

HEURISTICS AND COGNITIVE BIASES IN JUDICIAL DECISIONS: INTERDISCIPLINARY ANALYSIS TO UNDERSTAND THE JUDICIAL DECISION FROM COGNITIVE PSYCHOLOGY

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Abstract

A court decision can have a significant impact on the life of a person or a community. Judicial decisions not only require the understanding and specific monitoring of regulations, but are also associated with the cognitive processing of information by professionals in the area, such as lawyers, judges, conciliators or other entities whose powers have been granted by law for the resolution of judicial or extrajudicial processes. Therefore, it will be relevant to recognize influences in the reasoning and minimize conditions that affect the proper judicial decision making. The objective of this study was to identify the heuristic processes and cognitive biases for judicial decision making from the perspective of cognitive psychology. It was developed under a qualitative approach of hermeneutic method. The information was collected through the documentary review technique and the discourse analysis was used in the documentary analysis matrix. As results, the heuristic processes and cognitive biases with predominance in judicial decisions were identified, highlighting the heuristics of representativeness, availability and anchoring; in the classification of biases linked to the judicial decision, the bias of the law of small numbers, bias of overconfidence and bias of equiprobability stand out.

Keywords. Heuristic processes, cognitive biases, decision theory, legal education, judicial decisions.

INTRODUCTION

Throughout their lives, individuals are frequently required to make decisions based on available information, which may be scarce or sufficient for an easy decision. These decisions can lead to cognitive biases, patterns or rules that predispose or condition thinking and adjust information, leading to deviation or error in the assessment and prediction for decision-making. (Barón y Rotundo, 2018; Korteling et al., 2018).

Such cognitive biases can lead to wrong choices, particularly when judging in contexts of little information, where people make decisions or solve problems that are usually complex (Castro et al., 2019; Kahneman, 2003). Therefore, making a decision with scarce information leads to biased decisions, which is problematic due to the enormous amount of decisions that humans make in uncertain circumstances, in different areas of development, including the social, affective, family, work, and even the judicial context (Dror, 2020). The implications of biased decisions in professionals can have a



negative social impact, such as a doctor issuing an incorrect diagnosis or a judge sentencing a specific case, by not validating the necessary information to make such decisions, related to a person's health or respect for the fundamental right to freedom, respectively (Dror et al., 2018).

A cognitive bias is a disturbance in the processing of information from the senses, leading to distortions, erroneous judgments, and illogical interpretations of the available information (Bellé et al., 2018; González et al., 2017). Biases originate from the use of shortcuts to process information (heuristics), as well as limitations in processing capacity, distortions in memory and recall, or emotional, social, and moral influences (Páez, 2021). Indeed, when discussing biases, it is important to note that they are not limited to social, religious, sexual, racial, or other similar biases, but also include biases that are intrinsically ingrained and influence individuals on a daily basis in simple decisions such as which path to take, what clothes to buy, or even thinking that smoking is harmless for one's health based on knowing an 80-year-old smoker, among other situations.

In this sense, biases do not act in isolation, and the relevance of studying them lies in their persistent and systematic nature, meaning they persist in individuals and occur automatically in certain situations (Cooper et Meterko, 2019; Pascale et Pascale, 2007). Likewise, the importance of conscious and unbiased decision-making in professionals is emphasized to prevent the occurrence of biases, thereby contributing to more rational decision-making (Castro et al., 2019). The general recognition of cognitive biases is a task that arises from the appropriate development of critical and scientific thinking, as errors in predicting and explaining facts generated by biases can be moderated through argumentative analysis present in critical thinking (Ossa et al., 2016).

Now, in the context of law, according to Páez (2021), there are different moments in a judicial process where judicial agents use heuristics and, consequently, cognitive biases in their reasoning process, resulting in negative inferences for their decisions, which raises doubts about their full rationality due to the systematic nature of these biases. This, according to Muñoz (2011), holds significance, as the aim is for the adjudicating body to operate within the sphere of objective impartiality, devoid of any preconceptions in its function.

Particularly in Colombia, according to Mendoza et Gelvez (2022), judges have the duty to ensure the judicial protection of those who access the administration of justice, linked through the state via the judicial branch to guarantee impartiality in legal issues. Therefore, "the judge's role should be pure, free from any prejudice or bias that may taint their impartiality" (p. 2). This implies matters beyond the law and delves into the reasoning process of judges as human beings who not only think but also exist within a dynamic context with constant stimuli that can influence their decision-making process.

In this regard, we can mention legal decisions that have been influenced by confirmation bias, hindsight bias, representativeness heuristic, anchoring effect, framing effect, halo effect, or cryptomnesia (Páez, 2021), availability heuristic, hindsight bias, confirmation bias, group bias (Muñoz, 2011), personality bias, emotional bias (Mendoza y Gelvez, 2022). Consequently, it is pertinent to understand, identify, and prevent the emergence of cognitive biases not only in professionals but in every situation in which a human being makes decisions.

Having said that, and considering that law is based on the pursuit of justice and legal security, the following question that relates law to cognitive psychology is formulated: What heuristic processes and cognitive biases are involved in judicial decision-making?

Methodology

This research was conducted from a qualitative perspective (Martínez, 2006). The data collection employed the documentary review technique and hermeneutical method. Finally, the analysis was carried out using discourse analysis, applying a matrix analysis technique to break down the collected information into its constituent parts in order to comprehend it as a whole (Hurtado, 2010).

For the development of this study, a matrix for document review was created and validated by expert peers classified by Minciencias. The aim was to locate, compile, select, review, analyse, extract, and

record information contained in documents related to the topic (Hurtado, 2010), in this case, heuristics and cognitive biases generated in the reasoning for decision-making from the theoretical perspective of psychology. This matrix underwent a review of 45 scientific articles at both national and international levels. Subsequently, a discourse analysis matrix was developed to extract information from the documents, with the purpose of establishing relationships between individual, common, and axial categories that allowed for the exploration of the analysed phenomenon from current literature. A set of questions was formulated to identify heuristic processes and cognitive biases in the reasoning for judicial decision-making in psychology, as observed in Table 1.

Table 1. Table of Definition and Operationalization of Categories

Table of Definition and Operationalization of Categories				
Category	Definition	Analysis technique		Item
Definition	This category aims to expose the qualities of the concepts under study.			What is a heuristic process?
				What is a cognitive bias?
Classification	This category aims to organize the concepts related to the topic.	Discourse matrix	analysis	How are heuristics classified in judicial decision-making?
				How are cognitive biases classified in judicial decision-making?
Methodology	This category aims to understand how the concepts under this study are understood.			How are heuristics detected in decision-making?
				How are cognitive biases detected in decision-making?

Results and discussion

Understanding the Concepts of Heuristics and Cognitive Biases

Castro et al., (2019) define heuristics as a set of simple and efficient rules that adapt an individual's knowledge to new information provided by the environment. They are considered an energy-saving tool, suggesting lower cognitive effort and promptness in generating ideas. As a result, this can either expedite or hinder a solution or choice.

Heuristics are conceived as estimation procedures that are not irrational, constituting normal intuitive responses to highly complex problems, issues of plausibility, frequency, and prediction (Cortada de Kohan, 2008; Pascale & Pascale, 2007).

In this regard, based on the analysed studies, two definitions of heuristics were determined: i) heuristics as rules and ii) heuristics as strategies. This classification is based more on their nomenclature than their function, as heuristics are typically employed in complex problems, often based on incomplete information (Aranzabal y Fuentes, 2002; Castro et al., 2019).

For instance, when judging the probability that event B is characteristic of A insofar as A is representative of B: the crime rate (B) in Colombia (A) is high, therefore, all Colombians (A) are criminals (B). This type of reasoning could be termed a "heuristic procedure," a usage or definition that shows similarity among theorists. However, there are those who also refer to them as strategies or mechanisms (Aranzabal y Fuentes, 2002; Ossa et al., 2016; Serrano et al., 1998) and those who refer to it as a rule or set of rules

(Castro et al., 2019; González et al., 2017; Manzanal et al., 2015). Therefore, based on these designations, the two common categories mentioned earlier were created.

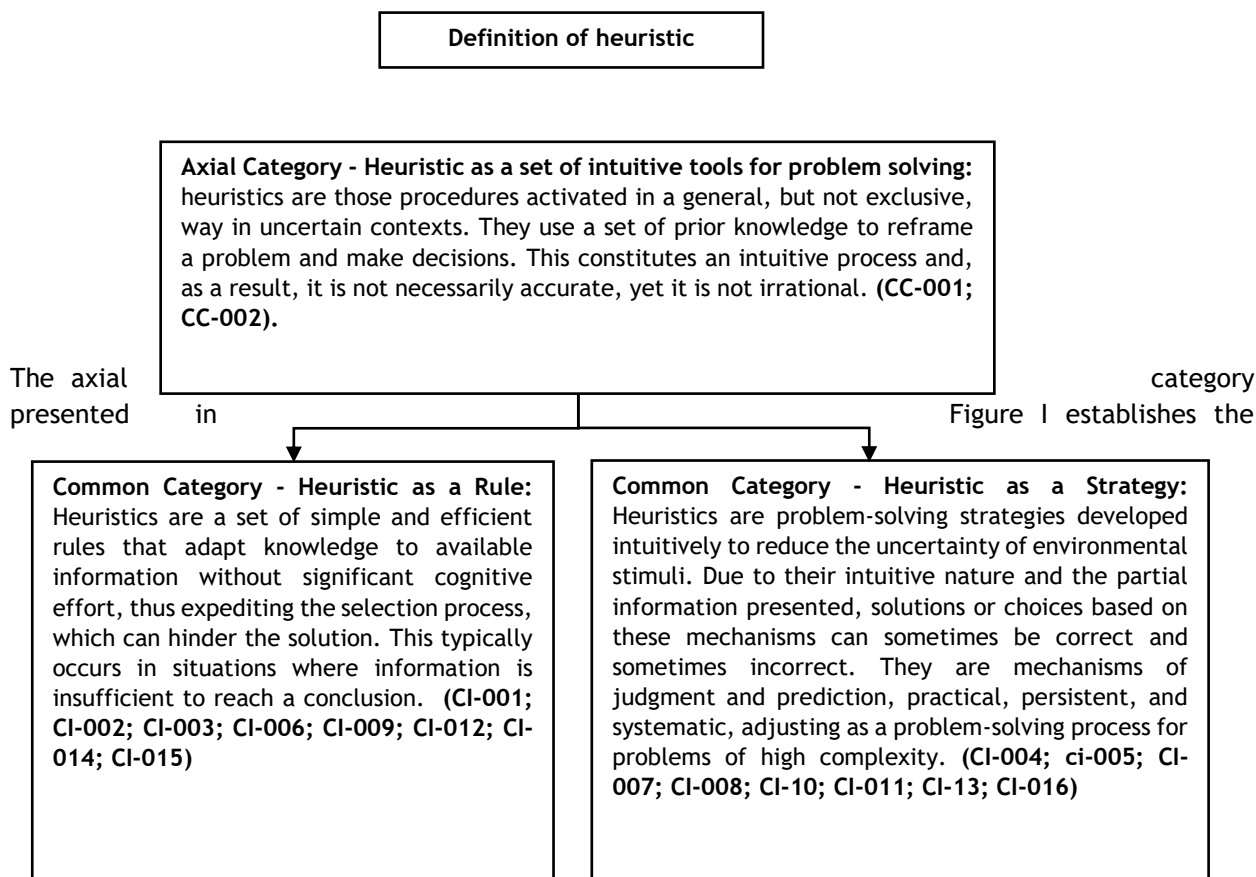
Table 2. Authors who support the definition of heuristics.

Authors ¹	Common categories	Axial category
Castro et al. (2019) Ossa et al. (2016) Pascale y Pascale (2007) González et al. (2017) Serrano et al. (1998) Aranzabal y Fuentes (2002) Manzanal et al. (2015) Casado (2017) Urra et al. (2011) Bustamante (2021) Rojas (2020) Prieto (2020) Kahneman (2003) Ramírez (2020) Nieva (2017)	Heuristic as a <i>rule</i> Heuristic as a <i>strategy</i> :	Heuristic as a set of intuitive tools for problem-solving:

Note. 1 Authors who support the coding process.

Figure 1.

Encoding: definition of heuristic



definition of heuristic resulting from the analysis process executed. In this way, it is coincident with what has been expressed by various authors, since heuristic processes are a set of intuitive tools for



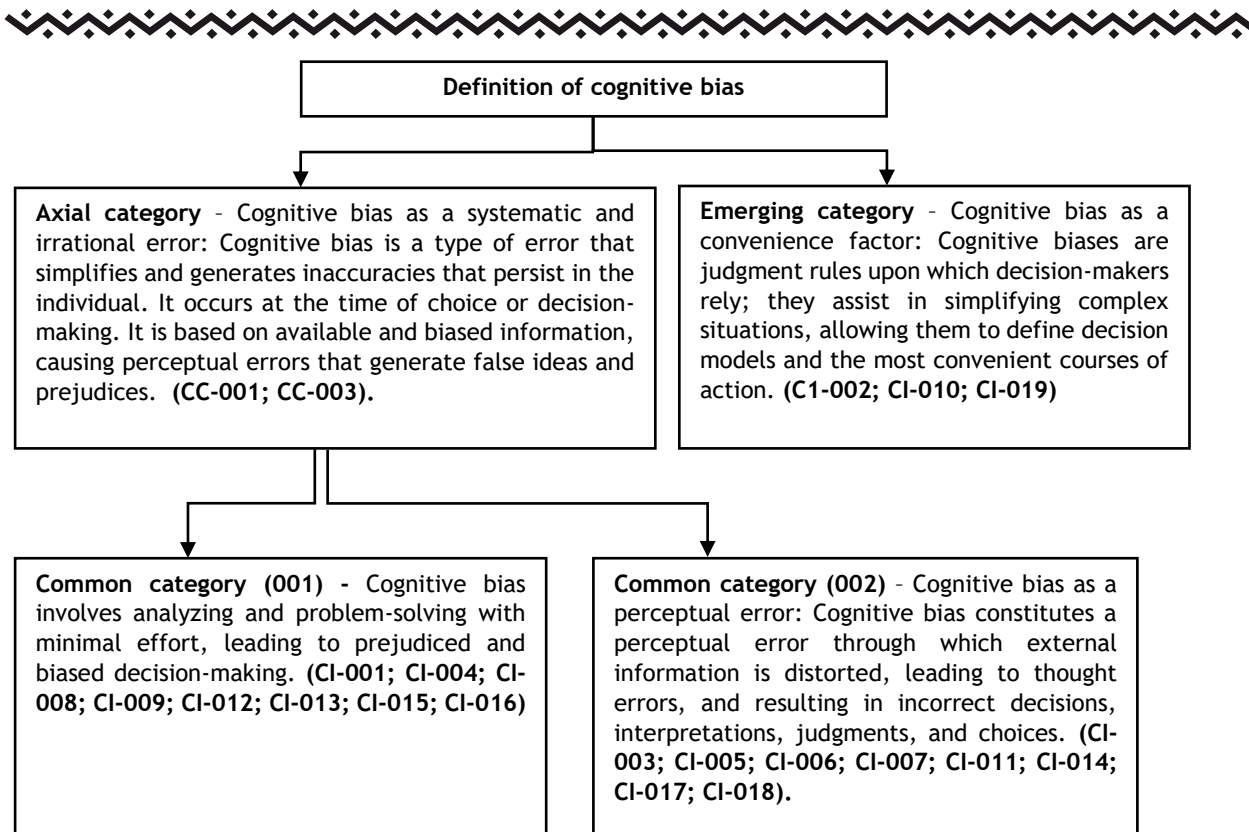
problem solving. Specifically, they simplify and process information (Urta et al., 2011), intentionally or unintentionally (Bustamante, 2011), by allowing for quick decision-making (Rojas 2020), simplifying processes in a simple and efficient way (Casado 2017; Gonzáles et al. (2017), constituting normal intuitive responses, not irrational, to problems, both complex and easily solvable (Pascale y Pascale, 2007). Furthermore, according to Páez (2021), these, regardless of their function, negatively affect judicial decision-making, casting doubt on the logical-legal reasoning of the outcome.

On the other hand, and considering the current literature, it can also be understood that heuristics and biases are similar terms (Pérez, 2020; Lázaro, 2020; Ramírez, 2020) mainly, in everyday use, heuristics and biases are often used interchangeably. However, a theoretical approach can help to differentiate between the two, with heuristics understood as a more general concept from which cognitive biases emerge (Castro et al., 2019), therefore, heuristics and biases are distinguished by the fact that the former does not necessarily lead to an error, while the latter is understood to have a negative or deviant connotation (Barón y Rotundo, 2018).

Table 3. Authors supporting the definition of bias

Author	Common categories	Axial category	Emerging category
Barón y Rotundo (2018)			
Castro et al. (2019)			
Ossa et al. (2016)			
Gonzáles et al. (2017)			
Carballo (2019)			
Bustamante (2021)			
Del Aguila (2022)			
Gatica y Garrido (2022)	Bias as a deductive error due to predisposition	Cognitive bias as a systematic error	Cognitive bias as a factor of convenience
Rojas (2020)			
Ramírez (2020)			
Lázaro (2022)	Cognitive bias as a perceptual error		
Jungbluth (2020)			
Cardona et al. (2020)			
Pérez (2021)			
Mendoza y Gelvez (2022)			
Bellé et al. (2018)			
Cooper y Meterko (2019)			
Korteling et al. (2018)			
Vázquez (2022)			

Figure 2. Encoding: Definition of cognitive bias



Note. CC = Common Category. CI = Individual category, authors' speech coded.

In this regard, the study was able to determine two types of cognitive biases: i) biases as systematic and irrational errors, which refer to the definition of bias as a perceptual and deductive error, which generate "a distortion, wrong judgment, incoherent or illogical interpretation on the basis of the information we have" (González et al., 2017, p.6). An example of this is when an object or situation is judged by its presentation without knowing its content.

And ii) cognitive biases as a factor of convenience, which basically, help according to Barón y Rotundo (2018) to "simplify complex situations and thus be able to define the most convenient decision-making and action models" (p.38), thus explaining that biases are beneficial for decision-making.

Cognitive biases as systematic and irrational errors are composed of: i) cognitive biases as deductive errors due to predisposition, which consist of unreasoned thought predispositions that generate biased or erroneous decisions (Barón y Rotundo, 2018; Castro. et al., 2019). And ii) cognitive biases as perceptual errors, which basically refer to the deviation or alteration of the perceptual process. This means that it occurs in the information coming from the senses at a given time or situation, which leads to a distortion, inaccurate judgment, or incoherent interpretation of the information available (González et al., 2017; Ossa et al., 2016). In other words, external stimuli are processed quickly, emotionally, and without cognitive effort, which leads to a perceptual distortion of these (Kahneman, 2003).

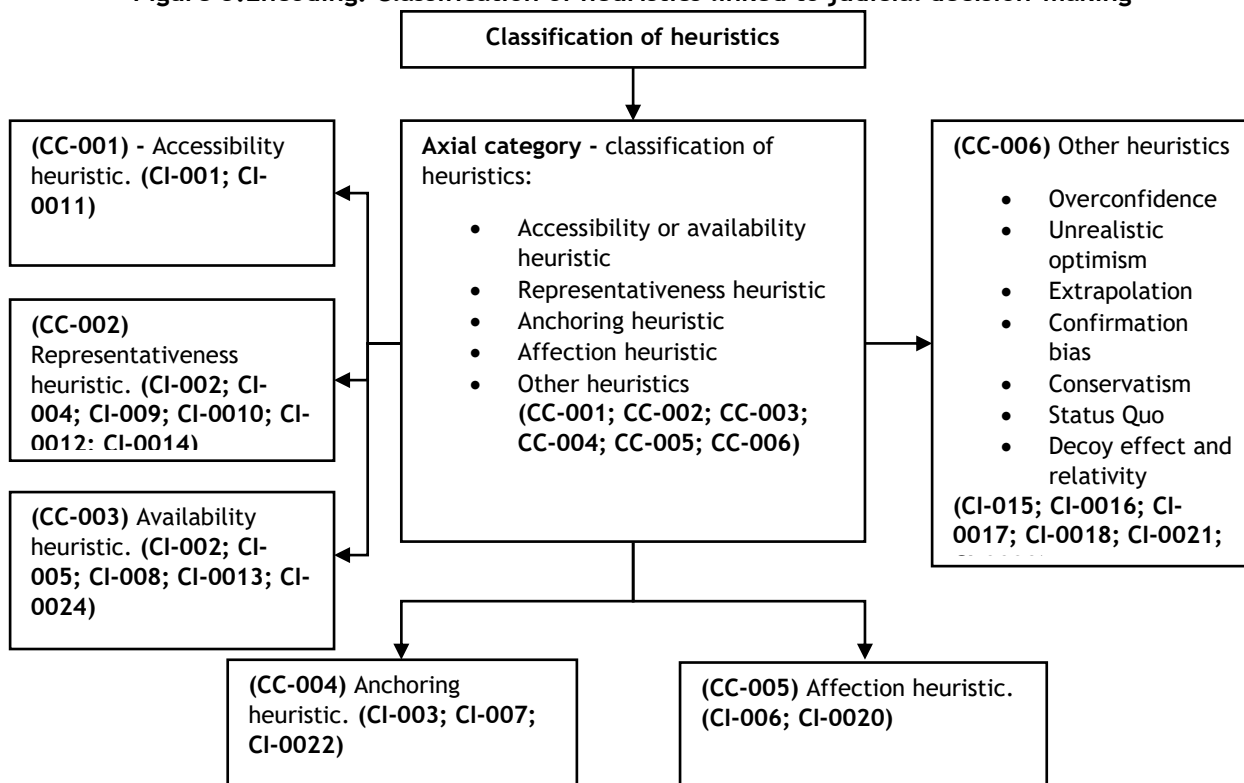
Classification of heuristics and cognitive biases linked to judicial decision-making:

Table 4. Authors who support the classification of heuristics:

Author	Common categories	Axial category
Pérez (2021)	Accessibility heuristic	
Nieva (2017)	Representativeness heuristic	Classification of heuristics:
Aranzabal y Fuentes (2002)		Accessibility or availability heuristic
Casado (2017)	Availability heuristic	

Chóliz (2006)		Representativeness
Cortada de Kohan (2008)	Anchoring heuristic	heuristic Anchoring
González et al. (2017)		heuristic
Manzanal et al. (2015)	Affection heuristic	Affection heuristic
Rampello (2019)		Other heuristics
Serrano et al. (1998)	Other heuristics	
Kahneman (2003)		
Arias (2016)		

Figure 3. Encoding: Classification of heuristics linked to judicial decision-making



Based on Figure 3, the following heuristics can be highlighted, as they are the most cited in the consulted literature:

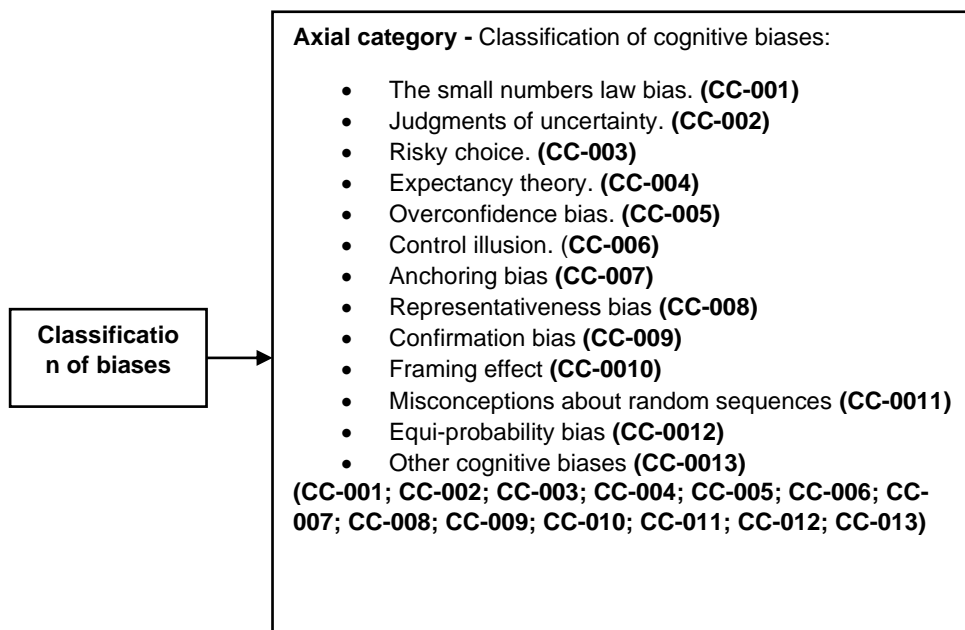
1. Accessibility or availability heuristic: this heuristic involves estimating the probability or frequency of an event based on associations with previous memories or on the ease with which examples of the occurrence of said event can be generated (Aranzabal y Fuentes, 2002; Casado, 2017; Chóliz, 2006; Cortada de Kohan, 2008; González et al., 2017; Manzanal et al., 2015; Rampello, 2019).
2. Representativeness heuristic: this heuristic involves evaluating or estimating the degree of membership of an element to a class or category, based on stereotypes or representative characteristics of a population. Thus, when judging the probability that an event or object A belongs to a certain group B, the degree to which event A is representative or resembles B is estimated. (Aranzabal y Fuentes, 2002; Casado, 2017; Chóliz, 2006; González et al., 2017; Manzanal et al., 2015; Rampello, 2019; Serrano et al., 1998).
3. Anchoring heuristic: This heuristic involves generating a reference value from the initial information obtained. Judgments and decisions are then formed based on this value, and this initial information is given a greater weight. (González et al., 2017; Casado, 2017; Rampello, 2019).

4. Affect heuristic: This refers to the way in which a decision is made based on experienced feelings, the results of a stimulus; the response to a problematic situation is activated prior to the human's reflective judgment (Nievas, 2017; Pérez, 2021).

Table 5. Authors who support the classification of cognitive biases

Author	Common categories	Axial category
Cortada de Kohan (2008)		Classification of cognitive biases:
Barón y Rotundo (2018)	The law of small numbers bias	The small numbers law bias
Castro et al. (2019)	Judgments of uncertainty	Judgments of uncertainty
Rampello (2019)	Risky choice	Risky choice
Ossa et al. (2016)	Expectancy theory	Expectancy theory
Pascale y Pascale (2007)	Overconfidence bias	Overconfidence bias
Chóliz (2006)	The illusion of control bias	Control illusion
Serrano et al. (1998)	Anchoring bias	Anchoring bias
Aranzabal y Fuentes (2002)	Representativeness bias	Representativeness bias
Baffi (2013)	Confirmation bias	Confirmation bias
Marín (2009)	Framing effect	Framing effect
Muñoz (2011)	Misconceptions about random sequences	Misconceptions about random sequences
Mendoza y Gelvez (2022)	Equi-probability bias	Equi-probability bias
Dror (2020)	Other cognitive biases	Other cognitive biases
De la Rosa y Sandoval (2016)		

Figura 4.Encoding: Classification of biases related to judicial decision-making.



In terms of cognitive biases, the following are the most prominent in their classification:

1. The law of small numbers bias: Also known as insensitivity to sample size, it arises from the representativeness heuristic. People tend to believe that information obtained from a small sample will



represent the entire population, forming an erroneous intuitive thought about chance (Aranzabal y Fuentes, 2002; Barón y Rotundo, 2018; Cortada de Kohan, 2008; Rampello, 2019; Serrano et al., 1998).

2. Judgments of uncertainty: Due to the nature of uncertainty, no calculation of chance or statistics is followed due to lack of information (Cortada de Kohan, 2008; Rampello, 2019).
 3. Risky choice: These are decisions made without knowledge of the consequences, depending on either “risk aversion” or “risk propensity”. The individual who is risk-averse will always choose the safest option, and the individual who is risk-prone will do the opposite (Cortada de Kohan, 2008; Pascale y Pascale, 2007; Rampello, 2019).
 4. Expectancy theory: People act based on expectations of the final outcome, in terms of gains, losses, and partial, not total, outcomes (Cortada de Kohan, 2008; Rampello, 2019).
 5. Overconfidence bias: Refers to the overestimation of one’s own abilities and future prospects, referring to an error in the subjective calibration of the success of the decisions made (Pascale y Pascale, 2007; Rampello, 2019).
 6. Control illusion: Refers to the tendency of individuals to believe that they can control events or phenomena over which they have no demonstrable influence (Baffi, 2013; Marín, 2009)
 7. Anchoring bias: Appears when making estimates based on a previously conceived value that adjusts progressively with new information obtained. This influence can be exerted improperly and disproportionately, generating unnoticed errors. Ideological projections and values of individuals can also act as an anchor for a judicial decision (De la Rosa y Sandoval, 2016; Muñoz, 2011).
 8. Representativeness bias: Refers to the statistical-mathematical errors that occur when calculating the probability of an event based on some superficial property related to it, without taking into account the evidence against it, sample size, or previous results (Muñoz, 2011; Páez, 2021).
 9. Confirmation bias: Refers to the search for information that confirms or ratifies previous hypotheses. It leads to confirming one’s own beliefs and ignoring those that contradict them (Castro. et al., 2019; Pascale y Pascale, 2007; Rampello, 2019).
 10. Framing effect: It is the tendency to value content by its presentation, description, or the way it is shown rather than by the content itself (Pascale y Pascale, 2007; Rampello, 2019).
 11. Misconceptions about random sequences: It is the belief that the sequences of results are ordered in a random process, which occurs because the process does not have a random aspect (Aranzabal y Fuentes, 2002; Serrano et al., 1998).
 12. Equi-probability bias: Refers to the belief in equiprobability in every random event, even when the principle of indifference is not found in this event (Aranzabal y Fuentes, 2002; Serrano et al., 1998).
 13. Extrapolation bias: Refers to the appearance of undesired estimates in which it is predicted that recent events will continue to appear in the future.
- iii. Methodology for recognizing cognitive biases and heuristics in decision-making.

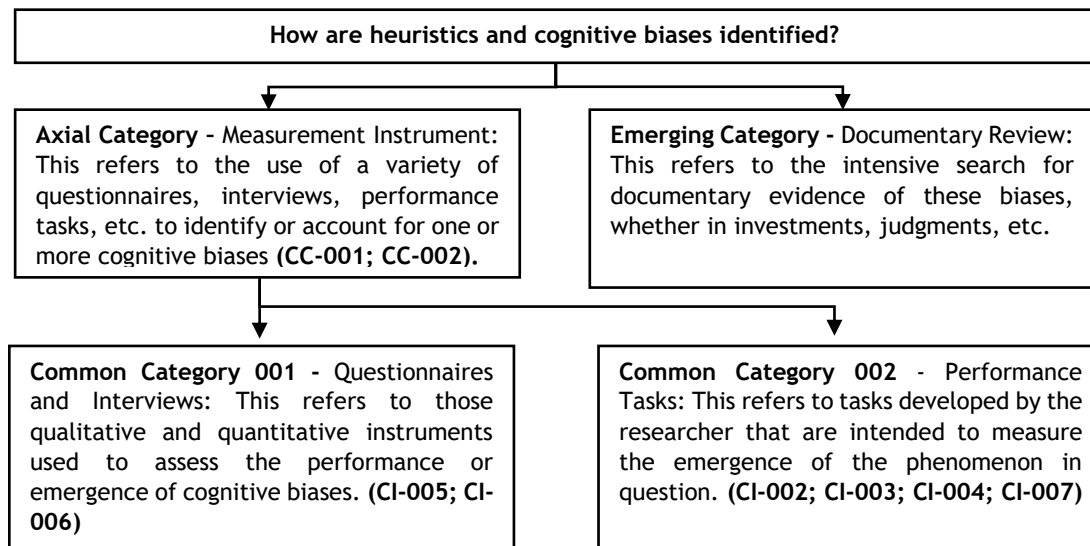
Table 6. Authors who support the methodology for understanding heuristic processes and cognitive biases.

Author	Common categories	Axial category	Emerging category
Kahnemann (2003) Arias (2016) Castro et al. (2019) Serrano et al. (1998)	Questionnaires and interviews	Measuring instrument	Documentary review
Aranzabal y Fuentes (2002)	Performance tasks		



Chóliz (2006)
 Barón y Rotundo
 (2018)
 Fariña et al. (2002)
 Ossa et al. (2016)
 Da Costa (2014)

Figure 5.Encoding: Methodology for Identifying Heuristics and Cognitive Biases.



In the face of the methodology for identifying heuristics and biases, various methods are recognized. Among these, the instrument called Cognitive Tasks stands out. This instrument has undergone an extensive process of adaptation (Da Costa, 2014; Kahneman, 2003). The following are highlighted in this order of ideas:

1. **Cognitive Task Questionnaire:** This questionnaire, which is a quantitative approach, is divided into two tasks. One task measures the representativeness bias by applying two subtasks (Castro. et al., 2019).
 - In the first subtask, a value between 0 and 100 is assigned regarding the probability that a person might be a librarian, doctor, or airplane pilot. Information related to personality aspects is presented with the purpose of distraction.
 - The second subtask shares similarities with the previous one. It also asks participants to assign a value between 0 and 100 in relation to the probability that a person is an engineer. This time, participants are asked to base their judgment on the information provided in the first task.
2. **Questionnaire:** Serrano et al. (1998) employed a questionnaire to assess the extent to which the sample, composed of students aged 14 to 18, demonstrates normative reasoning or biases in the resolution of probabilistic problems. The questionnaire consists of 8 items that additionally request justifications for some of the responses.

All items in the questionnaire require participants to compare the probability of various events in relation to random experiments that involve more than one trial. The results reveal the use of various heuristics in solving probabilistic problems, even after formal mathematical instructions. This suggests that participants encounter challenges in employing probabilistic reasoning.

3. **Interviews and surveys:** With a mixed-design approach, Aranzabal y Fuentes (2002) employed interviews to compare the outcomes obtained from questionnaires. They administered a questionnaire containing 12 open-ended questions, with an emphasis on explanations. In this study, it was discovered

that a minority, specifically 10% of a sample of 110 participants, analysed random phenomena from a formal standpoint in relation to probability theory.

4. **Experimentation:** Chóliz (2006) conducted two experiments. The first one, titled "The Effect of Illusion of Control on Bet Magnitude," involved a sample of 66 final-year psychology students. Through a dice game and betting with specific sequences and conditions, Chóliz aimed to confirm the illusion of control bias. This initial study demonstrated that these conditions encouraged active engagement in a game of chance, thereby inducing the aforementioned bias.

and, the second experiment named "The Effect of Stimulus Familiarity on Representativeness and Familiarity Biases," involved 65 participants aged between 21 and 45, comprising 40 women and 25 men. This experiment aimed to predict the occurrence of an event with a "1 in 10 chance in any given situation" (Chóliz, 2006, p.181). In this second experiment, it was shown that the estimation of the probability of random events is influenced by the characteristics of the events whose occurrence or frequency is being estimated.

5. **Documentary Review:** Barón y Rotundo (2018) from the field of economics have conducted documentary reviews. In the realm of law, it is common to encounter studies focused on judges' verdicts, such as researches of Fariña et al. (2002) which analyzes a total of 555 criminal sentences to identify the biases and implicit heuristics in decisions. These investigations were carried out using qualitative methods.

6. **Psychological Scales:** Ossa et al. (2016) implemented three instruments, the Inquiry Scale of the Critical Thinking Tasks test from the Educational Testing Service (CTT) and the Cognitive Tasks questionnaire. This research was conducted using a quantitative method.

CONCLUSIONS

The study's results allowed to the identification of heuristic processes and cognitive biases that impact judicial decision-making, as explained within the realm of psychology. Furthermore, it specified the psychological construct of heuristics in judicial decision-making as a set of intuitive tools used for problem-solving, comprised of two common categories: heuristic as a rule and heuristic as a strategy.

On the other hand, concerning the definition of cognitive bias in judicial decision-making, it reaffirmed the construct as a systematic and irrational error, which includes its appearance in terms of "cognitive bias as deductive predisposition error," "cognitive bias as perceptual error," or "cognitive bias as convenience factor".

The review of studies leads to the conclusion that, concerning the classification of heuristics, the most prominent ones in judicial decision-making are representativeness, availability, and anchoring. As for the classification of biases linked to judicial decisions, the ones that stand out include the small numbers law bias, overconfidence bias, and equiprobability bias. Regarding the measurement and detection of biases and heuristics associated with decision-making, different methods were found, with a particular emphasis on quantitative techniques using questionnaires, as well as the analysis of various judgments to demonstrate their existence in the rulings.

Finally, in line with the fact that heuristic processes are strategies continuously used for problem-solving, which have the potential to trigger various biases, they are essentially tools without an absolute outcome, be it in terms of failure or certainty. They are present in any judgment or decision-making context. Thus, there is a reiterated need to conduct studies that promote the recognition of processes affecting decision-making and enable optimal performance in the field of law.


ACKNOWLEDGEMENT

The authors express their gratitude to the University of Sinu, National Open and Distance University and Antioquia Technological IU, for giving us the time and opportunity to participate in the development of these projects that have to do Heuristics and cognitive biases in judicial decisions: interdisciplinary analysis to understand the judicial decision from cognitive psychology



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