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## **Cognitive Bias and Heuristic among Adolescents**

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### **Abstract:**

*In the process of decision-making our prejudices can make us selective about the information we pay attention to, and the sources we decide to rely on. Errors in cognition can lead us to making quick decisions confidently, only for them to backfire later. This tendency to deviate from logic and rationality in judgment, whereby inferences are drawn in an illogical manner is referred to as cognitive bias. As most of the decisions that determine the course of our lives are taken during our adolescence, remaining cognizant about such common biases and equipping ourselves to guard against them can empower our decision frameworks to take rational and informed decisions leading to better choices in life.*

### **Introduction**

Decision-making is all about how we choose, particularly when there is uncertainty. The way people process information can affect their decision-making. When the information necessary to make such decisions is incomplete or imperfect<sup>i</sup>, people tend to be prejudiced in their judgments. These prejudices<sup>ii</sup> can influence what information we pay attention to, what we remember about past decisions, and which sources we decide to rely on as we research our options. This bias in processing or error in cognition lets us make a quick decision confidently, founded on supposedly supporting research, only for it to backfire. This tendency to violate rules of logic and probability and make decisions or take action in an unknowingly irrational way is not a sporadic isolated or infrequent behavior of few but is quite pervasive, persistent, and surprisingly systematic. This systematic pattern of deviation from rationality in judgment, whereby inferences are drawn in an illogical manner is referred to as cognitive bias.



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A cognitive bias<sup>iii</sup> is a systematic pattern of deviation from norm or rationality, making us irrational in the way we search for, process, evaluate, interpret, judge, use, and remember information, as well as in the way we judge<sup>iv</sup> and make decisions.

A cognitive bias<sup>v</sup> is a subconscious and automatic process that we unconsciously design to make decision-making quicker and more efficient will result in errors in thinking that lead to misinterpreting information from the world around, and affects the rationality and accuracy of decisions and judgments.

Our brains have evolved over two hundred thousand years it was said. The environment we operate in has become much more complex<sup>vi</sup> and the number of decisions we take in a unit of time has also multiplied. The factors to consider while taking those decisions has also increased. But the brain still operates in much the same way today. The complex world bombards the human brain with such complex information on a daily basis, that the brain can't get the time every time to methodically, and thoughtfully evaluate the fine details of our everyday tasks, (i.e., the cognitive demands of daily life) making such processing logistically impossible. Hence it resorts to mental shortcuts to make decisions quickly and effectively. Psychologists refer to these efficient problem-solving techniques as heuristics<sup>vii</sup>. Thus, heuristics can be described as general cognitive frameworks humans rely on regularly to quickly reach a solution.

### **Literature Review**

In the late 1950s, Simon opposed the idea of classical rationality, based on the formalization of normative solutions to judgment and decision-making problems through probability theory and statistics, with his principle called bounded rationality<sup>viii</sup>, which addressed the specific constraints faced by agents in their environments.

Kahneman and Tversky demonstrated<sup>ix</sup> that, in the domains of, judgment and decision-making, human beings rarely behave as if they were trained or intuitive statisticians. Their judgments and decisions deviate in identifiable ways from established economic models. Kahneman and Tversky's claimed that these departures from perfect rationality can be anticipated and specified. In other words, errors are identifiable, common, and predictable. The concept of Cognitive Bias<sup>x</sup> was well explained by Amos Tversky & Daniel Kahneman in their work 'Judgment under Uncertainty: Heuristics and Biases'. Three heuristics employed in making judgment viz.

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representativeness, availability of instances or scenarios, and adjustment from an anchor were discussed in their paper.

According to Shafir and LeBoeuf People's decisions can deviate from logic, calculation, and probability in ways that are inadvisable, leading to suboptimal decisions in terms of invested time and effort, given the available information and expected benefits<sup>xi</sup>.

Kahneman in his 2011 paper 'Thinking Fast and Slow' states that certain cognitive biases are quite pervasive, persistent, consistent, and surprisingly systematic. In a variety of circumstances, people tend to use similar heuristics and show the same cognitive biases<sup>xii</sup>

Castro M. et. Al. studied 198 psychology students<sup>xiii</sup> from three universities in southern Chile to describe the level of representativeness and confirmation bias in Chilean psychology students, in order to know how this phenomenon occurs. This research analyzed and quantified three cognitive biases (the misinformation effect, cognitive dissonance, and confirmation bias) among undergraduate students.

Wolff J. et. Al. studied 7,748 adolescents (50% female) in grades 7-11 to examine<sup>xiv</sup> the role of deliberative decision making (the tendency to consider options and consequences before making a decision) and social contextual variables (parenting and friend influences) in alcohol and drug use, risky sex, and delinquency. They found that deliberative decision-making and contextual variables were associated with risk behavior concurrently and a year later.

### **The importance**

When it comes to cognitive biases in other areas like choosing a mobile phone brand or watching a movie the effects are neither consequential nor lasting. But in adolescent's life, certain decisions are highly impactful and irreversible. A cognitive bias can make a promising student who could have entered an Ivy league, move out of his/ her parent's home, and live with someone surviving on a part-time job.

As many life coaches tell us, 'it is not what happens to us, but how we interpret what has happened that decides our response.' Responding compulsively and not cognitively can be a sure recipe for a debacle. A cognitive bias in the life of a diligent adolescent may not bring a sudden catastrophe but can result in a sequence of decisions that can slowly alter his course of life from



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excellence to mediocrity or mediocrity to failure. Success is factored by the courage to take tough decisions and the character to stay committed to those decisions, long after the heat in which the decision is taken is lost. If these cognitive biases infect an adolescent mind, they will corrupt the courage to take decisions with pretensions and character to stay committed with pretexts. Perhaps adolescence is the stage of life where cognitive biases can be most consequential.

### **Different Types of Biases**

Confirmation Bias:

People tend to accept claims<sup>xv</sup> without any scrutiny or check if they fall within their identity scope i.e confirm their prior beliefs<sup>xvi</sup>. This tendency to interpret new information as confirmation of your pre-existing beliefs and opinions is called confirmation bias. This behavior could promote frequent interactions among people with a similar set of beliefs and can effectively trigger homophily<sup>xvii</sup>. When internal biases instead of being subjected to the test of objective rationality get positive reinforcement from like-minded people around, the comfort to believe in what one believes will grow. This tendency to search for, interpret, favor, and recall information in a way that confirms or supports one's prior beliefs or values can simply blind sight a teenager to see what is glaring at him/her in plain sight. As confirmation biases impact how one gathers information, but also influence how we interpret and recall information it can end up in adolescents many a time taking the wrong step.

Bandwagon effect:

This cognitive bias is perhaps most prevalent among teenagers. Many of us might have at one time or another intrigued by the frivolous reasons behind school boycotts and student protests. The bandwagon effect may be the reason for this. People can do certain things primarily because other people are doing it, regardless of their own beliefs, which they may ignore or override<sup>xviii</sup>. This can cause someone to adopt a certain political ideology because they see that other people in their social circle have adopted the same ideology.

The bandwagon effect refers to the tendency people have to adopt a certain behavior, style, or attitude simply because everyone else is doing it<sup>xix</sup>. In the areas like fashion, music, pop



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culture fads, etc, the bandwagon effect can be relatively harmless, but while adopting particular attitudes or groupthink toward health issues, like participating in an anti-vaccination drive<sup>xx</sup>, bandwagon beliefs can have serious and disastrous consequences.

Humans, being social animals have the evolutionary desire to join groups and work with others towards various goals. This desire can sometimes relegate the discretion and discrimination of an adolescent mind to think independently and take a stance. The peer pressure illusion can simply be their longing for the good opinion of others or just an attempt to fit into an image they portray. The latter can bring the Golem effect into play, especially in schools and colleges where expectations placed on them can become self-fulfilling prophecies.

**Focalism:**

Also known as the focusing illusion, it is the tendency to place too much focus or emphasis on a single factor or piece of information when making judgments or predictions. By focusing too much on the focal event or hypothesis, people tend to neglect other important considerations and end up making inaccurate judgments.

People tend to have unrealistic optimism<sup>xxi</sup> for common positive events and rare negative events but unrealistic pessimism for other common negative and rare positive events<sup>xxii</sup>. This tends to nudge people to get into wrong romantic associations as people tend to overestimate the impact of losing a romantic partner<sup>xxiii</sup>. With an adolescent high of hormones, the unrealistic optimism<sup>xxiv</sup> makes them underrate the risks they are taking assuming them to be not consequential. This tends to make them less cautious in life and less diligent in studies and less focused on their careers.

**Base Rate Neglect:**

Base rate neglect<sup>xxv</sup> refers to a phenomenon of bias in judgment that results due to ignoring the statistical proportion of base rate information and only focusing on the present case information<sup>xxvi</sup>.

Julia Galef succinctly illustrates this through an excellent example. Imagine a shy student on a University Campus. What is he more likely to be in, Math Ph.D. or Business School? Many instinctively guess, Math Ph.D. as shyness and introversion are expected



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to be more common with a math geek than with a B-School student who is more likely to be an outgoing extrovert. This guess has neglected the fact that the number of students enrolled in a business school will be approximately 10 times more than those enrolled for a maths Ph.D. Neglecting this base rate leads us to guess that a shy student would be more probably enrolled in Math Ph.D., while the chances that he had enrolled in a business school are much higher.

#### Anchoring Bias:

We tend to rely too much on the initial information we access when making decisions<sup>xxvii</sup>. This first piece of information that we receive and assimilate can influence how we perceive any supplemental information, even if it's received years later<sup>xxviii</sup>. While making plans or preparing estimates about something, instead of looking at the available information objectively, we tend to interpret newer information from the reference point which works as an anchor<sup>xxix</sup>. This anchor skewing our judgment can prevent us from updating our plans or making accurate estimates is called Anchoring Bias.

Anchoring bias seems to be more prevalent in adults than in teenagers. As teenagers are still in the learning phase of their lives, they tend to admit and assimilate new information more easily than adults whose belief systems have become more concretized. Michael Jetter et al. accessed data from the US game show Jeopardy, to investigate the anchoring bias among various age groups. They studied kids aged between 10 and 12 years (182 observations), teenagers aged between 13 and 17 years (606 observations), and undergraduate college students (559 observations). They found that college students anchor strongly on the initial clue value.

The area where anchoring bias can really affect people is on the social media platforms. When people tend to rely on news of questionable accuracy from these platforms, it can be effectively used to spread conspiracy theories, clickbait, hyper-partisan content, pseudoscience, and fake reports<sup>xxx</sup>.

#### Dunning Kruger Effect

This cognitive bias originates from being ignorant of one's own ignorance<sup>xxxi</sup>. In their 1999 paper, D. Dunning and J. Kruger argued that unskilled people are unaware of their incompetence in certain domains and tend to overestimate their abilities in many social and intellectual



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domains<sup>xxxii</sup>. In 4 studies conducted by the authors, it was found that those participants who were scoring in the last quartile on tests of grammar, logic, and humor overestimated their test performance and ability.

The five studies conducted by Joyce Ehrlinger et al. in 2008 further concluded that poor performers lack insight into their shortcomings in real-world settings even when given incentives to be accurate<sup>xxxiii</sup>. People tend to be overly optimistic while evaluating the quality of their performance on social and intellectual tasks. The incompetence of poor performers deprives them of the skills needed to recognize their deficits, and they tend to grossly overestimate their performances.

Dunning Kruger effect can manifest in the skilled too. High performers can tend to underestimate their skills. Those with exposure can compare what they know with what they have yet to learn and belittle their abilities. Alan Muller et al. designed a novel method to study the Dunning-Kruger effect via a test of item recognition while electroencephalography (EEG) was recorded<sup>xxxiv</sup>. It was found in their study that the participants in the bottom 25th percentile over-estimated their percentile, while participants in the top 75th percentile under-estimated their percentile, proving the ubiquity of the Dunning-Kruger effect in both the incompetent and the competent. As teenagers and undergrads are still in their learning phase, they are more susceptible to this bias.

#### Attribution Error/ Bias:

Bias in the process of inferring the causes of events or behaviors leads to attribution error. In their 1977 paper discussing the distortions in the attribution process Lee Ross et al. argued that often due to our perceptual salience, we tend to believe that the other person is what we see most of when we look at them and tend to believe that others as internally motivated and responsible for their behavior<sup>xxxv</sup>. We assume that a person's actions depend on the kind of person he/she is, rather than on the social and environmental forces that influence the person.

In their study, which was published in 2019, Kareem Haggag et al. found that students who were assigned to an early morning (7:30 AM) section of a general education course are approximately



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10% less likely to major in that subject, compared to those students who were assigned that same course in any other (later) time slot. The study found that the pattern of results proves attribution bias and was found difficult to reconcile with competing explanations<sup>xxxvi</sup>.

#### Self-Serving Bias:

Attribution error can lead to self-serving bias where people tend to attribute their success to internal factors and attribute failure to external factors<sup>xxxvii</sup>. Thus, people tend to attribute the reasons for the positive or negative outcomes of their behavior in a way that serves their self-interests<sup>xxxviii</sup>. Self-serving bias helps people to have a positive self-evaluation and affects to boost their public image. In other words, Self-serving bias helps people to maintain a socially desirable public image which helps them to compensate for their lack of self-esteem.

As East Asian cultures emphasize collectivism and endorse self-criticism and self-reflection, individuals tend to present an image of modesty or humility making them less susceptible to self-serving bias<sup>xxxix</sup>. But as western cultures emphasize individualism and self, people from these cultures have a strong need for positive self-regard and become prey to self-serving bias, promoting vanity in their lives<sup>xl</sup>.

#### Halo Effect:

The Halo effect is the tendency of letting an initial impression about a person influence our overall thinking about that person. In day-to-day language, we also call it the "physical attractiveness stereotype" or the "what is beautiful is the 'good' principle". This can lead us to various errors of judgment in our day-to-day life. We can end up with the good-looking person as being smarter, well-packed or high-priced goods as of a superior quality or even a confident person as a capable person. If our perception of one quality leads to biased judgments of other qualities of a person or product we call it the halo effect.

In the study published in 2021, Edmund Cannon et al. confirmed the presence of halo effects where answers to one question are contaminated by answers to the other questions during student evaluations of teaching (SETs)<sup>xli</sup>. Teenagers and undergrads are more susceptible to the halo effect of their greater reliance on appearances and first impressions. From choosing a course of



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study to a romantic partner their choices can be less than optimal due to the halo effect seeping into their decision frameworks.

### How to Overcome Biases?

Awareness is the best tool to fight biases. Knowledge of different biases and their mode of infliction would guard adolescents against falling into the trap of a cognitive bias. Awareness of the bias and the probable effect it was expected to influence (like the Dunning Kruger effect among the students) can make them cognizant and cautious of the biases. Developing a habit of reflecting on the decisions we made gives an insight into the attributes that drove us to take that decision. Irrespective of whether the outcome is positive or negative, examining those attributes can provide an insight into the blind spots and biases that have crept into our decision-making framework.

Assimilation of a numeric estimate to a previously considered standard (anchor) can work well against biases. Two studies, conducted by Thomas Mussweiler, Fritz Strack, and Tim Pfeiffer in 2000 found that anchoring could be reduced by applying what they call the ‘consider-the-opposite strategy’. The authors<sup>xlii</sup> applied the Selective Accessibility Model (anchoring is mediated by the selectively increased accessibility of anchor-consistent knowledge) in reverse and hypothesized that increasing the accessibility of anchor-inconsistent knowledge mitigates the effect. Generating reasons why an anchor is inappropriate proved to be a successful corrective strategy. They conducted two studies in a real-world setting using experts as participants. The first study proved that listing arguments that are directed against a provided anchor value reduces the effect. The second study found that the effects of anchoring and considering the opposite are additive.

Young people tend to find it difficult to accept that they do not know what they do not know. The psychological discomfort of knowing that they do not know tends to incline them to assume that they know and behave so. In the studies of D. Dunning and J. Kruger, the capacity to distinguish accuracy from error was the reason for such miscalibration leading to bias. Improving the skills of the teenagers/ undergraduate students, would increase their metacognitive competence, and help them recognize the limitations of their abilities.



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A Cognitive Reflection Test (CRT) measures cognitive processing ability<sup>xliii</sup>, particularly the tendency of a person to suppress an incorrect, intuitive answer, agut feeling, and come to a more deliberate rational answer which has got a greater probability to be correct. Putting students regularly through Cognitive Reflection Tests would not only bring awareness but also builds the capacity to distinguish accuracy from error and helps to recalibrate their decision frameworks.

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