

## Measuring Anchoring Bias among University Students

Azhar Mohammed Majeed<sup>1\*</sup>, Maryam Alaa Ahmed<sup>2</sup>

<sup>1</sup> Department of Psychology, College of Arts, University of Baghdad, Email: [azharalsabab@coart.uobaghdad.edu.iq](mailto:azharalsabab@coart.uobaghdad.edu.iq), (Corresponding author)

<sup>2</sup> Department of Psychology, College of Arts, University of Baghdad

\*Corresponding Author: [azharalsabab@coart.uobaghdad.edu.iq](mailto:azharalsabab@coart.uobaghdad.edu.iq)

**Citation:** Majeed, A. M., & Ahmed, M. A. (2025). Measuring Anchoring Bias among University Students, *Journal of Cultural Analysis and Social Change*, 10(4), 3761-3773. <https://doi.org/10.64753/jcasc.v10i4.3653>

**Published:** December 25, 2025

### ABSTRACT

Anchoring bias, first identified by Tversky and Kahneman, is a cognitive phenomenon whereby individuals' judgments are influenced by incidental numerical values, with initial reference points (anchors) disproportionately affecting subsequent evaluations. This study aimed to measure anchoring bias among university students and examine differences based on gender and academic specialization. A total of 400 students from the University of Baghdad, equally divided by gender and academic discipline (humanities and sciences), participated. An 18-item anchoring bias scale was developed, validated through expert review, and tested for reliability using split-half ( $r = 0.75$ ) and test-retest ( $r = 0.73$ ) methods. Results indicated that the sample exhibited anchoring bias. Statistically significant differences were observed according to gender, favoring females, and academic specialization, favoring students in the humanities. These findings suggest that cognitive heuristics such as anchoring influence judgment among university students and that demographic factors can moderate the extent of this bias.

### INTRODUCTION

The earliest reference to anchoring bias can be traced to psychological research approximately 25 years ago, when Tversky and Kahneman laid the foundations for what would become one of the most influential research topics in psychology, namely heuristics and biases. Psychologists observed the anchoring phenomenon in the way individuals' judgments are influenced by incidental numerical values, whereby the presence of a single extreme value exerts a significant effect on judgments of other values. Human judgments are thus affected by what is known as *anchoring bias*, with anchoring referring to an increased tendency or bias in judgment that is associated with a particular numerical value (the anchor).

#### The Present Study Aimed To:

1. Measure anchoring bias among university students.
2. Identify statistically significant differences in anchoring bias according to the variables of gender and academic specialization.

The population of the present study consisted of university students. A random sample was selected from the University of Baghdad, comprising 200 male and female students from the humanities and 200 male and female students from the scientific disciplines, resulting in a total sample of 400 students. To achieve the objectives of the study, an anchoring bias scale was developed based on the definition proposed by Mussweiler (1997) and grounded in the theory of logical coherence. The scale was constructed after reviewing several experimental studies in the field.

The instrument consisted of 18 situational items. Face validity was established through expert review, and item discrimination indices and internal consistency were calculated. Reliability and validity were further examined using

the split-half method, yielding a coefficient of 0.75, and the test–retest method, yielding a reliability coefficient of 0.73. After confirming the adequacy of the instrument, it was administered to the sample of 400 students.

The results indicated that:

1. The sample exhibited anchoring bias.
2. There were statistically significant differences in anchoring bias according to gender (male vs. female), in favor of females, and according to academic specialization, in favor of students in the humanities.

## **Chapter One / The Problem**

Anchoring bias is a well-known cognitive phenomenon that has been widely examined since its emergence in the seminal study conducted by Tversky and Kahneman in 1973. The term was introduced by these scholars when they identified limitations in individuals' abilities in calculation, mathematics, and rapid decision-making, which are often employed to reduce cognitive load. Such reliance results in systematic errors and flawed decisions. Accordingly, Ellis and Harper (1975) argue that individuals' decision-making in various situations is not necessarily based on conscious or logical beliefs; rather, in many cases it may be erroneous and lacking rationality, leading to distortions and deviations in perception.

This deficiency in perception contributes to errors in judgments and decisions, thereby predisposing individuals to cognitive bias. Simon (1955) suggested that human decisions may be influenced by both external circumstances and individuals' internal characteristics. Nevertheless, people commonly use anchoring as a tool in everyday decision-making, which is often intuitive, rapid, and automatic in nature.

Anchoring is therefore considered one of the cognitive shortcuts that enables individuals to reach solutions for complex tasks and problems with minimal effort. However, such shortcuts entail costs. In order to solve problems quickly, certain information is simplified while other information is ignored, and judgments are made accordingly. As a result, the likelihood of systematic errors in decision-making increases. The use of such heuristics has been documented over several decades across a wide range of cognitive tasks (Roumbanis, 2016, p. 1).

## **Significance**

The importance of anchoring has been documented over many decades across a wide variety of cognitive tasks. Tversky and Kahneman, for instance, demonstrated evidence of anchoring in individuals' attempts to estimate the year in which George Washington was elected as the first President of the United States, as well as in estimating the freezing point of vodka. In an experiment conducted by Shoemaker and Russo, participants were asked to imagine the last digits of their telephone numbers, add 400 to those digits, and then consider the resulting number as a historical date. They were subsequently asked whether Attila was defeated in Europe before or after that date, and in which year they believed Attila was defeated. When Shoemaker and Russo posed these questions, participants' responses were strongly influenced by the date derived from their telephone numbers. Although these numbers were entirely unrelated to the actual historical event of Attila's defeat, they exerted a significant influence on judgments.

Anchoring effects constitute one of the indicators that many values and beliefs are not directly retrieved from memory but are instead constructed in the process of responding to a question. Anchoring illustrates this constructive process, as value judgments are influenced by an initial reference point that is unrelated to the target and is merely introduced at the time of questioning.

The adaptive function of the human memory system is to support useful information while neglecting or forgetting irrelevant information. From a cognitive perspective, the primary aim of research on decision-making behavior is to achieve a better understanding of the processing components that are fundamental to learning, problem-solving, and reasoning. Although heuristic strategies are a major source of erroneous inferences and inaccurate probability judgments, individuals rely on them to reduce the complexity of decision-making (Chapman & Johnson, 1999, p. 117).

## **Chapter Two**

### **Theoretical Framework**

One might imagine that all decisions made within large organizations and corporations are entirely rational and thoroughly considered, and that such organizations are able to maintain complex systems and achieve stable profits year after year. However, this assumption may be reconsidered upon realizing that all individuals within these organizations rely, often unconsciously, on cognitive shortcuts when making decisions. This applies to everyone within such institutions.

As another example, imagine that you have been accepted into an ideal position at your dream company, and the only remaining task is to negotiate your salary. You are asked to make the initial offer regarding the level of compensation you would find satisfactory. Research has demonstrated that the initial offer in negotiations generally exerts a surprisingly strong influence on the final outcome. High initial offers tend to lead to higher agreement

values, whereas the opposite is true for low initial offers. In such situations, individuals unconsciously treat these values as reference points, commonly referred to as *anchors*. This represents just one example of how heuristics can influence decision-making, although there are many others.

People rely on heuristics because they reduce the time required for decision-making by drawing on prior experiences to establish rules that remain applicable for a certain period. Although heuristics are useful in reducing the time and cognitive effort invested in making choices, they are also risky, as they give rise to cognitive biases and errors in inference. The assessment of the likelihood of events can be easily formed based on the ease with which examples come to mind. A classic illustration of heuristics that produce misleading inferences was presented by Tversky and Kahneman (1974), who asked participants to generate words in which the third letter was “K.” Despite the fact that many words contain “K” as the third letter, it is easier for individuals to think of words that begin with “K,” making such words more readily retrievable. Consequently, these words are more likely to be reported. Another frequently cited example of heuristics leading to misleading inferences is that people often overestimate the frequency of airplane accidents relative to car accidents, because airplane crashes receive extensive media coverage when they occur. As a result, such examples come to mind more readily and automatically (Ballard, 2020, p. 3).

## Types of Anchors

### 1. Experimenter-provided anchors

Experimenter-provided anchors are defined as reference values that are directly supplied to decision-makers by an external source, varying in their degree of influence on the final decision. In other words, when decision-makers operate in environments characterized by high uncertainty and limited access to reference information, externally provided reference values become key cues or signals in the decision-making process. For illustrative purposes, consider the question: *Did Gandhi die at the age of 140?* For most respondents, Gandhi’s age at death is unknown, placing them in a judgmental situation characterized by high uncertainty and limited information.

### 2. Self-generated anchors

A self-generated anchor is a reference value that arises spontaneously from the decision-maker, with choices based on personal knowledge and experience. More specifically, the decision-maker may select a reference value while being aware that it is incorrect, yet close to the correct answer. This reference value constitutes the self-generated anchor. For clarification, consider the question: *When did George Washington become President of the United States?* Many individuals may not know the exact answer, but they will begin searching their memory for relevant information, such as the fact that the United States declared independence in 1776. Based on this, they may infer that George Washington assumed the presidency around that year. In reality, George Washington did not become President until 1789, thirteen years after independence (Liu, 2023, pp. 5–6).

Self-generated anchors are not mentally tested for their plausibility, and attributes associated with the anchor do not become more accessible. This implies that the selective accessibility mechanism does not operate in cases of self-generated anchors. The distinction between externally provided and self-generated anchors was supported by Epley and Gilovich (2005), who presented evidence that adjustment in the case of self-generated anchors is an effortful process influenced by motivation to process the problem more thoroughly. They found that the use of externally provided anchors was unaffected by attempts to increase cognitive effort (through punishments or rewards), whereas self-generated anchors were influenced by such measures (Ballard, 2020, p. 5).

## Theories Explaining Anchoring Bias

Traditional decision-making theories assume that individuals make rational decisions by weighing the costs and benefits of their choices. Nevertheless, although individuals strive to be rational, they often make biased decisions, particularly under conditions of uncertainty.

There are several phenomena that are easy to demonstrate yet difficult to explain, collectively referred to as anchoring bias. This bias involves evaluations that are unduly influenced by arbitrary values considered by individuals prior to making a numerical or quantitative estimate. To explain the anchoring phenomenon, several theoretical accounts have been proposed, including the following:

### 1. Selective Accessibility Theory (Mussweiler & Strack, 1999)

Mussweiler and Strack argue that anchoring effects can be observed in situations involving general knowledge estimation or outcome prediction, such as estimating animal weights or the probability of a nuclear war. Anchoring can also influence consumer behavior. Mussweiler and Englich (2001) found that anchoring affects judicial decision-making in criminal cases. In simulated criminal court scenarios, participants were presented with cases such as rape and were informed that the prosecutor had proposed either high or low sentencing demands. As

expected, sentencing judgments varied in severity depending on the sentencing anchor. This effect was replicated even when the sentencing recommendation was provided by a first-year computer science student rather than a prosecutor, indicating that the source of information was not critical. Individuals anchored on arbitrary and unreliable information, treating it as relevant to their judgments (Rodriguez, 2019, pp. 6–8).

Accordingly, in order to explore individuals' decision-making processes and the influence of anchoring bias in greater depth, Mussweiler and Strack (1999) classified decision situations into three broad categories. The first category involves situations in which the target value is known. The second involves situations in which the exact target value is unknown but can be inferred from relevant knowledge. The third involves situations in which the exact target value is unknown and cannot be easily inferred from existing knowledge. In the third case, decision-making typically involves a more complex process, known as the selective accessibility model.

Within this model, anchoring is conceptualized as a process of *hypothesis activation and testing*, which constitutes two central components. Mussweiler and Strack (1999) explained anchoring as an activation process in the following manner: anchoring influences the retrieval, construction, and formation of attributes of the target value being evaluated. More specifically, when decision-makers are confronted with third-category situations, they attempt to retrieve information from memory or external sources that can be used to determine the target value. When an anchor is available, the retrieval process becomes biased, allowing the anchor to influence the final judgment. Put differently, the presence of an anchor activates information related to its typical attributes, making it easier for decision-makers to retrieve anchor-consistent knowledge during the retrieval process, while simultaneously reducing the accessibility of alternative attributes (Liu, 2023).

Selective accessibility theory seeks to explain anchoring effects by linking them to two principles that are fundamental to research in social cognition:

**a) hypothesis-consistent testing.**

**b) Semantic Priming**

According to this model, when individuals are given evaluation tasks, they begin to reflect upon, consider, and test the given anchor, operating under an initial assumption that the provided value may represent the correct answer. This confirmatory hypothesis testing increases the accessibility of information that is consistent with the hypothesis. Such increased accessibility leads individuals to rely more heavily on recently activated information, thereby shifting their evaluations toward the anchor. Considerable effort is invested in hypothesis testing (Chen, 2013, p. 5), as participants link their stored knowledge about the target to the task at hand. The model emphasizes that comparing the judgment target with the anchor value facilitates access to knowledge about the target. Accessibility of anchor-consistent knowledge increases selectively because individuals compare the target with the anchor by testing whether the target value is equal to the anchor value.

For example, Chapman and Johnson (1999) asked participants to estimate the number of people in Chicago who would become victims of crime in the following year. In one group, participants were provided with a list of actions that could help them avoid becoming crime victims, whereas in the other group participants were given information unrelated to crime prevention. Chapman and Johnson (1999) found that anchoring effects were stronger among participants who had been informed about crime-prevention strategies. This finding can be attributed to their greater accessibility to anchor-consistent information (Chen, 2013, pp. 5–6).

This active retrieval of judgment-related knowledge is achieved through hypothesis testing based on diagnostic evidence—that is, evidence that helps determine whether the tested hypothesis is true or false. In many cases, evidence is more diagnostic when it is consistent with the tested hypothesis. To form a judgment, participants must retrieve or generate information relevant to the task at hand. The task defines the range of values considered acceptable: the less knowledge an individual possesses, the broader this range becomes.

First, an individual may know the true value of the target. If a person believes that a specific number represents the actual value, this knowledge can be used to answer the comparative question. For example, if a person knows (or believes) that the length of the Mississippi River is exactly 2,350 miles, this value can easily be compared with any reference value, whether 2,000 or 2,500 miles. If, however, the individual lacks specific knowledge about the target but possesses some general knowledge about the category to which it belongs, such knowledge may be used to solve the task. For instance, a person may know that rivers generally have lower and upper bounds in length and may rely on this knowledge to make a judgment. Thus, individuals who know only that the Mississippi is a river may apply their subjective range of river lengths and decide whether the target is higher or lower than the limits of this range. If asked whether the Mississippi is longer or shorter than 25,000 miles, general knowledge about rivers would be sufficient to generate a comparative response.

However, the mechanisms described above do not apply to many anchoring tasks. Individuals rarely know the precise target value, and simple categorical judgments are insufficient, because anchor values are typically less extreme than the category boundaries. To solve tasks under these conditions, individuals must engage in more

complex cognitive processes and construct a mental model in which the target is represented conceptually and imaginatively, and then compared with the anchor value. When the anchor value is implausible and general categorical knowledge is the only basis for responding to the comparative question, information about the true value of the target is limited. In such cases, anchoring may occur in the form of judgmental adjustment that converges on the nearest boundary of the acceptable value range. Individuals may then use this boundary value or test the possibility that the boundary value is correct.

For individuals who generate a mental model requiring comparison of the target with acceptable standards, the information activated during the construction of this mental model becomes more accessible when forming the absolute judgment. Participants tend to adopt a positive testing strategy, retrieving information consistent with the anchor. To explain anchoring effects that occur within category boundaries, it is assumed that participants selectively construct a mental model that increases the accessibility of anchor-consistent information. This information is more likely to be used when answering the subsequent absolute question (Mussweiler & Strack, 1997, p. 438).

Judgments about the target object are compared with the anchor value through hypothesis testing that treats the anchor as a potential value of the target. In other words, individuals consider the possibility that the target and the anchor are equal by initiating a selective search for evidence consistent with this hypothesis. For example, to determine whether the average temperature in Germany is 20°C, individuals may test the hypothesis that it is indeed 20°C. To do so, they retrieve knowledge from memory indicating that average temperatures could correspond to this value—for instance, recalling that summer temperatures often exceed 20°C, that spring temperatures sometimes approach 20°C, and that people wear short sleeves and shorts during such weather (Mussweiler & Strack, 1999, p. 135).

Additional support for the selective accessibility model has been provided by recent studies demonstrating that anchors should not influence absolute judgments if the information used for judgment has already been activated. If the comparative judgment activates information that is more accessible about summer in New York City, it should not affect judgments about the average summer temperature in New York City, because this information overlaps with the information typically used to form such judgments in any case. Bahník and Strack (2000) examined this informational overlap and found that judgments of the average summer temperature in New York City resembled the effects of a high anchor when the comparative question referred specifically to summer temperatures, making hot summer periods more accessible. However, this effect did not occur when participants were asked about average annual temperatures, which are more likely to activate information about summer regardless. A low anchor, by contrast, is more likely to activate information about winter, which does not overlap with the information ordinarily used to form an absolute judgment about average summer temperature.

The selective accessibility model is also consistent with other findings. For example, the time required to generate judgments depends on the degree of accessibility of knowledge relevant to the judgment. Accordingly, response times for absolute judgments depend on the accessibility of judgment-related knowledge, which increases during the comparative judgment process. Individuals are faster in providing absolute judgments when they have sufficient time to generate relevant knowledge during comparison than when they are required to make comparisons under time pressure, which may limit increases in accessibility. Anchoring effects occur under conditions that promote the generation of extensive anchor-consistent knowledge, thereby further increasing accessibility. For instance, individuals with greater amounts of available or anchor-consistent information exhibit stronger anchoring effects than those with less available information. Anchoring bias is also clearly stronger under negative mood states than under positive mood states (Stepan et al., 2016, p. 234).

## 2. Insufficient Adjustment Model

### (Kahneman & Tversky, 1974)

In their original description of the anchoring phenomenon, Tversky and Kahneman conceptualized anchoring in terms of *insufficient adjustment from an initial starting point*. According to this account, individuals form estimates by beginning with an initial value and subsequently adjusting it to arrive at a final answer. These adjustments, however, are typically insufficient, as they tend to remain within a range of values considered acceptable for the judgment (Mussweiler, 1997, p. 19).

Anchor values that are presented as random numbers may inadvertently lead participants to believe that they are not influenced by such arbitrary anchors and, consequently, to make no effort to avoid anchoring effects (Reis et al., 2023, p. 68). Warning individuals about potential bias is not always sufficient to ensure correction, because when people become aware of a possible bias, their attempts to correct their judgments depend on their naïve beliefs about their own ability to counteract bias. Accordingly, two models of correction have been distinguished: *correction by recomputation* and *correction by theory-based adjustment*.

In the first model, individuals reevaluate their judgments using only evidence that appears uncontaminated, thereby disregarding information they believe to be biased. This strategy requires individuals to be aware in advance

of the presence of a contaminating influence. In the second model, individuals adjust their responses in order to compensate for the presumed contamination. In this case, in addition to recognizing the presence of bias, individuals must also be aware of its direction and magnitude.

To illustrate this form of correction, the concept of insufficient adjustment can be understood as a special case of theory-based correction, in which the amount of adjustment is inadequate to compensate for the contaminating influence of the anchor. Individuals must recognize both the direction and the magnitude of the effect. That is, they must know that the presence of anchors distorts their judgments and must also understand the direction of this distortion (e.g., that their estimates tend to resemble the anchor). However, individuals typically underestimate the magnitude of the distortion, resulting in corrections that fall short of compensating for the bias, thereby leaving the final judgment closer to the anchor.

The degree of distortion depends on the perceived magnitude of contamination. If individuals' naïve theories overestimate the magnitude of the effect, they may overcorrect for the presumed bias, producing adjustments that exceed the actual influence. The concept of insufficient adjustment thus helps identify the boundary conditions of correction. For correction to occur, participants must recognize that their judgments are contaminated. Two conditions must be met: first, individuals must be aware that their evaluations are influenced by anchors at all; second, this influence must be perceived as contamination. In some cases, however, the perceived influence is not interpreted as contamination, thereby violating the second condition for adjustment. Anchors may be regarded as valid and legitimate bases for judgment, leading individuals to see no reason to adjust away from the provided value. For example, although individuals may be aware that their evaluations of property values are influenced by listed prices (an externally provided anchor), they may nonetheless perceive these prices as relevant to estimating the true value of a house and therefore see no need to adjust their judgments (Mussweiler, 1997).

Selective accessibility theory also has applications in social psychology, particularly in the domain of social comparison, where it has been used to explain different outcomes of social comparisons as a function of changes in the accessibility of self-related knowledge. As with any judgment, the way people perceive themselves in social comparison depends critically on the knowledge they use as a basis for self-evaluation. Social comparison influences self-evaluation, and to engage in social comparison, individuals must obtain certain information relevant to judgments about both the self and the standard. To do so, individuals engage in an active search for judgment-relevant information through hypothesis testing. This hypothesis-testing process is often selective: individuals focus on a single hypothesis and evaluate it against a particular standard. Rather than engaging in an effortful comparative test of all plausible hypotheses, individuals restrict themselves to testing one focal hypothesis.

In social comparison, individuals may test one of two basic hypotheses: either that the self is similar to the standard or that the self differs from the standard. Which of these hypotheses is tested depends on the perceived overall similarity between the self and the standard. As a first step in selective accessibility, individuals engage in a rapid initial assessment of the self and the standard, briefly considering a small number of attributes to determine whether they are generally similar or different (for example).

### **3. Anchoring and Adjustment Model**

#### **(Epley & Gilovich, 2004)**

The anchoring and adjustment theory refers to a cognitive process through which decision-makers initially focus on the anchor and then make a series of subsequent adjustments toward their final evaluations (Chapman & Johnson, 1999), resulting in judgments that remain similar to the initial starting value. Because these adjustments are insufficient, the final response remains biased toward the anchor.

This theory has a distinctive history in that it highlighted a major gap in psychologists' understanding of the common sources of judgmental inaccuracy encountered in everyday life. Initial information places a burden on subsequent adjustment processes, leaving final evaluations very close to the original anchor. In this theoretical framework, participants were asked questions such as, "What is the population of Chicago?" Countless experiments have employed this paradigm to demonstrate that individuals' absolute judgments are biased. People tend to believe that Chicago is densely populated and therefore estimate its population as exceeding five million.

Research on anchoring as a phenomenon did not cease after the pioneering work of Tversky and Kahneman (1974). Individuals adjust from values they generate as starting points in order to approximate the target value. The use of self-generated anchors functions as a judgmental heuristic by simplifying complex judgments and substituting an easily adjustable value for a more effortful evaluation. Most Americans do not know the year in which George Washington was elected President of the United States, but they can quickly generate an estimate by adjusting from the well-known date of independence in 1776, which is close to the correct answer (Epley & Gilovich, 2014, pp. 311–312).

From another perspective, this theory has been applied to explain expectations of inflation, based on the premise that economic markets change rapidly and that individuals' judgments about expected inflation are characterized by considerable uncertainty. Moreover, individuals are generally unable to form accurate judgments

about future inflation, either directly or through deliberation. In such cases, individuals are more likely to select data from previous periods as reference points and then adjust for current market characteristics and changes in order to forecast future inflation. However, these adjustments are often inadequate, as individuals cannot perceive the full picture of the market, resulting in forecasts that represent temporary satisfactions rather than precise values. Individuals often cease adjusting once they reach a value that seems satisfactory, thereby producing bias toward the initially generated anchor. In a study by Yang et al. (2011), it was suggested that individuals tend to adjust their inflation forecasts insufficiently and are strongly influenced by previous inflation rates (Liu, 2023, p. 274).

### Chapter Three

#### Second: Research Population

The research population refers to all individuals in whom the researcher studies a particular phenomenon or event. It also represents the total group of individuals who possess data related to the phenomenon under investigation; thus, it constitutes the set of units or individuals from whom research data are to be obtained (Melhem, 2002, p. 219). The population of the present study consists of male and female students at the University of Baghdad for the academic year 2024–2025. The total population numbered 8,881 students, including 3,314 males and 5,009 females. Table (1) illustrates this distribution.

**Table (1)**

Names of Colleges at the University of Baghdad and the Distribution of Students According to Gender and Specialization for the Academic Year (2024–2025)

No.	College	Specialization	Males	Females	Total
1	Medicine	Scientific	113	166	279
2	Al-Kindy College of Medicine	Scientific	2	24	26
3	Dentistry	Scientific	190	251	441
4	Pharmacy	Scientific	113	211	324
5	Veterinary Medicine	Scientific	178	124	302
6	Nursing	Scientific	145	151	296
7	Engineering	Scientific	297	352	649
8	Al-Khwarizmi College of Engineering	Scientific	24	49	73
9	Agricultural Engineering Sciences	Scientific	133	188	321
10	Science	Scientific	215	558	773
11	Administration and Economics	Humanities	238	285	523
12	Science for Women	Scientific	0	344	344
13	Physical Education and Sports Sciences	Humanities	80	26	106
14	Physical Education and Sports Sciences for Women	Humanities	0	118	118
15	Education for Pure Sciences / Ibn Al-Haytham	Scientific	146	244	390
16	Fine Arts	Humanities	213	208	421
17	Law	Humanities	95	156	251
18	Political Science	Humanities	49	59	108
19	Islamic Sciences	Humanities	138	189	327
20	Arts	Humanities	383	480	863
21	Languages	Humanities	27	58	85
22	Media	Humanities	118	100	218
23	Education for Women	Humanities	0	682	682

24	Ibn Rushd College of Education for Humanities	Humanities	417	544	961
<b>Total</b>			<b>3,314</b>	<b>5,009</b>	<b>8,881</b>

## Second Instrument / Anchoring Bias

### 1. Collection and Identification of Scale Items

The researcher reviewed a wide range of literature and previous studies addressing anchoring bias. Given that prior studies relied on scenarios developed by Mussweiler (1997), the researcher adopted several items from earlier studies. Specifically, items (7, 3) were taken from the study by Jin et al. (2023); items (14, 12, 11, 9) were adopted from Rodriguez (2019); and items (8, 5, 1) were taken from Riva (2011). The remaining items were drawn from the work of the theorist Mussweiler. After obtaining Mussweiler's book *A Selective Accessibility Model of Anchoring*, the researcher selected ten items from this source in the following order: (18, 17, 16, 15, 13, 10, 6, 4, 2).

### 2. Scoring of the Scale

The scale was scored using two alternatives (2 and 1). A score of (1) was assigned to respondents who were not influenced by the information presented in the scenario and did not agree with it. A score of (2) was assigned to respondents who answered "yes," indicating reliance on the initial information provided in the question without allocating sufficient cognitive effort to deliberate further. In such cases, the initial information interrupted further thinking, leading respondents to agree with the information presented in the scenario. The design of these items was based on the study by Berg and Moss (2022).

### 3. Instructions for the Scale

Respondents were instructed to answer all items by indicating their evaluation of each scenario. They were asked to respond honestly and sincerely, with the assurance that the procedure was conducted solely for scientific research purposes. Participants were instructed not to leave any item unanswered, were informed that the time for responding was limited, and were assured that their responses would be accessible only to the researcher. The researcher also asked participants to provide information regarding the following variables: gender and academic specialization.

### 4. Validity of the Anchoring Bias Scale Items

Ebel (1972) emphasized that the validity of scale items can be established by presenting the instrument to a panel of experts who assess the extent to which its items are suitable for measuring the construct for which it was designed (Ebel, 1972, p. 555). Accordingly, the researcher presented the preliminary version of the scale (see Appendix ...) to a group of psychology specialists, clarifying the purpose of the study, the theoretical definition adopted, and the type of sample to which the scale would be applied. The experts were asked to provide their observations and opinions regarding the suitability of the scale, its instructions, and its items, as well as any necessary deletions or modifications. The researcher adopted an agreement rate of 80% or higher as the criterion for item acceptance; expert agreement reached 100%.

### 5. Pilot Sample for Clarity of Instructions and Items and Time Estimation

To ensure the clarity of the anchoring bias scale items and instructions and to determine the average time required for completion, the researcher administered the scale to a pilot sample of 30 male and female students from the College of Arts, University of Baghdad (evening study program). The results indicated that the instructions were clear, the items were understandable, and the average time required to complete the scale was approximately 35 minutes.

6. Item Analysis To analyze the items of the present scale, the researcher followed the same procedures used in the analysis of the Change Blindness Test. Two methods were employed in the analysis of the scale:

#### A. Extreme Groups Method

To implement this method, the researcher followed the steps below:

The same sample of 400 male and female students was used.

The anchoring bias scale was administered to university students, and a total score was calculated for each response form.

The obtained scores were arranged in descending order (from the highest to the lowest score).

The upper 27% and the lower 27% of the scores were selected, as choosing this proportion allows for the formation of two groups with the largest possible size and maximum variance. Accordingly, 27% of the response forms with the highest scores (108 forms) and an equal number of forms with the lowest scores were selected.

The discriminative power of the anchoring bias items was calculated using the discrimination formula.

The calculated values were obtained by computing the chi-square value (for statistical significance) and the phi coefficient (for direction), and comparing them with the tabulated chi-square value (3.84) at a significance level of (0.05) and one degree of freedom. The comparison showed that all anchoring bias items were statistically significant and positively discriminating, as their calculated chi-square values exceeded the critical value. Table (2) below illustrates these results.

**Table (2)**

Discriminative Power of the Anchoring Bias Scale Items Using the Extreme Groups Method

Item No.	Lower Group (1)	Lower Group (2)	Upper Group (1)	Upper Group (2)	$\chi^2$ (calculated)	$\chi^2$ (tabulated)	Phi	Significance (0.05)
1	102	6	70	38	29.226	3.84	0.368	Significant (+)
2	68	40	10	98	67.505	3.84	0.559	Significant (+)
3	80	28	19	89	69.389	3.84	0.567	Significant (+)
4	43	65	2	106	47.186	3.84	0.467	Significant (+)
5	76	32	32	76	35.852	3.84	0.407	Significant (+)
6	39	79	6	102	18.037	3.84	0.289	Significant (+)
7	70	38	40	68	16.672	3.84	0.278	Significant (+)
8	90	18	67	41	12.336	3.84	0.239	Significant (+)
9	41	67	27	81	4.207	3.84	0.140	Significant (+)
10	48	60	7	101	41.005	3.84	0.436	Significant (+)
11	88	20	71	37	6.888	3.84	0.179	Significant (+)
12	99	9	71	37	21.655	3.84	0.317	Significant (+)
13	69	39	18	90	50.059	3.84	0.481	Significant (+)
14	103	5	82	26	16.610	3.84	0.277	Significant (+)
15	85	23	14	94	94.005	3.84	0.660	Significant (+)
16	35	73	5	103	27.614	3.84	0.358	Significant (+)
17	82	26	6	102	110.761	3.84	0.716	Significant (+)
18	40	68	7	101	29.614	3.84	0.370	Significant (+)

### B. Relationship Between Item Score and Total Scale Score (Internal Consistency)

The researcher employed this method to determine whether each item of the scale was aligned with the overall direction of the scale. This approach is considered one of the most accurate methods for estimating the internal consistency of scale items. Accordingly, the point-biserial correlation coefficient was used to calculate the relationship between the score of each item and the total score of the scale, using the Statistical Package for the Social Sciences (SPSS).

The results indicated that all correlation coefficients were statistically significant, as they exceeded the critical value. The critical value of the point-biserial correlation coefficient at a significance level of (0.05) and 398 degrees of freedom is (0.098). The obtained correlation coefficients for the anchoring bias scale ranged from 0.498 to 0.615. Table (3) presents the correlation coefficients between each item and the total scale score.

**Table(3)**

Item–Total Correlation Coefficients for the Anchoring Bias Scale

Item No.	Item–Total Correlation
1	0.518
2	0.537
3	0.615
4	0.534
5	0.546
6	0.489
7	0.513
8	0.471
9	0.524

<b>10</b>	0.547
<b>11</b>	0.570
<b>12</b>	0.532
<b>13</b>	0.565
<b>14</b>	0.607
<b>15</b>	0.523
<b>16</b>	0.576
<b>17</b>	0.559
<b>18</b>	0.490

All items demonstrated satisfactory discriminative power and adequate internal consistency, supporting the psychometric soundness of the anchoring bias scale.

## 7- Indicators of the Validity of the Anchoring Bias Scale

### a. Face Validity

Face validity of the Anchoring Bias Scale was established by presenting it to a panel of experts specialized in psychology, who evaluated the appropriateness of the items according to a predetermined acceptance threshold of 80% or higher.

### b. Exploratory Factor Analysis

Exploratory Factor Analysis (EFA) is a statistical technique used to reduce the number of observed variables that constitute the variable under study into a smaller number of underlying factors. EFA serves as a strategy to condense the number of variables or indicators used for data collection, such as questionnaires, and to identify the shared variance (commonality) among them. It also provides an estimate of construct validity by revealing the factorial structure (i.e., the number of factors and the pattern of item loadings) of the scale (Ayesh & Aoun, 2016, p. 96).

The researcher conducted an EFA on the Anchoring Bias Scale, which comprised 18 items. After performing orthogonal rotation, the analysis yielded a single factor, with all items exhibiting factor loadings above Guilford's criterion of 0.30. The factor's eigenvalue was 6.434, and the percentage of explained variance was 35.744%. According to Gorsuch (1983), significant factors are those with eigenvalues equal to or greater than 1, and item loadings on the factor should not be less than 0.30; items with lower loadings should be removed, as a factor with an eigenvalue below 1 indicates a limited contribution to the variance of the original variables (Rashwan, 2015, p. 20).

Table (4) presents the factor loadings for each item on the general factor:

<b>Item</b>	<b>Factor Loading</b>
<b>1</b>	0.422
<b>2</b>	0.464
<b>3</b>	0.416
<b>4</b>	0.555
<b>5</b>	0.532
<b>6</b>	0.412
<b>7</b>	0.433
<b>8</b>	0.440
<b>9</b>	0.564
<b>10</b>	0.475
<b>11</b>	0.509
<b>12</b>	0.515
<b>13</b>	0.510
<b>14</b>	0.666
<b>15</b>	0.621
<b>16</b>	0.686
<b>17</b>	0.536
<b>18</b>	0.699

## 8- Reliability Indicators

The researcher calculated the reliability of the Anchoring Bias Scale using two methods:

### a. Test-Retest Method

To determine test-retest reliability, the scale was administered to a randomly selected sample of 50 students (25 from the College of Education, Ibn Rushd, University of Baghdad, and 25 from the College of Pharmacy, Al-Nahrain University). After two weeks, the same scale was re-administered to the same sample, and Pearson's correlation coefficient was used to assess reliability. The result showed a reliability coefficient of 0.73, indicating good stability of the scale.

### b. Split-Half Method

The split-half method addresses some limitations of the test-retest approach by calculating reliability directly from a single administration. The test scores are divided into two equal halves, and the correlation between the two halves is calculated. This correlation is then adjusted using the Spearman-Brown formula to estimate the overall reliability of the scale (Abdul Karim, 2020, p. 47).

Table (5). shows the reliability values:

Variable	Split-Half Correlation	Spearman-Brown Corrected Reliability
Anchoring Bias	0.5981	0.75

## 9- Statistical Indicators

The Anchoring Bias Scale was further analyzed for its statistical properties, including mean, median, mode, standard deviation, skewness, kurtosis, minimum, and maximum scores. The results are summarized in Table (6), and the distribution curve of the sample's responses is illustrated in Figure ().

Indicator	Value
Mean (M)	27.7075
Median	28.0000
Mode	28.00
Standard Deviation (SD)	2.61803
Skewness	0.046
Kurtosis	0.067
Range	13.00
Minimum Score	20.00
Maximum Score	33.00

## Chapter Four

### First: Anchoring Bias among University Students

A one-sample t-test was employed to examine the significance of the difference between the sample mean of the Anchoring Bias scale, which was ( $M = 27.7075$ ) with a standard deviation ( $SD = 2.61803$ ), and the hypothetical mean ( $M_0 = 27$ ). The calculated t-value was ( $t = 5.405$ ), which is statistically significant at the 0.05 level with 399 degrees of freedom, compared to the critical t-value of 1.96.

**Table7**

Mean, Standard Deviation, Hypothetical Mean, Calculated t-Value, Critical t-Value, and Statistical Significance for Anchoring Bias Scores

Variable	N	Mean	SD	Hypothetical Mean	t-value	t-critical	Significance
<b>Anchoring Bias</b>	400	27.7075	2.61803	27	5.405	1.96	Significant

According to Mussweiler & Strack (1997), individuals facing decision-making tasks can be categorized into three groups:

1. **Known Target Value:** The value of the target is known.
2. **Unknown but Estimable Target Value:** The exact value of the target is unknown but can be estimated from related knowledge.
3. **Unknown Target Value with Information Retrieval:** Decision-makers attempt to obtain information from memory or external sources to determine the target value.

When an anchor is available, decision-makers tend to be influenced by it, allowing the anchor to affect the final judgment. In other words, the presence of the anchor activates information about its common characteristics, making it easier for the decision-maker to retrieve knowledge consistent with the anchor, while simultaneously reducing access to alternative cues.

The researcher attributes the existence of anchoring bias among university students to traditional study methods that do not encourage reflective thinking. Instead, students rely on information that is easily retrievable from memory and relevant to the tasks they are learning. In other words, students refer to “anchor points” in their learning, around which their thinking revolves, focusing on comparative rather than absolute judgments.

### **Second: Statistical Differences in Anchoring Bias among University Students According to Gender and Major**

To examine the mean and standard deviation of the sample according to gender and major, the results are presented in **Table 8**:

**Table8**

Mean and Standard Deviation of Anchoring Bias Scores by Gender and Major

Gender	Major	N	Mean	SD
<b>Male</b>	Scientific	100	26.1000	2.41836
<b>Male</b>	Humanities	100	28.4100	2.34454
<b>Total Male</b>		200	27.2550	2.64290
<b>Female</b>	Scientific	100	27.0700	2.37944
<b>Female</b>	Humanities	100	29.2500	2.16667
<b>Total Female</b>		200	28.1600	2.51915
<b>Overall Total</b>	Scientific	200	26.5850	2.44184
<b>Overall Total</b>	Humanities	200	28.8300	2.29071
<b>Grand Total</b>		400	27.7075	2.61803

A two-way ANOVA was conducted to determine whether there were significant differences in anchoring bias according to gender and major. The results were as follows:

1. There were **no statistically significant differences** in anchoring bias based on gender (male vs. female), as the F-value (15.096) exceeded the critical value (3.84) at 396/1 degrees of freedom and  $\alpha = 0.05$ .
2. There were **statistically significant differences** in anchoring bias according to major (Scientific vs. Humanities), as the F-value (92.897) was greater than the critical value (3.84) at 396/1 degrees of freedom and  $\alpha = 0.05$ .
3. There were **no statistically significant interaction effects** between gender (male vs. female) and major (Scientific vs. Humanities), as the F-value (0.078) was smaller than the critical value (3.84) at 396/1 degrees of freedom and  $\alpha = 0.05$ .

**Table 9**

Source of Variance, Sum of Squares, Degrees of Freedom, Mean Squares, Calculated F-Value, and Significance Level

Source of Variance	Sum of Squares	df	Mean Square	F-Value	Significance ( $\alpha = 0.05$ )
<b>Gender</b>	81.903	1	81.903	15.096	Significant
<b>Major</b>	504.003	1	504.003	92.897	Significant
<b>Gender * Major</b>	0.432	1	0.432	0.078	Not Significant
<b>Error</b>	2148.45	396	5.425		
<b>Total</b>	2734.777	396			

**REFERENCES**

- Ballard,s;(2020):An Examination of the effects of Gender and perceived stress level on the use of self –generated anchors.
- Champan,G.B.& Johnson,E.J;(1999): Anchoring ,Activation, and the construction of values.
- Eply& Gilovich (2006): The Anchoring –and- Adjustment Heuristic.
- Liu,Y;(2023): literature review of A cognitive heuristic: The Anchoring Effect.
- Mussweiler& Strack(1999): Comparing is Believing : A selective Accessibility Model of judgemental Anchoring.
- Mussweiler& Strack (1997): Explaining The Enigmatic Anchoring Effect: Mechanisms of selective Accessibility.
- Roumbanis,L.(2016): Academic judgement under uncertainty : A study of collective anchoring effects in Swedish .Research council panel groups.
- Rodriguez,M.S;(2019): The Anchoring Effect and moral judgment.