Memory Reconsolidation

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Memory Reconsolidation Blockade for Treating Substance Dependence Michelle Lonergan 2014 "Background: According to the pathological memory model of addiction, conditioned drug-related memories formed during repeated drug using episodes

underlie craving and the long-term propensity for addicted individuals to relapse, posing a formidable barrier to sustained recovery. However, reconsolidation theory suggests that the act of retrieval transiently destabilizes previously consolidate memories, during which time they can be pharmacologically manipulated prior to re-stabilizing back to long-term storage. Previous literature has revealed that the noradrenergic beta-blocker propranolol can reduce drug-seeking behaviour in rodents and craving in humans when administered in conjunction with the retrieval of drug-related memories. Reducing the strength of drug-related memories, and subsequent craving and relapse, would open the door to a novel treatment for addiction. Objective: In a feasibility study, we examined whether a memory reconsolidation blockade protocol previously designed by our laboratory for treating posttraumatic stress disorder can be successfully modified and implemented in a sample of treatment-seeking individuals with substance dependence. We further explored preliminary treatment effects. Methods: Eligible participants (18-65 years old) were randomized to receive six treatments of memory

reconsolidation blockade under propranolol or placebo, or to a treatment as usual only control condition. Memory reactivation was achieved by having participants read aloud to the investigator a personal drug-using narrative. One-week and 4-month post-treatment assessments were also performed. Feasibility outcome measures included evaluating recruitment and retention rates, the eligibility criteria, and protocol adherence. Secondary feasibility outcomes examined preliminary treatment effects, as measured by difference scores on self-report craving severity between the baseline and post-treatment assessments, and rates of relapse. Data Analysis: Feasibility outcomes are reported descriptively. Fisher's exact tests for categorical and independent t-tests for continuous baseline demographic and clinical variables were used to examine variables related to study dropout. For analysis of treatment effects, missing data was imputed using multiple imputation procedures, and independent t-tests were used to examine between-group differences on craving change between the baseline and post-treatment assessments. Relapse during the trial was dichotomized and compared between treatment groups. All

tests were two-tailed with alpha set at .05. Results: Although retention rates were comparable to what's currently observed in addiction treatment programs, recruitment remained difficult. However, the eligibility criteria were considered appropriate, and participants and research staff generally adhered to the protocol. Results from preliminary analyses of treatment effects revealed no significant between-group differences on change in subjective craving or relapse during the trial, despite propranolol treated participants tending to demonstrate slightly greater improvement. Conclusion: Despite finding no significant between-group differences, larger-scaled multi-center trials of disrupting memory reconsolidation to treat substance dependence using the described protocol are warranted, provided several procedural changes are implemented. The authors discuss ways to address potential methodological pitfalls in future studies. " --

Memory Reconsolidation

Satoshi Kida 2013-03-18

Memory retrieval is not a passive phenomenon. Recent studies have shown that memory retrieval initiates two opposite and dissociable processes: memory reconsolidation and extinction.

Reconsolidation acts to stabilize, whereas extinction tends to weaken, the expression of the original memory. This chapter reviews the regulation and mechanisms of reconsolidation and extinction and the current understanding of the relationship between the two.

Memory Reconsolidation and Computational Learning 2010 Memory models are central to Artificial Intelligence and Machine Learning, since memories hold knowledge and their updates are the heart of flexibility and adaptivity. Reconsolidation is a key process of human learning, modifying learned memories with new information. Reconsolidation has also been implicated in various disorders such as PTSD and OCD. Understanding the computational basis of reconsolidation is the focus of this work, as well as employing findings to create an improved memory methodology for a superior thinking machine. Through our research, we revealed basic principles of reconsolidation-like processes and included them in novel models. For the first time our neural memory models allow input dimension not to be constrained to a fixed size, similar to organic memory allocation for memories of

greater importance or increased detail. The total number of memories is, in a practical sense, unbounded. Furthermore, beyond the state of the art, our memory system has the ability to process on-line as objects change. These attributes may be very beneficial in psychological modeling. Significantly, we were able to employ our models as powerful engineering tools by using them to recognize and cluster realistic images during change and movement, and to track in highly dynamic environments.

Behavioral Neuroscience of Learning and Memory Robert E. Clark 2018-03-27 ‘Behavioral Neuroscience of Learning and Memory’ brings together the opinions and expertise of some of the world’s foremost neuroscientists in the field of learning and memory research. The volume provides a broad coverage of contemporary research and thinking in this field, focusing both on well established topics such as the medial temporal lobe memory system, as well as emerging areas of research such as the role of memory in decision making and the mechanisms of perceptual learning. Key intersecting themes include the molecular and cellular mechanisms of memory formation, the multiplicity of

memory systems in the brain, and the way in which technological innovation is driving discovery. Unusually for a volume of this kind, this volume brings together research from both humans and animals—often relatively separate areas of discourse—to give a more comprehensive and integrated view of the field. The book will be of interest to both established researchers who wish to broaden their knowledge of topics outside of their specific areas of expertise, and for students who need a resource to help them make sense of the vast scientific literature on this subject.

Understanding Depression Yong-Ku Kim 2018-01-02 This book, in two volumes, focuses on contemporary issues and dilemmas in relation to depression. The aim is to equip readers with an up-to-date understanding of the clinical and neurobiological underpinnings of depression, the clinical manifestations, and the development of more effective treatments. This second volume is devoted specifically to clinical and management issues. Readers will find detailed information on a wide range of frequently encountered and more complicated clinical presentations, with examination of risk factors and links to other

conditions. Diagnostic aspects, including progress toward biological classification and the role of neuroimaging, are explored. Current trends in therapy are examined at length, drawing on the latest evidence and covering not only antidepressant medications but also the roles of neurostimulation, combined pharmacotherapy and psychotherapy, mindfulness-based cognitive therapy, and complementary and alternative medicine. The companion volume is dedicated to the underlying biomedical and neurobiological basis of depression. Understanding Depression will be an excellent source of information for both researchers and practitioners in the field.

Cognitive Sciences at the Leading Edge Miao-Kun Sun 2008 This new book focuses on new research on cognitive science which is most simply defined as the scientific study either of mind or of intelligence. It is an interdisciplinary study drawing from relevant fields including psychology, philosophy, neuroscience, linguistics, anthropology, computer science, biology, and physics. There are several approaches to the study of cognitive science. These approaches may be classified broadly as symbolic,

connectionist, and dynamic systems. Symbolic -- holds that cognition can be explained using operations on symbols, by means of explicit computational theories and models of mental (but not brain) processes analogous to the workings of a digital computer. Connectionist (subsymbolic) -- holds that cognition can only be modelled and explained by using artificial neural networks on the level of physical brain properties. Hybrid systems -- holds that cognition is best modelled using both connectionist and symbolic models, and possibly other computational techniques.

The River of Life Lars Clausen 2018-10-23 Do you see your life as a spiritual journey? Do you experience blocks on the path? THE RIVER OF LIFE offers insights and simple tools to free your life from reactivity and attachments. The book begins with an easy method to turn off your stress response in less than two minutes. Next learn how stored upsets from the past cause continuing stress in the present. THE RIVER OF LIFE then introduces you to the brain science of Memory Reconsolidation - how your brain actually stores and releases emotional memories. Based on this science, author Lars Clausen created THE ICE METHOD and has helped hundreds of people bring calm

and healing to both physical and emotional upsets. In THE RIVER OF LIFE, Clausen turns to the spiritual journey, offering this breakthrough process for moving through the roadblocks to our awareness. THE RIVER OF LIFE takes you on a journey of awareness through the river of your life - bringing calm to the patterns and reactivities that have stored in your experience of life. A simple, profound, and effective book for increasing calm and source awareness in your life.

Memory Reconsolidation

Jonathan L.C. Lee 2013-03-18

Memory reconsolidation is the process that serves to restabilize a memory that has been destabilized through memory retrieval. This retrieval-induced plasticity has been extensively studied in the hippocampus, among other neural loci. A focus on hippocampal memory reconsolidation, for contextual fear, pure contextual, and spatial memories, reveals interesting constraints on when a retrieved memory undergoes reconsolidation. Moreover, the emergence of dissociable mechanisms of hippocampal contextual fear memory consolidation and reconsolidation has allowed the demonstration that reconsolidation serves to update both the strength and

the content of hippocampal memories. This provides compelling evidence that, at least in the hippocampus, reconsolidation exists in order to modify memories. However, whether or not these hippocampal findings can be generalized to nonhippocampal memories remains to be determined.

Memory Reconsolidation

Michelle H. Lonergan

2013-03-18 Background: Considering the pivotal role of negative emotional experiences in the development and persistence of mental disorders, effectively interfering with the consolidation/reconsolidation of such experiences would open the door to a novel treatment approach in psychiatry. Objective: We assessed the current evidence regarding the capacity of the □-blocker propranolol to block the consolidation/reconsolidation of emotional memories by means of a meta-analytic review. Data sources: An extensive multilingual literature search from 1994 to 2011 yielded 189 potential articles. Study selection: Selected studies consisted of randomized, double-blind experiments assessing long-term memory for emotional material in adults and involving at least one propranolol and one placebo condition. Of 189 potential

studies, 13 consolidation (n = 310) and 9 reconsolidation (n = 327) experiments with adults met inclusion criteria for statistical analysis. Data extraction: Two independent reviewers extracted outcome and descriptive data from each study. Effect sizes were calculated using a random effects model. Data synthesis: Compared to placebo, propranolol given before memory consolidation reduced subsequent recall for negatively valenced stories, pictures, word lists, and the expression of cue-elicited fear responses: Hedge's g = 0.47, 95% CI = 0.22–0.72. Moreover, compared to placebo, propranolol before memory reconsolidation reduced subsequent recall for negatively valenced emotional words, as well as the expression of cue-elicited fear responses, g = 0.59, 95% CI = 0.16–1.01. Splitting the results according to episodic retention and physiological responding did not yield a significant difference in effect size for consolidation or reconsolidation blockade. Removing the clinical studies from the larger group of nonclinical studies did not impact the statistical significance of the results either. Conclusions: Propranolol shows promise in reducing subsequent memory for new or recalled emotional material in healthy

subjects. Studies of clinical populations, however, have yet to independently demonstrate that such findings can translate into powerful clinical effects.

Computational Explorations of Memory Consolidation, Memory Reconsolidation, and Related Phenomena Peter Helfer 2019

"The term memory consolidation is used to describe two different groups of phenomena, on the one hand a family of fast intra-cellular processes believed to stabilize new memory traces, and on the other hand larger-scale and slower processes whereby new memory traces, initially hippocampus-dependent, are reorganized and gradually become independent of the hippocampus. To avoid confusion, the former type is referred to as synaptic consolidation and the latter as systems consolidation. A related term, memory reconsolidation, refers to a temporary instability that memories undergo after retrieval. Like consolidation, reconsolidation has also been observed at both the synaptic and the systems level. An enormous effort has been channeled into understanding these phenomena, and a large volume of data has been collected. Nevertheless, the underlying mechanisms are only partially understood and different explanations have been suggested for many

findings. In this dissertation I present two computational models designed to investigate proposed mechanisms of memory consolidation and reconsolidation. The first model concerns mechanisms at the synaptic level and the second addresses systems consolidation and reconsolidation. Both models incorporate mechanisms inspired by recent neuroscience discoveries, allowing them to capture findings not covered by previously published works. Predictions are derived from the models, suggesting experiments that may test their correctness"--

The River of Life (Color Edition)

Lars Clausen 2018-10-23 Color Edition. Do you see your life as a spiritual journey? Do you experience blocks on the path? THE RIVER OF LIFE offers insights and simple tools to free your life from reactivity and attachments. The book begins with an easy method to turn off your stress response in less than two minutes. Next learn how stored upsets from the past cause continuing stress in the present. THE RIVER OF LIFE then introduces you to the brain science of Memory Reconsolidation - how your brain actually stores and releases emotional memories. Based on this science, author Lars Clausen created THE ICE

METHOD and has helped hundreds of people bring calm and healing to both physical and emotional upsets. In THE RIVER OF LIFE, Clausen turns to the spiritual journey, offering this breakthrough process for moving through the roadblocks to our awareness. THE RIVER OF LIFE takes you on a journey of awareness through the river of your life - bringing calm to the patterns and reactivities that have stored in your experience of life. A simple, profound, and effective book for increasing calm and source awareness in your life.

Memory Consolidation and Reconsolidation Mikel Lee Olson 2006

Memory Reconsolidation in Psychotherapy Bruce Ecker 2015-01-21 Memory reconsolidation (MR)—a foundational process with the potential, if properly understood, to consistently bring about the kind of transformational change that we look for in the lives of clients—is the subject of this book. Featured in this issue is Bruce Ecker, one of the foremost experts in applying techniques that fulfil the neurobiological requirements to achieve MR in clinical practice. In fact all of the authors in this issue are experts in their respective fields, demonstrating the unifying nature of MR in such diverse therapies as the

Alexander technique, energy psychology, neuro-linguistic programming, and progressive counting. Understanding the biological basis of our memory and how it can be modified is the key to effective therapeutic change, especially when emotional memories are driving unwanted symptoms.The content of this special issue has been previously published in The Neuropsychotherapist or the International Journal of Neuropsychotherapy.

Memory Reconsolidation Karim Nader 2013-03-18 Research on reconsolidation has demonstrated that consolidated memories may again enter states of transient instability following reactivation from which they must restabilize in order to persist, contradicting the previously dominant view describing memory and its associated plasticity mechanisms as progressively and irreversibly declining with time. We are now witness to an exciting time as diverse fields begin embracing a position, long-held in cognitive psychology, that recognizes memory as a principally dynamic process. This chapter discusses the history of this exciting field, which has been "discovered" twice. Today, there has been an explosion of research on the topic and demonstrations of

reconsolidation across species, behavioral tasks, and amnesic treatments.

Memory Reconsolidation

Cristina M. Alberini 2013-03-18

As little as 10 years ago, it was believed that memory went from short to long term via one consolidation practice that made that memory intractable. Since then, research has shown that long-term memories can be activated, modified, and reconsolidated in their new form. This research indicates that memories are more dynamic than once believed. And understanding how this process works and helping people to redefine established memories can be clinically useful if those memories lead to problems, as is the case in post-traumatic stress disorder. This book provides a comprehensive overview of research on memory reconsolidation; what this has to say about the formation, storage, and changeability of memory; and the potential applications of this research to treating clinical disorders. Presents both neuroscience and psychological research on memory reconsolidation Discusses what findings mean for understanding memory formation, storage, and retrieval Includes treatment applications of these findings

Memory Reconsolidation

Carolyn E. Jones 2013-03-18 Animal models of fear conditioning provide insight into ways to reduce the intensity of a fear memory and attenuate its associated response. Two popular methods to reduce fear in animals are extinction, in which the animal is repeatedly exposed to the fear-inducing stimulus in the absence of any negative outcome, and reconsolidation blockade/update, in which the fear memory is reactivated and targeted directly using pharmacological blockade or behavioral updating mechanisms. Combining the strengths of both extinction and reconsolidation may allow researchers to persistently reduce the fear response after conditioning in animals and develop a translational model for treatment of fear and anxiety-related disorders in humans.

The Wiley Handbook on The Cognitive Neuroscience of Memory Donna Rose Addis 2015-06-02 "The Wiley Blackwell Handbook on the Cognitive Neuroscience of Memory" presents a comprehensive overview of the latest, cutting-edge neuroscience research being done relating to the study of human memory and cognition. Featuring contributions from an international cast of leading

experts in episodic, semantic, and working memory research, the chapters in this handbook summarize the innovative work currently being done in the field by scientists and their peers in each contributor's area of expertise. A wide range of methodological approaches are addressed, including fMRI, EEG, TMS, and neuropsychology--with a strong emphasis on the latest analysis techniques within each of these measurement approaches. Scholarly yet readily accessible to those with minimal experience in the field, "The Wiley Blackwell Handbook on the Cognitive Neuroscience of Memory" is an invaluable reference to the current state--and future potential--of human memory research.

Memory Reconsolidation Cristina M. Alberini 2013-03-18

Memory traces can become labile when retrieved. This has intrigued not only neuroscientists, psychologists, and cognitive scientists but also clinicians who work with memories to treat psychopathologies, such as psychotherapists and psychoanalysts. Psychotherapists and psychoanalysts question whether the treatments based on re-evoking memories engage reconsolidation and how treatments may work and be

effective with reconsolidation processes. However, reconsolidation may not easily occur in older or very strong, consolidated memories, which are, in fact, those deeply rooted in most maladaptive behaviors, and most animal reconsolidation studies have been done on memories that are only days old. Hence, the questions deepen into many more complex layers, asking the following: How are memories formed and retrieved and in part become unconscious? How does retrieval in a therapeutic setting change those traces? Here, we propose some hypotheses based on neuroscientific knowledge to begin explaining the bases of Freudian unconscious and speculate on how memory traces and Freudian unconscious intersect.

Selectively Modulating Emotional Memory Reconsolidation in Humans Ariel Dahan 2015 "Introduction: Reconsolidation theory postulates that following retrieval, previously consolidated memories enter a state of lability prior to being reconsolidated. Additionally, the administration of certain pharmacological agents (e.g., the beta-blocker propranolol) during the period of memory reactivation (i.e. recall) is believed to interfere with and

block at least in part the reconsolidation process in disorders with maladaptive and pathological emotional memories. However, while the main emotion examined in previous studies was fear or craving, it remains unclear whether other types of emotion can be disrupted. In this study, we aimed to elucidate whether these observed effects do in fact extend to memories linked to non-fear, non-craving emotions in humans. Methods: We elicited joy, fear, sadness, disgust and anger in 45 healthy adults by exposing them to visual stimuli mainly drawn from the IAPS (International Affective Picture System). Using a pre/post placebo-controlled randomized study design, we tested whether propranolol can block consolidation and/or reconsolidation of other forms of emotional memories as categorized by each participant according to emotion-type. Results: A series of 2 way, mixed design ANOVAs, with Group as a between subjects factor and Emotion-type as a within subjects factor were performed for primary and secondary endpoints. Consolidated and Reconsolidated image recognition data yielded a significant effect of Emotion-type, $F(5, 185) = 26.13$, p

Episodic Memory

Reconsolidation and Strengthening Kai Rong Tay 2020

Memory Reconsolidation Cristina M. Alberini 2013-03-18

The rediscovery of memory reconsolidation has brought the attention of many investigators to this field because the findings that a stabilized memory can return to a labile state have changed the way we view long-term memory formation and storage. Furthermore, it has provided important information for potentially developing novel therapeutic interventions for psychopathologies as well as cognitive impairments. As with all discoveries that change previous beliefs, many conclusions and interpretations about the novel data have been subjected to a great deal of debates and controversies. However, the studies on memory reconsolidation have undoubtedly led to the understanding that the processes of memory formation and storage are exquisitely dynamic. Elucidating the mechanisms and temporal dynamics of the biological changes that accompany memory encoding, storage, and retrieval is key to understanding many brain functions. In this chapter, we summarize studies from our laboratory that investigated the mechanisms and functions of memory

reconsolidation using the inhibitory avoidance task in rats. Based on the results of these studies, we propose the conclusions that memory reconsolidation contributes to a lingering consolidation process and that memory is a highly dynamic process. We then discuss how we can use the knowledge acquired about memory reconsolidation to develop new therapies for weakening maladaptive memories and enhancing memories to combat cognitive decline.

Reducing Intrusive Memories of Real-world Stimuli Via Memory Reconsolidation Elizabeth H. Marks 2018 After a distressing event, intrusive memories often persist and, for some, become pathological and debilitating (e.g., Brewin et al., 2010). Methods that enhance extinction learning may translate to improved exposure-based interventions that target intrusive memories. One possible opportunity for enhancing extinction is through memory reconsolidation (Nader, Schafe, & LeDoux, 2000; Monfils, Cowsanage, Klann, & LeDoux, 2009; Schiller et al., 2010). A retrieved memory reactivated by conditioned stimulus (CS) presentation is thought to enter a labile state as proteins are synthesized, and the effects of new learning

that occurs within the reconsolidation window (about 10 min to 6 hrs post-retrieval) is more robust (e.g., Nader et al., 2000). To date, memory reconsolidation reseach in humans has been limited by fear learning paradigms that lack ecological validity (e.g., Elsey & Kindt, 2017), and parameters of boundary conditions (e.g., memory strength, retrieval cue specificity, prediction error) remain unclear (e.g., Treanor, Brown, Rissman, & Craske, 2017). In a two-study sequence, both behavioral and biological mechanisms underlying memory reconsolidation were examined, first in a non-clinical sample, and then in a sample of trauma-exposed individuals with and without current trauma-related intrusive memories. We used the film fear learning paradigm in order to elicit and then reduce film-related intrusive memories. Neutral and negative cues were used to explore differences in cue valence, given that previously, a negative CS retrieval cue elicited higher distress and more intrusive memories than non-retrieval conditions (Marks & Zoellner, 2014). Timing of cues were varied to examine any enhanced effects of extinction within the reconsolidation window. In Study 1, participants (N = 173) were randomized to

one of four CS cueing conditions: Pre Neutral CS, Pre Negative CS, or Pre Scrambled cue, presented 10 min prior to extinction, or Delayed Neutral CS presented 10 min after extinction. Intrusive memories were assessed 24 hr and 72 hr after acquisition. There were no differences in intrusive memory frequency or distress 72 hr after acquisition between participants in the Pre Neutral and Pre Negative cue conditions, nor were there differences between the Pre Neutral and Pre Delayed conditions. Larger increases in sAA during acquisition, b = .23, and larger increases in cortisol and sAA together, b = .25, during acquisition predicted higher intrusive memory frequency 72 hr after acquisition. Larger cortisol increase, b = .28, and sAA increase, b = .25, during extinction also predicted intrusive memories 72 hr after acquisition, and a larger increase in sAA, b = .27, also predicted higher intrusive memory distress 72 hr after acquisition. Negative affect after acquisition predicted intrusive memory frequency and distress 72 hr after acquisition, b = .35 and b = .44 respectively. Boundary conditions of reconsolidation as they relate to more ecologically valid stimuli and intrusive memories remain elusive. Study 2 sought to

extend this work to a clinical sample, characterized by persistent intrusive memories, and to better understand the specific type of new learning during extinction that may be required to initiate reconsolidation. Importantly, intrusive memories are a transdiagnostic construct present in a range of psychopathology (e.g., Brewin et al., 2010). Participants (N = 14) in the PTSD/MDD (n = 11) and control (n = 3) groups were randomized to one of three extinction conditions: an image extinction condition, where a brief 20 sec film segment that preceded the analogue trauma during acquisition is presented repeatedly in the absence of the analogue trauma, and a film extinction condition, where the acquisition segment is shown repeatedly, and an assessment only control condition, where participants do not engage in any kind of extinction procedure. All data from this study is preliminary. Patterns of intrusive memories 72 hr after acquisition suggest that, though intrusive memory frequency did not decrease d = 0.08, related distress did decrease, d = 0.85. Participants in the PTSD/MDD group reported more intrusive memories than the control group both 24 hr (d = 1.12) and 72 hr (d = 0.54) after acquisition. Intrusive memory

frequency decreased in the assessment only (d = 0.89) but not in the extinction conditions 72 hr after acquisition (d = 0.07), but patterns of distress reduction from 24 to 72 hr post-acquisition appeared similar across conditions. Parameters of reconsolidation boundary conditions when more complex, ecologically valid stimuli and outcome measures are used remain unclear; neither cue valence nor timing of retrieval cue affected intrusive memories after extinction. Glucocorticoid and noradrenergic system activity predicted intrusive memories, illustrating the importance of these two systems in strengthening emotional memory. As efforts to push reconsolidation toward clinical settings continue, preliminary findings from Study 2 highlight the importance of capturing distressing and persistent intrusive memories and determining whether these intrusive memories are amenable to enhanced extinction, as these are the kinds of intrusive re-experiencing representative of psychopathology that are often missed in experimental paradigms.

Memory Reconsolidation María Eugenia Pedreira 2013-03-18 The finding of memory reconsolidation in invertebrates has provided important insight

into evolutionary conservation and the adaptive value of the mechanisms involved in memory reprocessing. Furthermore, due to the characteristics of some memory models, important aspects of reconsolidation were initially found in invertebrates and were then confirmed in vertebrates. In the present chapter, we revisit the findings obtained using the context-signal memory model in crabs. These studies were performed both at the behavioral level, to describe the parametrical conditions for memory labilization and reconsolidation, and at the mechanistic level, to describe the molecular features involved in memory reconsolidation and extinction. We then review comparative studies in rodents in which the role of the molecular mechanisms described in invertebrates was evaluated in the contextual memory paradigm of fear conditioning. Comparative studies in humans on the nature of the reminder for reconsolidation are described in another chapter of this book.

Neurological Functions of the Masterswitch Protein Kinase – GSK-3 Oksana Kaidanovich-Beilin The functions of the brain that allow us to think, feel, move, and perceive the world are the result of an exchange of information within a network

composed of millions of specialized cells called neurons and glia. Neurons use neurotransmitters and other extracellular messengers to communicate with each other, and to constantly update and re-organize their network of connections in a process known as neural plasticity. In order to respond to these extracellular signals, neurons are equipped with specialized receptors that can recognize a single neurotransmitter a bit like a lock would recognize a key. They do this by activating or inhibiting a class of specialized signaling proteins and second messengers. Typically, signaling proteins are themselves organized in networks or pathways in which they activate or inhibit each other in order to integrate the mass of information received by a single cell and to regulate the biological functions of this cell. As we can see, rather than simply being a network of neurons, the brain can be seen as a sort of "Russian doll" in which each neuron is at the same time a part of networks with other neurons and the receptacle of many networks composed of signaling proteins. Two individual genes encode two paralogous signaling proteins: Glycogen Synthase Kinase -3 alpha and beta (GSK-3a, GSK-3b), named for

its ability to phosphorylate a key metabolic enzyme of glycogen synthesis, glycogen synthase. This unique “glamour and gloom” protein kinase, has been intriguing many researches for over 30 years by its unusual features, still unknown mechanisms of its activation, its regulation by multiple “key” intracellular pathways, and its capacity to influence the functions of many substrates. Since GSK-3 was discovered, there has been significant progress in elucidating its regulatory roles in the neuron and the structure and functions of the brain. Lithium has been used as a gold standard in the treatment of bipolar disorder for 60 years; and “GSK-3’s renaissance” in psychiatry began with the discovery of GSK-3 as lithium's intracellular target. Since then, GSK3 has been implicated in the pathogenesis of mood disorders, schizophrenia, Alzheimer’s disease, ADHD, multiple sclerosis, Fragile X syndrome and Huntington disease. Connections to these and other diseases has led over the last 10 years to the generation of multiple types of GSK-3 inhibitors as promising therapeutic treatments for the aforementioned pathological conditions. During last couple years new genetic models have been generated, including

conventional and conditional mouse models, allowing the discovery of new roles of GSK-3 in the mechanism of neurotransmitter action, neurodevelopment, learning and memory formation, GSK-3's gene - effect on mouse behavior, and other functions. Thus, GSK-3 has been well-established as an intracellular second messenger for several neurotransmitter systems, and as an important therapeutic target of mood stabilizers, antipsychotics and psychomimetic drugs. The proposed Specific Topic for Frontiers in Neuroscience will be focused on the latest advances from leading laboratories in this area, subdivided into 5 topics: (1) GSK-3 history, mechanism of regulation, substrate specificity and comparison between the brain function of two GSK-3 genes through new animal models and cell biology approaches; (2) role of GSK-3 in neurodevelopment and neuronal structure; (3) involvement of GSK-3 in synaptic functions, learning and memory, and in serotonin and dopamine pathways; (4) role of GSK-3 in neuroinflammation, and application to the pathogenesis of multiple sclerosis, AD, schizophrenia, Fragile X, brain tumors, stroke and bipolar disorder; (5)

development of GSK-3 inhibitors and their application in psychiatry, including special discussion about the mechanism of lithium action.

Boundary Conditions on Memory Reconsolidation in Human Episodic Memory Sonja Wichert 2012

Investigating Spatial Memory Reconsolidation in Rats: Memory Updating, Effects of Aging, and Hippocampal Network Activity Bethany Jayne Jones 2013 Upon acquisition, memories undergo an initial stabilization, or consolidation, process after which they are generally resistant to interference. There is now an abundance of evidence that reactivation or retrieval of a consolidated memory opens up a window of time during which the memory can be strengthened, disrupted, or updated via a process of "reconsolidation". This dissertation is comprised of three experimental studies in rats aimed at investigating previously unexamined aspects of this dynamic memory process. The first study assessed whether spatial memories learned under positively-motivated conditions could be updated with new information following reactivation. Rats that learned a second spatial task in the same environmental context as a

previously learned task intruded items from the second episode during recall of the first. This result suggests that the context reactivated the memory for the first task, triggering reconsolidation and updating of the memory. The second study used the memory updating effect obtained in the first study as a behavioral measure to investigate the effects of aging on reconsolidation. Unlike in the young rats, the context reminder did not lead to intrusions of the second learning episode during recall of the first. Older adult human participants in this study also showed a different pattern of results than what had been seen previously in young participants. Therefore, in humans as well as in rats, it appears that aging may lead to changes in spatial memory reconsolidation. The third study piloted an experiment to examine hippocampal network activity associated with the spatial memory reconsolidation task used in the first two studies. Preliminarily, we found that the context reminder manipulation was associated with more place field stability across some spatial tasks and that stability across certain tasks was positively related to our measure of memory updating. Additionally, we found evidence that the context

reminder enhanced neural replay of some learning episodes. While preliminary, these results suggest that both place field stability and replay may play roles in this reconsolidation paradigm.

Memory Reconsolidation María Eugenia Pedreira 2013-03-18 The idea that memories are immutable after consolidation has been challenged. The reconsolidation process offers the possibility of modifying previously stored information. This process has been described in different animal models and in human memory paradigms. This chapter revisits findings obtained with a declarative memory paradigm developed in our laboratory. Our research demonstrates the existence of the reconsolidation process for declarative memory, characterizes its boundary conditions, and studies its functions. The study of this process in a memory type that is a hallmark of humans supports the idea that some mechanisms are conserved across evolution. Moreover, this profound description of the features of reconsolidation affords the opportunity to apply our current knowledge to the development of new therapies for traumatic memories, with the goal of modifying undesirable memories.

Memory Reconsolidation

Cristina M. Alberini 2013 As little as ten years ago, it was believed that memory went from short to long term via one consolidation practice that made that memory intractable. Since then, research has shown that long term memories can be activated, modified, and reconsolidated in their new form. This research indicates that memories are more dynamic than once believed. And understanding how this process works, and helping people to redefine established memories can be clinically useful, if those memories lead to problems as is the case in post traumatic stress disorder. This book provides a comprehensive overview of research on memory reconsolidation, what this has to say about the formation, storage, and changeabitility of memory, and the potential applications of this research to treating clinical disorders. Presents both neuroscience and psychological research on memory reconsolidation. Discusses what findings mean for understanding memory formation, storage, and retrieval. Includes treatment applications of these findings.

Memory Reconsolidation Applied – The Ice Method Workbook and Journal Lars Clausen 2015-04-30 Calm Your Past to Live Your Future

Memory Reconsolidation Applied: The ICE Method Workbook and Journal provides exercises that allow you to bring stored upset emotions to calm. The ICE Method is based on how the brain stores memories. Learn this simple method and you can enjoy many benefits. Develop emotional calm - feel calmer as you go through your day, starting on Day One of using these exercises. Gain emotional peace - if you keep doing these exercises you'll develop more peace for your whole life, including peace for whatever may have troubled you in your past. Lower stress and increase physical health - when you feel calm, the chemistry of your whole body changes from the fight//flight/freeze stress response. Instead of focusing on stress, your body focuses on cellular and bodily health. Physical Healing increases when calm. More than three-fourths of all doctor's visits are related to stress. People who turn off their stress response often report improvements in chronic conditions - and sometimes the elimination of chronic pain. A Deeper Spiritual Awareness can arise. When life grows calm - the qualities of love, peace, and compassion have more space to be present in daily life. The ICE Method Workbook and Journal

accompanies the text; Memory Reconsolidation Applied: Calm Your Past to Live Your Future.

Cognitive Neuroscience of Memory Consolidation Nikolai Axmacher 2017-02-09 This edited volume provides an overview the state-of-the-art in the field of cognitive neuroscience of memory consolidation. In a number of sections, the editors collect contributions of leading researchers . The topical focus lies on current issues of interest such as memory consolidation including working and long-term memory. In particular, the role of sleep in relation to memory consolidation will be addressed. The target audience primarily comprises research experts in the field of cognitive neuroscience but the book may also be beneficial for graduate students.

Biological Research on Addiction Barbara A. Sorg 2013-05-17

Memory Reconsolidation Almut Hupbach 2013-03-18 In contrast to the study of memory reconsolidation in animals, research in humans is still in the early stages. This reflects the challenge to directly target memory reconsolidation without the use of pharmacological interventions that are often not safe for humans. Most studies therefore use paradigms in which new material is presented

soon after memory reactivation. These studies show that human memories can be modified contingent upon their reactivation. Specifically, the novel material leads to interference in the original memories. This chapter reviews research on episodic memory reconsolidation that uses this approach in an object-learning paradigm. Learning a new set of objects after reactivation of a previous object-set memory causes the new objects to become integrated into the reactivated memory. We present studies that assess different types of reminders and the effects of memory strength and time delays, and we evaluate different theoretical accounts of our findings.

Unlocking the Emotional Brain Bruce Ecker 2012-10-12 Psychotherapy that regularly yields liberating, lasting change was, in the last century, a futuristic vision, but it has now become reality, thanks to a convergence of remarkable advances in clinical knowledge and brain science. In Unlocking the Emotional Brain, authors Ecker, Ticic and Hulley equip readers to carry out focused, empathic therapy using the process found by researchers to induce memory reconsolidation, the recently discovered and only known process for actually unlocking emotional memory at

the synaptic level. Emotional memory's tenacity is the familiar bane of therapists, and researchers have long believed that emotional memory forms indelible learning. Reconsolidation has overturned these views. It allows new learning to erase, not just suppress, the deep, unconscious, intensely problematic emotional learnings that form during childhood or in later tribulations and generate most of the symptoms that bring people to therapy. Readers will learn methods that precisely eliminate unwanted, ingrained emotional responses—whether moods, behaviors or thought patterns—causing no loss of ordinary narrative memory, while restoring clients' well-being. Numerous case examples show the versatile use of this process in AEDP, Coherence Therapy, EFT, EMDR and IPNB.

Memory Reconsolidation Karim Nader 2013-03-18 This chapter highlights the connections between research on memory reconsolidation and central ideas in memory research, considering the substantial body of work produced within the neurosciences as well as cognitive psychology–two fields that, at the beginning of our science in the past century, were not as separated as they are now. We advance the basic

idea that the reconsolidation phenomenon indicates that memory systems are inherently flexible, based on processes that constantly adapt existing memory representations to improve behavioral performance. These mechanisms are likely of meta-plastic nature, and they will play out on the levels of cognition and behavior. We discuss possible meta-plastic mechanisms that mediate reconsolidation. We then briefly discuss how reconsolidation might explain certain cognitive memory malleability phenomena, such as the misinformation effect and memory interference.

Rethinking Trauma Treatment Courtney Armstrong 2019 Creating safety, hope, and secure attachment to transform traumatic memories.

Memory Reconsolidation Philip R. Corlett 2013-03-18 Memories represent a means through which we bring to bear past experience on current processing in order to respond adaptively and predict the future. One process that reflects this utility is reconsolidation. When memories are retrieved, they sometimes return into a labile state so that they can be updated and consolidated anew. This represents a potential therapeutic window for illnesses in which memory

processing has gone awry; that is, it might be possible to render memories labile and excise the aberrant and maladaptive. In this chapter, we discuss this opportunity with regard to serious mental illnesses such as post-traumatic stress disorder, psychosis, and drug addiction. Although the preclinical data are promising, that preclinical potential has yet to be realized. We discuss some of the ethical implications of memory erasure as well as some of the practical impediments to this approach.

Memory Reconsolidation Applied Lars Clausen 2015-05-01 Is your fight/flight/freeze stress response triggering from long ago events? What if you could calm your past to live a better future? In Memory Reconsolidation Applied, you'll discover how to turn off your stress response and live calm. Memory Reconsolidation Applied shares the science of using Memory Reconsolidation for emotional relief and physical well-being. Discover how the brain can permanently replace stored upsets with emotions of calm. Learn the simple ICE Method which has helped hundreds of people bring calm to past memories. Read the stories of people who applied Memory Reconsolidation and found relief from PTSD, anxiety,

emotional distress, and even chronic physical pain.

Memory Reconsolidation

Elizabeth A. Phelps 2013-03-18 This chapter provides a comprehensive review of research on reconsolidation in humans to date. It examines the different techniques that have been used to explore memory reconsolidation in humans and highlights some of the unique challenges that arise when investigating reconsolidation in human participants. Through this survey of existing studies, we explore some of the reasons why this science has been slow to emerge, and we suggest some potential avenues for future research.

Learning and Memory: A Comprehensive Reference

2017-07-07 Learning and Memory: A Comprehensive Reference, Second Edition is the authoritative resource for scientists and students interested in all facets of learning and memory. This updated edition includes chapters that reflect the state-of-the-art of research in this area. Coverage of sleep and memory has been significantly expanded, while neuromodulators in memory processing, neurogenesis and epigenetics are also covered in greater detail. New chapters have been included to reflect the massive increase in

research into working memory and the educational relevance of memory research. No other reference work covers so wide a territory and in so much depth. Provides the most comprehensive and authoritative resource available on the study of learning and memory and its mechanisms Incorporates the expertise of over 150 outstanding investigators in the field, providing a ‘one-stop’ resource of reputable information from world-leading scholars with easy cross-referencing of related articles to promote understanding and further research Includes further reading for each chapter that helps readers continue their research Includes a glossary of key terms that is helpful for users who are unfamiliar with neuroscience terminology

Memory Reconsolidation Jacek D□biec 2013-03-18 The ability to learn about adverse events has a special significance for survival. A body of work established the key role of the amygdala in acquisition, consolidation, and extinction of defense (fear) responses that protect the organism in the presence of learned threats. More than a decade ago, our lab showed that exposure to a learned threat, leading to the retrieval or reactivation of the memory, leads to a

reconsolidation (re-storage) of the memory in the amygdala. This finding reinvigorated interest in the role of memory retrieval in memory stability and change. In this chapter, we summarize research on the role of the amygdala in defense learning and memory and then discuss memory reconsolidation in the amygdala and its theoretical and clinical implications.