March 7, 2026

{Memory}

Language is not needed it to perceive information and create memories, but it would be impossible without those memories.[1] [2] [3]

{Plato}

The Greek philosopher Socrates (469-399 BCE) saw memory as a gift from Mnemosyne, mother of the Muses, on which people could record what they wanted to remember and could be erased or fade away.[4] His student Plato (427–347 BCE) likened memory to a block of wax in our souls on which impressions are made.[5] Their images are apt metaphors for the current study of "synaptic plasticity" to describe actual changes in the brain by which we remember and learn.[6] [7]

{Neurons, Synapses, and Neural Circuits}

Our brains have an estimated 86 billion neurons, special nerve cells that receive, process, and store information. Synapses are junctions in the gaps between neurons with which neurons communicate with electrical and chemical signals. Each neuron might have between a few to many thousands of synaptic connections, with perhaps more than a trillion in the average human brain.[8] [9]

Neurons are organized into neural circuits, ensembles of cells define by their synaptic connections[10] [11] [12] that dynamically adjust to the strength and frequency of the electrochemical transmissions with physical changes that modify the strength and durability of syntactic junctions. This "syntactic plasticity" underlies our cognitive functions including learning, memory, and decision-making.[13] [14] [15] [16]

{Sensory Registers}

We can only recall what has been preserved, and memory is created through a process that begins with ingestion of stimulus that is ingested through dedicated neural networks for each of our five senses of sight (iconic), sound (echoic), smell (olfactory), taste (gustatory), or touch (haptic)[17] [18] [19] [20] at a rate of about billion bits per second.

The vast majority of sensory intake is devoted to subconscious regulation of necessary body functions such as breathing, heart rate, sleep, and digestion.[21] [22] [23]

However, this discussion is focused on neural networks devoted to the cognitive functions of learning, preserving that information in memory, and recalling information when it is needed for planning and decision making.[24]

{Short-Term Memory}

Within milliseconds[25] [26] those signals either decay or are passed along to short-term and working memory where they might be retained for 15 to 30 seconds while being evaluated and categorized for use in cognitive tasks such as learning, reasoning, comprehension, and decision making.[27] [28] [29] [30] In both short-term and working memory these sensory signals are blended in a supramodal manner[31] [32] when being processed at a rate of only 10 bits per second.[33] [34] [35]

{Rehearsal}

Retention in short-term and working memory can be extended through "rehearsal" (also called "maintenance rehearsal" and "rote rehearsal") by recurrent repetition.[36] [37] [38] [39]

{Long Term Memory - Memory Consolidation}

Some of the information fed into short-term and working memory is encoded into long-term memory reorganization and system consolidation in a more stable form that is resistant to decay.[40] [41] [42] [43] [44] [45]

{Retrieval Cues}

This process also stores retrieval cues that assist in recalling information when it might be useful.[46]

{Lexical Repertoire? / Linguistic Repertoire?}

Every person has unique and constantly changing cognitive and linguistic repertoires assembled from the information learned through the informal and formal interactions in the information environment to which they are exposed.[47] [48] [49] [50]

{Totality of Human Memory}

The sum of all individual cognitive repertoires constitutes the totality of human memory, and access to this priceless treasure should be the goal of anyone involved in designing the ultimate information environment.

{Information Environments}

Information environments are the interfusion of knowledge resources, communication modalities, and social standards shared by individuals and communities. They dynamically with social, political, technological innovation as well as circumstances.[51] [52] [53] [54]

Memory is one of the crucial components of all information environments.

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