

Moral Heuristics and Two Types of Information Processing

Vitaliy Nadurak

King Danylo University
Konovaltsia 35
Ivano-Frankivsk 76018, Ukraine
vnadurak@gmail.com

Abstract: The purpose of this paper is to clarify the relationship between moral heuristics and two types of information processing. To achieve this goal, moral heuristics will be considered in the context of a dual-process theory. Type 1 processes (deliberate) are being defined as consciously controlled and Type 2 processes (intuitive) as those that occur without conscious control. Heuristics are not one of the types of information processing, but a method or procedure that simplifies information processing for decision-makers. This simplification can be achieved both in deliberate and intuitive ways. Therefore, heuristics can operate at the different levels of the information processing. The level at which heuristics work depends on the heuristic itself, the person (their experience, cognitive qualities, etc.), environment, and problem that needs to be solved.

Keywords: *dual-process theory, heuristics, intuition, moral heuristics, Type 1 processing, Type 2 processing*

Introduction

In the scientific literature, the term ‘heuristic’ is often used as a synonym for intuitive, unconscious information processing. For example, Sinnott-Armstrong, Young and Cushman (2010, p. 252) write that heuristics normally operate unconsciously. Bruers (2013, p. 491) defines heuristics as intuitive, efficient rules of thumb applied when facing complex problems. Rand *et al.* (2014, p. 2) contrast intuitive heuristic processes with more deliberative processes. Dubljevića and Racine (2014) consider moral heuristics as moral intuitions.

Sunstein (2005a, p. 532) also primarily associates heuristics with intuitive processing, stating that that heuristics “operate through a process of attribute substitution. The use of heuristics gives rise to intuitions about what is true, and these intuitions sometimes are biased, in the sense that they produce errors in a predictable direction” (Sunstein, 2005a, p. 532).

Nevertheless, sometimes it is possible to find the opposite position when heuristics are associated not with intuition but with reasoning. For example, Liao argues that intuitions are not heuristics. For him “it is important to show that these two types of cognitive processes, intuitions and heuristics, are not equivalent” (Liao, 2016, p. 314). In his opinion, heuristics are a form of reasoning (Liao, 2016, p. 328). Betsch (2008, p. 8) also argues that “heuristics, to a substantial extent, rest on deliberative processes. As such, they can be considered shortcuts to deliberation rather than being intuitive strategies”.

There is also a third group of researchers who are convinced that heuristics can work both intuitively and deliberately. Kruglanski and Gigerenzer (2011, p. 100) write that heuristics need not be linked to automatic, intuitive processing. As an example, they cite a number of heuristics and prove that “each heuristic can underlie both intuitive and deliberate judgments” (Kruglanski & Gigerenzer, 2011, p. 101). As for heuristics which underlie moral action, in Gigerenzer’s opinion they are generally unconscious: “If one interviews people, the far majority are unaware of their underlying motives. Rather, they often stutter, laugh, and express surprise at their inability to find supporting reasons for their likes and dislikes, or they invent post hoc justifications (Haidt, 2001; Haidt & Hershey, 2001; Nisbett & Wilson, 1977; Tetlock, 2003)” (Gigerenzer, 2008, p. 9). When Gilovich and Griffin ask whether heuristics are automatic or deliberate, they write that:

It seems to us that both uses of the term are valid and have their place. When deciding whether there are more coups in Ecuador or Indonesia, for example, one automatically searches for known instances of each (availability). Yet one can also deliberately recruit such instances and use the ease with which they come to mind as an explicit strategy—as when deciding to bet on one team over another after explicitly considering the number of star players on each. (Gilovich & Griffin, 2002, p. 4)

The group of researchers who are convinced that heuristics can work both intuitively and deliberately should also include Daniel Kahneman. In his works, he mainly analyzes heuristics as intuitive strategies; therefore, he is often credited

to those who equate intuition with heuristic processing (Betsch, 2008, p. 8). However, in his article written with Shane Frederick, asking whether heuristics are deliberate or automatic, they give the following answer:

So far, we have described judgment by heuristic as an intuitive and unintentional process of attribute substitution, which we attribute to System 1. However, attribute substitution can also be a deliberate System 2 strategy, as when a voter decides to evaluate candidates solely by their stance on a particular issue. (Kahneman & Frederick, 2002, p. 59)

Sharing the point of view of those authors who argue that heuristics can work both intuitively and deliberately, I still see the need to analyze in detail the problem of the relation between heuristics and two types of information processing (intuitive and deliberate), since the presence of different points of view indicates a lack of clarity on this problem. The focus of this paper will be heuristics, which operate in moral decision-making. Therefore, its purpose is to clarify the relationship between moral heuristics and two types of information processing. To achieve this goal, the following steps will be taken: a) the term 'heuristic' will be defined; b) the basic principles of a dual-process approach to information processing will be considered; and c) a generalized model will be proposed that depicts how moral heuristics work at the different levels of information processing.

Heuristics

Although the term 'heuristics' is widely used in scientific literature, it can sometimes be argued that there is still "the conceptual unclarity about what is a heuristic (i.e., how to define the term)" (Vis, 2019, p. 47). The problem is that there are several basic definitions of heuristics that differ from each other. Therefore, any study of heuristics should begin with their definition.

There are two main research programs for the study of heuristics. The first is associated with the name of Daniel Kahneman (heuristics and biases program), and the second—with the name of Gerd Gigerenzer (fast and frugal heuristic program). Kahneman and Frederick define heuristics through the process of attribute substitution: "We will say that judgment is mediated by a heuristic when an individual assesses a specified *target attribute* of a judgment object by substituting another property of that object—the *heuristic attribute*—which

comes more readily to mind” (Kahneman & Frederick, 2002, p. 53). Gigerenzer (2015, p. 111) defines heuristic as “a strategy that ignores part of the information, with the goal of making decisions more quickly, frugally, and/or accurately than more complex methods”.

In the scientific literature, one can also find a more metaphorical definition of heuristics as mental shortcuts (Hertwig & Pachur, 2015, p. 829) or “rules of thumb” (Simon, 1990, p. 9). In particular, this is how Sunstein (2005b, p. 565) defines moral heuristics: “I am understanding moral heuristics to be mental shortcuts, in the form of simple rules of thumb that generally work well, but that also misfire”.

Most of the other definitions of heuristics, which can be found in various sources, are similar to those given. Thus, it would be quite appropriate to ask whether these definitions have certain common features that would allow us to propose a generalized definition of heuristics? When answering this question, one can agree with Shah and Oppenheimer (2008, p. 207), who write that “heuristics primarily serve the purpose of reducing the effort associated with a task”. Therefore, they define heuristics “as methods that use principles of effort-reduction and simplification. By definition, heuristics must allow decision-makers to process information in a less effortful manner than one would expect from an optimal decision rule” (Shah & Oppenheimer, 2008, p. 207). Agreeing with this approach, I will further consider the effort-reduction and simplification as defining characteristics of heuristics. Accordingly, moral heuristics are methods that serve the purpose of reducing the effort associated with moral decision-making (Nadurak, 2018; 2022). By the way, it is due to these features in the field of daily decision-making that “the vast majority of decisions is usually based on heuristics” (Hoffmann, 2020, p. 63).

Accepting such a definition of heuristics, there is no reason to argue that they can work either intuitively or deliberately. It is quite clear that the simplification of information processing can be achieved in both ways. For example, a decision-maker who wants to evaluate the morality of a particular act, instead of analyzing it comprehensively, can simply rely on the feeling that it evokes and this would be an example of the affect heuristic working intuitively. At the same time, they can simplify decision-making deliberately, for example, by logically concluding based on the part of the available information about the act (i.e., about one of its consequences). If a person accepts a comprehensive analysis of the act as an optimal strategy, then both examples will be simplified decision-making strategies for them, and can be considered as heuristics. Thus, accepting simplification as the defining

characteristic of heuristics, it should be recognized that heuristics could work both intuitively and deliberately because simplification can be achieved in both ways. In the following sections, this statement will be analyzed in more detail.

A dual-process approach

Sunstein (2019, p. 218) noted: “The principal heuristics should be seen in light of dual-process theories of cognition.” Probably not all researchers will agree with this statement, in particular those who criticize the dual-process approach. However, it is necessary to consider the problem posed in the paper precisely in light of this approach. The point is that it currently offers the most elaborate model, which explains the relationship between intuition and deliberation. At the same time, some of the criticisms made to this approach are compelling enough and therefore will be taken into account.

Although a dual-process approach is a widely known theory, it is still necessary to outline its main points, since this approach is rather heterogeneous and includes various interpretations.

Kahneman and Frederick (2005, p. 267) wrote: “The ancient idea that cognitive processes can be partitioned into two main families—traditionally called intuition and reason—is now widely embraced under the general label of dual-process theories (Chaiken & Trope, 1999; Evans & Over, 1996; Hammond, 1996; Slovic, 1996; 2002; see Evans, 2010, ch. 8).” To denote these two types of processes, they use the concepts of System 1 and System 2, which Kahneman adopted from the early writings of Stanovich and West (2000). Kahneman and Frederick (2002, p. 51) use the term ‘systems’ “as a label for collections of processes that are distinguished by their speed, controllability, and the contents on which they operate.” The processes of System 1 (intuitive) are automatic, effortless, associative, rapid, parallel, opaque, and result in skilled action. The processes of System 2 (reflective) are effortful, deductive, slow, serial, self-aware, and rule-based (Kahneman & Frederick, 2002, p. 51). The interaction of the two systems is as follows: “System 1 quickly proposes intuitive answers to judgment problems as they arise, and System 2 monitors the quality of these proposals, which it may endorse, correct, or override” (Kahneman & Frederick, 2005, p. 267).

As noted above, the dual-process approach is sometimes criticized. Among the critical remarks, there are a few that need to be considered, as they will be relevant to this work.

The first remark concerns the terms ‘System 1’ and ‘System 2’. Kahneman noted that he uses them as metaphors (Kahneman, 2011, p. 13), and it should be acknowledged that these metaphors are really convenient. However, in trying to be more precise, I will use other terms, which were proposed by Evans and Stanovich (2013). They “prefer to avoid this terminology as it suggests (falsely) that the two types of processes are located in just two specific cognitive or neurological systems” (Evan & Stanovich, 2013, p. 225). Instead, what is described as System 1 or System 2 is actually a set of multiple cognitive or neural systems. For these reasons, they “reverted to the older terminology of Type 1 and 2 processing. These terms indicate qualitatively distinct forms of processing but allow that multiple cognitive or neural systems may underlie them” (Evans & Stanovich, 2013, p. 226). I find the arguments of Evans and Stanovich quite convincing so, in this paper, I will prefer the terms ‘Type 1’ and ‘Type 2’ processing.

The second remark concerns the fact that the features often attributed to the first type of information processing may also be attributed to the second type, and vice versa. For example, Melnikoff and Bargh note:

For all we know, Type 1 features (e.g., unconsciousness) are no likelier to occur with other Type 1 features (e.g., unintentional) than they are to occur with Type 2 features (e.g., intentional). Likewise, it could be the case that Type 2 features (e.g., consciousness) are no likelier to occur with other Type 2 features (e.g., intentional) than they are to occur with Type 1 features (e.g., unintentional). The basic tenet of the Type 1/Type 2 distinction—that the attributes within each category are aligned—simply has not been demonstrated. (Melnikoff & Bargh, 2018, p. 282)

Similar criticism has also been expressed by Keren and Schul (2009), and Kruglanski and Gigerenzer (2011).

The problem occurs when a series of characteristics are ascribed to each process. Yet, one can agree with Evans and Stanovich, who, responding to such criticism, noted that to distinguish two types “the only thing needed is at least one dichotomous property that is necessary and sufficient” (Evans & Stanovich, 2013, p. 228). Therefore, they distinguished between defining

features—those that are used to define the two-types distinction—and typical correlates that occur under well-defined conditions and are neither necessary nor defining features (Evans & Stanovich, 2013, p. 226). The affiliation of a process to the first or second type is determined by whether it has this defining feature.

Before figuring out what can be a definitive feature, it is worth paying attention to another remark of critics of the dual-process approach. They have repeatedly noted that “the contrastive nature of System 1 and System 2 really is a matter of degree, as mental processing occurs along a continuum” (Grayot, 2020, p. 115). A similar criticism along with a justification for the existence of a continuum between the two types of information processing can be found in the works of Kruglanski (2013), Keren and Schul (2009), and Osman (2004). Earlier, Hammond (1996, p. 147) in his cognitive continuum theory argued that: “Various modes, or forms, of cognition can be ordered in relation to one another on a continuum that is identified by intuitive cognition at one pole and analytical cognition at the other.”

A continuum is “a set of things on a scale, which have a particular characteristic to different degrees” (*Collins Online Dictionary*, 2021). Therefore, in order to prove that the two types of processes are qualitatively different, and not just differ in quantitative characteristics, it is necessary, looking for a definitive feature, to try to find a dichotomous property, that is, a property that would be inherent in one of the types, but absent in the other. I think it is worth taking conscious control as such a property.

Firstly, it seems quite obvious that there are processes that we consciously control and those that do not. Accordingly, taking this trait as definitive we show that there is a qualitative and not only quantitative difference between the two types of processes: the processes of the second type are consciously controlled, and the processes of the first type are deprived of this quality. The latter can also be called autonomous, which corresponds to the literal meaning of this word: “The word *autonomous* (deriving from the Greek words *auto* [self] and *nomos* [law]) literally means self-governed or not controlled by outside forces” (Moors & De Houwer, 2006, p. 307). That is, I can agree with those who argue that autonomy is a good candidate for the defining feature for Type 1 processing (Evans & Stanovich, 2013; Thompson, 2013; Pennycook, 2017).

Secondly, conscious control should be considered as a definitive feature also because it is a fundamental feature that explains at least some other features

attributed to the two types of processes. For example, if a process is consciously controlled, it requires more time and effort than a process devoid of this quality.

Lastly, it is worth acknowledging the partial correctness of those who claim that there is a continuum of information processing. Such a continuum exists, not between two types, but within the second type. There really is a quantitative difference among controlled processes, a continuum from weakly controlled to strongly controlled. But, autonomous processes (Type 1) are characterized by the absence of conscious control; therefore, they cannot be part of this continuum.

Thus, hereinafter, the term ‘Type 2 processes’ will mean those processes that, although mainly attributed many features (effortful, deductive, slow, serial, etc.), are primarily consciously controlled. Accordingly, although the processes of the first type can often be described as fast, effortless, associative, parallel etc., they are, however, first of all, characterized by the absence of conscious control, that is, they are autonomous.

The above approach to the dual-process theory, although based on the works of Evans, Stanovich and Kahneman, however, primarily reflects the author’s analysis of this theory (Nadurak, 2021).

A spiral model

To visualize and explain the relationship between heuristics and different types of information processing, a metaphor of a spiral will be used. The idea of depicting a decision-making process as a spiral was proposed by Bangert, Schubert and Fabian (2014). Describing this model, they made the remark, which I fully accept: “We consider the spiral model to be a visual representation that can explain behavior and make certain predictions, but it is principally metaphorical in nature and not strictly mathematical (Gentner & Grudin, 1985; Hoffman *et al.*, 1990)” (Bangert, Schubert & Fabian, 2014, pp. 5–6).

Accepting this caveat, as well as the idea of depicting the information processing as a spiral, it should be noted that my use of this image will be different. For the purpose of this article, the spiral will represent the different types of information processing. Type 2 is at the top of the spiral and Type 1 at the bottom. The level of Type 2 processing is a continuum from weakly controlled to strongly controlled processes. The level of autonomous processes is not part of this continuum and

is depicted as a vicious circle. A heuristic in this image is depicted in the form of ball that is strung on a spiral and can move from top to bottom and backwards (Fig. 1). At the bottom of the spiral, this ball moves in a circle, which reflects the automatic operation of heuristics at the level of Type 1 processes.

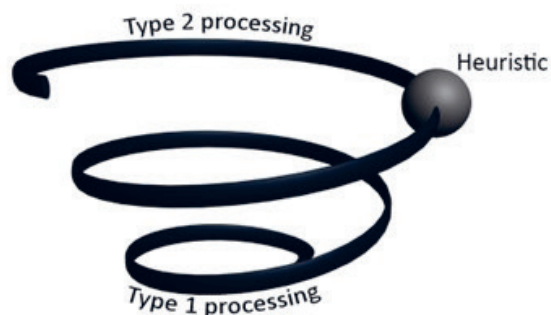


Figure 1. Heuristics and two types of information processing

Next, ideas embodied in the image will be described.

1. The fact that the ball can move in a spiral from top to bottom and backwards reflects the idea that heuristics can operate at different levels of information processing.

Take for example the “imitate-the-successful” heuristic (Fleischhut & Gigerenzer, 2013, p. 470). Sunstein (2005a, p. 533) describes it as follows: “Unsure of what to think or do about a target attribute (what morality requires, what the law is), people might substitute a heuristic attribute instead—asking, for example, about the view of trusted authorities (a leader of the preferred political party, an especially wise judge, or a religious figure).” Imagine a beginner in a class. In a situation where it is necessary to make a difficult moral decision, he or she recalls their father’s advice to do as authoritative students do. When this happens for the first time, the beginner must first make an effort to recall the advice, find out who in the class belongs to the category of authoritative ones, and if they demonstrate different decisions, then find out who is more authoritative. In this case, he or she deliberately uses the aforementioned heuristic, consciously inferring the solution using the rule proposed by their father. Over time, if this student repeatedly uses this heuristic in the same environment, then its use can become intuitive. That is, they will unconsciously and automatically copy the behavior of once chosen authoritative students.

The given example illustrates the situation when the same heuristic first works on a Type 2 level and then moves to the intuitive one. However, heuristics can also work simultaneously on the two levels of information processing. Imagine a mother who always helps her child when she feels that they need help. That is, she is driven by the intuitive rule: “If I feel that my child needs help, then I help.” However, the child gradually grows older and is often dissatisfied with the mother’s help because they want to solve their problems themselves. The mother decides to change the approach and begins to use new heuristic. When she feels that the child needs help, she first asks if they need help and intervenes only when they give an affirmative answer. Thus, she creates a new heuristic that will include both Type 1 and Type 2 processing. The first part of the heuristic, “I want to help my child”, will work intuitively because the mother cannot control this desire. But the second part, “I help only when my child agrees to accept help,” at least initially, will work in a controlled way through a conscious inference. Over time, of course, the second part of this heuristic algorithm can also become more automatic.

It should be noted that the level at which a heuristic works depends both on the heuristic itself and on the person, environment, and problem that needs to be solved. Let us look at some examples.

First, the level at which heuristics operate depends on the heuristic itself. For example, some heuristics can only work at the intuitive level. An example would be moral heuristics, which are varieties of *affect heuristics*, that is “if thinking about the act (whatever the act might be) makes you feel bad in a certain way, then judge that it is morally wrong” (Sinnott-Armstrong, Young & Cushman, 2010, p. 260); and if thinking about the act makes you feel good, then judge that it is morally good. Since these heuristics are based on affects, they cannot operate at the completely controlled level, because a person is not able to fully control the process of affective response. Their execution “is mandatory when their triggering stimuli are encountered” (Evans & Stanovich, 2013, p. 236). Perhaps those researchers who have equated heuristics with intuition concentrated their attention precisely on such heuristics, and therefore made such a conclusion. For example, a moral aversion to incest and cannibalism belongs to this kind of heuristic. If we study the work of heuristics using such examples, then we can really conclude that all heuristics are intuitive. However, because there are heuristics that can operate at the level of Type 2 processing, such a conclusion is hasty.

On the other hand, if a person uses consequentialism as a heuristic (that is, instead of taking into account all the consequences of the act, chooses one or more of the most obvious), then this heuristic will always imply a certain level of conscious control. Therefore, it will probably never be able to operate at the level of uncontrolled information processing.

Second, the level at which a heuristic operates also depends on the person who uses it (e.g., their experience, cognitive qualities, etc.). If a person adopts a new heuristic, it often first operates at the level of the second type of information processing, but then gradually its work can become increasingly automatized through repeated performance and practice until finally it will work at the level of intuitive processing. For example, a person who starts working in a new company initially deliberately follows many of its rules, although over time their execution becomes automatic.

It is worth noting that the adoption of a new heuristic does not necessarily have to take place at the level of the second type of information processing with subsequent migration to the intuitive level. Acquired heuristics can also be formed at the intuitive level. For example, imagine that a person repeatedly sees how another person of a certain nationality is harming someone. It is likely that in the observer's mind an associative bond may be formed between members of that nationality and immoral acts (a new heuristic). Accordingly, when meeting with members of this nationality, he or she will have an intuitive reaction—"this person is prone to immoral acts". Thus, the formation of this heuristic may occur not at the level of Type 2 but Type 1 information processing. That is, a person will simply perceive two events simultaneously (the appearance of a person of a certain nationality and the immoral act), between which, without any inference, an associative bond will be formed that will become intuitive.

Third, the level at which a heuristic operates is also determined by the environment in which that heuristic is used. For example, an intuitive heuristic in a new environment may start working at the deliberate level of information processing. Consider the example of a person for whom the rule "no smoking in public places" has become intuitive. When he or she finds himself or herself in a public place, the following algorithm automatically works in their mind:

No smoking in public places

I am in a public place

Therefore, I will not smoke here

However, suppose that a person does not know whether the place in which he or she found herself is public. In this case, this algorithm stops working automatically because they need to find out whether the statement “I am in a public place” is true. Thus, this heuristic will no longer operate intuitively but more deliberately.

Finally, a new problem may also cause a person to move heuristics from intuitive to the level of Type 2 processing. Imagine a person who is guided by the intuitive rule “help if you are asked for help”. However, one day, they are asked for help by a person who has done a great deal of harm to them in the past. The new problem causes a person to move this heuristic to the higher levels of information processing to find out whether it should be used to solve such a problem. It is quite possible that this person will decide to correct the heuristic and create a new rule for themselves: “Help only those who have not done you much harm”. By the way, this is the typical way in which some moral intuitions are corrected. Sauer (2012, p. 269) provides convincing arguments that “[e]x post moral reasoning exerts a rational pressure on subjects to modify their moral intuitions in accordance with the reasons that become available them, or to give up their intuitions if there are not any.” Moreover, in his view, the primary function of explicit moral reflection is “to feed back into people’s intuitive responses and to improve, shape and inform them” (Sauer, 2012, p. 271).

2. The second important idea visualized in a spiral image is the difference between heuristics and types of information processing.

As noted at the beginning of the article, “the term ‘heuristic processes’ is often used as a synonym for Type 1 or intuitive processing” (Evans, 2010, p. 321). However, the above arguments indicate that heuristics should not be considered as one of the types of information processing. If heuristics were of this type (e.g., intuitive), then this would mean that they are located on the clearly defined level of information processing. However, the fact that the same heuristics can operate at the different levels makes us recognize that heuristics are not a particular type of information processing. They are methods that simplify information processing and, accordingly, decision-making. This simplification is achieved in both reflective and intuitive ways. Although this does not deny the fact that some heuristics can operate only at the level of Type 1 or Type 2 processing.

Conclusion

Although heuristics are often associated in the research literature with intuitive, unconscious processing, or sometimes with reasoning, there are good reasons to interpret them as being capable of operating at the different levels of information processing.

This article proposes to depict different types of information processing as a spiral, at the top level of which Type 2 processing (consciously controlled processes) is located, and at the bottom level is Type 1 processing (processes that occur without conscious control).

Heuristics are not one of the types of information processing, but a method or procedure that simplifies information processing for decision-makers. Accordingly, they can operate at each of the described levels, since simplification can be achieved both intuitively and reflectively. However, some heuristics can operate only at the levels of Type 1 or Type 2 processing. Also, sometimes heuristics can work simultaneously at the two levels, when one part of the heuristic algorithm is executed deliberately and the other intuitively. The level at which heuristics operate depends on the heuristic itself, the person (their experience, cognitive qualities, etc.), environment, and problem that needs to be solved.

Acknowledgements

I would like to thank the reviewers for their valuable comments. Also, my sincere thanks to Stephanie Young for proofreading this article and Andy Kurovets for the illustration.

References

- Bangert, D.; Schubert, E. & Fabian, D.** (2014), 'A spiral model of musical decision-making,' *Frontiers in Psychology*, vol. 5, art. 320.
<https://psycnet.apa.org/doi/10.3389/fpsyg.2014.00320>
- Betsch, T.** (2008). 'The nature of intuition and its neglect in research on judgment and decision making,' in H. Plessner, C. Betsch & T. Betsch (eds.) *Intuition in*

- Judgment and Decision Making*, New York & London: Lawrence Erlbaum Associates Publishers, pp. 3–22.
- Bruers, S.** (2013), 'Speciesism as a moral heuristic', *Philosophia*, vol. 41, no. 2, pp. 489–501. <https://doi.org/10.1007/s11406-013-9420-y>
- Chaiken, S. & Trope, Y.** (1999), *Dual-Process Theories in Social Psychology*, New York: Guilford Press.
- Collins Online Dictionary* (2021), 'Continuum.' Retrieved from: <https://www.collinsdictionary.com/dictionary/english/continuum> [accessed 12 Jul 2021]
- Dubljević, V. & Racine, E.** (2014), 'The ADC of moral judgment: Opening the black box of moral intuitions with heuristics about agents, deeds, and consequences,' *AJOB Neuroscience*, vol. 5, no. 4, pp. 3–20. <https://doi.org/10.1080/21507740.2014.939381>
- Evans, J. S. B. T.** (2010), 'Intuition and reasoning: A dual-process perspective,' *Psychological Inquiry*, vol. 21, no. 4, pp. 313–326. <https://psycnet.apa.org/doi/10.1080/1047840X.2010.521057> <https://doi.org/10.1080/1047840X.2010.521057>
- Evans, J. S. B. T. & Over, D. E.** (1996), *Rationality and Reasoning*, Hove: Psychology Press.
- Evans, J. S. B. T. & Stanovich, K. E.** (2013), 'Dual-process theories of higher cognition: Advancing the debate,' *Perspectives on Psychological Science*, vol. 8, no. 3, pp. 223–241. <https://doi.org/10.1177%2F1745691612460685>
- Fleischhut, N. & Gigerenzer, G.** (2013), 'Can simple heuristics explain moral inconsistencies?' in R. Hertwig, U. Hoffrage & ABC Research Group (eds.) *Evolution and Cognition Series. Simple Heuristics in a Social World*, New York: Oxford University Press, pp. 459–485. <https://doi.org/10.1093/acprof:oso/9780195388435.003.0017>
- Gentner, D. & Grudin, J.** (1985), 'The evolution of mental metaphors in psychology. A 90-year retrospective,' *American Psychologist*, vol. 40, no. 2, pp. 181–192. <https://psycnet.apa.org/doi/10.1037/0003-066X.40.2.181> <https://doi.org/10.1037/0003-066X.40.2.181>
- Gigerenzer, G.** (2008), 'Moral intuition = fast and frugal heuristics?' in W. Sinnott-Armstrong (ed.) *Moral Psychology, Volume 2. The Cognitive Science of Morality: Intuition and Diversity*, Cambridge: MIT Press, pp. 1–26.
- Gigerenzer, G.** (2015), *Simply Rational: Decision Making in the Real World*, Oxford & New York: Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780199390076.001.0001>
- Gilovich, T. & Griffin, D.** (2002), 'Introduction—heuristics and biases: Then and now,' in T. Gilovich, D. Griffin & D. Kahneman (eds.) *Heuristics and Biases: The Psychology of Intuitive Judgment*, Cambridge: Cambridge University Press, pp. 1–18. <https://doi.org/10.1017/CBO9780511808098.002>
- Grayot, J. D.** (2020), 'Dual process theories in behavioral economics and neuroeconomics: A critical review,' *Review of Philosophy and Psychology*, vol. 11, no. 1, pp. 105–136. <https://doi.org/10.1007/s13164-019-00446-9>

- Haidt, J.** (2001), 'The emotional dog and its rational tail: A social intuitionist approach to moral judgment,' *Psychological Review*, vol. 108, no. 4, pp. 814–834.
<https://psycnet.apa.org/doi/10.1037/0033-295X.108.4.814>
<https://doi.org/10.1037/0033-295X.108.4.814>
- Haidt, J. & Hersh, M. A.** (2001), 'Sexual morality: The cultures and emotions of conservatives and liberals,' *Journal of Applied Social Psychology*, vol. 31, no. 1, pp. 191–221. <https://psycnet.apa.org/doi/10.1111/j.1559-1816.2001.tb02489.x>
<https://doi.org/10.1111/j.1559-1816.2001.tb02489.x>
- Hammond, K. R.** (1996), *Human Judgment and Social Policy*, New York: Oxford University Press.
- Hertwig, R. & Pachur, T.** (2015), 'Heuristics, history of,' in J. D. Wright (ed.) *International Encyclopedia of the Social & Behavioral Sciences*, 2nd ed., Oxford: Elsevier, pp. 829–835. <https://doi.org/10.1016/B978-0-08-097086-8.03221-9>
- Hoffman, R. R.; Cochran, E. L. & Nead, J. M.** (1990), 'Cognitive metaphors in experimental psychology,' in D. Leary (ed.) *Metaphors in the History of Psychology*, Cambridge: Cambridge University Press, pp. 173–229.
- Hoffmann, T.** (2020), 'Heuristics in legal decision-making,' *Acta Baltica Historiae et Philosophiae Scientiarum*, vol. 8, no. 1, pp. 62–71.
<https://doi.org/10.11590/abhps.2020.1.03>
- Kahneman, D.** (2011), *Thinking, Fast and Slow*, New York: Farrar, Straus and Giroux.
- Kahneman, D. & Frederick, S.** (2002), 'Representativeness revisited: Attribute substitution in intuitive judgment,' in T. Gilovich, D. Griffin & D. Kahneman (eds.) *Heuristics and Biases: The Psychology of Intuitive Judgment*, New York: Cambridge University Press, pp. 49–81.
<https://psycnet.apa.org/doi/10.1017/CBO9780511808098.004>
<https://doi.org/10.1017/CBO9780511808098.004>
- Kahneman, D. & Frederick, S.** (2005), 'A model of heuristic judgment,' in K. J. Holyoak & R. G. Morrison (eds.) *The Cambridge Handbook of Thinking and Reasoning*, New York: Cambridge University Press, pp. 267–293.
- Keren, G. & Schul, Y.** (2009), 'Two is not always better than one: A critical evaluation of two-system theories,' *Perspectives on Psychological Science*, vol. 4, no. 6, pp. 533–550.
<https://doi.org/10.1111%2Fj.1745-6924.2009.01164.x>
- Kruglanski, A. W.** (2013), 'Only one? The default interventionist perspective as a unimodel—commentary on Evans & Stanovich,' *Perspectives on Psychological Science*, vol. 8, no. 3, pp. 242–247. <https://psycnet.apa.org/doi/10.1177/1745691613483477>
<https://doi.org/10.1177/1745691613483477>
- Kruglanski, A. W. & Gigerenzer, G.** (2011), 'Intuitive and deliberate judgments are based on common principles,' *Psychological Review*, vol. 118, no. 1, pp. 97–109. <https://psycnet.apa.org/doi/10.1037/a0020762>
<https://doi.org/10.1037/a0020762>
- Liao, M. S.** (2016), 'Are intuitions heuristics?' in S. M. Liao (ed.) *Moral Brains: The Neuroscience of Morality*, New York: Oxford University Press, pp. 312–330.
<https://doi.org/10.1093/acprof:oso/9780199357666.003.0014>

- Melnikoff, D. E. & Bargh, J. A.** (2018), 'The mythical number two,' *Trends in Cognitive Sciences*, vol. 22, no. 4, pp. 280–293. <https://doi.org/10.1016/j.tics.2018.02.001>
- Moors, A. & De Houwer, J.** (2006), 'Automaticity: A theoretical and conceptual analysis,' *Psychological Bulletin*, vol. 132, no. 2, pp. 297–326. <https://doi.org/10.1037/0033-2909.132.2.297>
- Nadurak, V.** (2018), 'Two types of heuristics in moral decision making,' *Filosofija. Sociologija*, vol. 29, no. 3, pp. 141–149. <https://doi.org/10.6001/fil-soc.v29i3.3770>
- Nadurak, V.** (2021), 'Dual-process theory as a theory of the classification of information processing acts,' *Diametros*, vol. 18, no. 70, pp. 48–63. <https://doi.org/10.33392/diam.1698>
- Nadurak, V.** (2022), 'Prescriptive model of moral heuristics usage,' *Filosofija. Sociologija*, vol. 33, no. 1, pp. 49–56. <https://doi.org/10.6001/fil-soc.v33i1.4669>
- Nisbett, R. E. & Wilson, T. D.** (1977), 'Telling more than we can know: Verbal reports on mental processes,' *Psychological Review*, vol. 84, no. 3, pp. 231–259. <https://psycnet.apa.org/doi/10.1037/0033-295X.84.3.231>
<https://doi.org/10.1037/0033-295X.84.3.231>
- Osman, M.** (2004), 'An evaluation of dual-process theories of reasoning,' *Psychonomic Bulletin & Review*, vol. 11, no. 6, pp. 988–1010. <https://doi.org/10.3758/bf03196730>
- Pennycook, G.** (2018), 'A perspective on the theoretical foundation of dual process models,' in W. De Neys (ed.) *Current Issues in Thinking and Reasoning. Dual Process Theory 2.0*, London & New York: Routledge/Taylor & Francis Group, pp. 5–27. <https://doi.org/10.4324/9781315204550-2>
- Rand, D. G.; Peysakhovich, A.; Kraft-Todd, G. T.; Newman, G.; Wurzbacher, O.; Nowak, M. & Greene, J. D.** (2014), 'Social heuristics shape intuitive cooperation,' *Nature Communications*, vol. 5, art. 3677. <http://doi.org/10.2139/ssrn.2222683>
- Sauer, H.** (2012), 'Educated intuitions. Automaticity and rationality in moral judgement,' *Philosophical Explorations*, vol. 15, no. 3, pp. 255–275. <https://doi.org/10.1080/13869795.2012.706822>
- Shah, A. K. & Oppenheimer, D. M.** (2008), 'Heuristics made easy: An effort-reduction framework,' *Psychological Bulletin*, vol. 134, no. 2, pp. 207–222. <https://psycnet.apa.org/doi/10.1037/0033-2909.134.2.207>
<https://doi.org/10.1037/0033-2909.134.2.207>
- Simon, H. A.** (1990), 'Invariants of human behavior,' *Annual Review of Psychology*, vol. 41, pp. 1–20. <https://psycnet.apa.org/doi/10.1146/annurev.ps.41.020190.000245>
<https://doi.org/10.1146/annurev.ps.41.020190.000245>
- Sinnott-Armstrong, W.; Young, L. & Cushman, F.** (2010), 'Moral intuitions,' in J. M. Doris & The Moral Psychology Research Group (eds.) *The Moral Psychology Handbook*, New York: Oxford University Press, pp. 246–272. <https://psycnet.apa.org/doi/10.1093/acprof:oso/9780199582143.003.0008>
<https://doi.org/10.1093/acprof:oso/9780199582143.003.0008>

- Sloman, S. A.** (1996), 'The empirical case for two systems of reasoning,' *Psychological Bulletin*, vol. 119, no. 1, pp. 3–22.
<https://psycnet.apa.org/doi/10.1037/0033-2909.119.1.3>
<https://doi.org/10.1037/0033-2909.119.1.3>
- Sloman, S. A.** (2002), 'Two systems of reasoning,' in T. Gilovich, D. Griffin, & D. Kahneman (eds.) *Heuristics & Biases: The Psychology of Intuitive Judgment*, New York: Cambridge University Press, pp. 379–396.
<https://psycnet.apa.org/doi/10.1017/CBO9780511808098.024>
<https://doi.org/10.1017/CBO9780511808098.024>
- Stanovich, K. E. & West, R. F.** (2000), 'Individual differences in reasoning: Implications for the rationality debate,' *Behavioral and Brain Sciences*, vol. 23, no. 5, pp. 645–665. <https://psycnet.apa.org/doi/10.1017/S0140525X00003435>
<https://doi.org/10.1017/S0140525X00003435>
- Sunstein, C. R.** (2005a), 'Moral heuristics,' *Behavioral and Brain Sciences*, vol. 28, no. 4, pp. 531–542. <https://doi.org/10.1017/s0140525x05000099>
- Sunstein, C. R.** (2005b), 'On moral intuitions and moral heuristics: A response,' *Behavioral and Brain Sciences*, vol. 28, no. 4, pp. 565–570.
<https://doi.org/10.1017/S0140525X05460094>
- Sunstein, C. R.** (2019), *How Change Happens*, Cambridge & London: MIT Press.
<https://doi.org/10.7551/mitpress/11974.001.0001>
- Tetlock, P. E.** (2003), 'Thinking the unthinkable: Sacred values and taboo cognitions,' *Trends in Cognitive Sciences*, vol. 7, no. 7, pp. 320–324.
[https://doi.org/10.1016/s1364-6613\(03\)00135-9](https://doi.org/10.1016/s1364-6613(03)00135-9)
- Thompson, V. A.** (2013), 'Why it matters: The implications of autonomous processes for dual process theories—commentary on Evans & Stanovich,' *Perspectives on Psychological Science*, vol. 8, no. 3, pp. 253–256.
<https://doi.org/10.1177%2F1745691613483476>
- Vis, B.** (2019), 'Heuristics and political elites' judgment and decision-making,' *Political Studies Review*, vol. 17, no. 1, pp. 41–52.
<https://doi.org/10.1177/1478929917750311>

Vitaliy Nadurak is a professor at the King Danylo University, Ukraine. He received his PhD (2005) and DSc (2015) in philosophy from the Taras Shevchenko National University of Kyiv. He has also worked as a professor at the Vasyl Stefanyk Precarpathian National University. His primary research interests are moral decision-making and the dual-process theory.