

Cognitive Biases: Causes, Effects, and Implications for Effective Messaging

Quick Look

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*Prepared for:
Strategic Multilayer Assessment
Integrating Information in Joint
Operations (IIJO)*



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“What we’ve got here is failure to communicate.”

Cool Hand Luke

Background

In the current environment of contested norms, increasing great power competition, and rapid technological change, protecting and furthering US interests requires the ability to compete effectively in the information environment (IE). In recent years, the IE has seen the proliferation of actors, channels of communication, and messages. To compete in this crowded and contested environment, we must be able to communicate effectively. Yet, the IE is complicated, available information is often vast and imperfect, time is constrained, and additionally, we are limited by our own cognitive capacity.

Humans have developed several adaptations to address these cognitive limitations, including heuristics and other mental shortcuts that

facilitate survival by enabling more efficient processing of information from the environment. Unfortunately, these same shortcuts hardwire biases into our thinking and communication, which render messaging efforts ineffective and open to manipulation by adversaries seeking to mislead or confuse. These *cognitive biases* can lead to inaccurate judgments and poor decision-making that could trigger either unintended escalation or failures to identify threats in a timely manner. Understanding sources and types of cognitive bias can help minimize miscommunication and inform development of better strategies for responding to adversary attempts to leverage these biases to their advantage (see Figure 1 for an overview of bias during the communication process).

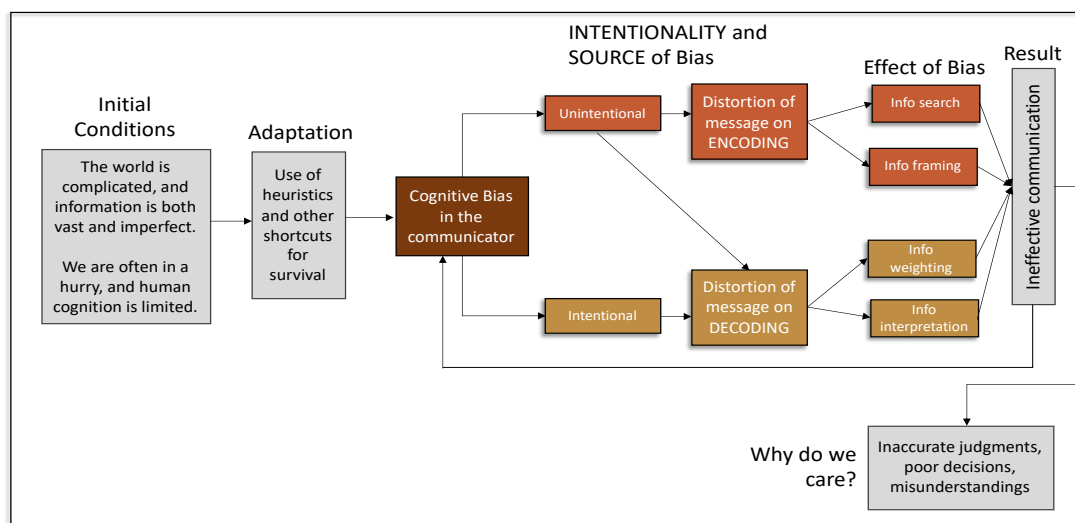


Figure 1: Bias during the communication process—from initial conditions to why it matters

Human beings have two basic ways of processing information¹ (Chaiken, 1987; Kahneman, 2011; Lieberman, 2007; Petty & Cacioppo, 1986; Stanovich, 1999). One way is through deliberative logical reasoning, which requires a significant amount of high-quality information, is costly in terms of cognitive processing, and thus is rarely used. The other way is more heuristic-based and also influenced by emotional and moral motives, as well as social influences (Hilbert, 2012).² *Heuristic-based processing*³ is largely adaptive—enabling people to efficiently process large amounts of information and simplify their judgments (Gigerenzer, 2008; Gigerenzer et al., 2011; Gigerenzer & Todd, 1999; Haselton et al., 2009; Kahneman, 2011). However, the use of heuristic-based processing or mental shortcuts can also make people vulnerable to certain cognitive traps, or biases, when these shortcuts result in incorrect inferences about the world (Kahneman, 2011; Tversky & Kahneman, 1986). As illustrated in Figure 1 above, these cognitive biases can be invoked either intentionally or unintentionally, have a multitude of effects on information processing, and thus impact the overall effectiveness of communication. Specifically, when it creates distortion⁴ either during *message encoding* by the sender (i.e., translating ideas into communication) or during *message decoding* by the recipient (i.e., translating communication into ideas), cognitive bias can result in ineffective communication.

Moreover, when triggered during communication, cognitive biases may reinforce one another. For example, failure to recognize that multiple perspectives exist may cause us to make erroneous inferences about others—making it more likely that communication will go awry. Such ineffective communication may reinforce certain cognitive biases (e.g., bolstering negative beliefs about a communicator or group), which increases the likelihood of further distortion. Becoming more aware of our biases and how they affect communication is an important first step in interrupting this chain reaction. Toward that end, the remainder of this paper will focus on exploring the items in the colored boxes in Figure 1.

Types of Bias

A review of relevant academic and professional literatures can return lists of several dozen to several hundred types of cognitive bias (e.g., Dixon, 2019; Baron, 2007, as cited in Hilbert, 2012). As our emphasis here is on understanding what makes communication effective in the IE (as conceptualized in the Department of Defense's doctrine, Joint Concept for Operating in the Information Environment [JCOIE]), we focus on a subset of the most relevant biases. The objective is two-fold: to aid planners and decision makers in 1) recognizing, and thus being able to counter, the intentional exploitation of cognitive biases to persuade populations; and 2) knowing which

¹ A comprehensive discussion of information processing is beyond the scope of this report. However, as information processing fundamentally depends on internal representations of information, message encoding and message decoding (discussed below) can be thought of as subsets of information processing for the current purpose (Gazzaniga et al., 2002).

² For simplicity, we will refer to this set of information processing orientations collectively as heuristic-based processing.

³ Heuristics are often studied and understood within the context of judgment and decision-making (Gilovich & Griffin, 2010). Here, we explore their application to the communication context, focusing only on the downstream cognitive biases that have the potential to distort messaging.

⁴ For additional sources of distortion (e.g., communicators' world views), see the full communication model developed for this project. Contact Dr. Belinda Bragg (bbragg@nsiteam.com) for more information.



Table 1: Categorization of Cognitive Biases Relevant to the Information Environment

Distortion of message upon ENCODING		Distortion of message upon DECODING	
Information Search	Information Presentation	Information Weighting	Information Interpretation
Availability bias	Belief in a just world	Authority bias	Anchoring & adjustment bias
Confirmation bias	Curse of knowledge	Bandwagon effect	Backfire effect
Negativity bias*	Endowment effect	Base rate fallacy	Belief bias
Optimism bias*	False consensus effect	Focusing effect	Belief perseverance
Salience bias	Fundamental attribution error *	Framing effect*	Framing effect*
	Hot-cold empathy gap	Hostile attribution bias*	Fundamental attribution error *
	Hyperbolic discounting	Hot hand fallacy	Halo effect
	Illusion of control	Ingroup-outgroup bias	Hostile attribution bias*
	Illusory correlation*	Mere exposure effect	Identifiable victim effect
	Naïve realism*	Negativity bias*	Illusory correlation*
	Status quo bias	Optimism bias*	Illusory superiority
	Ultimate attribution error*	Reactance	Naïve realism*
		Reactive devaluation	Negativity bias*
		Subjective validation	Pluralistic ignorance
			Ultimate attribution error*
			Zero sum bias

Note: * indicates a cognitive bias can emerge at multiple stages in the communication process, and is thus assigned to more than one category. Bolded items are discussed in the body of this paper.

biases limit the accuracy and robustness of communications meant to inform, as well as impact how messages are received and decoded. The resulting 38 types of cognitive bias are listed in Table 1, categorized according to how and when they affect information processing.⁵ For the sake of brevity, we discuss a subset of these biases in the following sections. Further information about these biases, as well as those not discussed, can be found in [Appendix A](#).

Intentionality, Source, and the Likelihood of Cognitive Bias

Cognitive bias can occur either intentionally or unintentionally. This intentionality influences where in the communication process message distortion occurs—that is, upon encoding or decoding. One way to examine this issue is to explore the difference between communication whose goal is to persuade (which may in some cases intentionally aim to trigger cognitive biases) and communication whose goal is to inform (which should aim to avoid succumbing to

⁵ While several of these biases arguably may be assigned to multiple categories, we endeavor to categorize them based on where they are *most* likely to be invoked, but allow for multiple assignments where necessary.

cognitive biases but may nonetheless do so unintentionally).

Attempts to persuade or change the attitudes and/or behaviors of a recipient often employ messages that are designed to disrupt how recipients weigh or interpret information. This might be accomplished by focusing on only one side of a story rather than equally and objectively presenting both sides. This type of persuasive communication (e.g., propaganda, advertising, information operations,⁶ and “fake news”) puts forward a specific narrative to encourage the perception or outcome desired by the sender, rather than leaving the recipient to more freely weigh and interpret available information. In this situation, it is important to note that intention is related to the accuracy of message encoding. If someone crafts a message to intentionally trigger a cognitive bias and achieves that outcome, no encoding error has occurred. Instead, the sender has achieved his or her goal (in this case, successful persuasion) if cognitive bias is triggered in the recipients upon message decoding (see Figure 1 above).

In contrast, attempts to inform a recipient by providing information that is both accurate and reasonably complete (e.g., situation reports, objective studies) may become derailed unintentionally when the people constructing the messages fail to recognize that their own biases are distorting message encoding. Similarly, failed (versus successful) attempts at persuasion may also indicate that an unintentional encoding error has occurred. In both cases (i.e., attempts to inform and failed attempts at persuasion), cognitive bias in the sender can affect the search

for and presentation of information, unintentionally distorting the encoding of the message that they send.

Table 2: Factors Increasing the Likelihood of Cognitive Biases and Their Effect on Information Processing

Factors that increase likelihood of bias	Information Search	Information Presentation	Information Weighting	Information Interpretation
Time pressure				
Conflicting information				
Too much information				
Unknown unknowns				
Uncertainty				
Distracted				
Less invested in issue				
Strong emotion				
Limited cognitive resources				
Preconceptions				
Worldview				
Mental or physical fatigue				
Threat to self or group				
Low “need for cognition” (do not enjoy thinking)				

Note: Shaded cells indicate that a given factor can distort that aspect of information processing.

Certain features of the communicator and of the information environment may contribute to heuristic-based processing (see Background section above), making cognitive biases more likely to occur in either encoding or decoding (e.g., Eagly & Chaiken, 1993; Fiske & Taylor, 1991; Gilbert et al., 1988; Peer & Gamliel, 2012; Petty & Cacioppo, 1986). Table 2 presents some of the more common factors, indicating which aspect of

⁶ We adopt the definition of “information operations” utilized in JP3-13: “The integrated employment, during military operations, of information-related capabilities in concert with other lines of operation to influence, disrupt, corrupt, or usurp the decision making of adversaries and potential adversaries while protecting our own.”



information processing (i.e., information search, presentation, weighting, or interpretation) they can affect. As the table shows, it can be difficult to avoid falling into cognitive bias traps given the prevalence of many of these environmental factors and the pervasiveness of their effects on information processing. However, developing a solid understanding of the potential biases and their effects provides a good starting point from which to counter them. We explore this topic in greater detail in the sections below.

Cognitive Biases That Influence Message Encoding by the Sender

Cognitive bias can distort how messages are encoded in one of two ways. It can affect the sender's *information search*, resulting in restrictions on the search for and selection of information, or it can affect *information presentation*, distorting how information is construed and subsequently presented. The effects of individual cognitive biases will, moreover, be compounded if they occur together with others.

Distorting the Search for Information

The tendency for people to seek out information that comes readily to mind when making judgments about the frequency or probability of future events is known as the *availability bias*. This common bias can distort the search for information by constraining the range of inputs used, decreasing the effectiveness of a given message. For example, when asked about which issues are most important in the United States, people often respond by indicating those that have received recent media coverage (and thus are easily recalled), rather than thinking deeply about the broader range of potential issues and selecting from that set of possibilities. Availability bias may be compounded if it occurs in

conjunction with *salience bias*—the tendency for people to focus on more prominent information to the exclusion of other potentially relevant information (e.g., thinking about the story of greatest relevance to them rather than the full set of topics presented in recent news coverage). Similarly, one can imagine how a situation report intended to deliver actionable information on local road closures could be distorted if the person constructing the report primarily relied on information that was easily accessible or most frequently reported. The unfortunate result would be that the decision-maker receiving the report would unknowingly be steered toward making a decision based on incomplete information (and thus, biased communication).

Other examples of biases that can affect information search in ways especially relevant to operations in the information environment (OIE) are:

- ***Confirmation bias***: people search for, and focus on, information or evidence that supports a pre-existing belief, and give this evidence greater credence than information that would disconfirm their belief.
- ***Negativity bias***: a person's psychological state is more strongly impacted by negative rather than positive information. As such, he or she may more readily notice and recall negative events, outcomes, or feelings.

Distorting the Presentation of Information

The *curse of knowledge* is a cognitive bias that describes the tendency for better-informed people to find it difficult or impossible to think about a situation from the perspective of someone who is not privy to the same information or knowledge. It is a bias that can



significantly affect how the knowledgeable person frames a message (i.e., what the communicator chooses to emphasize). Lacking the ability to appreciate what others know, as well as their level of understanding of the topic at hand, can easily derail a message; this results from a failure to include information upon message encoding that is necessary for the recipient to unambiguously decode it as it was intended. An infamous example of military miscommunication, the Charge of the Light Brigade during the Crimean War, may be partially explained by the curse of knowledge (Pinker, 2014). The British commander in Crimea, Lord Raglan, undoubtedly thought that his order to “advance rapidly to the front—follow the enemy and try to prevent the enemy from carrying away the guns” was clear. The order was, however, ambiguous in light of the known situation on the ground. This left the order up to interpretation both by the recipient (Lord Lucan, the cavalry commander) and the intermediary (Captain Louis Nolan) who delivered the message—resulting in a disastrous frontal assault against the wrong artillery battery (BBC HistoryExtra, 2018).

Other examples of biases that can affect information presentation in ways especially relevant to OIE are:

- **Optimism bias:** people underestimate the probability of adverse or catastrophic outcomes, which can result in inadequate contingency planning and taking unnecessary risks.
- **Naïve realism:** people naively believe that they see the world objectively and without any bias. This leads them to believe that “rational people” will agree with their perception of the world, and that those who do not agree with them are irrational, uninformed, or biased.

Implications of Message Encoding Biases for Operators and Planners

In order to minimize the effects of cognitive biases on message *encoding*, it is critical for operators and planners to recognize these biases as well as the triggers that cause them (see [Appendix A](#) for additional information). This is true both for crafting communication that is intended to persuade and crafting communication that is intended to objectively inform. The potential for message distortion resulting from the cognitive bias of the sender can be minimized by training operators and planners to recognize and avoid biases, along with red teaming and peer review of intended communication (e.g., individual messages, reports) that should similarly help to identify and mitigate bias. Potential messages can also be pre-tested with a sample audience and revised based on the feedback that is received.

It is also important to establish the knowledge level of message recipients before crafting a message. If this is not possible, the message sender should assume the recipient has minimal knowledge of the topic, and craft the message to be as descriptive and specific as possible. In crafting the message, the sender should also keep in mind whether he or she is trying to engage the recipient’s deliberative logical reasoning (harder task) or heuristic-based processing (easier task) (see Background section above).

Cognitive Biases That Influence Message Decoding by the Recipient

Even when a message is encoded and transmitted as intended, cognitive bias can affect how messages intended either to persuade or inform are decoded. This creates one of two kinds of distortion. The first affects *information*



weighting, influencing the relative emphasis that is placed on different aspects of incoming information. The second affects *information interpretation*, influencing how incoming information is understood. Once again, the effects of individual cognitive biases will be compounded if they occur together with others.

Distorting the Weighting of Information

The *focusing effect*,⁷ which causes the message recipient to place too much emphasis on one aspect of an event or issue, while neglecting other potentially important information, is a clear example of distortion of information weighting (Brickman et al., 1978; Gilovich et al., 2019; Kahneman et al., 2006; Wilson et al., 2000). The focusing effect may also be compounded if combined with other weighting biases, such as the *bandwagon effect* (the tendency to do or believe things because many other people do or believe the same). The focusing effect is particularly likely to result in miscommunication and inaccuracy in affective forecasting—or judgments of how we will feel in the future (Wilson et al., 2000). Policy initiatives, public health appeals, and cooperation requests provide ample opportunity for this bias. This suggests that it may be a concern in how messaging regarding US military engagement or proposed cooperation will be decoded. Recently, US adversaries seem to have purposefully exploited the focusing effect. For example, China has crafted a narrative positioning itself to potential partners as a “no strings attached” investor in their economies. Willing recipients of such investment have, however, discovered that it does in fact come with significant risks (Abi-Habib, 2018, Baboi, 2019; DeAeth, 2018;

Dimitrov, 2019; Fernholz, 2018; Horowitz & Alderman, 2017). It is possible that decision-makers in those countries succumbed to the focusing effect, thinking about the perceived future benefits to such investment without fully taking into account the potential pitfalls (or even purposefully dismissing them, as a result of additional cognitive biases).

Other examples of biases that can affect information weighting in ways especially relevant to OIE are:

- *Authority bias*: people assume that the opinions of an authority (e.g., recognized figures, leaders, or experts) are more accurate, increasing the likelihood that a message will be accepted.
- *The mere exposure effect*: occurs when people come to like something more upon repeated exposure to it, resulting in a preference for familiar objects or people. In fact, one of the most commonly used metrics of effectiveness in advertising is target ratings points (TRPs), which measure the number of times a target audience is exposed to a message.

Distorting the Interpretation of Information

The *anchoring and adjustment bias* occurs when the first information a person encounters provides an initial “anchor” that acts as a benchmark against which other information is evaluated. This bias affects the way in which recipients interpret incoming information in a wide range of daily situations—from salary negotiation and real estate sales to medical diagnoses and determining what constitutes a “good deal” (Epley & Gilovich, 2006; Tversky &

⁷ This bias may be more likely to occur in Western versus Eastern cultures, as the West tends to place greater emphasis on context-independent and analytic (vs. holistic) perceptual processes (Lam et al., 2005; Nisbett & Miyamoto, 2005).



Kahneman, 1974). For example, initial reports that conclude a situation is threatening may shape how subsequent intelligence is interpreted. If new information is discovered that suggests the situation is not threatening, an adjustment may be made to the assessment. However, that adjustment may fall short of where it would have been if the planner had started with the newest information. The anchoring and adjustment bias is particularly likely to emerge in situations where assessment requires frequent incorporation of new information. For example, receiving a one-time report that puts population support for continued US military presence at 30% is likely to be perceived as really low. However, if that same figure (30%) follows a prior report that placed support at 20%, then it is likely to be interpreted as “good,” unless the analyst can uncouple the new figure from the old.

Other examples of biases that can impact information interpretation in ways especially relevant to OIE are:

- **Hostile attribution bias:** information from certain actors is assumed to have hostile or nefarious intent, and is therefore not trusted. If the source is viewed in this way, any messages from that source will likely be viewed with a great deal of skepticism.
- **Belief perseverance:** an audience continues to hold on to previous beliefs and opinions even after they have been corrected. When faced with this bias, it may be very difficult to change attitudes through information operations (see footnote 5).

Distorting Both Information Weighting and Information Interpretation

Sometimes one bias can do two things at once, distorting both how recipients weigh incoming information and how they interpret information. This can be achieved intentionally by crafting messages to highlight certain pieces of information over others—for example, by emphasizing the risks rather than the benefits of a given choice (Nabi, 2003; Nelson et al., 1997; Tversky & Kahneman, 1981). Such framing has been shown to have a powerful influence on people’s decisions within multiple domains, including negotiation, public goods allocation, and voting (Kahneman & Tversky, 1984; Levin, 1987; Levin et al., 1985; Neale & Northcraft, 1986; Quattrone & Tversky, 1988). These **framing effects** can also be leveraged by those seeking to influence a population or government and shape perception of world affairs. For example, framing a conflict as a fight between good and evil creates perceptions of right and wrong, and can shape public support for specific policy actions against the “evil” side (Brewer, 2006).⁸

Sometimes two biases can work together to produce distortions in information weighting and in information interpretation. Consider the **ingroup-outgroup bias**, which influences people to think in terms of rigid “us versus them” categorization, treating ingroup members in a preferential way. In this context, messages that attempt to portray an outgroup’s rights may be viewed with some skepticism. This bias may co-occur with related biases such as the **ultimate**

⁸ Framing effects themselves can dovetail with or invoke other biases. In this particular case, framing of the ingroup as the “good side” would be likely to stimulate the biases discussed in the next paragraph.

attribution error,⁹ which is the tendency for people to interpret the negative behavior of outgroup members as driven by character, and their positive behavior as due to external or circumstantial causes (Greenwald & Pettigrew, 2014; Pettigrew, 1979, 2001; Tajfel & Turner, 1986; Tajfel, 1982). The ultimate attribution error can be leveraged for nefarious purposes by justifying wide-scale action against, or denigration of, a particular part of a population. The classic example of this is the historic mistreatment and vilification of the Jewish people any time the majority or dominant group needed a scapegoat.

Implications of Message Decoding Biases for Operators and Planners

Understanding the biases that can occur during message *decoding* can help operators and planners reduce the likelihood of unintentionally triggering misperceptions on the part of the receiver that can lead to unintended consequences, such as dispute escalation. Understanding which biases are relevant and present, as well as understanding how they operate, can also be critical in “inoculating” ourselves against the attempts of others to communicate information in ways that exploit vulnerabilities in our own decoding. Knowing which biases are being leveraged also creates an opportunity to counter the message in kind. For example, if *authority bias* is being leveraged (e.g., through the use of an expert speaker), having another recognized expert provide an alternative viewpoint can help to neutralize the effect. Knowledge of the biases being invoked might similarly suggest a path to mitigation of adversary

competitive or gray zone actions. Arguably, it was biases such as the ingroup-outgroup bias and ultimate attribution error that Russia invoked in its 2016 influence campaign on Facebook, which used hot-button issues to further divide American citizens (Frenkel & Benner, 2018; see also Wong et al., 2020 for a related discussion on China). For example, Russia’s Internet Research Agency created pages focused on social issues such as religion, policing, and especially race, then crafted ads to sow discord and division (Frenkel & Benner, 2018; Stewart, 2018). These messages played upon the common human tendency to think in terms of group membership and give preference to the ingroup, while providing ample fodder to encourage people to attribute any differences in opinion or behavior to the inherent “wickedness, immorality, or stupidity” of the outgroup.

A solid understanding of the cognitive biases discussed in the section above (and described in Appendix A to facilitate familiarization) will assist planners and operators in developing more effective strategies for persuasive communication by reducing distortions in message decoding. Leveraging heuristic-based processing and recognizing the cognitive characteristics of human nature are basic parts of campaigns designed to persuade. As long as information is presented in a truthful and ethical manner, understanding the effects of cognitive biases can help to make information transmission more impactful. Conversely, understanding the extent to which our own understanding can be manipulated can make us less vulnerable to adversary manipulation and disinformation campaigns.

⁹ Note that the ultimate attribution error can also be invoked during message encoding, which will affect how a sender frames his or her message (e.g., engaging in the “blame and shame game” for perceived outsiders in the face of a negative event that—while clearly caused by the outgroup—may have been inadvertent or atypical).



References

- Abi-Habib, M. (2018, June 25). How China got Sri Lanka to cough up a port. *The New York Times*. <https://www.nytimes.com/2018/06/25/world/asia/china-sri-lanka-port.html>
- Baboi, I. (2019, May 27). Bridges, roads and debt traps? China's "Balkan Silk Road." *Human Security Centre*. <http://www.hscentre.org/europe/bridges-roads-debt-traps-chinas-balkan-silk-road/>
- BBC HistoryExtra. (2018). *The Charge of the Light Brigade: Who blundered in the Valley of Death?* HistoryExtra. <https://www.historyextra.com/period/victorian/the-charge-of-the-light-brigade-who-blundered-in-the-valley-of-death/>
- Brewer, P. R. (2006). National interest frames and public opinion about world affairs. *Harvard International Journal of Press/Politics*, 11(4), 89–102.
- Brickman, P., Coates, D., & Janoff-Bulman, R. (1978). Lottery winners and accident victims: Is happiness relative? *Journal of Personality and Social Psychology*, 36(8), 917.
- Chaiken, S. (1987). The heuristic model of persuasion. *Social Influence: The Ontario Symposium*, 5, 3–39. https://books.google.com/books?hl=en&lr=&id=eGMAAAQAQBAJ&oi=fnd&pg=PA3&dq=The+heuristic+model+of+persuasion&ots=iwBkWBrs_&sig=Ole1S3JTveciwGF004NsLtZKeLO#v=onepage&q=The%20heuristic%20model%20of%20persuasion&f=false
- DeAeth, D. (2018, December 27). *China's African debt-trap: Beijing prepar...* Taiwan News. <https://www.taiwannews.com.tw/en/news/3605624>
- Dimitrov, M. (2019, February 11). China's Influence in Balkans Poses Risks, Report Warns. *Balkan Insight*. <https://balkaninsight.com/2019/02/11/chinas-influence-in-balkans-poses-risks-report-warns/>
- Dixon, P. (2019). *Understand Your Brain: For a Change*. OBI Press.
- Eagly, A. H., & Chaiken, S. (1993). *The psychology of attitudes*. Harcourt brace Jovanovich college publishers.
- Fernholz, T. (2018, March 7). *Eight countries in danger of falling into China's "debt trap."* Quartz. <https://qz.com/1223768/china-debt-trap-these-eight-countries-are-in-danger-of-debt-overloads-from-chinas-belt-and-road-plans/>
- Fiske, S. T., & Taylor, S. E. (1991). *Social cognition*. McGraw-Hill Book Company.
- Frenkel, S., & Benner, K. (2018, February 17). To stir discord in 2016, Russians turned most often to Facebook. *The New York Times*. <https://www.nytimes.com/2018/02/17/technology/indictment-russian-tech-facebook.html>
- Gazzaniga, M. S., Ivry, R. B., & Mangun, G. R. (2002). *Cognitive Neuroscience: The Biology of the Mind* (Second Edition). W.W. Norton & Company Inc.
- Gigerenzer, G. (2008). Why heuristics work. *Perspectives on Psychological Science*, 3(1), 20–29.
- Gigerenzer, G., Hertwig, R. E., & Pachur, T. E. (2011). *Heuristics: The foundations of adaptive behavior*. Oxford University Press.
- Gigerenzer, G., & Todd, P. M. (1999). Fast and frugal heuristics: The adaptive toolbox. In *Simple heuristics that make us smart* (pp. 3–34). Oxford University Press.
- Gilbert, D. T., Pelham, B. W., & Krull, D. S. (1988). On cognitive busyness: When person perceivers meet persons perceived. *Journal of Personality and Social Psychology*, 54(5), 733.
- Gilovich, T. D., & Griffin, D. W. (2010). Judgment and decision making. In D. T. Gilbert & S. T. Fiske (Eds.), *The Handbook of Social Psychology*. McGraw-Hill, New York.
- Gilovich, T., Keltner, D., Chen, S., & Nisbett, R. E. (2019). *Social Psychology* (5th ed.). W. W. Norton & Company.
- Greenwald, A. G., & Pettigrew, T. F. (2014). With malice toward none and charity for some: Ingroup favoritism enables discrimination. *American Psychologist*, 69(7), 669.



- Haselton, M. G., Bryant, G. A., Wilke, A., Frederick, D. A., Galperin, A., Frankenhuis, W. E., & Moore, T. (2009). Adaptive rationality: An evolutionary perspective on cognitive bias. *Social Cognition, 27*(5), 733–763.
- Hilbert, M. (2012). Toward a synthesis of cognitive biases: How noisy information processing can bias human decision making. *Psychological Bulletin, 138*(2), 211.
- Horowitz, J., & Alderman, L. (2017). *Chastised by E.U., a Resentful Greece Embraces China's Cash and Interests—The New York Times*. <https://www.nytimes.com/2017/08/26/world/europe/greece-china-piraeus-alexis-tsipras.html>
- Kahneman, D. (2011). *Thinking, fast and slow*. Macmillan.
- Kahneman, D., Krueger, A. B., Schkade, D., Schwarz, N., & Stone, A. A. (2006). Would you be happier if you were richer? A focusing illusion. *Science, 312*(5782), 1908–1910.
- Kahneman, D., & Tversky, A. (1984). Choices, values, and frames. *American Psychologist, 39*(4), 341.
- Lam, K. C., Buehler, R., McFarland, C., Ross, M., & Cheung, I. (2005). Cultural differences in affective forecasting: The role of focalism. *Personality and Social Psychology Bulletin, 31*(9), 1296–1309.
- Levin, I. P. (1987). Associative effects of information framing. *Bulletin of the Psychonomic Society, 25*(2), 85–86.
- Levin, I. P., Johnson, R. D., Russo, C. P., & Deldin, P. J. (1985). Framing effects in judgment tasks with varying amounts of information. *Organizational Behavior and Human Decision Processes, 36*(3), 362–377.
- Lieberman, M. D. (2007). The X-and C-systems: The neural basis of reflexive and reflective social cognition. In E. Harmon-Jones & P. Winkelman (Eds.), *Fundamentals of social neuroscience* (pp. 290–315). Guilford Press.
- Nabi, R. L. (2003). Exploring the framing effects of emotion: Do discrete emotions differentially influence information accessibility, information seeking, and policy preference? *Communication Research, 30*(2), 224–247.
- Neale, M. A., & Northcraft, G. B. (1986). Experts, amateurs, and refrigerators: Comparing expert and amateur negotiators in a novel task. *Organizational Behavior and Human Decision Processes, 38*(3), 305–317.
- Nelson, T. E., Oxley, Z. M., & Clawson, R. A. (1997). Toward a psychology of framing effects. *Political Behavior, 19*(3), 221–246.
- Nisbett, R. E., & Miyamoto, Y. (2005). The influence of culture: Holistic versus analytic perception. *Trends in Cognitive Sciences, 9*(10), 467–473.
- Peer, E., & Gamliel, E. (2012). Estimating time savings: The use of the proportion and percentage heuristics and the role of need for cognition. *Acta Psychologica, 141*(3), 352–359.
- Pettigrew, T. F. (1979). The ultimate attribution error: Extending Allport's cognitive analysis of prejudice. *Personality and Social Psychology Bulletin, 5*(4), 461–476.
- Pettigrew, T. F. (2001). The ultimate attribution error: Extending Allport's cognitive analysis of prejudice. In *Intergroup relations: Essential readings* (pp. 162–173). Psychology Press.
- Petty, R. E., & Cacioppo, J. T. (1986). The elaboration likelihood model of persuasion. In *Communication and persuasion* (Vol. 19, pp. 1–24). ADVANCES IN EXPERIMENTAL SOCIAL PSYCHOLOGY.
- Quattrone, G. A., & Tversky, A. (1988). Contrasting rational and psychological analyses of political choice. *The American Political Science Review, 719*–736.
- Stanovich, K. E. (1999). *Who is rational? Studies of individual differences in reasoning*. Psychology Press.
- Stewart, E. (2018, May 13). *Most Russian Facebook ads sought to divide Americans on race*. Vox. <https://www.vox.com/policy-and-politics/2018/5/13/17349670/facebook-russia-ads-race-house-democrats>
- Tajfel, H. (1982). Social psychology of intergroup relations. *Annual Review of Psychology, 33*(1), 1–39.
- Tajfel, H., & Turner, J. (1986). The social identity theory of inter-group behavior. In S. Worchel & L. W. Austin (Eds.), *Psychology of Intergroup Relations*. Nelson-Hall.



- Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, 211(4481), 453–458.
- Tversky, A., & Kahneman, D. (1986). Judgment under uncertainty: Heuristics and biases. *Judgment and Decision Making: An Interdisciplinary Reader*, 38–55.
- Wilson, T. D., Wheatley, T., Meyers, J. M., Gilbert, D. T., & Axson, D. (2000). *Focalism: A source of durability bias in affective forecasting*. 39.
- Wong, E., Rosenberg, M., & Barnes, J. E. (2020, April 22). Chinese agents helped spread messages that sowed virus panic in U.S., officials say. *The New York Times*. <https://www.nytimes.com/2020/04/22/us/politics/coronavirus-china-disinformation.html>

Appendix A: Cognitive Bias Definitions and Sample References

Cognitive Bias	Definition
Anchoring and adjustment heuristic	The tendency for people to rely on initial information “anchors” that influence subsequent judgments and interpretations. ^{1 2}
Authority bias	The tendency to assume that the opinions of an authority figure are more accurate (unrelated to their content), and subsequently be more influenced by these opinions. ³
Availability heuristic	The tendency for people to seek out information that comes readily to mind when making judgments about the frequency or probability of future events. ⁴
Backfire effect	The tendency for people to react to disconfirming evidence by strengthening their prior beliefs. ^{5 6 7 8 9 10}
Bandwagon effect	The tendency for people to do or believe things because many others do or believe the same (i.e., to “jump on the bandwagon”). ^{11 12 13 14}
Base rate fallacy (aka base rate neglect)	The tendency for people to ignore relevant statistical information when making assessments about the frequency or likelihood of events (i.e., ignore base rate information). ^{15 16 17 18}
Belief bias (aka continued influence effect, Semmelweis reflex)	The tendency for people to accept or reject a conclusion based on how consistent it is with their everyday knowledge or how “believable” that conclusion is. ^{19 20 21 22 23}
Belief in a just world	The tendency for people to believe that the world is a fair and just place, where other people get what they deserve in life. ^{24 25}
Belief perseverance	The tendency for people to continue believing previously learned (mis)information even after their initial beliefs have been corrected, effectively rejecting any new or contradictory information. ^{26 27}
Confirmation bias	The tendency for people to search for and focus on information or evidence that supports a pre-existing belief or hypothesis, and give this evidence greater credence than information that would disconfirm this belief. ^{28 29}
Curse of knowledge (aka mindblindness)	The tendency for better-informed people to find it difficult or impossible to think about a situation from the perspective of someone who is not privy to the same information or knowledge. ^{30 31}
Endowment effect	The tendency of people to value things that they own (i.e., things that become part of the person’s endowment) more positively than they would if they did not own them. ^{32 33 34}



False consensus effect	The tendency for people to overestimate how common their opinions are in the general population and therefore the degree to which others agree with them. ³⁵
Focusing effect (aka focalism)	The tendency for people to place too much emphasis on one aspect of an event or issue, while neglecting other potentially important information. ^{36 37 38}
Framing effect	The tendency for our choices and judgments to be influenced by the way these choices are presented using different ordering, wording, or situations. ^{39 40 41 42}
Fundamental attribution error (aka correspondence bias)	The tendency for people to overestimate the degree to which other people's behavior is caused by internal or dispositional factors, and to underestimate the degree to which situational or external factors play a role. ^{43 44}
Halo effect	The tendency for people to assume that attractive individuals have a range of other positive qualities beyond their physical appearance. ^{45 46}
Hostile attribution bias	The tendency for people to interpret others' behaviors as being caused by hostile intentions, even if the behaviors in question are benign or ambiguous. ⁴⁷
Hot-cold empathy gap	The tendency for people to underestimate the influence that their emotions have on their decisions and behaviors, while overestimating the role of cognition. ^{48 49}
Hot hand fallacy	The tendency for people to see statistically unrelated (i.e., random sequences of) events as being connected (such as a string of heads on multiple coin flips or making several baskets or goals in a row), in turn believing that the streak or "hot hand" will continue. ⁵⁰
Hyperbolic discounting	The tendency for people to frequently prioritize near-term benefits over future gains when making decisions. ^{51 52 53}
Identifiable victim effect (aka compassion fade)	The tendency for people to be more moved by the vivid plight of a single individual than they are by the less imaginable situations of a greater number of people. ^{54 55 56 57 58}
Illusion of control (aka illusory control)	The tendency for people to believe that they have control over random events or events over which they are in actuality powerless. ^{59 60 61}
Illusory correlation	The tendency for people to perceive a relationship or correlation where none actually exists, therefore assuming that two events or characteristics are related when they are not. ⁶²
Illusory superiority (aka Lake Wobegon effect, better-than-average effect, superiority bias)	The tendency for most people to believe that they are above average on a wide variety of personality, trait, and ability dimensions. ^{63 64}
Ingroup-outgroup bias (aka ingroup favoritism, ingroup bias, intergroup bias)	The tendency for people to think in terms of rigid "us versus them" categorization and treat ingroup members in a preferential way relative to outgroup members. ^{65 66 67}
Mere exposure effect (aka familiarity principle)	The tendency for people, upon repeated exposures to something, to come to like it more, resulting in a preference for familiar objects or people. ^{68 69}
Naïve realism	The tendency for people to believe that they see the world in an objective and unbiased way (i.e., to see reality as it really is), that rational people will agree with this perception of the world, and that those who do not agree are either irrational, uninformed, or biased. ⁷⁰

Negativity bias	The tendency for people’s psychological states to be more greatly influenced by things of a negative nature than by things that are generally positive, even when the negative and positive things are equal in number or proportion. ^{71 72 73}
Optimism bias (aka unrealistic optimism, positive outcome bias)	The tendency for people to overestimate the likelihood that they will have favorable future outcomes and to underestimate the likelihood that they will have unfavorable future outcomes. ^{74 75 76 77 78}
Pluralistic ignorance	The tendency for people to misperceive a group norm when they observe others acting at variance with their private beliefs out of a concern for the social consequences, which increases the likelihood that perceivers themselves will engage in the same behaviors, thereby reinforcing the erroneous group norm. ^{79 80 81}
Reactance	The tendency for people to—when they feel that their freedom to engage in a specific behavior is constrained—feel an unpleasant state of resistance, which they can reduce by engaging in the prohibited behavior. ⁸²
Reactive devaluation	The tendency for people to be more likely to devalue, and therefore reject, an idea or proposal if it comes from an opposing group or perceived outgroup than when it comes from an ingroup member or members. ^{83 84 85}
Salience bias (aka perceptual salience)	The tendency for people to focus on more prominent information, to the exclusion of other potentially relevant information, creating a bias in favor of things that are easily perceptible and vivid. ^{86 87 88 89 90}
Status quo bias	The tendency for people to prefer that things stay relatively the same, resulting in a preference for the current or default choice relative to other alternatives. ^{91 92 93}
Subjective validation (aka personal validation effect, Barnum effect, Forer effect)	The tendency for people to judge a statement or piece of information as being valid if it is personally meaningful to them. ^{94 95 96}
Ultimate attribution error	The tendency for people to interpret the negative behavior of outgroup members as being due to their character, and the positive behavior of outgroup members as being due to external or circumstantial causes. ⁹⁷
Zero sum bias	The tendency for people to erroneously perceive a situation as being zero-sum (i.e., one where one person or side can gain only at the expense of another). ⁹⁸

¹ Epley, N., & Gilovich, T. (2006). The anchoring-and-adjustment heuristic: Why the adjustments are insufficient. *Psychological Science*, 17(4), 311-318.

² Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, 185, 1124–1130.

³ Milgram, S. (1963). Behavioral study of obedience. *Journal of Abnormal Psychology*, 67 (4), 371–378.

⁴ Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology*, 5(2), 207–32.

⁵ Nyhan, B., & Reifler, J. (2010). When corrections fail: The persistence of political misperceptions. *Political Behavior*, 32, 303–330.

⁶ Nyhan, B., & Reifler, J. (2015). Does correcting myths about the flu vaccine work? An experimental evaluation of the effects of corrective information. *Vaccine*, 33(3), 459–464.



- ⁷ Peter, C., & Koch, T. (2016). When debunking scientific myths fails (and when it does not): The backfire effect in the context of journalistic coverage and immediate judgments as prevention strategy. *Science Communication*, 38(1), 3-25.
- ⁸ Trevors, G. J., Muis, K. R., Pekrun, R., Sinatra, G. M., & Winne, P. H. (2016). Identity and epistemic emotions during knowledge revision: A potential account for the backfire effect. *Discourse Processes*, 53(5-6), 339-370.
- ⁹ Cf: Haglin, K. (2017). The limitations of the backfire effect. *Research & Politics*, 4(3), 1-5.
- ¹⁰ Cf: Wood, T., Porter, E. (2019). The elusive backfire effect: Mass attitudes' steadfast factual adherence. *Political Behavior*, 41, 135-163.
- ¹¹ Leibenstein, H. (1950). Bandwagon, snob, and veblen effects in the theory of consumers' demand. *The Quarterly Journal of Economics*, 64(2), 183-207.
- ¹² Myers, D. G., Wojcicki, S. B., & Aardema, B. S. (1977). Attitude comparison: Is there ever a bandwagon effect? *Journal of Applied Social Psychology*, 7(4), 341-347.
- ¹³ Nadeau, R., Cloutier, E., & Guay, J. H. (1993). New evidence about the existence of a bandwagon effect in the opinion formation process. *International Political Science Review*, 14(2), 203-213.
- ¹⁴ Zech, C. E. (1975). Leibenstein's bandwagon effect as applied to voting. *Public Choice*, 21, 117-122.
- ¹⁵ Allen, M., Preiss, R. W., Gayle, B. M. (2006). Meta-analytic examination of the base-rate fallacy. *Communication Research Reports*, 23(1), 45-51.
- ¹⁶ Kahneman, D. & Tversky, A. (1973). On the psychology of prediction. *Psychological Review*, 80, 237-251.
- ¹⁷ Locksley, A., Hepburn, C., & Ortiz, V. (1982). Social stereotypes and judgments of individuals: An instance of the base-rate fallacy. *Journal of Experimental Social Psychology*, 18(1), 23-42.
- ¹⁸ Cf: Koehler, J. J. (1996). The base rate fallacy reconsidered: Descriptive, normative, and methodological challenges. *Behavioral and Brain Sciences*, 19(1), 1-17.
- ¹⁹ Cherubini, P., Garnham, A., Oakhill, J., & Morley, E. (1998). Can any ostrich fly? Some new data on belief bias in syllogistic reasoning. *Cognition*, 69(2), 179-218.
- ²⁰ Goel, V. & Dolan, R. J. (2003). Explaining modulation of reasoning by belief. *Cognition*, 87(1), B11-B22.
- ²¹ Klauer, K. C., Musch, J., Naumer, B. (2000). On belief bias in syllogistic reasoning. *Psychological Review*, 107(4), 852-84.
- ²² Markovits, H., & Nantel, G. (1989). The belief-bias effect in the production and evaluation of logical conclusions. *Memory and Cognition*, 17(1), 11-17.
- ²³ Roberts, M. J. & Sykes, E. D. (2003). Belief bias and relational reasoning. *The Quarterly Journal of Experimental Psychology Section A*, 56(1), 131-154.
- ²⁴ Lerner, M. J., & Miller, D. T. (1978). Just world research and the attribution process: Looking back and ahead. *Psychological Bulletin*, 85(5), 1030-1051.
- ²⁵ Lerner M.J. (1980) The Belief in a Just World. In: The Belief in a Just World. *Perspectives in Social Psychology*. Springer, Boston, MA.
- ²⁶ Johnson, H. M., & Seifert, C. M. (1994). Sources of the continued influence effect: When misinformation in memory affects later inferences. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 20(6). 1420-1436.
- ²⁷ Ross, L., Lepper, M. R., & Hubbard, M. (1975). Perseverance in self-perception and social perception: Biased attributional processes in the debriefing paradigm. *Journal of Personality and Social Psychology*, 32(5), 880-892.
- ²⁸ Klayman, J. & Ha, Y. (1987). Confirmation, disconfirmation, and information in hypothesis testing. *Psychological Review*, 94(20), 211-228.
- ²⁹ Skov, R. B., & Sherman, S. J. (1986). Information gathering processes: Diagnosticity, hypothesis-confirmatory strategies, and perceived hypothesis confirmation. *Journal of Experimental Social Psychology*, 22, 93-121.



- ³⁰ Birch, S. A. J. & Bloom, P. (2007). The curse of knowledge in reasoning about false beliefs. *Psychological Science*, 18(5), 382-386.
- ³¹ Camerer, C., Loewenstein, G., & Weber, M. (1989). The curse of knowledge in economic settings: An experimental analysis. *The Journal of Political Economy*, 97 (5), 1232-1254.
- ³² Kahneman, D., Knetsch, J. L., Thaler, R.H. (1991). Anomalies: The endowment effect, loss aversion, and status quo bias. *The Journal of Economic Perspectives*, 5(1), 193–206.
- ³³ Kahneman, D., Knetsch, J. L., & Thaler, R. H. (1990). Experimental tests of the endowment effect and the Coase Theorem. *Journal of Political Economy*, 98(6), 1325-1348.
- ³⁴ Thaler, R. H. (1980). Toward a positive theory of consumer choice. *Journal of Economic Behavior and Organization*, 1, 39-60.
- ³⁵ Marks, G., & Miller, N. (1987). Ten years of research on the false-consensus effect: An empirical and theoretical review. *Psychological Bulletin*, 102(1): 72–90.
- ³⁶ Brickman, P., Coates, D., & Janoff-Bulman, R. (1978). Lottery winners and accident victims: Is happiness relative? *Journal of Personality and Social Psychology*, 36(8), 917–927.
- ³⁷ Kahneman, D., Krueger, A. B., Schkade, D., Schwarz, N., Stone, A. A. (2006). Would you be happier if you were richer? A focusing illusion. *Science*, 312(5782), 1908–10.
- ³⁸ Wilson, T., Wheatley, T., Meyers, J. M., Gilbert, D. T., & Axsom, D. (2000). Focalism: A source of durability bias in affective forecasting. *Journal of Personality and Social Psychology*, 78(5), 821-836.
- ³⁹ Druckman, J. (2001a). Evaluating framing effects. *Journal of Economic Psychology*, 22, 96–101.
- ⁴⁰ Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47, 263-291.
- ⁴¹ Levin, I. P., Schneider, S. L., & Gaeth, G. J. (1998). All frames are not created equal: A typology and critical analysis of framing effects. *Organizational Behavior and Human Decision Processes*, 76, 149-188.
- ⁴² Tversky, A. & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, 211(4481), 453–58.
- ⁴³ Ross, L. D., Amabile, T. M. & Steinmetz, J. L. (1977). Social roles, social control, and biases in social-perception processes. *Journal of Personality and Social Psychology*, 35(7), 485–94.
- ⁴⁴ Cf: Ji, L.-J., Peng, K., & Nisbett, R. E. (2000). Culture, control, and perception of relationships in the environment. *Journal of Personality and Social Psychology*, 78(5), 943–955.
- ⁴⁵ Nisbett, R. E. & Wilson, T. D. (1977). The halo effect: Evidence for unconscious alteration of judgments. *Journal of Personality and Social Psychology*, 35(4), 250-256.
- ⁴⁶ Thorndike, E. L. (1920). A constant error in psychological ratings. *Journal of Applied Psychology*, 4(1), 25-29.
- ⁴⁷ Anderson, K. B., Graham, L.M. (2007). Hostile attribution bias. *Encyclopedia of Social Psychology*. SAGE Publications, Inc. pp. 446–447.
- ⁴⁸ Loewenstein, G. (2005). Hot-cold empathy gaps and medical decision making. *Health Psychology*, 24(4), S49-S56.
- ⁴⁹ Sayette, M. A., Loewenstein, G., Griffin, K., & Black, J. J. (2008). Exploring the cold-to-hot empathy gap in smokers. *Psychological Science*, 19(9), 926-932.
- ⁵⁰ Gilovich, T., Tversky, A. & Vallone, R. (1985). The hot hand in basketball: On the misperception of random sequences. *Cognitive Psychology*, 17, 295-314.
- ⁵¹ Ainslie, G., & Haslam, N. (1992). Hyperbolic discounting. In G. Loewenstein & J. Elster (Eds.), *Choice over time* (pp. 57–92).
- ⁵² Laibson, D. (1997). Golden eggs and hyperbolic discounting. *The Quarterly Journal of Economics*, 112(2), 443–478.
- ⁵³ Rubinstein, A. (2003). Economics and psychology? The case of hyperbolic discounting. *International Economic Review*, 44(4), 1207-1216.



- ⁵⁴ Collins, R. L., Taylor, S. E., Wood, J. V. & Thompson, S. C. (1988). The vividness effect: Elusive or illusory? *Journal of Experimental Social Psychology*, 24, 1-18.
- ⁵⁵ Jennil, K. E., & Loewenstein, G., (1997). Explaining the Identifiable Victim Effect. *Journal of Risk and Uncertainty*, 14, 235–257.
- ⁵⁶ Shedler, J., & Manis., M. (1986). Can the availability heuristic explain vividness effects? *Journal of Personality and Social Psychology*, 51(1), 26–36.
- ⁵⁷ Smalla, D. A., Loewenstein, G., & Slovic, P. (2007). Sympathy and callousness: The impact of deliberative thought on donations to identifiable and statistical victims. *Organizational Behavior and Human Decision Processes*, 102, 143–153.
- ⁵⁸ Västfjäll D., Slovic, P., Mayorga, M., & Peters, E. (2014). Compassion fade: Affect and charity are greatest for a single child in need. *PLOS ONE*, 9 (6): e100115.
- ⁵⁹ Langer, E. J. (1975). The illusion of control. *Journal of Personality and Social Psychology*, 32(2), 311–328.
- ⁶⁰ McKenna, F. P. (1993). It won't happen to me: Unrealistic optimism or illusion of control? *British Journal of Psychology*, 84(1), 39-50.
- ⁶¹ Presson, P. K., & Benassi, V. A. (1996). Illusion of control: A meta-analytic review. *Journal of Social Behavior and Personality*, 11(3), 493.
- ⁶² Chapman, L. J. & Chapman, J. (1967). Genesis of popular but erroneous diagnostic observations. *Journal of Abnormal Psychology*, 72, 193-204.
- ⁶³ Alicke, M. D., Govorum, O. (2005). The better than average effect. In M. D. Alicke, D. A. Dunning, & J. Krueger (Eds.), *The Self in Social Judgment*. New York: Taylor & Francis Group.
- ⁶⁴ Hoorens, V. (1993). Self-enhancement and Superiority Biases in Social Comparison. *European Review of Social Psychology*, 4(1), 113–139.
- ⁶⁵ Greenwald, A., & Pettigrew, T. (2014). With malice toward none and charity for some: Ingroup favoritism enables discrimination. *American Psychologist*, 69(7),669–684.
- ⁶⁶ Tajfel, H. (1982). Social psychology of intergroup relations. *Annual Review of Psychology*, 33, 1-39.
- ⁶⁷ Tajfel, H., & Turner, J. C. (1986). The social identity theory of intergroup behavior. In S. Worchel & W. G. Austin (Eds.), *Psychology of Intergroup Relations*. Chicago: Nelson-Hall.
- ⁶⁸ Bornstein, R. F. (1989). Exposure and affect: Overview and meta-analysis of research, 1968–1987. *Psychological Bulletin*, 106(2), 265-289.
- ⁶⁹ Zajonc, R. B. (1968). Attitudinal effects of mere exposure. *Journal of Personality and Social Psychology*, 9(2), 1-27.
- ⁷⁰ Ross, L. & Ward, A. (1997). Naive realism in everyday life: Implications for social conflict and misunderstanding. In A. Ward, L. Ross, E Reed, E Turiel (Eds.), *Values and Knowledge*.
- ⁷¹ Ito, T. A., Larsen, J. T., Smith, N. K., & Cacioppo, J. T. (1998). Negative information weighs more heavily on the brain: The negativity bias in evaluative categorizations. *Journal of Personality and Social Psychology*, 75(4), 887–900.
- ⁷² Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica*, 47, 263-291.
- ⁷³ Tversky, A. & Kahneman, D. (1992). Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and Uncertainty*, 5, 297-323
- ⁷⁴ Bracha, A., & Brown, D. J. (2012). Affective decision making: A theory of optimism bias. *Games and Economic Behavior*, 75(1), 67-80
- ⁷⁵ McKenna, F. P. (1993). It won't happen to me: Unrealistic optimism. It or illusion of control? *British Journal of Psychology*, 84(1), 39-50.
- ⁷⁶ Sharot, T. (2011). The optimism bias. *Current Biology*, 21(3).
- ⁷⁷ Slovic, P. (Ed.). (2000). Risk, society, and policy series. The perception of risk. Earthscan Publications.
- ⁷⁸ Weinstein, N. D. (1980). Unrealistic optimism about future life events. *Journal of Personality and Social Psychology*, 39(5), 806–820.

- ⁷⁹ Miller, D. T., & McFarland, C. (1987). Pluralistic ignorance: When similarity is interpreted as dissimilarity. *Journal of Personality and Social Psychology*, 53(2), 298–305.
- ⁸⁰ Prentice, D. A. & Miller, D. T. (1996). Pluralistic ignorance and the perpetuation of social norms by unwitting actors. *Advances in Experimental Social Psychology*, 28, 161-209.
- ⁸¹ Shelton, J. N. & Richeson, J. A. (2005). *Journal of Personality and Social Psychology*, 88(1), 91-107.
- ⁸² Brehm, S. S. & Brehm, J. (1981). *Psychological reactance: A theory of freedom and control*. New York: Academic Press Inc.
- ⁸³ Bruneau, E. (2015) Putting neuroscience to work for peace. In: E. Halperin and K. Sharvit (Eds.) *The Social Psychology of Intractable Conflicts*. Peace Psychology Book Series (Vol 27). Cambridge, MA: Springer.
- ⁸⁴ Ross, L. (1995). Reactive devaluation in negotiation and conflict resolution. In K. J. Arrow (Ed.), *Barriers to conflict resolution* (1st ed.). New York: W.W. Norton.
- ⁸⁵ Ross, L. & Stillinger, C. (1991), Barriers to conflict resolution. *Negotiation Journal*, 7, 389–404.
- ⁸⁶ Bordalo, P., Gennaioli, N., & Shleifer, A. (2012). Salience theory of choice under risk. *The Quarterly Journal of Economics* 127(3) 1243–1285.
- ⁸⁷ Defetyer, M. A., Russo, R., & McPartlin, P. L. (2009). The picture superiority effect in recognition memory: a developmental study using the response signal procedure. *Cognitive Development*, 24 (3): 265–273.
- ⁸⁸ Kahneman, D., Slovic, P., & Tversky, A. (1982). *Judgment under uncertainty: Heuristics and biases*. Cambridge, UK: Cambridge University Press.
- ⁸⁹ Whitehouse, A. J., Maybery, M. T., Durkin, K. (2006). The development of the picture-superiority effect. *British Journal of Developmental Psychology*, 24(4): 767–773.
- ⁹⁰ Cf: Taylor, S. E., & Thompson, S. C. (1982). Stalking the elusive "vividness" effect. *Psychological Review*, 89(2), 155–181.
- ⁹¹ Samuelson, W. & Zeckhauser, R. (1988). Status quo bias in decision making. *Journal of Risk and Uncertainty*, 1, 7–59.
- ⁹² Kahneman, D, Knetsch, J. L., Thaler, R. H. (1991). Anomalies: the endowment effect, loss aversion, and status quo bias. *The Journal of Economic Perspectives*, 5(1): 193–206.
- ⁹³ Masatlioglu, Y., & Efe, A. O. (2005). Rational choice with status quo bias. *Journal of Economic Theory*, 121(1), 1-29.
- ⁹⁴ Dickson, D. H. & Kelly, I. W. (1985). The 'Barnum Effect' in personality assessment: a review of the literature. *Psychological Reports*, 57(2), 367-382.
- ⁹⁵ Forer, B. R. (1949). The fallacy of personal validation: a classroom demonstration of gullibility. *The Journal of Abnormal and Social Psychology*, 44(1), 118–123.
- ⁹⁶ Glick, P., Gottesman, D., & Jolton, J. (1989). The fault is not in the stars: susceptibility of skeptics and believers in astrology to the Barnum Effect. *Personality and Social Psychology Bulletin*, 15(4), 572-583.
- ⁹⁷ Pettigrew, T. F. (1979). The ultimate attribution error: extending Allport's cognitive analysis of prejudice. *Personality and Social Psychology Bulletin*, 5(4), 461–476.
- ⁹⁸ Meegan, D. V. (2010). Zero-sum bias: perceived competition despite unlimited resources. *Frontiers in Psychology*, 1(191), 1-7.