

Dual-process theory

Description

Dual process theory in psychology suggests that thinking operates via two distinct systems: an implicit system, which is automatic and unconscious, and an explicit system, which is controlled and conscious. Explicit attitudes and behaviors can be modified relatively quickly through persuasion or education, whereas implicit attitudes usually take longer to change and often require the establishment of new habits. These theories are central to various branches of psychology, including social, personality, cognitive, and clinical psychology. They also intersect with economics, especially in the contexts of prospect theory and behavioral economics, and are gaining prominence in sociological studies through cultural analysis.

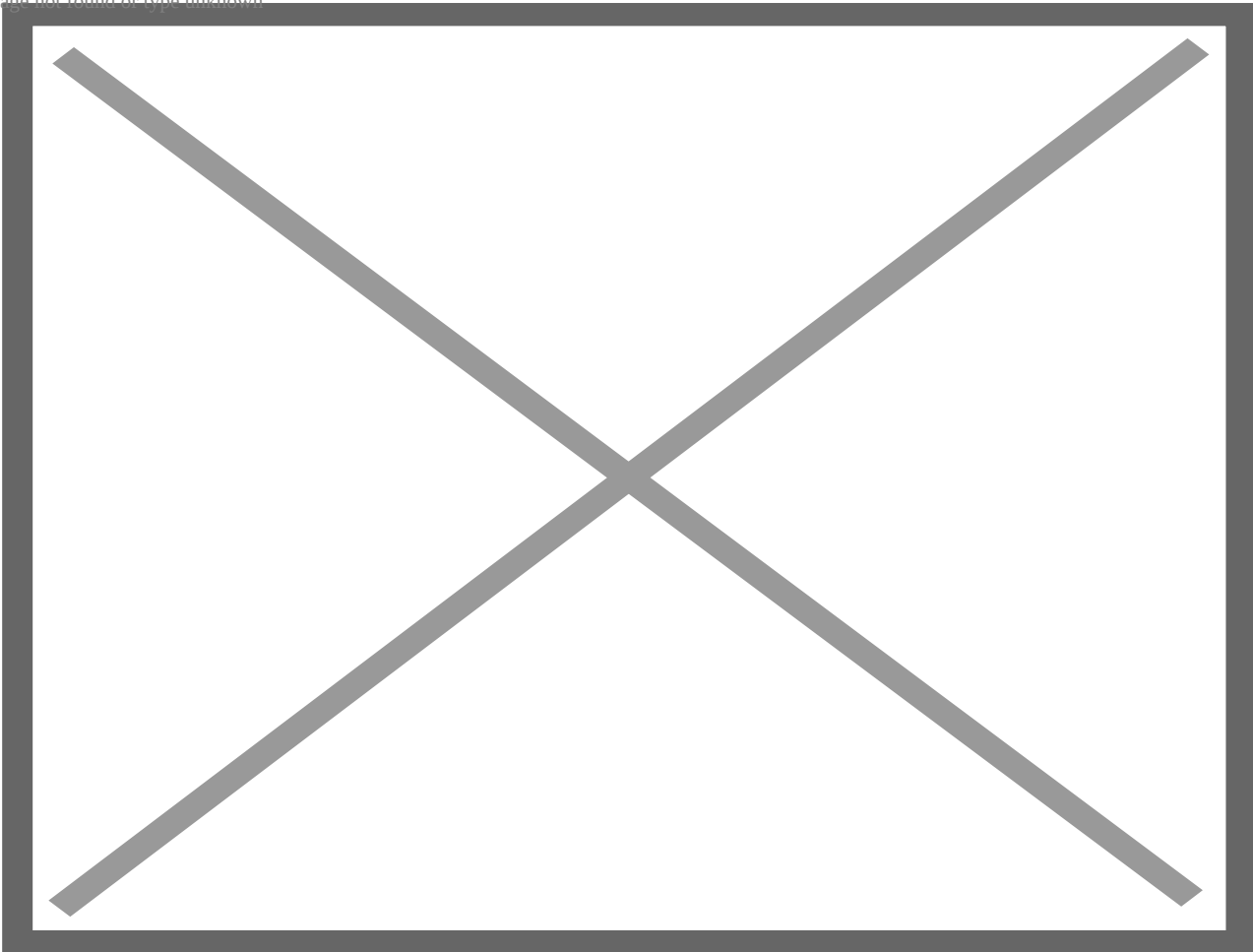
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Dual-process models of cognition: A multifarious nomenclature (or a terminological pandemonium)

- automatic vs. controlled (Kahneman, 2003)
- associative vs. rule based (Sloman, 1996)
- heuristic vs. analytic (Klaczynski, 2001)
- personal vs. subpersonal (Frankish, 2009)
- analogue vs. symbolic (Paivio, 1986)
- reflexive vs. reflective (Lieberman et al., 2002)
- heuristic vs. systematic (Chaiken, 1980)
- peripheral vs. central (Petty & Cacioppo, 1981)
- implicit vs. explicit (Greenwald et al., 1998)
- automatic vs. conscious (Baumeister, 2005)
- experiential vs. noetic (Strack & Deutsch, 2004)
- intuitive vs. reflective (Sperber, 1997)
- associative vs. propositional (Gawronski & Bodenhausen, 2006)
- etc. pp.

It has been noted that "*what matters is not the specific names but the fact of duality*" (Baumeister, 2005, p.75).

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Summary of the features attributed to each system

System 1

- Evolutionarily old
- Unconscious, preconconscious
- Shared with animals
- Implicit knowledge
- Automatic
- Fast
- Parallel
- High capacity
- Intuitive
- Contextualized
- Pragmatic
- Associative
- Independent of general intelligence

System 2

- Evolutionarily recent
- Conscious
- Uniquely (distinctive)
- Explicit knowledge
- Controlled
- Slow
- Sequential
- Low capacity
- Reflective
- Abstract
- Logical
- Rule-based
- Linked to general intelligence

Adapted from Frankish, K. (2009). Systems and levels: Dual-system theorie and the personal-subpersonal distinction. In J. S. B. T. Evans & K. Frankish (Eds.), *In two minds: Dual processes and beyond* (p. 89-108). Oxford: Oxford University Press.

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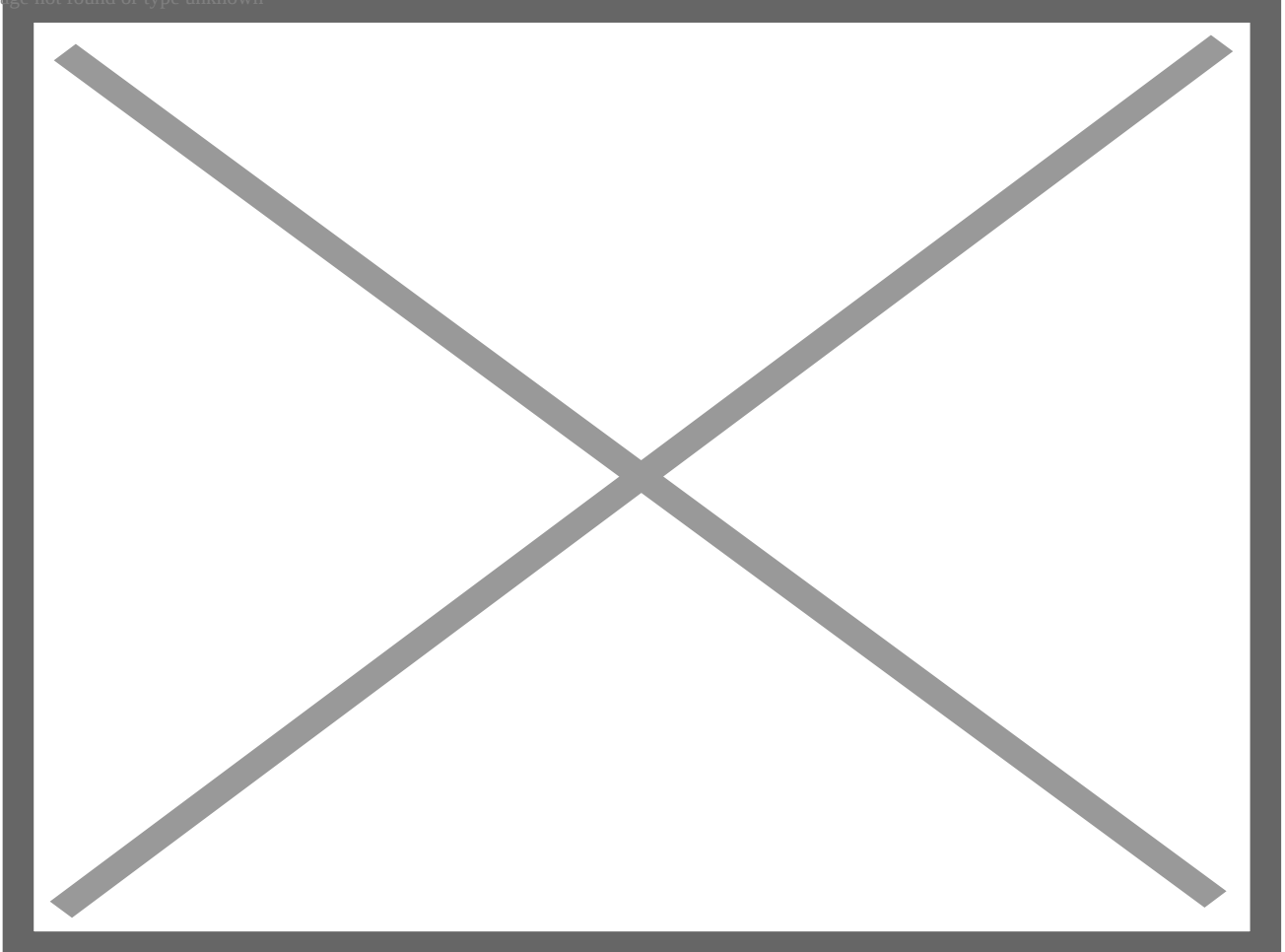


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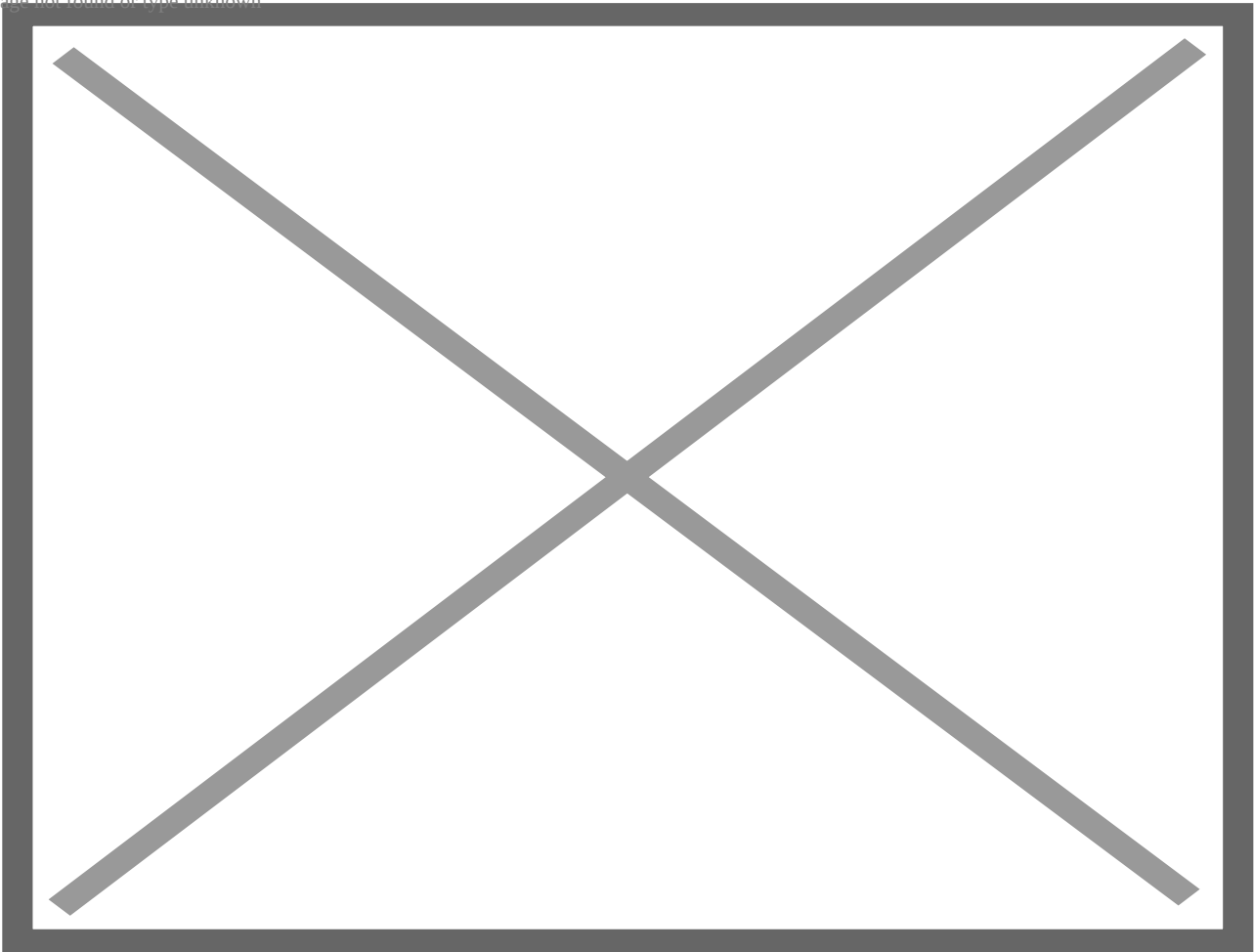


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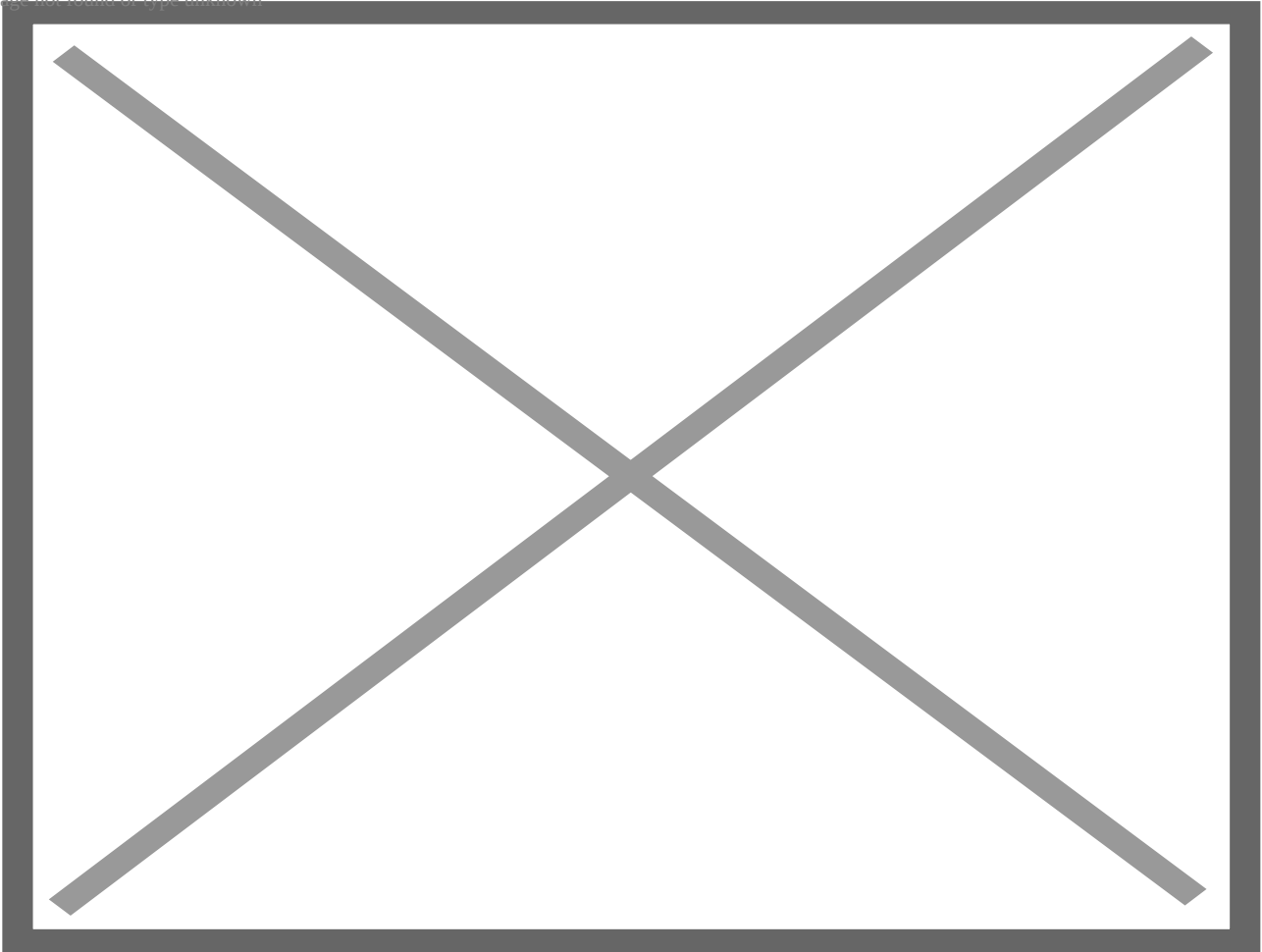
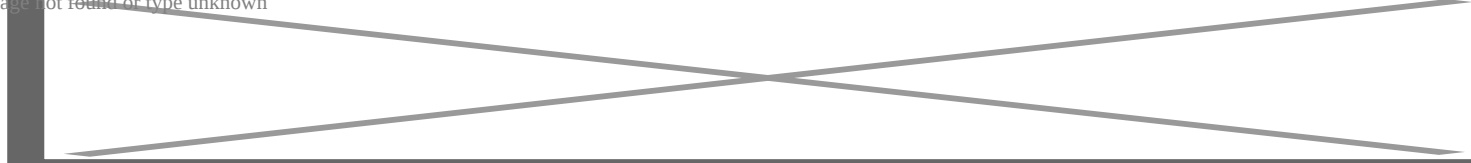


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Further References

Groves, P. M., & Thompson, R. F.. (1970). Habituation: A dual-process theory. Psychological Review

Plain numerical DOI: 10.1037/h0029810

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“Presented a dual-process theory of response plasticity to repeated stimulation. 2 hypothetical processes, 1 decremental (habituation) and 1 incremental (sensitization), are assumed to develop independently in the cns and interact to yield the final behavioral outcome. behavioral experiments are

presented, using both the hindlimb flexion reflex of acute spinal cat and the acoustic startle response of intact rat, which are consistent with this theory. neurophysiological experiments indicate that the 2 processes have separate and distinct neuronal substrates. the dual-process theory and other current theories of response habituation are evaluated in terms of these and other recent findings. (6 p. ref.)" Wixted, J. T.. (2007). Dual-process theory and signal-detection theory of recognition memory. Psychological Review

Plain numerical DOI: 10.1037/0033-295X.114.1.152

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"Two influential models of recognition memory, the unequal-variance signal-detection model and a dual-process threshold/detection model, accurately describe the receiver operating characteristic, but only the latter model can provide estimates of recollection and familiarity. such estimates often accord with those provided by the remember-know procedure, and both methods are now widely used in the neuroscience literature to identify the brain correlates of recollection and familiarity. however, in recent years, a substantial literature has accumulated directly contrasting the signal-detection model against the threshold/detection model, and that literature is almost unanimous in its endorsement of signal-detection theory. a dual-process version of signal-detection theory implies that individual recognition decisions are not process pure, and it suggests new ways to investigate the brain correlates of recognition memory."

Greene, J. D.. (2009). Dual-process morality and the personal/impersonal distinction: A reply to McGuire, Langdon, Coltheart, and Mackenzie. Journal of Experimental Social Psychology

Plain numerical DOI: 10.1016/j.jesp.2009.01.003

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"A substantial body of research supports a dual-process theory of moral judgment, according to which characteristically deontological judgments are driven by automatic emotional responses, while characteristically utilitarian judgments are driven by controlled cognitive processes. this theory was initially supported by neuroimaging and reaction time (rt) data. mcguire et al. have reanalyzed these initial rt data and claim that, in light of their findings, the dual-process theory of moral judgment and the personal/impersonal distinction now lack support. while mcguire and colleagues have convincingly overturned greene et al.'s interpretation of their original rt data, their claim that the dual-process theory now lacks support overstates the implications of their findings. mcguire and colleagues ignore the results of several more recent behavioral studies, including the study that bears most directly on their critique. they dismiss without adequate justification the results of a more recent neuroimaging study, three more recent patient studies, and an emotion-induction study. their broader critique is based largely on their conflation of the dual-process theory with the personal/impersonal distinction, which are independent. © 2009 elsevier inc. all rights reserved."

Stanovich, K. E.. (2012). Distinguishing the reflective, algorithmic, and autonomous minds: Is it time for a tri-process theory?

. In In Two Minds: Dual Processes and Beyond

Plain numerical DOI: 10.1093/acprof:oso/9780199230167.003.0003

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"Building upon work which considers the implications dual-process theory for the great rationality debate in cognitive science, this chapter advances that discussion, first by discussing additions and complications to dual-process theory and then by working through the implications of these ideas for our view of human rationality. it argues that system 2 needs to be understood in terms of two levels of processing: the algorithmic and the reflective."

Pelaccia, T., Tardif, J., Triby, E., & Charlin, B.. (2011). An analysis of clinical reasoning through a recent and comprehensive approach: The dual-process theory. Medical Education Online

Plain numerical DOI: 10.3402/meo.v16i0.5890

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"CONTEXT: clinical reasoning plays a major role in the ability of doctors to make diagnoses and decisions. it is considered as the physician's most critical competence, and has been widely studied by physicians, educationalists, psychologists and sociologists. since the 1970s, many theories about clinical reasoning in medicine have been put forward. purpose: this paper aims at exploring a comprehensive approach: the 'dual-process theory', a model developed by cognitive psychologists over the last few years. discussion: after 40 years of sometimes contradictory studies on clinical reasoning, the dual-process theory gives us many answers on how doctors think while making diagnoses and decisions. it highlights the importance of physicians' intuition and the high level of interaction between analytical and non-analytical processes. however, it has not received much attention in the medical education literature. the implications of dual-process models of reasoning in terms of medical education will be discussed."

Petty, R. E., & Wegener, D. T.. (1999). The Elaboration Likelihood Model: Current status and controversies. Dual Process Theories in Social Psychology

Plain numerical DOI: 10.1016/S0022-4405(97)00003-4

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"The elm contends information gets processed either centrally (effortful, scrutiny) or peripherally (heuristics) depending on their motivation and ability to process the information. this chapter looks back on 20 years of research since the 'two routes to persuasion' (central and peripheral) was introduced (petty, 1977; petty and cacioppo, 1981). the chapter provides an overview of the model in order to

discuss some of the major conceptual questions and confusions that have arisen. the seven postulates of the theory are presented and the research related to them is reviewed. the current status of the elaboration likelihood model (elm) as a theory of persuasion and of social judgment is reviewed. elm overview: in 1977, petty introduced the idea of two routes of persuasion positing that central and peripheral processing occurred. the elm was formulated as a theory about how the classic the source (expertise), message (number of arguments), recipient (mood), and contextual (distraction) variables have an impact on attitudes towards various objects, issues, and people. more generally, the theory can be used to understand how any external or internal variable has an impact on some evaluative or nonevaluative judgement. central-route attitude changes are those that are based on relatively extensive and effortful information-processing activity, aimed at scrutinizing and uncovering the central merits of the issue or advocacy. peripheral-route attitude changes are based on a variety of attitude change processes that typically require less cognitive effort. they may differ in quantitative or qualitative ways from the central process route. the central construct is the elaboration continuum. at the high end of the elaboration continuum, people assess object-relevant information in relation to knowledge that they already possess, and arrive at a reasoned attitude that is well articulated and bolstered by supporting information. at the low end, information scrutiny is reduced. where one lies on the continuum is determined by the motivation and ability of the perceiver on the issue. the continuum is supported by the idea that people are sometimes cognitive misers (taylor, 1981), but at other times it pays to use more cognitive resources. see summary graph pg 43. seven postulates: postulate 1: the correctness postulate – people are motivated to hold correct attitudes. summary 1: at the conscious level, people want to hold opinions that are correct. in the absence of o...”

Barrouillet, P.. (2011). Dual-process theories and cognitive development: Advances and challenges. Developmental Review

Plain numerical DOI: 10.1016/j.dr.2011.07.002

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“Dual-process theories have gained increasing importance in psychology. the contrast that they describe between an old intuitive and a new deliberative mind seems to make these theories especially suited to account for development. accordingly, this special issue aims at presenting the latest applications of dual-process theories to cognitive development. dual-process theoreticians mainly focused on adult functioning have been invited to elaborate the developmental implications of their theory, while developmental psychologists who have proposed dual-process theories of development in the domain of thinking and reasoning present the most recent formulation of their theory and review supporting empirical evidence. © 2011 elsevier inc.”

Greene, J. D., Morelli, S. A., Lowenberg, K., Nystrom, L. E., & Cohen, J. D.. (2008). Cognitive load selectively interferes with utilitarian moral judgment. Cognition

Plain numerical DOI: 10.1016/j.cognition.2007.11.004

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"Traditional theories of moral development emphasize the role of controlled cognition in mature moral judgment, while a more recent trend emphasizes intuitive and emotional processes. here we test a dual-process theory synthesizing these perspectives. more specifically, our theory associates utilitarian moral judgment (approving of harmful actions that maximize good consequences) with controlled cognitive processes and associates non-utilitarian moral judgment with automatic emotional responses. consistent with this theory, we find that a cognitive load manipulation selectively interferes with utilitarian judgment. this interference effect provides direct evidence for the influence of controlled cognitive processes in moral judgment, and utilitarian moral judgment more specifically. © 2007 elsevier b.v. all rights reserved."

Slade, P. D., & Glynn Owens, R.. (1998). A dual process model of perfectionism based on reinforcement theory. Behavior Modification

Plain numerical DOI: 10.1177/01454455980223010

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"This article begins with a brief review of the current literature on the structure and measurement of perfectionism. it is concluded from this review that 2 major types can be distinguished: a normal/healthy form and a pathological form. these 2 forms are then defined as positive and negative perfectionism and related directly to skinnerian concepts of positive and negative reinforcement. the positive/negative distinction is then further elaborated on in terms of approach/avoidance behavior, goal differences, self-concept involvement, emotional correlates, and the promoting environment. finally, some of the more obvious theoretical and practical implications are briefly explored. (psycinfo database record (c) 2008 apa, all rights reserved)."

Sowden, P. T., Pringle, A., & Gabora, L.. (2015). The shifting sands of creative thinking: Connections to dual-process theory. Thinking and Reasoning

Plain numerical DOI: 10.1080/13546783.2014.885464

[DOI URL](#)

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"Dual-process models of cognition suggest that there are two types of thought: autonomous type 1 processes and working memory dependent type 2 processes that support hypothetical thinking. models of creative thinking also distinguish between two sets of thinking processes: those involved in the generation of ideas and those involved with their refinement, evaluation, and/or selection. here we review dual-process models in both these literatures and delineate the similarities and differences. both generative creative processing and evaluative creative processing involve elements that have been attributed to each of the dual processes of cognition. we explore the notion that creative thinking may rest upon the nature of a shifting process between type 1 and type 2 dual processes. we suggest that a synthesis of the evidence bases on dual-process models of cognition and of creative thinking, together

with developing time-based approaches to explore the shifting process, could better inform the development of interventions to facilitate creativity."

Smith, E. R., & DeCoster, J.. (2000). Dual-process models in social and cognitive psychology: Conceptual integration and links to underlying memory systems. *Personality and Social Psychology Review*

Plain numerical DOI: 10.1207/S15327957PSPR0402_01

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"Two experiments were conducted to assess the impact of status differentials on subgroup attitudes and behaviours. in experiment 1, 73 math-science students were led to believe they had higher or lower status than humanities students. they then performed a non-interactive decision-making task during which they were categorized exclusively as a university student (superordinate condition), or as a university student and math-science student simultaneously (subgroups condition). experiment 2 (n = 98) differed from experiment 1 in that perceptions of relative subgroup status were measured rather than manipulated. consistent with social identity theory, subgroup members tended to categorize themselves more at the superordinate (university) level the lower status they considered their subgroup to be. in experiment 2, a series of interactions also emerged, showing that status and inter-subgroup bias were positively related when the participants had been categorized exclusively at the superordinate level. when superordinate and subgroup identities were activated simultaneously, perceptions of status had no effect on levels of bias. the results were interpreted in terms of participants' needs for identity enhancement and identity distinctiveness."

Pyszczynski, T., Solomon, S., & Greenberg, J.. (1999). A dual-process model of defense against conscious and unconscious death-related thoughts: An extension of terror management theory. *Psychological Review*

Plain numerical DOI: 10.1037/0033-295X.106.4.835

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"Distinct defensive processes are activated by conscious and nonconscious but accessible thoughts of death. proximal defenses, which entail suppressing death-related thoughts or pushing the problem of death into the distant future by denying one's vulnerability, are rational, threat-focused, and activated when thoughts of death are in current focal attention. distal terror management defenses, which entail maintaining self-esteem and faith in one's cultural worldview, function to control the potential for anxiety that results from knowing that death is inevitable. these defenses are experiential, are not related to the problem of death in any semantic or logical way, and are increasingly activated as the accessibility of death-related thoughts increases, up to the point at which such thoughts enter consciousness and proximal threat-focused defenses are initiated. experimental evidence for this analysis is presented. (psycinfo database record (c) 2013 apa, all rights reserved). (journal abstract)"

Knowles, E. S., & Condon, C. A.. (1999). Why people say "yes": A dual-process theory of acquiescence

. Journal of Personality and Social Psychology

Plain numerical DOI: 10.1037/0022-3514.77.2.379

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"In 3 studies the authors investigated yea-saying acquiescence from the standpoint of d. t. gilbert's (1991) 2-stage model of comprehension, wherein comprehension requires automatic acceptance during the first stage, which is then reconsidered and evaluated during a more effortful second stage." Gawronski, B.. (2013). What should we expect from a dual-process theory of preference construction in choice?. Journal of Consumer Psychology

Plain numerical DOI: 10.1016/j.jcps.2013.04.007

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"Dhar and gorlin (2013) proposed a dual-process framework for understanding the effects of preference construction in choice. drawing on the distinction operating principles and operating conditions, it is argued that their emphasis on cognitive elaboration fails to specify the mental operations involved in preference construction. this limitation makes their dual-process framework circular and susceptible to the criticism of single-process alternatives. the distinction between associative and propositional processes has the potential to fill this conceptual gap, thereby providing a more thorough understanding of preference construction effects in choice. © 2013 society for consumer psychology."

Sahlin, N. E., Wallin, A., & Persson, J.. (2009). Decision science: From Ramsey to dual process theories. Synthese

Plain numerical DOI: 10.1007/s11229-009-9472-5

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"The hypothesis that human reasoning and decision-making can be roughly modeled by expected utility theory has been at the core of decision science. accumulating evidence has led researchers to modify the hypothesis. one of the latest additions to the field is dual process theory, which attempts to explain variance between participants and tasks when it comes to deviations from expected utility theory. it is argued that dual process theories at this point cannot replace previous theories, since they, among other things, lack a firm conceptual framework, and have no means of producing independent evidence for their case."

De Neys, W.. (2017). Dual process theory 2.0. Dual Process Theory 2.0

Plain numerical DOI: 10.4324/9781315204550

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"In psychology, a dual process theory provides an account of how a phenomenon can occur in two different ways, or as a result of two different processes. often, the two processes consist of an implicit (automatic), unconscious process and an explicit (controlled), conscious process. verbalized explicit processes or attitudes and actions may change with persuasion or education; though implicit process or attitudes usually take a long amount of time to change with the forming of new habits. dual process theories can be found in social, personality, cognitive, and clinical psychology."

Reyna, V. F.. (2004). How People Make Decisions That Involve Risk: A Dual-Processes Approach. Current Directions in Psychological Science

Plain numerical DOI: 10.1111/j.0963-7214.2004.00275.x

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"Many health and safety problems, including war and terrorism, are by-products of how people reason about risk. i describe a new approach to reasoning about risk that implements a modern dual-process model of memory called fuzzy-trace theory. this approach posits encoding of both verbatim and gist representations, with reliance on the latter whenever possible; dependence of reasoning on retrieval cues that access stored values and principles; and vulnerability of reasoning to processing interference from overlapping classes of events, which causes denominator neglect in risk or probability judgments. these simple principles explain classic and new findings, for example, the finding that people overestimate small risks but ignore very small risks. fuzzy-trace theory differs from other dual-process approaches to reasoning in that it places intuition at the apex of development, considering fuzzy intuitive processing more advanced than precise computational processing (e.g., trading off risks and rewards). the theory supplies a conception of rationality that distinguishes degrees of severity of errors in reasoning. it also includes a mechanism for achieving consistency in reasoning, a hallmark of rationality, by explaining how a person can treat superficially different reasoning problems in the same way if the problems share an underlying gist. keywords—risk perception; risky decision making; fuzzy-trace theory; intuition; dual processes in reasoning as i write these words, coalition troops are at war in iraq. the decision to go to war with iraq, like many decisions, was based on a perception of risk, that is, the perceived threat posed by iraq under saddam hussein. key government officials also believed that inaction with respect to iraq posed a greater risk than taking action. since september 11, 2001, foreign threats and risks of terrorism have loomed large in people's perception, dwarfing perennial killers such as highway accidents and heart disease. in this article, i discuss the psychological factors that shape the perception of many kinds of risks and the decisions that involve those risks."

Bago, B., & De Neys, W.. (2017). Fast logic?: Examining the time course assumption of dual process theory.

Cognition

Plain numerical DOI: 10.1016/j.cognition.2016.10.014

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"Influential dual process models of human thinking posit that reasoners typically produce a fast, intuitive heuristic (i.e., type-1) response which might subsequently be overridden and corrected by slower, deliberative processing (i.e., type-2). in this study we directly tested this time course assumption. we used a two response paradigm in which participants have to give an immediate answer and afterwards are allowed extra time before giving a final response. in four experiments we used a range of procedures (e.g., challenging response deadline, concurrent load) to knock out type 2 processing and make sure that the initial response was intuitive in nature. our key finding is that we frequently observe correct, logical responses as the first, immediate response. response confidence and latency analyses indicate that these initial correct responses are given fast, with high confidence, and in the face of conflicting heuristic responses. findings suggest that fast and automatic type 1 processing also cues a correct logical response from the start. we sketch a revised dual process model in which the relative strength of different types of intuitions determines reasoning performance."

Category

1. Cognitive science
2. General

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