias, in line with the argument from several scholars (e.g., Bernardi, 2006; Smith, 2004). This study contributes to filling a research gap in the literature by being the first to examine the relationship between the five cultural dimensions and anchoring bias at an individual level.

1.4 Dissertation Structure

The research work begins with the introduction explaining the fundamental topic, the research questions including their sub-questions as well as the relevance of the topic. The following chapter gives the theoretical basis in the form of the literature review, which summarizes the current state of knowledge on the topics of cultural models and cognitive biases, with a focus on Hofstede's cultural dimensions and anchoring bias, ending with the developed hypotheses. The third chapter deals with the research methodology, which represents the chosen approach to test the hypotheses. This involves surveying 1,010 participants in Germany through an online survey, providing the primary data that is then analyzed and evaluated using SPSS. Chapter four presents the results and discussion. Results are presented and then discussed in light of the existing literature, from which conclusions are drawn that support or falsify the stated hypotheses. The thesis ends with a conclusion that summarizes the most important results and integrates them into insights for managers and researchers alike.

CHAPTER 2: LITERATURE REVIEW

2.1 Decision-Making

Every day, humans make up to 35,000 conscious and unconscious decisions a day, whether it is choosing the supermarket, the means of transportation to work or university, thinking about the next vacation destination, or even unconscious decisions, such as breathing or blinking the eyes (Krockow, 2018). People make decisions because they feel the desire to counteract a certain negative stimulus such as hunger, or to satisfy needs like affection, for example (Redish, 2013).

Decisions are made by combining numerous decision-making systems (Redish, 2013). Kahneman (2011) distinguishes between Systems 1 and 2, which are directly linked to attention, perception, as well as the processing of information, and therefore ultimately play a decisive role in making decisions. System 1 is the part of the brain that works quickly and intuitively, whereas System 2 is the counterpart responsible for rational and reflective thinking (Kahneman, 2011). Due to its limited capacity, the brain uses the first system about 95% of the time and thus tries to optimize decision making avoiding unnecessary overload (Kahneman, 2011). Without this automatic regulation, thinking about any task no matter how simple, would take hours and the day would be over before anything meaningful could be accomplished (Ehrlinger et al., 2016). System 1, therefore, allows these daily tasks to be performed incidentally due to their simplicity and repetitive nature (Korteling et al., 2018).

But how do people behave when it comes to life-changing decisions, such as evaluating and selecting job offers? This was observed in students who had been taught rational evaluation methods for years and yet almost all of them relied on their gut feelings in making such complex decisions (Klein, 2017). So even MIT graduates, who have been taught rational choice theory for years, seem not to apply the learned theory when it comes to praxis to act rationally (Klein, 2017).

2.2 Cognitive Biases

“Cognitive illusions will occur unless they are prevented by System 2” (Kahneman, 2002, p. 482).

People are influenced in all decisions both consciously and unconsciously (Korteling et al., 2018). Ehrlinger and collaborators (2016) show that especially unconscious or regular decisions are mostly based on short-cuts and rule-of-thumb schemes and are, therefore, particularly susceptible to giving in to certain biases thus limiting efficient decision-making. By influencing

how people think and perceive things, cognitive biases affect decision-making and often hinder rational behavior (Kahneman, 2011). This way, "they lead to systematic and predictable errors" (Tversky & Kahneman, 1974, p. 1131), that is, to cognitive biases. Especially when it comes to decisions that are characterized by uncertainty, there is usually an interplay between intuition and rationality (Sadler-Smith & Shefy, 2004). The intuitive System 1, which creates mental shortcuts, is particularly susceptible to cognitive biases (Ehrlinger et al., 2016). Suboptimal outcomes due to biases can arise especially when intuitive decisions are executed by the fast-acting System 1 but are not subsequently checked by the reflective and evaluative System 2 (Andersen & Hjortskov, 2016; Kahneman, 2002). Thus, this type of division of information processing between the two systems is both a curse and a blessing. A blessing as it ensures that we complete simple tasks sufficiently well on a daily basis rather quickly and without much effort, and provides our brain with sufficient capacity for difficult and changing tasks (Korteling et al., 2018). A curse, as while these often simplify daily tasks, they can also lead to suboptimal outcomes and systematic biases (Tversky & Kahneman, 1974). Biases are more likely to occur when people struggle with limited time, limited cognitive capacity, or with complex decisions (Busenitz & Barney, 1997; Tversky & Kahneman, 1974). In these situations, heuristics, rules of thumb, or mental shortcuts are helpful to act quickly and achieve an acceptable outcome (Hutchinson & Gigerenzer, 2005). They arise because the brain filters, simplifies, and interprets complex information in order to function more efficiently in the multitude of stimuli and information with which we are consciously and unconsciously confronted daily (Gigerenzer & Selten, 2002). But they do not apply well to all situations, leading to biased decision-making.

2.2.1 Anchoring Bias

One of the most widely studied cognitive biases that people encounter, and are strongly affected by in daily situations, is that of anchoring (Cho et al., 2017). It occurs when people are influenced by the first given information when making decisions (Kahneman, 2011). People tend to see this initial information as a reference point or as a possible hint (Chapman & Johnson, 1999; Wegener et al., 2010) and adjust their estimation based on this (usually) numerical value until they reach a plausible range (Epley & Gilovich, 2006), a phenomenon also known as anchoring and adjustment (Tversky & Kahneman, 1974).

During anchoring both defined Systems 1 and 2 are tricked (Kahneman, 2011). The given anchor initiates stimulus processing in System 1 and is subsequently evaluated in System 2 as to whether this number is perceived as too high or too low (Kahneman, 2011).

In this case, the problem is that people in the evaluative process become mostly too influenced by the previously given value and do not sufficiently shift away from it (Andersen & Hjortskov, 2016). Epley & Gilovich (2006) addressed the question of why the adjustment part tends to be insufficient. They concluded that people "stop adjusting once their adjustments fall within an implicit range of plausible values" (Epley & Gilovich, 2006, p. 316) from a point where they lose motivation to further adjust (Petty & Cacioppo, 1986). The biases' robustness goes so far that even a strong influence of the reference point could be measured, even if these anchoring values were given randomly by a "spin of a wheel of fortune" (Kahneman, 2011, p. 119). And it even affects the judgment of individuals who already know about the strong influence of anchoring (Bambauer, 2006). For participants who did not know about it beforehand, even being explicitly made aware of it did not show a reduced effect (Chapman & Johnson, 2002).

So prior knowledge, making them aware of the bias (Bambauer, 2006), giving an obviously random (Kahneman, 2011) or wrong anchors, like "Einstein visiting the United States in the year 1212" (Strack & Mussweiler, 1997, p. 443), still showed a big influence, making it one of the strongest types of bias.

Especially in estimation tasks, it was observed that people are influenced in their subsequent responses by previously given anchors (Ehrlinger et al., 2016; Kahneman, 2011). This is due to the fact that people tend to trust their gut feeling, which quickly comes to mind, but are subconsciously influenced by the anchor value and perceive it to be their own thought (Kahneman, 2003).

This forms the reason for the choice of the reliable scale by Jacowitz and Kahneman (1995), who found strong anchor effects for estimation questions in their study.

2.2.2 Factors of Anchoring

But what are "the conditions under which System 2 will override or correct System 1" (Kahneman, 2002, p. 481) and thus determine the strength of the anchoring influence?

The way in which susceptibility to anchoring occurs can vary between the several factors, with emotions being the first one to be described. People in a happy mood are less susceptible to anchoring than those in a sad mood (Englich & Soder, 2009). The underlying reason for this is that people in a sad mood are more attentive in general, when engaging in information processing than people in a happy mood and therefore tend to have the given anchor more present in their minds (Schwarz & Clore, 2007).

The second factor is the level of experience and knowledge available in the underlying field. Thus, knowledgeable people with experience in the area of interest are significantly less likely to be influenced by anchors (Eroglu & Croxton, 2010).

Wegener et al. (2010) underline the importance of source credibility in this regard, describing the results of a study in which two groups of participants were given either an anchor value of expert or obvious non-expert in the topic being asked. Participants who were given the expert value as an anchor suffered much greater influence than those who were given the non-expert value (Wegener et al., 2010). Therefore, not only one's knowledge in the area but also the knowledge of the people behind whom the anchor value is given plays a significant role.

A significantly lower susceptibility to cognitive bias was found using the cognitive reflection test, which measures the ability to identify and discard obviously false cues and to reflect on the correct answer (Toplak et al., 2011), refusing to give the very first answer that comes up (Frederick, 2005). A high score on this test indicates good intention and reduces susceptibility to anchoring (Toplak et al., 2011), as one shows the ability of "reflective and deliberate thinking" (Oechssler et al., 2009, p.67). Therefore, cognitive abilities play a major role, since the higher they are, the less susceptible a person is to heuristics (Czerwonka, 2017).

Another aspect influencing the susceptibility to anchoring is the motivation of cognitive effort to search for more information which has a direct impact on how far people adjust (Petty & Cacioppo, 1986). The lower the motivation, the fewer participants move away from the given anchor (Epley & Gilovich, 2006).

In addition to the previously mentioned factors for biases, Czerwonka (2017) found that the way in which biases, specifically anchoring, occur is also dependent on cultural aspects.

Thus, the following sub-chapter begins with a theoretical basis of the topic of culture and ends with assumptions about the connection between cultural dimensions and the susceptibility to anchoring bias.

2.3 Culture

There does not seem to be a clear definition of culture that is understood in the same way by everyone. Depending on the scientific discipline and perspective, there are different ways of looking at the concept of culture. Each society has its own meaning in different contexts varying in different times (Thomas et al., 2009). This is reflected by anthropologists Kroeber and Kluckhohn (1952) publishing 164 definitions of the term already in 1952.

Cronk (2000) collected definitions of the concept from anthropology textbooks, most of which have in common that they are about shared beliefs and behavior, which one learns from fellow human beings. Thus, culture is no longer seen as fixed and unchangeable (D'Andrade & Strauss, 1992), but instead compared much more to a metaphorical virus that spreads and adapts to the existing society from time to time through trends and shared beliefs (Cronk, 2000). This illustrates the extent to which culture itself, as well as the understanding of the term, is in constant change (Baum et al., 2004).

A crucial aspect of the continuing study of cultural influences is the extent to which cultural differences are reflected in behavior-creating patterns (Brislin, 1993; Cronk, 2000).

To identify certain cultural patterns that systematically influence our actions, the next subsections discuss cultural models, show examples of how cognitive biases vary across cultures, and how certain cultural dimensions might predict susceptibility to anchoring bias.

2.3.2 Hofstede's Model to explain Culture

As part of his study, Hofstede looked at international differences in areas of organizational behavior from 1967-1973 (Hofstede & McCrae, 2004). The study was conducted in 40 countries, interviewing 117,000 IBM employees (Hofstede & McCrae, 2004). The results were used to create the constructs from which Hofstede elaborated the cultural dimensions (Hofstede, 2011). The dimensions are summed up in the following table based on their definition as well as selected characteristics:

Table 1: Definitions of the five cultural dimensions

Dimension	Definition
<i>Individualism vs. Collectivism</i>	Defines the role of the individual versus the role of the group. If the role of the group is placed higher than the role of the individual, the society is described as collectivistic, whereas individualistic societies place a high value on independence and autonomy.
<i>Power Distance</i>	Indicates the degree of accepted and expected inequality in a society. It is visible in the extent of hierarchical structures, and

	leadership behavior between employer and employee.
<i>Uncertainty Avoidance</i>	Defined as “the extent to which the members of a culture feel threatened by ambiguous or unknown situations” (Hofstede et al., 2005, p.6). Low uncertainty avoidance is associated with taking initiative and risk-taking, and high avoidance with striving for strict guidelines, formal rules, and laws.
<i>Masculinity vs. Femininity</i>	Refers to how people interact with each other and to gender roles. This is evident, for example, in the preference for performance and career or interpersonal relationships, such as the values for family. Feminine societies focus on a pleasant working environment, while masculine societies focus on job goals and success by having an elbow society.
<i>Long-Term Orientation vs. Short-Term Orientation</i>	Respect for traditions, status, and expectation of quick results of success are characteristics of short-term orientation. The long-term orientation denotes thrift and the willingness to make sacrifices for a long-term purpose.

Hofstede's dimensions provided the conceptual basis for many other cultural models today, such as the GLOBE model (House, 2004). GLOBE was developed in cooperation with 170 researchers and offers further distinctions of cultural factors with nine dimensions (Hofstede, 2006). However, with power distance, uncertainty avoidance, a transformed form of masculinity, collectivism, and future orientation, it shows similarities to Hofstede's model (House, 2004).

As early as the 1950s, researcher Hall was one of the first to study nonverbal communication and the effects of communication between different cultures (Ellyson & Dovidio, 1985). Based on his research, the three dimensions of time, space, and context were developed and examined how they are interpreted and used differently in different cultures (Furstenberg et al., 2001). Hall distinguished between high and low context communication in cultures (Hall & Hall, 1989), where high context is significant for the implicit expression of information, as in China (Kim et al., 1998) whereas Germany, with its explicit and direct communication, provides an example in the form of low context communication (Kim et al., 1998).

Hofstede offers one of the most widely established models of culture, being cited 1,101 times between the years 1987 to 1997 alone (Sivakumar & Nakata, 2001). As Hofstede's model construct is based on studies in the business context (Hofstede & McCrae, 2004), the cultural dimensions form the suitable model as a basis for the remaining of this study's research, as it represents the most commonly used and hence most established model for cultural research (Yoo & Shin, 2017).

2.3.3 Cultural Influence on Biases

Some studies have previously linked cultural factors to cognitive biases. Thus, susceptibility to these biases may vary from country to country. This subsection presents four examples where culture has been associated with varying degrees of biases.

Home bias is the phenomenon when investors in financial markets estimate the value of stocks from their country or region to be significantly higher than their actual value (Sercu & Vanpée, 2007). Here, the disproportionate holding of domestic stocks may come from the reason that one is not familiar with foreign markets and consider unfamiliarities as too risky (Gehrig, 1993). A higher Uncertainty avoidance is directly related to this and is thus a factor for an insufficiently diversified portfolio (Anderson et al., 2011). For instance, Japan was analyzed as the country most affected by home bias (Bekaert & Wang, 2009), which according to Hofstede's Country Score with 92/100 points in uncertainty avoidance (Hofstede, 2023) reflects the connection between home bias and uncertainty avoidance. Thus, fear and the attempt to avoid risk from uncertainty lead to poor diversification and thus significantly increase risk (Solnik, 1974).

Another bias along related lines is the in-group bias, which is found in all cultures (Sidanius & Pratto, 2001) and is manifested across generations (Meadors & Murray, 2014). This bias reflects the fact that people prioritize the thoughts and actions of members of their group over those of people outside the group and are consequently more influenced by opinions from people inside

their group (Bettencourt et al., 2001). This was illustrated by the practical example in soccer when fans of each opposing team saw the behavior of the opposing team's players as unsportsmanlike and less fair (Molenberghs, 2013). However, this phenomenon also has a great impact at the national as well as international levels (Yamagishi et al., 1998). Yamagishi et al. (1998) take the collectivist culture of Japan as an example, where people place great value on harmony within society and are therefore strongly influenced in their behavior by members of their in-group (Triandis et al., 1990). This bias can make one more likely to feel threatened by people outside the group, due to uncertainty about expectations from these outgroups (Yamagishi et al., 1998). A major disadvantage can then arise from missing opportunities, for personal development through cross-cultural exchange as well as economic development by developing new business relationships (Yamagishi et al., 1998).

Related to in-group is nonverbal bias, which based on culture, can influence people's perceptions and thus actions (Weisbuch & Ambady, 2009). Hence, eye contact is a sign of respect for Americans, whereas it can be seen as an insult to Japanese (DeVito et al., 2000; McDaniel, 1993). So people might create biases against people outside their own group based on external characteristics and perceive information from these people differently (Dovidio & Gluszek, 2012).

Another relevant bias in this context is confirmation bias, which has also been associated with distorted information perception (Baack et al., 2015). Thereby, people tend to preferentially perceive or even search for information that reflects their own beliefs and confirms their opinion (Oswald & Grosjean, 2004). The susceptibility to this cognitive bias can vary depending on the language spoken or cultural background (Baack et al., 2015) and even between men and women (Traut-Mattausch et al., 2011).

2.3.4 Susceptibility of each dimension to anchoring

In this subchapter, the susceptibility of the respective culture dimension according to Hofstede in relation to the anchoring bias is to be highlighted to provide the theoretical basis for the formulation of the hypotheses.

2.3.4.1 Individualism & Collectivism

The dimension of Individualism versus Collectivism is considered first. Several studies found a direct link between individualism and the overconfidence bias (Antonczyk & Salzmänn, 2014; Chui et al., 2010; Czerwonka, 2017). Managers from countries with a high individualism score are especially convinced of their own capabilities in this regard and should therefore exhibit

lower susceptibility to anchoring (Antonczyk & Salzmann, 2014; Chui et al., 2010). The conviction of one's own opinion and its correctness, and thus to distinguish oneself from others by feeling superior, could already be found in children growing up in highly individualistic countries (Markus & Kitayama, 1991). On the contrary, countries with a high collectivism score place great value on outside opinions (Chui et al., 2010). Here, interdependence plays a major role and leads to being influenced by the actions and behaviors of others instead of focusing on oneself and one's abilities (Al-Zahrani & Kaplowitz, 1993). On top of that, people who are collectivist exhibit holistic behavior, and thus, according to studies, are significantly more vulnerable to manipulation by previously given information (Choi et al., 2007; Nisbett et al., 2001). Czerwinka (2017) found in his study that investors from less individualistic countries put great weight on information from their environment, thus showing less susceptibility to the overconfidence bias, but in turn, should display significantly greater influence on anchoring value, generating the first hypothesis.

***H1:** The degree of collectivism correlates positively with susceptibility to anchoring bias.*

2.3.4.2 Power Distance

This dimension measures the acceptance of the unequal distribution of power (Hofstede & Hofstede, 2007). High levels or low levels of power distance are described with behaviors characterized by "obedience or toward initiative" (Hofstede & McCrae, 2004, p. 62). Thus, the theory suggests that people with low levels of Power Distance will question given information significantly more (Curtis et al., 2012). This is corroborated by a positive association between low levels of power distance with increased independent research (Hofstede & McCrae, 2004). Consequently, it can be argued that people with low power distance are more detached in their thinking and more likely to question given information and should therefore be less influenced by anchoring, whereas people who obediently follow instructions and view them as unchangeable show greater susceptibility to anchoring. There is also a direct link between power distance and openness to new experiences (Hofstede & McCrae, 2004), which is a personality trait that leads to being "significantly more influenced by anchoring cues" (McElroy & Dowd, 2007, p.48).

This leads to the second hypothesis:

***H2:** The degree of power distance correlates positively with susceptibility to anchoring bias.*

2.3.4.3 Uncertainty Avoidance

Uncertainty avoidance describes the extent to which individuals avoid uncertain and changing situations (Hofstede & Hofstede, 2007). Going further, it indicates that in uncertain situations, a person does not want to move away from the steady (Hofstede, 2001) and would rather stick to the status quo (He et al., 2017). Societies with high uncertainty avoidance desire directive information, a common example of how that translates into real-life preferences is that such societies tend to prefer to have highway speed limit signs (Hofstede & Hofstede, 2007).

Furthermore, there is a positively measured correlation between Uncertainty avoidance and Neuroticism (Hofstede & McCrae, 2004; Lynn & Martin, 1995), linking it to self-criticism and doubting one's abilities (Cox et al., 2004). An increased influence is expected as people with high uncertainty avoidance are reluctant to change and therefore tend to prefer the status quo, which in this case would mean deviating less from the given number (Liu et al., 2001).

It can therefore be assumed that people with a high level of uncertainty avoidance are more likely to incorporate the anchor and accept the initial numerical information in their answer, forming the following hypothesis:

***H3:** The degree of uncertainty avoidance correlates positively with susceptibility to anchoring bias.*

2.3.4.4 Masculinity & Femininity

As this dimension is focusing on work behavior, the distinction is indirectly about the following question of mindset: Do you "work to live" (McGrath et al., 1992, p.442) or "live to work" (McGrath et al., 1992, p.442)? Masculine societies focus on success, whereas feminine societies focus on "caring for others and the quality of life" (Hofstede & Bond, 1984, p.420). The focus here is on certain traits that are inherent in these two contrasting character dimensions. People with a high masculinity score are by definition "very assertive and competitive" (Hofstede & McCrae, 2004, p. 63), whereas femininity traits tend to describe nurturing behavior (Hofstede & McCrae, 2004). It was found that people from more masculine countries are more confident in their abilities, while those from more feminine countries show a tendency to underestimate their capabilities (Bleidorn et al., 2016; Hofstede & McCrae, 2004). In addition to this, Jacowitz and Kahneman (1995) were able to determine in their study that people with an increased confidence level are less influenced by the anchor value in their answers.

The theory leads to the assumption that people with masculinity scores want to impose themselves and show confidence when it comes to their abilities, therefore placing less value on others' opinions and information. This leads to the following hypothesis:

H4: The degree of masculinity correlates negatively with susceptibility to anchoring bias.

2.3.4.5 Long-Term & Short-Term Orientation

Short term orientation is characterized by the desire for quick actions as well as quick results in the short run (Hofstede, 2001; Hofstede & Minkov, 2010). Thus, it has been shown that short term oriented people are more likely to integrate newly given information into their decisions (Khan et al., 2021). The reason for this could be that due to the desire for quick decisions under time pressure people tend to adapt (Lumpkin & Birgham, 2011), which could result in consequences not being sufficiently evaluated and weighed. Graafland (2020) further found that long-term orientation is associated with resisting direct external stimuli that may irritate them in a thoughtful assessment. Additionally, people with short term orientation are more agile in adapting to changing situations, whereas long-term oriented people favor stability and may have a harder time adapting to uncertain situations (Lumpkin & Birgham, 2011). Long-term oriented people, on the other hand, have been found to weigh information more consciously and more cautiously (Karande et al., 2011). Furthermore, it is argued that long-term oriented people place little value on actions aimed at short-term outcomes (Gul, 2013), so when they realize that the chosen task shows no benefit to them in the long-term, they may be less attentive and therefore less likely to internalize the anchor value. Thus, it could be concluded that short term oriented individuals place a greater focus on events in the present, pay significantly more attention to the anchoring value, and adapt to it in uncertain and new situations. As a result, the value would be more likely to be memorized and incorporated into subsequent judgments. Long-term oriented people, who attach great importance to stability (Hofstede & Minkov, 2010), are therefore expected to be less influenced by the given anchor value than short term oriented ones, forming the fifth hypothesis:

H5: The degree of long-term orientation correlates negatively with susceptibility to anchoring bias.

CHAPTER 3: METHODOLOGY

This chapter provides detailed insights into how the study was conducted to test the hypotheses and consequently to be able to answer the research question. The underlying approach, characteristics of the surveyed sample, and which measurements were used to arrive at the results are covered.

3.1 Research Approach

The goal of this study is to determine the extent to which culture predicts susceptibility to anchoring bias and thus address this underexplored topic.

The fundamental variables to be measured in order to answer the hypotheses are the respective culture dimensions and the level of anchoring. For this purpose, the correlational approach in the form of an online survey was suitable to investigate the relationship between the culture dimensions and anchoring (Curtis et al., 2016), where the variables were not actively manipulated (Field, 2013). In this way, the correlational research provided the numerical values for determining the independent variables (IV) as well as dependent variables (DV). The cooperation with the German market research company Appinio made it possible to conduct the survey throughout Germany to acquire a sample size of 1,010 participants.

Participants were selected using the simple random sampling method, as this is considered to generate both high internal and external validity (Acharya et al., 2013) leading to the randomized selection of 1,010 users of Appinio app users in Germany. This is essential for a cultural study of this type to ensure heterogeneity of the sample and to derive findings for populations outside the study (Stroebe et al., 2018). By using the two chosen scales, the independent and dependent variables were determined by measuring several items, namely 26 items for the five cultural dimensions and four estimation tasks with each high and low anchor values to examine the anchoring effect. Thus, all subjects were exposed to different conditions of the anchors several times in order to determine mean values. One disadvantage that the design brings is that Participants have a reference point from the previous question and it cannot be completely erased (Charness et al., 2012). Especially since it is about anchoring values, this reference point to be measured might still be present in the subsequent question. To address this concern, distraction tasks were inserted between each of the estimation questions, while also randomizing all the tasks, as well as the anchoring values being shown (high or low).

3.2 Participants

The online survey yielded 1,010 respondents. Several steps were taken to clean the data to improve its quality and informative value. In the first step, 15 participants were removed as they did not meet the minimum age requirement of 18 years. Inattentive participants were filtered out by using an attention question. The corresponding request to select "important" as an answer in the middle of the survey was not passed by 146 participants, which made their survey values unusable and were consequently removed. As a screening question, the participants were asked whether they are aware that they should not consult any outside help for the estimation tasks and should rely on their intuition, otherwise, they would distort the intended effect. Seven participants were excluded because they answered “no” to this question, which could mean that they looked up the correct values and could, therefore, distort the anchoring effect. Incomplete responses from 30 participants were dropped from the survey and a Mahalanobis Outlier Test was administered to identify additional inattentive participants beyond the Attention check (Kim et al., 2018). To prevent biased statistical analyses, the Mahalanobis distance was calculated and all participants below 0.001 were eliminated, resulting in a number of 757 responses.

386 females (51%), 368 males (48.6%), and one nonbinary person with a mean age of 41.52 years ($SD=14.34$) participated in this, while two respondents did not want to specify their gender. More detailed information about the demographics of the participants follows in chapter 4.2.1.

Table 2: Age mean and standard deviation

Descriptive Statistics			
	N	Mean	Std. Deviation
Age	757	41,52	14,339
Valid N (listwise)	757		

3.3 Procedure

The introduction of the survey was kept relatively vague in order not to go into too much detail, so as to not influence participants' answers.

In the survey itself, no introductory explanation of the basic issues of Hofstede's cultural dimensions and anchoring bias was given, as otherwise, it is to be expected that participants will look up or imagine the meaning of the dimensions and try to select answers matching the score of their home country. Therefore, participants were informed at the beginning that they would participate in a study about decision-making and given information about the survey,

such as voluntary participation, the expected processing time, and the possibility to leave feedback at the end, as well as agree to consent by clicking on next.

For the first part, the CVSCALE of Yoo et al. (2011) forms the basis for measuring cultural dimensions. Although this scale seems to prescribe a structured order, in that statements are to be agreed or disagreed with for the respective dimensions and these statements are asked directly one after the other for the respective dimension, the order of the questions was randomized. This can counteract the order effect that people are much more focused at the beginning of the survey, whereas over time they may click on random answers due to fatigue, leading to less useful data (Egleston et al., 2011). Otherwise, there could be a risk that participants recognize the pattern of questions and realize that the questions are aimed at the same metric and thus go back and match answers to each other (Strack, 1992).

The second part of the survey measures the level of anchoring bias, for which part of the scale of Jacowitz and Kahneman (1995) provided a reliable framework. Although the previously summarized literature shows that pointing out the effect of anchoring bias does not eliminate it (Bambauer, 2006), there is a high risk of skewing the effect, which is why the introduction of the second part of the survey was limited to the process of the estimation questions by simply explaining the steps the respondents had to go through in that part.

In this part of the survey, not only was the order of the questions randomized but also whether participants were assigned high or low anchors for each question. Each participant answered two Estimation questions with high anchors and two with low anchors.

This randomization process attempted to counteract the order effect as best as possible since it could otherwise have a significant influence on the order in which the questions were asked (Strack, 1992).

In addition, an attention check question was added in the middle of the survey to remove inattentive participants (Kung et al., 2018, p. 264).

Participants were shown either a high or low anchor value in four estimation questions by being asked comparative questions about whether they thought the value (for example, the length of the Mississippi River) was higher or lower than X. X reflected the high (in that case 3219 km) or low (in that case 113 km) anchor value, which was assigned automatically and randomly. They were then asked to provide their exact estimates, followed by questions about their level of confidence in the estimates given. The decisive point was not how close participants came

to the actual true value (which is 3778 km), but how far they adjusted away from the given reference point.

Between the four estimation tasks, there was a risk that participants could still have the anchor value from the previous task in their memory and thus unconsciously influence the anchor value of the following task. This risk can probably not be fully eliminated, however, with the help of distraction tasks between these estimation tasks, this risk was minimized as best as possible, leading to a higher likelihood to obtain uninfluenced values. The distraction tasks consisted of finding the differences between two similar pictures.

Finally, after asking demographic questions, the study ended with the debriefing, in which the participants were informed about the specific purpose of the research and could see the correct results of the estimation questions.

3.4 Variable Measurement

3.4.1 Cultural Dimensions

Hofstede's cultural dimensions were measured using Yoo et al. 's (2011) cultural values scale (CVSCALE). This framework provides a reliable measurement method with 26 questions, each with four to six questions on the respective dimension.

The items for power distance, uncertainty avoidance, masculinity, and collectivism were measured on a 5-point Likert scale by showing participants statements to agree or disagree with. Their agreement was measured on a scale from 1 (=Strongly Disagree) to 5 (Strongly agree). Example statements for measuring these four cultural dimensions read as follows:

- Power Distance: *“People in higher positions should make most decisions without consulting people in lower positions.”*
- Uncertainty Avoidance: *“Standardized work procedures are helpful.”*
- Collectivism: *“Group success is more important than individual success.”*
- Masculinity: *“It is more important for men to have a professional career than it is for women.”*

The fifth dimension of long-term orientation was also measured on a 5-point Likert scale, but the focus here was on the extent to which certain things were important to the participants.

Therefore, participants were asked how important aspects are to them on a scale from 1 (=very unimportant) to 5 (=very important). Examples read as follows:

- Long-term Orientation: “*Working hard for success in the future*”, “*Personal steadiness and stability*”.

The reason for using this scale instead of the Hofstede’s scale is that Hofstede only provides information at the national level and not at the individual level (Blodgett et al., 2008). Therefore, it is not possible to draw conclusions from the cultural scores in Hofstede's cultural dimensions to individuals (Brewer & Venaik, 2014). Thus, the ecological fallacy can be avoided, which refers to the problem when researchers assume that insights derived from aggregate data necessarily provide insights at the individual level (Brewer & Venaik, 2014; Kim et al., 2021). That Hofstede's scale is not suitable for this study became apparent from the fact that on an individual level, an alpha below 0.6 was measured for three of the five dimensions, namely power distance, masculinity, and uncertainty avoidance (Yoo et al., 2011). Therefore, it is not possible to generalize and infer from the cultural scores in Hofstede's cultural dimensions to individuals, as the alpha is even below the questionable range of reliability (Gliem & Gliem, 2003). For this reason, Yoo and collaborators (2011) focused on making these cultural dimensions measurable on an individual level by developing the "26-item five-dimensional scale of individual cultural values". At this point, however, it should be noted that the scale does not include the sixth dimension of indulgence vs. restraint, possibly because this new dimension was introduced in 2010, shortly before the publication of their alternative scale was introduced (Koc et al., 2017).

The main advantage over other designed scales, and at the same time, the reason for choosing this particular scale, is that it was designed to match Hofstede's dimensions, and therefore being identical in meaning and explanatory power (Yoo et al., 2011). With an alpha ranging from .74 to .91 on the individual level, the developed scale provides a reliable basis for measuring Hofstede's five dimensions, making it possible "to use primary data instead of cultural stereotypes" (Yoo et al., 2011, p. 205).

3.4.2 Level of Anchoring Bias

The anchoring level was measured using the estimation tasks based on the Jacowitz and Kahneman (1995) framework. For this purpose, the deviation from the previously given anchor

value is measured in the absolute follow-up question for the exact guess in the four different tasks.

One of the four estimation questions looked as follows:

- *Do you think the length of the Mississippi River (in kilometers) is greater than or smaller than _____? (Low Anchor: 113km, High Anchor: 3219km)*

In the first step, participants were randomly shown a high or low anchor value and inserted into the gap. Following this question, participants were then asked for an accurate estimate:

- *Please estimate the exact length of the Mississippi River (in kilometers).*

They were then asked to indicate their level of confidence on a scale from 1 (=I am totally unsure) to 10 (=I am absolutely sure):

- *Please indicate how confident you are with your estimate.*

For more details, see Appendix 1.

The formulas used to calculate the DV on an individual level were based on Epley and Gilovich's approach (2004) as they calculate the difference between the given anchoring value and the subsequent guess of the participants. Due to the different heights of the anchor values of the respective estimation questions (the high anchor value for Q2 was 48 km/h, that for Q1 was 3219 km), the absolute differences were standardized, following the approach of Epley and Gilovich (2004). These values formed the means to calculate the average anchoring effect of each question aligned with the measurement method of previous research about quantifying anchoring (Epley & Gilovich, 2004). Consequently, a high standardized value indicates that participants deviated more from the given anchoring values implicating a lower influence toward anchoring bias. A value of zero, in this case, would mean that participants did not deviate from the anchor value at all and completely considered and accepted it as a valid estimate.

CHAPTER 4: RESULTS

Originally, 1010 participants took part in this study, of whom 272 were eliminated after the data cleaning process (more detailed description of the filtering process in chapter 3.2).

Thus, 738 responses resulted in the study testing the existing research question and its hypotheses. The fourth chapter describes values of scale reliability, descriptive statistics, hypothesis testing as well as further analyses. Subsequently, the analyses are placed in the literary context, and inferences are presented in the form of the discussion.

4.1 Scale Reliability

In general, all of the Cronbach Alpha (CA) values for the five cultural factors of Power Distance ($\alpha=.89$), Uncertainty Avoidance ($\alpha=.76$), Collectivism ($\alpha=.81$), Masculinity ($\alpha=.80$), and Long-Term Orientation ($\alpha=.67$) were within or close to an acceptable range (Taber, 2018). A significant increase in CA could only be found for LTO, where one item ("*Giving up today's fun for success in the future*") could have been removed and an alpha of .71 increased for it. With Collectivism, only one other predictor could be increased from .814 to .815 by removing one item. However, this marginal increase was neglected and considered not justifying the removal of an item from the scale. The other variables were in terms of their CA value already at their maximum possible. Thus, the values were all within or close to the acceptable range of .7 to .9 (Taber, 2018), which is why none of the 26 items were removed, which is presented in Table 3.

Table 3: Chronbach's Alpha

Variable	Number of items – initial scale	Number of Items removed	Number of items – resulting scale	Cronbach's Alpha
PDI	5	-	5	.89
UAI	5	-	5	.76
COL	6	-	6	.81
MAS	4	-	4	.80
LTO	6	-	6	.67

4.2 Descriptive Statistics

4.2.1 Sample Characterization

In terms of age, the surveyed sample is divided as follows. The largest group is participants aged 46-55 (24.7%), followed by 36-45 (24%). As can be seen in Table 5 with each group consisting of over 100 participants, the five age groups between the ages of 18-65 were representatively populated. Women made up more than half of the respondents (51%), with 368 male participants, and one non-binary person. With 359 participants (47.4%), most of them are married, followed by 256 singles (33.8%) and 87 divorced people (11.5%). Over three-quarters are employed (76.5%) and apart from that the rest of the group is relatively similarly distributed between the groups “retired” (6.9%), “housewife/houseman” (5.4%), “unemployed” (4.9%), and “students” (4.8%). Most participants indicated having secondary school (36.6%) and vocational school (26.4%) as their highest level of education. The third most commonly indicated was high school with 149 responses (19.7%), followed by Bachelor's with 68 (9%) and Master's with 49 participants (6.5%). Nine people indicated no degree and five (0.7%) selected a doctoral as their highest degree. Thus, the three largest groups with secondary, vocational, and high school together made up more than 82.7% of the participants.

Table 4: Participants' school degree

		School Degree			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No Degree	9	1,2	1,2	1,2
	Secondary School	277	36,6	36,6	37,8
	Vocational School	200	26,4	26,4	64,2
	Highschool	149	19,7	19,7	83,9
	Bachelor	68	9,0	9,0	92,9
	Master	49	6,5	6,5	99,3
	Doctorate	5	,7	,7	100,0
	Total	757	100,0	100,0	

Table 5: Participants' age groups

Age Group					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-25	113	14,9	14,9	14,9
	26-35	136	18,0	18,0	32,9
	36-45	182	24,0	24,0	56,9
	46-55	187	24,7	24,7	81,6
	56-65	134	17,7	17,7	99,3
	66 and older	5	,7	,7	100,0
	Total	757	100,0	100,0	

Table 6: Participants' gender

Gender Sum					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	386	51,0	51,0	51,0
	Male	368	48,6	48,6	99,6
	Non binary	1	,1	,1	99,7
	Prefer not to say	2	,3	,3	100,0
	Total	757	100,0	100,0	

Germany is divided into 16 regions, which are unevenly represented in absolute numbers in the present sample due to the different sizes of the regions and the random sampling technique.

Figure 1 shows that the most participants come from the most populated region of Germany, North Rhine-Westphalia (called NRW), with 201 participants (26.6%), whereas the second smallest region of Germany, Saarland, provides the fewest responses with 7 (0.9%).

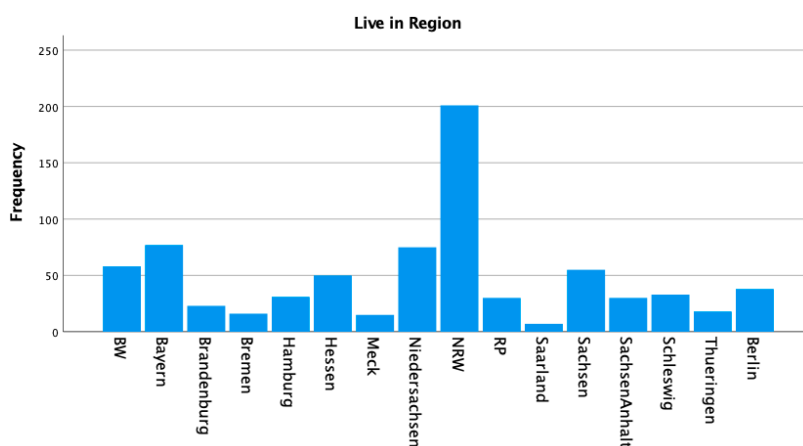


Figure 1: Participants' Region living in

When asked how long the participants have lived in their region, there was a clear majority of people who have already lived there for more than five years (92.9%), including people who

have lived in the region indicated for between three and five years, 97.1% of respondents have therefore lived in the area for at least three years. Only 4 (0.5%) of the total 757 participants have lived there for only one year, and the remaining 18 (2.4%) participants indicated they have lived there between one and three years.

Table 7: Participants' Time Region living in

Time living in Region

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Under 1 year	4	,5	,5	,5
	1 to 3 years	18	2,4	2,4	2,9
	3 to 5 years	32	4,2	4,2	7,1
	over 5 years	703	92,9	92,9	100,0
	Total	757	100,0	100,0	

4.2.2 Key Variables

This subsection describes the key variables of the IV and DV. The summarized dimensions and anchoring levels as well as the individual items leading to the respective cultural predictors and target variable are described.

PDI

The analysis starts with the items relating to the first cultural predictor, Power Distance. Participants agreed most with the statement that people in higher positions should avoid contact with people in lower positions in their working lives ($M=2.17$, $SD=1.27$). The highest level of agreement was assigned to stating that difficult tasks should not be passed on from people of higher positions to lower positions ($M=2.72$, $SD=1.18$). With the help of the five items, Power Distance was identified as the lowest measured culture dimension, with an average value of 2.54 ($SD=1.0$).

Table 8: Power Distance Scale

Descriptive Statistics

	N	Mean	Std. Deviation
PDI1	757	2,66	1,217
PDI2	757	2,61	1,220
PDI3	757	2,17	1,270
PDI4	757	2,72	1,181
PDI5	757	2,55	1,119
PDI	757	2,5421	1,00152
Valid N (listwise)	757		

UAI

With means ranging from 3.80 to 4.14, all statements on the level of Uncertainty Avoidance were relatively close to each other. The respondents rated the statement "Instructions for operations are important" (UAI3) as being the most important ($M=4.14$, $SD=0.69$). Thus, with an average score of 3.97 ($SD=$, this is the highest cultural dimension.

Table 9: Uncertainty Avoidance Scale

Descriptive Statistics

	N	Mean	Std. Deviation
UAI1	757	4,04	,799
UAI2	757	3,97	,698
UAI3	757	4,13	,616
UAI4	757	3,83	,748
UAI5	757	3,90	,716
UAI	757	3,9741	,51359
Valid N (listwise)	757		

COL

The third predictor variable is the level of collectivism, with six items determining the individual level of this cultural factor. Here, the sample showed an average score of 3.56. The statement that individuals should stick to the group even in the face of difficulties received the most agreement ($M=3.91$).

Table 10: Collectivism Scale

Descriptive Statistics

	N	Mean	Std. Deviation
COL1	757	3,31	,980
COL2	757	3,50	,960
COL3	757	3,69	,970
COL4	757	3,91	,703
COL5	757	3,45	,941
COL6	757	3,45	,896
COL	757	3,5537	,65794
Valid N (listwise)	757		

MAS

Masculinity forms the fourth independent variable. Participants showed the biggest disagreement with MAS1, stating "It is more important for men to have a professional career than it is for women", with an average score of 2.46, but also showed the biggest disagreement in terms of deviation in responses ($SD=1.25$) for the Masculinity items. Overall, the sample achieved the second-lowest total score ($M=2.82$) with regard to the five assessed dimensions.

Table 11: Masculinity Scale

Descriptive Statistics

	N	Mean	Std. Deviation
MAS1	757	2,46	1,253
MAS2	757	2,76	1,157
MAS3	757	2,95	1,104
MAS4	757	3,15	1,234
MAS	757	2,8283	,94232
Valid N (listwise)	757		

LTO

The second highest predictor among the 757 participants was the fifth one, long-term orientation, with a total mean score of 3.90. Of all 26 items measured for each of the five culture dimensions, two items for this achieved the highest scores. Therefore, it is evident that participants place the highest value on "Careful Management of Money" ($M=4.21$) and, with a mean score of 4.16 place great value on "Personal Steadiness and Stability". The second item achieved the lowest SD of 0.60 of all measured items and therefore the lowest disagreement among all participants.

Table 12: Long-Term Orientation Scale

Descriptive Statistics

	N	Mean	Std. Deviation
LTO1	757	4,21	,652
LTO2	757	4,06	,652
LTO3	757	4,16	,603
LTO4	757	4,02	,693
LTO5	757	3,08	1,046
LTO6	757	3,86	,796
LTO	757	3,8985	,46514
Valid N (listwise)	757		

Consequently, the five cultural dimensions were the first key variable to be quantified. The means show the respective level of the sample in the cultural dimensions. The least expressed is the level of Power Distance ($M=2.54$, $SD=1.00$), whereas the standard deviation was also the highest and thus shows the widest range of values. Participants showed moderate levels of Level Masculinity ($M=2.82$, $SD=0.94$) and an average score of 3.56 ($SD=0.66$) for Collectivism. Uncertainty Avoidance ($M=3.97$, $SD=0.51$) and Long-Term Orientation ($M=3.90$, $SD=0.47$) were highest among the 757 participants.

Table 13: All Scale Means

Descriptive Statistics

	N	Mean	Std. Deviation
PDI	757	2,5421	1,00152
UAI	757	3,9741	,51359
COL	757	3,5537	,65794
MAS	757	2,8283	,94232
LTO	757	3,8985	,46514
Valid N (listwise)	757		

The DV of anchoring influence was determined based on the four estimation questions. This resulted in different average estimation values of the participants, depending on whether a high or low anchoring value was shown. The following table summarizes all estimation questions showing the standardized difference values between the estimated value of participants and the given anchor value. As described in chapter 3.4.2, a high value represents a large deviation and therefore a low anchoring influence, whereas a low difference value indicates a small deviation from the anchor value, showing a strong influence. The highest value was found in Q1 about

the length of the Mississippi River (“ZQ1 High Anchor”) where people deviated most from the anchoring value ($M=0.81$). Participants showed the greatest influence in Q4 about the monthly average gas consumption per American, by deviating the least from the initial reference point ($M=0.48$).

Taking all standardized difference scores together for both high and low anchor values, it was apparent that participants moved less far away from low anchors ($M=0.62$, $SD=0.59$) than from high anchor values ($M=0.74$, $SD=0.48$). These values indicate that the influence of low anchor values was stronger than that of high anchor values. Taken together, this results in an average anchoring influence value of 0.68.

Table 27: Anchoring Impact Values all Anchors

Descriptive Statistics			
	N	Mean	Std. Deviation
ZQ1 Low Anchor	400	,6115	,79065
ZQ1 High Anchor	357	,8129	,58078
ZQ2 Low Anchor	369	,7442	,66682
ZQ2 High Anchor	388	,7963	,60351
ZQ3 Low Anchor	378	,5996	,79968
ZQ3 High Anchor	379	,6811	,73132
ZQ4 Low Anchor	367	,4787	,87761
ZQ4 High Anchor	390	,6950	,71812
Z-Difference to low Anchors	757	,6158	,59426
Z-Difference to high Anchors	757	,7427	,47747
Z-Difference to all Anchors	757	,6793	,41189
Valid N (listwise)	0		

4.3 Hypothesis Testing

In order to test the stated hypotheses, multiple linear regression was used to examine the relationship between the five culture dimensions and anchoring bias. This initially revealed a problem with the requirement of the DV being normally distributed, which originally was not the case. It resulted in a skewness score of 4.89 (Table 26, Appendix 2), suggesting that the distribution is right-tailed and by not being close to zero not being normally distributed, which can be seen in Figure 2.

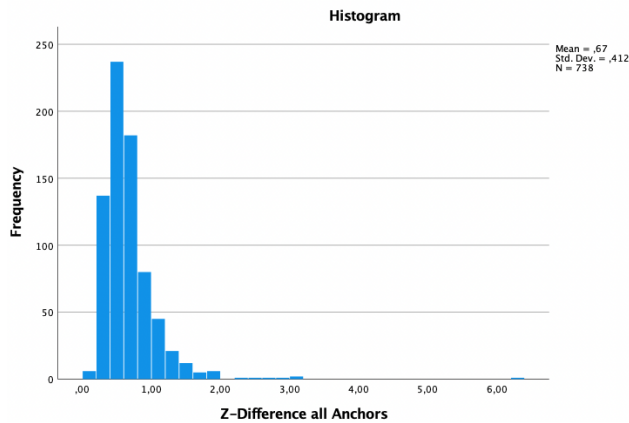


Figure 2: Histogram Anchoring Difference

Using the method of logarithmic transformation led to normally distributed (Feng et al., 2014) and transformed anchoring values (TA), so that the planned regression became feasible. This is shown by the new skewness score of 0.34 (Table 25, Appendix 2), which was within the sufficient range for normality between -1 to +1 (Ho et al., 2007).

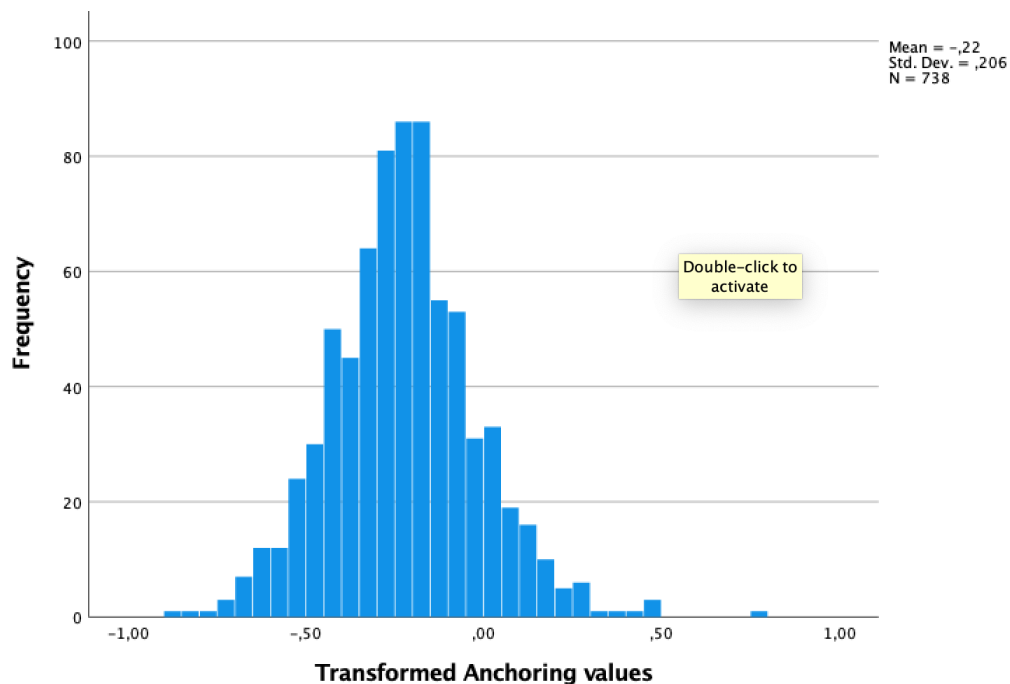


Figure 3: Normal Distribution TA

The absence of multicollinearity is another condition for regressions, which is evident from the Pearson Correlation. By having all values below .8, there is no collinearity between the variables (Senaviratna et al., 2019).

With an R-square value of .05 one can infer that 5% (Table 24, Appendix 2) of the anchoring bias was explained by the predictors in the form of the culture dimensions and therefore the

model showed relatively low predictive power. As the Durbin-Watson value of 1.9 was close to the aimed value of two, it is confirmed that there is no concern about autocorrelation (Chen, 2016). ANOVA Table (Table 14) showed a p-value below .05, which leads to rejecting H0 that the values of the coefficients are zero, leading to the conclusion that at least one predictor was having a statistically significant effect on the DV.

Since the t-values in the coefficients table (see Table 14) are all unequal to zero, the assumption that the IV influences the DV was supported. Another essential component here was the F-test, which with a value of 7.31 (Table 23, Appendix 2) is above the calculated critical value of 2.23 ($F(5, 757) = 7.31, p < 0.001$). Thus, there are significant differences between the IV, which need to be analyzed in further tests.

In the following, the hypotheses are validated based on the determined values.

4.3.1 Impact of Collectivism on Anchoring

H1: The degree of collectivism correlates positively with susceptibility to anchoring bias.

The coefficient for Collectivism is not statistically significant ($\beta = .03, p = .565$), indicating that there is no significant relationship between the level of Collectivism and the TA. Thus, hypothesis 1 is not supported. Consequently, the possibility that the influence of collectivism on anchoring bias emerged by chance cannot be rejected.

4.3.2 Impact of Power Distance on Anchoring

H2: The degree of power distance correlates positively with susceptibility to anchoring bias.

The multiple regression further showed a positive relationship between the predictor variable, Collectivism, and the dependent variable, TA. The coefficient for Collectivism is statistically significant ($\beta = .09, p = .017$), which leads to supporting H1. Therefore, it could be inferred that a higher level of Power Distance leads to greater deviation from the anchor value, indicating a lower susceptibility to the anchoring bias.

4.3.3 Impact of Uncertainty Avoidance on Anchoring

H3: The degree of uncertainty avoidance correlates positively with susceptibility to anchoring bias.

With a p-value of exactly .050, the results suggested a positive association between the degree of uncertainty avoidance and TA. Here, β is -.09, from which it can be concluded that the

susceptibility to anchoring increases with higher uncertainty avoidance. Therefore, H3 is supported.

4.3.4 Impact of Masculinity on Anchoring

H4: The degree of masculinity correlates negatively with susceptibility to anchoring bias.

The fourth hypothesis examined the association of Masculinity with AB. However, the predictor did not reach statistical significance ($\beta = .04, p = .429$) leading to the rejection of H4.

4.3.5 Impact of Long-Term Orientation on Anchoring

H5: The degree of long-term orientation correlates negatively with susceptibility to anchoring bias.

The fifth hypothesis predicted a negative correlation of long-term orientation on the AB. For this, the regression indicated a significant positive relationship on the DV ($\beta = .13, p = .002$). This suggests that as LTO expression increases, susceptibility to anchoring decreases. Therefore, H5 is supported.

Table 14: Coefficients Table all Dimensions

Coefficients ^a								
Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	-,430	,069		-6,208	<,001		
	Power Distance Mean	,025	,011	,124	2,388	,017	,470	2,128
	Uncertainty Avoidance Mean	-,034	,018	-,086	-1,965	,050	,658	1,521
	Collectivism Mean	,008	,014	,026	,576	,565	,609	1,642
	Masculinity Mean	,009	,011	,041	,791	,429	,484	2,067
	Long Term Orientation Mean	,058	,018	,132	3,155	,002	,728	1,374

a. Dependent Variable: Transform_Anchoring

The hypothesis tests yielded the following table summarizing the results:

Table 15: Hypotheses Test Outcomes

Hypothesis	Assumption	Result
1	The degree of collectivism correlates positively with susceptibility to anchoring bias.	Rejected

2	The degree of power distance correlates positively with susceptibility to anchoring bias.	Accepted
3	The degree of uncertainty avoidance correlates positively with susceptibility to anchoring bias.	Accepted
4	The degree of masculinity correlates negatively with susceptibility to anchoring bias.	Rejected
5	The degree of long-term orientation correlates negatively with susceptibility to anchoring bias.	Accepted

The hypothesis tests of the main analysis form the following regression equation resulting from which illustrates the impact of each predictor on anchoring susceptibility:

$$\text{Level of Anchoring Bias} = -0.43 + (0.03 \times \text{PDI}) - (0.03 \times \text{UAI}) + (0.06 \times \text{LTO}) + \varepsilon$$

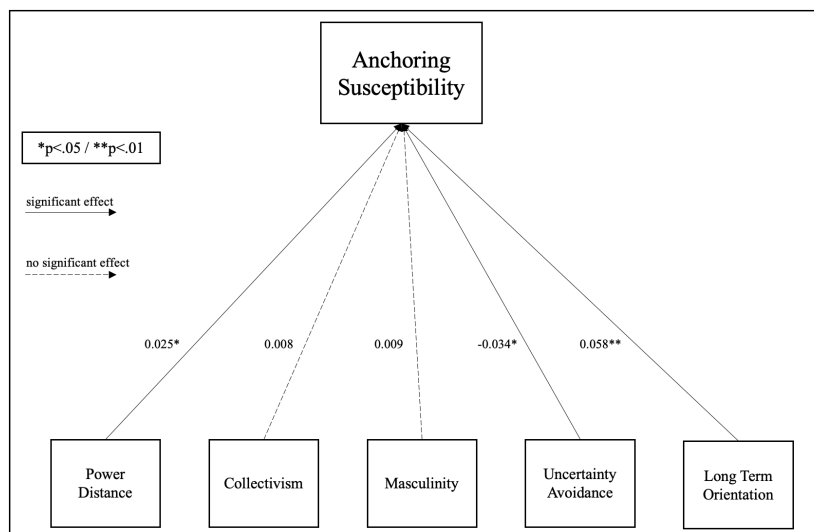


Figure 4: Impacts of Cultural Dimensions on Anchoring Susceptibility

4.4 Further Analysis

This subsection describes further analyses that were identified in testing the main hypotheses or aimed at replicating existing research.

By using Jacowitz and Kahneman's (1995) scale, four of the 15 estimation questions were adopted with the same anchor values transferred from American to European units of measurement. Jacowitz and Kahneman (1995) discovered that people are significantly more

influenced by high than low anchors in their study with 156 students at a University in America. Consistent with their findings, this study attempts to test and possibly replicate the results in Germany using a more heterogeneous and bigger sample size, with the sole exception of people living in Germany, rather than the homogeneous sample of American students in California.

In addition to this, Jacowitz and Kahneman (1995) found that more confident individuals are less influenced by the anchor value in their answers.

Thus, participants are expected to move less further from the higher set anchor than from the lower set anchor and to move further away from the anchor as the confidence level increases.

Looking at the differences in the deviation values from the given anchor and the subsequent estimation in Table 16, it can be concluded that participants moved less away from the low anchor ($M=0.61$, $SD=0.59$) than from the high anchor ($M=0.75$, $SD=0.48$).

Consequently, participants were more influenced by the low anchor and the results of Jacowitz and Kahneman (1995) were not replicated.

Table 16: Impact all Anchors Means

Descriptive Statistics

	N	Mean	Std. Deviation
Anchoring Impact Low Anchors	757	,6087	,58622
Anchoring Impact High Anchors	757	,7453	,48073
Anchoring Impact All Anchors	757	,6770	,40992
Valid N (listwise)	757		

Linear regression was the appropriate test to determine whether the susceptibility to anchoring decreases with increasing confidence level.

The model shows moderate predictive power explaining 4% of the variance of the DV ($R^2 = .04$). Again, the Durbin-Watson value of 1.89 was close to two suggesting no concerns for autocorrelation (Chen, 2016). Using the ANOVA table (Table 17), the null hypothesis can be rejected, concluding that there is a statistically significant effect on the DV ($p < .001$). In addition to this, the F-test also indicates statistical significance with a value of 30.16 being above the critical value of 3.85 ($F(1,757) = 30.16$, $p < .001$).

Table 17: Impact Confidence on Anchoring

Model Summary ^b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,196 ^a	,038	,037	,20124	1,891

a. Predictors: (Constant), Confidence all Anchor Estimates

b. Dependent Variable: Transformed Anchoring Difference All

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1,221	1	1,221	30,156	<,001 ^b
	Residual	30,577	755	,040		
	Total	31,798	756			

a. Dependent Variable: Transformed Anchoring Difference All

b. Predictors: (Constant), Confidence all Anchor Estimates

The regression analysis showed that there is a moderately positive relationship between confidence level and the DV, the anchoring influence. The results suggest that the coefficient for the confidence level is statistically significant ($\beta = .2, p < .001$). Therefore, it can be inferred that as the confidence level increases, the deviation from the anchor value increases, and, ultimately the susceptibility to bias decreases. Thus, the finding of decreased anchoring susceptibility with higher confidence levels can be replicated in the German sample.

Table 18: Coefficients Table TA and Confidence

Coefficients ^a								
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-,335	,022		-15,304	<,001		
	Confidence all Anchor Estimates	,021	,004	,196	5,491	<,001	1,000	1,000

a. Dependent Variable: Transformed Anchoring Difference All

The next step was to examine a relationship between various measured factors. First, the effect of school degree on anchoring bias was examined, as knowledge was found to be a factor of anchoring (Eroglu & Croxton, 2010). For this purpose, a linear regression was performed using the highest indicated educational degree as a predictor of susceptibility to anchors. The regression revealed that the predictor of School degree was not statistically significant ($\beta = -.02, p = .549$), suggesting that there is no meaningful relationship between the level of school degree and anchoring susceptibility.

Table 19: Impact School Degree on Anchoring

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,022 ^a	,000	-,001	,20518	1,868

a. Predictors: (Constant), School degree

b. Dependent Variable: Transformed Anchoring Difference All

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	,015	1	,015	,359	,549 ^b
	Residual	31,783	755	,042		
	Total	31,798	756			

a. Dependent Variable: Transformed Anchoring Difference All

b. Predictors: (Constant), School degree

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-,210	,020		-10,491	<,001		
	School degree	-,003	,005	-,022	-,600	,549	1,000	1,000

a. Dependent Variable: Transformed Anchoring Difference All

It was possible to show a statistically significant influence of age on the DV of anchoring bias ($\beta = -.1, p = .009$). Thus, it can be concluded that with increasing age the difference between the given anchor and the final estimate decreases, showing increased anchoring susceptibility.

Table 20: Impact Age on Anchoring

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,095 ^a	,009	,008	,20430	1,869

a. Predictors: (Constant), Age

b. Dependent Variable: Transformed Anchoring Difference All

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	,287	1	,287	6,870	,009 ^b
	Residual	31,512	755	,042		
	Total	31,798	756			

a. Dependent Variable: Transformed Anchoring Difference All

b. Predictors: (Constant), Age

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-,165	,023		-7,258	<,001		
	Age	-,001	,001	-,095	-2,621	,009	1,000	1,000

a. Dependent Variable: Transformed Anchoring Difference All

In chapter 2.3.4.4 the positive relationship between the level of masculinity and confidence in one's abilities was shown (Bleidorn et al., 2016; Hofstede & McCrae, 2004) which led to the

goal of replicating this finding from the literature with the present data. The following table shows that the level of masculinity describes a significant proportion of the variance of the confidence level variable ($R^2 = .08$).

The regression analysis revealed a statistically significant positive relationship between the two variables. Thus, the coefficient of Masculinity is significant ($\beta = .07$, $p < .001$), indicating a positive effect with confidence. Thus, it seems that as the degree of MAS increases, the confidence level also increases.

Table 21: Masculinity Impact on Level of Confidence

Model Summary^b

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,274 ^a	,075	,074	1,86203	2,113

a. Predictors: (Constant), Masculinity Mean

b. Dependent Variable: Confidence all Anchor Estimates

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	213,196	1	213,196	61,490	<,001 ^b
	Residual	2617,696	755	3,467		
	Total	2830,892	756			

a. Dependent Variable: Confidence all Anchor Estimates

b. Predictors: (Constant), Masculinity Mean

Coefficients^a

Model		Unstandardized Coefficients	Standardized Coefficients			Collinearity Statistics		
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	3,857	,214		18,002	<,001		
	Masculinity Mean	,564	,072	,274	7,842	<,001	1,000	1,000

a. Dependent Variable: Confidence all Anchor Estimates

Finally, the findings of the further analysis are summarized in the following table.

Table 22: Summary Further Findings

Analysis #	Tested hypothesis	Result
1	The influence of high anchors is stronger than that of low anchors.	Hypothesis is not supported as the influence of low anchors was stronger than the influence of high anchors.
2	Anchoring susceptibility decreases with increasing confidence level.	Hypothesis is supported.
3	Anchoring susceptibility decreases with an increasing degree of education.	Hypothesis is not supported.
4	Anchoring susceptibility decreases with increasing age.	Hypothesis is not supported as the susceptibility increases statistically significantly with age.
5	Rising masculinity level increases confidence level.	Hypothesis is supported.

CHAPTER 5: DISCUSSION

The discussion section aims to address the research question originally stated:

How does culture impact the expression of anchoring bias?

5.1 Main Findings

The main analysis of the five culture dimensions revealed three significant influences on the susceptibility of this cognitive bias.

H1, which stated that collectivism has a positive impact on anchoring susceptibility, was not supported. As such, one's level of collectivism seems irrelevant at least based on the observed sample, to predict anchoring bias. However, existing literature showed a strong relationship between collectivist-leaning cultures that tend to exhibit holistic behavior, which has been argued to lead to higher susceptibility to manipulation by given information (Choi et al., 2007; Nisbett et al., 2001). Therefore, this dimension, specifically in the context of AB or similar heuristics, could be an important topic to explore for future studies.

The results of H2, that the level of Power Distance correlates positively with the susceptibility of the AB, support the conjecture that a high score is associated with accepting given information rather than questioning it (Curtis et al., 2012). It is thought that people viewed the received reference point in the form of the anchor score as a good cue and therefore may have been more likely to view and adopt it as a guidance value. A low level of Power Distance was linked to taking initiatives (Hofstede & McCrae, 2004), which is reflected in the fact that participants with a low score were more likely to doubt the given anchor, to adjust further away from it, and thus ultimately show lower susceptibility.

The analyses of H3 suggest that the degree of UAI is positively correlated with AB susceptibility. This is thought to be the case as people with a high score are more averse to unclear situations (Hofstede et al., 2005), and thus more likely to address the given value (He et al., 2017). The findings of this study, therefore, support previous research in this direction.

H4 was also rejected, as a relationship between masculinity and susceptibility to AB was not found, so it is not possible to establish an association between masculinity and susceptibility to AB. This result contradicts the previously established link from the literature that people with a high masculinity score show increased confidence in their own abilities rather than cultures characterized by femininity underestimating their abilities (Bleidorn et al., 2016; Hofstede & McCrae, 2004), which suggested that they were less susceptible to AB.

Given the theoretical reasoning behind the hypothesis and the statistically significant link established by this study that increasing levels of masculinity also increase confidence levels and therefore should also increase anchoring influence, this dimension could be highly relevant to future research in the field of AB. This suggests, that the level of confidence is not the only predictors to be considered for anchoring.

H5 was accepted, as Long-Term Orientation showed a significant impact on anchoring susceptibility. It can possibly be deduced from this that people who are short term oriented are more likely to focus on the here and now and thus perceive things and the environment more accurately. Consequently, those having a low LTO score seem to pay more attention to the anchor value and therefore are more likely to keep this reference point in mind during the subsequent estimation.

In addition, further analyses revealed interesting findings. Firstly, a strong effect between the level of confidence and lower susceptibility to the influence of the anchor values was found. This answering the initial research sub questions, whether confidence level affects vulnerability to anchoring. Thus, the previous assumption based on the theoretical explanation in Chapter 2.3.4.4 was supported, and also the findings of Jacowitz and Kahneman (1995) were replicated with a German, representative sample, and in a study including the five cultural factors. This answers the research question about the influence of the confidence level on the susceptibility to the AB. Another finding, which reinforces the previous hint for future research between masculinity, level of confidence, and anchoring susceptibility.

However, their second finding, that high anchoring levels have a stronger influence on subsequent responses than low anchoring values, could not be supported. A possible reason for this is that two of the adopted questions about gas consumption by Americans and the estimation question about the length of the Mississippi River, being also America-related, have a different effect on Germans. Also, in particular, the high anchor value for the Mississippi River, which in the American study is 2,000 miles and is therefore much closer to the real value of 2,340 miles, than the low anchor value of 70 miles. This may be explained by the confirmation bias so that in this case the higher anchor value is perceived as more plausible and therefore had a stronger influence on the response of the participants (Oswald & Grosjean, 2004). Another reason could be the different cultural factors of the two countries compared. For example, Hofstede classified Germany as a country with a very high LTO score (83/100) and the US as a country with a very low LTO score (26/100). According to the results of the

present study, LTO has the strongest effect on susceptibility to anchoring bias, so it should come as no surprise that one cannot replicate the results of such different samples.

As explained in section 2.2.2, knowledge plays a major role in the area in question. This led to the idea of investigating whether knowledge and critical and questioning thinking increases with higher educational levels (Lövdén et al., 2020), in order to examine whether this has a direct effect on further adjustment away from the given anchor being less susceptible to AB. Contrary to the findings that cognitive skills (Czerwonka, 2017) impact AB susceptibility, knowledge did not show a significant effect in this study. However, here the theoretical linkage was not to the cognitive reflection test, but in the form of the degree of education. Therefore, the assumption that higher education leads to increased cognitive performance could not be linked to lower susceptibility to anchoring.

To provide a direct comparison between the measured culture scores in this study and Hofstede's published scores for Germany (Hofstede, 2023), the scores were multiplied by a factor of 20 to ensure a similar range of scores. In the dimensions MAS and LTO, the sample showed marginally lower expression, whereas the values of PDI and UAI were measured slightly higher. The largest difference was seen in the remaining dimension, Collectivism vs. Individualism, as both were relatively similar in their scores, but completely different in their meaning. For Hofstede's scale, a high score indicates a high level of Individualism, whereas it means a high score of Collectivism. A shortcoming of these findings in the direct comparison of the two scales is that the lowest value in the transformation is not 1, but 20 due to the multiplication, which is why the informative value is limited.

One of the initially formulated sub questions, to answer the main research questions, was whether certain cultural dimensions reduce the susceptibility to AB. Thus, it can be summarized that a low power distance, low uncertainty avoidance level as well as high long-term orientation help to be less susceptible to this cognitive bias.

5.2 Managerial and Academic Implications

By conducting this study, I advanced research in an under researched topic, independently measuring the culture dimensions in connection with measuring the anchoring bias for the first time, to the best of my knowledge. Thus, I hope the results of this study's unique approach provide important insights into the research in anchoring, susceptibility to biases, and cultural

differences. I also hope my research raises questions that inspire future research. My hope is that the suggestions for further analysis in the discussion will contribute to this goal.

Identifying significant influences of cultural factors on anchoring susceptibility can be of particular relevance to managers. Anchoring is especially relevant in the business arena where it is associated with several activities.

For instance, negotiations, which are a common part of business activities (Orr & Guthrie, 2005). In this context, managers can get a first impression of the culture of the other person in advance and thereby exert great influence in cultures with high power distance, high uncertainty avoidance, and a focus on short term orientation to be the first to speak up in the negotiation and thereby setting the anchor. In this way, they can strategically steer the conversation in the desired direction.

Furthermore, anchoring bias also plays an important role in pricing strategies (Northcraft & Neale, 1987). Managers can target regions or countries with the aforementioned characteristics of cultural expression and use their marketing budgets more efficiently. The results of the analysis showed that long-term orientation possessed the strongest influence on Anchoring ($\beta = .13, p = .002$, see Table 14). In this respect, the focus could be placed on countries or regions with a low long-term Orientation score as the analysis results suggest the higher susceptibility to anchoring.

When comparing countries using Hofstede's "Country Comparison Tool" (Hofstede, 2023) the Philippines fell into a pattern that fits with the three significant factors of PDI, LTO and UAI. In this respect, this could be relevant in practice for companies operating in the Philippine market or companies conducting negotiations with companies in this country.

Important here is not to be subject to the ecological fallacy and consider this indication as universally valid, but Hofstede's values can rather be seen as a hint. Therefore, based on the analysis conducted, there could be a possible increased susceptibility to anchoring in such cultures at the country level.

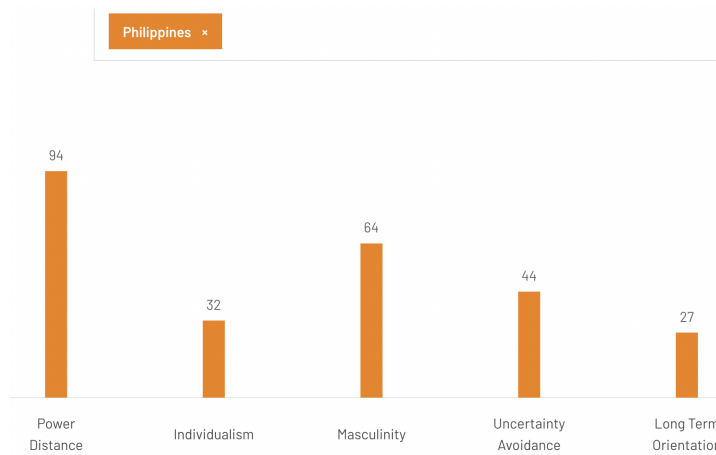


Figure 5: Country Scores Philippines

Furthermore, a significant influence of age has been demonstrated (see Table 20), so people of increasing age have shown a greater susceptibility to anchoring bias. Therefore, companies could focus specifically on markets or regions with older people and thus take advantage of the anchoring bias in pricing strategies and improve their marketing in such a way that price reductions appear more attractive due to the anchor values are shown.

5.3 Limitations and Further Research

For as well intended as my effort at data collection of high quality was, this research has limitations. A limitation is the procedure of variable measurement of anchoring. Here, the problem was already mentioned that if one performs several measures, in this case asking four estimation questions, one cannot completely eliminate the risk that in the estimation questions, the given anchor value of the previous question is kept in mind and thus the measured effect could be skewed. This concern was attempted to be countered by implementing distraction tasks but could have been eliminated if each participant had been asked only one estimation question. This might have contributed to more accurate measurements. On the other hand, the multiple measurement of each participant also represents a higher reliability, since the average of several measurements was calculated.

Furthermore, low R-squared values were measured in the analyses conducted, indicating the low predictive power of the models. Therefore, there might be other variables that better predict the DV. Another limitation and at the same time a hint for future research is the absence of the sixth cultural dimension Indulgence (vs. Restraint), which was not included in the used CVScale and therefore could not be measured.

Another limitation is the aforementioned concern that non-Americans were asked American estimation questions. With the two questions about the Mississippi length and gas consumption of Americans, they refer to foreign knowledge. It is possible that questions asked in a national (in this case German) context would have yielded different results.

CHAPTER 6: CONCLUSION

It is already known that we humans often make suboptimal decisions in everyday life. Anchoring can hinder us from making rational decisions and is impacted by several factors, including the level of motivation, knowledge, and emotions. Further, the extent to which certain biases may vary across cultures, was highlighted.

With this study, a previously under-researched relationship between cultural factors and anchoring bias was revealed. Thus, three dimensions, namely power distance, long-term orientation, and uncertainty avoidance, could be discovered, which, depending on their degree, can increase or decrease the susceptibility to this cognitive bias. These findings can therefore be helpful for future managerial decisions or even future research by exploring certain cultures. We humans should therefore be aware of the influence of cultural differences on our actions and try to take this awareness into account in situations under time pressure or uncertainty. The importance of cultural factors should also be recognized and considered in future research.

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APPENDICES

Appendix 1: Survey Questionnaire

All questions between #2-#4 were randomized to counteract the order effect. #7 and #8 shows the process by which participants were randomly assigned 2 high and 2 low anchor values on the estimation questions. These 4 estimation questions were also randomized, but always in the sequence shown as between #9-#11, so that first came the “greater or less” question, followed by the exact guess, and subsequently the question about the confidence level. #15, #22, and #29 were the Distraction tasks, which were always shown after the estimation questions. The costs on the first page were hidden by request of the research company.

31.05.23, 17:23

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Survey Summary

Title
Culture Dimensions Impact Anchoring Bias

Participants
1000

Countries
Germany

Target Audience

Gender
50% Men, 50% Women

Age Groups	Participants
16 to 66 Years	1000

Cost

Base Price: Germany



+

Up to 45 questions



Price per participant



×

Number of Participants

1000

Total Price



Questionnaire (46 Questions)

#1. Show info

Dear participants,

This survey is being conducted as a part of my master thesis at Católica Lisbon School of Business & Economics. I would like to ask you to take about 5-7 minutes to read and complete this survey thoroughly. It is about decision-making and there are no right or wrong answers, as it is only about your personal assessment. Your data will be treated anonymously and will not be shared with any third parties. There are no intended side effects of participating in this study, and you may stop participating at any time.

In case you have any questions about the survey, please feel free to contact me at the following email address: s-jpesch@ucp.pt.

There will also be a comments section at the end of the survey where you can leave suggestions and general feedback. A link to an anonymous survey will also be there, where you will have the possibility to enter your email to receive the results.

Thank you for your participation!

Please click on the arrow below if you agree to participate

#2. Matrix

To what extent do you agree or disagree with the following statements?

Strongly disagree Disagree Undecided Agree Strongly agree

Topics

People in higher positions should make most decisions without consulting people in lower positions.
 People in higher positions should not ask the opinions of people in lower positions too frequently.
 People in higher positions should avoid social interaction with people in lower positions.
 People in lower positions should not disagree with decisions by people in higher positions.
 People in higher positions should not delegate important tasks to people in lower positions.
 It is important to have instructions spelled out in detail so that I always know what I'm expected to do.
 It is important to closely follow instructions and procedures.
 Rules and regulations are important because they inform me of what is expected of me.
 Standardized work procedures are helpful. Instructions for operations are important.

#3. Matrix

To what extent do you agree or disagree with the following statements?

Strongly disagree Disagree Undecided Agree Strongly agree

Topics

Individuals should sacrifice self-interest for the group (either at school or the work place).
 Individuals should stick with the group even through difficulties.
 Group welfare is more important than individual rewards.
 Group success is more important than individual success.
 Individuals should only pursue their goals after considering the welfare of the group.
 Group loyalty should be encouraged even if individual goals suffer.
 It is more important for men to have a professional career than it is for women.
 Men usually solve problems with logical analysis; women usually solve problems with intuition.
 Solving difficult problems usually requires an active, forcible approach, which is typical of men.
 There are some jobs that a man can always do better than a woman.

#4. Matrix

To what extent are the following aspects not important or important to you?

Very unimportant Unimportant Neither unimportant nor important Important
 Very important

Topics

Careful management of money (Thrift) Going on resolutely in spite of opposition (Persistence)
 Personal steadiness and stability Long-term planning Please select "important"
 Giving up today's fun for success in the future Working hard for success in the future

#5. Show info

In the next part of the survey, you will be asked estimation questions.

Please do not look it up on the Internet, as this is about intuition and otherwise the study will be falsified. You will first be asked a "bigger or smaller question" and then asked for an exact guess. After the guessing question, you are asked to indicate how sure you are about your given answer.

#6. Single/Multiple Choice

I am aware that I rely solely on my intuition for the following estimation questions and should not look up the answers on the Internet, otherwise the evaluation of my participation is useless.

Yes No

#7. Single/Multiple Choice

Random choice (hoch)☐ Multiple answers possible ☐ min. 2 answers ☐ max. 2 answers☐ Block 2 Mississippi 3219km ☐ Block 4 Katze 48 km/h ☐ Block 6 Mammutbaum 168m
☐ Block 8 Benzin 303 Liter

#8. Single/Multiple Choice

Random choice (niedrig)☐ Multiple answers possible ☐ min. 2 answers ☐ max. 2 answers☐ Block 1 Mississippi 113km ☐ Block 3 Katze 11 km/h ☐ Block 5 Mammutbaum 20m
☐ Block 7 Benzin 76 Liter

#9. Single/Multiple Choice

Do you think the length of the Mississippi River (in kilometers) is greater than or smaller than 113 km?☐ Greater ☐ Smaller

#10. Number (open submission)

Please estimate the exact length of the Mississippi River (in kilometers). Input: 1 - 10000 Unit: km

#11. Numeric Slider / NPS

**Please indicate how confident you are with your estimate.
1 = I am totally unsure; 10 = I am absolutely sure** Input: 1 - 10

#12. Single/Multiple Choice

Do you think the length of the Mississippi River (in kilometers) is greater than or smaller than 3219 km?☐ Greater ☐ Smaller

#13. Number (open submission)

Please estimate the exact length of the Mississippi River (in kilometers). Input: 1 - 10000 Unit: km

#14. Numeric Slider / NPS

**Please indicate how confident you are with your estimate.
1 = I am totally unsure; 10 = I am absolutely sure** Input: 1 - 10

#15. Heatmap

Please take a close look at the picture. The picture on the right is different from the one on the left. Click on the first difference that you see.

#16. Single/Multiple Choice

Do you think the maximum speed of a house cat (in km/h) is greater than or smaller than 11 km/h?

Greater Smaller

#17. Number (open submission)

Please estimate the exact maximum speed of a house cat (in km/h).

Input: 1 - 100 Unit: km/h

#18. Numeric Slider / NPS

Please indicate how confident you are with your estimate. 1 = I am totally unsure; 10 = I am absolutely sure

Input: 1 - 10

#19. Single/Multiple Choice

Do you think the maximum speed of a house cat (in km/h) is greater than or smaller than 48 km/h?

Greater Smaller

#20. Number (open submission)

Please estimate the exact maximum speed of a house cat (in km/h).

Input: 1 - 100 Unit: km/h

#21. Numeric Slider / NPS

Please indicate how confident you are with your estimate. 1 = I am totally unsure; 10 = I am absolutely sure

Input: 1 - 10

#22. Heatmap

Please take a close look at the picture. The picture on the right is different from the one on the left. Click on the first difference that you see.

#23. Single/Multiple Choice

Do you think the height of the tallest redwood (in meters) is greater than or smaller than 20 m?

Greater Smaller

#24. Number (open submission)

Please estimate the exact height of the tallest redwood (in meters).

Input: 1 - 1000 Unit: m

#25. Numeric Slider / NPS

Please indicate how confident you are with your estimate.
1 = I am totally unsure; 10 = I am absolutely sure

Input: 1 - 10

#26. Single/Multiple Choice

Do you think the height of the tallest redwood (in meters)
is greater than or smaller than 168m?

Greater Smaller

#27. Number (open submission)

Please estimate the exact height of the tallest redwood
(in meters).

Input: 1 - 1000 Unit: m

#28. Numeric Slider / NPS

Please indicate how confident you are with your estimate.
1 = I am totally unsure; 10 = I am absolutely sure

Input: 1 - 10

#29. Heatmap

Please take a close look at the picture. The picture on the
right is different from the one on the left. Click on the first
difference that you see.

#30. Single/Multiple Choice

Do you think the amount of gas (in liters) used per month
by the average American is greater than or smaller than
76 liters?

Greater Smaller

#31. Number (open submission)

Please estimate the exact amount of gas (in liters) used
per month by the average American.

Input: 1 - 1000 Unit: in liters

#32. Numeric Slider / NPS

Please indicate how confident you are with your estimate.
1 = I am totally unsure; 10 = I am absolutely sure

Input: 1 - 10

#33. Single/Multiple Choice

Do you think the amount of gas (in liters) used per month
by the average American is greater than or smaller than
303 liters?

Greater Smaller

#34. Number (open submission)

Please estimate the exact amount of gas (in liters) used per month by the average American.

Input: 1 - 1000 Unit: in liters

#35. Numeric Slider / NPS

Please indicate how confident you are with your estimate.
1 = I am totally unsure; 10 = I am absolutely sure

Input: 1 - 10

#36. Show info

Here are a few more questions about you.

#37. Single/Multiple Choice

Which gender do you feel you belong to?

Female Male Non-binary / Third gender Prefer not to say

#38. Open question

What is your age?

#39. Open question

What is your country of origin?

#40. Single/Multiple Choice

In which federal state were you born?

Baden-Wuerttemberg Bavaria Berlin Brandenburg Bremen Hamburg Hesse
Mecklenburg-Western Pomerania Lower Saxony North Rhine-Westphalia Rhineland-Palatinate
Saarland Saxony Saxony-Anhalt Schleswig-Holstein Thuringia I wasn't born in Germany

#41. Single/Multiple Choice

Which federal state do you live in?

Baden-Wuerttemberg Bavaria Berlin Brandenburg Bremen Hamburg Hesse
Mecklenburg-Western Pomerania Lower Saxony North Rhine-Westphalia Rhineland-Palatinate
Saarland Saxony Saxony-Anhalt Schleswig-Holstein Thuringia

#42. Single/Multiple Choice

How long have you lived in the federal state?

Less than 1 year Between 1 and 3 years Between 3 and 5 years More than 5 years

#43. Single/Multiple Choice

What is your marital status?

Single Married Engaged Divorced Widowed Prefer not to say

#44. Single/Multiple Choice

What is your current occupation?

☐ Student ☐ Employed ☐ Unemployed ☐ Retired ☐ Housewife/man ☐ Prefer not to say

#45. Single/Multiple Choice

What is your highest degree/level of school you have completed?

☐ No degree ☐ Secondary School ☐ Vocational School ☐ Highschool ☐ Bachelor's degree (or equivalent) ☐ Master's degree (or equivalent) ☐ Doctorate

#46. Show info

Thank you for participating!

Your responses have been transmitted.

The purpose of this study is to find out if there are certain cultural dimensions that correlate with the cognitive bias of anchoring – that is, provided an numerical answer that is influenced by a previously seen number. Participants were randomly assigned a high or low anchor using the "greater or smaller" questions. In case you have any questions about the survey, please feel free to contact me at the following email address: s-jpesch@ucp.pt.

Below you can anonymously enter your email address at this [link](#) to receive the results.

Here are the solutions to the estimation questions:

Length of the Mississippi: 3778 km

Maximum speed of the domestic cat: ≈48km/h

Monthly gas consumption of the average American: 34 liters

Largest sequoia: ≈116m

Table 23: ANOVA table TA

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1,476	5	,295	7,312	<,001 ^b
	Residual	30,322	751	,040		
	Total	31,798	756			

a. Dependent Variable: Transform_Anchoring

b. Predictors: (Constant), Long Term Orientation Mean, Power Distance Mean, Uncertainty Avoidance Mean, Collectivism Mean, Masculinity Mean

Table 24: Model Summary TA

Model Summary ^b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	,215 ^a	,046	,040	,20094	1,901

a. Predictors: (Constant), Long Term Orientation Mean, Power Distance Mean, Uncertainty Avoidance Mean, Individualism Mean, Masculinity Mean

b. Dependent Variable: Transform_Anchoring

Table 25: TA Descriptives

Descriptives			Statistic	Std. Error
Transformed Anchoring values	Mean		-,2249	,00758
	95% Confidence Interval for Mean	Lower Bound	-,2398	
		Upper Bound	-,2100	
	5% Trimmed Mean		-,2280	
	Median		-,2272	
	Variance		,042	
	Std. Deviation		,20586	
	Minimum		-,87	
	Maximum		,79	
	Range		1,66	
	Interquartile Range		,24	
	Skewness		,342	,090
	Kurtosis		1,166	,180

Table 26: Descriptives Difference all Anchors

Case Processing Summary						
	Valid		Cases Missing		Total	
	N	Percent	N	Percent	N	Percent
Z-Difference all Anchors	738	100,0%	0	0,0%	738	100,0%

Descriptives					Statistic	Std. Error
Z-Difference all Anchors	Mean				,6727	,01517
	95% Confidence Interval for Mean	Lower Bound			,6429	
		Upper Bound			,7025	
	5% Trimmed Mean				,6300	
	Median				,5926	
	Variance				,170	
	Std. Deviation				,41221	
	Minimum				,14	
	Maximum				6,22	
	Range				6,09	
	Interquartile Range				,33	
	Skewness				4,891	,090
	Kurtosis				49,450	,180