حافظهٔ اجتماعی

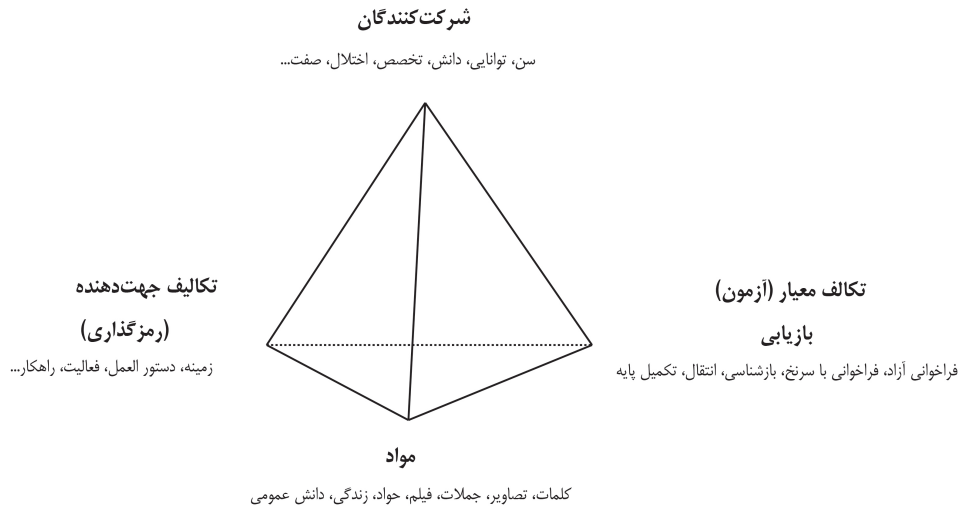
مغز، ذهن و جامعه

تاکاشی تسوکیورا، ساتوشی اومدا (ویراستار)

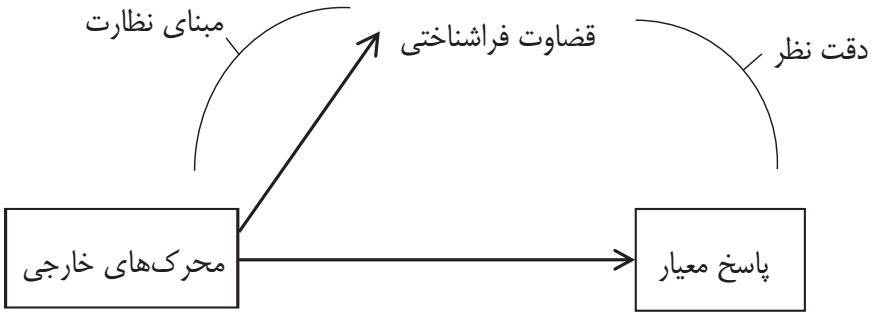
دکتر سوسن علیزاده فرد

مقدمه دکتر حسین زارع

مؤسسه
انتشارات
بعثت



شکل ۱,۱. نسخهٔ اصلاح‌شدهٔ مدل چندوجهی جنکینز برای آزمایش‌های حافظه (جنکینز و همکاران؛ و رودیگر، ۲۰۰۸)



شکل ۲,۱. طرح بازنمایی تمایز بین تأثیر یک متغیر مستقل بر بزرگ‌نمایی قضاوت نظارتی فراشناختی (مبتنی بر نظارت) در مقابل اندازهٔ ارتباط بین قضاوت و عملکرد معیار (دقت قضاوت) (نلسون، ۱۹۹۶)

Anderson MC, Bjork RA, Bjork EL (1994) Remembering can cause forgetting: retrieval dynamics in long-term memory. J Exp Psychol Learn Mem Cogn 20(5):1063–1087
Banaji MR, Crowder RG (1989) The bankruptcy of everyday memory. Am Psychol 44(9):1185–1193
Barnes JM, Underwood BJ (1959) Fate of first-list association in transfer theory. J Exp Psychol 58(2):97–105
Bjork RA (1970) Positive forgetting: the noninterference of items intentionally forgotten. J Verbal Learn Verbal Behav 9(3):255–268
Bjork RA (1989) Retrieval inhibition as an adaptive mechanism in human memory. In: Roediger HL III, Craik FIM (eds) Varieties of memory and consciousness: essays in honour of Endel Tulving. Erlbaum, Hillsdale, pp 309–330
Brigham JC, Maass A, Snyder LD, Spaulding K (1982) Accuracy of eyewitness identification in a field setting. J Pers Soc Psychol 42(4):673–681
Brown J (1958) Some tests of the decay theory of immediate memory. Q J Exp Psychol 10(1):12–21
Bruce D (1985) The how and why of ecological memory. J Exp Psychol Gen 114(1):78–90
Craik FIM, Tulving E (1975) Depth of processing and the retention of words in episodic memory. J Exp Psychol Gen 104(3):268–294
Deese J (1959) On the prediction of occurrence of particular verbal intrusions in immediate recall. J Exp Psychol 58(1):17–22
Dunlosky J, Metcalfe J (2009) Metacognition. Sage, Thousand Oaks Ebbinghaus H (1885/1964) Memory: a contribution to experimental psychology. Dover, New York (Originally published 1885)
Einstein GO, McDaniel MA (1996) Retrieval processes in prospective memory: theoretical approaches and some new empirical findings. In: Brandimonte M, Einstein G, McDaniel M (eds) Prospective memory: theory and applications. Lawrence Erlbaum Associates, Hillsdale, pp 115–142
Flavell JH, Friedrichs AG, Hoyt JD (1970) Developmental changes in memorization processes. Cogn Psychol 1(4):324–340
Glaze JA (1928) The association value of non-sense syllables. Pedagog Semin J Gen Psychol 35:255–269
Jacoby LL (1984) Incidental versus intentional retrieval: remembering and awareness as separate issues. In: Squires LR, Butters N (eds) Neuropsychology of memory. Guilford, New York, pp 145–156

Jenkins JJ (1979) Four points to remember: a tetrahedral model of memory experiments. In: Cermak LS, Craik FIM (eds) Levels of processing in human memory. Erlbaum, Hillsdale, pp 429–446
Jenkins JJ (1985) Nonsense syllables: comprehending the "almost incomprehensible variation". J Exp Psychol Learn Mem Cogn 11(3):455–460
Kantowitz BH, Roediger HL III, Elmes DG (2008) Experimental psychology, 9th edn. Wadsworth, Belmont
Kim P, Mayhorn CB (2008) Exploring students' prospective memory inside and outside the lab. Am J Psychol 121(2):241–254
Lockhart RS (2000) Methods of memory research. In: Tulving E, Craik FIM (eds) The Oxford handbook of memory. Oxford University Press, New York, pp 45–57
Loftus EF (1979) Eyewitness testimony. Harvard University Press, Cambridge, MA
Loftus EF, Palmer JE (1974) Reconstruction of automobile destruction: an example of the interaction between language and memory. J Verbal Learn Verbal Behav 13(5):585–589
Mazzoni G, Nelson TO (1995) Judgments of learning are affected by the kind of encoding in ways that cannot be attributed to the level of recall. J Exp Psychol Learn Mem Cogn 21(5):1263–1274
McGuigan FJ (1996) Experimental psychology: methods of research, 7th edn. Prentice Hall, Englewood Cliffs
Neisser U (1982) Memory observed. W. H. Freeman, San Francisco
Nelson (1996) Consciousness and metacognition. Am Psychol 51(2):102–116
Nelson TO, Narens L (1990) Metamemory: a theoretical framework and new findings. In: Bower GH (ed) The psychology of learning and motivation, vol 26. Academic, New York, pp 125–173
Noble CE (1952) An analysis of meaning. Psychol Rev 59(6):421–430
Nyberg L, Cabeza R (2000) Brain imaging of memory. In: Tulving E, Craik FIM (eds) The Oxford handbook of memory. Oxford University Press, New York, pp 501–519
Peterson LR, Peterson MJ (1959) Short-term retention of individual verbal items. J Exp Psychol 58(3):193–198
Roediger HL (2008) Relativity of remembering: why the laws of memory vanished. Annu Rev Psychol 59:225–254
Roediger HL III, McDermott KB (1995) Creating false memories: remembering words not presented on lists. J Exp Psychol Learn Mem Cogn 21(4):803–814
Schacter DL (1987) Implicit memory: history and current status. J Exp Psychol Learn Mem Cogn 13(3):501–518

Takahashi M, Shimizu H, Saito S, Tomoyori H (2006) One percent ability and ninety-nine percent perspiration: a study of a Japanese memorist. J Exp Psychol Learn Mem Cogn 32(5):1195–1200

Umemoto T (1969) The norms of association values in Japan. University of Tokyo Press, Tokyo. (梅本堯夫 (1969). 連想基準表 東京大学出版会)

Wickens DD (1972) Characteristics of word encoding. In: Melton AW, Martin E (eds) Coding processes in human memory. Winston & Sons, Washington, DC, pp 191–215

ـــــ منابع فصل دوم ـــــ

Atkinson RC, Juola JF (1973) Factors influencing speed and accuracy of word recognition. Atten Perform IV:583–612

Atkinson RC, Herrmann DJ, Wescourt KT (1974) Search processes in recognition memory. In: Solso R (ed) Theories in cognitive psychology: the Loyola symposium. Halsted Press, New York, pp 193–238

Buzsaki G (1996) The hippocampo-neocortical dialogue. Cereb Cortex 6(2):81–92

Cabeza R, Ciaramelli E, Moscovitch M (2012) Cognitive contributions of the ventral parietal cortex: an integrative theoretical account. Trends Cogn Sci 16(6):338–352

Daselaar SM, Prince SE, Cabeza R (2004) When less means more: deactivations during encoding that predict subsequent memory. NeuroImage 23(3):921–927

Daselaar SM, Fleck MS, Cabeza R (2006) Triple dissociation in the medial temporal lobes: recollection, familiarity, and novelty. J Neurophysiol 96(4):1902–1911

Davachi L, Mitchell JP, Wagner AD (2003) Multiple routes to memory: distinct medial temporal lobe processes build item and source memories. Proc Natl Acad Sci U S A 100(4):2157–2162

Deuker L, Olligs J, Fell J, Kranz TA, Mormann F, Montag C, Reuter M, Elger CE, Axmacher N (2013) Memory consolidation by replay of stimulus-specific neural activity. J Neurosci 33(49):19373–19383

Diana RA, Yonelinas AP, Ranganath C (2007) Imaging recollection and familiarity in the medial temporal lobe: a three-component model. Trends Cogn Sci 11(9):379–386

Dickerson BC, Miller SL, Greve DN, Dale AM, Albert MS, Schacter DL, Sperling RA (2007) Prefrontal-hippocampal-fusiform activity during encoding predicts intraindividual differences in free recall ability: an event-related functional-anatomic MRI study. Hippocampus 17(11):1060–1070

Dolcos F, Denkova E, Dolcos S (2012) Neural correlates of emotional memories: a review of evidence from brain imaging studies. Psychologia 55(2):80–111

Duverne S, Motamedinia S, Rugg MD (2009) The relationship between aging, performance, and the neural correlates of successful memory encoding. Cereb Cortex 19(3):733–744

Fernandez G, Tendolkar I (2001) Integrated brain activity in medial temporal and prefrontal areas predicts subsequent memory performance: human declarative memory formation at the system level. Brain Res Bull 55(1):1–9

Garoff RJ, Slotnick SD, Schacter DL (2005) The neural origins of specific and general memory: the role of the fusiform cortex. Neuropsychologia 43(6):847–859

Gilmore AW, Nelson SM, McDermott KB (2015) A parietal memory network revealed by multiple MRI methods. Trends Cogn Sci 19(9):534–543

Girardeau G, Benchenane K, Wiener SI, Buzsaki G, Zugaro MB (2009) Selective suppression of hippocampal ripples impairs spatial memory. Nat Neurosci 12(10):1222–1223

Hammond DC (2011) What is neurofeedback: an update. J Neurother 15(4):305–336

Haynes JD, Rees G (2006) Decoding mental states from brain activity in humans. Nat Rev Neurosci 7(7):523–534

Henson RN, Rugg MD, Shallice T, Josephs O, Dolan RJ (1999) Recollection and familiarity in recognition memory: an event-related functional magnetic resonance imaging study. J Neurosci 19(10):3962–3972

Hirose S, Chikazoe J, Jimura K, Yamashita K, Miyashita Y, Konishi S (2009) Sub-centimeter scale functional organization in human inferior frontal gyrus. NeuroImage 47(2):442–450

Huijbers W, Schultz AP, Vannini P, McLaren DG, Wigman SE, Ward AM, Hedden T, Sperling RA (2013) The encoding/retrieval flip: interactions between memory performance and memory stage and relationship to intrinsic cortical networks. J Cogn Neurosci 25(7):1163–1179

Jadhav SP, Kemere C, German PW, Frank LM (2012) Awake hippocampal sharp-wave ripples support spatial memory. Science 336(6087):1454–1458

Kahn I, Davachi L, Wagner AD (2004) Functional-neuroanatomic correlates of recollection: implications for models of recognition memory. J Neurosci 24(17):4172–4180

Kensinger EA, Schacter DL (2006) Amygdala activity is associated with the successful encoding of item, but not source, information for positive and negative stimuli. J Neurosci 26(9):2564–2570

Kim H (2011) Neural activity that predicts subsequent memory and forgetting: a meta-analysis of 74 fMRI studies. NeuroImage 54(3):2446–2461

Kim H, Cabeza R (2007) Trusting our memories: dissociating the neural correlates of confidence in veridical versus illusory memories. J Neurosci 27(45):12190–12197

Kim H, Daselaar SM, Cabeza R (2010) Overlapping brain activity between episodic memory encoding and retrieval: roles of the task-positive and task-negative networks. NeuroImage 49(1):1045–1054

Kirwan CB, Stark CE (2004) Medial temporal lobe activation during encoding and retrieval of novel face-name pairs. Hippocampus 14(7):919–930
Konishi S, Wheeler ME, Donaldson DI, Buckner RL (2000) Neural correlates of episodic retrieval success. NeuroImage 12(3):276–286
Mandler G (1979) Organization and repetition: organizational principles with special reference to rote learning. In: Nilsson L (ed) Perspectives on memory research. Wiley, New York, pp 293–327
Mandler G, Pearlstone Z, Koopmans HS (1969) Effects of organization and semantic similarity on recall and recognition. J Verbal Learn Verbal Behav 8(3):410–423
Mason MF, Norton MI, Van Horn JD, Wegner DM, Grafton ST, Macrae CN (2007) Wandering minds: the default network and stimulus-independent thought. Science 315(5810):393–395
McDermott KB, Jones TC, Petersen SE, Lageman SK, Roediger HL 3rd (2000) Retrieval success is accompanied by enhanced activation in anterior prefrontal cortex during recognition memory: an event-related fMRI study. J Cogn Neurosci 12(6):965–976
Mur M, Bandettini PA, Kriegeskorte N (2009) Revealing representational content with pattern-information fMRI – an introductory guide. Soc Cogn Affect Neurosci 4(1):101–109
Otten LJ, Rugg MD (2001) When more means less: neural activity related to unsuccessful memory encoding. Curr Biol 11(19):1528–1530
Paller KA, Kutas M, Mayes AR (1987) Neural correlates of encoding in an incidental learning paradigm. Electroencephalogr Clin Neurophysiol 67(4):360–371
Polyn SM, Natu VS, Cohen JD, Norman KA (2005) Category-specific cortical activity precedes retrieval during memory search. Science 310(5756):1963–1966
Raichle ME, MacLeod AM, Snyder AZ, Powers WJ, Gusnard DA, Shulman GL (2001) A default mode of brain function. Proc Nat Acad Sci U S A 98(2):676–682
Ritchey M, Wing EA, LaBar KS, Cabeza R (2013) Neural similarity between encoding and retrieval is related to memory via hippocampal interactions. Cereb Cortex 23(12):2818–2828
Rugg MD, Vilberg KL (2013) Brain networks underlying episodic memory retrieval. Curr Opin Neurobiol 23(2):255–260
Rugg MD, Fletcher PC, Frith CD, Frackowiak RS, Dolan RJ (1996) Differential activation of the prefrontal cortex in successful and unsuccessful memory retrieval. Brain 119(Pt 6):2073–2083

Scoville WB, Milner B (1957) Loss of recent memory after bilateral hippocampal lesions. J Neurol Neurosurg Psychiatry 20(1):11–21
Sherwood MS, Kane JH, Weisend MP, Parker JG (2016) Enhanced control of dorsolateral prefrontal cortex neurophysiology with real-time functional magnetic resonance imaging (rt-fMRI)
neurofeedback training and working memory practice. NeuroImage 124(Pt A):214–223
Simons JS, Spiers HJ (2003) Prefrontal and medial temporal lobe interactions in long-term memory. Nat Rev Neurosci 4(8):637–648
Sommer T, Rose M, Weiller C, Buchel C (2005) Contributions of occipital, parietal and parahippocampal cortex to encoding of object-location associations. Neuropsychologia 43(5):732–743
Spaniol J, Davidson PS, Kim AS, Han H, Moscovitch M, Grady CL (2009) Event-related fMRI studies of episodic encoding and retrieval: meta-analyses using activation likelihood estimation.Neuropsychologia 47(8–9):1765–1779
Squire LR (1982) The neuropsychology of human memory. Annu Rev Neurosci 5:241–273
Squire LR, Alvarez P (1995) Retrograde amnesia and memory consolidation: a neurobiological perspective. Curr Opin Neurobiol 5(2):169–177
Staresina BP, Alink A, Kriegeskorte N, Henson RN (2013) Awake reactivation predicts memory in humans. Proc Natl Acad Sci U S A 110(52):21159–21164
Stoeckel LE, Garrison KA, Ghosh S, Wighton P, Hanlon CA, Gilman JM, Greer S, Turk-Browne NB, deBettencourt MT, Scheinost D, Craddock C, Thompson T, Calderon V, Bauer CC, George M, Breiter HC, Whitfield-Gabrieli S, Gabrieli JD, LaConte SM, Hirshberg L, Brewer JA, Hampson M, Van Der Kouwe A, Mackey S, Evins AE (2014) Optimizing real time fMRI neurofeedback for therapeutic discovery and development. Neuroimage: Clinical 5:245–255
Sulzer J, Haller S, Scharnowski F, Weiskopf N, Birbaumer N, Blefari ML, Bruehl AB, Cohen LG, DeCharms RC, Gassert R, Goebel R, Herwig U, LaConte S, Linden D, Luft A, Seifritz E, Sitaram R (2013) Real-time fMRI neurofeedback: progress and challenges. NeuroImage 76:386–399
Sutherland GR, McNaughton B (2000) Memory trace reactivation in hippocampal and neocortical neuronal ensembles. Curr Opin Neurobiol 10(2):180–186

Tambini A, Ketz N, Davachi L (2010) Enhanced brain correlations during rest are related to memory for recent experiences. Neuron 65(2):280–290
Tulving E (1999) Memory, consciousness and the brain: the Tallinn conference. Psychology Press, Philadelphia

Uncapher MR, Rugg MD (2009) Selecting for memory? The influence of selective attention on the mnemonic binding of contextual information. J Neurosci 29(25):8270–8279

Wagner AD, Schacter DL, Rotte M, Koutstaal W, Maril A, Dale AM, Rosen BR, Buckner RL (1998) Building memories: remembering and forgetting of verbal experiences as predicted by brain activity. Science 281(5380):1188–1191

Wagner AD, Shannon BJ, Kahn I, Buckner RL (2005) Parietal lobe contributions to episodic memory retrieval. Trends Cogn Sci 9(9):445–453

Weissman DH, Roberts KC, Visscher KM, Woldorff MG (2006) The neural bases of momentary lapses in attention. Nat Neurosci 9(7):971–978

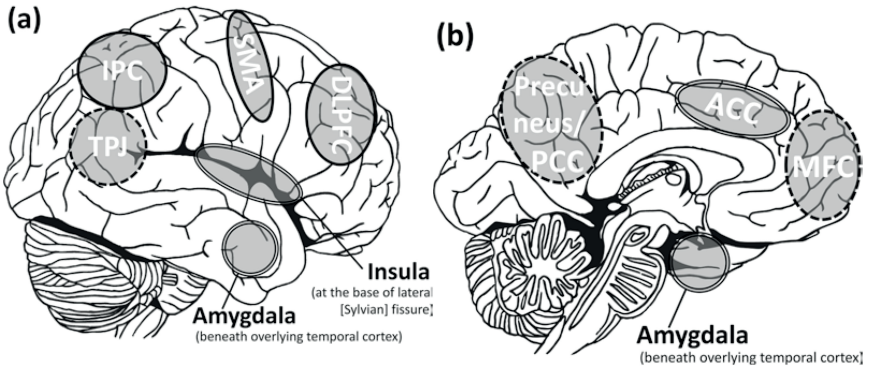
Wheeler ME, Buckner RL (2004) Functional-anatomic correlates of remembering and knowing. NeuroImage 21(4):1337–1349

Wilson MA, McNaughton BL (1994) Reactivation of hippocampal ensemble memories during sleep. Science 265(5172):676–679

Yamashita K, Hirose S, Kunimatsu A, Aoki S, Chikazoe J, Jimura K, Masutani Y, Abe O, Ohtomo K, Miyashita Y, Konishi S (2009) Formation of long-term memory representation in human temporal cortex related to pictorial paired associates. J Neurosci 29(33):10335–10340

Yonelinas AP (2002) The nature of recollection and familiarity: a review of 30 years of research. J Mem Lang 46(3):441–517

Yoo JJ, Hinds O, Ofen N, Thompson TW, Whitfield-Gabrieli S, Triantafyllou C, Gabrieli JD (2012) When the brain is prepared to learn: enhancing human learning using real-time fMRI. NeuroImage 59(1):846–852



شکل ۱,۳. (الف) سطح جانبی و (ب) سطح داخلی مغز. بیضی‌ها با خط ممتد مناطق اصلی تشکیل‌دهندهٔ شبکه پیشانی– اهیانه‌ای (FPN) را نشان می‌دهند؛ بیضی‌ها با خط‌چین مناطقی را نشان می‌دهند که برای شبکهٔ حالت پیش‌فرض (DMN) و شبکهٔ شناخت اجتماعی، مشترکند؛ بیضی‌ها با خط دوتایی مناطق اصلی تشکیل‌دهندهٔ شبکهٔ برجسته را نشان می‌دهند که در جابه‌جایی بین FPN و DMN نقش دارد.

سالی اسباب‌بازی خود را در جعبهٔ قرمزی گذاشته و برای بازی بیرون می‌رود.

در غیاب او، دختر دیگری به نام آن، اسباب‌بازی را از جعبهٔ قرمز به جعبهٔ سبز جابه‌جا می‌کند و سپس برای بازی بیرون می‌رود.

سالی بازمی‌گردد و اسباب‌بازی‌اش را می‌خواهد. فکر می‌کنید اولین جایی که به‌دنبال آن خواهد گشت کجاست؟

شکل ۲,۳. تصویری از تکلیف باورهای نادرست سالی– آن[1] که برای ارزیابی نظریهٔ ذهن کودکان استفاده می‌شود (تصاویر از مای‌هارا ۲۰۱۴، بازسازی‌شده از انتشارات دانشگاه توکیو)

1. Sally-Anne false-belief task

Allen M, Smallwood J, Christensen J, Gramm D, Rasmussen B, Jensen CG, Roepstorff A, Lutz A (2013) The balanced mind: the variability of task-unrelated thoughts predicts error monitoring. Front Hum Neurosci 7:743

Amodio DM, Frith CD (2006) Meeting of minds: the medial frontal cortex and social cognition. Nat Rev Neurosci 7(4):268–277

Baddeley AD (1986) Working memory. Oxford University Press, Oxford

Baddeley AD (2000) The episodic buffer: a new component of working memory? Trends Cogn Sci 4(11):417–423

Baddeley AD (2007) Working memory, thought, and action. Oxford University Press, Oxford

Baddeley AD (2012) Working memory: theories, models, and controversies. Annu Rev Psychol 63:1–29

Baddeley AD, Hitch GJ (1974) Working memory. In: Bower GH (ed) The psychology of learning and motivation, vol 8. Academic Press, New York, pp 47–89

Baron-Cohen S, Leslie AM, Frith U (1985) Does the autistic child have a 'theory of mind'? Cognition 21(1):37–46

Baron-Cohen S, Tager-Flusberg H, Lombardo MV (eds) (2013) Understanding other minds: perspective from developmental social neuroscience. Oxford University Press, Oxford

Baune BT, Fuhr M, Air T, Hering C (2014) Neuropsychological functioning in adolescents and young adults with major depressive disorder: a review. Psychiatry Res 218(3):261–271

Braver TS, Cohen JD, Nystrom LE, Jonides J, Smith EE, Noll DC (1997) A parametric study of prefrontal cortex involvement in human working memory. NeuroImage 5(1):49–62

Brouillet P, Portrat S, Camos V (2011) On the law relating processing to storage in working memory. Psychol Rev 118(2):175–192

Buckner RL, Andrews-Hanna JR, Schacter DL (2008) The brain's default network: anatomy, function, and relevance to disease. Ann N Y Acad Sci 1124:1–38

Bull R, Phillips LH, Conway CA (2008) The role of control functions in mentalizing: dual-task studies of theory of mind and executive function. Cogn, 107(2):663–672

Bzdok D, Schilbach L, Vogeley K, Schneider K, Laird AR, Langner R, Eickhoff SB (2012) Parsing the neural correlates of moral cognition: ALE meta-analysis on morality, theory of mind, and empathy. Brain Struct Funct 217(4):783–796

Carlson SM, Moses LJ, Breton C (2002) How specific is the relation between executive function and theory of mind? Contributions of inhibitory control and working memory. Infant Child Dev 11(2):73–92
Carrington SJ, Bailey AJ (2009) Are there theory of mind regions in the brain? A review of the neuroimaging literature. Hum Brain Mapp 30(8):2313–2335
Cavanna AE, Trimble MR (2006) The precuneus: a review of its functional anatomy and behavioural correlates. Brain 129(3):564–583
Christoff K, Gordon AM, Smallwood J, Smith R, Schooler JW (2009) Experience sampling during fMRI reveals default network and executive system contributions to mind wandering. Proc Natl Acad Sci U S A 106(21):8719–8724
Corbetta M, Patel G, Shulman GL (2008) The reorienting system of the human brain: from environment to theory of mind. Neuron 58(3):306–324
Costa A, Torriero S, Oliveri M, Caltagirone C (2008) Prefrontal and temporo–parietal involvement in taking others' perspective: TMS evidence. Behav Neurol 19(1–2):71–74
Cowan N (2005) Working memory capacity (Essays in cognitive psychology). Psychology Press, New York
Crone EA, Wendelken C, Donohue S, van Leijenhorst L, Bunge SA (2006) Neurocognitive development of the ability to manipulate information in working memory. Proc Natl Acad Sci U S A 103(24):9315–9320
Curtis CE, D'Esposito M (2003) Persistent activity in the prefrontal cortex during working memory. Trends Cogn Sci 7(9):415–423
D'Esposito M, Detre JA, Alsop DC, Shin RK, Atlas S, Grossman M (1995) The neural basis of the central executive system of working memory. Nature 378(6554):279–281
Daneman M, Merikle PM (1996) Working memory and language comprehension: a meta–analysis. Psychon Bull Rev 3(4):422–433
Davis HL, Pratt C (1995) The development of children's theory of mind: the working memory explanation. Aust J Psychol 47(1):25–31
Dennis M, Agostino A, Roncadin C, Levin HS (2009) Theory of mind depends on domain–general executive functions of working memory and cognitive inhibition in children with traumatic brain injury. J Clin Exp Neuropsychol 31(7):835–847
Druzgal TJ, D'Esposito M (2001) Activity in fusiform face area modulated as a function of working memory load. Cogn Brain Res 10(3):355–364
Ellamil M, Dobson C, Beeman M, Christoff K (2012) Evaluative and generative modes of thought during the creative process. NeuroImage 59(2):1783–1794

Gallagher HL, Frith CD (2003) Functional imaging of ‘theory of mind’. Trends Cogn Sci 7(2):77–83
Gerlach KD, Spreng RN, Gilmore AW, Schacter DL (2011) Solving future problems: Default network and executive activity associated with goal-directed mental simulations. NeuroImage 55(4):1816–1824
Goulden N, Khusnulina A, Davis N, Bracewell RM, Bokde AL, McNulty JP, Mullins PG (2014) The salience network is responsible for switching between the default mode network and the central executive network: replication from DCM. NeuroImage 99:180–190
Gray JR, Chabris CF, Braver TS (2003) Neural mechanisms of general fluid intelligence. Nat Neurosci 6(3):316–322
Greicius MD, Menon V (2004) Default–mode activity during a passive sensory task: uncoupled from deactivation but impacting activation. J Cogn Neurosci 16(9):1484–1492
Gusnard DA, Raichle ME (2001) Searching for a baseline: functional imaging and the resting human brain. Nat Rev Neurosci 2(10):685–694
Honan CA, McDonald S, Gowland A, Fisher A, Randall RK (2015) Deficits in comprehension of speech acts after TBI: the role of theory of mind and executive function. Brain Lang 150(1):69–79
Hyatt CJ, Calhoun VD, Pearlson GD, Assaf M (2015) Specific default mode subnetworks support mentalizing as revealed through opposing network recruitment by social and semantic fMRI tasks. Hum Brain Mapp 36(8):3047–3063
Kane MJ, Brown LH, McVay JC, Silvia PJ, Myin-Germeys I, Kwapil TR (2007) For whom the mind wanders, and when. Psychol Sci 18(7):614–621
Keenan T, Olson DR, Marini Z (1998) Working memory and children’s developing understanding of mind. Aust J Psychol 50(1):76–82
Kercood S, Grskovic JA, Banda D, Begeske J (2014) Working memory and autism: a review of literature. Res Autism Spect Dis 8(10):1316–1332
Killingsworth MA, Gilbert DT (2010) A wandering mind is an unhappy mind. Science 330(6006):932
Koban L, Pourtois G (2014) Brain systems underlying the affective and social monitoring of actions: an integrated review. Neurosci Biobehav Rev 46:71–84
Lett TA, Voineskos AN, Kennedy JL, Levine B, Daskalakis ZJ (2014) Treating working memory deficits in schizophrenia: a review of the neurobiology. Biol Psychiatry 75(5):361–370

Lin S, Keysar B, Epley N (2010) Reflexively mindblind: using theory of mind to interpret behavior requires effortful attention. J Exp Soc Psychol 46(3):551–556
Linden DE (2007) The working memory networks of the human brain. Neuroscientist 13(3):257–267
LoPresti ML, Schon K, Tricarico MD, Swisher JD, Celone KA, Stern CE (2008) Working memory for social cues recruits orbitofrontal cortex and amygdala: a functional magnetic resonance imaging study of delayed matching to sample for emotional expressions. J Neurosci 28(14):3718–3728
Maehara Y (2014) Mind over–reading: Psychological research on working memory in theory of mind. Kyoto University Press, Kyoto (in Japanese) Maehara Y, Saito S (2011) I see into your mind too well: working memory adjusts the probability judgment of others' mental states. Acta Psychol 138(3):367–376
Maehara Y, Saito S (2013) Cognitive load on working memory both encourages and discourages reasoning bias regarding the mental states of others. Aust J Psychol 65(3):163–171
Mahy CEV, Moses LJ, Pfeifer JH (2014) How and where: theory–of–mind in the brain. Dev Cogn Neurosci 9(1):68–81
Mars RB, Neubert FX, Noonan MP, Sallet J, Toni I, Rushworth MF (2012) On the relationship between the "default mode network" and the "social brain". Front Hum Neurosci 6:189
Mason MF, Norton MI, Van Horn JD, Wegner DM, Grafton ST, Macrae CN (2007) Wandering minds: the default network and stimulus-independent thought. Science 315(5810):393–395
McKiernan KA, Kaufman JN, Kucera-Thompson J, Binder JR (2003) A parametric manipulation of factors affecting task-induced deactivation in functional neuroimaging. J Cogn Neurosci 15(3):394–408
McKinnon MC, Moscovitch M (2007) Domain-general contributions to social reasoning: theory of mind and deontic reasoning re-explored. Cognition 102(2):179–218
McVay JC, Kane MJ (2012) Why does working memory capacity predict variation in reading comprehension? On the influence of mind wandering and executive attention. J Exp Psychol Gen 141(2):302–320
Meyer ML, Spunt RP, Berkman ET, Taylor SE, Lieberman MD (2012) Evidence for social working memory from a parametric functional MRI study. Proc Natl Acad Sci U S A 109(6):1883–1888

Miyake A, Shah P (eds) (1999) Models of working memory: mechanisms of active maintenance and executive control. Cambridge University Press, New York

Moses LJ (2001) Executive accounts of theory-of-mind development. Child Dev 72(3):688–690

Mulders PC, van Eijndhoven PF, Schene AH, Beckmann CF, Tendolkar I (2015) Resting-state functional connectivity in major depressive disorder: a review. Neurosci Biobehav Rev 56:330–344

Ouimet AJ, Gawronski B, Dozois DJA (2009) Cognitive vulnerability to anxiety: a review and an integrative model. Clin Psychol Rev 29(6):459–470

Owen AM, McMillan KM, Laird AR, Bullmore E (2005) N-back working memory paradigm: a meta-analysis of normative functional neuroimaging studies. Hum Brain Mapp 25(1):46–59

Perner J (1991) Understanding the representational mind. MIT Press, Cambridge, MA

Raichle ME, MacLeod AM, Snyder AZ, Powers WJ, Gusnard DA, Shulman GL (2001) A default mode of brain function. Proc Natl Acad Sci U S A 98(2):676–682

Reniers RL, Corcoran R, Vollm BA, Mashru A, Howard R, Liddle PF (2012) Moral decision-making, ToM, empathy and the default mode network. Biol Psychol 90(3):202–210

Rypma B, Prabhakaran V, Desmond JE, Glover GH, Gabrieli JD (1999) Load-dependent roles of frontal brain regions in the maintenance of working memory. NeuroImage 9(2):216–226

Saxe R, Carey S, Kanwisher N (2004) Understanding other minds: linking developmental psychology and functional imaging. Annu Rev Psychol 55:87–124

Schilbach L, Eickhoff SB, Rotarska-Jagiela A, Fink GR, Vogeley K (2008) Minds at rest? Social cognition as the default mode of cognizing and its putative relationship to the "default system" of the brain. Conscious Cogn 17(2):457–467

Schurz M, Radua J, Aichhorn M, Richlan F, Perner J (2014) Fractionating theory of mind: a meta-analysis of functional brain imaging studies. Neurosci Biobehav Rev 42:9–34

Seeley WW, Menon V, Schatzberg AF, Keller J, Glover GH, Kenna H, Kenna H, Reiss AL, Greicius MD (2007) Dissociable intrinsic connectivity networks for salience processing and executive control. J Neurosci 27(9):2349–2356

Sheffield JM, Barch DM (2016) Cognition and resting-state functional connectivity in schizophrenia. Neurosci Biobehav Rev 61:108–120

Sidlauskaite J, Wiersema JR, Roeyers H, Krebs RM, Vassena E, Fias W, Brass B, Achten E, Sonuga-Barke E (2014) Anticipatory processes in brain state switching: Evidence from a novel cued-switching task implicating default mode and salience networks. NeuroImage 98:359–365

Smallwood J (2011) Mind-wandering while reading: attentional decoupling, mindless reading and the cascade model of inattention. Lang Ling Compass 5(2):63–77

Smallwood J, Schooler JW (2015) The science of mind wandering: empirically navigating the stream of consciousness. Annu Rev Psychol 66:487–518

Smallwood J, Brown K, Baird B, Schooler JW (2011) Cooperation between the default mode network and the frontal-parietal network in the production of an internal train of thought. Brain Res 1428:60–70

Smith EE, Jonides J (1997) Working memory: a view from neuroimaging. Cogn Psychol 33(1):5–42

Spreng RN, Grady C (2010) Patterns of brain activity supporting autobiographical memory, prospection and theory-of-mind and their relationship to the default mode network. J Cogn Neurosci 22(6):1112–1123

Spreng R, Stevens WD, Chamberlain JP, Gilmore AW, Schacter DL (2010) Default network activity, coupled with the frontoparietal control network, supports goal-directed cognition. NeuroImage 53(1):303–317

Sridharan D, Levitin DJ, Menon V (2008) A critical role for the right fronto-insular cortex in switching between central-executive and default-mode networks. Proc Natl Acad Sci U S A 105(34):12569–12574

Stone VE, Baron-Cohen S, Knight RT (1998) Frontal lobe contributions to theory of mind. J Cogn Neurosci 10(5):640–656

Summerfield JJ, Hassabis D, Maguire EA (2010) Differential engagement of brain regions within a “core” network during scene construction. Neuropsychologia 48(5):1501–1509

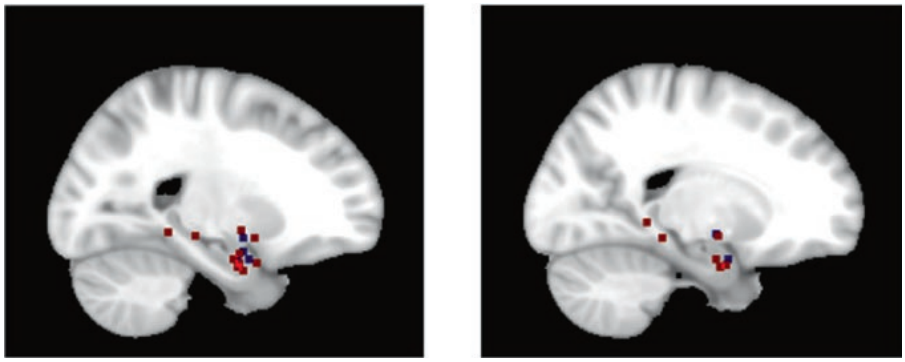
Towse JN, Towse AS, Saito S, Maehara Y, Miyake A (2016) Joint cognition: thought contagion and the consequences of cooperation when sharing the task of random sequence generation. PLoS One 11(3):e0151306

Uddin LQ (2015) Salience processing and insular cortical function and dysfunction. Nat Rev Neurosci 16(1):55–61

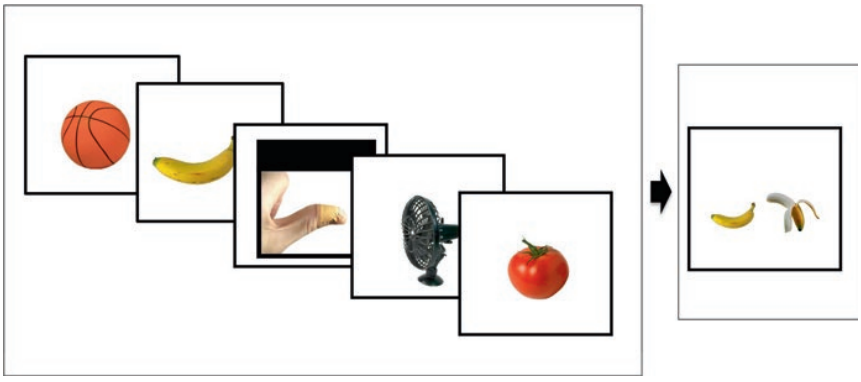
Uddin LQ, Supekar K, Menon V (2013) Reconceptualizing functional brain connectivity in autism from a developmental perspective. Front Hum Neurosci 7:458

Unsworth N, McMillan BD (2013) Mind wandering and reading comprehension: examining the roles of working memory capacity, interest,

motivation, and topic experience. J Exp Psychol Learn Mem Cogn 39(3):832–842
Unsworth N, Spillers GJ (2010) Working memory capacity: attention control, secondary memory, or both? A direct test of the dual-component model. J Mem Lang 62(4):392–406
Van Overwalle F (2009) Social cognition and the brain: a meta-analysis. Hum Brain Mapp 30(3):829–858
Vogel EK, Machizawa MG (2004) Neural activity predicts individual differences in visual working memory capacity. Nature 428(6984):748–751
Wager TD, Smith EE (2003) Neuroimaging studies of working memory: a meta-analysis. Cogn Affect Behav Neurosci 3(4):255–274
Wagner DD, Haxby JV, Heatherton TF (2012) The representation of self and person knowledge in the medial prefrontal cortex. WIREs Cogn Sci 3(4):451–470
Wellman HM, Cross D, Watson J (2001) Meta-analysis of theory-of-mind development: the truth about false belief. Child Dev 72(3):655–684
Whitfield-Gabrieli S, Ford JM (2012) Default mode network activity and connectivity in psychopathology. Annu Rev Clin Psychol 8:49–76
Wimmer H, Perner J (1983) Beliefs about beliefs: representation and constraining function of wrong beliefs in young children's understanding of deception. Cognition 13(1):103–128
Yeo BTT, Krienen FM, Sepulcre J, Sabuncu MR, Lashkari D, Hollinshead M, Roffman JL, Smoller JW, Zöllei L, Polimeni JR, Fischl B, Liu H, Buckner RL (2011) The organization of the human cerebral cortex estimated by intrinsic functional connectivity. J Neurophysiol, 106(3):1125–1165
Zwaan RA, Radvansky GA (1998) Situation models in language comprehension and memory. Psychol Bull 123(2):162–185



شکل ۱,۴. هم‌پوشانی در فعالیت لوب گیجگاهی میانی (الف) چپ و (ب) راست، در طول رمزگذاری (قرمز) و بازیابی (آبی) محرک‌های هیجانی در مقایسه با محرک‌های خنثی (مطالعاتی که برای ایجاد این شکل استفاده شده، در منابع با علامت ستاره * مشخص شده‌اند).



شکل ۲,۴. تصویری نمادین از یک کوشش در مرحلهٔ رمزگذاری و آزمون حافظه؛ پژوهش ساکاکی و همکاران (۲۰۱۴)

Amaral DG, Behniea H, Kelly JL (2003) Topographic organization of projections from the amygdala to the visual cortex in the macaque monkey. Neuroscience 118(4):1099–1120

Anderson AK, Wais PE, Gabrieli JDE (2006) Emotion enhances remembrance of neutral events past. Proc Natl Acad Sci U S A 103(5):1599–1604

Bakker A, Kirwan CB, Miller M, Stark CEL (2008) Pattern separation in the human hippocampal CA3 and dentate gyrus. Science 319(5870):1640–1642

Baumeister RF, Bratslavsky E, Finkenauer C, Vohs KD (2001) Bad is stronger than good. Rev Gen Psychol 5(4):323–370

Bellace M, Williams JM, Mohamed FB, Faro SH (2012) An fMRI study of the activation of the hippocampus by emotional memory. Int J Neurosci 123(2):121–127*

Bouret S, Duvel A, Onat S, Sara SJ (2003) Phasic activation of locus ceruleus neurons by the central nucleus of the amygdala. J Neurosci 23(8):3491–3497

Bradley MM, Greenwald MK, Petry MC, Lang PJ (1992) Remembering pictures: pleasure and arousal in memory. J Exp Psychol Learn Mem Cogn 18(2):379–390

Cahill L, Uncapher M, Kilpatrick L, Alkire MT, Turner J (2004) Sex-related hemispheric lateralization of amygdala function in emotionally influenced memory: an fMRI investigation. Learn Mem 11(3):261–266*

Chen FJ, Sara SJ (2007) Locus coeruleus activation by foot shock or electrical stimulation inhibits amygdala neurons. Neuroscience 144(2):472–481

Daselaar SM, Rice HJ, Greenberg DL, Cabeza R, LaBar KS, Rubin DC (2008) The spatiotemporal dynamics of autobiographical memory: neural correlates of recall, emotional intensity, and reliving. Cereb Cortex 18(1):217–229

Dew ITZ, Ritchey M, LaBar KS, Cabeza R (2014) Prior perceptual processing enhances the effect of emotional arousal on the neural correlates of memory retrieval. Neurobiol Learn Mem 112:104–113

Dolan RJ, Lane R, Chua P, Fletcher P (2000) Dissociable temporal lobe activations during emotional episodic memory retrieval. NeuroImage 11(3):203–209

Dolcos F, LaBar KS, Cabeza R (2004a) Interaction between the amygdala and the medial temporal lobe memory system predicts better memory for emotional events. Neuron 42(5):855–863

Dolcos F, LaBar KS, Cabeza R (2004b) Dissociable effects of arousal and valence on prefrontal activity indexing emotional evaluation and subsequent memory: an event-related fMRI study. NeuroImage 23(1):64–74*

Dolcos F, LaBar KS, Cabeza R (2005) Remembering one year later: role of the amygdala and the medial temporal lobe memory system in retrieving emotional memories. Proc Natl Acad Sci U S A 102(7):2626–2631

Dolcos F, Iordan AD, Kragel J, Stokes J, Campbell R, McCarthy G, Cabeza R (2013) Neural correlates of opposing effects of emotional distraction on working memory and episodic memory: an event-related fMRI investigation. Front Psychol 4:293*

Dougal S, Phelps EA, Davachi L (2007) The role of medial temporal lobe in item recognition and source recollection of emotional stimuli. Cogn Affect Behav Neurosci 7(3):233–242*

Easterbrook JA (1959) The effect of emotion on cue utilization and the organization of behavior. Psychol Rev 66(3):183–201

Fenker DB, Schott BH, Richardson-Klavehn A, Heinze H-J, Düzel E (2005) Recapitulating emotional context: activity of amygdala, hippocampus and fusiform cortex during recollection and familiarity. Eur J Neurosci 21(7):1993–1999*

Ford JH, Morris JA, Kensinger EA (2014) Effects of emotion and emotional valence on the neural correlates of episodic memory search and elaboration. J Cogn Neurosci 26(4):825–839*

Frey S, Bergado-Rosado J, Seidenbecher T, Pape H-C, Frey JU (2001) Reinforcement of early long-term potentiation (Early-LTP) in dentate gyrus by stimulation of the basolateral amygdala: heterosynaptic induction mechanisms of late-LTP. J Neurosci 21(10):3697–3703

Grant SJ, Aston-Jones G, Redmond DE Jr (1988) Responses of primate locus coeruleus neurons to simple and complex sensory stimuli. Brain Res Bull 21(3):401–410

Greenberg DL, Rice HJ, Cooper JJ, Cabeza R, Rubin DC, LaBar KS (2005) Co-activation of the amygdala, hippocampus and inferior frontal gyrus during autobiographical memory retrieval. Neuropsychologia 43(5):659–674

Hamann S, Ely TD, Grafton ST, Kilts CD (1999) Amygdala activity related to enhanced memory for pleasant and aversive stimuli. Nat Neurosci 2(3):289–293

Harvey PO, Fossati P, Lepage M (2007) Modulation of memory formation by stimulus content: specific role of the medial prefrontal cortex in the successful encoding of social pictures. J Cogn Neurosci 19(2):351–362*

Hatfield T, McGaugh JL (1999) Norepinephrine infused into the basolateral amygdala posttraining enhances retention in a spatial water maze task. Neurobiol Learn Mem 71(2):232–239

Hofstetter C, Achaibou A, Vuilleumier P (2012) Reactivation of visual cortex during memory retrieval: content specificity and emotional modulation. NeuroImage 60(3):1734–1745*

Johnson JD, McDuff SGR, Rugg MD, Norman KA (2009) Recollection, familiarity, and cortical reinstatement: a multivoxel pattern analysis. Neuron 63(5):697–708

Kark SM, Kensinger EA (2015) Effect of emotional valence on retrieval-related recapitulation of encoding activity in the ventral visual stream. Neuropsychologia 78:221–230

Keightley ML, Chiew KS, Anderson JAE, Grady CL (2011) Neural correlates of recognition memory for emotional faces and scenes. Soc Cogn Affect Neurosci 6(1):24–37

Kensinger EA, Corkin S (2003) Memory enhancement for emotional words: are emotional words more vividly remembered than neutral words? Mem Cogn 31(8):1169–1180

Kensinger EA, Corkin S (2004) Two routes to emotional memory: distinct neural processes for valence and arousal. Proc Natl Acad Sci U S A 101(9):3310–3315

Kensinger EA, Schacter DL (2005a) Retrieving accurate and distorted memories: neuroimaging evidence for effects of emotion. NeuroImage 27(1):167–177

Kensinger EA, Schacter DL (2005b) Emotional content and reality-monitoring ability: fMRI evidence for the influences of encoding processes. Neuropsychologia 43(10):1429–1443*

Kensinger EA, Schacter DL (2006) Amygdala activity is associated with the successful encoding of item, but not source, information for positive and negative stimuli. J Neurosci 26(9):2564–2570*

Kensinger EA, Schacter DL (2007) Remembering the specific visual details of presented objects: neuroimaging evidence for effects of emotion. Neuropsychologia 45(13):2951–2962*

Kensinger EA, Garoff-Eaton RJ, Schacter DL (2006) Memory for specific visual details can be enhanced by negative arousing content. J Mem Lang 54(1):99–112

Kensinger EA, Garoff-Eaton RJ, Schacter DL (2007a) Effects of emotion on memory specificity:memory trade-offs elicited by negative visually arousing stimuli. J Mem Lang 56(4):575–591

Kensinger EA, Garoff-Eaton RJ, Schacter DL (2007b) How negative emotion enhances the visual specificity of a memory. J Cogn Neurosci 19(11):1872–1887*

Kensinger EA, Addis DR, Atapattu RK (2011) Amygdala activity at encoding corresponds with memory vividness and with memory for select episodic details. Neuropsychologia 49(4):663–673
Kumfor F, Irish M, Hodges JR, Piguet O (2013) The orbitofrontal cortex is involved in emotional enhancement of memory: evidence from the dementias. Brain 136(10):2992–3003
LaBar KS, Cabeza R (2006) Cognitive neuroscience of emotional memory. Nat Rev Neurosci 7(1):54–64
Leal SL, Tighe SK, Jones CK, Yassa MA (2014) Pattern separation of emotional information in hippocampal dentate and CA3. Hippocampus 24(9):1146–1155
Lee T-H, Sakaki M, Cheng R, Velasco R, Mather M (2014) Emotional arousal amplifies the effects of biased competition in the brain. Soc Cogn Affect Neurosci 9(12):2067–2077
Levine LJ, Edelstein RS (2009) Emotion and memory narrowing: a review and goal-relevance approach. Cognit Emot 23(5):833–875
Loftus E, Burns T (1982) Mental shock can produce retrograde amnesia. Mem Cogn 10(4):318–323
Maratos EJ, Dolan RJ, Morris JS, Henson RNA, Rugg MD (2001) Neural activity associated with episodic memory for emotional context. Neuropsychologia 39(9):910–920
Markovic J, Anderson AK, Todd RM (2014) Tuning to the significant: neural and genetic processes underlying affective enhancement of visual perception and memory. Behav Brain Res 259:229–241
Mather M (2007) Emotional arousal and memory binding: an object-based framework. Perspect Psychol Sci 2(1):33–52
Mather M, Sutherland M (2011) Arousal-biased competition in perception and memory. Perspect Psychol Sci 6(2):114–133
Mather M, Clewett D, Sakaki M, Harley CW (2016) Norepinephrine ignites local hot spots of neuronal excitation: how arousal amplifies selectivity in perception and memory. Behav Brain Sci 39:e200
McGaugh JL (2013) Making lasting memories: remembering the significant. Proc Natl Acad Sci U S A 110(S2):10402–10407
McIntyre CK, McGaugh JL, Williams CL (2012) Interacting brain systems modulate memory consolidation. Neurosci Biobehav Rev 36(7):1750–1762
Medford N, Phillips ML, Brierley B, Brammer M, Bullmore ET, David AS (2005) Emotional memory: separating content and context. Psychiatry Res 138(3):247–258*

Mickley KR, Kensinger EA (2008) Emotional valence influences the neural correlates associated with remembering and knowing. Cogn affect Behav Neurosci 8(2):143–152

Mickley Steinmetz KR, Kensinger EA (2009) The effects of valence and arousal on the neural activity leading to subsequent memory. Psychophysiology 46(6):1190–1199*

Mickley Steinmetz KR, Addis DR, Kensinger EA (2010) The effect of arousal on the emotional memory network depends on valence. NeuroImage 53(1):318–324

Mickley Steinmetz KR, Schmidt K, Zucker HR, Kensinger EA (2012) The effect of emotional arousal and retention delay on subsequent-memory effects. Cogn Neurosci 3(3-4):150–159*

Murty VP, Ritchey M, Adcock RA, LaBar KS (2010) fMRI studies of successful emotional memory encoding: a quantitative meta-analysis. Neuropsychologia 48(12):3459–3469

Nielsen SE, Barber SJ, Chai A, Clewett DV, Mather M (2015) Sympathetic arousal increases a negative memory bias in young women with low sex hormone levels. Psychoneuroendocrinology 62:96–106

Norman KA, O'Reilly RC (2003) Modeling hippocampal and neocortical contributions to recognition memory: a complementary-learning-systems approach. Psychol Rev 110(4):611–646

Nyberg L, Persson J, Habib R, Tulving E, McIntosh AR, Cabeza R, Houle S (2000) Large scale neurocognitive networks underlying episodic memory. J Cogn Neurosci 12(1):163–173

Ochsner KN (2000) Are affective events richly recollected or simply familiar? The experience and process of recognizing feelings past. J Exp Psychol Gen 129(2):242–261

Onur OA, Walter H, Schlaepfer TE, Rehme AK, Schmidt C, Keysers C, Maier W, Hurlemann R (2009) Noradrenergic enhancement of amygdala responses to fear. Soc Cogn Affect Neurosci 4(2):119–126

Phelps EA, Sharot T (2008) How (and why) emotion enhances the subjective sense of recollection. Curr Dir Psychol Sci 17(2):147–152

Pitkanen A, Pikkarainen M, Nurminen N, Ylinen A (2000) Reciprocal connections between the amygdala and the hippocampal formation, perirhinal cortex, and postrhinal cortex in rat: a review. Ann N Y Acad Sci 911(1):369–391

Pourtois G, Schettino A, Vuilleumier P (2013) Brain mechanisms for emotional influences on perception and attention: what is magic and what is not. Biol Psychol 92(3):492–512
Richardson MP, Strange BA, Dolan RJ (2004) Encoding of emotional memories depends on amygdala and hippocampus and their interactions. Nat Neurosci 7(3):278–285
Rimmele U, Davachi L, Petrov R, Dougal S, Phelps EA (2011) Emotion enhances the subjective feeling of remembering, despite lower accuracy for contextual details. Emotion 11(3):553–562
Ritchey M, Dolcos F, Cabeza R (2008) Role of amygdala connectivity in the persistence of emotional memories over time: an event-related FMRI investigation. Cereb Cortex 18(11):2494–2504*
Ritchey M, LaBar KS, Cabeza R (2011) Level of processing modulates the neural correlates of emotional memory formation. J Cogn Neurosci 23(4):757–771*
Ritchey M, Wing EA, LaBar KS, Cabeza R (2012) Neural similarity between encoding and retrieval is related to memory via hippocampal interactions. Cereb Cortex 23(12):2818–2828
Rugg MD, Vilberg KL (2013) Brain networks underlying episodic memory retrieval. Curr Opin Neurobiol 23(2):255–260
Rugg MD, Johnson JD, Park H, Uncapher MR (2008) Encoding-retrieval overlap in human episodic memory: a functional neuroimaging perspective. In: Sossin WS, Lacaille JC, Castellucci
VF, Belleville S (eds) Progress in brain research, vol 169. Elsevier, Amsterdam, pp 339–352
Sakaki M, Niki K, Mather M (2012) Beyond arousal and valence: the importance of the biological versus social relevance of emotional stimuli. Cogn affect Behav Neurosci 12(1):115–139
Sakaki M, Fryer K, Mather M (2014) Emotion strengthens high-priority memory traces but weakens low-priority memory traces. Psychol Sci 25(2):387–395
Schaefer A, Philippot P (2005) Selective effects of emotion on the phenomenal characteristics of autobiographical memories. Memory 13(2):148–160
Schwarze U, Bingel U, Sommer T (2012) Event-related nociceptive arousal enhances memory consolidation for neutral scenes. J Neurosci 32(4):1481–1487*
Sears RM, Fink AE, Wigestrand MB, Farb CR, de Lecea L, LeDoux JE (2013) Orexin/hypocretin system modulates amygdala-dependent threat learning through the locus coeruleus. Proc Natl Acad Sci U S A 110(50):20260–20265

Sergerie K, Lepage M, Armony JL (2006) A process-specific functional dissociation of the amygdala in emotional memory. J Cogn Neurosci 18(8):1359–1367*

Segal SK, Stark SM, Kattan D, Stark CE, Yassa MA (2012) Norepinephrine-mediated emotional arousal facilitates subsequent pattern separation. Neurobiol Learn Mem 97(4):465–469

Shafer AT, Dolcos F (2012) Neural correlates of opposing effects of emotional distraction on perception and episodic memory: an event-related FMRI investigation. Front Integr Neurosci 6:70*

Shafer AT, Dolcos F (2014) Dissociating retrieval success from incidental encoding activity during emotional memory retrieval, in the medial temporal lobe. Front Behav Neurosci 8:177

Sharot T, Delgado MR, Phelps EA (2004) How emotion enhances the feeling of remembering. Nat Neurosci 7(12):1376–1380

Smith APR, Henson RNA, Dolan RJ, Rugg MD (2004) fMRI correlates of the episodic retrieval of emotional contexts. NeuroImage 22(2):868–878*

Smith APR, Henson RNA, Rugg MD, Dolan RJ (2005) Modulation of retrieva processing reflects accuracy of emotional source memory. Learn Mem 12(5):472–479*

Smith APR, Stephan KE, Rugg MD, Dolan RJ (2006) Task and content modulate amygdalahippocampal connectivity in emotional retrieval. Neuron 49(4):631–638*

Spachtholz P, Kuhbandner C, Pekrun R (2014) Negative affect improves the quality of memories: trading capacity for precision in sensory and working memory. J Exp Psychol Gen 143(4):1450–1456

St. Jacques PL, Levine B (2007) Ageing and autobiographical memory for emotional and neutral events. Memory 15(2):129–144

Steblay NM (1992) A meta-analytic review of the weapon focus effect. Law Hum Behav 16(4):413–424

Sterpenich V, D'Argembeau A, Desseilles M, Balteau E, Albouy G, Vandewalle G, Degueldre C, Luxen A, Collette F, Maquet P (2006) The locus ceruleus is involved in the successful retrieval of emotional memories in humans. J Neurosci 26(28):7416–7423*

Sterpenich V, Albouy G, Darsaud A, Schmidt C, Vandewalle G, TTD V, Desseilles M, Phillips C, Degueldre C, Balteau E, Collette F (2009) Sleep promotes the neural reorganization of remote emotional memory. J Neurosci 29(16):5143–5152*

Strange BA, Hurlemann R, Dolan RJ (2003) An emotion-induced retrograde amnesia in humans is amygdala- and beta-adrenergic-dependent. Proc Natl Acad Sci U S A 100(23):13626–13631*

Sutherland MR, Mather M (2012) Negative arousal amplifies the effects of saliency in short-term memory. Emotion 12(6):1367–1372

Talarico JM, Rubin DC (2003) Confidence, not consistency, characterizes flashbulb memories. Psychol Sci 14(5):455–461

Talmi D, Anderson AK, Riggs L, Caplan JB, Moscovitch M (2008) Immediate memory consequences of the effect of emotion on attention to pictures. Learn Mem 15(3):172–182*

Taylor SF, Liberzon I, Fig LM, Decker LR, Minoshima S, Koeppe RA (1998) The effect of emotional content on visual recognition memory: a PET activation study. NeuroImage 8(2):188–197

Todd RM, Talmi D, Schmitz TW, Susskind J, Anderson AK (2012) Psychophysical and neural evidence for emotion-enhanced perceptual vividness. J Neurosci 32(33):11201–11212

van Bockstaele EJ, Colago EEO, Valentino RJ (1998) Amygdaloid corticotropin-releasing factor targets locus coeruleus dendrites: substrate for the co-ordination of emotional and cognitive limbs of the stress response. J Neuroendocrinol 10(10):743–758

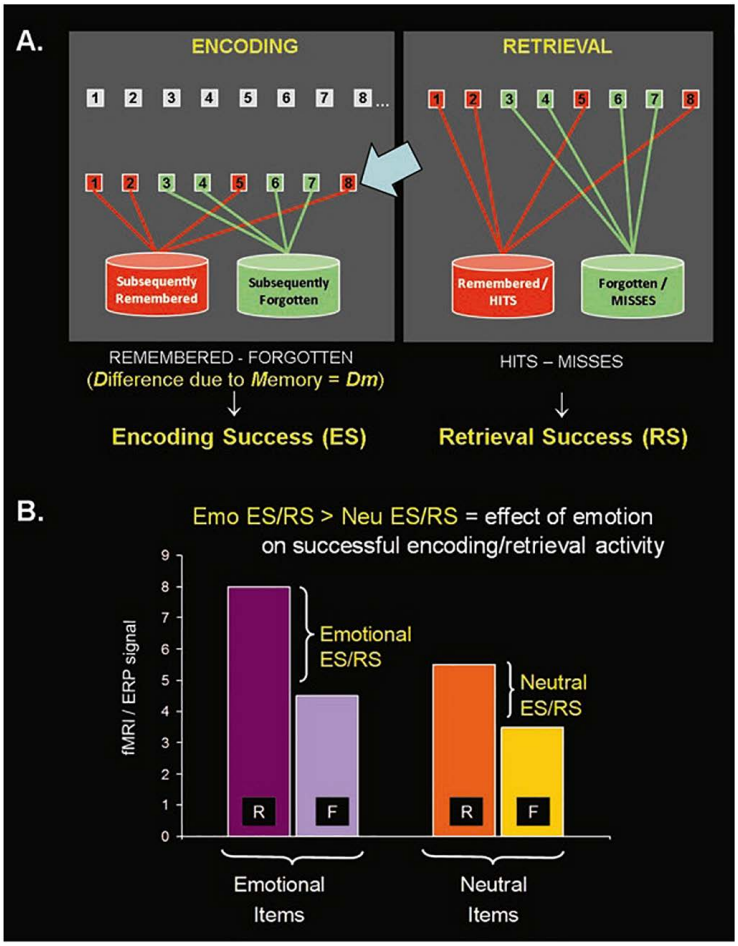
Vuilleumier P, Richardson MP, Armony JL, Driver J, Dolan RJ (2004) Distant influences of amygdala lesion on visual cortical activation during emotional face processing. Nat Neurosci 7(11):1271–1278

Waring JD, Kensinger EA (2011) How emotion leads to selective memory: neuroimaging evidence. Neuropsychologia 49(7):1831–1842*

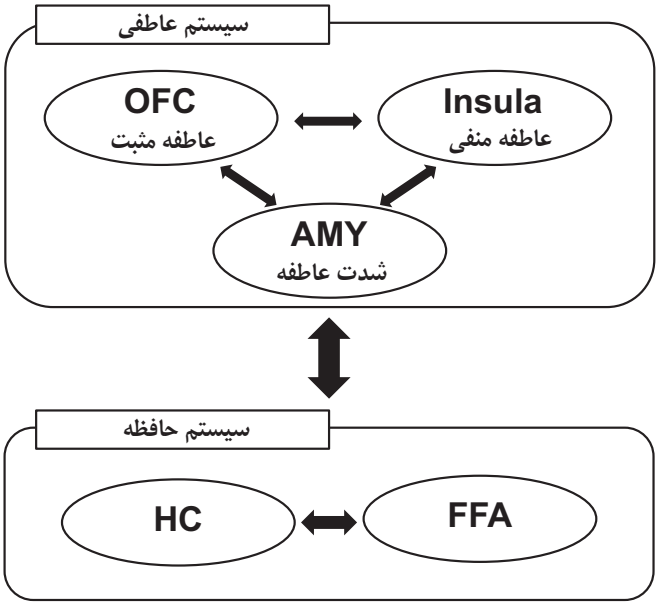
Wheeler ME, Petersen SE, Buckner RL (2000) Memory's echo: vivid remembering reactivates sensory-specific cortex. Proc Natl Acad Sci U S A 97(20):11125–11129

Yassa MA, Stark CEL (2011) Pattern separation in the hippocampus. Trends Neurosci 34(10):515–525

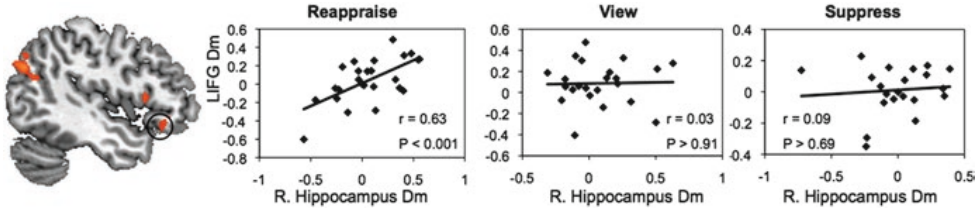
Yonelinas AP, Ritchey M (2015) The slow forgetting of emotional episodic memories: an emotional binding account. Trends Cogn Sci 19(5):259–267



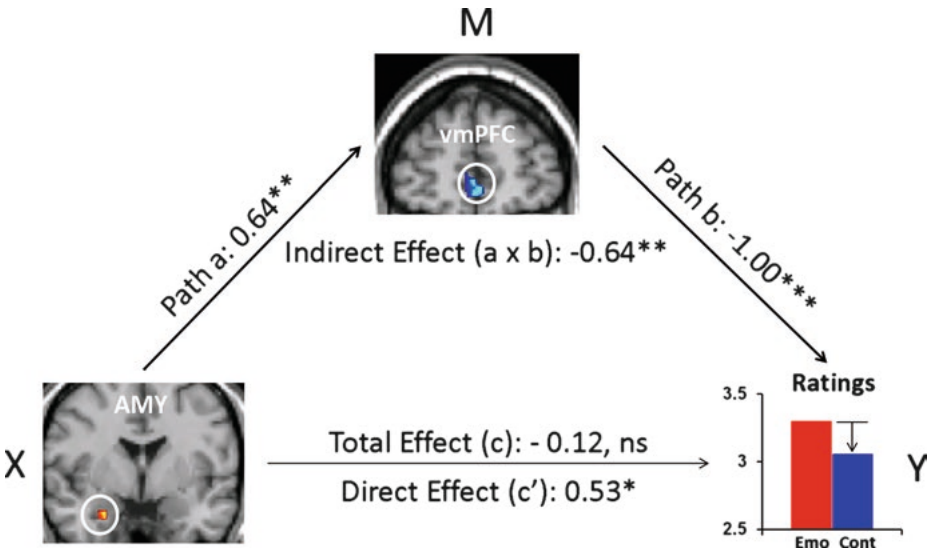
شکل ۱.۵. شیوه حافظهٔ متعاقب (SMP) ــ سنجش تأثیر هیجان‌ها بر فعالیت موفقیت رمزگذاری (ES) و موفقیت بازیابی (RS). (الف) روند کلی دخیل در SMP. (ب) نمودار مقایسه‌هایی که شناسایی مناطق مغزی حساس به ES و RS هیجانی را امکان‌پذیر می‌کند. R مواردی که بعداً به خاطر آورده می‌شوند، F موارد فراموش‌شدهٔ بعدی، fMRI، تصویربرداری تشدید مغناطیسی عملکردی، ERP، پتانسیل وابسته به رویداد.



شکل ۲,۵. یک مدل فرضی از سازوکارهای عصبی زمینه‌ساز تأثیر سیگنال‌های هیجانی مبتنی بر چهره بر حافظهٔ چهره‌ها. آمیگدال- آمیگدال، OFC- قشر اوربیتوفرونتال، INS- قشر اینسولار، HIP- هیپوکامپ، FFA_ ناحیهٔ دوکی‌شکل چهره (بازتولید شده و با کسب اجازه از تسوکیورا، ۲۰۱۲).

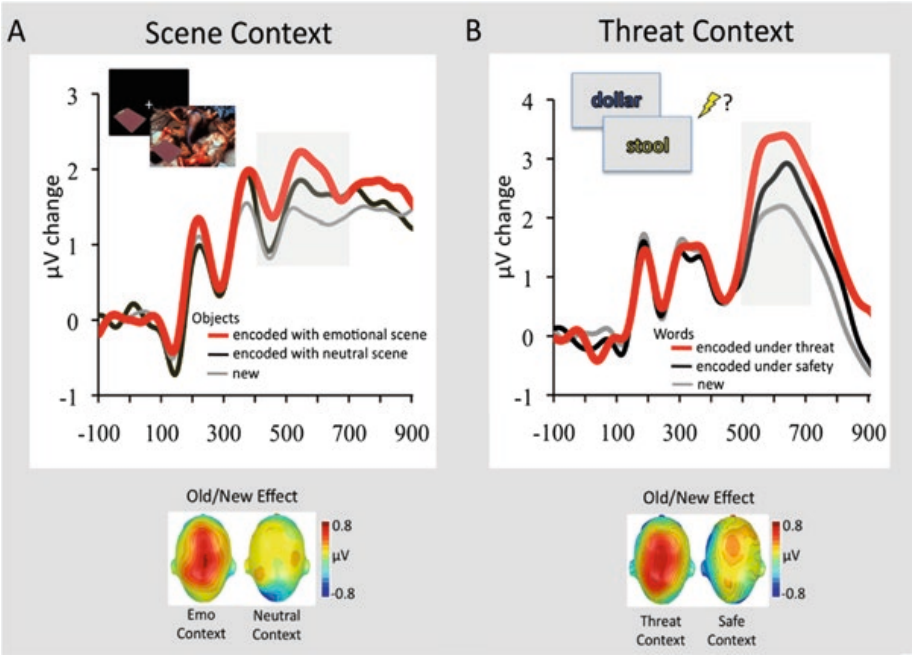


شکل ۳,۵. هم‌بستگی مثبت قوی‌تر بین شکنج پیشانی تحتانی چپ (IFG) و هیپوکامپ (هیپوکامپ) در زمان استفاده از ارزیابی مجدد، در مقایسه با مشاهدهٔ غیرفعال و سرکوب، ارزیابی مجدد با افزایش هم‌بستگی -IFGهیپوکامپ برای فعالیت وابسته به حافظه (اثر Dm) به‌عنوان تابعی از سازوکارهای تنظیم هیجان (ER) مورد استفاده در طول رمزگذاری همراه بود. Dm- تفاوت ناشی از حافظه (بازتولی و اجازه از هایس و همکاران، ۲۰۱۰)



شکل ۴,۵. PFC شکمی‌میانی زمانی که تمرکز از جنبه‌های هیجانی یادآوری‌های زندگینامه‌ای دور می‌شود، بین آمیگدال و نمرات هیجانی میانجی می‌شود. تجزیه‌وتحلیل میانجی زمانی که تمرکز بر جنبه‌های غیرهیجانی خاطرات شخصی بود یک اثر میانجی منفی معنادار (p=0.009) مربوط به PFC شکمی‌میانی (vmPFC) بر رابطهٔ بین آمیگدال و رتبه‌بندی هیجانی شناسایی کرد، و در زمان کنترل برای تأثیر vmPFC، اثر مستقیم مثبت معناداری (p=0.03) بین آمیگدال و رتبه‌بندی هیجانی نشان داد (مسیر c´، کنترل X به Y برای M). برای هر مسیر ضرایب استانداردشده و معناداری که با ستاره نشان داده شده، گزارش شده است.

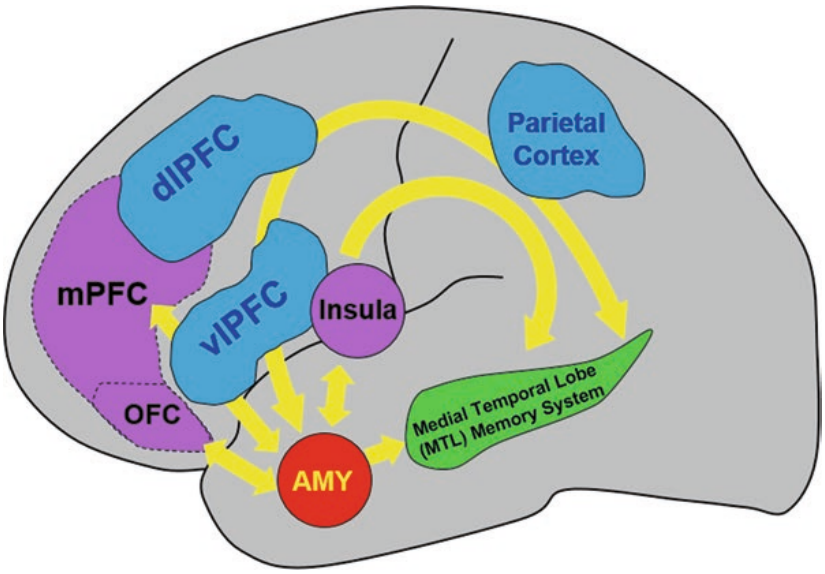
ns– غیرمعنادار (بازتولید و اجازه از دنکووا و همکاران، ۲۰۱۵) ;*p<0.05 ;**p<0.01 ;***p<0.001



شکل ۵،۵ اثر ERP وابسته به بازیابی (اثر قدیم/ جدید) مربوط به محرک‌هایی که قبلاً با زمینه‌های هیجانی و خنثی مرتبط بودند.

(الف) شکل موج‌های ERP متوسط بزرگ در یک خوشهٔ حسی مرکزی- آهیانه‌ای برای اشیائی که به‌درستی بازشناسی شده‌اند، که در زمینهٔ یک صحنه پس‌زمینهٔ هیجانی (خط قرمز)، یا صحنه پس‌زمینهٔ خنثی (خط سیاه) و اشیای جدیدی که به‌درستی طبقه‌بندی شده‌اند (خط خاکستری) رمزگذاری شده‌اند. توالی رمزگذاری این آزمایش در قسمت بالا سمت چپ نشان داده شده است. در این آزمایش ۱۴۴ شیء در ۱۴۴ صحنهٔ پس‌زمینه (۴۸ صحنهٔ دلپذیر، ۴۸ صحنهٔ خنثی و ۴۸ صحنهٔ ناخوشایند) ارائه شدند. برای جلوگیری از رقابت مستقیم بین پس‌زمینه‌های هیجانی و اشیا خنثی، ابتدا اشیا نمایش داده شده و به‌دنبال آن صحنهٔ پس‌زمینه ارائه شد. برای تسهیل پیوند حافظه، از شرکت‌کنندگان خواسته شد تصور کنند شیء بخشی از صحنه است. نمودار پایین توپوگرافی‌های پوست سر مربوط به اختلاف ERP (قدیمی منهای جدید؛ ۴۰۰- ۷۰۰ میلی‌ثانیه) را نشان می‌دهد که به تفکیک برای اشیائی که با صحنه‌های هیجانی یا خنثی جفت شده‌اند به کار می‌رود.

(ب) شکل موج‌های ERP متوسط بزرگ در یک خوشهٔ حسی مرکزی- آهیانه‌ای برای کلماتی که به‌درستی به خاطر آورده می‌شوند که با رنگ فونتی رمزگذاری شده‌اند (توالی رمزگذاری بالا سمت چپ را ببینید) که نشانهٔ تهدید شوک (خط قرمز) یا ایمنی (خط سیاه) است و کلمات جدیدی که به‌درستی طبقه‌بندی شده است (خط خاکستری). نمودار پایین توپوگرافی‌های پوست سر مربوط به اختلاف ERP (قدیمی منهای جدید؛ ۵۰۰- ۷۰۰ میلی‌ثانیه) را نشان می‌دهد که به تفکیک برای اشیائی که تحت تهدید یا ایمنی رمزگذاری شده‌اند، به کار می‌رود.



شکل ۶,۵. نمودار خلاصه‌ای از مناطق‌های عصبی اثر هیجان‌ها بر تقویت حافظه که از مطالعات تصویربرداری مغز حاصل شده است. دو سازوکار اصلی دخیل در تأثیر هیجان‌ها بر تقویت حافظه شناسایی شده است: یکی بر اساس لوب گیجگاهی میانی (MTL؛ (سیستم حافظه MTL و آمیگدال= هیپوکامپ و قشر پاراهیپوکامپ مرتبط) و دیگری نیز شامل مناطق غیر MTL مانند قشر پیش‌پیشانی میانی و پشتی/ شکمی جانبی (به‌ترتیب mPFC و dlPFC/vlPFC) در میان دیگران (مانند قشر آهیانه). مناطق حافظه MTL و آمیگدال از طریق سازوکارهای عصبی- هورمونی مستقیم/ خودکار تعامل می‌کنند که در اثر هیجان‌ها بر تقویت حافظه مشارکت دارند (سازوکار پایین به بالا)، درحالی‌که PFC بخشی از سازوکاری است که با ارتقای فرایندهای سازوکارک، معنایی، حافظهٔ کاری و توجه (سازوکار بالا به پایین)، مشارکت غیرمستقیم/ با واسطه‌ای در خاطرات هیجانی دارد. علاوه‌بر این، بررسی حافظه هیجانی برای جنبه‌های اجتماعی، مشارکت خاص خوشایندیِ سایر مناطق مغزی را که در تقویت حافظهٔ هیجانی در زمینهٔ اجتماعی نقش دارند، شناسایی کرد- یعنی حافظه برای اطلاعات مرتبط اجتماعی، برای مواردی با مفاهیم مثبت شامل فعالیت در OFC میانی و MTL و تعاملات بین آن‌ها است و تعاملات بین اینسولا و MTL برای مواردی با مفاهیم منفی است. در نهایت، بررسی تأثیر تنظیم هیجان بر حافظه هیجانی، روابط دو سویهٔ بین مناطق PFC و MTL مربوط به سازوکارهای خاص تنظیم هیجانی را شناسایی کرد، که شامل PFC جانبی/ میانی در مدولاسیون بالا به پایین، سازوکارهای آمیگدال MTL - در رمزگذاری و بازیابی حافظهٔ هیجانی و سیگنال‌دهی آمیگدال به PFC میانی است که نیاز به اعمال کنترل بر محرک‌های هیجانی دارد، که به کاهش کلی تجربهٔ هیجانی در طول بازیابی زندگینامه‌ای منجر می‌شود (برگرفته و کسب اجازه از دنوکووا و همکاران، ۲۰۱۵؛ دولکاس و همکاران، ۲۰۱۱، ۲۰۱۲).

Addis DR, Moscovitch M, Crawley AP, McAndrews MP (2004) Recollective qualities modulate hippocampal activation during autobiographical memory retrieval. Hippocampus 14(6):752–762
Adolphs R (2010) What does the Amygdala contribute to social cognition? Ann N Y Acad Sci 1191(1):42–61
Adolphs R, Cahill L, Schul R, Babinsky R (1997) Impaired declarative memory for emotional material following bilateral amygdala damage in humans. Learn Mem 4(3):291–300
Adolphs R, Tranel D, Denburg N (2000) Impaired emotional declarative memory following unilateral amygdala damage. Learn Mem 7(3):180–186
Adolphs R, Tranel D, Buchanan TW (2005) amygdala damage impairs emotional memory for gist but not details of complex stimuli. Nat Neurosci 8(4):512–518
Ahn HM, Kim SA, Hwang IJ, Jeong JW, Kim HT, Hamann S, Kim SH (2015) The effect of cognitive reappraisal on long-term emotional experience and emotional memory. J Neuropsychol 9(1):64–76
Allen M, Dietz M, Blair KS, van Beek M, Rees G, Vestergaard-Poulsen P, Lutz A, Roepstorff A (2012) Cognitive-affective neural plasticity following active-controlled mindfulness intervention. J Neurosci 32(44):15601–15610
Amft M, Bzdok D, Laird AR, Fox PT, Schilbach L, Eickhoff SB (2015) Definition and characterization of an extended social-affective default network. Brain Struct Funct 220(2):1031–1049
Anderson MC, Ochsner KN, Kuhl B, Cooper J, Robertson E, Gabrieli SW, Glover GH, Gabrieli JDE (2004) Neural systems underlying the suppression of unwanted memories. Science 303(5655):232–235
Beadle JN, Tranel D, Cohen NJ, Duff M (2013) Empathy in hippocampal amnesia. Front Psychol 4:69
Benoit RG, Anderson MC (2012) Opposing mechanisms support the voluntary forgetting of unwanted memories. Neuron 76(2):450–460
Benoit RG, Hulbert JC, Huddleston E, Anderson MC (2015) Adaptive top-down suppression of hippocampal activity and the purging of intrusive memories from consciousness. J Cogn Neurosci 27(1):96–111
Bickart KC, Dickerson BC, Barrett LF (2014) The amygdala as a hub in brain networks that support social life. Neuropsychologia 63:235–248
Binder J, de Quervain DJ, Friese M, Luechinger R, Boesiger P, Rasch B (2012) Emotion suppression reduces hippocampal activity during successful memory encoding. NeuroImage 63(1):525–532

Bisby JA, Horner AJ, Horlyck LD, Burgess N (2016) Opposing effects of negative emotion on amygdalar and hippocampal memory for items and associations. Soc Cogn Affect Neurosci 11(6):981–990

Botzung A, LaBar KS, Kragel P, Miles A, Rubin DC (2010a) Component neural systems for the creation of emotional memories during free viewing of a complex, real-world event. Front Hum Neurosci 4:34

Botzung A, Rubin DC, Miles A, Cabeza R, Labar KS (2010b) Mental hoop diaries: emotional memories of a college basketball game in rival fans. J Neurosci 30(6):2130–2137

Bradley MM, Lang PJ (1994) Measuring emotion: i self-assessment manikin and the semantic differential. J Behav Ther Exp Psychiatry 25(1):49–59

Bradley MM, Greenwald MK, Petry MC, Lang PJ (1992) Remembering pictures: pleasure and arousal in memory. J Exp Psychol Learn Mem Cogn 18(2):379–390

Buchanan TW (2007) Retrieval of emotional memories. Psychol Bull 133(5):761–779

Buchanan TW, Adolphs R (2002) The role of the human amygdala in emotional modulation of long-term declarative memory. In: Moore SC, Oaksford M (eds) Emotional cognition: from brain to behaviour, Advances in consciousness research, vol. 44. John Benjamins Publishing Company, Amsterdam, pp 9–34

Burke A, Heuer F, Reisberg D (1992) Remembering emotional events. Mem Cogn 20(3):277–290

Cabeza R, Prince SE, Daselaar SM, Greenberg DL, Budde M, Dolcos F, LaBar KS, Rubin DC (2004) Brain activity during episodic retrieval of autobiographical and laboratory events: aN fMRI study using a novel photo paradigm. J Cogn Neurosci 16(9):1583–1594

Cahill L, Prins B, Weber M, McGaugh JL (1994) Beta-adrenergic activation and memory for emotional events. Nature 371(6499):702–704

Cahill L, Babinsky R, Markowitsch HJ, McGaugh JL (1995) The amygdala and emotional memory. Nature 377(6547):295–296

Cahill L, Haier RJ, Fallon J, Alkire MT, Tang C, Keator D, Wu J, McGaugh JL (1996) amygdala activity at encoding correlated with long-term, free recall of emotional information. Proc Natl Acad Sci 93(15):8016–8021

Cahill L, Weinberger NM, Roozendaal B, McGaugh JL (1999) Is the amygdala a locus of “conditioned fear”? Some questions and caveats. Neuron 23(2):227–228

Canli T, Zhao Z, Brewer J, Gabrieli JD, Cahill L (2000) Event-related activation in the human amygdala associates with later memory for individual emotional experience. J Neurosci 20(19):RC99
Cassidy BS, Leshikar ED, Shih JY, Aizenman A, Gutchess AH (2013) Valence-based age differences in medial prefrontal activity during impression formation. Soc Neurosci 8(5):462–473
Chiu Y-C, Dolcos F, Gonsalves BD, Cohen NJ (2013) On opposing effects of emotion on contextual or relational memory. Front Psychol 4:103
Christianson SA (1992) Emotional stress and eyewitness memory: a critical review. Psychol Bull 112(2):284–309
Ciaramelli E, Bernardi F, Moscovitch M (2013) Individualized Theory of Mind (iToM): when memory modulates empathy. Front Psychol 4:4
Cohen NJ, Ryan J, Hunt C, Romine L, Wszalek T, Nash C (1999) Hippocampal system and declarative (relational) memory: summarizing the data from functional neuroimaging studies. Hippocampus 9(1):83–98
Collins JA, Olson IR (2014) Beyond the FIthe role of the ventral anterior temporal lobes in face processing. Neuropsychologia 61:65–79
Cunningham WA, Brosch T (2012) Motivational salience: amygdala tuning from traits, needs, values, and goals. Curr Dir Psychol Sci 21(1):54–59
Cunningham WA, Van Bavel JJ, Johnsen IR (2008) Affective flexibility: evaluative processing goals shape amygdala activity. Psychol Sci 19(2):152–160
D'Argembeau A, Van der Linden M (2004) Influence of affective meaning on memory for contextual information. Emotion 4(2):173–188
D'Esposito M, Zarahn E, Aguirre GK (1999) Event-related functional MRI: implications for cognitive psychology. Psychol Bull 125(1):155–164
D'Esposito M, Postle BR, Rypma B (2000) Prefrontal cortical contributions to working memory: evidence from event-related fMRI studies. Exp Brain Res 133(1):3–11
Daselaar SM, Rice HJ, Greenberg DL, Cabeza R, LaBar KS, Rubin DC (2008) The spatiotemporal dynamics of autobiographical memory: neural correlates of recall, emotional intensity, and reliving. Cereb Cortex 18(1):217–229
Davachi L (2006) Item, context and relational episodic encoding in humans. Curr Opin Neurobiol 16(6):693–700
Davidson RJ, Irwin W (1999) The functional neuroanatomy of emotion and affective style. Trend Cogn Sci 3(1):11–21

De Gelder B, de Borst AW, Watson R (2015) The perception of emotion in body expressions. Wiley Interdiscip Rev Cogn Sci 6(2):149–158
Delgado MR, Olsson A, Phelps EA (2006) Extending animal models of fear conditioning to humans. Biol Psychol 73(1):39–48
Delgado MR, Beer JS, Fellows LK, Huettel SA, Platt ML, Quirk GJ, Schiller D (2016) Viewpoints: dialogues on the functional role of the ventromedial prefrontal cortex. Nat Neurosci 19(12):1545–1552
Denkova E, Botzung A, Scheiber C, Manning L (2006) Implicit emotion during recollection of past events: a nonverbal fMRI study. Brain Res 1078(1):143–150
Denkova E, Dolcos S, Dolcos F (2012) Reliving emotional personal memories: affective biases linked to personality and sex-related differences. Emotion 12(3):515–528
Denkova E, Dolcos S, Dolcos F (2013) The effect of retrieval focus and emotional valence on the medial temporal lobe activity during autobiographical recollection. Front Behav Neurosci 7:109
Denkova E, Dolcos S, Dolcos F (2015) Neural correlates of 'distracting' from emotion during autobiographical recollection. Soc Cogn Affect Neurosci 10(2):219–230
Depue BE, Banich MT, Curran T (2006) Suppression of emotional and nonemotional content in memory: effects of repetition on cognitive control. Psychol Sci 17(5):441–447
Depue BE, Curran T, Banich MT (2007) Prefrontal regions orchestrate suppression of emotional memories via a two-phase process. Science 317(5835):215–219
Desbordes G, Negi LT, Pace TW, Wallace BA, Raison CL, Schwartz EL (2012) Effects of mindful-attention and compassion meditation training on amygdala response to emotional stimuli in an ordinary, non-meditative state. Front Hum Neurosci 6:292
Diana RA, Van den Boom W, Yonelinas AP, Ranganath C (2011) ERP correlates of source memory: unitized source information increases familiarity-based retrieval. Brain Res 1367:278–286
Dillon DG, Ritchey M, Johnson BD, LaBar KS (2007) Dissociable effects of conscious emotion regulation strategies on explicit and implicit memory. Emotion 7(2):354–365
Doerksen S, Shimamura AP (2001) Source memory enhancement for emotional words. Emotion 1(1):5–11

Dolan RJ (2007) The human amygdala and orbital prefrontal cortex in behavioural regulation. Philos Trans R Soc Lond Ser B Biol Sci 362(1481):787–799
Dolan RJ, Lane R, Chua P, Fletcher P (2000) Dissociable temporal lobe activations during emotional episodic memory retrieval. NeuroImage 11(3):203–209
Dolcos F (2014) The fast and the slow sides of cortisol's effects on emotional interference and sustained attention. Front Neurosci 8:268
Dolcos F, Denkova E (2008) Neural correlates of encoding emotional memories: a review of functional neuroimaging evidence. Cell Sci Rev 5:78–122
Dolcos F, LaBar KS, Cabeza R (2004a) Dissociable effects of arousal and valence on prefrontal activity indexing emotional evaluation and subsequent memory: an event-related fMRI study. NeuroImage 23(1):64–74
Dolcos F, LaBar KS, Cabeza R (2004b) Interaction between the amygdala and the medial temporal lobe memory system predicts better memory for emotional events. Neuron 42(5):855–863
Dolcos F, LaBar KS, Cabeza R (2005) Remembering one year later: role of the amygdala and the medial temporal lobe memory system in retrieving emotional memories. Proc Natl Acad Sci 102(7):2626–2631
Dolcos F, Kragel P, Wang L, McCarthy G (2006a) Role of the inferior frontal cortex in coping with distracting emotions. Neuroreport 17(15):1591–1594
Dolcos F, LaBar KS, Cabeza R (2006b) The memory-enhancing effect of emotion: functional neuroimaging evidence. In: Uttl B, Ohta N, Siegenthaler AL (eds) Memory and emotion: interdisciplinary perspectives. Blackwell Publishing, Malden, pp 105–134
Dolcos F, Iordan AD, Dolcos S (2011) Neural correlates of emotion-cognition interactions: a review of evidence from brain imaging investigations. J Cogn Psychol 23(6):669–694
Dolcos F, Denkova E, Dolcos S (2012) Neural correlates of emotional memories: a review of evidence from brain imaging studies. Psychologia 55(2):80–111
Dolcos F, Katsumi Y, Weymar M, Moore M, Tsukiura T, Dolcos S (2017) Emerging directions in emotional episodic memory. Front Psychol. 8:1867
Donaldson DI, Buckner RL (2001) Effective paradigm design. In: Jezzard P, Matthews PM, Smith SM (eds) Functional MRI: an introduction to methods. Oxford University Press, New York, pp 177–198

Dorfel D, Lamke JP, Hummel F, Wagner U, Erk S, Walter H (2014) Common and differential neural networks of emotion regulation by detachment, reinterpretation, distraction, and expressive suppression: a comparative fMRI investigation. NeuroImage 101:298–309

Dougal S, Phelps EA, Davachi L (2007) The role of medial temporal lobe in item recognition and source recollection of emotional stimuli. Cogn Affect Behav Neurosci 7(3):233–242

Easterbrook JA (1959) The effect of emotion on cue utilization and the organization of behavior. Psychol Rev 66(3):183–201

Edelson M, Sharot T, Dolan RJ, Dudai Y (2011) Following the crowd: brain substrates of long-term memory conformity. Science 333(6038):108–111

Eippert F, Veit R, Weiskopf N, Erb M, Birbaumer N, Anders S (2007) Regulation of emotional responses elicited by threat-related stimuli. Hum Brain Mapp 28(5):409–423

Erk S, Martin S, Walter H (2005) Emotional context during encoding of neutral items modulates brain activation not only during encoding but also during recognition. NeuroImage 26(3):829–838

Erk S, von Kalckreuth A, Walter H (2010) Neural long-term effects of emotion regulation on episodic memory processes. Neuropsychologia 48(4):989–996

Fabiansson EC, Denson TF, Moulds ML, Grisham JR, Schira MM (2012) Don't look back in anger: neural correlates of reappraisal, analytical rumination, and angry rumination during recall of an anger-inducing autobiographical memory. NeuroImage 59(3):2974–2981

Fanselow MS, LeDoux JE (1999) Why we think plasticity underlying Pavlovian fear conditioning occurs in the basolateral amygdala. Neuron 23(2):229–232

Flor H, Nees F (2014) Learning, memory and brain plasticity in posttraumatic stress disorder: context matters. Restor Neurol Neurosci 32(1):95–102

Flores LE, Berenbaum H (2017) The effect of the social regulation of emotion on emotional long-term memory. Emotion 17(3):547–556

Fossati P, Hevenor SJ, Lepage M, Graham SJ, Grady C, Keightley ML, Craik F, Mayberg H (2004)

Distributed self in episodic memory: neural correlates of successful retrieval of self-encoded positive and negative personality traits. NeuroImage 22(4):1596–1604

Gagnepain P, Henson RN, Anderson MC (2014) Suppressing unwanted memories reduces their unconscious influence via targeted cortical inhibition. Proc Natl Acad Sci 111(13):E1310–E1319

Gilron R, Gutchess AH (2012) Remembering first impressions: effects of intentionality and diagnosticity on subsequent memory. Cogn Affect Behav Neurosci 12(1):85–98
Glascher J, Adolphs R (2003) Processing of the arousal of subliminal and supraliminal emotional stimuli by the human amygdala. J Neurosci 23(32):10274–10282
Goldin PR, McRae K, Ramel W, Gross JJ (2008) The neural bases of emotion regulation: reappraisal and suppression of negative emotion. Biol Psychiatry 63(6):577–586
Gotlib IH, Joormann J (2010) Cognition and depression: current status and future directions. Annu Rev Clin Psychol 6:285–312
Graf P, Schacter DL (1989) Unitization and grouping mediate dissociations in memory for new associations. J Exp Psychol Learn Mem Cogn 15(5):930–940
Grecucci A, Theuninck A, Frederickson J, Job R (2015) Mechanisms of social emotion regulation: from neuroscience to psychotherapy. In: Bryant ML (ed) Emotion regulation: processes, cognitive effects and social consequences. Nova Science Publishers, New York, pp 57–84
Greenberg DL, Rice HJ, Cooper JJ, Cabeza R, Rubin DC, LaBar KS (2005) Co-activation of the amygdala, hippocampus and inferior frontal gyrus during autobiographical memory retrieval. Neuropsychologia 43(5):659–674
Greenwald AG, Banaji MR (1989) The self as a memory system: powerful, but ordinary. J Pers Soc Psychol 57(1):41
Gross JJ (2002) Emotion regulation: affective, cognitive, and social consequences. Psychophysiology 39(3):281–291
Gross JJ (2008) Emotion regulation. In: Lewis M, Haviland-Jones JM, Barrett LF (eds) Handbook of emotions. Guilford, New York, pp 497–512
Gross JJ (2015) Emotion regulation: current status and future prospects. Psychol Inq 26(1):1–26
Guillet R, Arndt J (2009) TabooIds: the effect of emotion on memory for peripheral information. Mem Cogn 37(6):866–879
Gutchess AH, Sokal R, Coleman JA, Gotthilf G, Grewal L, Rosa N (2015) Age differences in self-referencing: evidence for common and distinct encoding strategies. Brain Res 1612:118–127
Haas BW, Canli T (2008) Emotional memory function, personality structure and psychopathology: a neural system approach to the identification of vulnerability markers. Brain Res Rev 58(1):71–84

Hamann S (2001) Cognitive and neural mechanisms of emotional memory. Trends Cogn Sci 5(9):394–400
Hamann SB, Ely TD, Grafton ST, Kilts CD (1999) amygdala activity related to enhanced memory for pleasant and aversive stimuli. Nat Neurosci 2(3):289–293
Harvey PO, Fossati P, Lepage M (2007) Modulation of memory formation by stimulus content: specific role of the medial prefrontal cortex in the successful encoding of social pictures. J Cogn Neurosci 19(2):351–362
Haskins AL, Yonelinas AP, Quamme JR, Ranganath C (2008) Perirhinal cortex supports encoding and familiarity-based recognition of novel associations. Neuron 59(4):554–560
Hayes JP, Morey RA, Petty CM, Seth S, Smoski MJ, McCarthy G, LaBar KS (2010) Staying cool when things get hot: emotion regulation modulates neural mechanisms of memory encoding. Front Hum Neurosci 4:230
Heeren A, Van Broeck N, Philippot P (2009) The effects of mindfulness on executive processes and autobiographical memory specificity. Behav Res Ther 47(5):403–409
Heinzel A, Northoff G (2009) Emotional feeling and the orbitomedial prefrontal cortex: theoretical and empirical considerations. Philos Psychol 22(4):443–464
Hermann A, Bieber A, Keck T, Vaitl D, Stark R (2014) Brain structural basis of cognitive reappraisal and expressive suppression. Soc Cogn Affect Neurosci 9(9):1435–1442
Hermans EJ, Henckens MJ, Joels M, Fernandez G (2014) Dynamic adaptation of large-scale brain networks in response to acute stressors. Trend Neurosci 37(6):304–314
Holland AC, Kensinger EA (2013) The neural correlates of cognitive reappraisal during emotional autobiographical memory recall. J Cogn Neurosci 25(1):87–108
Iordan AD (2016) The impact of emotional distraction on cognition: from basic brain responses to large-scale network interactions. Doctoral dissertation, University of Illinois at Urbana-Champaign Jaeger A, Rugg MD (2012) Implicit effects of emotional contexts: an ERP study. Cogn Affect Behav Neurosci 12(4):748–760
Jaeger A, Johnson JD, Corona M, Rugg MD (2009) ERP correlates of the incidental retrieval of emotional information: effects of study-test delay. Brain Res 1269:105–113

Jing HG, Madore KP, Schacter DL (2016) Worrying about the future: an episodic specificity induction impacts problem solving, reappraisal, and well-being. J Exp Psychol Gen 145(4):402–418
Joels M, Fernandez G, Roozendaal B (2011) Stress and emotional memory: a matter of timing. Trends Cogn Sci 15(6):280–288
Kalokerinos EK, Greenaway KH, Denson TF (2015) Reappraisal but not suppression downregulates the experience of positive and negative emotion. Emotion 15(3):271–275
Kanske P, Heissler J, Schonfelder S, Bongers A, Wessa M (2011) How to regulate emotion? Neural networks for reappraisal and distraction. Cereb Cortex 21(6):1379–1388
Kapur S, Tulving E, Cabeza R, McIntosh AR, Houle S, Craik FI (1996) The neural correlates of intentional learning of verbal materials: a PET study in humans. Brain Res Cogn Brain Res 4(4):243–249
Katsumi Y, Denkova E, Dolcos S (2017) Personality and memory. In: Zeigler-Hill V, Shackelford TK (eds) Encyclopedia of personality and individual differences. Springer International Publishing, New York
Kensinger EA (2004) Remembering emotional eIiences: the contribution of valence and arousal. Rev Neurosci 15(4):241–251
Kensinger EA (2009) Remembering the details: effects of emotion. Emot Rev 1(2):99–113
Kensinger EA, Corkin S (2004) Two routes to emotional memory: distinct neural processes for valence and arousal. Proc Natl Acad Sci 101(9):3310–3315
Kensinger EA, Schacter DL (2005) Retrieving accurate and distorted memories: neuroimaging evidence for effects of emotion. NeuroImage 27(1):167–177
Kensinger EA, Schacter DL (2006a) amygdala activity is associated with the successful encoding of item, but not source, information for positive and negative stimuli. J Neurosci 26(9):2564–2570
Kensinger EA, Schacter DL (2006b) Processing emotional pictures and words: effects of valence and arousal. Cogn Affect Behav Neurosci 6(2):110–126
Kensinger EA, Schacter DL (2008) Neural processes supporting young and older adults' emotional memories. J Cogn Neurosci 20(7):1161–1173
Kensinger EA, Garoff-Eaton RJ, Schacter DL (2007) Effects of emotion on memory specificity: memory trade-offs elicited by negative visually arousing stimuli. J Mem Lang 56(4):575–591

Kensinger EA, Addis DR, Atapattu RK (2011) amygdala activity at encoding corresponds with memory vividness and with memory for select episodic details. Neuropsychologia 49(4):663–673
Kilpatrick L, Cahill L (2003) amygdala modulation of parahippocampal and frontal regions during emotionally influenced memory storage. NeuroImage 20(4):2091–2099
Kim SH, Hamann S (2012) The effect of cognitive reappraisal on physiological reactivity and emotional memory. Int J Psychophysiol 83(3):348–356
Kleinhans NM, Johnson LC, Mahurin R, Richards T, Stegbauer KC, Greenson J, Dawson G, Aylward E (2007) Increased amygdala activation to neutral faces is associated with better face memory performance. Neuroreport 18(10):987–991
Konkel A, Cohen NJ (2009) Relational memory and the hippocampus: representations and methods. Front Neurosci 3(2):166–174
Kosslyn SM, Shin LM, Thompson WL, McNally RJ, Rauch SL, Pitman RK, Alpert NM (1996) Neural effects of visualizing and perceiving aversive stimuli: a PET investigation. Neuroreport 7(10):1569–1576
Kross E, Davidson ML, Weber M, Ochsner K (2009) Coping withItions past: the neural bases of regulating affect associated with negative autobiographical memories. Biol Psychiatry 65(5):361–366
Kupper CS, Benoit RG, Dalgleish T, Anderson MC (2014) Direct suppression as a mechanism for controlling unpleasant memories in daily life. J Exp Psychol Gen 143(4):1443–1449
LaBar KS, Cabeza R (2006) Cognitive neuroscience of emotional memory. Nat Rev Neurosci 7(1):54–64
LaBar KS, Gatenby JC, Gore JC, LeDoux JE, Phelps EA (1998) Human amygdala activation during conditioned fear acquisition and extinction: a mixed-trial fMRI study. Neuron 20(5):937–945
Lang PJ, Bradley MM (2010) Emotion and the motivational brain. Biol Psychol 84(3):437–450
Lang PJ, Greenwald MK, Bradley MM, Hamm AO (1993) Looking at pictures: affective, facial, visceral, and behavioral reactions. Psychophysiology 30:261–273
Laurita AC, Spreng RN (2017) The hippocampus and social cognition. In: Hannula DE, Duff MC (eds) The hippocampus from cells to systems: Structure, connectivity, and functional contributions to memory and flexible cognition. Springer International Publishing, Cham, pp 537–558

LeDoux J (2000) Emotion circuits in the brain. Annu Rev Neurosci 23:155–184
LeDoux J (2007) The amygdala. Curr Biol 17(20):R868–R874
Lee TH, Sakaki M, Cheng R, Velasco R, Mather M (2014) Emotional arousal amplifies the effects of biased competition in the brain. Soc Cogn Affect Neurosci 9(12):2067–2077
Levine LJ, Schmidt S, Kang HS, Tinti C (2012) Remembering the silver lining: reappraisal and positive bias in memory for emotion. Cognit Emot 26(5):871–884
Li W, Mai X, Liu C (2014) The default mode network and social understanding of others: what do brain connectivity studies tell us. Front Hum Neurosci 8:74
Lieberman MD, Eisenberger NI, Crockett MJ, Tom SM, Pfeifer JH, Way BM (2007) Putting feelings into words: affect labeling disrupts amygdala activity in response to affective stimuli. Psychol Sci 18(5):421–428
Lieberman MD, Inagaki TK, Tabibnia G, Crockett MJ (2011) Subjective responses to emotional stimuli during labeling, reappraisal, and distraction. Emotion 11(3):468–480
Liu F, Cui L, Zhang Q (2015) The influences of reappraisal and suppression instructions on memory for neutral words in negative background. Neuroreport 26(17):1023–1031
Liu ZX, Grady C, Moscovitch M (2016) Effects of prior-knowledge on brain activation and connectivity during associative memory encoding. Cereb Cortex 27(3):1991–2009
Luck D, Leclerc M-E, Lepage M (2014) The potentiation of associative memory by emotions: an event-related fMRI study. Adv Neurosci 2014:9
Macrae CN, Moran JM, Heatherton TF, Banfield JF, Kelley WM (2004) Medial prefrontal activity predicts memory for self. Cereb Cortex 14(6):647–654
Madore KP, Schacter DL (2016) Remembering the past and imagining the future: selective effects of an episodic specificity induction on detail generation. Q J Exp Psychol 69(2):285–298
Madore KP, Addis DR, Schacter DL (2015) Creativity and memory: effects of an episodic-specificity induction on divergent thinking. Psychol Sci 26(9):1461–1468
Maguire EA, Frith CD (2003) Lateral asymmetry in the hippocampal response to the remoteness of autobiographical memories. J Neurosci 23(12):5302–5307

Mano Y, Sugiura M, Tsukiura T, Chiao JY, Yomogida Y, Jeong H, Sekiguchi A, Kawashima R (2011) The representation of social interaction in episodic memory: a functional MRI study. NeuroImage 57(3):1234–1242
Maratos EJ, Dolan RJ, Morris JS, Henson RN, Rugg MD (2001) Neural activity associated with episodic memory for emotional context. Neuropsychologia 39(9):910–920
Maren S, Phan KL, Liberzon I (2013) The contextual brain: implications for fear conditioning, extinction and psychopathology. Nat Rev Neurosci 14(6):417–428
Markowitsch HJ, Thiel A, Reinkemeier M, Kessler J, Koyuncu A, Heiss WD (2000) Right amygdalar and temporofrontal activation during autobiographic, but not during fictitious memory retrieval. Behav Neurol 12(4):181–190
Markowitsch HJ, Vandekerckhove MM, Lanfermann H, Russ MO (2003) Engagement of lateral and medial prefrontal areas in the ecphory of sad and happy autobiographical memories. Cortex 39(4–5):643–665
Martin SJ, Grimwood PD, Morris RG (2000) Synaptic plasticity and memory: an evaluation of the hypothesis. Annu Rev Neurosci 23:649–711
Mather M (2007) Emotional arousal and memory binding: an object-based framework. Perspect Psychol Sci 2(1):33–52
Mather M, Knight M (2008) The emotional harbinger effect: poor context memory for cues that previously predicted something arousing. Emotion 8(6):850–860
Mather M, Nesmith K (2008) Arousal-enhanced location memory for pictures. J Mem Lang 58(2):449–464
Mather M, Sutherland MR (2011) Arousal-biased competition in perception and memory. Perspect Psychol Sci 6(2):114–133
Mather M, Clewett D, Sakaki M, Harley CW (2015) Norepinephrine ignites local hot spots of neuronal excitation: how arousal amplifies selectivity in perception and memory. Behav Brain Sci 39:e200
Mattarozzi K, Todorov A, Codispoti M (2015) Memory for faces: the effect of facial appearance and the context in which the face is encountered. Psychol Res 79(2):308–317
Mayberg HS (1997) Limbic-cortical dysregulation: a proposed model of depression. J Neuropsychiatry Clin Neurosci 9(3):471–481
McFarland CP, Primosch M, Maxson CM, Stewart BT (2017) Enhancing memory and imagination improves problem solving among individuals with depression. Mem Cogn 45(6):932–939

McGaugh JL (2000) Memory—a century of consolidation. Science 287(5451):248–251
McGaugh JL (2004) The amygdala modulates the consolidation of memories of emotionally arousing experiences. Annu Rev Neurosci 27:1–28
McRae K, Hughes B, Chopra S, Gabrieli JD, Gross JJ, Ochsner KN (2010) The neural bases of distraction and reappraisal. J Cogn Neurosci 22(2):248–262
Mende-Siedlecki P, Said CP, Todorov A (2013) The social evaluation of faces: a meta-analysis of functional neuroimaging studies. Soc Cogn Affect Neurosci 8(3):285–299
Meyer ML, Lieberman MD (2012) Social working memory: neurocognitive networks and directions for future research. Front Psychol 3:571
Meyer ML, Taylor SE, Lieberman MD (2015) Social working memory and its distinctive link to social cognitive ability: an fMRI study. Soc Cogn Affect Neurosci 10(10):1338–1347
Mickley KR, Kensinger EA (2008) Emotional valence influences the neural correlates associated with remembering and knowing. Cogn Affect Behav Neurosci 8(2):143–152
Mickley Steinmetz KR, Kensinger EA (2009) The effects of valence and arousal on the neural activity leading to subsequent memory. Psychophysiology 46(6):1190–1199
Mickley Steinmetz KR, Addis DR, Kensinger EA (2010) The effect of arousal on the emotional memory network depends on valence. NeuroImage 53(1):318–324
Miskovic V, Keil A (2012) Acquired fears reflected in cortical sensory processing: a review of electrophysiological studies of human classical conditioning. Psychophysiology 49(9):1230–1241
Mitchell JP, Macrae CN, Banaji MR (2004) Encoding-specific effects of social cognition on the neural correlates of subsequent memory. J Neurosci 24(21):4912–4917
Morris JS, Ohman A, Dolan RJ (1999) A subcortical pathway to the right amygdala mediating “unseen” fear. Proc Natl Acad Sci 96(4):1680–1685
Murray BD, Kensinger EA (2013) A review of the neural and behavioral consequences for unitizing emotional and neutral information. Front Behav Neurosci 7:42
Murray BD, Kensinger EA (2014) The route to an integrative associative memory is influenced by emotion. PLoS One 9(1):e82372

Muscatell KA, Addis DR, Kensinger EA (2010) Self-involvement modulates the effective connectivity of the autobiographical memory network. Soc Cogn Affect Neurosci 5(1):68–76
Nashiro K, Mather M (2011) How arousal affects younger and older adults' memory binding. Exp Aging Res 37(1):108–128
Northoff G, Heinzel A, de Greck M, Bermpohl F, Dobrowolny H, Panksepp J (2006) Self-referential processing in our brain – a meta-analysis of imaging studies on the self. NeuroImage 31(1):440–457
Northoff G, Schneider F, Rotte M, Matthiae C, Tempelmann C, Wiebking C, Bermpohl F, Heinzel A, Danos P, Heinze HJ, Bogerts B, Walter M, Panksepp J (2009) Differential parametric modulation of self-relatedness and emotions in different brain regions. Hum Brain Mapp 30(2):369–382
O'Doherty JP (2004) Reward representations and reward-related learning in the human brain: insights from neuroimaging. Curr Opin Neurobiol 14(6):769–776
Ochsner KN, Knierim K, Ludlow D, Hanelin J, Ramachandran T, Mackey S (2004) Reflecting upon feelings: an fMRI study of neural systems supporting the attribution of emotion to self and other. J Cogn Neurosci 16(10):1748–1772
Oddo S, Lux S, Weiss PH, Schwab A, Welzer H, Markowitsch HJ, Fink GR (2008) Specific role of medial prefrontal cortex in retrieving recent autobiographical memories: an fMRI study of young female subjects. Cortex 46(1):29–39
Okada G, Okamoto Y, Kunisato Y, Aoyama S, Nishiyama Y, Yoshimura S, Onoda K, Toki S, Yamashita H, Yamawaki S (2011) The effect of negative and positive emotionality on associative memory: an fMRI study. PLoS One 6(9):e24862
Olatunji BO, Berg HE, Zhao Z (2015) Emotion regulation of fear and disgust: differential effects of reappraisal and suppression. Cognit Emot 31(2):403–410
Olson IR, McCoy D, Klobusicky E, Ross LA (2013) Social cognition and the anterior temporal lobes: a review and theoretical framework. Soc Cogn Affect Neurosci 8(2):123–133
Owen AM, Herrod NJ, Menon DK, Clark JC, Downey SP, Carpenter TA, Minhas PS, Turkheimer FE, Williams EJ, Robbins TW, Sahakian BJ, Petrides M, Pickard JD (1999) Redefining the functional organization of working

memory processes within human lateral prefrontal cortex. Eur J Neurosci 11(2):567–574
Paller KA, Wagner AD (2002) Observing the transformation of experience into memory. Trends Cogn Sci 6(2):93–102
Paller KA, Kutas M, Shimamura AP, Squire LR (1987) Brain responses to concrete and abstract words reflect processes that correlate with later performance on a test of stem-completion priming. Electroencephalogr Clin Neurophysiol Suppl 40:360–365
Pasupathi M (2003) Emotion regulation during social remembering: differences between emotions elicited during an event and emotions elicited when talking about it. Memory 11(2):151–163
Petrides M (1995) Functional organization of the human frontal cortex for mnemonic processing. Evidence from neuroimaging studies. Ann N Y Acad Sci 769:85–96
Phan KL, Wager T, Taylor SF, Liberzon I (2002) Functional neuroanatomy of emotion: a meta-analysis of emotion activation studies in PET and fMRI. NeuroImage 16(2):331–348
Phelps EA (2004) Human emotion and memory: interactions of the amygdala and hippocampal complex. Curr Opin Neurobiol 14(2):198–202
Phelps EA, LeDoux J (2005) Contributions of the amygdala to emotion processing: from animal models to human behavior. Neuron 48(2):175–187
Phelps EA, LaBar KS, Anderson AK, O'Connor KJ, Fulbright RK, Spencer DD (1998) Specifying the contributions of the human amygdala to emotional memory: a case study. Neurocase 4(6):527–540
Phelps EA, O'Connor KJ, Gatenby JC, Gore JC, Grillon C, Davis M (2001) Activation of the left amygdala to a cognitive representation of fear. Nat Neurosci 4(4):437–441
Piefke M, Weiss PH, Zilles K, Markowitsch HJ, Fink GR (2003) Differential remoteness and emotional tone modulate the neural correlates of autobiographical memory. Brain 126(3):650–668
Pierce BH, Kensinger EA (2011) Effects of emotion on associative recognition: valence and retention interval matter. Emotion 11(1):139–144
Poldrack RA, Wagner AD, Prull MW, Desmond JE, Glover GH, Gabrieli JD (1999) Functional specialization for semantic and phonological processing in the left inferior prefrontal cortex. NeuroImage 10(1):15–35

Prince SE, Daselaar SM, Cabeza R (2005) Neural correlates of relational memory: successful encoding and retrieval of semantic and perceptual associations. J Neurosci 25(5):1203–1210
Prince SE, Dennis NA, Cabeza R (2009) Encoding and retrieving faces and places: distinguishing process- and stimulus-specific differences in brain activity. Neuropsychologia 47(11):2282–2289
Raes F, Williams JM, Hermans D (2009) Reducing cognitive vulnerability to depression: a preliminary investigation of MEmory Specificity Training (MEST) in inpatients with depressive symptomatology. J Behav Ther Exp Psychiatry 40(1):24–38
Ranganath C (2010) Binding items and contexts the cognitive neuroscience of episodic memory. Curr Dir Psychol Sci 19(3):131–137
Ray RD, McRae K, Ochsner KN, Gross JJ (2010) Cognitive reappraisal of negative affect: converging evidence from EMG and self-report. Emotion 10(4):587–592
Richards JM, Gross JJ (2000) EmoI regulation and memory: the cognitive costs of keeping one's cool. J Pers Soc Psychol 79(3):410–424
Richards JM, Butler EA, Gross JJ (2003) Emotion regulatiIn romantic relationships: the cognitive consequences of concealing feelings. J Soc Pers Relat 20(5):599–620
Richardson MP, Strange BA, Dolan RJ (2004) Encoding of emotional memories depends on آمیگدالgdala and hippocampus and their interactions. Nat Neurosci 7(3):278–285
Rimmele U, Davachi L, Petrov R, Dougal S, Phelps EA (2011) Emotion enhances the subjective feeling of remembering, despite lower accuracy for contextual details. Emotion 11(3):553–562
Ritchey M, Dolcos F, Cabeza R (2008) Role of amygdala connectivity in the persistence of emotional memories over time: an event-related fMRI investigation. Cereb Cortex 18(11):2494–2504
Ritchey M, LaBar KS, Cabeza R (2011) Level of processing modulates the neural correlates of emotional memory formation. J Cogn Neurosci 23(4):757–771
Rosen BR, Buckner RL, Dale AM (1998) Event-related functional MRI: past, present, and future. Proc Natl Acad Sci 95(3):773–780
Rubin DC, Dennis MF, Beckham JC (2011) AutobiograIal memory for stressful events: the role of autobiographical memory in posttraumatic stress disorder. Conscious Cogn 20(3):840–856

Rugg MD, Curran T (2007) Event-related potentials and recognition memory. Trends Cogn Sci 11(6):251–257
Russell J (1980) A circumplex model of affect. J Pers Soc Psychol 39(6):1161–1178
Said CP, Baron SG, Todorov A (2009) Nonlinear amygdala response to face trustworthiness: contributions of high and low spatial frequency information. J Cogn Neurosci 21(3):519–528
Sakaki M, Niki K, Mather M (2012) Beyond arousal and valence: the importance of the biological versus social relevance of emotional stimuli. Cogn Affect Behav Neurosci 12(1):115–139
Sakaki M, Fryer K, Mather M (2014) Emotion strengthens high-priority memory traces but weakens low-priority memory traces. Psychol Sci 25(2):387–395
Schilbach L, Eickhoff SB, Rotarska-Jagiela A, Fink GR, Vogeley K (2008) Minds at rest? Social cognition as the default mode of cognizing and its putative relationship to the "default system" of the brain. Conscious Cogn 17(2):457–467
Schilbach L, Bzdok D, Timmermans B, Fox PT, Laird AR, Vogeley K, Eickhoff SB (2012) Introspective minds: using ALE meta-analyses to study commonalities in the neural correlates of emotional processing, social & unconstrained cognition. PLoS One 7(2):e30920
Schiller D, Freeman JB, Mitchell JP, Uleman JS, Phelps EA (2009) A neural mechanism of first impressions. Nat Neurosci 12(4):508–514
Schmeichel BJ, Volokhov RN, Demaree HA (2008) Working memory capacity and the self-regulation of emotional expression and experience. J Pers Soc Psychol 95(6):1526–1540
Schweizer S, Grahn J, Hampshire A, Mobbs D, Dalgleish T (2013) Training the emotional brain: improving affective control through emotional working memory training. J Neurosci 33(12):5301–5311
Sergerie K, Lepage M, Armony JL (2006) A process-specific functional dissociation of the amygdala in emotional memory. J Cogn Neurosci 18(8):1359–1367
Shafer A, Iordan A, Cabeza R, Dolcos F (2011) Brain imaging investigation of the memory-enhancing effect of emotion. J Vis Exp 51:2433
Shafer AT, Matveychuk D, Penney T, O'Hare AJ, Stokes J, Dolcos F (2012) Processing of emotional distraction is both automatic and modulated by

attention: evidence from an event-related fMRI investigation. J Cogn Neurosci 24(5):1233–1252
Shallice T, Fletcher P, Frith CD, Grasby P, Frackowiak RS, Dolan RJ (1994) Brain regions associated with acquisition and retrieval of verbal episodic memory. Nature 368(6472):633–635
Sharot T (2011) The optimism bias. Curr Biol 21(23):R941–R945
Sharot T, Delgado MR, Phelps EA (2004) How emotion enhances the feeling of remembering. Nat Neurosci 7(12):1376–1380
Sharot T, Martorella EA, Delgado MR, Phelps EA (2007a) How personal experience modulates the neural circuitry of memories of September 11. Proc Natl Acad Sci 104(1):389–394
Sharot T, Riccardi AM, Raio CM, Phelps EA (2007b) Neural mechanisms mediating optimism bias. Nature 450(7166):102–105
Sheppes G, Gross JJ (2012) Emotion regulation effectiveness: what works when. In: Tennen HA, Suls JM (eds) Handbook of psychology: personality and social psychology, vol 5. Wiley, New York
Sheppes G, Scheibe S, Suri G, Radu P, Blechert J, Gross JJ (2014) Emotion regulation choice: a conceptual framework and supporting evidence. J Exp Psychol Gen 143(1):163–181
Sheppes G, Suri G, Gross JJ (2015) Emotion regulation and psychopathology. Annu Rev Clin Psychol 11:379–405
Singer T, Kiebel SJ, Winston JS, Dolan RJ, Frith CD (2004) Brain responses to the acquired moral status of faces. Neuron 41(4):653–662
Smith AP, Dolan RJ, Rugg MD (2004a) Event-related potential correlates of the retrieval of emotional and nonemotional context. J Cogn Neurosci 16(5):760–775
Smith AP, Henson RN, Dolan RJ, Rugg MD (2004b) fMRI correlates of the episodic retrieval of emotional contexts. NeuroImage 22(2):868–878
Smith AP, Henson RN, Rugg MD, Dolan RJ (2005) Modulation of retrieval processing reflects accuracy of emotional source memory. Learn Mem 12(5):472–479
Smith AP, Stephan KE, Rugg MD, Dolan RJ (2006) Task and content modulate amygdala-hippocampal connectivity in emotional retrieval. Neuron 49(4):631–638
Somerville LH, Wig GS, Whalen PJ, Kelley WM (2006) Dissociable medial temporal lobe contributions to social memory. J Cogn Neurosci 18(8):1253–1265

Spreng RN, Andrews-Hanna JR (2015) The default network and social cognition. In: Brain mapping: an encyclopedic reference, vol 3. Elsevier/Academic Press, Amsterdam, pp 165–169
Spreng RN, Mar RA (2012) I remember you: a role for memory in social cognition and the functional neuroanatomy of their interaction. Brain Res 1428:43–50
Staresina BP, Davachi L (2010) Object unitization and associative memory formation are supported by distinct brain regions. J Neurosci 30(29):9890–9897
Strange BA, Dolan RJ (2004) Beta-adrenergic modulation of emotional memory-evoked human amygdala and hippocampal responses. Proc Natl Acad Sci 101(31):11454–11458
Strange BA, Hurlemann R, Dolan RJ (2003) An emotion-induced retrograde amnesia in humans is amygdala- and beta-adrenergic-dependent. Proc Natl Acad Sci 100(23):13626–13631
Takashima A, van der Ven F, Kroes MCW, Fernández G (2016) Retrieved emotional context influences hippocampal involvement during recognition of neutral memories. NeuroImage 143:280–292
Takeuchi H, Taki Y, Nouchi R, Sekiguchi A, Hashizume H, Sassa Y, Kotozaki Y, Miyauchi CM, Yokoyama R, Iizuka K, Nakagawa S, Nagase T, Kunitoki K, Kawashima R (2013) Resting state functional connectivity associated with trait emotional intelligence. NeuroImage 83:318–328
Talarico JM, LaBar KS, Rubin DC (2004) Emotional intensity predicts autobiographical memory experience. Mem Cogn 32(7):1118–1132
Tambini A, Rimmele U, Phelps EA, Davachi L (2017) Emotional brain states carry over and enhance future memory formation. Nat Neurosci 20(2):271–278
Taylor SF, Liberzon I, Fig LM, Decker LR, Minoshima S, Koeppe RA (1998) The effect of emotional content on visual recognition memory: a PET activation study. NeuroImage 8(2):188–197
Thiruchselvam R, Blechert J, Sheppes G, Rydstrom A, Gross JJ (2011) The temporal dynamics of emotion regulation: an EEG study of distraction and reappraisal. Biol Psychol 87(1):84–92
Thoresen C, Jensen J, Sigvartsen NP, Bolstad I, Server A, Nakstad PH, Andreassen OA, Endestad T (2012) Arousal modulates activity in the medial temporal lobe during a short-term relational memory task. Front Hum Neurosci 5:177

Touryan SR, Marian DE, Shimamura AP (2007b) Effect of negative emotional pictures on associative memory for peripheral information. Memory 15(2):154–166

Tsukiura T (2012) Neural mechanisms underlying the effects of face-based affective signals on memory for faces: a tentative model. Front Integr Neurosci 6:50

Tsukiura T, Cabeza R (2008) Orbitofrontal and hippocampal contributionI memory for face-name associations: the rewarding power of a smile. Neuropsychologia 46(9):2310–2319

Tsukiura T, Cabeza R (2011a) Remembering beauty: roles of orbitofrontal and hippocampal regions in successful memory encoding of attractive faces. NeuroImage 54(1):653–660

Tsukiura T, Cabeza R (2011b) Shared brain activity for aesthetic and moral judgments: implications for the beauty-is-good stereotype. Soc Cogn Affect Neurosci 6(1):138–148

Tsukiura T, Suzuki C, Shigemune Y, Mochizuki-Kawai H (2008) Differential contributions of the anterior temporal and medial temporal lobe to the retrieval of memory for person identity information. Hum Brain Mapp 29(12):1343–1354

Tsukiura T, Mano Y, Sekiguchi A, Yomogida Y, Hoshi K, Kambara T, Takeuchi H, Sugiura M, Kawashima R (2010) Dissociable roles of the anterior temporal regions in successful encoding of memory for person identity information. J Cogn Neurosci 22(10):2226–2237

Tsukiura T, Sekiguchi A, Yomogida Y, Nakagawa S, Shigemune Y, Kambara T, Akitsuki Y, Taki Y, Kawashima R (2011) Effects of aging on hippocampal and anterior temporal activations during successful retrieval of memory for face-name associations. J Cogn Neurosci 23(1):200–213

Tsukiura T, Shigemune Y, Nouchi R, Kambara T, Kawashima R (2013) Insular and hippocampal contributions to remembering people with an impression of bad personality. Soc Cogn Affect Neurosci 8(5):515–522

Tulving E (1985) Memory and consciousness. Can Psychol 26(1):1–12

Van Ast VA, Cornelisse S, Marin MF, Ackermann S, Garfinkel SN, Abercrombie هیپوکامپ (2013) Modulatory mechanisms of cortisol effects on emotional learning and memory: novel perspectives. Psychoneuroendocrinology 38(9):1874–1882

Van den Stock J, de Gelder B (2012) Emotional information in body and background hampers recognition memory for faces. Neurobiol Learn Mem 97(3):321–325

Vandekerckhove MM, Markowitsch HJ, Mertens M, Woermann FG (2005) Bi-hemispheric engagement in the retrieval of autobiographical episodes. Behav Neurol 16(4):203–210

Vazdarjanova A, McGaugh JL (1998) Basolateral amygdala is not critical for cognitive memory of contextual fear conditioning. Proc Natl Acad Sci 95(25):15003–15007

Ventura-Bort C, Löw A, Wendt J, Dolcos F, Hamm AO, Weymar M (2016a) When neutral turns significant: brain dynamics of rapidly formed associations between neutral stimuli and emotional contexts. Eur J Neurosci 44(5):2176–2183

Ventura-Bort C, Löw A, Wendt J, Molto J, Poy R, Dolcos F, Hamm AO, Weymar M (2016b) Binding neutral information to emotional contexts: brain dynamics of long-term recognition memory. Cogn Affect Behav Neurosci 16(2):234–247

Vilberg KL, Rugg MD (2009) Functional significance of retrieval-related activity in lateral parietal cortex: Evidence from fMRI and ERPs. Hum Brain Mapp 30(5): 1490-1501

Vogel S, Fernandez G, Joels M, Schwabe L (2016) Cognitive adaptation under stress: a case for the mineralocorticoid receptor. Trends Cogn Sci 20(3):192–203

Vrtička P, Sander D, Vuilleumier P (2012) Lateralized interactive social content and valence processing within the human amygdala. Front Hum Neurosci 6:358

Vuilleumier P, Richardson MP, Armony JL, Driver J, Dolan RJ (2004) Distant influences of amygdala lesion on visual cortical activation during emotional face processing. Nat Neurosci 7(11):1271–1278

Wagner DD, Haxby JV, Heatherton TF (2012) The representation of self and person knowledge in the medial prefrontal cortex. Wiley Interdiscip Rev Cogn Sci 3(4):451–470

Wagner U, Handke L, Walter H (2015) The relationship between trait empathy and memory formation for social vs. non-social information. BMC Psychol 3(1):2

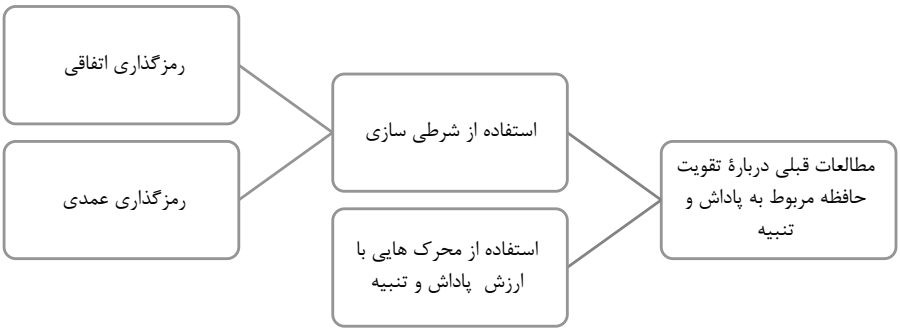
Waring JD, Kensinger EA (2011) How emotion leads to selective memory: neuroimaging evidence. Neuropsychologia 49(7):1831–1842

Watkins ER, Baeyens CB, Read R (2009) Concreteness training reduces dysphoria: proofof-principle for repeated cognitive bias modification in depression. J Abnorm Psychol 118(1):55–64
Webb TL, Miles E, Sheeran P (2012) Dealing with feeling: a meta-analysis of the effectiveness of strategies derived from the process model of emotion regulation. Psychol Bull 138(4):775–808
Weis S, Klaver P, Reul J, Elger CE, Fernandez G (2004) Temporal and cerebellar brain regions that support both declarative memory formation and retrieval. Cereb Cortex 14(3):256–267
Weymar M, Löw A, Melzig CA, Hamm AO (2009) Enhanced long-term recollection for emotional pictures: evidence from high-density ERPs. Psychophysiology 46(6):1200–1207
Weymar M, Hamm AO (2013) Electrophysiological signature of emotional memories. In: Linden M, Rutkowski K (eds) Hurting memories and beneficial forgetting: posttraumatic stress disorders, biographical developments and social conflicts. Elsevier, Saint Louis, pp 21–35
Weymar M, Löw A, Hamm AO (2011) Emotional memories are resilient to time: evidence from the parietal ERP old/new effect. Hum Brain Mapp 32(4):632–640
Weymar M, Bradley MM, Hamm AO, Lang PJ (2013) When fear forms memories: threat of shock and brain potentials during encoding and recognition. Cortex 49(3):819–826
Weymar M, Bradley MM, Hamm AO, Lang PJ (2014) Encoding and reinstatement of threat: recognition potentials. Neurobiol Learn Mem 107:87–92
Wieser MJ, Keil A (2014) Fearful faces heighten the cortical representation of contextual threat. NeuroImage 86:317–325
Wilker S, Elbert T, Kolassa IT (2014) The downside of strong emotional memories: how human memory-related genes influence the risk for posttraumatic stress disorder—a selective review. Neurobiol Learn Mem 112:75–86
Williams AD, Moulds ML (2010) The impact of ruminative processing on the experience of self-referent intrusive memories in dysphoria. Behav Ther 41(1):38–45
Williams JM, Teasdale JD, Segal ZV, Soulsby J (2000) Mindfulness-based cognitive therapy reduces overgeneral autobiographical memory in formerly depressed patients. J Abnorm Psychol 109(1):150–155

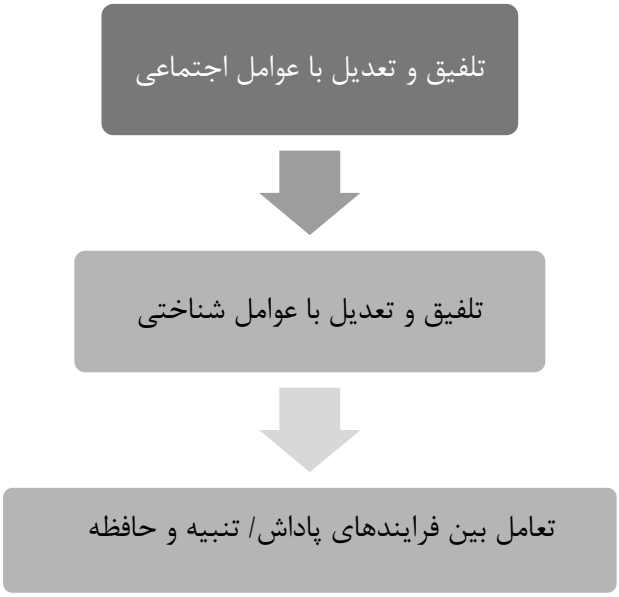
Yang XF, Bossmann J, Schiffhauer B, Jordan M, Immordino-Yang MH (2013) Intrinsic default mode network connectivity predicts spontaneous verbal descriptions of autobiographical memories during social processing. Front Psychol 3:592

Yaoi K, Osaka M, Osaka N (2015) Neural correlates of the self-reference effect: evidence from evaluation and recognition processes. Front Hum Neurosci 9:383

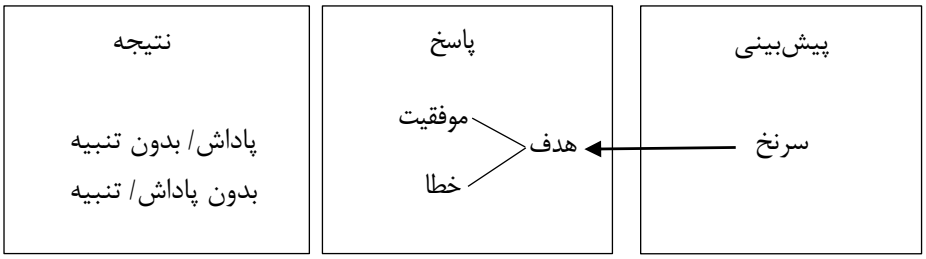
Yonelinas AP, Ritchey M (2015) The slow forgetting of emotional episodic memories: an emotional binding account. Trends Cogn Sci 19(5):259–267



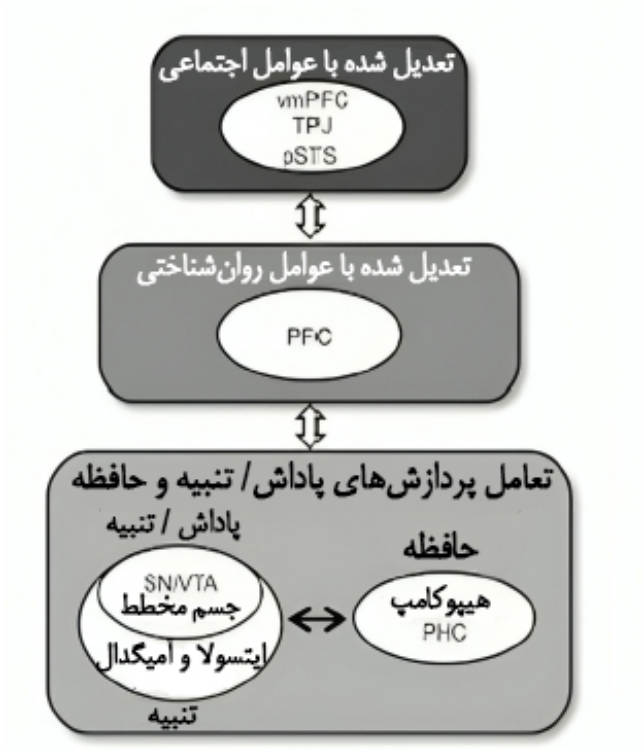
شکل ۱،۶. طبقه‌بندی مطالعات قبلی دربارۀ تقویت حافظه وابسته به پاداش یا تنبیه



شکل ۲،۶. ساختار سلسله‌مراتبی سه لایۀ مربوط به تقویت حافظه با پاداش یا تنبیه در شرطی‌سازی



شکل ۳،۶. روند کلی تکلیف تأخیر مشوق پولی (MID)



شکل ۴،۶. مدل فرضی سازوکارهای عصبی زیربنای ساختار سلسله‌مراتبی سه‌لایهٔ تقویت حافظه توسط پاداش/تنبیه در شرطی‌سازی

Adcock RA, Thangavel A, Whitfield-Gabrieli S, Knutson B, Gabrieli JD (2006) Reward-motivated learning: mesolimbic activation precedes memory formation. Neuron 50(3):507–517

Ballard IC, Murty VP, Carter RM, MacInnes JJ, Huettel SA, Adcock RA (2011) Dorsolateral prefrontal cortex drives mesolimbic dopaminergic regions to initiate motivated behavior. J Neurosci 31(28):10340–10346

Basten U, Biele G, Heekeren HR, Fiebach CJ (2010) How the brain integrates costs and benefits during decision making. Proc Natl Acad Sci U S A 107(50):21767–21772

Bauch EM, Rausch VH, Bunzeck N (2014) Pain anticipation recruits the mesolimbic system and differentially modulates subsequent recognition memory. Hum Brain Mapp 35(9):4594–4606

Bault N, Pelloux B, Fahrenfort JJ, Ridderinkhof KR, van Winden F (2015) Neural dynamics of social tie formation in economic decision-making. Soc Cogn Affect Neurosci 10(6):877–884

Behrens TE, Hunt LT, Woolrich MW, Rushworth MF (2008) Associative learning of social value. Nature 456(7219):245–249

Bialleck KA, Schaal HP, Kranz TA, Fell J, Elger CE, Axmacher N (2011) Ventromedial prefrontal cortex activation is associated with memory formation for predictable rewards. PLoS One 6(2):e16695

Breiter HC, Etcoff NL, Whalen PJ, Kennedy WA, Rauch SL, Buckner RL, Strauss MM, Hyman SE, Rosen BR (1996) Response and habituation of the human amygdala during visual processing of facial expression. Neuron 17(5):875–887

Bulganin L, Wittmann BC (2015) Reward and novelty enhance imagination of future events in a motivational-episodic network. PLoS One 10(11):e0143477

Cahill L, Haier RJ, Fallon J, Alkire MT, Tang C, Keator D, Wu J, McGaugh JL (1996) Amygdala activity at encoding correlated with long-term, free recall of emotional information. Proc Natl Acad Sci U S A 93(15):8016–8021

Callan DE, Schweighofer N (2008) Positive and negative modulation of word learning by reward anticipation. Hum Brain Mapp 29(2):237–249

Canli T, Zhao Z, Desmond JE, Glover G, Gabrieli JDE (1999) fMRI identifies a network of structures correlated with retention of positive and negative emotional memory. Psychobiology 27(4):441–452

Canli T, Zhao Z, Brewer J, Gabrieli JD, Cahill L (2000) Event-related activation in the human amygdala associates with later memory for individual emotional experience. J Neurosci 20(19):RC99

Carter RM, Macinnes JJ, Huettel SA, Adcock RA (2009) Activation in the VTA and nucleus accumbens increases in anticipation of both gains and losses. Front Behav Neurosci 3:21
Coghill RC, Talbot JD, Evans AC, Meyer E, Gjedde A, Bushnell MC, Duncan GH (1994) Distributed processing of pain and vibration by the human brain. J Neurosci 14(7):4095–4108
Cohen MS, Rissman J, Suthana NA, Castel AD, Knowlton BJ (2014) Value-based modulation of memory encoding involves strategic engagement of fronto-temporal semantic processing regions. Cogn Affect Behav Neurosci 14(2):578–592
Coizet V, Dommett EJ, Redgrave P, Overton PG (2006) Nociceptive responses of midbrain dopaminergic neurones are modulated by the superior colliculus in the rat. Neuroscience 139(4):1479–1493
Cooper JC, Knutson B (2008) Valence and salience contribute to nucleus accumbens activation. NeuroImage 39(1):538–547
Critchley HD, Rolls ET (1996) Hunger and satiety modify the responses of olfactory and visual neurons in the primate orbitofrontal cortex. J Neurophysiol 75(4):1673–1686
D'Ardenne K, McClure SM, Nystrom LE, Cohen JD (2008) BOLD responses reflecting dopaminergic signals in the human ventral tegmental area. Science 319(5867):1264–1267
D'Esposito M, Aguirre GK, Zarahn E, Ballard D, Shin RK, Lease J (1998) Functional MRI studies of spatial and nonspatial working memory. Brain Res Cogn Brain Res 7(1):1–13
Davachi L (2006) Item, context and relational episodic encoding in humans. Curr Opin Neurobiol 16(6):693–700
Delgado MR, Frank RH, Phelps EA (2005) Perceptions of moral character modulate the neural systems of reward during the trust game. Nat Neurosci 8(11):1611–1618
Delgado MR, Schotter A, Ozbay EY, Phelps EA (2008) Understanding overbidding: using the neural circuitry of reward to design economic auctions. Science 321(5897):1849–1852
Diana RA, Yonelinas AP, Ranganath C (2007) Imaging recollection and familiarity in the medial temporal lobe: a three-component model. Trends Cogn Sci 11(9):379–386

Dillon DG, Dobbins IG, Pizzagalli DA (2014) Weak reward source memory in depression reflects blunted activation of VTA/SN and parahippocampus. Soc Cogn Affect Neurosci 9(10):1576–1583
Eichenbaum H, Yonelinas AP, Ranganath C (2007) The medial temporal lobe and recognition memory. Annu Rev Neurosci 30:123–152
Fareri DS, Delgado MR (2014) Differential reward responses during competition against in- and out-of-network others. Soc Cogn Affect Neurosci 9(4):412–420
Fareri DS, Niznikiewicz MA, Lee VK, Delgado MR (2012) Social network modulation of reward-related signals. J Neurosci 32(26):9045–9052
Fareri DS, Chang LJ, Delgado MR (2015) Computational substrates of social value in interpersonal collaboration. J Neurosci 35(21):8170–8180
Gerraty RT, Davidow JY, Wimmer GE, Kahn I, Shohamy D (2014) Transfer of learning relates to intrinsic connectivity between hippocampus, ventromedial prefrontal cortex, and large-scale networks. J Neurosci 34(34):11297–11303
Gruber MJ, Ritchey M, Wang SF, Doss MK, Ranganath C (2016) Post-learning hippocampal dynamics promote preferential retention of rewarding events. Neuron 89(5):1110–1120
Guarraci FA, Kapp BS (1999) An electrophysiological characterization of ventral tegmental area dopaminergic neurons during differential pavlovian fear conditioning in the awake rabbit. Behav Brain Res 99(2):169–179
Haber SN, Knutson B (2010) The reward circuit: linking primate anatomy and human imaging. Neuropsychopharmacology 35(1):4–26
Halko ML, Hlushchuk Y, Hari R, Schurmann M (2009) Competing with peers: mentalizing-related brain activity reflects what is at stake. NeuroImage 46(2):542–548
Hamann SB, Ely TD, Grafton ST, Kilts CD (1999) Amygdala activity related to enhanced memory for pleasant and aversive stimuli. Nat Neurosci 2(3):289–293
Hampton AN, Bossaerts P, O'Doherty JP (2008) Neural correlates of mentalizing-related computations during strategic interactions in humans. Proc Natl Acad Sci U S A 105(18):6741–6746
Hare TA, Camerer CF, Rangel A (2009) Self-control in decision-making involves modulation of the vmPFC valuation system. Science 324(5927):646–648
Hutcherson CA, Bushong B, Rangel A (2015) A neurocomputational model of altruistic choice and its implications. Neuron 87(2):451–462

Joshua M, Adler A, Mitelman R, Vaadia E, Bergman H (2008) Midbrain dopaminergic neurons and striatal cholinergic interneurons encode the difference between reward and aversive events at different epochs of probabilistic classical conditioning trials. J Neurosci 28(45):11673–11684

Kable JW, Glimcher PW (2007) The neural correlates of subjective value during intertemporal choice. Nat Neurosci 10(12):1625–1633

Kim H, Shimojo S, O'Doherty JP (2006) Is avoiding an aversive outcome rewarding? Neural substrates of avoidance learning in the human brain. PLoS Biol 4(8):e233

Knutson B, Westdorp A, Kaiser E, Hommer D (2000) FMRI visualization of brain activity during a monetary incentive delay task. NeuroImage 12(1):20–27

Knutson B, Fong GW, Adams CM, Varner JL, Hommer D (2001) Dissociation of reward anticipation and outcome with event-related fMRI. Neuroreport 12(17):3683–3687

Knutson B, Fong GW, Bennett SM, Adams CM, Hommer D (2003) A region of mesial prefrontal cortex tracks monetarily rewarding outcomes: characterization with rapid event-related fMRI. NeuroImage 18(2):263–272

Koster R, Guitart-Masip M, Dolan RJ, Duzel E (2015) Basal ganglia activity mirrors a benefit of action and reward on long-lasting event memory. Cereb Cortex 25(12):4908–4917

Kuhl BA, Shah AT, DuBrow S, Wagner AD (2010) Resistance to forgetting associated with hippocampus-mediated reactivation during new learning. Nat Neurosci 13(4):501–506

Le Bouc R, Pessiglione M (2013) Imaging social motivation: distinct brain mechanisms drive effort production during collaboration versus competition. J Neurosci 33(40):15894–15902

Li P, Shen Y, Sui X, Chen C, Feng T, Li H, Holroyd C (2013) The neural basis of responsibility attribution in decision-making. PLoS One 8(11):e80389

Lim SL, O'Doherty JP, Rangel A (2013) Stimulus value signals in ventromedial PFC reflect the integration of attribute value signals computed in fusiform gyrus and posterior superior temporal gyrus. J Neurosci 33(20):8729–8741

Lisman JE, Grace AA (2005) The hippocampal-VTA loop: controlling the entry of information into long-term memory. Neuron 46(5):703–713

Loh E, Kumaran D, Koster R, Berron D, Dolan R, Duzel E (2015) Context-specific activation of hippocampus and SN/VTA by reward is related to

enhanced long-term memory for embedded objects. Neurobiol Learn Mem 134(Pt A):65–77
Matsumoto M, Hikosaka O (2009) Two types of dopamine neuron distinctly convey positive and negative motivational signals. Nature 459(7248):837–841
McClure SM, Berns GS, Montague PR (2003) Temporal prediction errors in a passive learning task activate human striatum. Neuron 38(2):339–346
Mirenowicz J, Schultz W (1996) Preferential activation of midbrain dopamine neurons by appetitive rather than aversive stimuli. Nature 379(6564):449–451
Mitchell JP (2009) Inferences about mental states. Philos Trans R Soc Lond Ser B Biol Sci 364(1521):1309–1316
Mobbs D, Yu R, Meyer M, Passamonti L, Seymour B, Calder AJ, Schweizer S, Frith CD, Dalgleish T (2009) A key role for similarity in vicarious reward. Science 324(5929):900
Morris JS, Dolan RJ (2001) Involvement of human amygdala and orbitofrontal cortex in hunger-enhanced memory for food stimuli. J Neurosci 21(14):5304–5310
Morris JS, Frith CD, Perrett DI, Rowland D, Young AW, Calder AJ, Dolan RJ (1996) A differential neural response in the human amygdala to fearful and happy facial expressions. Nature 383(6603):812–815
Murty VP, Adcock RA (2014) Enriched encoding: reward motivation organizes cortical networks for hippocampal detection of unexpected events. Cereb Cortex 24(8):2160–2168
Murty VP, Labar KS, Adcock RA (2012) Threat of punishment motivates memory encoding via amygdala, not midbrain, interactions with the medial temporal lobe. J Neurosci 32(26):8969–8976
Nishijo H, Ono T, Nishino H (1988) Single neuron responses in amygdala of alert monkey during complex sensory stimulation with affective significance. J Neurosci 8(10):3570–3583
Nitschke JB, Sarinopoulos I, Mackiewicz KL, Schaefer HS, Davidson RJ (2006) Functional neuroanatomy of aversion and its anticipation. NeuroImage 29(1):106–116
O'Doherty JP, Deichmann R, Critchley HD, Dolan RJ (2002) Neural responses during anticipation of a primary taste reward. Neuron 33(5):815–826
O'Doherty JP, Dayan P, Friston K, Critchley H, Dolan RJ (2003) Temporal difference models and reward-related learning in the human brain. Neuron 38(2):329–337

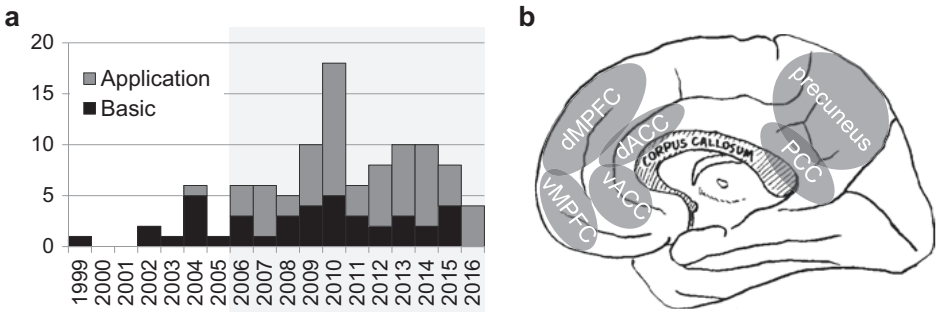
Owen AM (1997) The functional organization of working memory processes within human lateral frontal cortex: the contribution of functional neuroimaging. Eur J Neurosci 9(7):1329–1339
Pessiglione M, Seymour B, Flandin G, Dolan RJ, Frith CD (2006) Dopamine-dependent prediction errors underpin reward-seeking behaviour in humans. Nature 442(7106):1042–1045
Phan KL, Sripada CS, Angstadt M, McCabe K (2010) Reputation for reciprocity engages the brain reward center. Proc Natl Acad Sci U S A 107(29):13099–13104
Phillips ML, Young AW, Senior C, Brammer M, Andrew C, Calder AJ, Bullmore ET, Perrett DI, Rowland D, Williams SC, Gray JA, David AS (1997) A specific neural substrate for perceiving facial expressions of disgust. Nature 389(6650):495–498
Pikkarainen M, Ronkko S, Savander V, Insausti R, Pitkanen A (1999) Projections from the lateral, basal, and accessory basal nuclei of the amygdala to the hippocampal formation in rat. J Comp Neurol 403(2):229–260
Ploghaus A, Tracey I, Gati JS, Clare S, Menon RS, Matthews PM, Rawlins JN (1999) Dissociating pain from its anticipation in the human brain. Science 284(5422):1979–1981
Pribram KH, Maclean PD (1953) Neuronographic analysis of medial and basal cerebral cortex. II. Monkey. J Neurophysiol 16(3):324–340
Reysen MB (2003) The effects of social pressure on group recall. Mem Cogn 31(8):1163–1168
Reysen MB, Adair SA (2008) Social processing improves recall performance. Psychon Bull Rev 15(1):197–201
Rilling J, Gutman D, Zeh T, Pagnoni G, Berns G, Kilts C (2002) A neural basis for social cooperation. Neuron 35(2):395–405
Rilling JK, Sanfey AG, Aronson JA, Nystrom LE, Cohen JD (2004a) The neural correlates of theory of mind within interpersonal interactions. NeuroImage 22(4):1694–1703
Rilling JK, Sanfey AG, Aronson JA, Nystrom LE, Cohen JD (2004b) Opposing BOLD responses to reciprocated and unreciprocated altruism in putative reward pathways. Neuroreport 15(16):2539–2543
Rolls ET, Sienkiewicz ZJ, Yaxley S (1989) Hunger modulates the responses to gustatory stimuli of single neurons in the caudolateral orbitofrontal cortex of the macaque monkey. Eur J Neurosci 1(1):53–60

Rolls ET, Yaxley S, Sienkiewicz ZJ (1990) Gustatory responses of single neurons in the caudolateral orbitofrontal cortex of the macaque monkey. J Neurophysiol 64(4):1055–1066
Rutecki PA, Grossman RG, Armstrong D, Irish-Loewen S (1989) Electrophysiological connections between the hippocampus and entorhinal cortex in patients with complex partial seizures. J Neurosurg 70(5):667–675
Samanez-Larkin GR, Gibbs SE, Khanna K, Nielsen L, Carstensen LL, Knutson B (2007) Anticipation of monetary gain but not loss in healthy older adults. Nat Neurosci 10(6):787–791
Sanghera MK, Rolls ET, Roper-Hall A (1979) Visual responses of neurons in the dorsolateral amygdala of the alert monkey. Exp Neurol 63(3):610–626
Schultz W (1998) Predictive reward signal of dopamine neurons. J Neurophysiol 80(1):1–27
Schultz W, Dayan P, Montague PR (1997) A neural substrate of prediction and reward. Science 275(5306):1593–1599
Schurz M, Radua J, Aichhorn M, Richlan F, Perner J (2014) Fractionating theory of mind: a meta-analysis of functional brain imaging studies. Neurosci Biobehav Rev 42:9–34
Scott TR, Yan J, Rolls ET (1995) Brain mechanisms of satiety and taste in macaques. Neurobiology 3(3-4):281–292
Seid-Fatemi A, Tobler PN (2015) Efficient learning mechanisms hold in the social domain and are implemented in the medial prefrontal cortex. Soc Cogn Affect Neurosci 10(5):735–743
Shigemune Y, Abe N, Suzuki M, Ueno A, Mori E, Tashiro M, Itoh M, Fujii T (2010) Effects of emotion and reward motivation on neural correlates of episodic memory encoding: a PET study. Neurosci Res 67(1):72–79
Shigemune Y, Tsukiura T, Kambara T, Kawashima R (2014) Remembering with gains and losses: effects of monetary reward and punishment on successful encoding activation of source memories. Cereb Cortex 24(5):1319–1331
Smith EE, Jonides J (1999) Storage and executive processes in the frontal lobes. Science 283(5408):1657–1661
Suzuki WA, Amaral DG (1994) Perirhinal and parahippocampal cortices of the macaque monkey: cortical afferents. J Comp Neurol 350(4):497–533
Tricomi E, Fiez JA (2012) Information content and reward processing in the human striatum during performance of a declarative memory task. Cogn Affect Behav Neurosci 12(2):361–372

Tsukiura T, Cabeza R (2008) Orbitofrontal and hippocampal contributions to memory for face-name associations: the rewarding power of a smile. Neuropsychologia 46(9):2310–2319
Tsukiura T, Cabeza R (2011) Remembering beauty: roles of orbitofrontal and hippocampal regions in successful memory encoding of attractive faces. NeuroImage 54(1):653–660
Tsukiura T, Shigemune Y, Nouchi R, Kambara T, Kawashima R (2013) Insular and hippocampal contributions to remembering people with an impression of bad personality. Soc Cogn Affect Neurosci 8(5):515–522
Ungless MA, Magill PJ, Bolam JP (2004) Uniform inhibition of dopamine neurons in the ventral tegmental area by aversive stimuli. Science 303(5666):2040–2042
Van den Bos W, Talwar A, McClure SM (2013) Neural correlates of reinforcement learning and social preferences in competitive bidding. J Neurosci 33(5):2137–2146
Van Overwalle F (2009) Social cognition and the brain: a meta-analysis. Hum Brain Mapp 30(3):829–858
Van Overwalle F, Baetens K (2009) Understanding others' actions and goals by mirror and mentalizing systems: a meta-analysis. NeuroImage 48(3):564–584
Votinov M, Pripfl J, Windischberger C, Sailer U, Lamm C (2015) Better you lose than I do: neural networks involved in winning and losing in a real time strictly competitive game. Sci Rep 5:11017
Wang Q, Luo S, Monterosso J, Zhang J, Fang X, Dong Q, Xue G (2014) Distributed value representation in the medial prefrontal cortex during intertemporal choices. J Neurosci 34(22):7522–7530
Wicker B, Keysers C, Plailly J, Royet JP, Gallese V, Rizzolatti G (2003) Both of us disgusted in my insula: the common neural basis of seeing and feeling disgust. Neuron 40(3):655–664
Wimmer GE, Shohamy D (2012) Preference by association: how memory mechanisms in the hippocampus bias decisions. Science 338(6104):270–273
Wimmer GE, Braun EK, Daw ND, Shohamy D (2014) Episodic memory encoding interferes with reward learning and decreases striatal prediction errors. J Neurosci 34(45):14901–14912
Wittmann BC, Schott BH, Guderian S, Frey JU, Heinze HJ, Duzel E (2005) Reward-related FMRI activation of dopaminergic midbrain is associated with enhanced hippocampus-dependent long-term memory formation. Neuron 45(3):459–467

Wittmann BC, Schiltz K, Boehler CN, Duzel E (2008) Mesolimbic interaction of emotional valence and reward improves memory formation. Neuropsychologia 46(4):1000–1008
Wittmann BC, Tan GC, Lisman JE, Dolan RJ, Duzel E (2013) DAT genotype modulates striatal processing and long-term memory for items associated with reward and punishment. Neuropsychologia 51(11):2184–2193
Wolosin SM, Zeithamova D, Preston AR (2012) Reward modulation of hippocampal subfield activation during successful associative encoding and retrieval. J Cogn Neurosci 24(7):1532–1547
Wolosin SM, Zeithamova D, Preston AR (2013) Distributed hippocampal patterns that discriminate reward context are associated with enhanced associative binding. J Exp Psychol Gen 142(4):1264–1276
Wrase J, Kahnt T, Schlagenhauf F, Beck A, Cohen MX, Knutson B, Heinz A (2007) Different neural systems adjust motor behavior in response to reward and punishment. NeuroImage 36(4):1253–1262

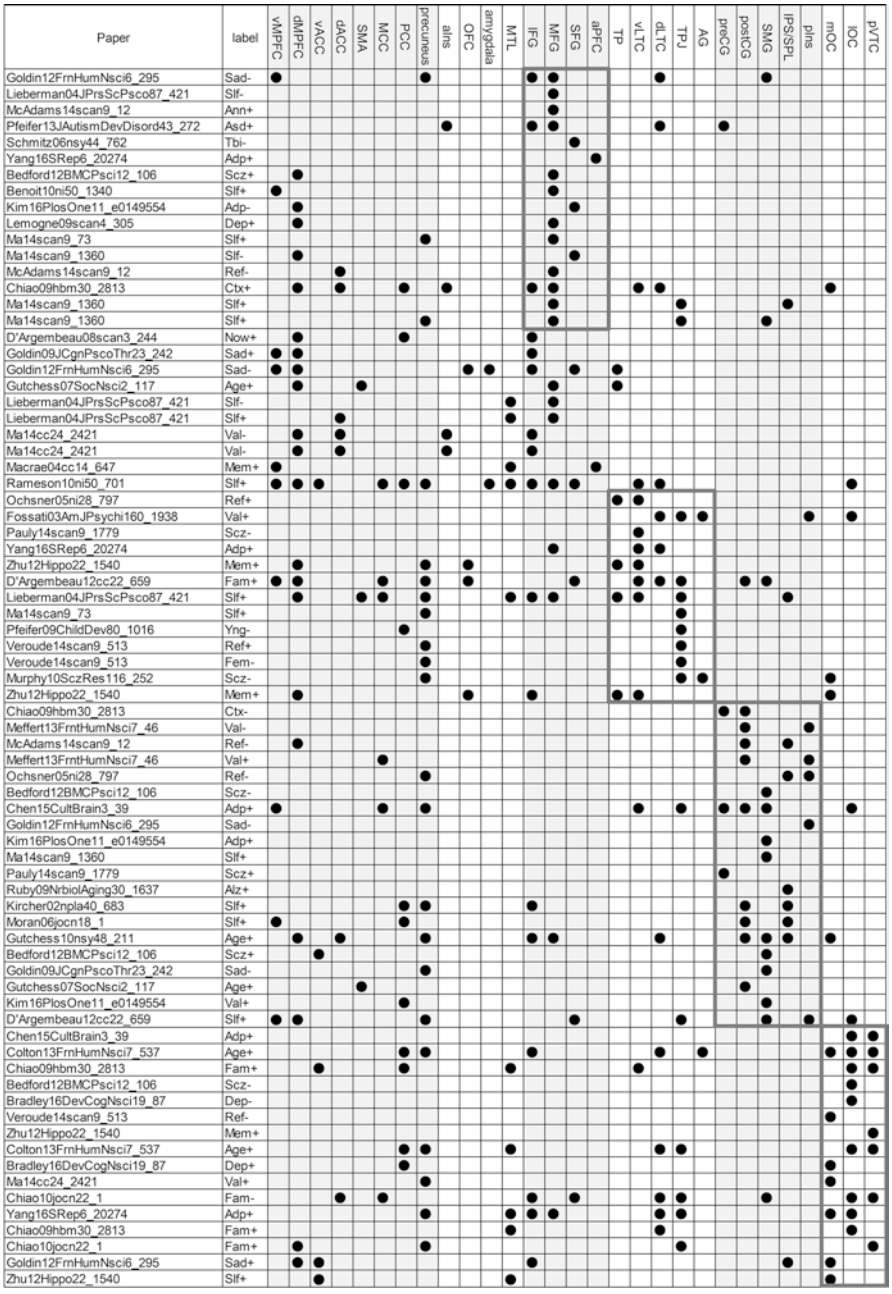
شکل ۱,۷. وظیفه ارزیابی صفات خود (STE). (الف) از آزمودنی‌ها خواسته می‌شود قضاوت کنند که آیا صفت ارائه‌شده توصیفی از خودشان است یا نه، یا درجه توصیفی بودن آن را ارزیابی کنند. با تغییرات کمی در دستورالعمل‌های تکلیف، می‌توان تکالیف کنترلی مختلفی ایجاد نمود، از جمله (ب) تکلیف انتساب اجتماعی در مورد فردی آشنا، و انواع مختلفی از تکالیف پایه، مانند (ج) وظیفه معنایی (یا ارزشی) و (د) وظیفه ساختاری (یا ادراکی).



شکل ۲,۷. مطالعاتی که از تکلیف STE و ساختارهای خط میانی قشر مغز (CMS) استفاده می‌کنند (a) تعداد مقالات منتشرشده تا اواسط سال ۲۰۱۶ که فعالیت CMS را در طول تکلیف STE گزارش کرده‌اند. و در مجموع، ۱۰۲ مطالعه (۴۰ مطالعهٔ پایه و ۶۲ مطالعهٔ کاربردی) شناسایی شد (برای اطلاع از جزئیات بیشتر، به متن مربوط به روش مورد استفاده برای فراتحلیل مراجعه کنید). افزایش در تعداد مطالعات با دوره‌ای هم‌زمان است که اصل CMS تأثیرگذار بود (پس‌زمینهٔ سایه‌دار؛ برای جزئیات بیشتر متن را ببینید).
(b) تشریح آناتومیکی متداول CMS. vMPFC قشر پیش‌پیشانی شکمی‌میانی، dMPFC قشر پیش‌پیشانی خلفی میانی، vACC بخش شکمی قشر سینگولیت قدامی، dACC بخش پشتی قشر سینگولیت قدامی، PCC قشر سینگولیت خلفی.

جدول ۱,۷ انواع فعالیت در ازیابی صفت خود، تکلیف STE

Paper	label	vMPFC	dMPFC	vACC	dACC	SMA	MCC	PCC	precuneus	aIns	OFC	amygdala	MTL	IFG	MFG	SFG	aPFC	TP	vLTC	dLTC	TPJ	AG	preCG	postCG	SMG	IPS/SPL	pIns	mOC	IOC	pVTC
Pfeifer07jocn19_1323	Yng+		●	●					●																					
Pfeifer09ChildDev80_1016	Yng+	●	●		●																									
Bedford12BMCPsci12_106	Scz-		●					●																						
Bedford12BMCPsci12_106	Scz+			●					●																					
Holt11BiolPsci69_415	Scz+						●	●																						
McAdams14scan9_12	Ref+							●	●																					
Ray09ChildDev80_1232	Mem+	●		●	●	●				●				●																
Ray10scan5_318	Slf+		●					●																						
Ruby09NrbiolAging30_1637	Age-		●						●																					
Schneider12DevCgNsci2_277	Scz-			●	●																									
Schneider12DevCgNsci2_277	Scz-	●		●																										
Schneider12DevCgNsci2_277	Scz-				●		●																							
Pfeifer09ChildDev80_1016	Yng+	●	●		●																●									
Bedford12BMCPsci12_106	Scz-		●																											
Bedford12BMCPsci12_106	Scz-		●																											
Blackwood04PscoMed34_591	Scz-				●																									
Blackwood04PscoMed34_591	Scz+							●																						
D'Argembeau07jocn19_935	Ref+				●																									
Holt11BiolPsci69_415	Scz-	●																												
Lieberman04JPrsScPsco87_421	Slf-	●																												
Lieberman04JPrsScPsco87_421	Slf+	●																												
Lieberman04JPrsScPsco87_421	Slf-	●																												
Ma14scan9_73	Slf-			●																										
Ma14scan9_73	Slf+			●																										
Ma14scan9_73	Slf-			●																										
Macrae04cc14_647	Slf+	●																												
Macrae04cc14_647	Slf-				●																									
McAdams14scan9_12	Ann-								●																					
McAdams14scan9_12	Ann+				●																									
McAdams14scan9_12	Ann-				●																									
McAdams14scan9_12	Ref+								●																					
McAdams14scan9_12	Ref+								●																					
McAdams14scan9_12	Ref-				●																									
Moran06jocn18_1	Val+			●																										
Moran06jocn18_1	Slf+			●	●	●					●			●																
Moran09SocNsci4_197	Slf+	●																												
Ochsner05ni28_797	Ref-							●																						
Pfeifer07jocn19_1323	Yng-								●																					
Pfeifer09ChildDev80_1016	Yng+	●	●		●												●													
Pfeifer09ChildDev80_1016	Fem+								●																					
Pfeifer13jns33_7415	Yng-	●																												
Pfeifer13JAutismDevDisord43_272	Asd-	●			●		●			●					●								●							
Ruby09NrbiolAging30_1637	Alz-		●																											
Sarsam13POne8_e78844	Dep+		●																											
Tan15PlosOne10_e0138737	Scz-				●																									
Veroude14scan9_513	Fem-							●																						
Yang12nsy50_1267	Adp+				●																									
Hoefler15POne10_e136027	Val+				●			●													●					●				
Schmitz06nsy44_762	Tbi+			●					●									●												
Yoshimura14scan9_487	Dep-		●	●																	●									
McAdams14scan9_12	Ref+					●		●	●											●								●		
D'Argembeau12cc22_659	Slf+	●	●		●		●	●			●		●			●						●			●	●	●			
Ma14scan9_1360	Slf-		●							●			●		●				●											
Pfeifer13jns33_7415	Yng+												●																	
Zhu12Hippo22_1540	Mem+												●																	
Hughes13jocn25_613	Adp+	●							●	●	●	●	●	●	●			●	●		●		●	●	●	●			●	
Hoefler15POne10_e136027	Adp-		●										●																	
Lieberman04JPrsScPsco87_421	Slf-		●										●																	
Ma14cc24_2421	Val-				●					●																				
Colton13FrnHumNsci7_537	Age+						●		●	●		●								●	●				●		●		●	
Ochsner05ni28_797	Ref+										●		●													●	●	●		
Lieberman04JPrsScPsco87_421	Slf+	●										●								●						●				
Pauly14scan9_1779	Scz-									●								●												
Lieberman04JPrsScPsco87_421	Slf+	●							●			●								●										


Paper
label
vMPFC
dMPFC
vACC
dACC
SMA
MCC
PCC
precuneus
ains
OFC
amygdala
MTL
IFG
MFG
SFG
aPFC
TP
vLTC
dLTC
TPJ
AG
preCG
postCG
SMG
IPS/SPL
pIns
mOC
lOC
pVTC
Goldin12FrnHumNsci6_295 Sad-
Lieberman04JPrsScPsco87_421 Slf-
McAdams14scan9_12 Ann+
Pfeifer13JAutismDevDisord43_272 Asd+
Schmitz06nsy44_762 Tbi-
Yang16SRep6_20274 Adp+
Bedford12BMCPsci12_106 Scz+
Benoit10ni50_1340 Slf+
Kim16PlosOne11_e0149554 Adp-
Lemogne09scan4_305 Dep+
Ma14scan9_73 Slf+
Ma14scan9_1360 Slf-
McAdams14scan9_12 Ref-
Chiao09hbm30_2813 Ctx+
Ma14scan9_1360 Slf+
Ma14scan9_1360 Slf+
D'Argembeau08scan3_244 Now+
Goldin09JCgnPscoThr23_242 Sad+
Goldin12FrnHumNsci6_295 Sad-
Gutchess07SocNsci2_117 Age+
Lieberman04JPrsScPsco87_421 Slf-
Lieberman04JPrsScPsco87_421 Slf+
Ma14cc24_2421 Val-
Ma14cc24_2421 Val-
Macrae04cc14_647 Mem+
Rameson10ni50_701 Slf+
Ochsner05ni28_797 Ref+
Fossati03AmJPsychi160_1938 Val+
Pauly14scan9_1779 Scz-
Yang16SRep6_20274 Adp+
Zhu12Hippo22_1540 Mem+
D'Argembeau12cc22_659 Fam+
Lieberman04JPrsScPsco87_421 Slf+
Ma14scan9_73 Slf+
Pfeifer09ChildDev80_1016 Yng-
Veroude14scan9_513 Ref+
Veroude14scan9_513 Fem-
Murphy10SczRes116_252 Scz-
Zhu12Hippo22_1540 Mem+
Chiao09hbm30_2813 Ctx-
Meffert13FrntHumNsci7_46 Val-
McAdams14scan9_12 Ref-
Meffert13FrntHumNsci7_46 Val+
Ochsner05ni28_797 Ref-
Bedford12BMCPsci12_106 Scz-
Chen15CultBrain3_39 Adp+
Goldin12FrnHumNsci6_295 Sad-
Kim16PlosOne11_e0149554 Adp+
Ma14scan9_1360 Slf+
Pauly14scan9_1779 Scz+
Ruby09NrbiolAging30_1637 Alz+
Kircher02npla40_683 Slf+
Moran06jocn18_1 Slf+
Gutchess10nsy48_211 Age+
Bedford12BMCPsci12_106 Scz+
Goldin09JCgnPscoThr23_242 Sad-
Gutchess07SocNsci2_117 Age+
Kim16PlosOne11_e0149554 Val+
D'Argembeau12cc22_659 Slf+
Chen15CultBrain3_39 Adp+
Colton13FrnHumNsci7_537 Age+
Chiao09hbm30_2813 Fam+
Bedford12BMCPsci12_106 Scz-
Bradley16DevCogNsci19_87 Dep-
Veroude14scan9_513 Ref-
Zhu12Hippo22_1540 Mem+
Colton13FrnHumNsci7_537 Age+
Bradley16DevCogNsci19_87 Dep+
Ma14cc24_2421 Val+
Chiao10jocn22_1 Fam-
Yang16SRep6_20274 Adp+
Chiao09hbm30_2813 Fam+
Chiao10jocn22_1 Fam+
Goldin12FrnHumNsci6_295 Sad+
Zhu12Hippo22_1540 Slf+

Araujo HF, Kaplan J, Damasio A (2013) Cortical midline structures and autobiographical-self processes: an activation-likelihood estimation meta-analysis. Front Hum Neurosci 7:548
Bedford NJ, Surguladze S, Giampietro V, Brammer MJ, David AS (2012) Self-evaluation in schizophrenia: an fMRI study with implications for the understanding of insight. BMC Psychiatry 12:106
Beer JS, Lombardo MV, Bhanji JP (2010) Roles of medial prefrontal cortex and orbitofrontal cortex in self-evaluation. J Cogn Neurosci 22(9):2108–2119
Benoit RG, Gilbert SJ, Volle E, Burgess PW (2010) When I think about me and simulate you: medial rostral prefrontal cortex and self-referential processes. NeuroImage 50(3):1340–1349
Blackwood NJ, Bentall RP, Ffytche DH, Simmons A, Murray RM, Howard RJ (2004) Persecutory delusions and the determination of self-relevance: an fMRI investigation. Psychol Med 34(4):591–596
Bradley KA, Colcombe S, Henderson SE, Alonso CM, Milham MP, Gabbay V (2016) Neural correlates of self-perceptions in adolescents with major depressive disorder. Dev Cogn Neurosci 19:87–97
Brent BK, Coombs G, Keshavan MS, Seidman LJ, Moran JM, Holt DJ (2014) Subclinical delusional thinking predicts lateral temporal cortex responses during social reflection. Soc Cogn Affect Neurosci 9(3):273–282
Chen P-HA, Wagner DD, Kelley WM, Powers KE, Heatherton TF (2013) Medial prefrontal cortex differentiates self from mother in Chinese: evidence from self-motivated immigrants. Cult Brain 1(1):3–15
Chen PA, Wagner DD, Kelley WM, Heatherton TF (2015) Activity in cortical midline structures is modulated by self-construal changes during acculturation. Cult Brain 3(1):39–52
Chiao JY, Harada T, Komeda H, Li Z, Mano Y, Saito D, Parrish TB, Sadato N, Iidaka T (2009) Neural basis of individualistic and collectivistic views of self. Hum Brain Mapp 30(9):2813–2820
Chiao JY, Harada T, Komeda H, Li Z, Mano Y, Saito D, Parrish TB, Sadato N, Iidaka T (2010) Dynamic cultural influences on neural representations of the self. J Cogn Neurosci 22(1):1–11
Colton G, Leshikar ED, Gutchess AH (2013) Age differences in neural response to stereotype threat and resiliency for self-referenced information. Front Hum Neurosci 7:537

Craik FIM, Moroz TM, Moscovitch M, Stuss DT, Winocur G, Tulving E, Kapur S (1999) In search of the self: a positron emission tomography study. Psychol Sci 10(1):26–34

D'Argembeau A (2013) On the role of the ventromedial prefrontal cortex in self-processing: the valuation hypothesis. Front Hum Neurosci 7:372

D'Argembeau A, Ruby P, Collette F, Degueldre C, Balteau E, Luxen A, Maquet P, Salmon E (2007) Distinct regions of the medial prefrontal cortex are associated with self-referential processing and perspective taking. J Cogn Neurosci 19(6):935–944

D'Argembeau A, Feyers D, Majerus S, Collette F, Van der Linden M, Maquet P, Salmon E (2008) Self-reflection across time: cortical midline structures differentiate between present and past selves. Soc Cogn Affect Neurosci 3(3):244–252

D'Argembeau A, Jedidi H, Balteau E, Bahri M, Phillips C, Salmon E (2012) Valuing one's self: medial prefrontal involvement in epistemic and emotive investments in self-views. Cereb Cortex 22(3):659–667

Denny BT, Kober H, Wager TD, Ochsner KN (2012) A meta-analysis of functional neuroimaging studies of self- and other judgments reveals a spatial gradient for mentalizing in medial prefrontal cortex. J Cogn Neurosci 24(8):1742–1752

Flagan T, Beer JS (2013) Three ways in which midline regions contribute to self-evaluation. Front Hum Neurosci 7:450

Fossati P, Hevenor SJ, Graham SJ, Grady C, Keightley ML, Craik F, Mayberg H (2003) In search of the emotional self: an fMRI study using positive and negative emotional words. Am J Psychiatry 160(11):1938–1945

Fossati P, Hevenor SJ, Lepage M, Graham SJ, Grady C, Keightley ML, Craik F, Mayberg H (2004) Distributed self in episodic memory: neural correlates of successful retrieval of self-encoded positive and negative personality traits. NeuroImage 22(4):1596–1604

Frith U, Frith CD (2003) Development and neurophysiology of mentalizing. Phil Trans R Soc Lond B 358: 459–473

Goldin P, Ramel W, Gross J (2009) Mindfulness meditation training and self-referential processing in social anxiety disorder: behavioral and neural effects. J Cogn Psychother 23(3):242–257

Goldin P, Ziv M, Jazaieri H, Gross JJ (2012) Randomized controlled trial of mindfulness-based stress reduction versus aerobic exercise: effects on the

self-referential brain network in social anxiety disorder. Front Hum Neurosci 6:295
Grady CL, Grigg O, Ng C (2012) Age differences in default and reward networks during processing of personally relevant information. Neuropsychologia 50(7):1682–1697
Gutchess AH, Kensinger EA, Schacter DL (2007) Aging, self-referencing, and medial prefrontal cortex. Soc Neurosci 2(2):117–133
Gutchess AH, Kensinger EA, Schacter DL (2010) Functional neuroimaging of self-referential encoding with age. Neuropsychologia 48(1):211–219
Gutchess AH, Sokal R, Coleman JA, Gotthilf G, Grewal L, Rosa N (2015) Age differences in self-referencing: evidence for common and distinct encoding strategies. Brain Res 1612:118–127
Han S, Mao L, Gu X, Zhu Y, Ge J, Ma Y (2008) Neural consequences of religious belief on self-referential processing. Soc Neurosci 3(1):1–15
Han S, Gu X, Mao L, Ge J, Wang G, Ma Y (2010) Neural substrates of self-referential processing in Chinese Buddhists. Soc Cogn Affect Neurosci 5(2-3):332–339
Heatherton TF, Wyland CL, Macrae CN, Demos KE, Denny BT, Kelley WM (2006) Medial prefrontal activity differentiates self from close others. Soc Cogn Affect Neurosci 1(1):18–25
Hoefler A, Athenstaedt U, Corcoran K, Ebner F, Ischebeck A (2015) Coping with self-threat and the evaluation of self-related traits: an fMRI study. PLoS One 10(9):e0136027
Holt DJ, Cassidy BS, Andrews-Hanna JR, Lee SM, Coombs G, Goff DC, Gabrieli JD, Moran JM (2011) An anterior-to-posterior shift in midline cortical activity in schizophrenia during self-reflection. Biol Psychiatry 69(5):415–423
Hughes BL, Beer JS (2013) Protecting the self: the effect of social-evaluative threat on neural representations of self. J Cogn Neurosci 25(4):613–622
Jankowski KF, Moore WE, Merchant JS, Kahn LE, Pfeifer JH (2014) But do you think I'm cool? Developmental differences in striatal recruitment during direct and reflected social self-evaluations. Dev Cogn Neurosci 8:40–54
Jenkins AC, Mitchell JP (2011) Medial prefrontal cortex subserves diverse forms of self-reflection. Soc Neurosci 6(3):211–218
Jenkins AC, Macrae CN, Mitchell JP (2008) Repetition suppression of ventromedial prefrontal activity during judgments of self and others. Proc Natl Acad Sci U S A 105(11):4507–4512

Johnson SC, Baxter LC, Wilder LS, Pipe JG, Heiserman JE, Prigatano GP (2002) Neural correlates of self-reflection. Brain 125(Pt 8):1808–1814
Johnson SC, Ries ML, Hess TM, Carlsson CM, Gleason CE, Alexander AL, Rowley HA, Asthana S, Sager MA (2007) Effect of Alzheimer disease risk on brain function during self-appraisal in healthy middle-aged adults. Arch Gen Psychiatry 64(10):1163–1171
Kelley WM, Macrae CN, Wyland CL, Caglar S, Inati S, Heatherton TF (2002) Finding the self? An event-related fMRI study. J Cogn Neurosci 14(5):785–794
Kennedy DP, Courchesne E (2008) Functional abnormalities of the default network during self- and other-reflection in autism. Soc Cogn Affect Neurosci 3(2):177–190
Kim EJ, Kyeong S, Cho SW, Chun JW, Park HJ, Kim J, Kim J, Dolan RJ, Kim JJ (2016) Happier people show greater neural connectivity during negative self-referential processing. PLoS One 11(2):e0149554
Kircher TT, Brammer M, Bullmore E, Simmons A, Bartels M, David AS (2002) The neural correlates of intentional and incidental self processing. Neuropsychologia 40(6):683–692
Kjaer TW, Nowak M, Lou HC (2002) Reflective self-awareness and conscious states: PET evidence for a common midline parietofrontal core. NeuroImage 17(2):1080–1086
Krienen FM, Tu PC, Buckner RL (2010) Clan mentality: evidence that the medial prefrontal cortex responds to close others. J Neurosci 30(41):13906–13915
Lemogne C, le Bastard G, Mayberg H, Volle E, Bergouignan L, Lehericy S, Allilaire JF, Fossati P (2009) In search of the depressive self: extended medial prefrontal network during self-referential processing in major depression. Soc Cogn Affect Neurosci 4(3):305–312
Lemogne C, Mayberg H, Bergouignan L, Volle E, Delaveau P, Lehericy S, Allilaire JF, Fossati P (2010) Self-referential processing and the prefrontal cortex over the course of depression: a pilot study. J Affect Disord 124(1–2):196–201
Lemogne C, Delaveau P, Freton M, Guionnet S, Fossati P (2012) Medial prefrontal cortex and the self in major depression. J Affect Disord 136(1-2):e1–e11
Lieberman MD, Jarcho JM, Satpute AB (2004) Evidence-based and intuition-based self-knowledge: an FMRI study. J Pers Soc Psychol 87(4):421–435

Lombardo MV, Chakrabarti B, Bullmore ET, Sadek SA, Pasco G, Wheelwright SJ, Suckling J, Baron-Cohen S (2010) Atypical neural self-representation in autism. Brain 133(Pt 2):611–624

Lou HC, Luber B, Crupain M, Keenan JP, Nowak M, Kjaer TW, Sackeim HA, Lisanby SH (2004) Parietal cortex and representation of the mental self. Proc Natl Acad Sci U S A 101(17):6827–6832

Ma Y, Bang D, Wang C, Allen M, Frith C, Roepstorff A, Han S (2014a) Sociocultural patterning of neural activity during self-reflection. Soc Cogn Affect Neurosci 9(1):73–80

Ma Y, Wang C, Li B, Zhang W, Rao Y, Han S (2014b) Does self-construal predict activity in the social brain network? A genetic moderation effect. Soc Cogn Affect Neurosci 9(9):1360–1367

Macrae CN, Moran JM, Heatherton TF, Banfield JF, Kelley WM (2004) Medial prefrontal activity predicts memory for self. Cereb Cortex 14(6):647–654

McAdams CJ, Krawczyk DC (2014) Who am I? How do I look? Neural differences in self-identity in anorexia nervosa. Soc Cogn Affect Neurosci 9(1):12–21

Meffert H, Blanken L, Blair KS, White SF, Blair JR (2013) The influence of valence and decision difficulty on self-referential processing. Front Hum Neurosci 7:46

Modinos G, Ormel J, Aleman A (2009) Activation of anterior insula during self-reflection. PLoS One 4(2):e4618

Modinos G, Renken R, Ormel J, Aleman A (2011) Self-reflection and the psychosis-prone brain: an fMRI study. Neuropsychology 25(3):295–305

Moran JM, Macrae CN, Heatherton TF, Wyland CL, Kelley WM (2006) Neuroanatomical evidence for distinct cognitive and affective components of self. J Cogn Neurosci 18(9):1586–1594

Moran JM, Lee SM, Gabrieli JD (2011) Dissociable neural systems supporting knowledge about human character and appearance in ourselves and others. J Cogn Neurosci 23(9):2222–2230

Morel N, Villain N, Rauchs G, Gaubert M, Piolino P, Landeau B, Mezenge F, Desgranges B, Eustache F, Chetelat G (2014) Brain activity and functional coupling changes associated with self-reference effect during both encoding and retrieval. PLoS One 9(3):e90488

Morin A, Hamper B (2012) Self-reflection and the inner voice: activation of the left inferior frontal gyrus during perceptual and conceptual self-referential thinking. Open Neuroimaging J 6:78–89

Murphy ER, Brent BK, Benton M, Pruitt P, Diwadkar V, Rajarethinam RP, Keshavan MS (2010) Differential processing of metacognitive evaluation and the neural circuitry of the self and others in schizophrenia: a pilot study. Schizophr Res 116(2–3):252–258

Murray RJ, Schaer M, Debbane M (2012) Degrees of separation: a quantitative neuroimaging meta-analysis investigating self-specificity and shared neural activation between self- and other-reflection. Neurosci Biobehav Rev 36(3):1043–1059

Murray RJ, Debbane M, Fox PT, Bzdok D, Eickhoff SB (2015) Functional connectivity mapping of regions associated with self- and other-processing. Hum Brain Mapp 36(4):1304–1324

Ng SH, Han S, Mao L, Lai JC (2010) Dynamic bicultural brains: fMRI study of their flexible neural representation of self and significant others in response to culture primes. Asian J Soc Psychol 13(2):83–91

Northoff G, Bermpohl F (2004) Cortical midline structures and the self. Trends Cogn Sci 8(3):102–107

Northoff G, Heinzel A, de Greck M, Bermpohl F, Dobrowolny H, Panksepp J (2006) Self-referential processing in our brain – a meta-analysis of imaging studies on the self. NeuroImage 31(1):440–457

Ochsner KN, Beer JS, Robertson ER, Cooper JC, Gabrieli JD, Kihsltrom JF, D'Esposito M (2005) The neural correlates of direct and reflected self-knowledge. NeuroImage 28(4):797–814

Pankow A, Katthagen T, Diner S, Deserno L, Boehme R, Kathmann N, Gleich T, Gaebler M, Walter H, Heinz A, Schlagenhauf F (2016) Aberrant salience is related to dysfunctional self-referential processing in psychosis. Schizophr Bull 42(1):67–76

Pauly K, Finkelmeyer A, Schneider F, Habel U (2013) The neural correlates of positive self-evaluation and self-related memory. Soc Cogn Affect Neurosci 8(8):878–886

Pauly KD, Kircher TT, Schneider F, Habel U (2014) Me, myself and I: temporal dysfunctions during self-evaluation in patients with schizophrenia. Soc Cogn Affect Neurosci 9(11):1779–1788

Pfeifer JH, Lieberman MD, Dapretto M (2007) "I know you are but what am I?!": neural bases of self- and social knowledge retrieval in children and adults. J Cogn Neurosci 19(8):1323–1337

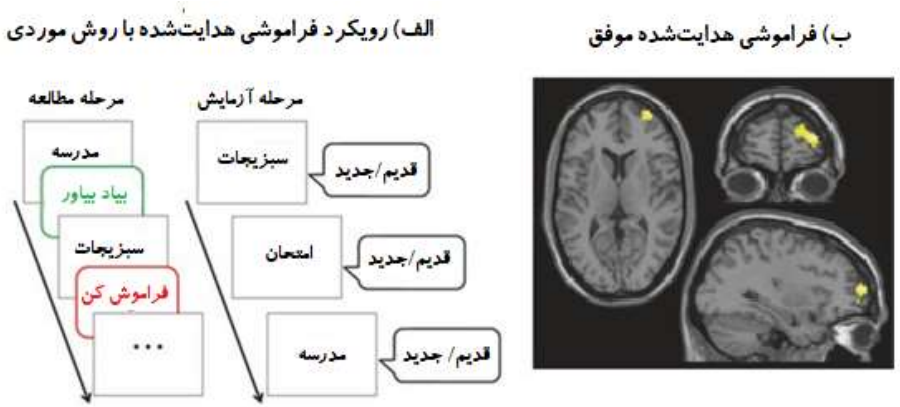
Pfeifer JH, Masten CL, Borofsky LA, Dapretto M, Fuligni AJ, Lieberman MD (2009) Neural correlates of direct and reflected self-appraisals in adolescents

and adults: when social perspective-taking informs self-perception. Child Dev 80(4):1016–1038
Pfeifer JH, Kahn LE, Merchant JS, Peake SJ, Veroude K, Masten CL, Lieberman MD, Mazziotta JC, Dapretto M (2013a) Longitudinal change in the neural bases of adolescent social self-evaluations: effects of age and pubertal development. J Neurosci 33(17):7415–7419
Pfeifer JH, Merchant JS, Colich NL, Hernandez LM, Rudie JD, Dapretto M (2013b) Neural and behavioral responses during self-evaluative processes differ in youth with and without autism. J Autism Dev Disord 43(2):272–285
Powell LJ, Macrae CN, Cloutier J, Metcalfe J, Mitchell JP (2010) Dissociable neural substrates foragentic versus conceptual representations of self. J Cogn Neurosci 22(10):2186–2197
Qin P, Northoff G (2011) How is our self related to midline regions and the default-mode network? NeuroImage 57(3):1221–1233
Rameson LT, Satpute AB, Lieberman MD (2010) The neural correlates of implicit and explicit self-relevant processing. NeuroImage 50(2):701–708
Ray RD, Shelton AL, Hollon NG, Michel BD, Frankel CB, Gross JJ, Gabrieli JD (2009) Cognitive and neural development of individuated self-representation in children. Child Dev 80(4):1232–1242
Ray RD, Shelton AL, Hollon NG, Matsumoto D, Frankel CB, Gross JJ, Gabrieli JD (2010) Interdependent self-construal and neural representations of self and mother. Soc Cogn Affect Neurosci 5(2-3):318–323
Ries ML, Schmitz TW, Kawahara TN, Torgerson BM, Trivedi MA, Johnson SC (2006) Task-dependent posterior cingulate activation in mild cognitive impairment. NeuroImage 29(2):485–492
Ries ML, Jabbar BM, Schmitz TW, Trivedi MA, Gleason CE, Carlsson CM, Rowley HA, Asthana S, Johnson SC (2007) Anosognosia in mild cognitive impairment: relationship to activation of cortical midline structures involved in self-appraisal. J Int Neuropsychol Soc 13(3):450–461
Rogers TB, Kuiper NA, Kirker WS (1977) Self-reference and the encoding of personal information. J Pers Soc Psychol 35(9):677–688
Ruby P, Collette F, D'Argembeau A, Peters F, Degueldre C, Balteau E, Luxen A, Maquet P, Salmon E (2009) Perspective taking to assess self-personality: what's modified in Alzheimer's disease? Neurobiol Aging 30(10):1637–1651

Sarsam M, Parkes LM, Roberts N, Reid GS, Kinderman P (2013) The Queen and I: neural correlates of altered self-related cognitions in major depressive episode. PLoS One 8(10):e78844
Saverino C, Grigg O, Churchill NW, Grady CL (2015) Age differences in the default network at rest and the relation to self-referential processing. Soc Cogn Affect Neurosci 10(2):231–239
Schmitz TW, Johnson SC (2006) Self-appraisal decisions evoke dissociated dorsal-ventral aMPFC networks. NeuroImage 30(3):1050–1058
Schmitz TW, Johnson SC (2007) Relevance to self: a brief review and framework of neural systems underlying appraisal. Neurosci Biobehav Rev 31(4):585–596
Schmitz TW, Kawahara-Baccus TN, Johnson SC (2004) Metacognitive evaluation, self-relevance, and the right prefrontal cortex. NeuroImage 22(2):941–947
Schmitz TW, Rowley HA, Kawahara TN, Johnson SC (2006) Neural correlates of self-evaluative accuracy after traumatic brain injury. Neuropsychologia 44(5):762–773
Schneider M, Debbane M, Lagioia A, Salomon R, d'Argembeau A, Eliez S (2012) Comparing the neural bases of self-referential processing in typically developing and 22q11.2 adolescents. Dev Cogn Neurosci 2(2):277–289
Sugiura M (2013) Associative account of self-cognition: extended forward model and multi-layer structure. Front Hum Neurosci 7:535
Sugiura M, Seitz RJ, Angel H-F (2015) Models and neural bases of the believing process. J Behav Brain Sci 5(01):12
Sul S, Choi I, Kang P (2012) Cultural modulation of self-referential brain activity for personality traits and social identities. Soc Neurosci 7(3):280–291
Symons CS, Johnson BT (1997) The self-reference effect in memory: a meta-analysis. Psychol Bull 121(3):371–394
Tan S, Zhao Y, Fan F, Zou Y, Jin Z, Zen Y, Zhu X, Yang F, Tan Y, Zhou D (2015) Brain correlates of self-evaluation deficits in schizophrenia: a combined functional and structural MRI study. PLoS One 10(9):e0138737
van Buuren M, Gladwin TE, Zandbelt BB, Kahn RS, Vink M (2010) Reduced functional coupling in the default-mode network during self-referential processing. Hum Brain Mapp 31(8):1117–1127
van der Meer L, Costafreda S, Aleman A, David AS (2010) Self-reflection and the brain: a theoretical review and meta-analysis of neuroimaging studies with implications for schizophrenia. Neurosci Biobehav Rev 34(6):935–946

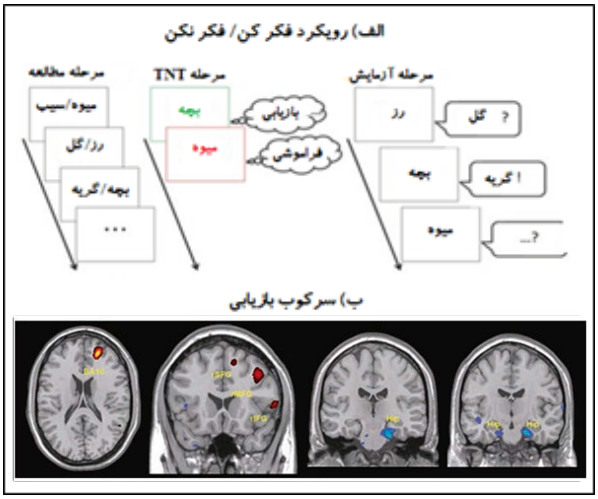
van der Meer L, de Vos AE, Stiekema AP, Pijnenborg GH, van Tol MJ, Nolen WA, David AS, Aleman A (2013) Insight in schizophrenia: involvement of self-reflection networks? Schizophr Bull 39(6):1288–1295
Vanderwal T, Hunyadi E, Grupe DW, Connors CM, Schultz RT (2008) Self, mother and abstract other: an fMRI study of reflective social processing. NeuroImage 41(4):1437–1446
Veroude K, Jolles J, Croiset G, Krabbendam L (2014) Sex differences in the neural bases of social appraisals. Soc Cogn Affect Neurosci 9(4):513–519
Wang G, Mao L, Ma Y, Yang X, Cao J, Liu X, Wang J, Wang X, Han S (2012) Neural representations of close others in collectivistic brains. Soc Cogn Affect Neurosci 7(2):222–229
Whitfield-Gabrieli S, Moran JM, Nieto-Castanon A, Triantafyllou C, Saxe R, Gabrieli JD (2011) Associations and dissociations between default and self-reference networks in the human brain. NeuroImage 55(1):225–232
Wu Y, Wang C, He X, Mao L, Zhang L (2010) Religious beliefs influence neural substrates of self-reflection in Tibetans. Soc Cogn Affect Neurosci 5(2-3):324–331
Yang J, Dedovic K, Chen W, Zhang Q (2012) Self-esteem modulates dorsal anterior cingulate cortical response in self-referential processing. Neuropsychologia 50(7):1267–1270
Yang J, Xu X, Chen Y, Shi Z, Han S (2016) Trait self-esteem and neural activities related to self-evaluation and social feedback. Sci Rep 6:20274
Yaoi K, Osaka N, Osaka M (2009) Is the self special in the dorsomedial prefrontal cortex? An fMRI study. Soc Neurosci 4(5):455–463
Yaoi K, Osaka M, Osaka N (2015) Neural correlates of the self-reference effect: evidence from evaluation and recognition processes. Front Hum Neurosci 9:383
Yoshimura S, Ueda K, Suzuki S, Onoda K, Okamoto Y, Yamawaki S (2009) Self-referential processing of negative stimuli within the ventral anterior cingulate gyrus and right amygdala. Brain Cogn 69(1):218–225
Yoshimura S, Okamoto Y, Onoda K, Matsunaga M, Ueda K, Suzuki S, Yamawaki S (2010) Rostral anterior cingulate cortex activity mediates the relationship between the depressive symptoms and the medial prefrontal cortex activity. J Affect Disord 122(1-2):76–85
Yoshimura S, Okamoto Y, Onoda K, Matsunaga M, Okada G, Kunisato Y, Yoshino A, Ueda K, Suzuki S, Yamawaki S (2014) Cognitive behavioral therapy for depression changes medial prefrontal and ventral anterior

cingulate cortex activity associated with self-referential processing. Soc Cogn Affect Neurosci 9(4):487–493
Zhang L, Zhou T, Zhang J, Liu Z, Fan J, Zhu Y (2006) In search of the Chinese self: an fMRI study. Sci China C Life Sci 49(1):89–96
Zhu Y, Zhang L, Fan J, Han S (2007) Neural basis of cultural influence on self-representation. NeuroImage 34(3):1310–1316
Zhu L, Guo X, Li J, Zheng L, Wang Q, Yang Z (2012) Hippocampal activity is associated with self-descriptiveness effect in memory, whereas self-reference effect in memory depends on medial prefrontal activity. Hippocampus 22(7):1540–1552
Zysset S, Huber O, Ferstl E, von Cramon DY (2002) The anterior frontomedian cortex and evaluative judgment: an fMRI study. NeuroImage 15(4):983–991
Zysset S, Huber O, Samson A, Ferstl EC, von Cramon DY (2003) Functional specialization within the anterior medial prefrontal cortex: a functional magnetic resonance imaging study with human subjects. Neurosci Lett 335(3):183–186



شکل ۱,۸. نمونه‌ای از رویکردهای فراموشی هدایت‌شدهٔ تجربی و هم‌بستگی‌های عصبی زیربنایی

الف) رویکرد فراموشی هدایت‌شده با روش موردی. در این رویکرد که سرکوب ارادی در رمزگذاری را می‌سنجد، شرکت‌کنندگان موردها را یک‌به‌یک مطالعه می‌کنند، و هر مورد با یک دستورالعمل «فراموش کردن» یا «به خاطر سپردن» دنبال می‌شود. در ادامه حافظهٔ شرکت‌کنندگان برای تمام موردها آزمایش می‌شوند.
ب) نقشهٔ فعال‌سازی مربوط به یک مطالعهٔ fMRI اخیر مربوط به فراموشی هدایت‌شده با روش موردی. نواحی نشان داده شده است که در رابطه با فراموشی تعمدی در مقایسه با فراموشی اتفاقی به‌طور معناداری فعال‌ترند (موردهایی که باید فراموش شوند و با موفقیت فراموش می‌شوند در مقابل موردهایی که باید به خاطر سپرده شوند و تصادفاً فراموش شده‌اند). فراموشی هدایت‌شدهٔ موفق (در مقایسه با فراموشی اتفاقی) با افزایش فعال‌سازی در شکنج پیشانی میانی راست یعنی قشر پیش‌پیشانی خلفی جانبی (DLPFC) همراه است.



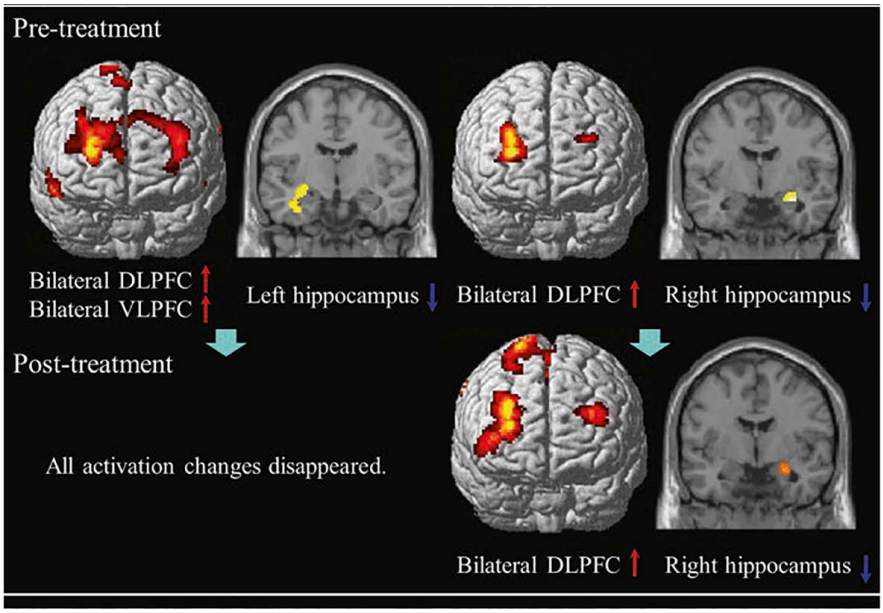
شکل ۲,۸. نمونه‌ای از رویکردهای سرکوب بازیابی آزمایشی و هم‌بستگی‌های عصبی زیربنایی

الف) رویکرد فکرکن/ فکرنکن (TNT). در این رویکرد، که سرکوب ارادی در بازیابی را می‌سنجد، شرکت‌کنندگان در ابتدا جفت‌های نشانه– هدف را مطالعه می‌کنند. در ادامه شرکت‌کنندگان تحت مرحلهٔ TNT قرار می‌گیرند، که در آن نشانه‌های یادآوری یک‌به‌یک به آن‌ها ارائه شده و از آن‌ها خواسته می‌شود تا هدفی را بازیابی (فکرکن) یا فراموش (فکرنکن) کنند که با رنگ‌های سبز یا قرمز نشان داده می‌شوند. حافظهٔ شرکت‌کنندگان برای تمام جفت‌ها آزمایش می‌شوند.

ب) نقشهٔ فعال‌سازی مربوط به یک مطالعهٔ fMRI در مورد سرکوب بازیابی با استفاده از رویکرد TNT (اصلاح‌شده با اجازهٔ دووپ و همکاران، ۲۰۰۷). مناطقی که در آزمون‌های فکرنکن در مقایسه با آزمون‌های فکرکن نمایش داده شدند که به‌طور معناداری فعال‌تر (قرمز) یا غیرفعال (آبی) بودند. سرکوب بازیابی با افزایش فعال‌سازی در مناطق پیش‌پیشانی راست (شامل شکنج پیشانی فوقانی راست، میانی و تحتانی و ناحیهٔ ۱۰ برودمن) و غیرفعال‌سازی در هیپوکامپ دوطرفه همراه بود.

جدول ۱,۸. دورهٔ فراموشی و تغییرات آن با درمان در بیماران ۱ و ۲ با تشخیص فراموشی تجزیه‌ای

فراموشی پس‌گستر	بیمار ۱	بیمار ۲
دورهٔ فراموشی پیش از درمان	یک دورهٔ ۴/۵ ساله از زمان نیم‌سال آخر دوران تحصیل در دانشگاه و ۴ سال بعد از آن به‌عنوان تاجر	یک دورهٔ حدوداً ۳۵ ساله از زمان فارغ‌التحصیلی از دبیرستان تا زمان بروز مشکل
درمان: مصاحبه تحت بیهوشی	↓	↓
پس از درمان	تمام خاطرات از ۴ سال اول دورهٔ فراموشی تقریباً به‌طور کامل بهبود یافت. نیم‌سال آخر دورهٔ فراموشی بهبود نیافت.	هیچ خاطره‌ای بازیابی نشد.



شکل ۳،۸. تغییرات فعال‌سازی مربوط به فراموشی تجزیه‌ای از یک مطالعهٔ fMRI مرتبط با تکلیف (اصلاح شده با اجازه از کیکوچی و همکاران. ۲۰۱۰).

تغییرات فعال‌سازی معنادار در پاسخ به محرک‌های «غیرقابل تشخیص» در مقابل محرک‌های «قابل تشخیص»، که به‌طور کامل با تغییرات فعال‌سازی معنادار در پاسخ به محرک‌های «غیرقابل‌تشخیص» در مقابل محرک‌های «کنترل» پوشانده شده‌اند، نشان داده شده است. پیش از درمان، بیماران ۱ و ۲ مبتلا به فراموشی تجزیه‌ای، الگوهای تغییریافته‌ای از فعال‌سازی مغزی را نشان دادند که در آن مناطق پیش‌پیشانی فعال‌تر و مناطق هیپوکامپ غیرفعال‌تر بودند. پس از درمان، تمام تغییرات فعال‌سازی در بیمار ۱ که تقریباً تمام خاطرات ازدست‌رفتهٔ خود را بازیابی کرد، ناپدید شدند. در مقابل در بیمار ۲ که خاطرات ازدست‌رفتهٔ خود را بازیابی نکرد، الگوی تغییریافتهٔ فعال‌سازی‌های مغزی تقریباً بدون تغییر باقی ماند. DLPFC قشر پیش‌پیشانی خلفی جانبی، VLPFC قشر پیش‌پیشانی شکمی جانبی.

American Psychiatric Association (1994) Diagnostic and statistical manual of mental disorders, 4th edn. American Psychiatric Association, Washington, DC
Anderson MC (2003) Rethinking interference theory: executive control and the mechanisms of forgetting. J Mem Lang 49(4):415–445
Anderson MC, Green C (2001) Suppressing unwanted memories by executive control. Nature 410(6826):366–369
Anderson MC, Hanslmayr S (2014) Neural mechanisms of motivated forgetting. Trends Cogn Sci 18(6):279–292
Anderson MC, Huddleston E (2011) Towards a cognitive and neurobiological model of motivated forgetting. In: Belli RF (ed) True and false recovered memories: toward a reconciliation of the debate: Nebraska Symposium on Motivation. Springer, New York, pp 53–120
Anderson MC, Levy BJ (2009) Suppressing unwanted memories. Curr Dir Psychol Sci 18(4):189–194
Anderson MC, Ochsner KN, Kuhl B, Cooper J, Robertson E, Gabrieli SW, Glover GH, Gabrieli JDE (2004) Neural systems underlying the suppression of unwanted memories. Science 303(5655):232–235
Anderson MC, Reinholz J, Kuhl BA, Mayr U (2011) Intentional suppression of unwanted memories grows more difficult as we age. Psychol Aging 26(2):397–405
Aron AR, Robbins TW, Poldrack RA (2004) Inhibition and the right inferior frontal cortex. Trends Cogn Sci 8(4):170–177
Baddeley A, Eysenck MW, Anderson MC (2009) Memory. Psychology Press, Hove
Badre D (2008) Cognitive control, hierarchy, and the rostro-caudal organization of the frontal lobes. Trends Cogn Sci 12(5):193–200
Basden BH, Basden DR (1998) Directed forgetting: a contrast of methods and interpretations. In: Golding JM, MacLeod CM (eds) Intentional forgetting: interdisciplinary approache. Erlbaum, Mahwah, pp 139–172
Bäuml KH, Pastötter B, Hanslmayr S (2010) Binding and inhibition in episodic memory: cognitive, emotional, and neural processes. Neurosci Biobehav Rev 34(7):1047–1054
Bell V, Oakley DA, Halligan PW, Deeley Q (2011) Dissociation in hysteria and hypnosis: evidence from cognitive neuroscience. J Neurol Neurosurg Psychiatry 82(3):332–339
Benoit RG, Anderson MC (2012) Opposing mechanisms support the voluntary forgetting of unwanted memories. Neuron 76(2):450–460

Bjork RA (1989) Retrieval inhibition as an adaptive mechanism in human memory. Varieties of memory and consciousness: essays in honor of Endel Tulving. Erlbaum, Hillsdale

Botzung A, Denkova E, Manning L (2007) Psychogenic memory deficits associated with functional cerebral changes: an fMRI study. Neurocase 13(5–6):378–384

Brand M, Eggers C, Reinhold N, Fujiwara E, Kessler J, Heiss WD, Markowitsch HJ (2009) Functional brain imaging in 14 patients with dissociative amnesia reveals right inferolateral prefrontal hypometabolism. Psychiatry Res Neuroimaging 174(1):32–39

Costello A, Fletcher PC, Dolan RJ, Frith CD, Shallice T (1998) The origins of forgetting in a case of isolated retrograde amnesia following a haemorrhage: evidence from functional imaging. Neurocase 4(6):437–446

De Renzi E, Lucchelli F, Muggia S, Spinnler H (1995) Persistent retrograde amnesia following a minor trauma. Cortex 31(3):531–542

Depue BE, Banich MT, Curran T (2006) Suppression of emotional and nonemotional content in memory: effects of repetition on cognitive control. Psychol Sci 17(5):441–447

Depue BE, Curran T, Banich MT (2007) Prefrontal regions orchestrate suppression of emotional memories via a two-phase process. Science 317(5835):215–219

Ecker UKH, Lewandowsky S, Oberauer K (2014) Removal of information from working memory: a specific updating process. J Mem Lang 74:77–90

Erdelyi MH (2006) The unified theory of repression. Behav Brain Sci 29(5):499–551

Fawcett JM, Taylor TL (2008) Forgetting is effortful: evidence from reaction time probes in an item-method directed forgetting task. Mem Cogn 36(6):1168–1181

Fawcett JM, Taylor TL (2010) Directed forgetting shares mechanisms with attentional withdrawal but not with stop-signal inhibition. Mem Cogn 38(6):797–808

Freud S (1966) In: Strachey J (ed) The standard edition of the complete psychological works of Sigmund Freud 1. Hogarth, London, pp 117–128

Gagnepain P, Henson RN, Anderson MC (2014) Suppressing unwanted memories reduces their unconscious influence via targeted cortical inhibition. Proc Natl Acad Sci U S A 111(13):E1310–E1319

Geiselman RE, Bjork RA, Fishman DL (1983) Disrupted retrieval in directed forgetting: a link with posthypnotic amnesia. J Exp Psychol 112(1):58–72
Hanslmayr S, Leipold P, Pastötter B, Bäuml KH (2009) Anticipatory signatures of voluntary memory suppression. J Neurosci 29(9):2742–2747
Hanslmayr S, Volberg G, Wimber M, Oehler N, Staudigl T, Hartmann T, Raabe M, Greenlee MW, Bäuml KH (2012) Prefrontally driven downregulation of neural synchrony mediates goal-directed forgetting. J Neurosci 32(42):14742–14751
Hart RE, Schooler JW (2012) Suppression of novel stimuli: changes in accessibility of suppressed nonverbalizable shapes. Conscious Cogn 21(3):1541–1546
Hennig-Fast K, Meister F, Frodl T, Beraldi A, Padberg F, Engel RR, Reiser M, Möller HJ, Meindl T (2008) A case of persistent retrograde amnesia following a dissociative fugue: neuropsychological and neurofunctional underpinnings of loss of autobiographical memory and self-awareness. Neuropsychologia 46(12):2993–3005
Hertel PT, Large D, Stück ED, Levy A (2012) Suppression-induced forgetting on a free-association test. Memory 20(2):100–109
Kaplan HI, Sadock BJ (1995) Comprehensive textbook of psychiatry, 6th edn. William & Wilkins, New York, pp 650–653
Kapur N (2000) Focal retrograde amnesia and the attribution of causality: an exceptionally benign commentary. Cogn Neuropsychol 17(7):623–637
Kihlstrom JF (2002) No need for repression. Trends Cogn Sci 6(12):502
Kikuchi H, Fujii T, Abe N, Suzuki M, Takagi M, Mugikura S, Takahashi S, Mori E (2010) Memory repression: brain mechanisms underlying dissociative amnesia. J Cogn Neurosci 22(3):602–613
Kopelman MD (2000) Focal retrograde amnesia and the attribution of causality: an exceptionally critical review. Cogn Neuropsychol 17(7):585–621
Kopelman MD (2002) Disorders of memory. Brain 125(10):2152–2190
MacLeod CM, Daniels KA (2000) Direct versus indirect tests of memory: directed forgetting meets the generation effect. Psychon Bull Rev 7(2):354–359
Markowitsch HJ (2003) Psychogenic amnesia. NeuroImage 20(S1): S132–S138
Markowitsch HJ, Fink GR, Thöne A, Kessler J, Heiss WD (1997) A PET study of persistent psychogenic amnesia covering the whole life span. Cogn Neuropsychiatry 2(2):135–158

Markowitsch HJ, Kessler J, Weber-Luxenburger G, Van der Ven C, Albers M, Heiss WD (2000) Neuroimaging and behavioral correlates of recovery from mnestic block syndrome and other cognitive deteriorations. Neuropsychiatry Neuropsychol Behav Neurol 13(1):60–66

Miller EK, Cohen JD (2001) An integrative theory of prefrontal cortex function. Annu Rev Neurosci 24:167–202

Muther WS (1965) Erasure or partitioning in short-term memory. Psychon Sci 3(1):429–430

Nakamura H, Kunori Y, Mori K, Nakaaki S, Yoshida S, Hamanaka T (2002) Two cases of functional focal retrograde amnesia with impairment of object use. Cortex 38(4):613–622

Noreen S, MacLeod MD (2013) It's all in the detail: intentional forgetting of autobiographical memories using the autobiographical think/no-think task. J Exp Psychol Learn Mem Cogn 39(2):375–393

Noreen S, MacLeod MD (2014) To think or not to think, that is the question: individual differences in suppression and rebound effects in autobiographical memory. Acta Psychol 145:84–97

Nowicka A, Marchewka A, Jednoróg K, Tacikowski P, Brechmann A (2011) Forgetting of emotional information is hard: an fMRI study of directed forgetting. Cereb Cortex 21(3):539–549

Paller KA, Wagner AD (2002) Observing the transformation of experience into memory. Trends Cogn Sci 6(2):93–102

Rizio AA, Dennis NA (2013) The neural correlates of cognitive control: successful remembering and intentional forgetting. J Cogn Neurosci 25(2):297–312

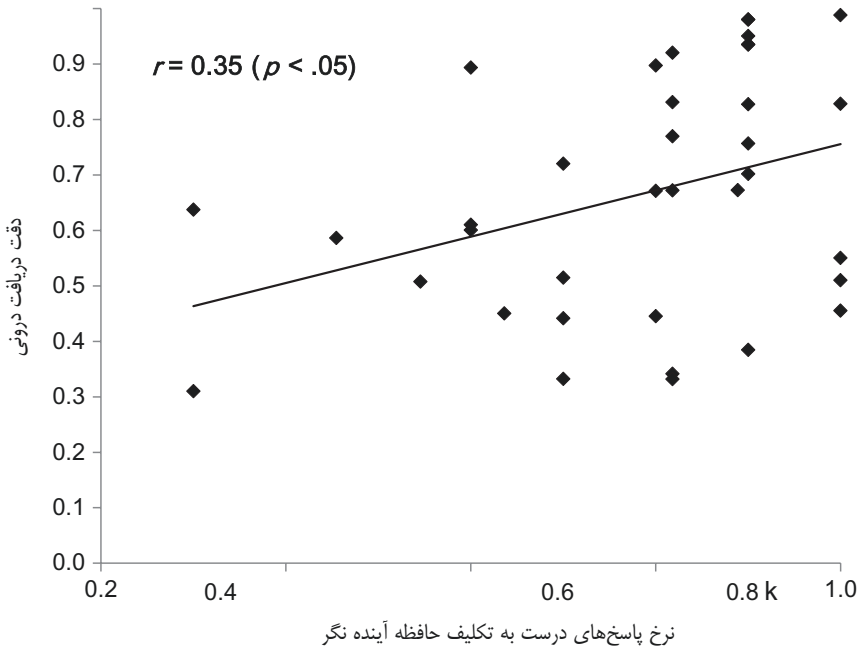
Squire LR, Zola-Morgan S (1991) The medial temporal lobe memory system. Science 253(5026):1380–1386

Tramoni E, Aubert-Khalfa S, Guye M, Ranjeva JP, Felician O, Ceccaldi M (2009) Hypo-retrieval and hyper-suppression mechanisms in functional amnesia. Neuropsychologia 47(3):611–624

Williams M, Hong SW, Kang MS, Carlisle NB, Woodman GF (2013) The benefit of forgetting. Psychon Bull Rev 20(2):348–355

Wylie GR, Foxe JJ, Taylor TL (2008) Forgetting as an active process: an fMRI investigation of item-method-directed forgetting. Cereb Cortex 18(3):670–682

Yang JC, Jeong GW, Lee MS, Kang HK, Eun SJ, Kim YK, Lee YH (2005) Functional MR imaging of psychogenic amnesia: a case report. Korean J Radiol 6(3):196–199
Yang T, Lei X, Anderson M (2016) Decreased inhibitory control of negative information in directed forgetting. Int J Psychophysiol 100:44–51
Zacks RT, Radvansky G, Hasher L (1996) Studies of directed forgetting in older adults. J Exp Psychol Learn Mem Cogn 22(1):143–156



شکل ۱,۹. هم‌بستگی مثبت بین عملکرد حافظه آینده‌نگر (PM) و دقت دریافت درونی شرکت‌کنندگانی که عملکرد PM بالاتری نشان دادند، می‌توانستند ضربان قلب خود را نیز دقیق‌تر احساس کنند (نویسندگان اومدا و همکاران (۲۰۱۶) اجازهٔ استفاده از این شکل را بر اساس داده‌های خود دادند).

Araujo HF, Kaplan J, Damasio H, Damasio A (2015) Neural correlates of different self domains. Brain Behav 5(12):e00409
Barrett LF (2006) Emotions as natural kinds? Perspect Psychol Sci 1(1):28–58
Bermudez-Rattoni F (2014) The forgotten insular cortex: its role on recognition memory formation. Neurobiol Learn Mem 109:207–216
Bermudez-Rattoni F, Okuda S, Roozendaal B, McGaugh JL (2005) Insular cortex is involved in consolidation of object recognition memory. Learn Mem 12(5):447–449
Berntson GG, Norman GJ, Bechara A, Bruss J, Tranel D, Cacioppo JT (2011) The insula and evaluative processes. Psychol Sci 22(1):80–86
Boucein W (1992) Electrodermal activity. Plenum Press, New York
Casanova JP, Madrid C, Contreras M, Rodriguez M, Vasquez M, Torrealba F (2016) A role for the interoceptive insular cortex in the consolidation of learned fear. Behav Brain Res 296:70–77
Chua EF, Bliss-Moreau E (2016) Knowing your heart and your mind: the relationships between metamemory and interoception. Conscious Cogn 45:146–158
Contreras M, Billeke P, Vicencio S, Madrid C, Perdomo G, Gonzalez M, Torrealba F (2012) A role for the insular cortex in long-term memory for context-evoked drug craving in rats. Neuropsychopharmacology 37(9):2101–2108
Craig AD (2009) How do you feel – now? The anterior insula and human awareness. Nat Rev Neurosci 10(1):59–70
Critchley HD, Wiens S, Rotshtein P, Ohman A, Dolan RJ (2004) Neural systems supporting interoceptive awareness. Nat Neurosci 7(2):189–195
Damasio AR (1994) Descarte's error. Penguin Putnam, New York
Garfinkel SN, Barrett AB, Minati L, Dolan RJ, Seth AK, Critchley HD (2013) What the heart forgets: cardiac timing influences memory for words and is modulated by metacognition and interoceptive sensitivity. Psychophysiology 50(6):505–512
Hirsh R (1974) The hippocampus and contextual retrieval of information from memory: a theory. Behav Biol 12(4):421–444
Kassab R, Alexandre F (2015) Integration of exteroceptive and interoceptive information within the hippocampus: a computational study. Front Syst Neurosci 9:87

Kensinger EA, Schacter DL (2008) Memory and emotion. In: Lewis M, Haviland-Jones JM, Barrett LF (eds) Handbook of emotions. The Guilford Press, New York, pp 601–617
Kliegel M, Guynn MJ, Zimmer H (2007) The role of noticing in prospective memory forgetting. Int J Psychophysiol 64(3):226–232
Kuppens P, Tuerlinckx F, Russell JA, Barrett LF (2013) The relation between valence and arousal in subjective experience. Psychol Bull 139(4):917–940
Kurth F, Zilles K, Fox PT, Laird AR, Eickhoff SB (2010) A link between the systems: functional differentiation and integration within the human insula revealed by meta-analysis. Brain Struct Funct 214(5–6):519–534
LaBar KS, Cabeza R (2006) Cognitive neuroscience of emotional memory. Nat Rev Neurosci 7(1):54–64
Lewis PA, Critchley HD, Rotshtein P, Dolan RJ (2007) Neural correlates of processing valence and arousal in affective words. Cereb Cortex 17(3):742–748
McCall C, Hildebrandt LK, Bornemann B, Singer T (2015) Physiophenomenology in retrospect: memory reliably reflects physiological arousal during a prior threatening experience. Conscious Cogn 38:60–70
Menon V, Uddin LQ (2010) Saliency, switching, attention and control: a network model of insula function. Brain Struct Funct 214(5–6):655–667
Newcombe N, Fox NA (1994) Infantile amnesia: through a glass darkly. Child Dev 65(1):31–40
Oehman A (1979) The orienting response, attention and learning: an information-processing perspective. In: Kimmel HD, van Olst EH, Orlebeke JF (eds) The orienting reflex in humans. Erlbaum, Hillsdale
Pais-Vieira C, Wing EA, Cabeza R (2016) The influence of self-awareness on emotional memory formation: an fMRI study. Soc Cogn Affect Neurosci 11(4):580–592
Rapcsak SZ, Kaszniak AW, Reminger SL, Glisky ML, Glisky EL, Comer JF (1998) Dissociation between verbal and autonomic measures of memory following frontal lobe damage. Neurology 50(5):1259–1265
Rothen N, Meier B (2014) Psychophysiology of prospective memory. Memory 22(7):867–880
Russell JA, Lemay G (2000) A dimensional-contextual perspective on facial expressions. Jpn Psychol Rev 43:161–176

Schnyer DM, Verfaellie M, Alexander MP, LaFleche G, Nicholls L, Kaszniak AW (2004) A role for right medial prefrontal cortex in accurate feeling-of-knowing judgements: evidence from patients with lesions to frontal cortex. Neuropsychologia 42(7):957–966

Sokolov EN (1963) Perception and the conditioned reflex. Pergamon, New York

Stormark JK (2004) Skin conductance and heart-rate responses as indices of covert face recognition in preschool children. Infant Child Dev 13(5):423–433

Terasawa Y, Umeda S, Saito F, Kato M (2010) Loss of discrimination among negative facial expressions following right insula lesion. High Brain Funct Res 30(2):349

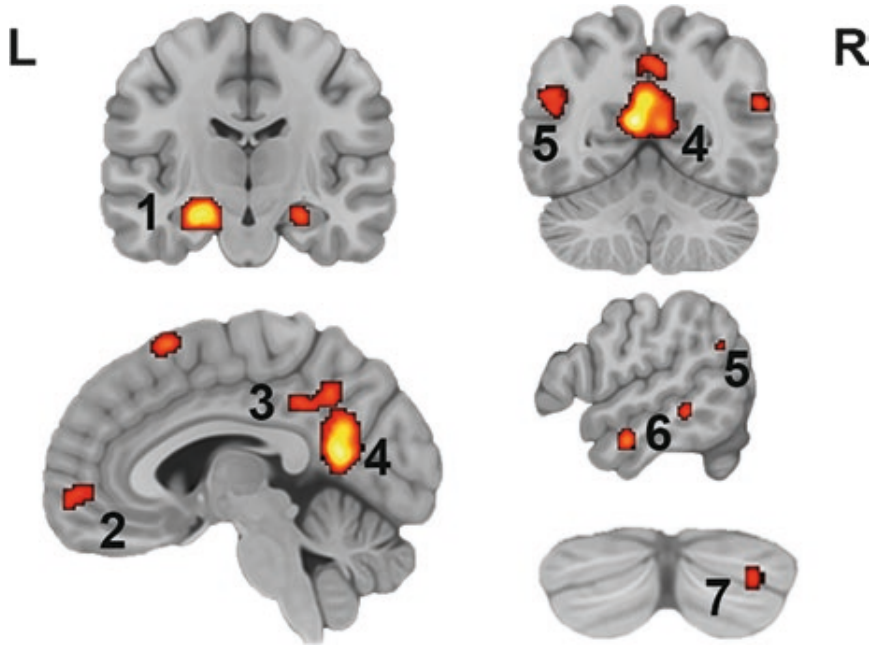
Terasawa Y, Fukushima H, Umeda S (2013) How does interoceptive awareness interact with the subjective experience of emotion? An fMRI study. Hum Brain Mapp 34(3):598–612

Tranel D, Damasio AR (1985) Knowledge without awareness: an autonomic index of facial recognition by prosopagnosics. Science 288(4706):145–1454

Umeda S, Tochizawa S, Shibata M, Terasawa Y (2016) Prospective memory mediated by interoceptive accuracy: a psychophysiological approach. Philos Trans R Soc B 371(1708):20160005

Verfaellie M, Bauer RM, Bowers D (1991) Autonomic and behavioral evidence of "implicit" memory in amnesia. Brain Cogn 15(1):10–25

West R, Craik FI (1999) Age-related decline in prospective memory: the roles of cue accessibility and cue sensitivity. Psychol Aging 14(2):264–272

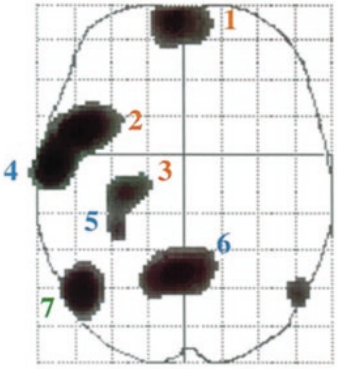


شکل ۱.۱۰. شبکهٔ بازیابی حافظهٔ سرگذشتی (خاطرات سرگذشتی). فراتحلیل تخمین احتمال فعال‌سازی از ۳۲ مطالعه نشان داد که شبکهٔ مغزی به‌طور پایایی با بازیابی خاطرات سرگذشتی خاص مرتبط است. این شبکه شامل (۱) هیپوکامپ دوطرفه، (۲) قشر پیش‌پیشانی میانی، (۳) سینگولیت خلفی، (۴) قشر رتروااسپلنیال و پره‌کونئوس، (۵) شکنج زاویه‌ای دوطرفه، (۶) قطب گیجگاهی و (۷) مخچهٔ راست خلفی است (برگرفته از آدیس و همکاران، ۲۰۱۶).

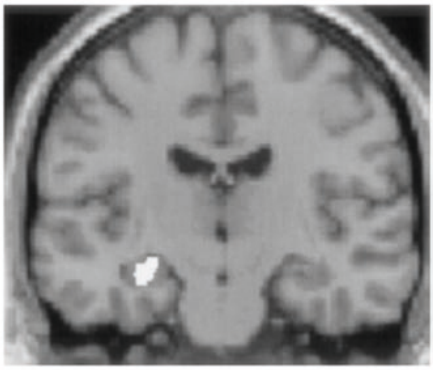
(a)

Memory Type	Temporally Specific?	Personally Relevant?	Example
Episodic AM	+	+	"You were Mike's best man at his wedding"
Semantic AM	-	+	"Ray is the youngest of your brothers"
Public event	+	-	"Windsor Castle was damaged by a fire"
Semantic facts	-	-	"The people of Holland are known as Dutch"
Control task	-	+	"While yet your therefore still about this"
Control task	-	-	"Ago rather he yet if because"

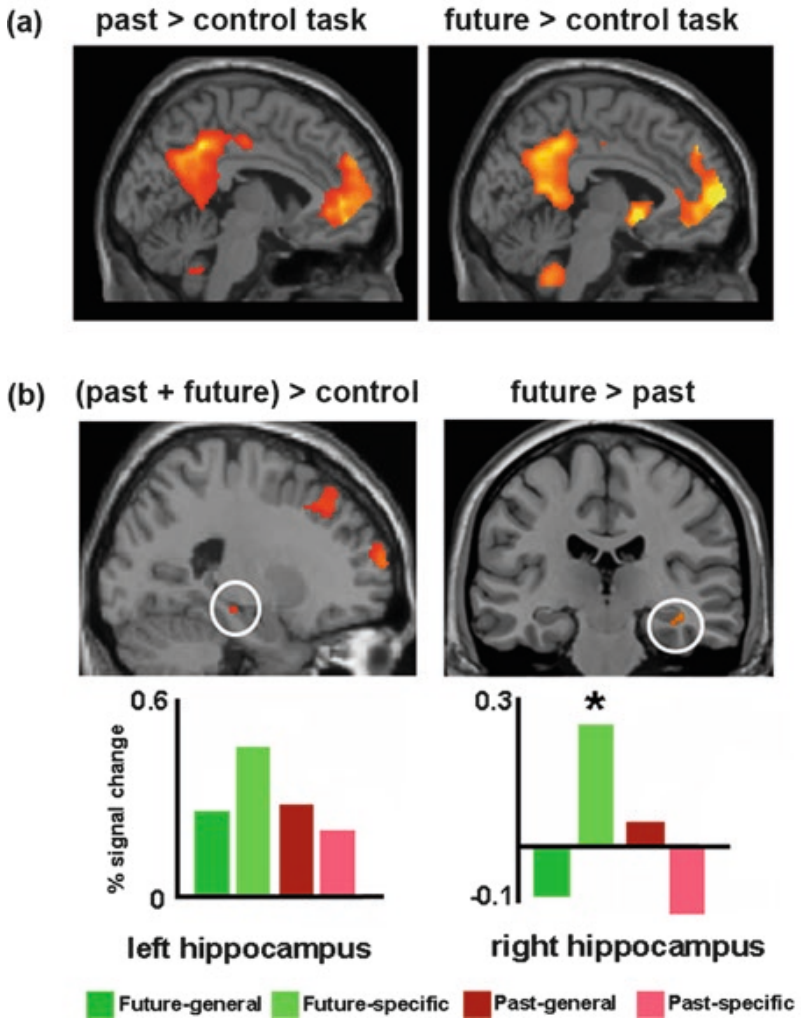
(b)



(c)



شکل ۲,۱۰. شبکهٔ بازیابی حافظهٔ سرگذشتی میانی و جانبی چپ، که با تکلیف بازشناسی زندگی‌نامه‌ای نشان داده شده است. (a) شرایط تکلیف بازشناسی زندگی‌نامه‌ای برحسب اختصاصی بودن زمانی و ارتباط شخصی متفاوت است. (b) مغز شیشه‌ای به‌وضوح نشان می‌دهد که فعال‌سازی در طول بازشناسی حافظهٔ سرگذشتی عمدتاً میانی و جانبی چپ است، چنان‌که در موارد زیر دیده می‌شود: (۱) قشر پیش‌پیشانی میانی، (۲) قطب گیجگاهی چپ، (۳) هیپوکامپ چپ، (۴) شکنج گیجگاهی میانی قدامی جانبی چپ، (۵) شکنج پاراهیپوکامپ چپ، (۶) قشر آهیانه‌ای میانی/ سینگولیت خلفی، و (۷) اتصال گیجگاهی– اهیانه‌ای. (c) با قراردادن نتایج بر روی یک تصویر MRI، افزایش فعالیت در هیپوکامپ چپ در زمان بازیابی حافظهٔ سرگذشتی زمانی خاص و مرتبط با شخص (یعنی حافظهٔ سرگذشتی رویدادی نسبت به حافظهٔ سرگذشتی معنایی، رویدادهای عمومی و حافظهٔ معنایی عمومی) دیده می‌شود.



شکل ۳,۱۰. فعال‌سازی مرتبط با به خاطر آوردن گذشته و تصور آینده

(a) نقش مشترک شبکهٔ بازیابی خاطرات سرگذشتی هنگام به خاطر آوردن رویدادهای گذشته و تصور رویدادهای آینده (مربوط به یک تکلیف کنترل معنایی/ دیداری- فضایی). (b) فعالیت مشترک (چپ) و افتراقی (راست) هیپوکامپ در طول شبیه‌سازی رویدادهای گذشته و آیندهٔ کلی و خاص. در شبیه‌سازی رویدادهای آیندهٔ خاص، فعالیت افتراقی هیپوکامپ مشخص بود (برگرفته از آدیس و همکاران، ۲۰۰۷ و ۲۰۱۱).

Addis DR, Schacter DL (2008) Effects of detail and temporal distance of past and future events on the engagement of a common neural network. Hippocampus 18(2):227–237
Addis DR, Schacter DL (2012) The hippocampus and imagining the future: where do we stand? Front Hum Neurosci 5:173
Addis DR, McIntosh AR, Moscovitch M, Crawley AP, McAndrews MP (2004a) Characterizing spatial and temporal features of autobiographical memory retrieval networks: a partial least squares approach. NeuroImage 23(4):1460–1471
Addis DR, Moscovitch M, Crawley AP, McAndrews MP (2004b) Recollective qualities modulate hippocampuspal activation during autobiographical memory retrieval. Hippocampus 14(6):752–762
Addis DR, Wong AT, Schacter DL (2007) Remembering the past and imagining the future: common and distinct neural substrates during event construction and elaboration. Neuropsychologia 45(7):1363–1377
Addis DR, Wong AT, Schacter DL (2008) Age-related changes in the episodic simulation of future events. Psychol Sci 19(1):33–41
Addis DR, Pan L, Vu M-A, Laiser N, Schacter DL (2009) Constructive episodic simulation of the future and the past: distinct subsystems of a core brain network mediate imagining and remembering. Neuropsychologia 47(11):2222–2238
Addis DR, Musicaro R, Pan L, Schacter DL (2010) Episodic simulation of past and future events in older adults: evidence from an experimental recombination task. Psychol Aging 25(2):369–376
Addis DR, Cheng T, Roberts RP, Schacter DL (2011a) Hippocampal contributions to the episodic simulation of specific and general future events. Hippocampus 21(10):1045–1052
Addis DR, Roberts RP, Schacter DL (2011b) Age-related neural changes in autobiographical remembering and imagining. Neuropsychologia 49(13):3656–3669
Addis DR, Knapp K, Roberts RP, Schacter DL (2012) Routes to the past: neural substrates of direct and generative autobiographical memory retrieval. NeuroImage 59(3):2908–2922
Addis DR, Moloney EE, Tippett LJ, Robert RP, Hach S (2016a) Characterizing cerebellar activity during autobiographical memory retrieval: ALE and functional connectivity investigations. Neuropsychologia 90:80–93

Addis DR, Pan L, Musicaro R, Schacter DL (2016b) Divergent thinking and constructing episodic simulations. Memory 24(1):89–97
Andreasen NC, O'Leary DS, Cizadlo T, Arndt S, Rezai K, Watkins GL, Ponto LL, Hichwa RD (1995) Remembering the past: two facets of episodic memory explored with positron emission tomography. Am J Psychiatr 152(11):1576–1585
Andreasen NC, O'Leary D, Paradiso S, Cizadlo T, Arndt S, Watkins GL, Boles Ponto LL, Hichwa RD (1999) The cerebellum plays a role in conscious episodic memory retrieval. Hum Brain Mapp 8(4):226–234
Andrews-Hanna JR (2012) The brain's default network and its adaptive role in internal mentation. Neuroscientist 18(3):251–270
Baddeley AD (2000) The episodic buffer: a new component of working memory? Trends Cogn Sci 4(11):417–423
Bar M, Aminoff E (2003) Cortical analysis of visual context. Neuron 38(2):347–358
Benoit RG, Szpunar KK, Schacter DL (2014) Ventromedial prefrontal cortex supports affective future simulation by integrating distributed knowledge. Proc Natl Acad Sci U S A 111(46):16550–16555
Berryhill ME, Phuong L, Picasso L, Cabeza R, Olson IR (2007) Parietal lobe and episodic memory: bilateral damage causes impaired free recall of autobiographical memory. J Neurosci 27(52):14415–14423
Binder JR, Desai RH (2011) The neurobiology of semantic memory. Trends Cogn Sci 15(11):527–536
Binder JR, Desai RH, Graves WW, Conant LL (2009) Where is the semantic system? A critical review and meta-analysis of 120 functional neuroimaging studies. Cereb Cortex 19(12):2767–2796
Bonnici HM, Chadwick MJ, Lutti A, Hassabis D, Weiskopf N, Maguire EA (2012) Detecting representations of recent and remote autobiographical memories in vmPFC and hippocampus. J Neurosci 32(47):16982–16991
Buckner RL (2013) The cerebellum and cognitive function: 25 years of insight from anatomy and neuroimaging. Neuron 80(3):807–815
Buckner RL, Head D, Lustig C (2006) Brain changes in aging: a lifespan perspective. In: Bialystok E, Craik FIM (eds) Lifespan cognition: mechanisms of change. Oxford University Press, New York, pp 27–42
Burgess N, Maguire EA, Spiers HJ, O'Keefe J (2001) A temporoparietal and prefrontal network for retrieving the spatial context of lifelike events. NeuroImage 14(2):439–453

Cabeza R, St Jacques P (2007) Functional neuroimaging of autobiographical memory. Trends Cogn Sci 11(5):219–227
Cabeza R, Prince SE, Daselaar SM, Greenberg DL, Budde M, Dolcos F, LaBar KS, Rubin DC (2004) Brain activity during episodic retrieval of autobiographical and laboratory events: an fMRI study using a novel photo paradigm. J Cogn Neurosci 16(9):1583–1594
Cabeza R, Ciaramelli E, Olson IR, Moscovitch M (2008) The parietal cortex and episodic memory: an attentional account. Nat Rev Neurosci 9(8):613–625
Cavanna AE, Trimble MR (2006) The precuneus: a review of its functional anatomy and behavioural correlates. Brain 129(3):564–583
Chadwick MJ, Hassabis D, Weiskopf N, Maguire EA (2010) Decoding individual episodic memory traces in the human hippocampus. Curr Biol 20(6):544–547
Chadwick MJ, Hassabis D, Maguire EA (2011) Decoding overlapping memories in the medial temporal lobes using high-resolution fMRI. Learn Mem 18(12):742–746
Cohen NJ, Eichenbaum H (1993) Memory, amnesia, and the hippocampal system. The MIT Press, Cambridge, MA
Cole SN, Morrison CM, Conway MA (2013) Episodic future thinking: linking neuropsychological performance with episodic detail in young and old adults. Q J Exp Psychol 66(9):1687–1706
Conway MA, Pleydell-Pearce CW (2000) The construction of autobiographical memories in the self-memory system. Psychol Rev 107(2):261–288
Conway MA, Turk DJ, Miller SL, Logan J, Nebes RD, Meltzer CC, Becker JT (1999) A positron emission tomography (PET) study of autobiographical memory retrieval. Memory 7(5–6):679–703
Conway MA, Pleydell-Pearce CW, Whitecross SE (2001) The neuroanatomy of autobiographical memory: a slow cortical potential study of autobiographical memory retrieval. J Mem Lang 45(3):493–524
Conway MA, Pleydell-Pearce CW, Whitecross SE, Sharpe H (2003) Neurophysiological correlates of memory for experienced and imagined events. Neuropsychologia 41(3):334–340
Crovitz HF, Schiffman H (1974) Frequency of episodic memories as a function of their age. Bull Psychon Soc 4(5):517–518

Daselaar SM, Rice HJ, Greenberg DL, Cabeza R, LaBar KS, Rubin DC (2008) The spatiotemporal dynamics of autobiographical memory: neural correlates of recall, emotional intensity, and reliving. Cereb Cortex 18(1):217–229

De Beni R, Borella E, Carretti B, Zavagnin M, Lazzarini L, Milojevi G (2013) Remembering the past and imagining the future: age-related differences between young, young-old and old-old. Aging Clin Exp Res 25(1):89–97

De Brigard F, Addis DR, Ford JH, Schacter DL, Giovanello KS (2013) Remembering what could have happened: neural correlates of episodic counterfactual thinking. Neuropsychologia 51(12):2401–2414

Dennis NA, Hayes SM, Prince SE, Madden DJ, Huettel SA, Cabeza R (2008a) Effects of aging on the neural correlations of successful item and source memory encoding. J Exp Psychol: Learn Mem Cogn 34(4):791–808

Dennis NA, Kim H, Cabeza R (2008b) Age-related differences in brain activity during true and false memory retrieval. J Cogn Neurosci 20(8):1390–1402

D'Esposito M, Postle BR, Rypma B (2000) Prefrontal cortical contributions to working memory: evidence from event-related fMRI studies. Exp Brain Res 133(1):3–11

Devitt AL, Tippett LJ, Schacter DL, Addis DR (2016) Autobiographical memory conjunction errors in younger and older adults: evidence for a role of inhibitory ability. Psychol Aging 31(8):927–942

Donaldson DI, Petersen SE, Buckner RL (2001) Dissociating memory retrieval processes using fMRI: evidence that priming does not support recognition memory. Neuron 31(6):1047–1059

Duff MC, Kurczek J, Rubin R, Cohen NJ, Tranel D (2013) Hippocampal amnesia disrupts creative thinking. Hippocampus 23(12):1143–1149

Epstein RA (2008) Parahippocampal and retrosplenial contributions to human spatial navigation. Trends Cogn Sci 12(10):388–396

Fink GR, Markowitsch HJ, Reinkemeier M, Bruckbauer T, Kessler J, Heiss W (1996) Cerebral representation of one's own past: neural networks involved in autobiographical memory. J Neurosci 16(13):4275–4282

Fletcher P, Frith C, Baker SC, Shallice T, Frackowiak RS, Dolan R (1995) The mind's eye – precuneus activation in memory-related imagery. NeuroImage 2(3):195–200

Ford JH, Addis DR, Giovanello KS (2011) Differential neural activity during search of specific and general autobiographical memories elicited by musical cues. Neuropsychologia 49(9):2514–2526

Ghosh VE, Moscovitch M, Melo Colella B, Gilboa A (2014) Schema representation in patients with ventromedial PFC lesions. J Neurosci 34(36):12057–12070
Gilboa A (2004) Autobiographical and episodic memory--one and the same? Evidence from prefrontal activation in neuroimaging studies. Neuropsychologia 42(10):1336–1349
Gilboa A, Winocur G, Grady CL, Hevenor SJ, Moscovitch M (2004) Remembering our past: functional neuroanatomy of recollection of recent and very remote personal events. Cereb Cortex 14(11):1214–1225
Gilboa A, Alain C, Stuss DT, Melo B, Miller S, Moscovitch M (2006) Mechanisms of spontaneous confabulations: a strategic retrieval account. Brain 129(6):1399–1414
Gilmore AW, Nelson SM, McDermott KB (2016) The contextual association network activates more for remembered than for imagined events. Cereb Cortex 26(2):611–617
GrahamKS, Lee AC, Brett M, Patterson K (2003) The neural basis of autobiographical and semantic memory: new evidence from three PET studies. Cogn Affect Behav Neurosci 3(3):234–254
Gusnard DA, Akbudak E, Shulman GL, Raichle ME (2001) Medial prefrontal cortex and self-referential mental activity: relation to a default mode of brain function. Proc Natl Acad Sci U S A 98(7):4259–4264
Hassabis D, Maguire EA (2007) Deconstructing episodic memory with construction. Trends Cogn Sci 11(7):299–306
Hassabis D, Kumaran D, Maguire EA (2007) Using imagination to understand the neural basis of episodic memory. J Neurosci 27(52):14365–14374
Haxby J, Gobbini MI, Furey M, Ishai A, Schouten J, Pietrini P (2001) Distributed and overlapping representations of faces and objects in ventral temporal cortex. Science 293(5539):2425–2430
Henson RN, Rugg MD, Shallice T, Josephs O, Dolan RJ (1999) Recollection and familiarity in recognition memory: an event-related functional magnetic resonance imaging study. J Neurosci 19(10):3962–3972
Hodges JR, GrahamKS (2001) Episodic memory: insights from semantic dementia. Philos Trans R Soc Lond B Biol Sci 356(1413):1423–1434
Holland AC, Addis DR, Kensinger EA (2011) The neural correlates of specific versus general autobiographical memory construction and elaboration. Neuropsychologia 49(12):3164–3177

Horner AJ, Bisby JA, Bush D, Lin W-J, Burgess N (2015) Evidence for holistic episodic recollection via hippocampal pattern completion. Nat Commun 6:7462
Irish M, Piguet O (2013) The pivotal role of semantic memory in remembering the past and imagining the future. Front Behav Neurosci 7:27
Irish M, Hornberger M, Lah S, Miller L, Pengas G, Nestor PJ, Hodges JR, Piguet O (2011) Profiles of recent autobiographical memory retrieval in semantic dementia, behavioural- variant frontotemporal dementia, and Alzheimer's disease. Neuropsychologia 49(9):2694–2702
Johnson MR, Johnson MK (2014) Decoding individual natural scene representations during perception and imagery. Front Hum Neurosci 8:59
Johnson MK, Hashtroudi S, Lindsay DS (1993) Source monitoring. Psychol Bull 114(1):3–28
Kirwan CB, Ashby SR, Nash MI (2014) Remembering and imagining differentially engage the hippocampus: a multivariate fMRI investigation. Cogn Neurosci 5(3–4):177–185
Lee ACH, Yeung LK, Barense MD (2012) The hippocampus and visual perception. Front Hum Neurosci 6:91
Leggio MG, Tedesco am, Chiricozzi FR, Clausi S, Orsini A, Molinari M (2008) Cognitive sequencing impairment in patients with focal or atrophic cerebellar damage. Brain 131(5):1332–1343
Leggio MG, Chiricozzi FR, Clausi S, Tedesco am, Molinari M (2011) The neuropsychological profile of cerebellar damage: the sequencing hypothesis. Cortex 47(1):137–144
Levine B, Svoboda E, Hay JF, Winocur G, Moscovitch M (2002) Aging and autobiographical memory: dissociating episodic from semantic retrieval. Psychol Aging 17(4):677–689
Levine B, Turner GR, Tisserand D, Hevenor SJ, GrahamSJ, McIntosh AR (2004) The functional neuroanatomy of episodic and semantic autobiographical remembering: a prospective functional MRI study. J Cogn Neurosci 16(9):1633–1646
Macrae CN, Moran JM, Heatherton TF, Banfield JF, Kelley WM (2004) Medial prefrontal activity predicts memory for self. Cereb Cortex 14(6):647–654
Maddock RJ (1999) Retrosplenial cortex and emotion: new insights from functional imaging studies of the human brain. Trends Neurosci 22(7):310–316

Madore KP, Schacter DL (2014) An episodic specificity induction enhances means-end problem solving in young and older adults. Psychol Aging 29(4):913–924
Madore KP, Addis DR, Schacter DL (2015) Creativity and memory: effects of an episodic-specificity induction on divergent thinking. Psychol Sci 26(9):1461–1468
Maguire EA (2001) Neuroimaging studies of autobiographical event memory. Philos Trans R Soc Lond Ser B Biol Sci 356(1413):1441–1451
Maguire EA, Frith CD (2003a) Aging affects the engagement of the hippocampus during autobiographical memory retrieval. Brain 126(7):1511–1523
Maguire EA, Frith CD (2003b) Lateral asymmetry in the hippocampal response to the remoteness of autobiographical memories. J Neurosci 23(12):5302–5307
Maguire EA, Mullally SL (2013) The hippocampus: a manifesto for change. J Exp Psychol Gen 142(4):1180–1189
Maguire EA, Mummery CJ (1999) Differential modulation of a common memory retrieval network revealed by positron emission tomography. Hippocampus 9(1):54–61
Maguire EA, Mummery CJ, Buchel C (2000) Patterns of hippocampal-cortical interaction dissociate temporal lobe memory subsystems. Hippocampus 10(4):475–482
Maguire EA, Henson RN, Mummery CJ, Frith CD (2001a) Activity in prefrontal cortex, not hippocampus, varies parametrically with the increasing remoteness of memories. Neuroreport 12(3):441–444
Maguire EA, Vargha-Khadem F, Mishkin M (2001b) The effects of bilateral hippocampal damage on fMRI regional activations and interactions during memory retrieval. Brain 124(6):1156–1170
Martin VC, Schacter DL, Corballis MC, Addis DR (2011) A role for the hippocampus in encoding simulations of future events. Proc Natl Acad Sci U S A 108(33):13858–13863
McLelland VC, Devitt AL, Schacter DL, Addis DR (2015) Making the future memorable: phenomenology of remembered future events. Memory 23(8):1255–1263
Milner B (1972) Disorders of learning and memory after temporal lobe lesions in man. Clin Neurosurg 19:421–446

Mitchell KJ, Johnson MK, Raye CL, Mather M, D'Esposito M (2000) Aging and reflective processes of working memory: binding and test load deficits. Psychol Aging 15(3):527–541
Moscovitch M (1992) Memory and working-with-memory: a component process model based on modules and central systems. J Cogn Neurosci 4(3):257–267
Moscovitch M, Melo B (1997) Strategic retrieval and the frontal lobes: evidence from confabulation and amnesia. Neuropsychologia 35(7):1017–1034
Moscovitch M, Winocur G (2002) The frontal cortex and working with memory. In: Stuss DT, Knight RT (eds) Principles of frontal lobe function. Oxford University Press, Oxford, pp 188–209
Moscovitch M, Rosenbaum RS, Gilboa A, Addis DR, Westmacott R, Grady C, McAndrews MP, Levine B, Black S, Wincour G, Nadel L (2005) Functional neuroanatomy of remote episodic, semantic and spatial memory: a unified account based on multiple trace theory. J Anat 207(1):35–66
Nadel L, Moscovitch M (1997) Memory consolidation, retrograde amnesia and the hippocampal complex. Curr Opin Neurobiol 7(2):217–227
Nadel L, Campbell J, Ryan L (2007) Autobiographical memory retrieval and hippocampal activation as a function of repetition and the passage of time. Neural Plast 2007:90472
Naveh-Benjamin M (2000) Adult age differences in memory performance: tests of an associative deficit hypothesis. J Exp Psychol Learn Mem Cogn 26(5):1170–1187
Northoff G, Bermpohl F (2004) Cortical midline structures and the self. Trends Cogn Sci 8(3):102–107
Okuda J, Fujii T, Ohtake H, Tsukiura T, Tanji K, Suzuki K, Kawashima R, Fukuda H, Itoh M, Yamadori A (2003) Thinking of the future and the past: the roles of the frontal pole and the medial temporal lobes. NeuroImage 19(4):1369–1380
Piefke M, Weiss PH, Zilles K, Markowitsch HJ, Fink GR (2003) Differential remoteness and emotional tone modulate the neural correlates of autobiographical memory. Brain 126(3):650–668
Piolino P, Desgranges B, Benali K, Eustache F (2002) Episodic and semantic remote autobiographical memory in ageing. Memory 10(4):239–257
Piolino P, Giffard-Quillon G, Desgranges B, Chetelat G, Baron JC, Eustache F (2004) Re-experiencing old memories via hippocampus: a PET study of autobiographical memory. NeuroImage 22(3):1371–1383

Piolino P, Coste C, Martinelli P, Macé AL, Quinette P, Guillery-Girard B, Belleville S (2010) Reduced specificity of autobiographical memory and aging: do the executive and feature binding functions of working memory have a role? Neuropsychologia 48(2):429–440

Prebble SC, Addis DR, Tippett LJ (2013) Autobiographical memory and sense of self. Psychol Bull 139(4):815–840

Prull MW, Gabrieli JDE, Bunge SA (2000) Age-related changes in memory: a cognitive neuroscience perspective. In: Craik FIM, Salthouse TA (eds) The handbook of aging and cognition. Lawrence Erlbaum Associates Publishers, Mahwah, pp 91–153

Raichle ME, MacLeodam, Snyder AZ, Powers WJ, Gusnard DA, Shulman GL (2001) A default mode of brain function. Proc Natl Acad Sci U S A 98(2):676–682

Raz N, Lindenberger U, Rodrigue KM, Kennedy KM, Head D, Williamson A, Dahle C, Gerstorf D, Acker JD (2005) Regional brain changes in aging healthy adults: general trends, individual differences and modifiers. Cereb Cortex 15(11):1676–1689

Rekkas PV, Constable RT (2005) Evidence that autobiographical memory retrieval does not become independent of the hippocampus: an fMRI study contrasting very recent with remote events. J Cogn Neurosci 17(12):1950–1961

Rendell PG, Bailey PE, Henry JD, Phillips LH, Gaskin S, Kliegel M (2012) Older adults have greater difficulty imagining future rather than atemporal experiences. Psychol Aging 27(4):1089–1098

Rissman J, Chow TE, Reggente N, Wagner AD (2016) Decoding fMRI signatures of real-world autobiographical memory retrieval. J Cogn Neurosci 28(4):604–620

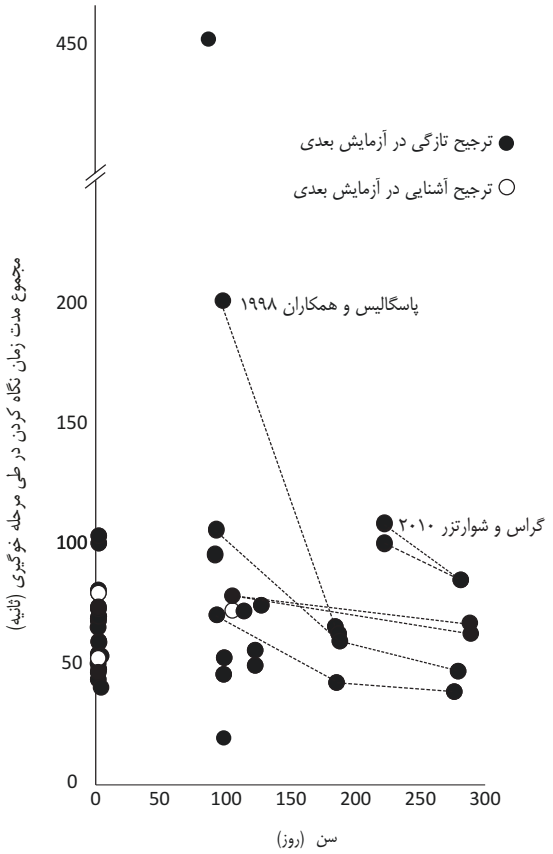
Ryan L, Nadel L, Keil K, PutnamK, Schnyer D, Trouard T, Moscovitch M (2001) Hippocampal complex and retrieval of recent and very remote autobiographical memories: evidence from functional magnetic resonance imaging in neurologically intact people. Hippocampus 11(6):707–714

Schacter DL, Addis DR (2007) The cognitive neuroscience of constructive memory: remembering the past and imagining the future. Philos Trans R Soc Lond Ser B Biol Sci 362(1481):773–786

Schacter DL, Addis DR, Hassabis D, Martin VC, Spreng RN, Szpunar KK (2012) The future of memory: remembering, imagining, and the brain. Neuron 76(4):677–694

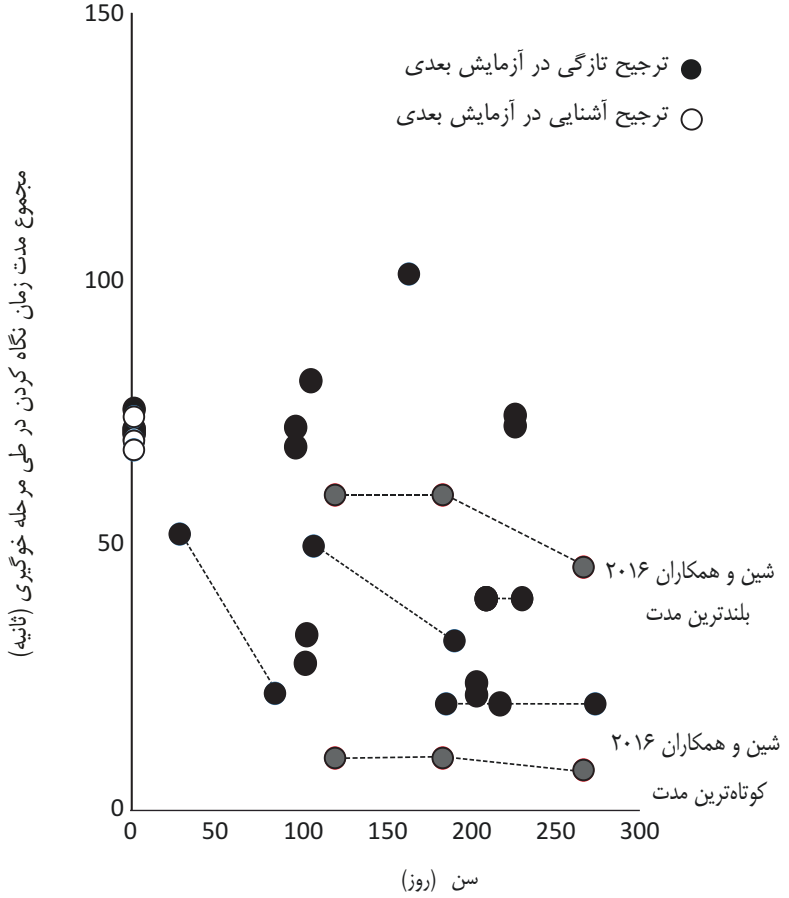
Schacter DL, Gaesser B, Addis DR (2013) Remembering the past and imagining the future in the elderly. Gerontology 59(2):143–151
Scoville WB, Milner B (1957) Loss of recent memory after bilateral hippocampal lesions. J Neurol Neurosurg Psychiatry 20(1):11–21
Sheldon S, Levine B (2013) Same as it ever was: vividness modulates the similarities and differences between the neural networks that support retrieving remote and recent autobiographical memories. NeuroImage 83:880–891
Sheldon S, McAndrews MP, Moscovitch M (2011) Episodic memory processes mediated by the medial temporal lobes contribute to open-ended problem solving. Neuropsychologia 49(9):2439–2447
Spaniol J, Madden DJ, Voss A (2006) A diffusion model analysis of adult age differences in episodic and semantic long-term memory retrieval. J Exp Psychol Learn Mem Cogn 32(1):101–117
Sperduti M, Martinelli P, Kalenzaga S, Devauchelle AD, Lion S, Malherbe C, Gallarda T, Amado I, Krebs MO, Oppenheim C, Piolino P (2013) Don't be too strict with yourself! Rigid negative self-representation in healthy subjects mimics the neurocognitive profile of depression for autobiographical memory. Front Behav Neurosci 7:41
Squire LR, Alvarez P (1995) Retrograde Amnesia and memory consolidation: a neurobiological perspective. Curr Opin Neurobiol 5(2):169–177
St Jacques P, Rubin DC, Cabeza R (2012) Age-related effects on the neural correlates of autobiographical memory retrieval. Neurobiol Aging 33(7):1298–1310
St Jacques PL, Levine B (2007) Ageing and autobiographical memory for emotional and neutral events. Memory 15(2):129–144
Steinvorth S, Levine B, Corkin S (2005) Medial temporal lobe structures are needed to re-experience remote autobiographical memories: evidence from H.M. and W.R. Neuropsychologia 43(4):479–496
Steinvorth S, Corkin S, Halgren E (2006) Ecphory of autobiographical memories: an fMRI study of recent and remote memory retrieval. NeuroImage 30(1):285–298
St-Laurent M, Abdi H, Burianová H, Grady CL (2011) Influence of aging on the neural correlates of autobiographical, episodic, and semantic memory retrieval. J Cogn Neurosci 23(12):4150–4163

Svoboda E, Levine B (2009) The effects of rehearsal on the functional neuroanatomy of episodic autobiographical and semantic remembering: a functional magnetic resonance imaging study. J Neurosci 29(10):3073–3082
Svoboda E, McKinnon MC, Levine B (2006) The functional neuroanatomy of autobiographical memory: a meta-analysis. Neuropsychologia 44(12):2189–2208
Szpunar KK, Chan JCK, McDermott KB (2009) Contextual processing in episodic future thought. Cereb Cortex 19(7):1539–1548
Van Mulukom V, Schacter DL, Corballis MC, Addis DR (2013) Re-imagining the future: repetition decreases hippocampal involvement in future simulation. PLoS One 8(7):e69596
Vann SD, Aggleton JP, Maguire EA (2009) What does the retrosplenial cortex do? Nat Rev Neurosci 10(11):792–802
Viard A, Chetelat G, Lebreton K, Desgranges B, Landeau B, De La Sayette V, Eustache F, Piolino P (2011) Mental time travel into the past and the future in healthy aged adults: an fMRI study. Brain Cogn 75(1):1–9
Vilberg KL, Rugg MD (2008) Memory retrieval and the parietal cortex: a review of evidence from a dual-process perspective. Neuropsychologia 46(7):1787–1799
Wagner AD, Shannon BJ, Kahn I, Buckner RL (2005) Parietal lobe contributions to episodic memory retrieval. Trends Cogn Sci 9(9):445–453
Wheeler M, Buckner RL (2004) Functional-anatomic correlates of remembering and knowing. NeuroImage 21(4):1337–1349
Wheeler M, Stuss DT, Tulving E (1997) Toward a theory of episodic memory: the frontal lobes and autonoetic consciousness. Psychol Bull 121(3):331–354
Winocur G, Moscovitch M, Sekeres M (2007) Memory consolidation or transformation: context manipulation and hippocampal representations of memory. Nat Neurosci 10(5):555–557



نمودار ۱,۱۱. مجموع مدت‌زمان نگاه‌کردن در طول مرحلهٔ خوگیری برای گروه‌های سنی در تحقیقات ذکرشده در جدول ۱,۱۱ دایرهٔ پرشده نمایانگر نقطهٔ دادهٔ گروهی است که در مرحلهٔ آزمایش بعدی، موجب ترجیح تازگی شده است. دایرهٔ پرنشده نقطهٔ دادهٔ گروهی را نشان می‌دهد که سبب ترجیح آشنایی در مرحلهٔ آزمایش بعدی شده است. نقاط داده که با خط‌چین به هم مرتبط شده‌اند، داده‌های گروه‌های سنی مختلف در تحقیقات مشابه را بیان می‌کنند.

این نقاط دادهٔ مرتبط در گروه‌های سنی، بیان‌کنندهٔ کاهش مدت‌زمان نگاه کردن برای گروه‌های سنی بالاتر است. کاهش مدت‌زمان نگاه کردن نوزادان بزرگ‌تر در مرحلهٔ خوگیری مطابق و هم‌سو با یافته‌های تحقیقاتی است که دورهٔ تحولی خوگیری به چهره در نوزادان را بررسی کرده‌اند (به‌طور مثال، کلمبو و همکاران، ۲۰۰۴).



نمودار ۲,۱۱. مجموع مدت‌زمان نگاه‌کردن طی مرحلهٔ آشنایی برای هر گروه سنی در بررسی‌های درج‌شده در جدول ۲,۱۱

دایرهٔ پرشده نمایانگر نقطهٔ دادهٔ گروهی است که در مرحلهٔ آزمایش بعدی، موجب ترجیح تازگی شده است. دایرهٔ پرنشده نقطهٔ دادهٔ گروهی را نشان می‌دهد که سبب ترجیح آشنایی در مرحلهٔ آزمایش بعدی شده است. نقاط داده که با خط‌چین به هم مرتبط شده‌اند، داده‌های گروه‌های سنی مختلف در تحقیق مشابه را بیان می‌کنند. نقاط داده در دایره‌های خاکستری در هر گروه سنی، کوتاه‌ترین تا بلندترین مدت‌زمان نگاه‌کردن آشنایی در تحقیق شین و همکاران را نشان می‌دهد (۲۰۱۶).

Bahrick LE, Gogate LJ, Ruiz I (2002) Attention and memory for faces and actions in infancy: the salience of actions over faces in dynamic events. Child Dev 73(6):1629–1643
Bahrick LE, Lickliter R, Castellanos I (2013) The development of face perception in infancy: intersensory interference and Unimodal visual facilitation. Dev Psychol 49(10):1919–1930
Barrera ME, Maurer D (1981) Recognition of mother's photographed face by the three-month-old infant. Child Dev 52(2):714–716
Bauer PJ (2013) The development of forgetting: childhood amnesia. In: Bauer PJ, Fivush (eds) The Wiley-Blackwell handbook on the development of children's memory. Wiley-Blackwell, West Sussex, pp 519–544
Bornstein MH, Arterberry ME, Mash C (2004) Long-term memory for an emotional interpersonal interaction occurring at 5 months of age. Infancy 6(3):407–416
Bulf H, Turati C (2010) The role of rigid motion in newborns' face recognition. Vis Cogn 18(4):504–512
Bulf H, Valenza E, Turati C (2013) How a hat may affect 3-month-olds' recognition of a face: an eye-tracking study. PLoS One 8(12):e82839
Bushnell IWR (2001) Mother's face recognition in newborn infants: learning and memory. Infant Child Dev 10(1–2):67–74
Bushnell IWR (2003) Newborn face recognition. In: Pascalis O, Slater A (eds) The development of face processing in infancy and early childhood current perspectives. Nova Science Pub Inc, New York, pp 41–53
Bushnell IWR, Sai F, Mullin JT (1989) Neonatal recognition of the mother's face. Br J Dev Psychobiol 7(1):3–15
Chien SH, Wang JF, Huang TR (2016) Developing the own-race advantage in 4, 6-, and 9-month-old
Taiwanese infants: a perceptual learning perspective. Front Psychol 7:1606
Colombo J, Shaddy DJ, Richman WA, Maikranz JM, Blaga OM (2004) The developmental course of habituation in infancy and preschool outcome. Infancy 5(1):1–38
Coulon M, Guellai B, Streri A (2011) Recognition of unfamiliar talking faces at birth. Int J Behav Dev 35(3):282–287
De Haan M, Johnson MH, Maurer D, Perrett DI (2001) Recognition of individual faces and average face prototypes by 1- and 3-month-old infants. Cogn Dev 16(2):659–678

De Heering A, Turati C, Rossion B, Bulf H, Goffaux V, Simion F (2008) Newborns' face recognition is based on spatial frequencies below 0.5 cycles per degree. Cognition 106(1):444–454
Fagan JF (1976) Infants' recognition of invariant features of faces. Child Dev 47(3):627–638
Farroni T, Massaccesic S, Menona E, Johnson MH (2007) Direct gaze modulates face recognition in young infants. Cognition 102(3):396–404
Field TM, Cohen D, Gracia R, Greenberg R (1984) Mother-stranger face discrimination by the newborn. Infant Behav Dev 7(1):19–25
Gava L, Valenza E, Turati C, de Schonen S (2008) Effect of partial occlusion on newborns' face preference and recognition. Dev Sci 11(4):563–574
Gross C, Schwarzer G (2010) Face recognition across varying poses in 7-and 9-month-old infants: I role of facial expression. Int J Behav Dev 34(5):417–426
Guellai B, Coulon M, Streri A (2011) The role of motion and speech in face recognition at birth. Vis Cogn 19(9):1212–1233
Guellai B, Mersad K, Streri A (2015) Suprasegmental information affects processing of talking faces at birth. Infant Behav Dev 38:11–19
Hayne H (2007) Infant memory development. In: Oakes LM, Bauer PJ (eds) Short- and long-term memory in infancy and early childhood: first steps toward remembering. Oxford University Press, Oxford, pp 209–239
Hayne H, Jack F (2011) Childhood amnesia. Wiley Interdiscip Rev Cogn Sci 2(2):136–145
Kelly DJ, Quinn PC, Slater AM, Lee K, Ge L, Pascalis O (2007) The other-race effect develops during infancy: evidence of perceptual narrowing. Psychol Sci 18(12):1084–1089
Kelly DJ, Liu SY, Lee K, Quinn PC, Pascalis O, Slater AM, Ge LZ (2009) Development of the other-race effect during infancy: evidence toward universality? J Exp Child Psychol 104(1):105–114
Kingo OS, Staugaard SR, Krojgaard P (2014) Three-year-olds' memory for a person met only once at the age of 12 months: very long-term memory revealed by a late-manifesting novelty preference. Conscious Cogn 24:49–56
Kobayashi M, Otsuka Y, Nakato E, Kanazawa S, Yamaguchi MK, Kakigi R (2011) Do infants represent the face in a viewpoint-invariant manner? Neural adaptation study as measured by near-infrared spectroscopy. Front Hum Neurosci 5:153

Kobayashi M, Otsuka Y, Kanazawa S, Yamaguchi MK, Kakigi R (2012) Size-invariant representation of face in infant brain: an fNIRS-adaptation study. Neuroreport 23(17):984–988

Lee K, Anzures G, Quinn PC, Pascalis O, Slater A (2011) Development of face processing expertise. In: Calder GRAJ, Johnson MH, Haxby JV (eds) The Oxford handbook of face perception. Oxford University Press, Oxford, pp 753–778

Leo I, Simion F (2009) Face processing at birth: a Thatcher illusion study. Dev Sci 12(3):492–498

Liu S, Xiao NG, Quinn PC, Zhu D, Ge L, Pascalis O, Lee K (2015) Asian infants show preference for own-race but not other-race female faces: the role of infant caregiving arrangements. Front Psychol 6:593

Lukowski AF, Bauer PJ (2014) Long-term memory in infancy and early childhood. In: Bauer PJ, Fivush R (eds) The Wiley handbook on the development of children's memory. Wiley, Chichester, pp 230–254

Macchi Cassia V, Bulf H, Quadrelli E, Proietti V (2014) Age-related face processing bias in infancy: evidence of perceptual narrowing for adult faces. Dev Psychobiol 56(2):238–248

Otsuka Y (2014) Face recognition in infants: a review of behavioral and near-infrared spectroscopic studies. Jpn Psychol Res 56(1):76–90

Otsuka Y, Konishi Y, Yamagushi MK, Kanazawa S, Abdi H, O'Toole AJ (2009) Recognition of moving and static faces by young infants. Child Dev 80(4):1259–1271

Otsuka Y, Motoyoshi I, Hill H, Kobayashi M, Kanazawa S, Yamagushi MK (2013) Eye contrast polarity is critical for face recognition by infants. J Exp Child Psychol 115(3):598–606

Pascalis O, de Schonen S (1994) Recognition memory in 3- to 4-day-old human neonates. Neuroreport 5(14):1721–1724

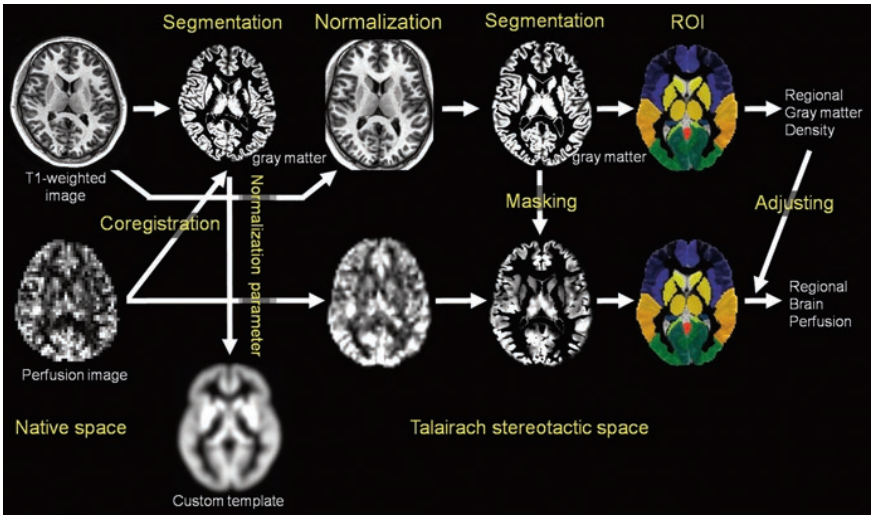
Pascalis O, de Schonen S, Morton J, Deruelle C, Fabregrenet M (1995) Mothers face recognition by neonates – a replication and an extension. Infant Behav Dev 18(1):79–85

Pascalis O, de Haan M, Nelson CA, de Schonen S (1998) Long-term recognition memory for faces assessed by visual paired comparison in 3- and 6-month-old infants. J Exp Psychol-Learn Mem Cogn 24(1):249–260

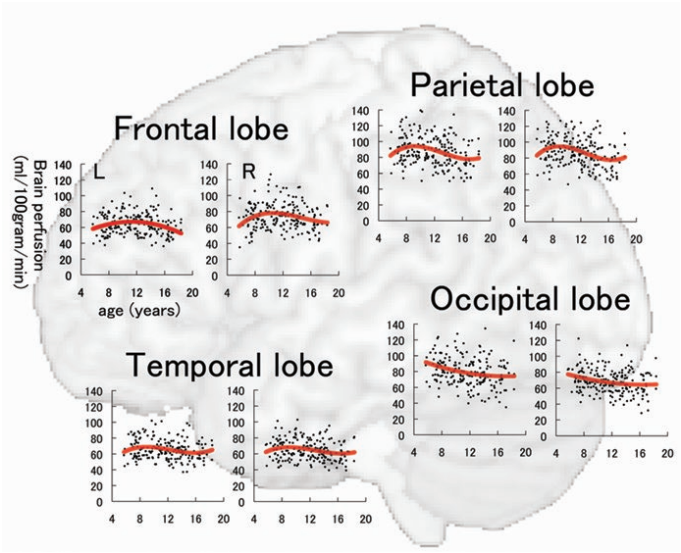
Pascalis O, de Haan M, Nelson CA (2002) Is face processing species-specific during the first year of life? Science 296(5571):1321–1323

Peykrjou S, Pauen S, Hoehl S (2015) 9-month-old infants recognize individual unfamiliar faces in a rapid repetition ERP paradigm. Infancy 21(3):288–311
Quinn PC, Tanaka JW (2009) Infants' processing of featural and configural information in the upper and lower halves of the face. Infancy 14(4):474–487
Quinn PC, Yahr J, Kuhn A, Slater AM, Pascalis O (2002) Representation of the gender of human faces by infants: a preference for female. Perception 31(9):1109–1121
Quinn PC, Uttley L, Lee K, Gibson A, Smith M, Slater AM, Pascalis O (2008) Infant preference for female faces occurs for same- but not other-race faces. J Neuropsychol 2(1):15–26
Richards JE (1997) Effects of attention on infants' preference for briefly exposed visual stimuli in the paired comparison recognition-memory paradigm. Dev Psychol 33(1):22–31
Righi G, Westerlund A, Congdon EL, Troller-Renfree S, Nelson CA (2014) Infants' experience-dependent processing of male and female faces: insights from eye tracking and event-related potentials. Dev Cogn Neurosci 8:144–152
Roder BJ, Bushnell EW, Sasseville AM (2000) Infants' preferences for familiarity and novelty during the course of visual processing. Infancy 1(4):491–507
Rose SA, Gottfried AW, Melloy-Carminar P, Bridger WH (1982) Familiarity and novelty preferences in infant recognition memory: implications for information processing. Dev Psychol 18(5):704–713
Rose SA, Jankowski JJ, Feldman JF (2002a) Speed of processing and face recognition at 7 and 12 months. Infancy 3(4):435–455
Rose SA, Feldman JF, Jankowski JJ (2002b) Processing speed in the 1st year of life: a longitudinal study of preterm and full-term infants. Dev Psychol 38(6):895–902
Rose SA, Feldman J, Jankowski JJ (2007) Developmental aspects of visual recognition memory in infancy. In: Bauer PJ, Oakes LM (eds) Short- and long-term memory in infancy and early childhood: taking the first steps toward remembering. Oxford University Press, Oxford, pp 153–178
Sai FZ (2005) The role of the mother's voice in developing mother's face preference: evidence for intermodal perception at birth. Infant Child Dev 14(1):29–50
Sangrigoli S, de Schonen S (2004) Recognition of own-race and other-race faces by three-month-old infants. J Child Psychol Psychiatry 45(7):1219–1227

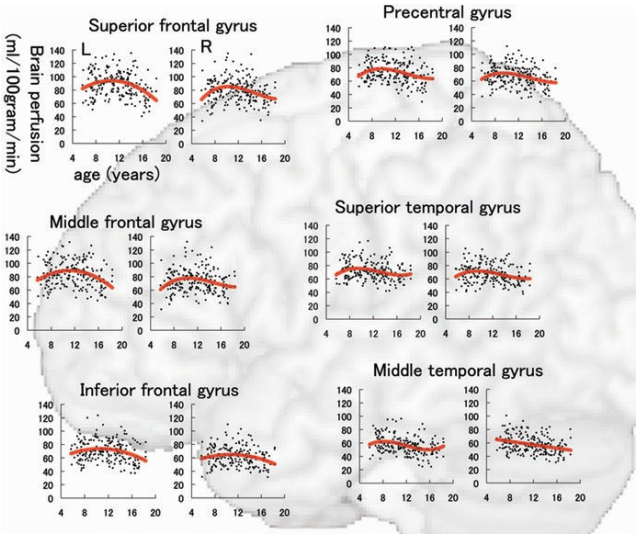
Simion F, Di Giorgio E (2015) Face perception and processing in early infancy: inborn predispositions and developmental changes. Front Psychol 6:969
Turati C, Sangrigoli S, Ruel J, de Schonen S (2004) Evidence of the face inversion effect in 4-month-old infants. Infancy 6(2):275–297
Turati C, Macchi Cassia V, Simion F, Leo I (2006) Newborns' face recognition: role of inner and outer facial features. Child Dev 77(2):297–311
Turati C, Bulf H, Simion F (2008) Newborns' face recognition over changes in viewpoint. Cognition 106(3):1300–1321
Turati C, Di Giorgio E, Bardi L, Simion F (2010) Holistic face processing in newborns, 3-month-old infants, and adults: evidence from the composite face effect. Child Dev 81(6):1894–1905
Tyrrell DJ, Anderson JT, Clubb M, Bradbury A (1987) Infant's recognition of the correspondence between photographs and caricatures of human faces. Bull Psychon Soc 25(1):41–43



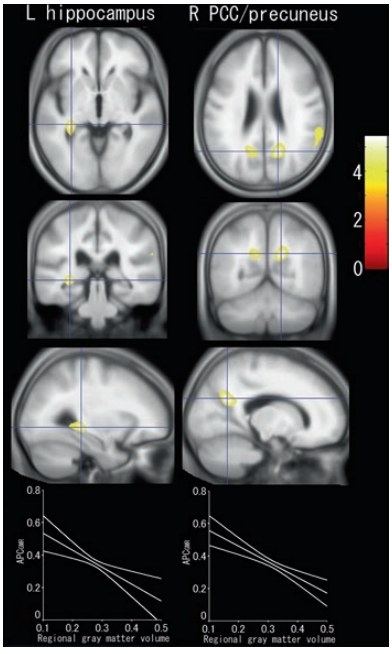
شکل ۱,۱۲. طرح کلی از تجزیه و تحلیل تصاویر



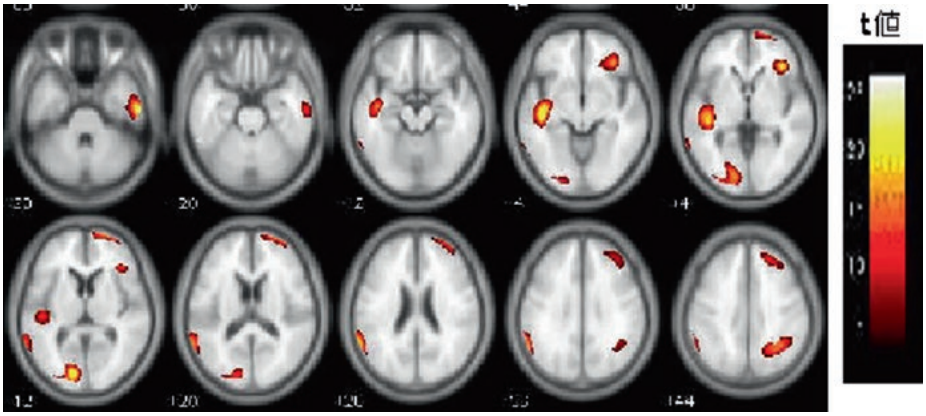
شکل ۲,۱۲. ارتباط بین پرفیوژن مغزی، تطابق تراکم مادهٔ خاکستری و سن در لوب پیشانی، لوب آهیانه، لوب پس‌سری و لوب گیجگاهی در هر نیمکره



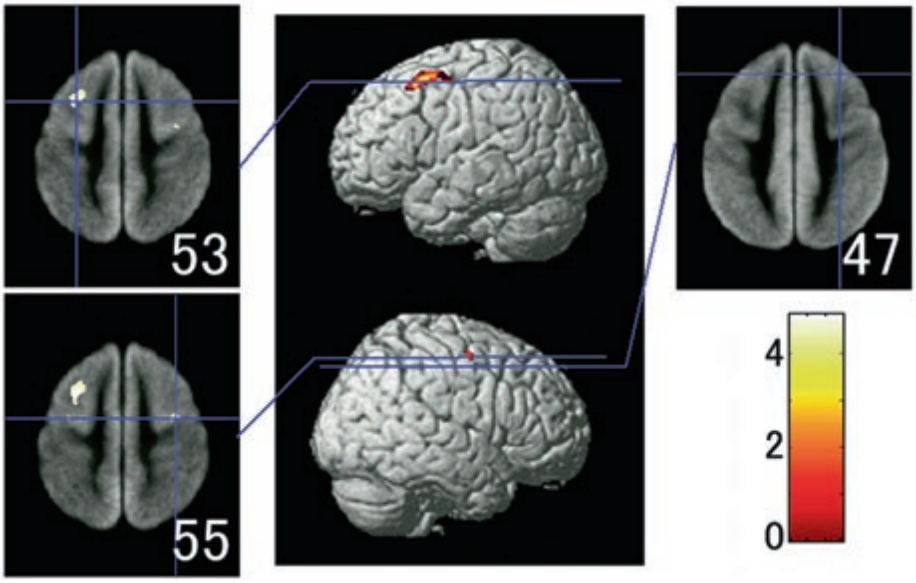
شکل ۳,۱۲. ارتباط بین پرفیوژن مغزی، تطابق برای تراکم مادهٔ خاکستری و سن در شکنج پیش‌مرکزی، شکنج پیشانی فوقانی، شکنج پیشانی میانی، شکنج پیشانی تحتانی، شکنج گیجگاهی فوقانی و شکنج گیجگاهی میانی



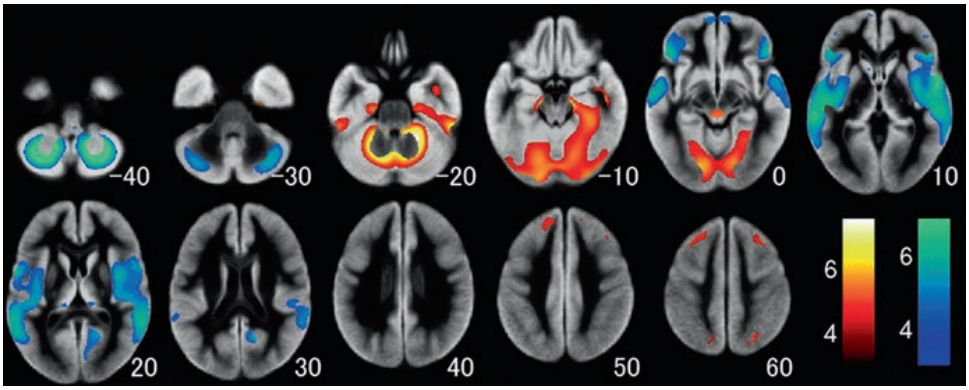
شکل ۴,۱۲. مناطق مادهٔ خاکستری که نمایانگر ارتباط منفی مهم با درصد تغییر سالانهٔ نسبت مادهٔ خاکستری (APCGMR) تنظیم‌شده برای سن، جنس و حجم درون‌جمجمه‌ای است



شکل ۵,۱۲. مناطق مغزی که ارتباط معکوس بین حجم مادهٔ خاکستری و فشار سیستولیک خون را نشان می‌دهد



شکل ۶,۱۲. مناطق مغزی که ارتباط منفی بین مادهٔ خاکستری و حجم مصرف الکل در طول زندگی را نشان می‌دهند



شکل ۷,۱۲. مناطق مغزی که رابطه بین حجم مادهٔ خاکستری و شاخص تودهٔ بدنی (BMI) را نشان می‌دهد. رنگ قرمز و آبی به‌ترتیب نمایانگر روابط منفی و مثبت هستند

Taki Y, Goto R, Evans A, Zijdenbos A, Neelin P, Lerch J, Sato K, Ono S, Kinomura S, Nakagawa M, Sugiura M, Watanabe J, Kawashima R, Fukuda H (2004) Voxel-based morphometry of human brain with age and cerebrovascular risk factors. Neurobiol Aging 25(4):455–463

Taki Y, Kinomura S, Sato K, Goto R, Inoue K, Okada K, Ono S, Kawashima R, Fukuda H (2006) Both global gray matter volume and regional gray matter volume negatively correlate with lifetime alcohol intake in non-alcohol-dependent Japanese men: a volumetric analysis and a voxel-based morphometry. Alcohol Clin Exp Res 30(6):1045–1050

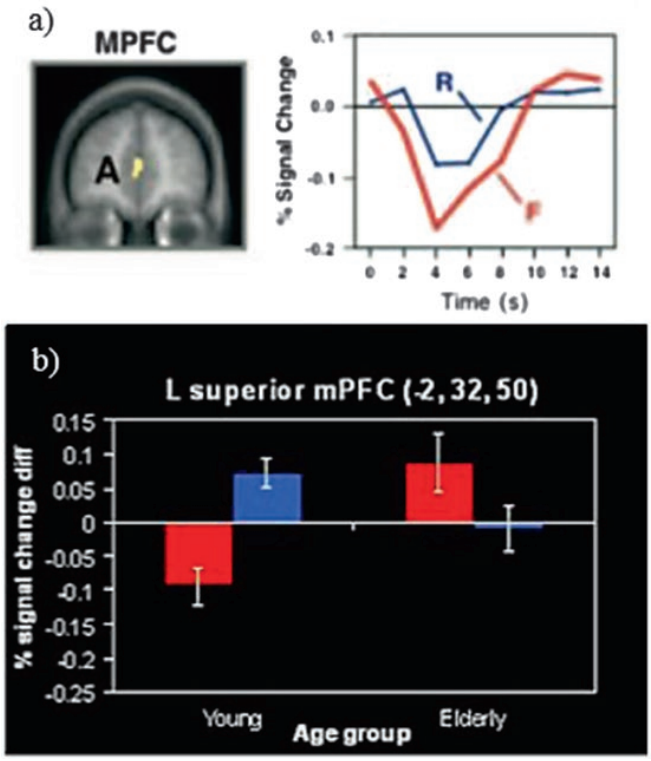
Taki Y, Kinomura S, Sato K, Inoue K, Goto R, Okada K, Uchida S, Kawashima R, Fukuda H (2008) Relationship between body mass index and gray matter volume in 1,428 healthy individuals. Obesity (Silver Spring) 16(1):119–124

Taki Y, Hashizume H, Sassa Y, Takeuchi H, Wu K, Asano M, Asano K, Fukuda H, Kawashima R (2011a) Correlation between gray matter density-adjusted brain perfusion and age using brain MR images of 202 healthy children. Hum Brain Mapp 32(11):1973–1985

Taki Y, Kinomura S, Sato K, Goto R, Wu K, Kawashima R, Fukuda H (2011b) Correlation between baseline regional gray matter volume and global gray matter volume decline rate. NeuroImage 54(2):743–749

Taki Y, Kinomura S, Sato K, Goto R, Wu K, Kawashima R, Fukuda H (2011c) Correlation between degree of white matter hyperintensities and global gray matter volume decline rate. Neuroradiology 53(6):397–403

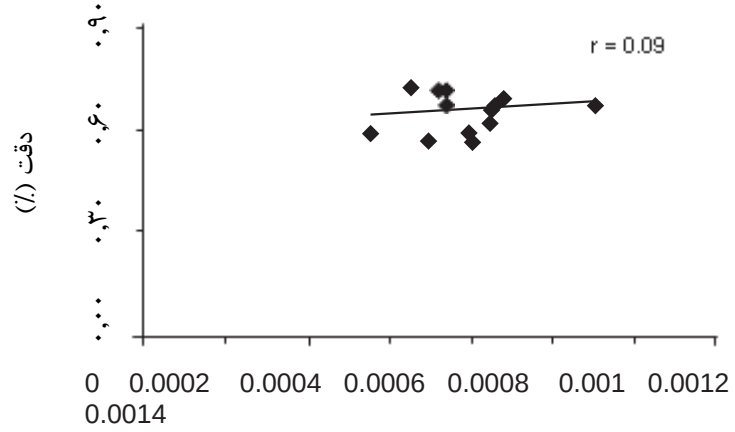
Taki Y, Hashizume H, Thyreau B, Sassa Y, Takeuchi H, Wu K, Kotozaki Y, Nouchi R, Asano M, Asano K, Fukuda H, Kawashima R (2012) Sleep duration during weekdays affects hippocampal gray matter volume in healthy children. NeuroImage 60(1):471–475



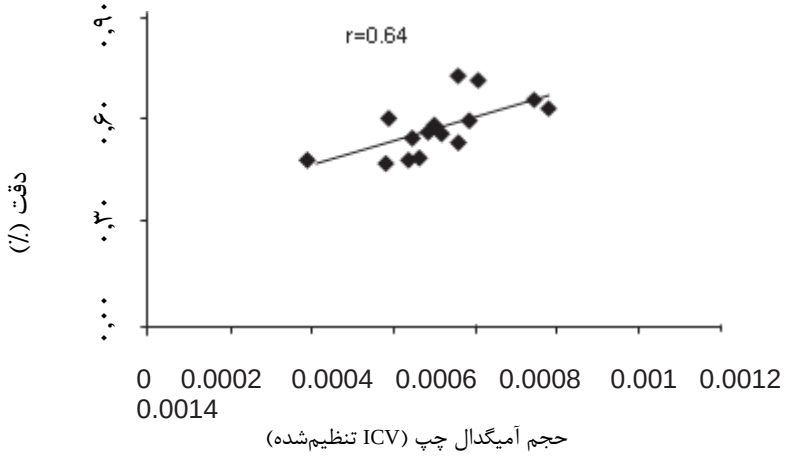
شکل ۱,۱۳. تفکر دربارهٔ خود، مناطق عصبی مختلفی را فعال می‌کند که از مناطق مربوط به تفکر دربارهٔ دیگران قابل تفکیک هستند.

(الف) در پژوهشی شرکت‌کنندگان مشخص کردند که آیا ویژگی‌های شخصیتی خاصی، توصیف‌کنندهٔ خود آن‌ها است یا خیر. در این حال فعال‌سازی مغز با استفاده از fMRI اندازه‌گیری شد. تضادها بر اساس اینکه آیا هر کلمه به خاطر سپرده شده یا فراموش شده است و اینکه آیا این ویژگی‌ها خود توصیفی در نظر گرفته شده است یا خیر، ایجاد شد. در قشر پیش‌پیشانی میانی و در حین خودقضاوتی برای کلماتی که بعداً به یاد می‌آیند (R) در مقابل کلمات فراموش‌شده (F) فعال‌سازی رو به افزایشی مشاهده می‌شود (با اقتباس ماکرا و همکاران ۲۰۰۴ و با مجوز). (ب) وقتی قضاوت دربارهٔ خود و دیگران به‌طور هم‌زمان انجام می‌شود، فعال‌سازی‌ها به تغییر رویکرد مرتبط با سن از الگوهای قبلی منجر می‌شود. ارزیابی پارامترها برای قشر پیش‌پیشانی بالایی چپ، حوزهٔ کاری افزایش‌یافته برای افراد جوان‌تر در خصوص موارد خودارجاعی که بعداً فراموش شده‌اند و در مقابل، برای سالمندان در موارد مربوط به خودی که متعاقباً به یاد می‌آیند و اثرات فراموشی برای موارد ارجاع به دیگران را نشان می‌دهد (با اقتباس از گوچس و همکاران ۲۰۱۰ و با مجوز).

افراد جوان‌تر



سالمندان

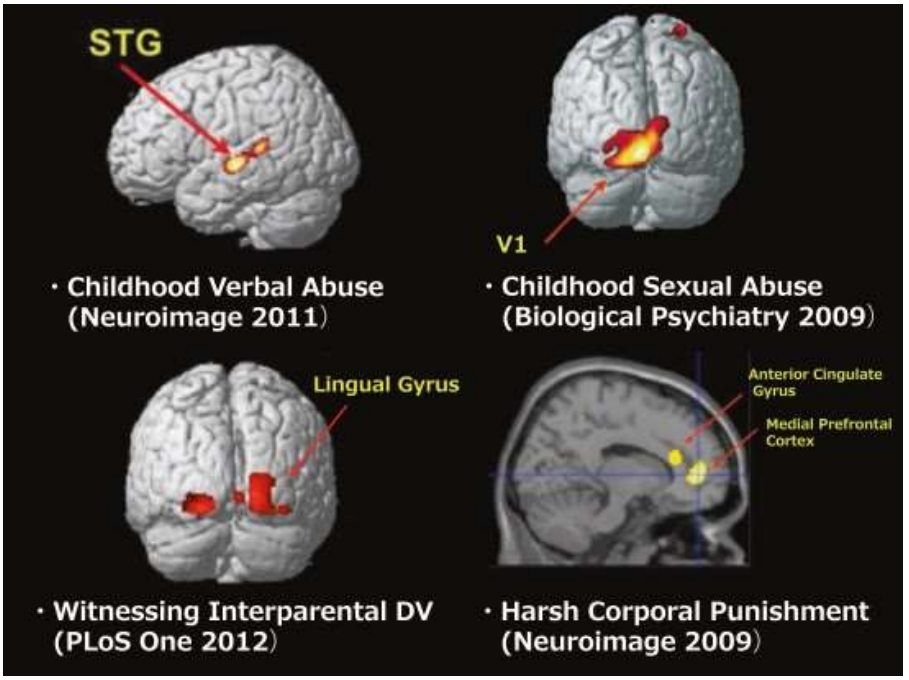


نمودار ۲٫۱۳. پژوهش قبلی نشان داده است یکپارچگی ساختاری مناطق که در شکل‌گیری برداشت نقش دارند، به عملکرد حافظهٔ متعاقب حاوی اطلاعات اجتماعی مربوط می‌شود. تصویربرداری‌های ام‌آرآی ساختاری افراد جوان و میانسال که در حال انجام تکالیف مربوط به برداشت‌های مبتنی بر رفتار و آزمون حافظهٔ متعاقب بودند، نشان داد که میزان حجم آمیگدال چپ بیشتر، می‌تواند حافظهٔ مربوط به برداشت کلی افزایش‌یافته را تنها در سالمندان پیش‌بینی می‌کند (اقتباس از کسیدی و همکاران (۲۰۱۲ ب) با مجوز).

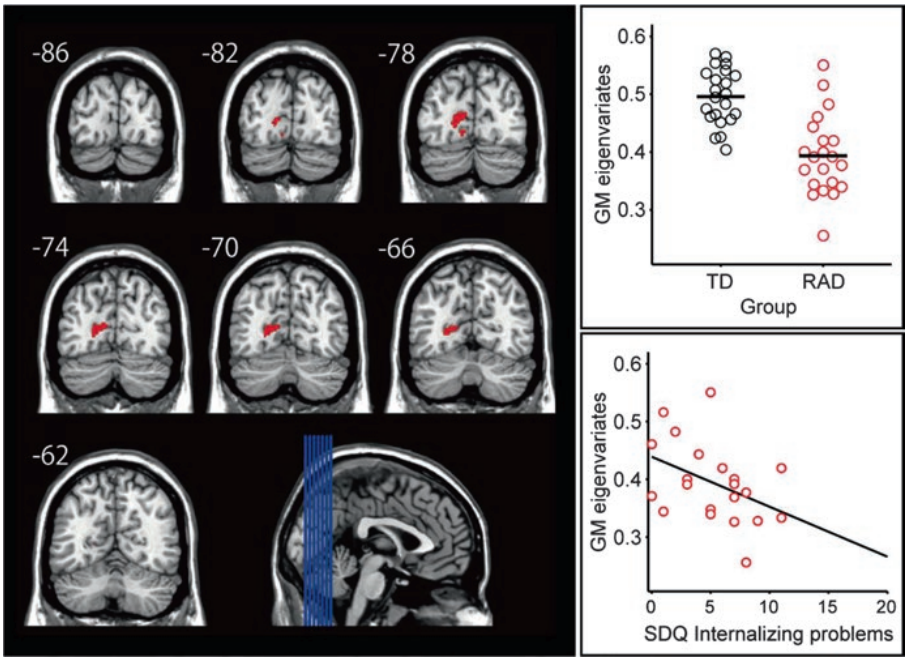
Aron A, Aron EN, Tudor M, Nelson G (1991) Close relationships as including other in the self. J Pers Soc Psychol 60(2):241–253
Baron SG, Gobbini M, Engell AD, Todorov A (2011) Amygdala and dorsomedial prefrontal cortex responses to appearance-based and behavior-based person impressions. Soc Cogn Affect Neurosci 6(5):572–581
Cassidy BS, Gutchess AH (2012a) Social relevance enhances memory for impressions in older adults. Memory 20(4):332–345
Cassidy BS, Gutchess AH (2012b) Structural variation within the amygdala and ventromedial prefrontal cortex predicts memory for impressions in older adults. Front Psychol 3:319
Cassidy BS, Leshikar ED, Shih JY, Aizenman A, Gutchess AH (2013) Valence-based age differences in medial prefrontal activity during impression formation. Soc Neurosci 8(5):462–473
Craik FI, Moroz TM, Moscovitch M, Stuss DT, Winocur G, Tulving E, Kapur S (1999) In search of the self: a positron emission tomography study. Psychol Sci 10(1):26–34
Dulas MR, Newsome RN, Duarte A (2011) The effects of aging on ERP correlates of source memory retrieval for self-referential information. Brain Res 1377:84–100
Edelson M, Sharot T, Dolan RJ, Dudai Y (2011) Following the crowd: brain substrates of long-term memory conformity. Science 333(6038):108–111
Engell AD, Haxby JV, Todorov A (2007) Implicit trustworthiness decisions: automatic coding of face properties in the human amygdala. J Cogn Neurosci 19(9):1508–1519
Gilron R, Gutchess AH (2012) Remembering first impressions: effects of intentionality and diagnosticity on subsequent memory. Cogn Affect Behav Neurosci 12(1):85–98
Glisky EL, Marquine MJ (2009) Semantic and self-referential processing of positive and negative trait adjectives in older adults. Memory 17(2):144–157
Gutchess AH, Kensinger EA, Yoon C, Schacter DL (2007a) Ageing and the self-reference effect in memory. Memory 15(8):822–837
Gutchess AH, Kensinger EA, Schacter DL (2007b) Aging, self-referencing, and medial prefrontal cortex. Soc Neurosci 2(2):117–133
Gutchess AH, Kensinger EA, Schacter DL (2010) Functional neuroimaging of self-referential encoding with age. Neuropsychologia 48(1):211–219
Gutchess Gutchess AH, Sokal R, Coleman JA, Gotthilf G, Grewal L, Rosa N (2015) Age differences in self-referencing: evidence for common and distinct encoding strategies. Brain Res 1612:118–127

Hamami A, Serbun SJ, Gutchess AH (2011) Self-referencing enhances memory specificity with age. Psychol Aging 26(3):636
Harris CB, Barnier AJ, Sutton J (2013) Shared encoding and the costs and benefits of collaborative recall. J Exp Psychol Learn Mem Cogn 39(1):183–195
Heatherton TF, Wyland CL, Macrae CN, Demos KE, Denny BT, Kelley WM (2006) Medial prefrontal activity differentiates self from close others. Soc Cogn Affect Neurosci 1(1):18–25
Heatherton TF, Krendl AC, Macrae CN, Kelley WM (2007) A social brain sciences approach to understanding self. In: Sedikides C, Spencer SJ (eds) The self. Psychology Press, New York, pp 3–19
Hess TM, Tate CS (1991) Adult age differences in explanations and memory for behavioral information. Psychol Aging 6(1):86–92
Hirst W, Echterhoff G (2012) Remembering in conversations: the social sharing and reshaping of memories. Annu Rev Psychol 63(1):55–79
Johnson MK, Hashtroudi S, Lindsay DS (1993) Source monitoring. Psychol Bull 114(1):3–28
Kelley WM, Macrae CN, Wyland CL, Caglar S, Inati S, Heatherton TF (2002) Finding the self? An event-related fMRI study. J Cogn Neurosci 14(5):785–794
Koutstaal W, Schacter DL (1997) Gist-based false recognition of pictures in older and younger adults. J Mem Lang 37(4):555–583
Krendl AC, Rule NO, Ambady N (2014) Does aging impair first impression accuracy? Differentiating emotion recognition from complex social inferences. Psychol Aging 29(3):482–490
Leblond M, Laisney M, Lamidey V, Egret S, de La Sayette V, Chételat G, Piolino P, Rauchs G, Desgranges B, Eustache F (2016) Self-reference effect on memory in healthy aging, mild cognitive impairment and Alzheimer's disease: influence of identity valence. Cortex 74:177–190
Leshikar ED, Duarte A (2012) Medial prefrontal cortex supports source memory accuracy for self-referenced items. Soc Neurosci 7(2):126–145
Leshikar ED, Duarte A (2014) Medial prefrontal cortex supports source memory for self-referenced materials in young and older adults. Cogn Affect Behav Neurosci 14(1):236–252
Leshikar ED, Gutchess AH (2015) Similarity to the self affects memory for impressions of others. J Appl Res Mem Cogn 4(1):20–28
Lieberman MD (2007) Social cognitive neuroscience: a review of core processes. Annu Rev
Psychol 58:259–289

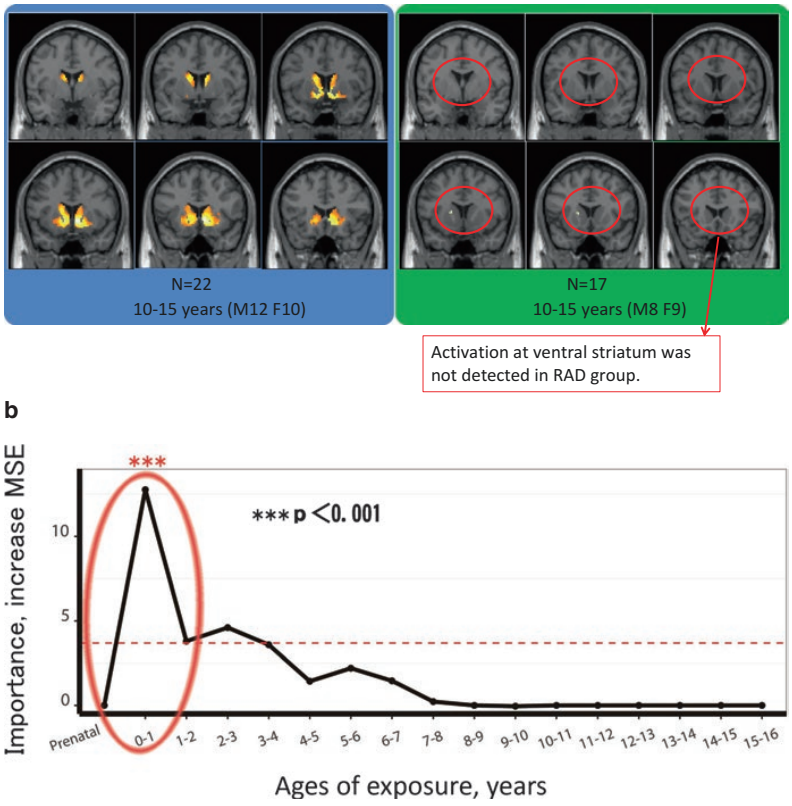
Macrae CN, Moran JM, Heatherton TF, Banfield JF, Kelley WM (2004) Medial prefrontal activity predicts memory for self. Cereb Cortex 14(6):647–654
Meade ML, Roediger HL (2009) Age differences in collaborative memory: the role of retrieval manipulations. Mem Cogn 37(7):962–975
Mitchell JP, Macrae CN, Banaji MR (2004) Encoding-specific effects of social cognition on the neural correlates of subsequent memory. J Neurosci 24(21):4912–4917
Montague PR, Berns GS, Cohen JD, McClure SM, Pagnoni G, Dhamala M, Apple N (2002) Hyperscanning: simultaneous fMRI during linked social interactions. NeuroImage 16(4):1159–1164
Mueller JH, Wonderlich S, Dugan K (1986) Self-referent processing of age-specific material. Psychol Aging 1(4):293–299
Rajaram S, Pereira-Pasarin LP (2010) Collaborative memory: cognitive research and theory. Perspect Psychol Sci 5(6):649–663
Roediger HL, Meade ML, Bergman ET (2001) Social contagion of memory. Psychon Bull Rev 8(2):365–371
Rogers TB, Kuiper NA, Kirker WS (1977) Self-reference and the encoding of personal information. J Pers Soc Psychol 35(9):677–688
Rosa NM, Gutchess AH (2011) Source memory for action in young and older adults: self vs. close or unknown others. Psychol Aging 26(3):625–630
Rosa NM, Deason RG, Budson AE, Gutchess AH (2014) Source memory for self and other in patients with mild cognitive impairment due to Alzheimer's disease. J Gerontol Ser B Psychol Sci Soc Sci 71(1):59–65
Ross M, Spencer SJ, Blatz CW, Restorick E (2008) Collaboration reduces the frequency of false memories in older and younger adults. Psychol Aging 23(1):85–92
Serbun SJ, Shih JY, Gutchess AH (2011) Memory for details with self-referencing. Memory 19(8):1004–1014
Symons CS, Johnson BT (1997) The self-reference effect in memory: a meta-analysis. Psychol Bull 121(3):371–394
Todorov A, Engell AD (2008) The role of the amygdala in implicit evaluation of emotionally neutral faces. Soc Cogn Affect Neurosci 3(4):303–312
Todorov A, Olson IR (2008) Robust learning of affective trait associations with faces when the hippocampus is damaged, but not when the amygdala and temporal pole are damaged. Soc Cogn Affect Neurosci 3(3):195–203
Zebrowitz LA, Franklin RG Jr, Hillman S, Boc H (2013) Older and younger adults' first impressions from faces: similar in agreement but different in positivity. Psychol Aging 28(1):202–212



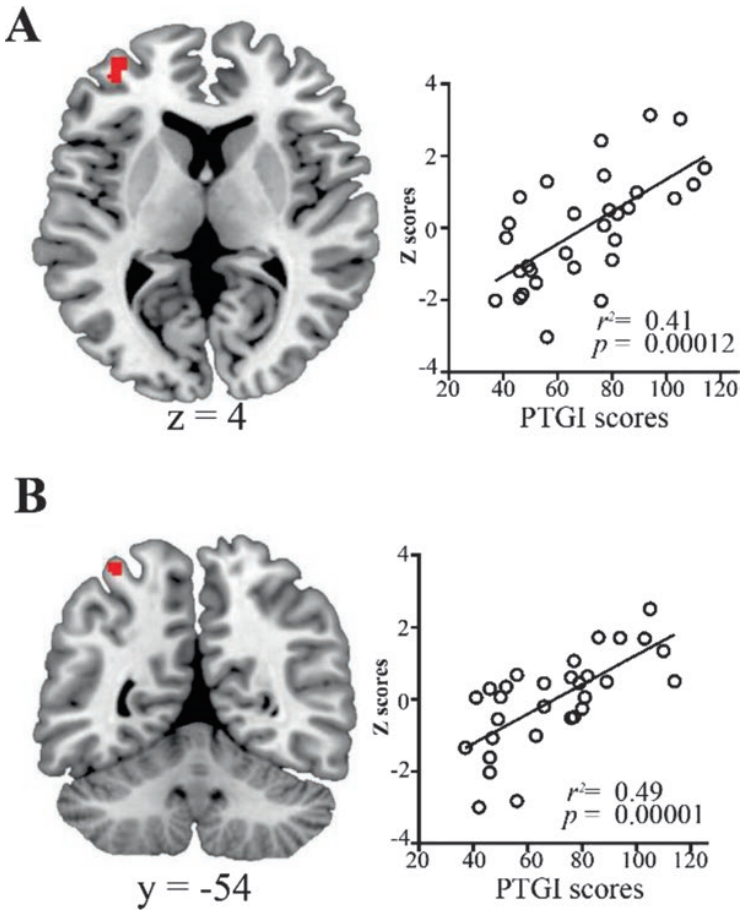
شکل ۱,۱۴. تفاوت‌های بسیار در قشر مغزی بین افرادی که مورد بدرفتاری قرار گرفته‌اند و افراد گروه کنترل با استفاده از مورفومتری مبتنی بر وکسل دیده می‌شود (توموداو همکاران ۲۰۰۹ الف، ب، ۲۰۱۱ و ۲۰۱۲). مشخصاً در افرادی که مورد آزار کلامی والدین بودند، تراکم مادهٔ خاکستری (GM) در شکنج گیجگاهی فوقانی بالاتر بود (STG؛ شکل بالا سمت چپ)، در افرادی که در دوران کودکی مورد آزار جنسی قرار گرفته بودند، تراکم مادهٔ خاکستری (GM) به‌طور قابل توجهی در قشرهای ارتباطی بینایی (شکل بالا سمت راست) و بینایی اولیه (V1) راست و چپ کمتر ارزیابی شد. در افرادی که شاهد خشونت خانگی بین والدینی بودند، تراکم مادهٔ خاکستری (GM) به‌طور معنی‌داری در شکنج زبانی راست کمتر (شکل پایین سمت چپ) و تراکم مادهٔ خاکستری (GM) مشخصاً در افرادی که مورد تنبیه بدنی شدید بودند، در قشر پیش‌پیشانی میانی سمت راست و شکنج کمربندی قدامی راست (شکل پایین سمت راست) کمتر ارزیابی شد.



شکل ۲,۱۴.تفاوت‌های ساختاری در میزان مادهٔ خاکستری منطقه‌ای بین گروه‌هایی با رشد معمولی (TD) و اختلال دلبستگی واکنشی (RAD) (شیمادا و همکاران ۲۰۱۵). گروه اختلال دلبستگی واکنشی، میزان مادهٔ خاکستری کاهش‌یافتهٔ مهمی را در قشر بینایی اولیهٔ چپ (BA17) در مقایسه با گروه معمولی (P = ۰/۰۳۸، FWE سطح خوشه‌ای اصلاح‌شده) نشان داد. مقیاس‌های رنگی نمایانگر مقادیر t هستند. مقیاس‌های علائم روان‌پزشکی برای مشکلات درونی‌سازی پرسش‌نامهٔ SDQ (β =-۰/۹۶، t = -۳/۸۶، p <۰/۰۵) پیش‌بینی‌کنندهٔ مهمی برای ارزیابی



شکل ۳,۱۴. نقشه‌های پارامتری آماری پاداش پولی زیاد (HMR منهای بدون پاداش پولی [NMR]) در افراد TD و بیماران مبتلا به اختلال دلبستگی واکنشی (تاکیگوچی و همکاران ۲۰۱۵). (الف) نقشه‌های پارامتری آماری مواجهه با چالش پاداش پولی زیاد در TD، اختلال دلبستگی واکنشی و TD منهای اختلال دلبستگی واکنشی (تاکیگوچی و همکاران ۲۰۱۵). سمت راست (R) و سمت چپ (L) و محور عرض‌ها (مختصات MNI) نشان داده شده است. آستانهٔ تحمل تجزیه‌وتحلیل در $P < ۰/۰۰۱$ سطح وکسل و $P < ۰/۰۵$ با اصلاح FWE برای مقایسه‌های متعدد در سطح خوشه‌ای کل مغز تنظیم شد. هریک از شش قسمت مبنا از گروه TD (۲۲ = n، ۱۲ مرد و ۱۰ زن، ۱۰–۱۵ سال) و گروه اختلال دلبستگی واکنشی (۱۷ = n، ۸ مرد و ۹ زن، ۱۰–۱۵ ساله) نشان داده شده‌است. (ب) حداکثر حساسیت پیرامون سن مواجهه (حداکثر اهمیت سن مواجهه، صرف‌نظر از نوع آن) در اختلال دلبستگی واکنشی (تاکیگوچی و همکاران ۲۰۱۵). یافته‌های رگرسیون جنگل تصادفی با درختان مشروط، اهمیت مواجهه با بدرفتاری اولیه از بدو تولد تا ۱۵ سالگی و با توجه به ارزیابی‌های مقایسه‌ای پاداش پولی زیاد (پاداش پولی زیاد منهای NMR) برای (الف) جسم مخطط راست و (ب) جسم مخطط چپ را نشان داد. این اهمیت، همان‌طور که با افزایش خطای مجذور میانگین، پس از حذف مؤثر هر سن از مدل با جایگشت نشان داده می‌شود، با تنزل در تناسب نمایش داده می‌شود. خط افقی خط‌چین، سطح معنی‌داری برای مقادیر بااهمیت متغیر نشان می‌دهد.



شکل ۴,۱۴. یافته‌های تحلیل رگرسیون چندگانه میان شبکهٔ اجرایی مرکزی و نمرات پرسش‌نامهٔ رشد پس از سانحه (PTGI) (فوجیساوا و همکاران ۲۰۱۵). مناطق مغزی نشان‌دهندهٔ ارتباط مستقیم بین نمرات پرسش‌نامهٔ رشد پس از سانحه و توانایی فعالیت شبکهٔ اجرایی مرکزی است که توسط تحلیل رگرسیون چندگانه مشخص می‌شود. نمودارهای پراکندگی ارتباط میان نمرات پرسش‌نامهٔ رشد پس از سانحه و توانایی فعالیت شبکهٔ اجرایی مرکزی را نشان می‌دهد. (الف) قشر پیش‌پیشانی قدامی؛ (ب) لوبول ناحیهٔ فوقانی آهیانه. آستانهٔ آماری برای اختلاف‌ها، سطح وکسل $p < ۰/۰۰۱$ اصلاح‌نشده برای ارتفاع و سطح خوشه‌ای $P <۰/۰۵$ برای مقایسه‌های چندگانه بود.

Ahern GL, Schwartz GE (1985) Differential lateralization for positive and negative emotion in the human brain: EEG spectral analysis. Neuropsychologia 23(6):745–755

American Psychiatric Association (2013) Diagnostic and statistical manual of mental disorders, fifth edition (DSM-5). American Psychiatric Association, Washington, DC

Amodio DM, Frith CD (2006) Meeting of minds: the medial frontal cortex and social cognition. Nat Rev Neurosci 7(4):268–277

Andersen SL, Tomoda A, Vincow ES, Valente E, Polcari A, Teicher MH (2008) Preliminary evidence for sensitive periods in the effect of childhood sexual abuse on regional brain development. J Neuropsychiatry Clin Neurosci 20(3):292–301

Aron A, Fisher H, Mashek DJ, Strong G, Li H, Brown LL (2005) Reward, motivation, and emotion systems associated with early-stage intense romantic love. J Neurophysiol 94(1):327–337

Bar KJ, Wagner G, Koschke M, Boettger S, Boettger MK, Schlosser R, Sauer H (2007) Increased prefrontal activation during pain perception in major depression. Biol Psychiatry 62(11):1281–1287

Bremner JD (2003) Long-term effects of childhood abuse on brain and neurobiology. Child Adolesc Psychiatr Clin N Am 12(2):271–292

Bremner JD, Randall P, Vermetten E, Staib L, Bronen RA, Mazure C, Capelli S, McCarthy G, Innis RB, Charney DS (1997) Magnetic resonance imaging-based measurement of hippocampal volume in posttraumatic stress disorder related to childhood physical and sexual abuse – a preliminary report. Biol Psychiatry 41(1):23–32

Cabeza R, Ciaramelli E, Olson IR, Moscovitch M (2008) The parietal cortex and episodic memory: an attentional account. Nat Rev Neurosci 9(8):613–625

Calhoun LG, Cann A, Tedeschi RG, McMillan J (2000) A correlational test of the relationship between posttraumatic growth, religion, and cognitive processing. J Trauma Stress 13(3):521–527

Calvo MG, Beltrán D (2014) Brain lateralization of holistic versus analytic processing of emotional facial expressions. NeuroImage 92:237–247

Carrion VG, Weems CF, Watson C, Eliez S, Menon V, Reiss AL (2009) Converging evidence for abnormalities of the prefrontal cortex and evaluation of midsagittal structures in pediatric posttraumatic stress disorder: an MRI study. Psychiatry Res Neuroimaging 172(3):226–234

Choi J, Jeong B, Rohan ML, Polcari AM, Teicher MH (2009) Preliminary evidence for white matter tract abnormalities in young adults exposed to parental verbal abuse. Biol Psychiatry 65(3):227–234
Choi J, Jeong B, Polcari A, Rohan ML, Teicher MH (2012) Reduced fractional anisotropy in the visual limbic pathway of young adults witnessing domestic violence in childhood. NeuroImage 59(2):1071–1079
Crockford DN, Goodyear B, Edwards J, Quickfall J, el-Guebaly N (2005) Cue-induced brain activity in pathological gamblers. Biol Psychiatry 58(10):787–795
Dannlowski U, Stuhrmann A, Beutelmann V, Zwanzger P, Lenzen T, Grotegerd D, Domschke K, Hohoff C, Ohrmann P, Bauer J, Lindner C, Postert C, Konrad C, Arolt V, Heindel W, Suslow T, Kugel H (2012) Limbic scars: long-term consequences of childhood maltreatment revealed by functional and structural magnetic resonance imaging. Biol Psychiatry 71(4):286–293
Davidson RJ, Ekman P, Saron CD, Senulis JA, Friesen WV (1990) Approach-withdrawal and cerebral asymmetry: emotional expression and brain physiology I. J Pers Soc Psychol 58(2):330–341
De Bellis MD, Kuchibhatla M (2006) Cerebellar volumes in pediatric maltreatment-related posttraumatic stress disorder. Biol Psychiatry 60(7):697–703
De Bellis MD, Keshavan MS, Clark DB, Casey BJ, Giedd JN, Boring AM, Frustaci K, Ryan ND (1999) A.E. Bennett research award. Developmental traumatology. Part II: brain development. Biol Psychiatry 45(10):1271–1284
De Bellis MD, Keshavan MS, Shifflett H, Iyengar S, Beers SR, Hall J, Moritz G (2002) Brain structures in pediatric maltreatment-related posttraumatic stress disorder: a sociodemographically matched study. Biol Psychiatry 52(11):1066–1078
De Brito SA, Viding E, Sebastian CL, Kelly PA, Mechelli A, Maris H, McCrory EJ (2013) Reduced orbitofrontal and temporal grey matter in a community sample of maltreated children. J Child Psychol Psychiatry 54(1):105–112
Drexler K, Schweitzer JB, Quinn CK, Gross R, Ely TD, Muhammad F, Kilts CD (2000) Neural activity related to anger in cocaine-dependent men: a possible link to violence and relapse. Am J Addict 9(4):331–339
Edmiston EE, Wang F, Mazure CM, Guiney J, Sinha R, Mayes LC, Blumberg HP (2011) Corticostriatal-limbic gray matter morphology in adolescents with self-reported exposure to childhood maltreatment. Arch Pediatr Adolesc Med 165(12):1069–1077

Fennema-Notestine C, Stein MB, Kennedy CM, Archibald SL, Jernigan TL (2002) Brain morphometry in female victims of intimate partner violence with and without posttraumatic stress disorder. Biol Psychiatry 52(11):1089–1101

Fitzgerald PB, Laird AR, Maller J, Daskalakis ZJ (2008) A meta-analytic study of changes in brain activation in depression. Hum Brain Mapp 29(6):683–695

Fujisawa TX, Jung M, Kojima M, Saito DN, Kosaka H, Tomoda A (2015) Neural basis of psychological growth following adverse experiences: a resting-state functional MRI study. PLoS One 10(8):e0136427

Geuze E, Westenberg HG, Jochims A, de Kloet CS, Bohus M, Vermetten E, Schmahl C (2007) Altered pain processing in veterans with posttraumatic stress disorder. Arch Gen Psychiatry 64(1):76–85

Gilbert SJ, Williamson ID, Dumontheil I, Simons JS, Frith CD, Burgess PW (2007) Distinct regions of medial rostral prefrontal cortex supporting social and nonsocial functions. Soc Cogn Affect Neurosci 2(3):217–226

Hanson JL, Nacewicz BM, Sutterer MJ, Cayo AA, Schaefer SM, Rudolph KD, Shirtcliff EA, Pollak SD, Davidson RJ (2015) Behavioral problems after early life stress: contributions of the hippocampus and amygdala. Biol Psychiatry 77(4):314–323

Hart H, Rubia K (2012) Neuroimaging of child abuse: a critical review. Front Hum Neurosci 6:52

Hou C, Liu J, Wang K, Li L, Liang M, He Z, Liu Y, Zhang Y, Li W, Jiang T (2007) Brain responses to symptom provocation and trauma-related short-term memory recall in coal mining accident survivors with acute severe PTSD. Brain Res 1144:165–174

Jansari A, Rodway P, Goncalves S (2011) Identifying facial emotions: valence specific effects and an exploration of the effects of viewer gender. Brain Cogn 76(3):415–423

Koenigs M, Barbey AK, Postle BR, Grafman J (2009) Superior parietal cortex is critical for the manipulation of information in working memory. J Neurosci 29(47):14980–14986

Koizumi M, Takagishi H (2014) The relationship between child maltreatment and emotion recognition. PLoS One 9(1):e86093

Liao M, Yang F, Zhang Y, He Z, Song M, Jiang T, Li Z, Lu S, Wu W, Su L, Li L (2013) Childhood maltreatment is associated with larger left thalamic gray matter volume in adolescents with generalized anxiety disorder. PLoS One 8(8):e71898

Liberzon I, Britton JC, Phan KL (2003) Neural correlates of traumatic recall in posttraumatic stress disorder. Stress 6(3):151–156
Lim L, Radua J, Rubia K (2014) Gray matter abnormalities in childhood maltreatment: a voxelwise metaanalysis. Am J Psychiatry 171(8):854–863
Liotti M, Mayberg HS (2001) The role of functional neuroimaging in the neuropsychology of depression. J Clin Exp Neuropsychol 23(1):121–136
McCrory E, De Brito SA, Viding E (2011) The impact of childhood maltreatment: a review of neurobiological and genetic factors. Front Psychiatry 2:48
Mehta MA, Golembo NI, Nosarti C, Colvert E, Mota A, Williams SCR, Rutter M, Sonuga-Barke EJS (2009) Amygdala, hippocampal and corpus callosum size following severe early institutional deprivation: the English and Romanian adoptees study pilot. J Child Psychol Psychiatry 50(8):943–951
Pechtel P, Lyons-Ruth K, Anderson CM, Teicher MH (2014) Sensitive periods of amygdala development: the role of maltreatment in preadolescence. NeuroImage 97:236–244
Prete G, Laeng B, Fabri M, Foschi N, Tommasi L (2015) Right hemisphere or valence hypothesis, or both? The processing of hybrid faces in the intact and callosotomized brain. Neuropsychologia 68:94–106
Raust A, Slama F, Mathieu F, Roy I, Chenu A, Koncke D, Fouques D, Jollant F, Jouvent E, Courtet P, Leboyer M, Bellivier F (2007) Prefrontal cortex dysfunction in patients with suicidal behavior. Psychol Med 37(3):411–419
Richert KA, Carrion VG, Karchemskiy A, Reiss AL (2006) Regional differences of the prefrontal cortex in pediatric PTSD: an MRI study. Depress Anxiety 23(1):17–25
Shakespeare-Finch J, Armstrong D (2010) Trauma type and posttrauma outcomes: differences between survivors of motor vehicle accidents, sexual assault, and bereavement. J Loss Trauma 15(2):69–82
Shakespeare-Finch J, Lurie-Beck J (2014) A meta-analytic clarification of the relationship between posttraumatic growth and symptoms of posttraumatic distress disorder. J Anxiety Disord 28(2):223–229
Shimada K, Takiguchi S, Mizushima S, Fujisawa TX, Saito DN, Kosaka H, Okazawa H, Tomoda A (2015) Reduced visual cortex grey matter volume in children and adolescents with reactive attachment disorder. NeuroImage Clin 9:13–19
Silberman EK, Weingartner H (1986) Hemispheric lateralization of functions related to emotion. Brain Cogn 5(3):322–353

Sun X, Zhang X, Chen X, Zhang P, Bao M, Zhang D, Chen J, He S, Hu X (2005) Age-dependent brain activation during forward and backward digit recall revealed by fMRI. NeuroImage 26(1):36–47
Suzuki H, Tomoda A (2015) Roles of attachment and self-esteem: impact of early life stress on depressive symptoms among Japanese institutionalized children. BMC Psychiatry 15:8
Takiguchi S, Fujisawa TX, Mizushima S, Saito DN, Okamoto Y, Shimada K, Koizumi M, Kumazaki H, Jung M, Kosaka H, Hiratani M, Ohshima Y, Teicher MH, Tomoda A (2015)
Ventral striatum dysfunction in children and adolescents with reactive attachment disorder: a functional MRI study. Br J Psychiatry Open 1(2):121–128
Taku K, Calhoun LG, Tedeschi RG, Gil-Rivas V, Kilmer RP, Cann A (2007) Examining posttraumatic growth among Japanese university students. Anxiety Stress Coping 20(4):353–367
Taku K, Cann A, Tedeschi RG, Calhoun LG (2009) Intrusive versus deliberate rumination in posttraumatic growth across US and Japanese samples. Anxiety Stress Coping 22(2):129–136
Tedeschi RG, Calhoun LG (1996) The posttraumatic growth inventory: measuring the positive legacy of trauma. J Trauma Stress 9(3):455–471
Teicher MH, Ito Y, Glod CA, Andersen SL, Dumont N, Ackerman E (1997) Preliminary evidence for abnormal cortical development in physically and sexually abused children using EEG coherence and MRI. Ann N Y Acad Sci 821:160–175
Teicher MH, Dumont NL, Ito Y, Vaituzis C, Giedd JN, Andersen SL (2004) Childhood neglect is associated with reduced corpus callosum area. Biol Psychiatry 56(2):80–85
Teicher MH, Tomoda A, Andersen SL (2006) Neurobiological consequences of early stress and childhood maltreatment: are results from human and animal studies comparable? Ann N Y Acad Sci 1071:313–323
Teicher MH, Anderson CM, Polcari A (2012) Childhood maltreatment is associated with reduced volume in the hippocampal subfields CA3, dentate gyrus, and subiculum. Proc Natl Acad Sci 109(9):E563–E572
Teicher MH, Samson JA (2013) Childhood maltreatment and psychopathology: a case for ecophenotypic variants as clinically and neurobiologically distinct subtypes. Am J Psychiatry 170(10):1114–1133
Tomoda A, Navalta CP, Polcari A, Sadato N, Teicher MH (2009a) Childhood sexual abuse is associated with reduced gray matter volume in visual cortex of young women. Biol Psychiatry 66(7):642–648

Tomoda A, Suzuki H, Rabi K, Sheu YS, Polcari A, Teicher MH (2009b) Reduced prefrontal cortical gray matter volume in young adults exposed to harsh corporal punishment. NeuroImage 47:T66–T71
Tomoda A, Sheu YS, Rabi K, Suzuki H, Navalta CP, Polcari A, Teicher MH (2011) Exposure to parental verbal abuse is associated with increased gray matter volume in superior temporal gyrus. NeuroImage 54:S280–S286
Tomoda A, Polcari A, Anderson CM, Teicher MH (2012) Reduced visual cortex gray matter volume and thickness in young adults who witnessed domestic violence during childhood. PloS One 7(12):e52528
Tottenham N, Hare TA, Quinn BT, McCarry TW, Nurse M, Gilhooly T, Millner A, Galvan A, Davidson MC, Eigsti I-M, Thomas KM, Freed PJ, Booma ES, Gunnar MR, Altemus M, Aronson J, Casey BJ (2010) Prolonged institutional rearing is associated with atypically large amygdala volume and difficulties in emotion regulation. Dev Sci 13(1):46–61
van Harmelen A-L, van Tol M-J, van der Wee NJA, Veltman DJ, Aleman A, Spinhoven P, van Buchem MA, Zitman FG, Penninx BWJH, Elzinga BM (2010) Reduced medial prefrontal cortex volume in adults reporting childhood emotional maltreatment. Biol Psychiatry 68(9):832–838
Veltman DJ, de Ruiter MB, Rombouts SA, Lazeron RH, Barkhof F, Van Dyck R, Dolan RJ, Phaf RH (2005) Neurophysiological correlates of increased verbal working memory in high-dissociative participants: a functional MRI study. Psychol Med 35(2):175–185
Vervoort E, De Schipper JC, Bosmans G, Verschueren K (2013) Screening symptoms of reactive attachment disorder: evidence for measurement invariance and convergent validity. Int J Methods Psychiatr Res 22(3):256–265
Vrticka P, Bondolfi G, Sander D, Vuilleumier P (2011) The neural substrates of social emotion perception and regulation are modulated by adult attachment style. Soc Neurosci 7(5):473–493
Wager TD, Smith EE (2003) Neuroimaging studies of working memory: a meta-analysis. Cogn Affect Behav Neurosci 3(4):255–274
Weber DL, Clark CR, McFarlane AC, Moores KA, Morris P, Egan GF (2005) Abnormal frontal and parietal activity during working memory updating in post-traumatic stress disorder. Psychiat Res Neuroimaging 140(1):27–44
Zeanah CH, Gleason MM (2015) Attachment disorders in early childhood – clinical presentation, causes, correlates, and treatment. J Child Psychol Psychiatry 56(3):207–222

منابع فصل پانزدهم

Barberger-Gateau P, Fabrigoule C (1997) Disability and cognitive impairment in the elderly. Disabil Rehabil 19(5):175–193

Barnett SM, Ceci SJ (2002) When and where do we apply what we learn? A taxonomy for far transfer. Psychol Bull 128(4):612

Basak C, Boot WR, Voss MW, Kramer AF (2008) Can training in a real-time strategy video game attenuate cognitive decline in older adults? Psychol Aging 23(4):765

Bjorklund DF, Miller PH, Coyle TR, Slawinski JL (1997) Instructing children to use memory strategies: evidence of utilization deficiencies in memory training studies. Dev Rev 17(4):411–441

Boot WR, Kramer AF, Simons DJ, Fabiani M, Gratton G (2008) The effects of video game playing on attention, memory, and executive control. Acta Psychol 129(3):387–398

Boot WR, Blakely DP, Simons DJ (2011) Do action video games improve perception and cognition? Front Psychol 2:226

Borella E, Carretti B, De Beni R (2008) Working memory and inhibition across the adult life-span. Acta Psychol 128(1):33–44

Borella E, Carretti B, Riboldi F, De Beni R (2010) Working memory training in older adults: evidence of transfer and maintenance effects. Psychol Aging 25(4):767

Bransford JD, Brown AL, Cocking RR (2000) How people learn. National Academy Press, Washington, DC

Cahn-Weiner DA, Malloy PF, Boyle PA, Marran M, Salloway S (2000) Prediction of functional status from neuropsychological tests in community-dwelling elderly individuals. Clin Neuropsychol 14(2):187–195

Carlson MC, Fried LP, Xue QL, Bandeen-Roche K, Zeger SL, Brandt J (1999) Association between executive attention and physical functional performance in community-dwelling older women. J Gerontol B Psychol Sci Soc Sci 54(5):S262–S270

Carretti B, Borella E, De Beni R (2007) Does strategic memory training improve the working memory performance of younger and older adults? Exp Psychol 54(4):311–320

Cassilhas RC, Viana VA, Grassmann V, Santos RT, Santos RF, Tufik S, Mello MT (2007) The impact of resistance exercise on the cognitive function of the elderly. Med Sci Sports Exerc 39(8):1401–1407

Cavallini E, Dunlosky J, Bottiroli S, Hertzog C, Vecchi T (2010) Promoting transfer in memory training for older adults. Aging Clin Exp Res 22(4):314–323

Chang Y-K, Pan C-Y, Chen F-T, Tsai C-L, Huang C-C (2012) Effect of resistance-exercise training on cognitive function in healthy older adults: a review. J Aging Phys Act 20(4):497–517

Colcombe S, Kramer AF (2003) Fitness effects on the cognitive function of older adults a meta-analytic study. Psychol Sci 14(2):125–130

Davis CL, Tomporowski PD, McDowell JE, Austin BP, Miller PH, Yanasak NE, Allison JD, Naglieri JA (2011) Exercise improves executive function and achievement and alters brain activation in overweight children: a randomized, controlled trial. Health Psychol 30(1):91–98

Edwards JD, Wadley VG, Myers RS, Roenker DL, Cissell GM, Ball KK (2002) Transfer of a speed of processing intervention to near and far cognitive functions. Gerontology 48(5):329–340

Edwards JD, Wadley V, Vance D, Wood K, Roenker D, Ball K (2005) The impact of speed of processing training on cognitive and everyday performance. Aging Ment Health 9(3):262–271

Green CS, Bavelier D (2003) Action video game modifies visual selective attention. Nature 423(6939):534–537

Grigsby J, Kaye K, Baxter J, Shetterly SM, Hamman RF (1998) Executive cognitive abilities and functional status among community-dwelling older persons in the San Luis Valley health and aging study. J Am Geriatr Soc 46(5):590–596

Hampstead BM, Gillis MM, Stringer AY (2014) Cognitive rehabilitation of memory for mild cognitive impairment: a methodological review and model for future research. J Int Neuropsychol Soc 20(2):135–151

Karbach J, Kray J (2009) How useful is executive control training? Age differences in near and far transfer of task-switching training. Dev Sci 12(6):978–990

Kean RJ, Lamport DJ, Dodd GF, Freeman JE, Williams CM, Ellis JA, Butler LT, Spencer JP (2015) Chronic consumption of flavanone-rich orange juice is associated with cognitive benefits: an 8-week, randomized, double-blind, placebo-controlled trial in healthy older adults. Am J Clin Nutr 101(3):506–514

Klingberg T (2010) Training and plasticity of working memory. Trends Cogn Sci 14(7):317–324
Lamport DJ, Saunders C, Butler LT, Spencer JP (2014) Fruits, vegetables, 100% juices, and cognitive function. Nutr Rev 72(12):774–789
Lee Y, Kim JH, Lee KJ, Han G, Kim JL (2005) Association of cognitive status with functional limitation and disability in older adults. Aging Clin Exp Res 17(1):20–28
Lovden M, Backman L, Lindenberger U, Schaefer S, Schmiedek F (2010) A theoretical framework for the study of adult cognitive plasticity. Psychol Bull 136(4):659–676
Lustig C, Shah P, Seidler R, Reuter-Lorenz PA (2009) Aging, training, and the brain: a review and future directions. Neuropsychol Rev 19(4):504–522
Macready AL, Kennedy OB, Ellis JA, Williams CM, Spencer JP, Butler LT (2009) Flavonoids and cognitive function: a review of human randomized controlled trial studies and recommendations for future studies. Genes Nutr 4(4):227–242
Mahncke HW, Connor BB, Appelman J, Ahsanuddin ON, Hardy JL, Wood RA, Joyce NM, Boniske T, Atkins SM, Merzenich MM (2006) Memory enhancement in healthy older adults using a brain plasticity-based training program: a randomized, controlled study. Proc Natl Acad Sci U S A 103(33):12523–12528
McDougall S, House B (2012) Brain training in older adults: evidence of transfer to memory span performance and pseudo-Matthew effects. Aging Neuropsychol Cognit 19(1–2):195–221
Miller DJ, Robertson DP (2010) Using a games console in the primary classroom: effects of 'brain Training' programme on computation and self-esteem. Br J Educ Technol 41(2):242–255
Nilsson LG (2003) Memory function in normal aging. Acta Neurol Scand Suppl 179:7–13
Nouchi R, Kawashima R (2014) Improving cognitive function from children to old age: a systematic review of recent smart ageing intervention studies. Adv Neurosci 2014:Article ID 235479
Nouchi R, Taki Y, Takeuchi H, Hashizume H, Akitsuki Y, Shigemune Y, Sekiguchi A, Kotozaki Y, Tsukiura T, Yomogida Y (2012) Brain training game improves executive functions and processing speed in the elderly: a randomized controlled trial. PLoS One 7(1):e29676
Nouchi R, Taki Y, Takeuchi H, Hashizume H, Nozawa T, Kambara T, Sekiguchi A, Miyauchi CM, Kotozaki Y, Nouchi H, Kawashima R (2013)

Brain training game boosts executive functions, working memory and processing speed in the young adults: a randomized controlled trial. PLoS One 8(2):e55518
Nouchi R, Taki Y, Takeuchi H, Sekiguchi A, Hashizume H, Nozawa T, Nouchi H, Kawashima R (2014) Four weeks of combination exercise training improved executive functions, episodic memory, and processing speed in healthy elderly people: evidence from a randomized controlled trial. Age 36(2):787–799
Owsley C, McGwin G Jr (2004) Association between visual attention and mobility in older adults. J Am Geriatr Soc 52(11):1901–1906
Park DC, Lautenschlager G, Hedden T, Davidson NS, Smith AD, Smith PK (2002) Models of visuospatial and verbal memory across the adult life span. Psychol Aging 17(2):299–320
Peig-Chiello P, Perrig WJ, Ehrsam R, Staehelin HB, Krings F (1998) The effects of resistance training on well-being and memory in elderly volunteers. Age Ageing 27(4):469–475
Pollitt E, Mathews R (1998) Breakfast and cognition: an integrative summary. Am J Clin Nutr 67(4):804S–813S
Rendeiro C, Rhodes JS, Spencer JP (2015) The mechanisms of action of flavonoids in the brain: direct versus indirect effects. Neurochem Int 89:126–139
Richmond LL, Morrison AB, Chein JM, Olson IR (2011) Working memory training and transfer in older adults. Psychol Aging 26(4):813
Salthouse TA (2003) Memory aging from 18 to 80. Alzheimer Dis Assoc Disord 17(3):162–167
Smith A (1998) Breakfast consumption and intelligence in elderly persons. Psychol Rep 82(2):424–426
Smith PJ, Blumenthal JA, Hoffman BM, Cooper H, Strauman TA, Welsh-Bohmer K, Browndyke JN, Sherwood A (2010) Aerobic exercise and neurocognitive performance: a meta-analytic review of randomized controlled trials. Psychosom Med 72(3):239–252
Takeuchi H, Taki Y, Kawashima R (2010) Effects of working memory training on cognitive functions and neural systems. Rev Neurosci 21(6):427–449
Takeuchi H, Taki Y, Hashizume H, Sassa Y, Nagase T, Nouchi R, Kawashima R (2011) Effects of training of processing speed on neural systems. J Neurosci 31(34):12139–12148

Van Uffelen JG, Paw MJCA, Hopman-Rock M, van Mechelen W (2008) The effects of exercise on cognition in older adults with and without cognitive decline: a systematic review. Clin J Sport Med 18(6):486–500

Verhaeghen P, Marcoen A, Goossens L (1992) Improving memory performance in the aged through mnemonic training: a meta-analytic study. Psychol Aging 7(2):242

Willis SL, Tennstedt SL, Marsiske M, Ball K, Elias J, Koepke KM, Morris JN, Rebok GW, Unverzagt FW, Stoddard AM (2006) Long-term effects of cognitive training on everyday functional outcomes in older adults. JAMA 296(23):2805–2814

Zelinski EM (2009) Far transfer in cognitive training of older adults. Restor Neurol Neurosci

27(5):455–471

ـــــ منابع فصل شانزدهم ـــــ

Baddeley AD (2012) Working memory: theories, models, and controversies. Annu Rev Psychol 63:1–29

Baddeley AD, Gathercole S, Papagno C (1998) The phonological loop as a language learning device. Psychol Rev 105(1):158–173

Bartlett FC (1932) Remembering: a study in experimental and social psychology, 1st edn. Cambridge University Press, Cambridge

Bartlett FC (1995) Remembering: a study in experimental and social psychology, 2nd edn. Cambridge University Press, Cambridge

Botvinick MM (2005) Effects of domain-specific knowledge on memory for serial order. Cognition 97(2):135–151

Botvinick MM, Bylsma LM (2005) Regularization in short-term memory for serial order. J Exp Psychol Learn Mem Cogn 31(2):351–358

Boyer P, Wertsch JV (2009) Memory in mind and culture. Cambridge University Press, Cambridge

Bozeat S, Lambon Ralph MA, Patterson K, Hodges JR (2002) When objects lose their meaning: what happens to their use? Cogn Affect Behav Neurosci 2(3):236–251

Bruner J (1994) The "remembered" self. In: Neisser U, Fivush R (eds) The remembering self: construction and accuracy in the self-narrative. Cambridge University Press, Cambridge, pp 41–54

Chua HF, Boland JE, Nisbett RE (2005) Cultural variation in eye movements during scene perception. Proc Natl Acad Sci U S A 102(35):12629–12633

Cohen D, Gunz A (2002) As seen by the other…: perspectives on the self in the memories and emotional perceptions of easterners and westerners. Psychol Sci 13(1):55–59

Diener E, Diener C (1995) The wealth of nations revisited: income and quality of life. Soc Indic Res 36(3):275–286

Duffy S, Kitayama S (2007) Mnemonic context effect in two cultures: attention to memory representations? Cogn Sci 31(6):1009–1020

Evans K, Rotello CM, Li XS, Rayner K (2009) Scene perception and memory revealed by eye movements and receiver-operating characteristic analyses: does a cultural difference truly exist? Q J Exp Psychol 62(2):276–285

Freeman J, Ziemba CM, Heeger DJ, Simoncelli EP, Movshon A (2013) A functional and perceptual signature of the second visual area in primates. Nat Neurosci 16(7):974–981

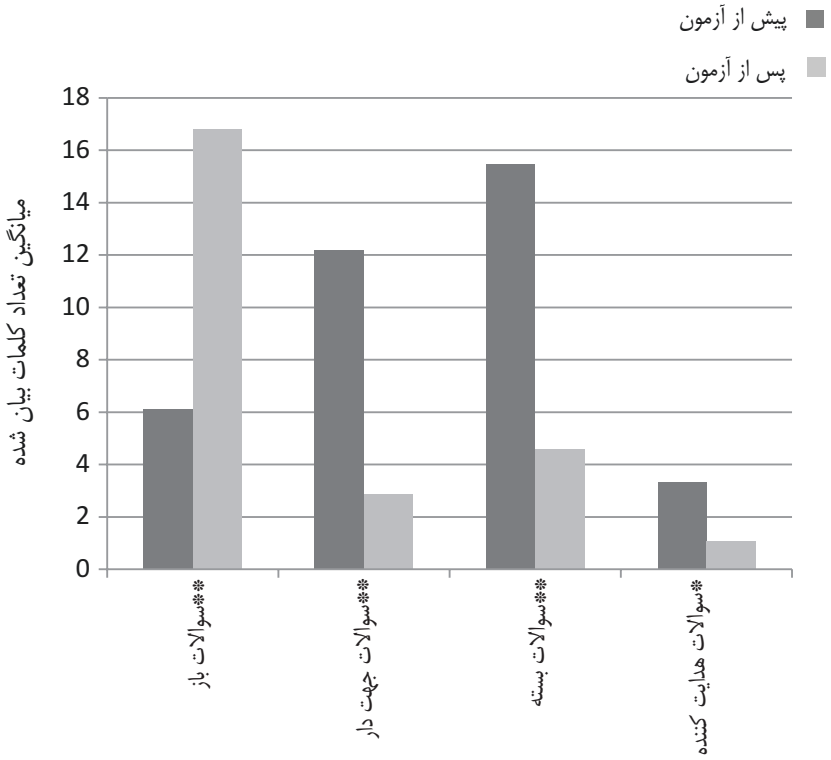
He X, Sebanz N, Sui J, Humphreys GW (2014) Individualism-collectivism and interpersonal memory guidance of attention. J Exp Soc Psychol 54:102–114
Heine SJ, Kitayama S, Lehman DR, Takata T, Ide E, Leung C, Matsumoto H (2001) Divergent consequences of success and failure in Japan and North America: an investigation of self-improving motivations and malleable selves. J Pers Soc Psychol 81(4):599–615
Inglehart R, Foa R, Peterson C, Welzel C (2008) Development, freedom, and rising happiness: a global perspective (1981–2007). Perspect Psychol Sci 3(4):264–285
Ji LJ, Peng KP, Nisbett RE (2000) Culture, control, and perception of relationships in the environment. J Pers Soc Psychol 78(5):943–955
Ji LJ, Nisbett RE, Su YJ (2001) Culture, change, and prediction. Psychol Sci 12(6):450–456
Jobson L, O'Kearney R (2008) Cultural differences in retrieval of self-defining memories. J Cross-Cult Psychol 39(1):75–80
Kashima Y (2000) Maintaining cultural stereotypes in the serial reproduction of narratives. Personal Soc Psychol Bull 26(5):594–604
Kitayama S, Cohen D (2007) Handbook of cultural psychology. Guilford Press, New York
Kitayama S, Markus HR (1999) Yin and yang of the Japanese self. In: Cervone D, Shoda Y (eds) The coherence of personality: social-cognitive bases of consistency, variability, and organization. Guilford Press, New York, pp 242–302
Kitayama S, Uchida Y (2005) Interdependent agency: an alternative system for action. In: Sorrentino RM, Cohen D, Olson JM, Zanna MP (eds) Cultural and social behavior: the Ontario symposium. Lawrence Erlbaum Associates, Mahwah, pp 137–164
Kitayama S, Uskul AK (2011) Culture, mind, and the brain: current evidence and future directions. Annu Rev Psychol 62:419–449
Kitayama S, Duffy S, Kawamura T, Larsen JT (2003) Perceiving an object and its context in different cultures: a cultural look at new look. Psychol Sci 14(3):201–206
Kitayama S, Park H, Sevincer AT, Karasawa M, Uskul AK (2009) A cultural task analysis of implicit independence: comparing north America, western Europe, and east Asia. J Pers Soc Psychol 97(2):236–255
Kitayama S, King A, Yoon C, Tompson S, Huff S, Liberzon I (2014) The dopamine D4 receptor gene (DRD4) moderates cultural difference in

independent versus interdependent social orientation. Psychol Sci 25(6):1169–1177
Kuhnen U, Hannover B, Roeder U, Shah AA, Schubert B, Upmeyer A, Zakaria S (2001) Cross-cultural variations in identifying embedded figures: comparisons from the United States, Germany, Russia, and Malaysia. J Cross-Cult Psychol 32(3):365–371
Macrae CN, Roseveare TA (2002) I was always on my mind: the self and temporary forgetting. Psychon Bull Rev 9(3):611–614
Markus HR, Kitayama S (1991) Culture and the self: implications for cognition, emotion, and motivation. Psychol Rev 98(2):224–253
Markus HR, Kitayama S (2010) Cultures and selves: a cycle of mutual constitution. Perspect Psychol Sci 5(4):420–430
Markus HR, Uchida Y, Omoregie H, Townsend SSM, Kitayama S (2006) Going for the gold: models of agency in Japanese and American contexts. Psychol Sci 17(2):103–112
Martin M, Jones GV (2012) Individualism and the field viewpoint: cultural influences on memory perspective. Conscious Cogn 21(3):1498–1503
Martin D, Hutchison J, Slessor G, Urquhart J, Cunningham SJ, Smith K (2014) The spontaneous formation of stereotypes via cumulative cultural evolution. Psychol Sci 25(9):1777–1786
Masuda T, Kitayama S (2004) Perceiver-induced constraint and attitude attribution in Japan and the US: a case for the cultural dependence of the correspondence bias. J Exp Soc Psychol 40(3):409–416
Masuda T, Nisbett RE (2001) Attending holistically versus analytically: comparing the context sensitivity of Japanese and Americans. J Pers Soc Psychol 81(5):922–934
Masuda T, Ellsworth PC, Mesquita B, Leu J, Tanida S, De Veerdonk EV (2008) Placing the face in context: cultural differences in the perception of facial emotion. J Pers Soc Psychol 94(3):365–381
McClelland JL, Botvinick MM, Noelle DC, Plaut DC, Rogers TT, Seidenberg MS, Smith LB (2010) Letting structure emerge: connectionist and dynamical systems approaches to cognition. Trends Cogn Sci 14(8):348–356
Miller JG (1984) Culture and the development of everyday social explanation. J Pers Soc Psychol 46(5):961–978
Miyamoto Y, Kitayama S (2002) Cultural variation in correspondence bias: the critical role of attitude diagnosticity of socially constrained behavior. J Pers Soc Psychol 83(5):1239–1248

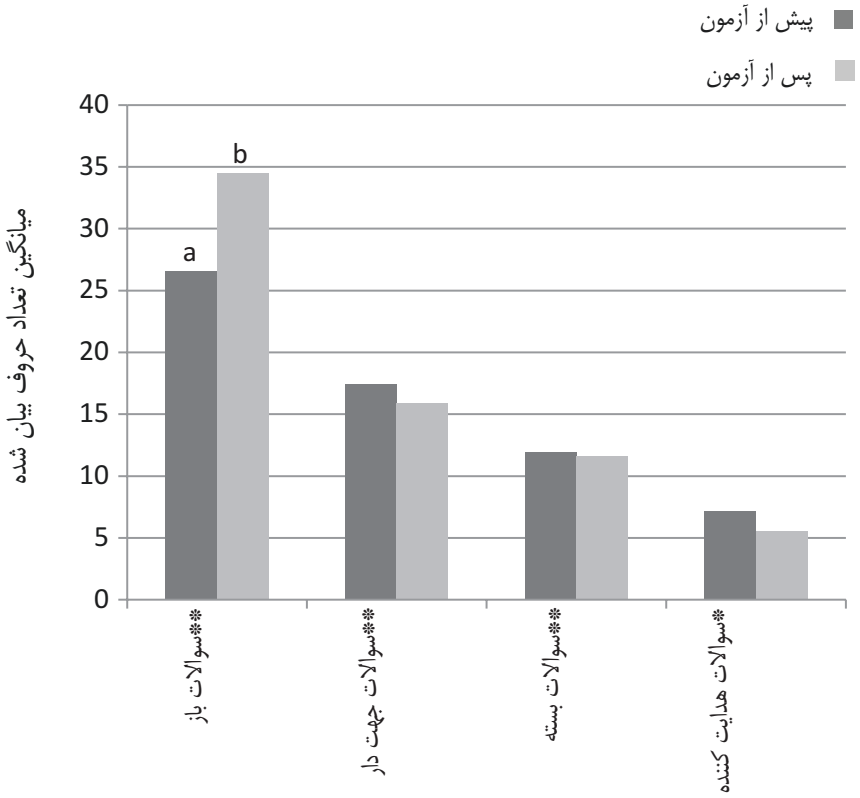
Miyamoto Y, Nisbett RE, Masuda T (2006) Culture and the physical environment – holistic versus analytic perceptual affordances. Psychol Sci 17(2):113–119
Morling B, Lamoreaux M (2008) Measuring culture outside the head: a meta-analysis of individualism-collectivism in cultural products. Personal Soc Psychol Rev 12(3):199–221
Na J, Grossmann I, Varnum MEW, Kitayama S, Gonzalez R, Nisbett RE (2010) Cultural differences are not always reducible to individual differences. Proc Natl Acad Sci U S A 107(14):6192–6197
Nakayama M, Tanida Y, Saito S (2015) Long-term phonological knowledge supports serial ordering in working memory. J Exp Psychol Learn Mem Cogn 41(5):1570–1578
Nisbett RE (2003) The geography of thought: how Asians and westerners think differently… And why. Free Press, New York
Nisbett RE, Peng KP, Choi I, Norenzayan A (2001) Culture and systems of thought: holistic versus analytic cognition. Psychol Rev 108(2):291–310
Norenzayan A, Smith EE, Kim BJ, Nisbett RE (2002) Cultural preferences for formal versus intuitive reasoning. Cogn Sci 26(5):653–684
Norman D, Shallice T (1986) Attention to action. In: Davidson RJ, Schwartz GE, Shapiro D (eds) Consciousness and self regulation. Springer US, Boston, pp 1–18
Oishi S (2002) The experiencing and remembering of well-being: a cross-cultural analysis. Personal Soc Psychol Bull 28(10):1398–1406
Patterson K, Nestor PJ, Rogers TT (2007) Where do you know what you know? The representation of semantic knowledge in the human brain. Nat Rev Neurosci 8(12):976–987
Peng KP, Nisbett RE (1999) Culture, dialectics, and reasoning about contradiction. Am Psychol 54(9):741–754
Rauschenberger R, Chu HQ (2006) The effects of stimulus rotation and familiarity in visual search. Percept Psychophys 68(5):770–775
Rensink RA, Enns JT (1995) Preemption effects in visual-search: evidence for low-level grouping. Psychol Rev 102(1):101–130
Roediger III HL, Abel M (2015) Collective memory: a new arena of cognitive study. Trends Cogn Sci 19(7):359–361
Ross M, Wang Q (2010) Why we remember and what we remember: culture and autobiographical memory. Perspect Psychol Sci 5(4):401–409
Saiki J, Ueda Y, Chen R, Kitayama S (2013) Cultural differences in visual search with culturally neutral items. J Vis 13(9):1254–1254

Schwartz AJ, Boduroglu A, Gutchess AH (2014) Cross-cultural differences in categorical memory errors. Cogn Sci 38(5):997–1007
Senzaki S, Masuda T, Takada A, Okada H (2016) The communication of culturally dominant modes of attention from parents to children: a comparison of Canadian and Japanese parent-childconversations during a joint scene description task. PLoS One 11(1):e0147199
Shen J, Reingold EM (2001) Visual search asymmetry: the influence of stimulus familiarity and low-level features. Percept Psychophys 63(3):464–475
Shweder RA (1995) The confessions of a methodological individualist. Cult Psychol 1(1):115–122
Stone CB, Luminet O, Takahashi M (2015) Remembering public, political events: a cross-cultural and – sectional examination of Australian and Japanese public memories. Appl Cogn Psychol 29(2):280–290
Sui J, Zhu Y, Chiu CY (2007) Bicultural mind, self-construal, and self- and mother-reference effects: consequences of cultural priming on recognition memory. J Exp Soc Psychol 43(5):818–824
Szwed M, Qiao E, Jobert A, Dehaene S, Cohen L (2014) Effects of literacy in early visual and occipitotemporal areas of Chinese and French readers. J Cogn Neurosci 26(3):459–475
Talhelm T, Zhang X, Oishi S, Shimin C, Duan D, Lan X, Kitayama S (2014) Large-scale psychological differences within China explained by rice versus wheat agriculture. Science 344(6184):603–608
Treisman A, Gormican S (1988) Feature analysis in early vision: evidence from search asymmetries. Psychol Rev 95(1):15–48
Uchida Y, Kitayama S (2009) Happiness and unhappiness in east and west: themes and variations. Emotion 9(4):441–456
Uchida Y, Ueno T, Miyamoto Y (2014) You were always on my mind: the importance of "significant others" in the attenuation of retrieval-induced forgetting in Japan. Jpn Psychol Res 56(3):263–274
Uchida Y, Ogihara Y, Fukushima S (2015) Cultural construal of wellbeing: theories and empirical evidence. In: Glatzer W, Camfield L, Moller V, Rojas M (eds) Global handbook of quality of life: exploration of well-being of nations and continents. Springer Netherlands, Heidelberg, pp 823–837
Ueda Y, Komiya A (2012) Cultural adaptation of visual attention: calibration of the oculomotor control system in accordance with cultural scenes. PLoS One 7(11):e50282

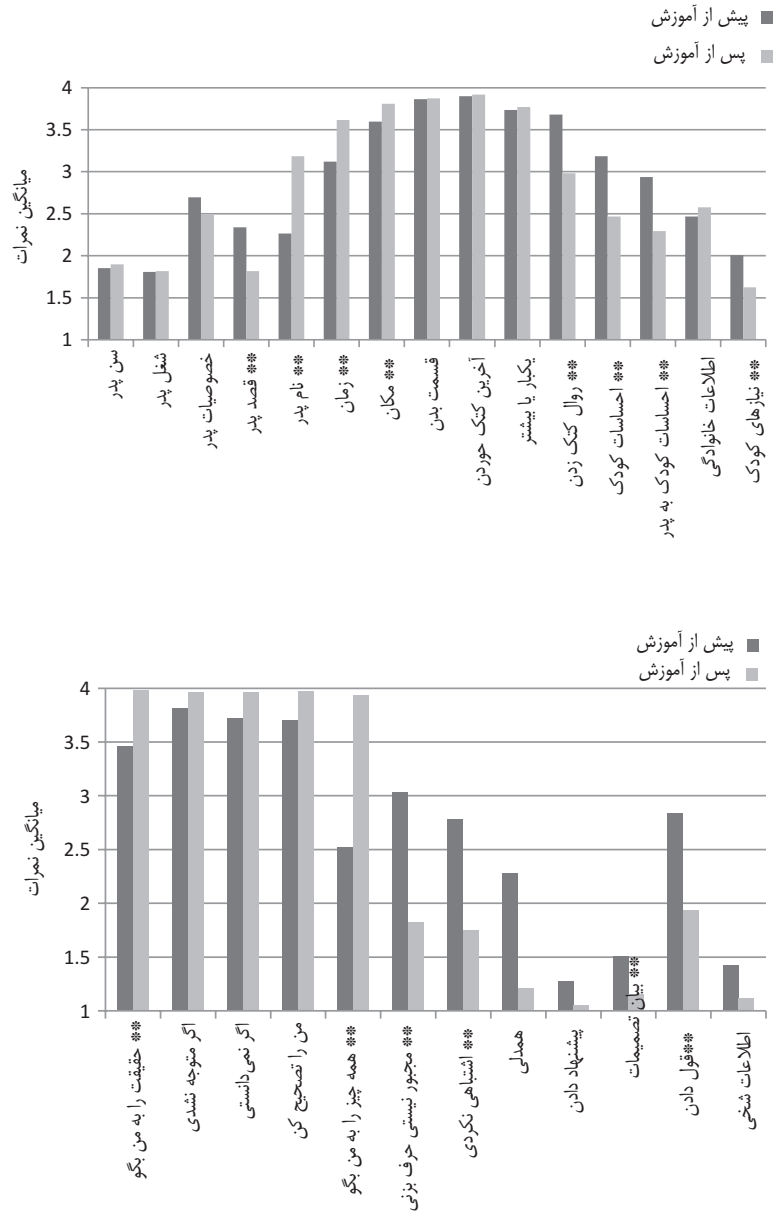
Ueda Y, Chen L, Kopecky J, Cramer ES, Rensink RA, Meyer DE, Kitayama S, Saiki J (2017) Cultural differences in visual search for geometric figures. Cogn Sci, Advance online publication.
Uskul AK, Kitayama S, Nisbett RE (2008) Ecocultural basis of cognition: farmers and fishermen are more holistic than herders. Proc Natl Acad Sci U S A 105(25):8552–8556
Wagar BM, Cohen D (2003) Culture, memory, and the self: an analysis of the personal and collective self in long-term memory. J Exp Soc Psychol 39(5):468–475
Wang Q (2001) Culture effects on adults' earliest childhood recollection and self-description: implications for the relation between memory and the self. J Pers Soc Psychol 81(2):220–233
Wang Q (2009) Are Asians forgetful? perception, retention, and recall in episodic remembering. Cognition 111(1):123–131
Wang Q, Ross M (2005) What we remember and what we tell: the effects of culture and self-priming on memory representations and narratives. Memory 13(6):594–606
Wang Q, Ross M (2007) Culture and memory. In: Kitayama S, Cohen D (eds) The handbook of cultural Psychology. Guilford Press, New York, pp 645–667
Witkin HA, Berry JW (1975) Psychological differentiation in cross-cultural perspective. J Cross-Cult Psychol 6(1):4–87



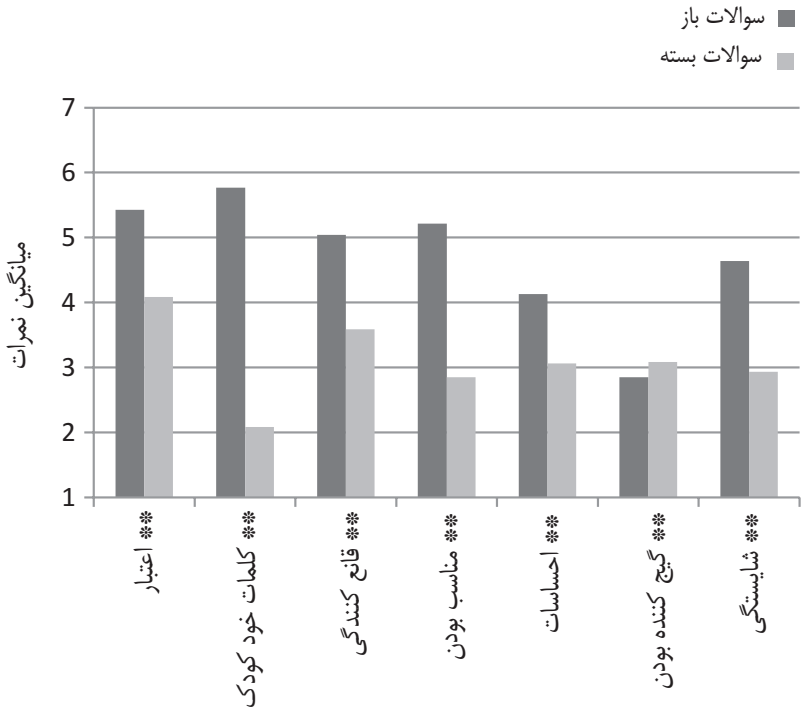
شکل ۱,۱۷. میانگین میزان گفتار در هر نوع سؤال قبل و بعد از آموزش
(*$p < 0.05$)؛ (**$p < 0.01$)



شکل ۲,۱۷. میانگین تعداد حروف به‌دست‌آمده توسط هر نوع سؤال (پایین) در قبل و بعد از آموزش (الف) قبل از آموزش، سؤالات باز و جهت‌دار اطلاعات بیشتری را نسبت به سؤالات هدایت‌کننده به دست آوردند ($p < 0.01$). سؤالات جهت‌دار اطلاعات بیشتری نسبت به سؤالات بسته به دست آوردند ($p < 0.01$). سؤالات بسته اطلاعات بیشتری نسبت به سؤالات هدایت‌کننده به دست آوردند ($p < 0.01$)
(ب) پس از آموزش، سؤالات باز اطلاعات بیشتری را نسبت به سؤالات جهت‌دار ($p < 0.05$)، سؤالات بسته و سؤالات هدایت‌کننده ($p < 0.05$) به دست آورد. سؤالات جهت‌دار اطلاعات بیشتری نسبت به سؤالات بسته و هدایت‌کننده به دست آوردند ($p < 0.01$). سؤالات بسته اطلاعات بیشتری نسبت به سؤالات هدایت‌کننده به دست آوردند ($p < 0.01$).



شکل ۳,۱۷. دیدگاه حرفه‌ای‌ها دربارهٔ اطلاعاتی که باید جمع‌آوری شود (بالا) و اطلاعاتی که باید بیان شود (پایین)
** $p < 0.01$



شکل ۴,۱۷. ارزیابی شهادت کودک در وضعیت سؤالات باز و سؤالات بسته

** $p < 0.01$

Fulcher G (2004) Litigation-induced trauma sensitisation (LITS): a potential negative outcome of the process of litigation. Psychiatry Psychol Law 11(1):79–86

Home Office (1992) Memorandum of good practice on video recorded interviews with child witnesses for criminal proceedings. The Stationery Office, London

Lamb ME, Fauchier A (2001) The effects of question type on self-contradictions by children in the course of forensic interviews. Appl Cogn Psychol 15(5):483–491

Lamb ME, Orbach Y, Hershkowitz I, Esplin PW, Horowitz D (2007a) A structured forensic interviewprotocol improves the quality and informativeness ofinvestigative interviews with children: a review of research using the NICHD Investigative Interview Protocol. Child Abuse Negl 31(11–12):1201–1231

Lamb ME, Orbach Y, Hershkowitz I, Horowitz D, Abbott CB (2007b) Does the type of prompt affect the accuracy of information provided by alleged victims of abuse in forensic interviews? Appl Cogn Psychol 21(9):1117–1130

Lamb EM, Hershkowitz I, Orbach Y, Esplin PW (2008) Tell me what happened: structured investigative interviews of child victims and witnesses. Wiley, Hoboken

Lamb ME, Malloy LC, Hershkowitz I, La Rooy D (2015) Children and the law. In: Lamb ME, Lerner RM (eds) Handbook of child psychology and developmental science: socioemotional processes. Wiley, Hoboken, pp 464–512

Ministry of Health, Labor, and Welfare(2013) Kodomo gyakutai taiou no tebiki (Heisei 25. 8 kaisei) [On the guideline of how to respond to child abuse. Revised in August, October 8th, 2013].

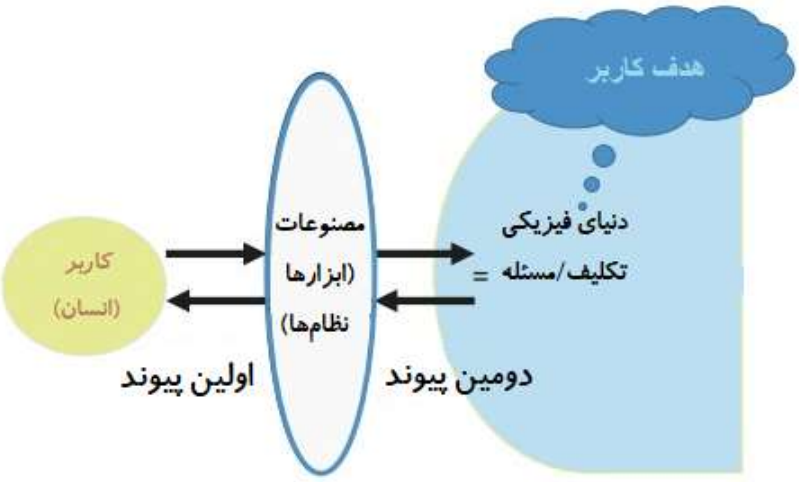
Ministry of Health, Labor, and Welfare (2015) Kodomo no shinriteki hutan tou ni hairyosita mensetsu no torikumi ni muketa keisatsu kensatsu tono saranaru renkei kyouka nit suite (Heisei 27, Oct 8th) [Strengthening further collaboration with police agency and prosecutor office to accomplish the interviews with children considering their psychological burden. Oct 8th, 2015]

http://www.moj.go.jp/keiji1/keiji10_00006.html

Ministry of Justice, U.K (2011) Achieving best evidence in criminal proceedings: guidance on interviewing victims and witnesses, and

guidance on using special measures https://www.cps.gov.uk/publications/docs/best_evidence_in_criminal_proceedings.pdf
Naka M (2011) The effect of forensic interview training based on the NICHD structured protocol. Jpn J Child Abuse Negl 13(3):316–325. (In Japanese)
Naka M (2012) The effect of different ways of interviewing on children's reports and subsequent memories of an eye-witnessed event. Jpn J Psychol 83(4):303–313. (In Japanese)
Naka M (2013) Lay judges' evaluation of a child interview: effects of how a child talks and camera perspectives. Paper presented at International Investigative Interviewing Research Group (iIIRG), Maastricht, the Netherlands, July 3–5, 2013
Naka M (2014a) A training program for investigative interviewing of children. In: Bull R (ed) Investigative interviewing. Springer, New York, pp 103–122
Naka M (2014b) Information to deal with in forensic interviews: practitioner's view before and after the training. Paper presented at international congress of applied psychology, Paris, France, 10 July 2014
Naka M (2015) Interviews with victims and witnesses of crime in Japan: research and practice. In: Walsh D, Oxburgh GE, Redlich AD, Myklebust T (eds) International developments and practices in investigative interviewing and interrogation, volume 1: victims and witnesses. Routledge, London, pp 43–57
Naka M(2016a) Where developmental psychology meets law: forensic interviews with alleged child victims and witnesses. In Japan Society for Developmental Psychology (ed) Frontiers in developmental psychology research: Japanese perspectives. Hitsuzi Shobo, Tokyo, pp 251–264
Naka M (2016b) The development of forensic interviews: towards the multi-disciplinary team approach. Hou to Shinri 16(1):24–30. (in Japanese)
Naka M (2017) Rokuon rokuga mensetsu ni okeru kodomo no kyojutsu: Shitsumon no shikata, camera perspective, senmonka shogen ga shinyosei handan ni oyobosu kouka. In Ueishi K, Otsuka H, Musashi K (eds) Gendai Nihon no Houkatei. Shinzansha, Tokyo, pp 345–368
[Videotaped child testimony: effects of question type, camera perspective, and expert testimony on the credibility judgment. In Ueishi K, Otsuka H, Musashi K (eds) Legal processes in modern Japan. Shinzansha, Tokyo, pp 345–368]
National Police Agency (2015) Jidou wo higaisha tou to suru jian heno taiou ni okeru kensatsu oyobi jidou soudansho tono saranaru renkei kyouka nit

suite. (October 28, Heisei 27). [Strengthening further collaboration with Child Guidance Centers and Prosecutors Office in response to the cases of child victims (October 28, 2015)] http://www.moj.go.jp/keiji1/keiji10_00006.html
Orbach Y, Lamb ME (2001) The relationship between within-interview contradictions and eliciting interviewer utterances. Child Abuse Negl 25(3):323–333
Schacter DL, Kagan J, Leichtman MD (1995) True and false memories in children and adults: a cognitive neuroscience perspective. Psychol Public Policy Law 1(2):411–428
Shing YL, Werkle-Bergner M, Brehmer Y, Müller V, Li SC, Lindenberger U (2010) Episodic memory across the lifespan: the contributions of associative and strategic components. Neurosci Behav Rev 34(7):1080–1091
Supreme Public Prosecutors Office (2015) Keisatsu oyobi jidou soudansho tono saranaru renkei kyouka nit suite (Oct 28, Heisei 27) [Strengthening Further collaboration with Police Agency and Child Guidance Centers (October 28, 2015)]



شکل ۱,۱۸. مدل مهندسی شناختی: نظریهٔ پیوند دوگانه (سایکی ۱۹۸۸)

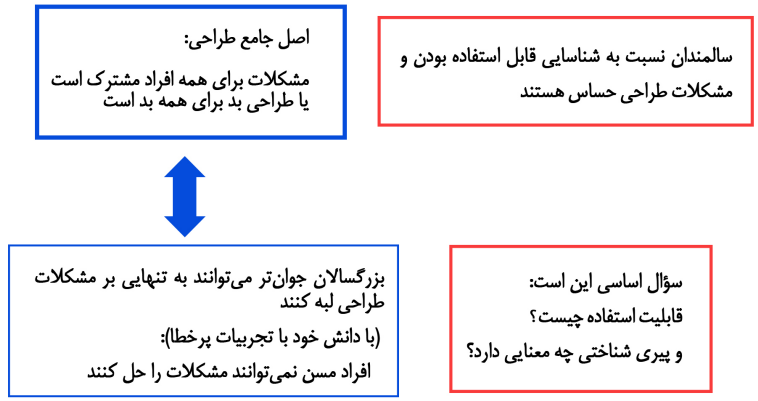
۳. فراشناخت دو نگرش‌ها / راهبردها و تنظیمات هدف
– شامل عوامل فرهنگی/ اجتماعی
– مؤثر نگه داشتن خود به‌عنوان هدف اجتماعی

۲. کمبود دانش/ مدل‌خای ذهنی
– به‌خصوص فقدان مفهوم اطلاعات

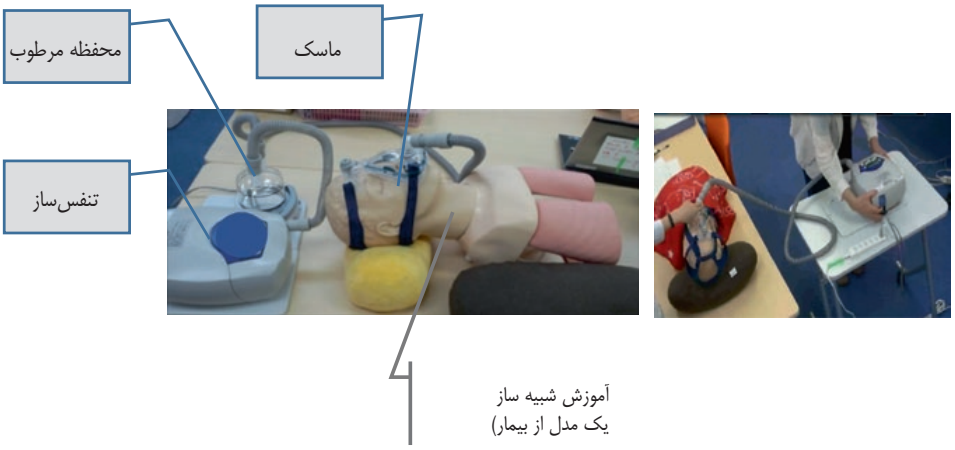
۱. تغییر/کاهش در عملکردهای شناختی
– به‌ویژه کاهش بازداری یا مهار و/ کاهش سرعت

۰. کاهش عملکردهای ادراکی/ فیزیکی
– تأثیر بر شناخت از طریق تلاش بیشتر

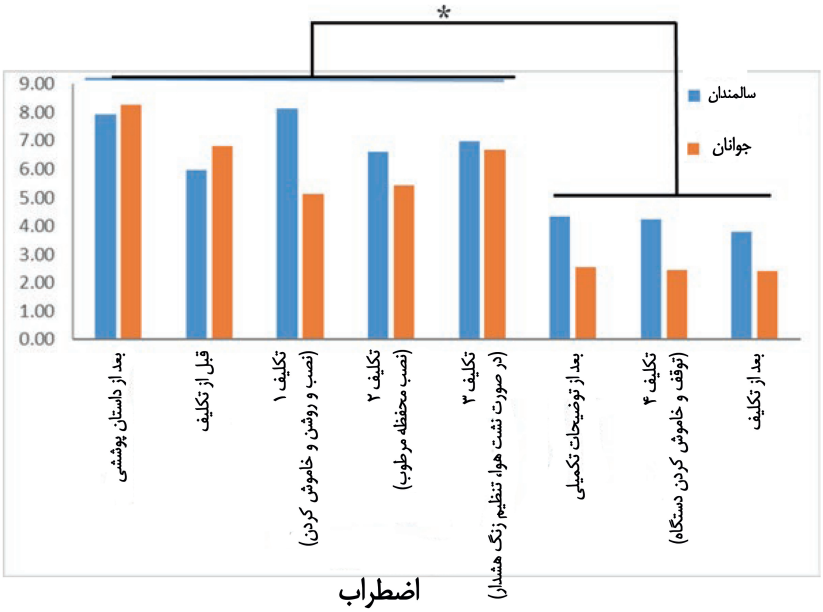
شکل ۲,۱۸. منابع فرضی مشکلات پیری شناختی در استفاده از تجهیزات فناوری اطلاعات: یک مدل چهارلایه (هارادا ۲۰۰۹)



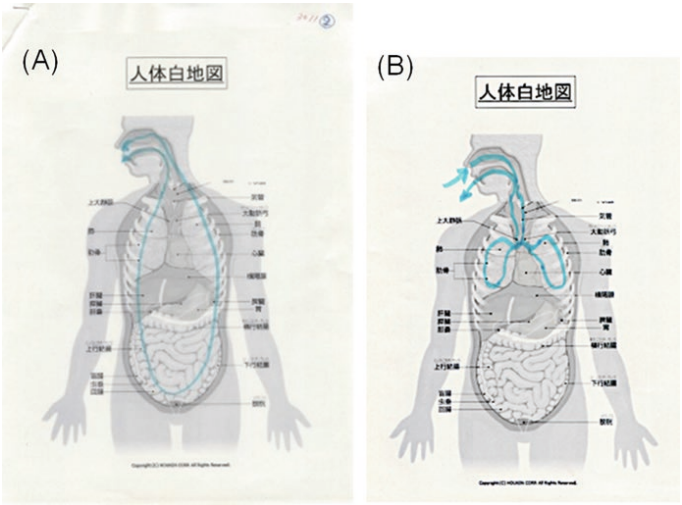
شکل ۳,۱۸. جوانب دوگانهٔ سالمندی و قابلیت استفاده



شکل ۴,۱۸. صحنهٔ آزمایش قابلیت استفاده یک دستگاه تنفسی از نوع NPPV (تهویه با فشار مثبت غیرتهاجمی)



شکل ۵،۱۸. ارزیابی ذهنی اضطراب: هیچ اختلاف سنی وجود ندارد و شرکت‌کنندگان فقط پس از تکمیل همهٔ تکالیف، اضطرابشان کاهش یافت (هارادا و اویچی ۲۰۱۴)



شکل ۶،۱۸. نمونه‌هایی از ترسیم (خطوط آبی روی نمودار) در حین توضیح «تنفس».
(الف) هوا به‌سمت «شکم» پایین می‌رود، (ب) الگوی معمول نقاشی بزرگ‌سالان جوان‌تر

Anderson ND, Craik FIM (2006) The mnemonic mechanisms of errorless learning. Neuropsychologia 44(14):2806–2813
Barber SJ, Mather M (2013) Stereotype threat can both enhance and impair older adults' memory. Psychol Sci 24(12):2522–2529
Chasteen AL, Bhattacharyya S, Horhota M, Tam R, Hasher L (2005) How feelings of stereotype threat influence older adults' memory performance. Exp Aging Res 31(3):235–260
Craik FIM (1986) A functional account of age differences in memory. In: Klix F, Hagendorf H (eds) Human memory and cognitive capabilities: mechanisms and performances. North-Holland, Amsterdam, pp 409–422
Craik FIM, Salthouse TA (eds) (1992) The handbook of aging and cognition. Lawrence Erlbaum Associates Publishers, Mahwah
Craik FIM, Salthouse TA (eds) (2000) The handbook of aging and cognition, 2nd edn. Lawrence Erlbaum Associates Publishers, Mahwah
Craik FIM, Salthouse TA (eds) (2008) The handbook of aging and cognition, 3rd edn. Psychology Press, New York/Hove
Ericsson K, Simon H (1993) Protocol analysis: verbal reports as data, 2nd edn. MIT Press, Boston. ISBN 0-262-05029-3
European Commission. (2012). Proposal for a regulation of the European parliament and of the council, p 9. http://ec.europa.eu/justice/data-protection/document/review2012/com_2012_11_en.pdf
Folstein MF, Folstein E, McHugh PR (1975) "Mini-mental state". A practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res 12(3):189–198
Harada ET, Akatsu H (2003) Usability for old users. In: Harada ET (ed) Cognitive studies of human-artifacts interaction: what is 'usability?'. Tokyo, Kyoritsu-syuppan, pp 119–138. (In Japanese)
Hara N, Naka T, Harada ET (2009) How can we make IT appliances easy for older adults? Usability studies of Electronic Program Guide system. In: Maurtua I (ed) Human-computer interaction. In-Tech, Rijecka, pp 369–388
Harada ET (2008) Problems in memory in modern society. In: Ohta N (ed) Psychology of human memory, pp 208–221. (in Japanese) (現代社会における記憶の問題.太田信夫(編著) 記憶 の心理学(放送大学教材) 放送大学教育振興会)
Harada ET (2009) What do cognitive aging studies tell us? Some implications from aging investigations on human memory and cognitive engineering

studies. Jpn Psychol Rev 52(3):383–395. (In Japanese with English abstract)
Harada ET, Hashimoto E (2016) Understandablity of signboard direction and ageing: the universal design principle is there. Paper presented at the 31st international congress of psychology. Yokohama, Japan
Harada ET, Oishi Y (2014) Robustness of crystallized intelligence: ageing effects on the process to use knowledge. Paper presented at the 31st annual meeting of the Japanese cognitive science society
Harada ET, Suto S, Asano A (2012) Error repetition phenomena and its relation to cognitive control, memory and ageing: why does it happen outside the psychology lab? In: Naveh-Benjamin
M, Ohta N (eds) Perspectives on human memory and aging. Psychology Press, New York, pp 49–67
Hasher L, Zacks RT (1988) Working memory, comprehension, and aging: a review and a new view. In: Bower GH (ed) The psychology of learning and motivation, vol 22. Academic Press, New York, pp 193–225
Ikai S (2010) The theory of the hospital century. Yuhikaku, Tokyo. (in Japanese, 猪飼周平,病院の世紀の理論,有斐閣)
Kaiho H, Harada ET (1993) Introduction to verbal protocol analysis: reading from uttered data. Tokyo, Shin-yo-sha. (in Japanese: 海保博之・原田悦子編(1993).『プロトコル分析-発話データから何を読むか』新曜社)
Mather M, Carstensen LL (2005) Aging and motivated cognition: the positivity effect in attention and memory. Trends Cogn Sci 9(10):496–502
McCoy SL, Tun PA, Cox LC, Colangelo M, Stewart RA, Wingfield A (2005) Hearing loss and perceptual effort: downstream effects on older adults' memory for speech. Q J Exp Psychol A 58(1):22–33
Norman DA (1991) Cognitive artifacts. In: Carroll JM (ed) Designing interaction: psychology at the human-computer interface. Cambridge University Press, New York, pp 17–38
Ophir E, Nass C, Wagner AD (2009) Cognitive control in media multi-taskers. Proc Natl Acad Sci USA 106(37):15583–15587
Salthouse TA (1991) Theoretical perspectives on cognitive aging. Lawrence Erlbaum Associates. Inc., Hillsdale
Sayeki Y (1988) Information processing between human and machine: an introduction to cognitive engineering. In: Takeuchi K (ed) Semantics and informatics. Tokyo University Press, Tokyo. (in Japanese, title translated

by the authors) Schaie KW (1994) The course of adult intellectual development. Am Psychol 49(4):304–313
Suto S (in press) Cognitive psychological view on usability of home-use medical equipment and ageing: a case report. In: Harada ET (ed) Cognitive psychology for better medical care. Seishin Shobo. Co., Tokyo
Suto S, Harada ET, Tanaka S, Adachi Y, Hine K (2014) When older adults met tablet computers: a study of learning process to use newly innovated equipment by young - and older adults. Cogn Stud 21(1):62–82. (in Japanese, with English abstract)
Tanaka S, Harada ET (2016) Older adults' timidness to use new artifacts: analyzing human-artifact interaction in experimental lab and in community activities. Trans Hum Interface Soc 19:1–12
Tanaka S, Harada ET, Fujiwara K, Suto S (2017) Constructing a scale of timidity to use artifacts for healthy older adults. Tsukuba Psychol Res 53:41–50
Verhaeghen P, Steitz D, Sliwinski M, Cerella J (2003) Aging and dual-task performance: a metaanalysis. Psychol Aging 18(3):443–460
Wingfield A, Tun PA, McCoy SL (2005) Hearing loss in older adulthood: what it is and how it interacts with cognitive performance. Curr Dir Psychol Sci 14(3):144–148