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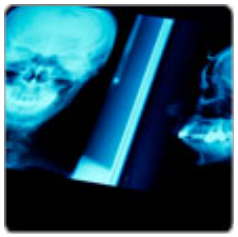

Unconscious Processes

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Introduction

Consciousness has to do with two aspects of mental life: monitoring ourselves, our phenomenal awareness of our experiences, thoughts, and actions; and controlling ourselves, engaging in voluntary behavior that goes beyond reflex, instinct, and conditioned response. The unconscious mind—whether it exists at all, and if so what its scope and limits are—has been an important theoretical issue since the beginning of scientific psychology. There are of course many physical and biological processes that, in some sense, proceed unconsciously: the orbiting of planets around the sun and photosynthesis are two examples. Changes in blood pressure are not accessible to phenomenal awareness; and the brain activity which gives rise to consciousness itself goes on unconsciously (neurosurgeons assure us that there is no afference in the brain). But there is little point in talking about something being *unconscious* if that same thing cannot also be conscious, in the sense of being accessible to phenomenal awareness and voluntary control. Therefore, the adjective *unconscious* only makes sense when applied to mental states and mental activity, as an adjectival contrast to *conscious*. Mental states come in various forms—namely cognition (percepts, memories, thoughts, and knowledge acquired through learning), emotion (positive and negative feelings), and motivation (desires and goals of approach and avoidance). Usually, these mental states are accessible to consciousness, in that people are generally aware of what they are thinking, what they want and feel. “The unconscious” is shorthand for mental states and processes that are inaccessible to introspective phenomenal awareness and voluntary control. The question is whether, and to what extent, mental states can exist (and mental activities transpire) outside the scope of phenomenal awareness and voluntary control. *Objection*: If these mental states and activities are unconscious, how are we to know them? *Answer*: We know them indirectly by virtue of their effects on our ongoing conscious experience, thought, and action. Question: If there are two kinds of mental states and processes, conscious and unconscious, how do they compare and contrast? Answer: In principle, unconscious processes differ from conscious processes because they operate outside phenomenal awareness. And because conscious awareness is the logical prerequisite for conscious control; unconscious processes are not susceptible to voluntary self-regulation. Other differences between conscious and unconscious processes are empirical questions. This revision adds items that appeared through 2022.

Textbooks and Monographs

There is only one textbook specifically devoted to unconscious mental life: Weinberger and Stoycheva 2020. However, there are several textbooks and monographs that discuss various aspects of the unconscious in the context of the more general philosophical, psychological, and neuroscientific literature on consciousness. The best of these is Farthing 1992—now out of print, but well worth finding on the used book market. Revonsuo 2018; Wallace, et al. 2011; and Zeman 2002 provide more up-to-date coverage. Although none are as comprehensive as Farthing, they are good alternatives for classroom use. Blackmore and Troscianko 2018 focuses mostly on the mind-body problem. Schechter 2018 examines the implications of neurological patients with cerebral commissurotomies. There have been many philosophical monographs dealing with the mind-body problem and other

aspects of consciousness, some of which also discuss the problem of the unconscious. Seager 2016 provides a comprehensive textbook treatment of the philosophical debates, but some flavor of the current scene can be gleaned from Searle 1997 and Natsoulas 2018. There is also Blackmore 2005, which is a contribution to Oxford's Very Short Introduction series, and even a graphic treatment of the topic in Papineau and Selina 2000. Schechter 2018 reviews the implications for consciousness of neurological patients with disconnected hemispheres.

Blackmore, S. 2005. *Consciousness: A very short introduction*. Oxford: Oxford Univ. Press.

Too short to serve as a standalone text for a course in consciousness but an excellent ancillary text for courses on philosophy of mind, cognitive psychology, and cognitive neuroscience—and, as intended, as an introduction for the general public.

Blackmore, S., and E. D. Troscianko. 2018. *Consciousness: An introduction*. 3d ed. Abingdon, UK: Routledge.

Expressly intended as an undergraduate text, like most books on consciousness it focuses mostly on the mind-body problem but also covers the evolution of consciousness, consciousness in artificial intelligence, and altered states of consciousness.

Farthing, G. W. 1992. *The psychology of consciousness*. Englewood Cliffs, NJ: Prentice-Hall.

Some twenty-five years after its original publication, this remains the best and most comprehensive textbook for a course on consciousness: the model for any who would aspire to replace it. Covers, sometimes in multiple chapters, introspection, the mind-body problem, explicit-implicit dissociations, daydreaming, hypnosis, sleep and dreams, meditation, and psychedelic drugs.

Natsoulas, T. 2018. *States of consciousness: The pulses of experience*. New York: Cambridge Univ. Press.

Comprehensive treatment of classical and modern discussions of consciousness by one of the pioneers of the "consciousness revolution" in psychology, making connections between the philosophical and psychological literature.

Papineau, D., and H. Selina. 2000. *Introducing consciousness: A graphic guide*. London: Icon Books.

Comprehensive illustrated inquiry into the mind-body problem, "the last frontier of science"; not just for young people and other reluctant readers.

Revonsuo, A. 2018. *Foundations of consciousness*. Oxford: Routledge.

In the absence of a new edition of Farthing, this volume can serve as the core textbook in an undergraduate course on consciousness. Excellent coverage of the neural correlates of consciousness and other aspects of the mind-body problem. Compared to Farthing 1992, there is less extensive coverage of altered states of consciousness.

Schechter, E. 2018. *Self-consciousness and "split" brains: The minds' I*. New York: Oxford Univ. Press.

Reviews the psychological consequences of cerebral commissurotomy and argues that in such cases, the left and right hemispheres support separate streams of consciousness.

Seager, W. 2016. *Theories of consciousness; An introduction and assessment*. 2d ed. New York: Routledge.

Comprehensive coverage of contemporary philosophical analyses of consciousness. A genuine textbook for courses in philosophy.

Searle, J. R. 1997. *The mystery of consciousness*. 1st ed. New York: New York Review of Books.

Reprints Searle's reviews of major monographs on consciousness by Daniel Dennett, David Chalmers, and others, as well as responses from the authors and rejoinders to them. An excellent resource.

Wallace, B., B. B. Oswald, and L. E. Fisher. 2011. *Consciousness and behavior*. 5th ed. Dubuque, IA: KendallHunt.

Also a good choice as the text for an undergraduate course, with much the same coverage as Farthing 1992, and the addition of chapters on parapsychology and sensory deprivation.

Weinberger, J., and V. Stoycheva. 2020. *The unconscious: Theory, research, and clinical implications*. New York: Guilford.

One of the few textbook-length treatments of unconscious mental life; covers clinical as well as experimental research, including classical and modern psychoanalytic theory.

Zeman, A. 2002. *Consciousness: A user's guide*. New Haven, CT: Yale Univ. Press.

Written by a practicing neurologist, this is also an excellent choice for a core text. Contains lots of material on the neural bases of consciousness but less on altered states and unconscious processes.

Anthologies

As with textbooks, there are relatively few anthologies devoted to the unconscious as such. Block, et al. 1997; Cohen and Schooler 1997; Carter 2002; Baars, et al. 2003; Bayne, et al. 2009; Velmans 2018; Zelazo, et al. 2007; and Kriegel 2020 are primarily concerned with consciousness in general but contain many articles concerned with various aspects of unconscious mental life. Underwood 1996 and Kirsner, et al. 1998 expressly focus on unconscious processes. Hameroff, et al. 1996 records the proceedings of the first of a series of biennial conferences focused on "The Science of Consciousness," sponsored by the Center for Consciousness Studies at the University of Arizona. Rossetti and Revonsuo 2000

presents papers exploring the interactions between conscious and unconscious processes.

Baars, B. J., W. P. Banks, and J. B. Newman, eds. 2003. *Essential sources in the scientific study of consciousness*. Cambridge, MA: MIT Press.

Collects nearly seventy seminal papers covering vision, attention, short- and long-term memory, imagery, unconscious processes, and contemporary theories.

Bayne, T., A. Cleeeremans, and P. Wilken, eds. 2009. *Oxford Companion to Consciousness*. Oxford: Oxford Univ. Press.

Like its companions in the Oxford Companion series, consists of more than 250 individual entries covering various aspects of consciousness, arranged alphabetically from “absent qualia” to “zombies”; a brick of a book, but the brevity of the entries make for excellent bedtime sampling.

Block, N., O. Flanagan, and G. Guzeldere, eds. 1997. *The nature of consciousness: Philosophical debates*. Cambridge, MA: MIT Press.

Covers philosophical issues such as qualia, intentionality, the explanatory gap, conscious inessentialism, and epiphenomenalism. Also includes important papers on methodology and neuropsychological approaches to consciousness.

Carter, R. 2002. *Exploring consciousness*. Berkeley: Univ. of California Press.

Approaching coffee-table status, this large-format, generously illustrated book collects provocative essays on various aspects of the mind-body problem along with integrative commentary by a distinguished science writer.

Cohen, J. D., and J. W. Schooler, eds. 1997. *Scientific approaches to consciousness*. Mahwah, NJ: Erlbaum.

Proceedings of the twenty-fifth annual Carnegie Mellon Symposium on Cognition, held in 1993. With authoritative essays on attention and automaticity, subliminal perception, various aspects of the explicit-implicit distinction, and neuroscientific approaches.

Hameroff, S., A. W. Kaszniak, and A. C. Scott, eds. 1996. *Toward a science of consciousness: The 1st Tucson discussions and debates*. Cambridge, MA: MIT Press.

Proceedings of the first in a regular series of conferences on “The Science of Consciousness,” which draws an eclectic “Who’s Who?” of psychologists, philosophers, neuroscientists, artists, and writers. The biennial conferences, some of whose later proceedings have also been published, track our progress, and give a good picture of the field as it stands. For a somewhat humorous view of the 2018 conference, see “Has Consciousness Lost Its Mind?” by Tom Bartlett, *Chronicle of Higher Education*, June 6, 2018.

Kirsner, K., C. Speelman, M. Maybery, A. O’Brien-Malone, M. Anderson, and C. MacLeod, eds. 1998. *Implicit and explicit mental processes*. Mahwah, NJ: Erlbaum.

One of the few anthologies to focus on unconscious mental processes, in the form of variations on the explicit-implicit distinction.

Kriegel, U., ed. 2020. *Oxford handbook of the philosophy of consciousness*. New York: Oxford Univ. Press.

Another invaluable resource, provides a comprehensive look at current philosophical approaches to consciousness, including the relations between consciousness and the material world.

Rossetti, Y., and A. Revonsuo, eds. 2000. *Beyond dissociation: Interaction between dissociated implicit and explicit processing*. Amsterdam: John Benjamins.

Implicit memory and its cognates are of interest because they can be dissociated from their explicit counterparts, but unconscious processes can also interact with conscious ones. This volume collects papers exploring explicit-implicit interactions in perception, memory, motor behavior, and other domains.

Schneider, S., and M. Velmans, eds. 2017. *The Blackwell companion to consciousness*. 2d ed. Chichester, UK: Wiley.

More than fifty extensive essays, with full references, on a wide variety of topics from the evolution and development of consciousness to varieties of conscious and unconscious mental life, theories of consciousness, and related topics in cognitive psychology and neuroscience.

Underwood, G., ed. 1996. *Implicit cognition*. Oxford: Oxford Univ. Press.

Contributions exploring various aspects of the explicit-implicit distinction in memory, perception, learning, thinking, etc.

Velmans, M., ed. 2018. *Consciousness (critical concepts in psychology)*. Routledge Major Works Series. London: Routledge.

Monumental collection, in four volumes and over two thousand pages, covering all the bases from Aristotle to Tononi and Koch, introspection to brain-imaging.

Zelazo, P. D., M. Moscovitch, and E. Thompson, eds. 2007. *Cambridge handbook of consciousness*. Cambridge Handbook of Consciousness. Cambridge, UK: Cambridge Univ. Press.

Extensively documented articles covering all aspects of consciousness, including altered states, social and cultural differences, and cognitive and affective neuroscience.

Journals

Research reports and theoretical statements concerning consciousness and the unconscious can be found in most journals publishing psychological research, including

Research reports and theoretical statements concerning consciousness and the unconscious can be found in most journals publishing psychological research, including *Psychological Review* and *Psychological Bulletin*. In addition, four journals specialize in publishing research on consciousness and unconscious mental life: *Consciousness and Cognition*; the *Journal of Consciousness Studies*; *Psychology of Consciousness: Theory, Research, and Practice*; and the *Journal of Anomalous Experience and Cognition*.

***Consciousness and Cognition*.**

The oldest of these specialty journals, having begun publication in 1992. It is the de facto journal of the Association for the Scientific Study of Consciousness.

***Journal of Anomalous Experience and Cognition*.**

The most recent entry into this field, having begun publication only in 2022. An open-access journal maintained by the University of Lund, Sweden, it has a special interest in parapsychology (psi), but it publishes papers on a wide variety of topics.

***Journal of Consciousness Studies*.**

Began publication in 1994. Explicitly interdisciplinary in orientation, it publishes philosophical as well as scientific investigations of topics related to consciousness, and sometimes ventures into the arts and humanistic studies. As opposed to many scientific journals, *Journal of Consciousness Studies* aims to make its contents accessible to the wider public as well as the research community.

***Psychology of Consciousness: Theory, Research, and Practice*.**

Began publication in 2014 under the auspices of the Educational Publishing Foundation of the American Psychological Association. As its name implies, it specifically aims to publish clinical and well as laboratory research.

Metacognition

"Metacognition" refers to "knowledge about cognition" and includes both our awareness of what we know (and believe) and our understanding of how our minds work. Thus, metacognition is about consciousness, and unconscious processing implies the absence of metacognition. In a psychological context, the prefix *meta-* was coined in Gleitman, et al. 1972 and popularized within developmental psychology by Flavell 1979. Research on metacognition, especially in children, served as a bridge between the classic Piagetian view of cognitive development and the more modern focus on the emergence of a theory of mind (which is also, in some respects, a theory of consciousness) and the broader "theory theory." Nelson 1992, Metcalfe and Shimamura 1994, and Reder 1996 provide excellent overviews of the topic. Historical footnote: in a 2002 news conference conducted during the run-up to the Iraq War, then-Secretary of Defense Donald Rumsfeld stated that "as we know, there are known knowns; there are things we know we know." That is metacognition. He continued: "We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns—the ones we don't know we don't know." Rumsfeld omitted the fourth logical category: *unknown knowns*, things we do not know we know, including unconscious percepts, memories, knowledge, thoughts, emotions, and motives that influence our experience, thought, and action outside introspective phenomenal awareness and voluntary control, and that can be known only

by inference. Lehmann, et al. 2022 explores the relations among various metacognitive measures. Proust and Fortier 2018 presents papers reflecting cultural differences in metacognition.

Flavell, J. H. 1979. Metacognition and cognitive monitoring: A new area of cognitive-developmental inquiry. *American Psychologist* 34.10: 906–911.

Traces the emergence of metamemory, and metacognition in general, as an alternative to the traditional Piagetian theory of cognitive development.

Gleitman, L. R., H. Gleitman, and E. Shipley. 1972. The emergence of the child as grammarian. *Cognition* 1:137–164.

Records the first usage of the prefix *meta-* to describe "knowing about knowing," portraying language development as the development of "metalanguage," or knowledge about grammar and other aspects of language, a component of metacognition in general.

Hennecke, M., and S. Bürgler. 2022. Metacognition and self-control: An integrative framework. *Psychological Review*.

Conscious control requires conscious awareness. This paper reviews the role of metacognition in self-regulation. The implication is that we cannot control unconscious mental processes or their influence on experience, thought, and action.

Lehmann, M., J. Hagen, and U. Ettinger. 2022. Unity and diversity of metacognition. *Journal of Experimental Psychology: General* 151.10: 2396–2417.

Exploration of the "functional architecture" of metacognition, by examining the relations among a number of different metacognitive tasks, indicating that metacognition has both domain-general and domain-specific aspects.

Metcalfe, J., and A. P. Shimamura. 1994. *Metacognition: Knowing about knowing*. Cambridge, MA: MIT Press.

Anthology of readings on various aspects of metacognition, with emphasis on the "feeling of knowing" and other aspects of metamemory. See pp. xiii, 334.

Nelson, Thomas O. 1992. *Metacognition: Core readings*. Boston: Allyn and Bacon.

Another anthology of readings on various aspects of metacognition, emphasizing the connections between metacognition and consciousness.

Proust, J., and M. Fortier. 2018. *Metacognitive diversity: An interdisciplinary approach*. New York: Oxford Univ. Press.

Studies by psychologists, neuroscientists, anthropologists, linguists, and philosophers exploring cross-cultural differences in metacognition.

Reder, L., ed. 1996. *Implicit Memory and Metacognition*. Cambridge, MA: MIT Press.

Proceedings of the Twenty-Seventh Carnegie Symposium on cognition, held in 1995.

Historical Background

Although Sigmund Freud (see Freud 1900 and Freud 1915) is generally credited with "discovering" "the unconscious," Whyte 1960, Ellenberger 1970, and Klein 1977 show clearly that the idea of unconscious mental life had been around for at least a century before Freud. Kihlstrom 1995 provides a brief overview of this legacy. Weinberger 2000 corrects longstanding and widely shared misunderstandings about William James's view of the unconscious. After the dark age of functional behaviorism, which virtually banished "consciousness," not to mention "the unconscious," from psychologists' vocabulary, the cognitive revolution in psychology promoted a resurgence of interest in both conscious and unconscious mental life. Kihlstrom 1987 and Kihlstrom 2013 summarize a new view of the unconscious that owes little to Freud and everything to developments in cognitive psychology.

Ellenberger, H. F. 1970. *The discovery of the unconscious: The history and evolution of dynamic psychiatry*. New York: Basic Books.

Monumental, must-read scholarly treatise covering the philosophical and psychological antecedents of the "dynamic psychiatry" of Pierre Janet, Sigmund Freud, C. G. Jung, and Alfred Adler, which emphasized the importance of unconscious processes in personality and psychopathology.

Freud, S. 1900. The interpretation of dreams. In *The standard edition of the complete psychological works of Sigmund Freud*. Edited by J. Strachey, 4–5. London: Hogarth Press.

Introduces Freud's "topographical" division of the mind into three systems: conscious, preconscious, and unconscious.

Freud, S. 1915. The unconscious. In *The standard edition of the complete psychological works of Sigmund Freud*. Edited by J. Strachey, 14. London: Hogarth Press.

Companion to Freud's 1915 essay on "Repression" reflects Freud's later thinking about the nature and role of "the unconscious" in mental life.

Kihlstrom, J. F. 1987. The cognitive unconscious. *Science* 237.4821: 1445–1452.

Summarizes four lines of research contributing to the revival of interest in unconscious mental life: the distinction between automatic (unconscious) and controlled (conscious) mental processes, dissociations between implicit and explicit memory observed in the amnesic syndrome, renewed interest in "subliminal" perception, and research on hypnosis.

Kihlstrom, J. F. 1995. The rediscovery of the unconscious. In *The mind, the brain, and complex adaptive systems*. Edited by H. Morowitz and J. L. Singer, 123–143. Reading, MA: Addison-Wesley.

Connects the literature surveyed in Kihlstrom 1987 to 19th-century philosophical and psychological analyses of unconscious mental life, including Helmholtz's "unconscious inferences" and Hartmann's "philosophy of the unconscious."

Kihlstrom, J. F. 2013. Unconscious processes. In *Oxford handbook of cognitive psychology*. Edited by D. Reisberg, 176–186. New York: Oxford Univ. Press.

Comprehensive survey of unconscious processes in perception, memory, learning, and thinking, on which this annotated bibliography is based.

Klein, D. B. 1977. *The unconscious: Invention or discovery? A historico-critical inquiry*. Santa Monica, CA: Goodyear.

Critical survey of Freudian, pre-Freudian (e.g., Hartmann), and non-Freudian (e.g., James) ideas about the unconscious. See also Klein's useful companion volume, *The Concept of Consciousness: A Survey* (Lincoln: University of Nebraska Press, 1984).

Weinberger, J. 2000. William James and the unconscious: Redressing a century-old misunderstanding. *Psychological Science* 11.6: 439–445.

James is often quoted out of context as viewing the unconscious as "the sovereign means for believing what one likes in psychology, and of turning what might become a science into a tumbling-ground for whimsies" (*The Principles of Psychology* 1890). Weinberger reinstates the context, and shows that, in fact, James was quite open to certain views of unconscious mental life.

Whyte, L. L. 1960. *The unconscious before Freud*. New York: Basic Books.

Brief survey of philosophical, theological, and literary analyses of the unconscious mind leading up to Freud, from St. Augustine to Marx and Engels, Descartes to James, and Shakespeare to Dostoyevsky.

Automaticity

In contemporary psychology the most popular construal of "the unconscious" is in terms of *automaticity*. According to this view, some mental processes are inevitably evoked by the appearance of certain stimuli and incorrigibly executed once set in motion; they consume few or no cognitive resources and do not interfere with conscious mental activities. Automatic processes are unconscious in the strict sense of the term, because they operate outside phenomenal awareness and voluntary control and can be known only by inference. Automatic processing, an idea with its scientific roots in Helmholtz's ideas about the role of unconscious inferences in perception, is exemplified by the Stroop color-word effect. MacLeod 1991 reviews the massive literature on the Stroop effect, while Besner, et al. 1997 reports experiments indicating that Stroop interference might not be as automatic as generally assumed. On the other hand, Anderson 2018 argues that "controlled" processes may not be as voluntary as they appear. Landry, et al. 2022 discusses experiments,

suggesting that the Stroop effect can be abolished by hypnotic suggestions for agnosia or alexia. Servant, et al. 2018 reviews research on the neural bases of automaticity. The list of canonical features associated with automatic processing was developed in a series of papers published in the 1970s and 1980s, culminating in Shiffrin and Schneider 1984. Interest in automaticity reached its apex with Kahneman 2011 and its distinction between “System 1” (fast) and “System 2” (slow) thinking. Jacoby 1991 introduces the process-dissociation procedure for separating the contributions of automatic and controlled processes to task performance. Yonelinas and Jacoby 2012 reviews the wealth of studies that have employed the PDP. On the other hand, Curran and Hintzman 1995 and Merikle and Joordens 1997 express doubts about some of the assumptions underlying Jacoby’s method —particularly that automatic and controlled processes operate independently of each other. A comprehensive overview of the literature on automaticity is provided in Moors 2016.

Anderson, B. A. 2018. Controlled information processing, automaticity, and the burden of proof. *Psychonomic Bulletin & Review* 25.5: 1814–1823.

Argues that ostensibly “automatic” processes can be conditionalized on factors such as task relevance, and thus appear to be “controlled.”

Besner, D., J. A. Stolz, and C. Boutilier. 1997. The Stroop effect and the myth of automaticity. *Psychonomic Bulletin & Review* 4:221–225.

One of a series of papers by Besner and his colleagues offering a critical analysis of the “myth” that the “Stroop” color-word phenomenon is a product of automatic processes.

Curran, T., and D. L. Hintzman. 1995. Violations of the independence assumption in process dissociation. *Journal of Experimental Psychology: Learning, Memory, & Cognition* 21:531–547.

Shows that the estimates of controlled and automatic processing provided by Jacoby’s process-dissociation procedure may be inaccurate when the two processes are not in fact independent and suggests that this may often be the case.

Jacoby, L. L. 1991. A process dissociation framework: Separating automatic from intentional uses of memory. *Journal of Memory & Language* 13:513–541.

Introduces the process dissociation framework, and its associated method of opposition, for determining the strength of automatic and controlled components of task performance.

Kahneman, D. 2011. *Thinking fast and slow*. New York: Farrar, Straus and Giroux.

The idea of automaticity has its roots in Kahneman’s 1973 book, *Attention and Effort*. Here the 2002 Nobel laureate in economics links automaticity to the “heuristics and biases” approach to judgment and decision making, which he pioneered with Amos Tversky.

Landry, M., J. Da Silva Castanheira, D. Milton, and A. Raz. 2022. Suggestion alters Stroop automaticity: Hypnotic alexia through a proactive lens. *Psychology of Consciousness: Theory, Research, and Practice* 9.2: 159–171.

Conventional wisdom holds that processes, once they are automatized, stay so. This experiment, and others like it reviewed here, employs hypnotic suggestions for alexia (or, perhaps, agnosia) to eliminate Stroop interference—thus, “unringing the bell.”

MacLeod, C. M., 1991. Half a century of research on the Stroop effect: An integrative review. *Psychological Bulletin* 109.2: 163–203.

The Stroop “color-word” phenomenon is the example *par excellence* of automatic processing.

Merikle, P. M., and S. Joordens. 1997. Measuring the relative magnitude of unconscious influences. In *Scientific approaches to consciousness*. Edited by J. D. Cohen and J. W. Schooler, 109–123. Hillsdale, NJ: Erlbaum.

Another alternative to Jacoby’s process-dissociation technique, also assuming that automatic and controlled processes are redundant and *not* independent.

Moors, A. 2016. Automaticity: Componential, causal, and mechanistic explanations. *Annual Review of Psychology* 67:263–287.

Provides a comprehensive overview of research and theory on automaticity, including the relations among the cardinal and secondary features of automatic processing: automatic evocation, incorrigible completion, parallel processing, and efficiency and causal theories of automatic processing.

Servant, M., P. Cassey, G. F. Woodman, and G. D. Logan. 2018. Neural bases of automaticity. *Learning, Memory, and Cognition* 44.3: 440–464.

Summarizes evidence from studies of event-related potentials that automaticity reflects a shift in the basis of task performance from working memory to long-term memory.

Shiffrin, R. M., and W. Schneider. 1984. Automatic and controlled processing revisited. *Psychological Review* 91.2: 269–276.

Schneider and Shiffrin’s two 1977 *Psychological Review* papers were largely responsible for popularizing the automatic-controlled distinction within cognitive psychology. This paper reflects on developments since those papers and responds to some criticisms.

Yonelinas, A. P., and L. L. Jacoby. 2012. The process-dissociation approach two decades later: Convergence, boundary conditions, and new directions. *Memory & Cognition* 40:663–680.

Retrospective review of the contributions of (and controversies concerning) Jacoby’s process dissociation procedure.

Automaticity in Social, Personality, and Clinical Psychology

The concept of automaticity was quickly imported from cognitive psychology into social psychology. John Bargh established himself as a leader of this movement, but many other personality, social, and clinical psychologists have taken similar positions. Wegner and Bargh 1998 argues that many of the classic experiments in social psychology—on aggression, conformity, obedience, and the like—involved automatic, reflex-like responses to primes contained in social situations. Uleman and Bargh 1989; Hassin, et al. 2005; Bargh 2007; and Wood, et al. 2022 detail the application of automaticity to a wide scope of problems of personality and social psychology. Chaiken and Trope 1999 and Sherman, et al. 2014 advance a number of "dual-process" theories of social cognition and behavior. These theories generally agree that many interpersonal behaviors generally attributed to controlled, conscious processing can also be performed automatically and unconsciously. Because automatic processes are executed quickly and effortlessly, most "dual-process" theories emphasize the dominance of unconscious automaticity over conscious control. Melnikoff and Bargh 2018 argues that dual-process theorizing has led psychology stray and should be abandoned. Enthusiasm for automaticity led Wegner 2002 and some other theorists (following the lead of Libet 1985) to doubt the role of conscious will in human behavior. On the other hand, Kihlstrom 2008 argues that many studies of automaticity fail to employ rigorous operational definitions of the concept, or to actually compare the strength of automatic and controlled processes. Leaning on Miller, et al. 2011, Kihlstrom 2017 argues that Libet's provocative findings are wholly artifacts of his method. It is important to note that some of the most provocative demonstrations of "social priming" and other aspects of automaticity in emotion, motivation, and social interaction have proved difficult to confirm in independent laboratories, contributing to the "replication crisis" in contemporary psychology.

Bargh, J. A., ed. 2007. *Social psychology and the unconscious: The automaticity of higher mental processes*. New York: Psychology Press.

Anthology exploring the effects of automatic processing on many aspects of social interaction.

Chaiken, S., and Y. Trope, eds. 1999. *Dual-process theories in social psychology*. New York: Guilford.

Anthology containing authoritative surveys of dual-process theories of social perception and judgment, attitudes, stereotypes, emotion, and self-regulation.

Hassin, R. R., J. S. Uleman, and J. A. Bargh, eds. 2005. *The new unconscious*. New York: Oxford Univ. Press.

The "old" unconscious was Freud's. The "new" one is automaticity—which is also rather old, dating back to Helmholtz's "unconscious inferences." Anthology focuses on applications of automaticity in personality and social psychology.

Kihlstrom, J. F. 2008. The automaticity juggernaut. In *Psychology and free will*. Edited by J. Baer, J. C. Kaufman, and R. F. Baumeister, 155–180. New York: Oxford Univ. Press.

Critical analysis, arguing that many studies employ weak operational definitions of automaticity and fail to compare the strength of automatic and controlled processes. Worries that automaticity theories are "behaviorism with a cognitive face" (p. 171).

Kihlstrom, J. F. 2017. Time to lay the Libet Experiment to rest: Commentary on Papanicolaou. *Psychology of Consciousness: Theory, Research, & Practice* 4.3: 324–329.

Commentary on a review of literature stimulated by the Libet Experiment, concluding that Libet's findings are "wholly an artifact of his method" and have no bearing on the question of free will.

Libet, B. 1985. Unconscious cerebral initiative and the role of conscious will in voluntary action. *Behavioral & Brain Sciences* 8:529–566.

Based on evidence of event-related potentials in the EEG, Libet argues that apparently conscious actions are initiated unconsciously, with conscious awareness serving only as a post-hoc "veto."

Melnikoff, D. E., and J. A. Bargh. 2018. The mythical number two. *Trends in Cognitive Sciences* 22.4: 280–293.

Argues against the automatic-controlled duality and the dual-process theories that have followed from it.

Miller, J., P. Shepherdson, and J. Trevena. 2011. Effects of clock monitoring on electroencephalographic activity: Is unconscious movement initiation an artifact of the clock? *Psychological Science* 21.1: 103–109.

After all the attention paid to the Libet experiment, this shows that Libet's findings were an artifact of having subjects watch a clock while deciding when to move their hands.

Sherman, J. W., B. Gawronski, and Y. Trope, eds. 2014. *Dual-process theories of the social mind.* New York: Guilford.

Anthology containing authoritative surveys of dual-process theories of attitudes, social perception, thinking and reasoning, habit and motivation, and self-regulation.

Strack, F., and N. Schwarz. 2016. Editorial overview: Social priming: Information accessibility and its consequences. *Current Opinion in Psychology* 12:iv–vii.

Introduction to a special issue of the journal, surveying recent research and theory on automaticity in social interaction.

Uleman, J. S., and J. A. Bargh, eds. 1989. *Unintended thought.* New York: Guilford.

Anthology collecting papers on the role of automatic processing in personality and social psychology.

Wegner, D. M. 2002. *The illusion of conscious will*. Cambridge, MA: MIT Press.

Argues, based on the Libet Experiment and other evidence, that the experience of free will is an illusion and that the "true causes" of behavior are unconscious.

Wegner, D. M., and J. A. Bargh. 1998. Control and automaticity in social life. In *Handbook of social psychology*. Vol. 1. Edited by D. Gilbert, S. T. Fiske, and G. Lindzey, 446–496. Boston: McGraw-Hill.

Argues that many of the classic findings in experimental social psychology, such as Milgram's experiments on obedience to authority, reflect the operation of automatic processes.

Wood, W., A. Mazar, and D. T. Neal. 2022. Habits and goals in human behavior: Separate but interacting systems. *Perspectives on Psychological Science* 17.2: 590–605.

Argues, based on Wood's extensive programmatic research, that habitual thoughts and behaviors are automatically activated by features of the surrounding context, independent of the (conscious) goals that people set for themselves.

Implicit Memory

Research on automaticity reveals the role of unconscious *processes* in experience, thought, and action, but traditionally the percepts, memories, and thoughts generated by these processes are assumed to be accessible to phenomenal awareness. Evidence for unconscious mental *contents* emerged with studies comparing alternative measures of memory in amnesic patients and normal subjects. In priming effects, for example, presentation of a stimulus (the prime) such as *doctor* makes it easier for subjects to complete stems *doc___* or *nur___* with legal English words. In repetition priming, the target is physically similar to the prime. In semantic priming, the relationship between prime and target is based on meaning. According to Schacter 1987, explicit memory refers to recall or recognition; implicit memory refers to any change in behavior attributable to a past event. When priming occurs in the absence of recall or recognition, we say that implicit memory is dissociated from explicit memory. Implicit memory is not merely an indirect measure of memory: when priming and similar effects occur in the absence of conscious recall or recognition, they count as expressions of unconscious memory. It might have been preferable simply to distinguish between "conscious" and "unconscious" memory, but the explicit-implicit distinction avoided the psychoanalytic and other baggage with which the concept of "the unconscious" is freighted; and it is here to stay. Schacter 2019 summarizes the author's own research on implicit memory, and related topics, since his classic 1987 paper. Mitchell 2020 covers a broader swath of the same territory. Graf and Masson 1993 is a collection of early reviews of various aspects of implicit memory, and an update has been supplied in Kihlstrom, et al. 2017. The most popular theory of implicit memory, influenced by the neuroscientific doctrine of modularity, is that explicit and implicit memory are the products of separate memory modules or systems in the brain: variants have been offered in Schacter, et al. 2000; Squire 2004; and Eichenbaum 2008. Reber 2013 and Kim 2019 review neuroimaging studies of the differential neural substrates of explicit and implicit memory. A competing view assumes that there is only a single memory system but that implicit and explicit memory differ in terms of the processes involved: variants have been proposed in Mandler 1980; Jacoby 1991 (cited under Automaticity); Roediger and McDermott 1993; Reder, et al. 2009; and in other works. "Hybrid" theories, such as those proposed in Henke 2010 and Cabeza and Moscovitch 2013, assume that different modes of processing are mediated by different brain systems. Most studies of implicit memory involve repetition priming: evidence that implicit memory extends to semantic priming challenges most popular theories. Even though explicit and implicit memory are dissociable, Yonelinas, et al. 2010 reviews mounting evidence that both amnesic patients and forgetful subjects can capitalize on the feeling of familiarity associated with priming to enhance their performance on explicit memory tests.

Cabeza, R., and M. Moscovitch. 2013. Memory systems, processing modes, and components: Functional neuroimaging evidence. *Perspectives on Psychological Science* 8.1: 49–55.

Synthesis of “memory systems” and “processing” views of memory: memory is regulated by a large number of processing components, each associated with a different brain module or system.

Eichenbaum, H. 2008. *Memory systems*. Edited by J. H. Byrne. 4 vols. New York: Elsevier.

The medial temporal lobe, including the hippocampus, is critical for performance on explicit memory tasks. Offers a “relational processing” theory that the hippocampus is critical for encoding arbitrary or accidental relations between the features of a to-be-remembered event. Explicit memory typically depends on relational processing, while implicit memory typically does not.

Graf, P., and M. E. J. Masson, eds. 1993. *Implicit memory: New directions in cognition, development, and neuropsychology*. Hillsdale, NJ: Erlbaum.

Collects authoritative articles extending and updating Schacter 1987; especially good on developmental aspects of implicit memory, which is a topic still largely unexplored.

Henke, K. 2010. A model for memory systems based on processing modes rather than consciousness. *Nature Reviews Neuroscience* 11:523–532.

Another “hybrid” theory, suggesting that three different processing modes are each associated with a different brain system; the extent of explicit-implicit dissociations will depend on the brain system(s) involved in each task.

Kihlstrom, J. F., J. Dorfman, and L. Park. 2017. Conscious and unconscious memory. In *Blackwell companion to consciousness*. 2d ed. Edited by S. Schneider and M. Velmans, 562–575. Oxford: Wiley.

Update of the literature on implicit memory, including the several varieties of multiple- and single-memory theories of explicit-implicit dissociations. Argues that, far from being independent (as implied by some multiple-systems views), implicit memory can contribute to performance on explicit memory tasks.

Kim, H. 2019. Neural correlates of explicit and implicit memory at encoding and retrieval: A unified framework and meta-analysis of functional neuroimaging studies. *Biological Psychology* 145:96–111.

Encoding explicit and implicit memories involves much the same brain regions, while there are only modest overlaps between the regions involved in retrieval of the two types of memories.

Mandler, G. 1980. Recognizing: The judgment of previous occurrence. *Psychological Review* 87.3: 252–271.

Mandler, G. 1980. Recognizing: The judgment of previous occurrence. *Psychological Review* 87.3: 252–271.

Written before the explicit-implicit distinction was formalized, Mandler offers a dual-process theory of recognition memory with implications for the explicit-implicit distinction: implicit memory occurs by virtue of the automatic activation of preexisting memory structures at the time of encoding; explicit memory requires effortful elaboration, creating new relations among activated structures.

Mitchell, D. B. 2020. The charming quirks of implicit memory. In *Memory quirks: The study of odd phenomena in memory*. Edited by A. M. Cleary and B. L. Schwartz, 101–113. New York and Abingdon, UK: Routledge.

Reviews the literature on implicit memory from the seventeenth century(!) into the twenty-first, with an emphasis on experimental studies published beginning in the 1980s.

Reber, P. J. 2013. The neural basis of implicit learning and memory: A review of neuropsychological and neuroimaging research. *Neuropsychologia* 51.10: 2026–2042.

The neural substrate of explicit memory is to be found in the medial temporal-lobe memory system (MTL). By contrast, the neural correlates of implicit memory appear to be dispersed widely throughout the cerebral cortex, depending on the precise requirements of the task.

Reder, L. M., H. Park, and P. D. Kieffaber. 2009. Memory systems do not divide on consciousness: Reinterpreting memory in terms of activation and binding. *Psychological Bulletin* 135:23–49.

Comprehensive review of literature on priming and other effects often labeled as “implicit memory.” While the explicit-implicit distinction divides memory tests based on consciousness, argues that the more appropriate division is based on whether the test requires relational processing. Explicit memory requires the formation of new associations, while implicit memory does not.

Roediger, H. L., and K. B. McDermott. 1993. Implicit memory in normal human subjects. In *Handbook of neuropsychology*. Edited by F. Boller and J. Grafman, 63–131. Amsterdam: Elsevier Science.

Focuses on explicit-implicit dissociations observed in neurologically intact subjects, and offers an interpretation of explicit-implicit dissociations in terms of transfer-appropriate processing. Explicit and implicit memory are dissociated when one task (typically, the implicit test) depends on “perceptually driven” processing and the other (typically the explicit test) depends on “conceptually driven” processing.

Schacter, D. L. 1987. Implicit memory: History and current status. *Journal of Experimental Psychology: Learning, Memory, and Cognition* 13:501–518.

Seminal paper on implicit memory, defining the phenomenon and reviewing relevant research, leading to an interpretation of explicit-implicit dissociations in terms of dissociable memory systems in the brain.

Schacter, D. L. 2019. Implicit memory, constructive memory, and imagining the future: A career perspective. *Perspectives on Psychological Science* 14.2: 256–272.

Summarizes Schacter's research on implicit memory, which combined behavioral, neuropsychological, and neuroscientific approaches.

Schacter, D. L., A. D. Wagner, and R. L. Buckner. 2000. Memory systems of 1999. In *Oxford handbook of memory*. Edited by E. Tulving and F. I. M. Craik, 627–643. New York: Oxford Univ. Press.

Updates the "memory systems" view of explicit-implicit dissociations.

Squire, L. R. 2004. Memory systems of the brain: A brief history and current perspective. *Neurobiology of Learning & Memory* 82.3: 171–177.

Offers another "memory systems" view of explicit-implicit dissociations. Note, however, that Squire favors the label "nondeclarative" over Schacter's original "implicit"—potentially confusing the explicit-implicit distinction with the distinction between declarative and procedural knowledge.

Yonelinas, A. P., M. Aly, W.-C. Wang, and J. D. Koen. 2010. Recollection and familiarity: Examining controversial assumptions and new directions. *Hippocampus* 20:1178–1194.

Comprehensive review of evidence suggesting that explicit and implicit memory may be produced by independent memory systems. But they can nonetheless interact, as when subjects strategically use the feeling of familiarity that accompanies priming effects to improve performance on recognition tests.

Implicit Perception

By analogy with implicit memory, implicit perception refers to the influence of events in the current stimulus environment that cannot be consciously perceived. The most familiar example is subliminal perception, a literature comprehensively reviewed in Dixon 1981. The term was coined in Kihlstrom, et al. 1992 because there are many examples of unconscious perception where the stimulus is not truly subliminal. The newer term also avoids methodological controversies over the details of threshold-setting procedures and focuses attention on whether the stimulus is consciously perceptible. In implicit memory, the prime is consciously perceived at the time of presentation but not consciously remembered afterward; in implicit perception, the prime is not consciously perceived to begin with. Because perception is not complete until the stimulus has been identified and classified, the ultimate test of implicit perception is semantic priming—evidence that the stimulus has been processed for meaning, not just for physical structure. Blake 2021 reflects on C. W. Eriksen's influential critique of the early literature on unconscious perception and learning. Vadillo, et al. 2022 offers a contemporary version of that critique. Interest in "subliminal" perception was revived by Marcel 1983a and Marcel 1983b, whose observation of "masked" semantic priming were confirmed in Cheesman and Merikle 1984 and Greenwald, et al. 1996, among many other works. Beyond subliminal, masked, and other forms of preconscious priming, implicit perception includes blindsight, analyzed in Weiskrantz 1986 and de Gelder, et al. 2001. Phillips 2021 offers a critical view of blindsight. Young 1998 discusses unconscious perception in prosopagnosia and other pathologies of face recognition. Logie 2013 does the same for unilateral neglect and other neurological disorders of attention. Mack and Rock 1998 finds evidence for semantic priming in inattentional blindness, and Rensink 2013 reviews evidence for priming in various forms of attentional blindness such as repetition blindness, the attentional blink, and change blindness. Kihlstrom and Cork 2017 discusses the most extreme case of implicit perception—priming by stimuli presented to surgical patients during general anesthesia. There may be no conscious perception without attention, but attention apparently does not guarantee conscious perception, either. Still, the meaning of unperceived events may be processed unconsciously, outside awareness. Subliminal perception occurs, but in most cases it is analytically limited and its effects typically do not last very long.

Blake, R. 2021. Reflections on Eriksen's seminal essay on discrimination, performance and learning without awareness. *Attention, Perception, & Psychophysics* 83:546–557.

Presents an appreciation of C. W. Eriksen's classic 1960 critique of the literature on subliminal perception and learning without awareness, an analysis of more recent methodological critiques along the same lines, and its continuing relevance for current work on unconscious processing.

Cheesman, J., and P. M. Merikle. 1984. Priming with and without awareness. *Perception & Psychophysics* 36:387–395.

Demonstrates masked priming in the "subliminal Stroop" paradigm. Distinguishes between the subjective threshold, below which there is no conscious awareness of a stimulus, and the objective threshold, below which there is no discriminative response to the stimulus.

de Gelder, B., E. H. F. de Haan, and C. A. Heywood, eds. 2001. *Out of mind: Varieties of unconscious processes*. London: Oxford Univ. Press.

Festschrift honoring Lawrence Weiskrantz, who first documented "blindsight" in a brain-damaged patient, marshaling evidence for unconscious processing in a wide variety of domains, including vision, audition, memory, emotion, and action.

Dixon, N. F. 1981. *Preconscious processing*. Chichester, UK: Wiley.

Updates Dixon's *Subliminal Perception: The Nature of a Controversy* (1971) classic, comprehensive review of the literature on subliminal perception, reflecting a broader view of unconscious perception, beyond the narrow definition of "subliminal."

Greenwald, A. G., S. C. Draine, and R. L. Abrams. 1996. Three cognitive markers of unconscious semantic activation. *Science* 273:1699–1702.

Summarizes rigorous studies employing subliminal (actually masked) affective priming in studies that solve the "threshold bugaboo" once and for all. Also discusses cognitive limitations on subliminal perception.

Kihlstrom, J. F., and R. C. Cork. 2017. Anesthesia and consciousness. In *Blackwell companion to consciousness*. 2d ed. Edited by S. Schneider and M. Velmans, 682–694. Chichester, UK: Wiley.

Discusses evidence for implicit perception in general anesthesia and conscious sedation.

Kihlstrom, J. F., T. M. Barnhardt, and D. J. Tataryn. 1992. Implicit perception. In *Perception without awareness: Cognitive, clinical, and social perspectives*. Edited by R. F. Bornstein and T. S. Pittman, 17–54. New York: Guilford.

Introduced the term “implicit perception” as a broader alternative to “subliminal,” with coverage of sensory-perceptual disorders associated with hypnosis and the conversion (“hysterical”) disorders.

Logie, R. H. 2013. Disorders of attention. In *Oxford handbook of cognitive psychology*. Edited by D. Reisberg, 131–146. New York: Oxford Univ. Press.

Reviews research on impairments in visual consciousness observed in brain-damaged patients, such as unilateral spatial neglect, including evidence for unconscious perception of stimuli presented in the neglected portion of space.

Mack, A., and I. Rock. 1998. *Inattentional blindness*. Bradford Book Series in Cognitive Psychology. Cambridge, MA: MIT Press.

Describes a program of research on inattentional blindness, in which subjects do not detect supraliminal stimuli because their attention is focused on another portion of the visual field. Conclusion: conscious perception cannot occur in the absence of attention.

Marcel, A. J. 1983a. Conscious and unconscious perception: Experiments on visual masking and word recognition. *Cognitive Psychology* 15:197–237.

The study that revived interest in “subliminal” perception. Clearly demonstrated masked semantic priming in a lexical decision task: subjects were quicker to identify targets (e.g., *nurse*) as legal words when they were preceded by a semantically related word (e.g., *doctor*), even though a masking stimulus prevented them from being consciously aware of the prime.

Marcel, A. J. 1983b. Conscious and unconscious perception: An approach to the relations between phenomenal experience and perceptual processes. *Cognitive Psychology* 15:238–300.

Lays out Marcel’s theory of the relations between conscious and unconscious perceptual processes.

Phillips, I. 2021. Blindsight is qualitatively degraded conscious vision. *Psychological Review* 128.3: 558–584.

Drawing on signal-detection theory as well as subjective reports, argues that blindsight is not a case of unconscious visual processing.

Rensink, R. A. 2013. Perception and attention. In *Oxford handbook of cognitive psychology*. Edited by D. Reisberg, 97–116. New York: Oxford Univ. Press.

Reviews research on what might be called “attentional” (as opposed to “inattentional” blindness. In cases of attentional blindness, such as repetition blindness, the attentional blink, and change blindness, perceivers are unaware of stimuli presented within their field of attention. In some cases, there is evidence of priming effects of the stimuli in question.

Vadillo, M. A., S. Mallejka, D. Y. Lee, Z. Dienees, and D. R. Shanks. 2022. Raising awareness about measurement error in research on unconscious mental processes. *Psychonomic Bulletin & Review* 29.1: 21–43.

Argues that apparent dissociations between conscious and unconscious processing, as in subliminal perception, are artifacts of low reliability and other poor psychometric properties of the measures involved.

Weiskrantz, L. 1986. *Blindsight: A case study and implications*. Oxford: Oxford Univ. Press.

Classic case study of Patient RB, who lost a portion of his visual field from damage to his striate cortex but nevertheless was able to make better-than-chance judgments about many properties of visual stimuli.

Young, A. W., ed. 1998. *Face and Mind*. New York: Oxford Univ. Press.

Anthology collecting research on various aspects of face perception and recognition, including prosopagnosia and other forms of “face-blindness.”

Implicit Learning

Apparently, subjects can also learn unconsciously, in the sense that they can acquire new knowledge that affects their ongoing experience, thought, and action, even though they are not aware of what they have learned. Pioneering studies such as Reber 1967, which introduces the term, show that subjects can pick up on the “grammar” by which meaningless strings of letters have been arranged. This permits them to discriminate between grammatical and ungrammatical letter strings, even though they cannot articulate the grammar itself. Greenwald and de Houwer 2017 offers a carefully controlled demonstration of conditioning without awareness. Smith and Church 2018 explores the implications of the explicit-implicit distinction for understanding learning and behavior in nonhuman animals. Reber 1993 and Berry and Dienes 1993 offer comprehensive overviews of implicit learning while describing their own research programs. Similar effects have been observed in a number of different paradigms, including categorization, the detection of covariation, sequence learning, and the control of complex systems. Stadler and Frensch 1998 is a valuable anthology offering reviews of empirical, methodological, and theoretical aspects of implicit learning. Implicit learning is sometimes classified as a special case of implicit memory, but there is an important difference. Implicit memory is an unconscious expression of episodic memory, while implicit learning covers abstract, context-free semantic and procedural knowledge. In implicit memory, subjects do not consciously remember the experiences that give rise to priming and other effects. In source amnesia—a variant on implicit memory studied in Evans and Thorne 1966; Schacter, et al. 1984; and in other works—subjects are aware of knowledge they have recently acquired, but cannot consciously remember the learning experience. In implicit learning, subjects remember the learning experiences, but are not aware of knowledge acquired from them. Nevertheless, this newly acquired knowledge influences their performance on various tasks. Shanks 2017 marshals conceptual and methodological criticisms of this literature (and the literature on implicit perception as well). In contrast to memory and perception, it is not easy to equate the informational value of the cues provided for the explicit and implicit tests of learning—in which case apparent dissociations can emerge as artifacts of test differences in cues or difficulty. Wagenmakers, et al. 2012 reviews the problems with statistical interactions (which is what explicit-implicit dissociations are) and how they can be addressed. Even if implicit learning were to be satisfactorily demonstrated to be unconscious, there remains the question of just what is learned in implicit learning. Most accounts of the artificial-grammar paradigm, for example, assume that subjects unconsciously acquire procedural knowledge, which guides their grammaticality judgments. An alternative view is that they acquire something like a prototype of a grammatical string, which would be a piece of declarative knowledge. Perruchet and Pacteau 1990 reports experimental findings consistent with this proposal. Seger 1994 and

Perruchet and Pacton 2006 offer good theoretical overviews.

Berry, D. C., and Z. Dienes. 1993. *Implicit learning: Theoretical and empirical issues*. Hove, UK: Erlbaum.

Comprehensive coverage of various aspects of implicit learning, framed by the authors' own programmatic research.

Evans, F. J., and W. A. F. Thorne. 1966. Two types of posthypnotic amnesia: Recall amnesia and source amnesia. *International Journal of Clinical and Experimental Hypnosis* 14.2: 162–179.

An early experimental demonstration of source amnesia.

Greenwald, A. G., and J. de Houwer. 2017. Unconscious conditioning: Demonstration of existence and difference from conscious conditioning. *Journal of Experimental Psychology: General* 146.12: 1705–1721.

Convincing demonstration of conditioning with subliminal conditioned stimuli. Unlike conscious conditioning, unconscious conditioning occurred only when the interval between conditioned and unconditioned stimuli is very brief.

Perruchet, P., and C. Pacteau. 1990. Synthetic grammar learning: Implicit rule abstraction or explicit fragmentary knowledge. *Journal of Experimental Psychology: General* 119.3: 264–275.

Reports experiments suggesting that rather than reflecting unconscious procedural knowledge, successful performance on the artificial-grammar task is mediated by conscious but fragmentary knowledge of smaller legal letter combinations.

Perruchet, P., and S. Pacton. 2006. Implicit learning and statistical learning: One phenomenon, two approaches. *Trends in Cognitive Sciences* 10.5: 233–238.

Argues that implicit learning and other forms of "incidental" learning are special cases of a domain-general "statistical" learning mechanisms.

Reber, A. S. 1967. Implicit learning of artificial grammars. *Journal of Verbal Learning & Verbal Behavior* 6:855–863.

Long before the explicit-implicit distinction was applied to memory, Reber introduced "implicit learning" to psychological research and theory.

Reber, A. S. 1993. *Implicit learning and tacit knowledge: An essay on the cognitive unconscious*. Oxford: Oxford Univ. Press.

Provides a comprehensive overview of relevant research and argues that implicit learning is an evolutionarily prior, and extremely powerful, mode of learning.

Schacter, D. L., J. L. Harbluk, and D. R. McClachlan. 1984. Retrieval without recollection: An experimental analysis of source amnesia. *Journal of Verbal Learning and Verbal Behavior* 23:593–611.

First observed in hypnosis by F. J. Evans, and subsequently observed in cases of “organic” amnesia as well, source amnesia occurs when a person retains conscious access to declarative and procedural knowledge but cannot consciously remember the episodic circumstances under which that knowledge was acquired.

Seger, C. A. 1994. Implicit learning. *Psychological Bulletin* 115:163–196.

Comprehensive, succinct overview of methods and theories concerning implicit learning.

Shanks, D. R. 2017. Regressive research: The pitfalls of post hoc data selection in the study of unconscious mental processes. *Psychonomic Bulletin & Review* 24:752–775.

Argues that many experiments ostensibly demonstrating unconscious perception and learning are vulnerable to methodological and statistical artifacts such as regression to the mean.

Smith, J. D., and B. A. Church. 2018. Dissociable learning processes in comparative psychology. *Psychonomic Bulletin & Review* 25.5: 1565–1584.

Explores the implications of the explicit-distinction for understanding learning and other aspects of behavior in nonhuman animals.

Stadler, M. A., and P. A. Frensch, eds. 1998. *Handbook of implicit learning*. Thousand Oaks, CA: SAGE.

Anthology collecting authoritative reviews of various aspects of implicit learning: its nature, proper methods for investigation, and unresolved theoretical issues.

Wagenmakers, E.-J., A.-M. Kryptopos, A. H. Criss, and G. Iverson. 2012. On the interpretation of removable interactions: A survey of the field 33 years after Loftus. *Memory & Cognition* 40:145–160.

In statistical terms, explicit-implicit dissociations are two-way interactions, and these can be misleading unless the explicit and implicit tests are equated for potentially confounding variables such as task difficulty. This paper updates the argument, initially made by Loren and Jean Chapman (*Psychological Bulletin*, 1973) and Geoffrey Loftus (*Memory & Cognition*, 1978).

Implicit Thought

Again by analogy to implicit memory, Kihlstrom, et al. 1996 defines implicit thought as the influence of an internally generated idea (or image) on experience, thought, or action in the absence of conscious awareness of that thought. In the case of implicit thought, the source of the unconscious influence on task performance is neither a percept (i.e., a mental representation of some event in the current stimulus environment) nor a memory (i.e., a representation of some event in the past). Instead, it is something internally generated by the subject, albeit outside of conscious awareness: an idea (or perhaps an image). While it is certainly possible to construct situations where intuitions can lead us astray, in the ordinary course of everyday living it appears that intuitions can be rational guides to appropriate choice. The idea of unconscious thinking is inspired by a large corpus of anecdotes from mathematics and science, such as Kekule's discovery of the structure of the benzene molecule. Wallas 1926 proposes an influential model of problem solving and creativity in which intuition and incubation lead to insight, but some research led to skepticism concerning the validity of intuitions. But research reviewed in Sio and Ormerod 2009 casts doubt on the very existence of incubation. Interest in intuition was revived with a series of studies, with Bowers, et al. 1990 showing that subjects could predict which verbal problems had correct solutions without being aware of the solutions themselves. In addition, Dijksterhuis and Aarts 2010, Topolinski 2011, Kounios and Beeman 2014, and other works show that the unachieved solutions primed performance on other tasks. Bechara, et al. 1997 presents a similar result by recording anticipatory physiological responses during the Iowa Gambling Task. Myers 2002provides a balanced review of the intuition literature, while Lieberman 2000 views intuition in the framework of cognitive neuroscience. On the developmental side, Siegler 2000 shows that children who are learning to solve arithmetic problems show signs of shifting to a more efficient cognitive strategy before they are aware of having done so. Haidt 2001 implicates intuitive "gut feelings" in irrational (or, at least *non*-rational), emotion-based theories of moral reasoning. Banks 2021 analyzes the mechanisms by which unconscious thinking takes place. Much research interest has been stimulated by the Unconscious Thought Effect, in which unconscious (automatic, intuitive) thinking is superior to conscious (deliberate, rational) thought. This literature is reviewed in Abadie and Waroquier 2019 and in Strick, et al. 2011, and by the contributors to Engel and Singer 2008.

Abadie, M., and L. Waroquier. 2019. Evaluating the benefits of conscious and unconscious thought in complex decision making. *Policy Insights from the Behavioral & Brain Sciences* 6.1: 72–78.

Discusses the circumstances under which reliance on unconscious, intuitive judgements are superior to conscious deliberation.

Banks, A. P. 2021. Mechanisms of unconscious thought: Capacities and limits. *Journal of Mind & Behavior* 42.3–4: 317–346.

Surveying the literature across a wide variety of domains, concludes that unconscious thinking is mediated by three mechanisms: automatic processing, association, spreading activation in memory networks.

Bechara, A., H. Damasio, D. Tranel, and A. R. Damasio. 1997. Deciding advantageously before knowing the advantageous strategy. *Science* 275:1293–1295.

In a study employing the Iowa Gambling Task, both normal subjects and patients with bilateral damage to ventromedial prefrontal cortex showed differential galvanic skin responses to advantageous and risky choices before they reported conscious insight into the best strategy. These physiological cues predicted the performance of the normal subjects but not the patients, suggesting that prefrontal cortex mediates response to unconscious physiological cues.

Bowers, K. S., G. Regehr, C. Balthazard, and K. Parker. 1990. Intuition in the context of discovery. *Cognitive Psychology* 22:72–110.

Revived research on intuition by showing that subjects could guess which of two verbal problems, similar to those presented on the Remote Associates Test (RAT), had a correct solution, even though they did not know what the solution was.

Dijksterhuis, A., and H. Aarts. 2010. Goals, attention, and (un)consciousness. *Annual Review of Psychology* 61:467–490.

Reviews a substantial body of research stimulated by Bowers, et al. 1990, indicating that thinking can proceed unconsciously even though it requires attention and a goal-directed mental set.

Engel, C., and W. Singer, eds. 2008. *Better than conscious? Decision making, the human mind, and implications for institutions*. Cambridge, MA: MIT Press.

Anthology explores the advantages and disadvantages of intuitive versus deliberate thinking. Pays particular attention to real-world contexts, such as jury decision making.

Haidt, J. 2001. The emotional dog and its rational tail: A social intuitionist approach to moral judgment. *Psychological Review* 108.4: 814–834.

Argues, from responses to the “Trolley Problem” and other evidence, that moral judgments are shaped by unconscious, automatic, emotional responses to the situation.

Kihlstrom, J. F., V. A. Shames, and J. Dorfman. 1996. Intimations of memory and thought. In *Implicit memory and metacognition*. Edited by L. M. Reder, 1–23. Mahwah, NJ: Erlbaum.

Integrates Bowers’s revival of intuition with Wallas’s stage model of problem solving. Contains a summary of Shames’s (1994) doctoral dissertation, which demonstrated unconscious semantic priming by RAT-like items and laid the foundation for many subsequent studies of intuitive thinking. Much the same material is covered by Dorfman, Shames, and Kihlstrom in “Intuition, Incubation, and Insight: Implicit Cognition in Problem Solving,” in G. Underwood, ed., *Implicit cognition* (Oxford: Oxford University Press, 1996).

Kounios, J., and M. E. Beeman. 2014. The cognitive neuroscience of insight. *Annual Review of Psychology* 65:71–93.

Solving RAT-like problems benefits from right hemisphere activation of a coarse semantic network, leading to unconscious semantic processing that, while unconscious, is nonetheless contingent on adopting a problem-solving mental set.

Lieberman, M. D. 2000. Intuition: A social cognitive neuroscience approach. *Psychological Bulletin* 126.1: 109–137.

Links intuition to implicit learning processes and reviews neuropsychological and brain-imaging research indicating that the neural substrates of both are to be found in the basal ganglia.

Myers, D. G. 2002. *Intuition: Its powers and perils*. New Haven, CT: Yale Univ. Press.

Balanced coverage of the promise and perils of intuitive thinking.

Siegler, R. S. 2000. Unconscious insights. *Current Directions in Psychological Science* 9.3: 79–83.

Showed that elementary-school children achieved insight into the solution of an arithmetic problem before they were able to report the solution.

Sio, U. N., and T. C. Ormerod. 2009. Does incubation enhance problem solving? A meta-analytic review. *Psychological Bulletin* 135.1: 94–120.

Quantitative review of 117 independent studies, covering a wide variety of problems, confirming a positive effect of incubation, particularly on divergent-thinking tasks.

Strick, M., A. Dijksterhuis, M. W. Bos, A. Sjoerdsma, R. B. van Baaren, and L. F. Nordgren. 2011. A meta-analysis on unconscious thought effects. *Social Cognition* 29.6: 738–762.

Reviews early research establishing boundary conditions on the Unconscious Thought Effect, in which unconscious (automatic, intuitive) thought is (sometimes) superior to conscious (deliberate) thought.

Topolinski, S. 2011. A process model of intuition. *European Review of Social Psychology* 22.1: 274–315.

Considering a wide variety of tasks, supports a model of intuition in which both priming-related processing fluency and a spurt of positive affect play a role in having, and acting on, intuitions.

Wallas, G. 1926. *The art of thought*. New York: Harcourt Brace.

A classic of the literature on thinking, describing five steps in problem-solving and creativity: preparation prior to the problem; intimation (intuition) about the correct solution; incubation as the solution rises to the threshold of consciousness; illumination (insight) as the solution crosses that threshold; and verification that the insight is, indeed, correct.

Implicit Emotion

Implicit memory, perception, learning, and thinking comprise the cognitive unconscious. Hilgard 1980 points out that, in addition to cognitive states of knowledge and belief, mental life also includes emotional and motivational states—raising the question of whether these, too, can operate unconsciously. LeDoux 2000 proposes a neuroscientific model of emotion in which conscious emotional states can be automatically and unconsciously elicited by relevant stimulus events. Feldman Barrett, et al. 2005 reviews evidence that

conscious emotions can also occur as expressions of implicit perception and memory. Although unconscious emotion seems to some theorists to be a contradiction in terms, as explored in Clore and Ortony 2000 and Ortony 2022, Lang 1968 proposes that, in principle, every emotional state has three components: the subjective feeling, the physiological correlate, and the behavioral expression. Usually these components vary together, but Rachman and Hodgson 1974 argues that various desynchronies among them can be observed in certain clinical syndromes. Kring and Mote 2016 reviews a great deal of evidence for such desynchronies in various forms of mental illness. Kihlstrom, et al. 2000 argues that unconscious (implicit) emotion entails desynchronies (dissociations) between explicit emotion, defined as the subjective feeling state, and implicit emotion, defined as the overt behavioral or covert physiological components. Winkielman and Berridge 2004 makes the case for unconscious emotion on different grounds. Cameron, et al. 2012 reviews evidence that measures of individual differences in affective priming can serve as measures of unconscious social attitudes, which have an emotional component by definition. Banaji and Greenwald 2013 offers the Implicit Association Test (IAT) as a reaction-time measure that can reveal prejudices and other attitudes that subjects are not aware of harboring. Nosek 2007 reviews evidence that the correlations between explicit and implicit measures of the same attitude are relatively low—although they are still high enough to question whether the attitudes measured by the IAT are truly unconscious. Greenwald, et al. 2022 provides an up-to-date survey of the literature on the IAT, while Greenwald and Lai 2020 provides a comprehensive analysis of “implicit social cognition” (which typically has an attitudinal/emotional component). Unfortunately, assessments of explicit and implicit attitudes and other emotional states are so different in character as to question whether discrepancies between them might be artifacts of differences in cues or task difficulty. Both affective priming and the IAT are beset by a number of potentially confounding variables. Arkes and Tetlock 2004, Kihlstrom 2004, and Schimmack 2021 review theoretical and methodological considerations that question whether they really measure unconscious attitudes (as opposed to unobtrusive measures of conscious attitudes), or even if they are measurements of attitudes at all. Moreover, as noted in Automaticity in Social, Personality, and Clinical Psychology, some of the most provocative demonstrations of unconscious processes in emotion have proved difficult to replicate in independent laboratories. For these reasons, “implicit emotion” represents a plausible, but not firmly proven, construct.

Arkes, H. R., and P. E. Tetlock. 2004. Attributions of implicit prejudice, or “Would Jesse Jackson ‘fail’ the Implicit Association Test?” *Psychological Inquiry* 15:257–321.

Critical analysis of the IAT and similar measures, suggesting that responses may reflect knowledge of cultural stereotypes rather than prejudice, explicit or implicit.

Banaji, M. R., and A. G. Greenwald. 2013. *Blindspot: Hidden biases of good people.* New York: Delacorte.

Popular-press argument in favor of implicit prejudice, written by the leaders of the team who devised the IAT.

Cameron, C. D., J. L. Brown-Iannuzzi, and B. K. Payne. 2012. Sequential priming measures of implicit social cognition: A meta-analysis of associations with behavior and explicit attitudes. *Personality & Social Psychology Bulletin* 16.4: 330–350.

Comprehensive review of studies of priming measures of stereotypes, attitudes, and prejudice.

Clore, G. L., and A. Ortony. 2000. Cognition in emotion: Always, sometimes, or never? In *Cognitive neuroscience of emotion.* Edited by R. D. Lane and L. Nadel, 24–61. New York: Oxford Univ. Press.

Argues, from a cognitive point of view, that emotions reflect appraisals of the situations that elicit them. Because these appraisals are presumably conscious, the authors reject presumptive evidence for unconscious emotions.

Feldman Barrett, L., P. M. Niedenthal, and P. Winkielman, eds. 2005. *Emotion and consciousness*. New York: Guilford.

Anthology covering a wide variety of research programs concerned with conscious and unconscious emotion.

Greenwald, A. G., M. Brendl, H. Cai, et al. 2022. Best research practices for using the Implicit Association Test. *Behavior Research Methods* 54:1161–1180.

A collaborative effort involving a large number of users of the procedure, summarizes what is known about the IAT, its uses, and the conclusions that can be drawn from subjects' scores.

Greenwald, A. G., and C. K. Lai. 2020. Implicit social cognition. *Annual Review of Psychology* 71:419–445.

Because social interactions typically have an attitudinal component, the term "social cognition" is often construed to cover emotion as well. This article reviews the literature on the IAT and other topics.

Hilgard, E. R. 1980. The trilogy of mind: Cognition, affection, and conation. *Journal for the History of the Behavioral Sciences* 16:107–117.

Reflections on the classic tripartite distinction of mental functions: cognition, emotion, and motivation.

Kihlstrom, J. F. 2004. Implicit methods in social psychology. In *The SAGE handbook of methods in social psychology*. Edited by C. Sansone, C. C. Morf, and A. T. Panter, 195–212. Thousand Oaks, CA: SAGE.

Presents an overview of the use of priming measures and the Implicit Association Test to measure unconscious attitudes and other constructs relevant to implicit emotion, along with a conceptual and methodological concerns.

Kihlstrom, J. F., S. Mulvaney, B. A. Tobias, and I. P. Tobis. 2000. The emotional unconscious. In *Cognition and emotion*. Edited by E. Eich, J. F. Kihlstrom, G. H. Bower, J. P. Forgas, and P. M. Niedenthal, 30–86. New York: Oxford Univ. Press.

Introduces the concept of "implicit emotion," defined as a dissociation between the subjective, experiential component of emotion and the behavioral and/or physiological components.

Kring, A. M., and J. Mote. 2016. Emotion disturbances as transdiagnostic processes in psychopathology. In *Handbook of emotion*. 4th ed. Edited by L. F. Barrett, M. Lewis, and J. M. Haviland-Jones, 653–669. New York: Guilford.

Comprehensive review of emotion in various syndromes of mental illness, noting discrepancies between various components of emotion in schizophrenia.

Lang, P. J. 1968. Fear reduction and fear behavior: Problems in treating a construct. In *Research in psychotherapy*. Edited by J. M. Schlein, 90–103. Washington, DC: American Psychological Association.

Proposes an influential multicomponent view of emotion comprising subjective experience, behavioral expressions, and physiological changes, and calling for assessment of each component in diagnosis and treatment.

LeDoux, J. E. 2000. Emotion circuits in the brain. *Annual Review of Neuroscience* 23:155–184.

Reviews advances in affective neuroscience, including LeDoux's own neuroscientific theory of emotion (particularly fear), allowing for dissociations between various aspects of emotional experience and expression.

Nosek, B. A. 2007. Implicit-explicit relations. *Current Directions in Psychological Science* 16.2: 65–69.

Reviews results of many studies with the Implicit Association Test, showing relatively low correlations between explicit and implicit measures of social attitudes.

Ortony, A. 2022. Are all "basic emotions" emotions? A problem for the (basic) emotions construct. *Perspectives on Psychological Science* 17.1: 41–61.

Argues that some ostensibly "basic" emotions, such as surprise, do not really qualify as emotions. In the process, restates that emotions must be conscious, and critically analyzes some claims to the contrary.

Rachman, S., and R. E. Hodgson. 1974. I. Synchrony and desynchrony in measures of fear. *Behaviour Research & Therapy* 12:311–318.

Based on Lang's multicomponent view of emotion, proposes that in anxiety disorders the three components may become dissociated from each other.

Schimmack, U. 2021. Invalid claims about the validity of Implicit Association Tests by prisoners of the implicit social-cognition paradigm. *Perspectives on Psychological Science* 16.2: 435–442.

Continues the author's negative psychometric assessment of the IAT.

Winkielman, P., and K. C. Berridge. 2004. Unconscious emotion. *Current Directions in Psychological Science* 13.3: 120–123.

Briefly reviews arguments and evidence that "emotion" need not be confined to conscious feeling states.

Implicit Motivation

Again based on an analogy to implicit memory, implicit motivation may be defined as any change in experience, thought, or action attributable to a goal or motive, in the absence of conscious awareness of that motive. McClelland, et al. 1989, which coined the term, argues that motives themselves can be unconscious, such that people are not aware of the reasons they do what they do. In addition, Bargh 1990 argues that goals and motives can be automatically elicited by various environmental stimuli. Gollwitzer and Bargh 1996 provides extensive coverage of theories of automatically elicited goals and motives, while Pessiglione, et al. 2007 shows how motives can arise as expressions of implicit perception or memory. Schultheiss and Brunstein 2010 collects a number of articles on various aspects of implicit motivation. Kollner and Schultheiss 2014 reviews evidence that there are low correlations between “objective” assessments of motives by such means as self-report personality questionnaires, and “projective” assessments by means of such techniques as the Thematic Apperception Test or Picture-Story Exercise. Schultheiss and Kollner 2021 provides an updated overview of this literature. As with implicit learning and implicit emotion, however, there are substantial differences in how explicit and implicit motives are assessed: enough to raise the question of whether the typically low correlation between them indicates that they differ in terms of accessibility to consciousness or is simply a reflection of method variance. Thrash, et al. 2010 reviews these concerns. However, an experiment in Schultheiss, et al. 2009, which carefully matched the assessments of explicit and implicit motives, suggests that motives can be unconscious after all. However, as with other studies of priming and automaticity in social, personality, and clinical psychology, some of the most provocative demonstrations of unconscious processes in motivation have proved difficult to replicate in independent laboratories.

Bargh, J. A. 1990. Auto-motives: Preconscious determinants of social interaction. In *Handbook of motivation and cognition*. Edited by E. T. Higgins and R. M. Sorrentino, 93–130. New York: Guilford.

First statement of Bargh’s theory that goals and motives can be automatically determined by environmental stimuli and guide behavior outside awareness and voluntary control.

Gollwitzer, P. M., and J. A. Bargh, eds. 1996. *The psychology of action*. New York: Guilford.

Anthology of papers employing the concept of automaticity to integrate theories of motivation with advances in our understanding of social cognition.

Kollner, M. G., and O. C. Schultheiss. 2014. Meta-analytic evidence of low convergence between implicit and explicit measures of the needs for achievement, affiliation, and power. *Frontiers in Psychology: Personality & Social Psychology* 5:826.

Reviews evidence for the low correlations between explicit and implicit measurements of the three great social motives: achievement, affiliation/intimacy, and power.

McClelland, D. C., R. Koestner, and J. Weinberger. 1989. How do self-attributed and implicit motives differ? *Psychological Review* 96:690–702.

First statement of the idea that people can be unconscious of their motivational dispositions, and preliminary analysis of similarities and differences between explicit and implicit motives.

Pessiglione, M., L. Schmidt, B. Draganski, et al. 2007. How the brain translates money into force: A neuroimaging study of subliminal motivation. *Science* 316.5826: 904–906.

Demonstrates that muscular performance can be influenced by “subliminal” presentation of reward cues. Neuroimaging indicated that the effect is mediated by a network including the vetral pallidum and supplementary motor area.

Schultheiss, O. C., and M. G. Kollner. 2021. Implicit motives. In *Handbook of personality: Theory and research*. 3d ed. Edited by O. John and R. W. Robins, 385–410. New York: Guilford.

Reviews issues pertaining to the assessment of conscious and unconscious motives, and differences in their effects on individual and social behavior.

Schultheiss, O. C., D. Yankova, B. Dirlikov, and D. J. Schad. 2009. Are implicit and explicit motive measures statistically independent? A fair and balanced test using the Picture Story Exercise and a cue- and response-matched questionnaire measure. *Journal of Personality Assessment* 91.1: 72–81.

Important study confirming a dissociation between explicit and implicit motive measures employing tests equated for cue values.

Schultheiss, O. C., and J. C. Brunstein, eds. 2010. *Implicit motives*. Oxford: Oxford Univ. Press.

Anthology surveying various empirical and theoretical issues concerning implicit motivation.

Thrash, T. M., S. E. Cassidy, L. A. Maruskin, and A. J. Eliot. 2010. Factors that influence the relation between implicit and explicit motives: A general implicit-explicit congruence framework. In *Implicit motives*. Edited by O. Schultheiss and J. Brunstein, 308–340. Oxford: Oxford Univ. Press.

Reviews evidence on factors that moderate the relationship between explicit and implicit motive measures.

The Freudian Unconscious Revisited

Freud did not discover the unconscious—according to Hall 1912, the “iceberg metaphor” of the unconscious, commonly attributed to Freud, was coined by Fechner, inspired by Herbart, while Freud was still in short pants. However, Freud’s essentially Romantic view of unconscious mental life dominated Western culture in the twentieth century. The essay collection Roth 1998 celebrates this influence; the collection Crews 1998 is more critical. Shevrin 1992 compares and contrasts the Freudian and non-Freudian views of the unconscious. Rapaport 1942 provides an early overview of attempts to study repression and other emotional influences on memory in laboratory settings; Singer 1990 provides an update. The programmatic research efforts of Silverman, et al. 1982 and Shevrin, et al. 1996 to validate psychoanalytic theory both made use of subliminal perception methods. Westen 1998 is among those psychoanalytically inclined works that claim modern research on the cognitive unconscious validates Freud’s essential claims. But nothing in the research literature validates Freud’s specific claims about the repression of trauma. Freudian theory was at the root of the controversy, regrettably still with us, over “repressed” and

"recovered" memories of child sexual abuse and other traumas. Crews 1998 provides a critical view of the recovered memory literature, while Kihlstrom 1998 and Kihlstrom 2006 offer a formal definition of the "false memory syndrome." While Freud's notion of repressed memories reappearing as neurotic symptoms is consistent with what we know about implicit memory, there has never been any convincing evidence that traumatic memories are subject to repression; in fact, emotional arousal, whether positive or negative, tends to enhance memory. Wakefield 2018 reconstructs Freud's arguments in favor of the unconscious. Ffytche 2016 and Leuzinger-Bohleber, et al. 2017 provide updated views of unconscious mental life from the perspective of the broader psychoanalytic community. Despite efforts to bolster Freud with modern scientific psychology, psychoanalysis remains seriously flawed, both as a scientific theory of mind and behavior and as an approach to the treatment of mental illness. Macmillan 1997 offers a comprehensive analysis of classical Freudian psychoanalytic theory, while Crews 2017 offers a critical view of the early (prepsychoanalytic) Freud. What Ebbinghaus famously wrote of Hartmann's *Philosophy of the Unconscious*, we can also say about Freud's psychoanalysis: "Wherever the structure is touched, it falls apart" and "What is true is alas not new, the new not true." Although there are certain general aspects of Freudian "metapsychology" that are intuitively appealing to psychologists, Freud appears to have gotten every detail wrong: a worse success rate, someone once remarked, than could occur simply by chance.

Crews, F. C. 2017. *Freud: The making of an illusion*. New York: Metropolitan.

Drawing on archival sources, including recently released correspondence, Crews—a literature scholar who once embraced psychoanalytic theory as a vehicle for literary criticism, paints a devasting picture of Freud's misunderstanding, misrepresentation, and mendacity.

Crews, F. C., ed. 1998. *Unauthorized Freud: Doubters confront a legend*. New York: Viking.

Collects essays by critics of "the emptiness of Freud's claims and the whimsical nature of his interpretations" (p. xii), largely in response to the 1998–1999 exhibit celebrating Freud at the Library of Congress.

Ffytche, M. 2016. Sigmund Freud: Psychoanalysis and the unconscious. In *Routledge handbook of psychoanalysis in the social sciences and humanities*. Edited by N. A. Elliott and J. Prager, 13–30. Abingdon, UK, and New York: Routledge.

Explores shifting psychoanalytic views of the unconscious, both within Freud's own work and in later developments.

Hall, G. S. 1912. *Founders of modern psychology*. New York: Appleton.

Highly readable history of 19th-century scientific psychology, written by a student of both William James and Wilhelm Wundt. No mention of Freud, but a good chapter on Hartmann and his *Philosophy of the Unconscious* (1867).

Kihlstrom, J. F. 1998. Exhumed memory. In *Truth in memory*. Edited by S. J. Lynn and K. M. McConkey, 3–31. New York: Guilford.

Discusses research bearing on the current controversy (still with us) over "repressed" and "recovered" memories of child sexual abuse and other traumatic experiences. Offers a formal definition of the "false memory syndrome."

Kihlstrom, J. F. 2006. Trauma and memory revisited. In *Memory and emotion: Interdisciplinary perspectives*. Edited by B. Uttl, N. Ohta, and A. L. Siegenthaler, 259–291. Malden, NJ: Blackwell.

Updates the critical perspective on repressed and recovered memories of trauma offered in Kihlstrom 1998.

Leuzinger-Bohleber, M., S. Arnold, and M. Solms, eds. 2017. *The unconscious: A bridge between psychoanalysis and cognitive neuroscience*. Abingdon, UK, and New York: Routledge.

A collection of articles exploring the relations between clinical psychoanalysis and cognitive neuroscience, including the differences in their conceptions of unconscious mental life.

Macmillan, M. 1997. *Freud evaluated: The completed arc*. Cambridge, MA: MIT Press.

A monumental work in the history of science, Macmillan details the evolution of Freud's theory of personality, with special attention to the evidence that Freud himself cited in support of his ideas.

Rapaport, D. 1942. *Emotions and memory*. Baltimore, MD: Williams & Wilkins.

Classic discussion of experimental studies of the effects of emotion on memory. Reminds us that repression is not about forgetting the merely unpleasant but rather operates on memories of vital threats that cannot be reproduced in the laboratory.

Roth, M. S., ed. 1998. *Freud: Conflict and culture*. New York: Knopf.

Collection of essays published in conjunction with the exhibit of the same name mounted in 1998–1999 by the Library of Congress, exploring the impact of Freud on society and culture.

Shevrin, H. 1992. The Freudian unconscious and the cognitive unconscious: Identical or fraternal twins? In *Interface of psychoanalysis and psychology*. Edited by J. W Barron, M. N. Eagle, and D. L. Wolitzky, 313–316. Washington, DC: American Psychological Association.

Compares and contrasts the views of the unconscious in psychoanalysis and modern cognitive psychology, finding that the two are largely compatible with each other, particularly with respect to the "nonrepressed realm of the unconscious."

Shevrin, H., J. A. Bond, L. A. W. Brakel, R. K. Hertel, and W. J. Williams. 1996. *Conscious and unconscious processes: Psychodynamic, cognitive, and neurophysiological convergences*. New York: Guilford.

Describes an extensive research program employing neuroscientific methods, especially event-related potentials, to assess unconscious conflict and its relationship to symptoms.

Silverman, L. H., F. M. Lachman, and R. H. Milich. 1982. *The search for oneness*. New York: International Universities Press.

Presents a program of research exploring the positive and negative effects, on psychiatric patients and normal subjects, of subliminal presentations of the “symbiotic” stimulus *Mommy and I Are One*.

Singer, J., ed. 1990. *Repression and dissociation: Implications for personality theory, psychopathology, and health*. Chicago: Univ. of Chicago Press.

Contributions summarize recent research on repression, and the related (though different) topic of dissociation.

Wakefield, J. C. 2018. *Freud and philosophy of mind. Vol. 1, Reconstructing the argument for unconscious mental states*. Cham, Switzerland: Palgrave Macmillan.

Analyzes Freud’s philosophical (rather than strictly clinical) arguments for the reality of unconscious mental life, situating Freud’s work in the context of 19th-century philosophy of mind.

Westen, D. 1998. Unconscious thought, feeling, and motivation: The end of a century-long debate. In *Empirical perspectives on the psychoanalytic unconscious*. Edited by R. F. Bornstein and J. M. Masling, 1–44. Washington, DC: American Psychological Association.

Argues that modern (post-Freudian) psychoanalytic theory, stripped of its references to primitive sexual and aggressive urges, finds considerable support from laboratory studies of implicit memory and subliminal perception.

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