Hyperthymesia: The Gift of Total Recall

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The capacity for exceptional memory can take several forms.

Hyperthymesia

Hyperthymesia or hyperthymesitic syndrome is superior autobiographical memory, the type of memory that forms people's life stories. The term thymesia is derived from the Greek word thymesis, meaning "memory".

The capabilities of the affected individuals are not limited to recalling specific events from their personal experience. Hyperthymesia has both enhanced autobiographical and episodic memory There are two important characteristics of hyperthymesia:

Persons with the syndrome spend much of their time thinking about their pasts.
Persons with the syndrome have an unusual, amazing capacity to remember as well as recall any specific personal events or trivial details, including a date, the weather, what people wore on that day, from their past.

Unlike other people with advanced memory abilities, such as autism or savant syndrome (who tend to use calendrical calculation), individuals with hyperthymestic syndrome rely heavily on their personal "mental calendar", which is an automatic and obsessive process. Moreover, individuals with hyperthymesia do not focus on practiced mnemonic strategies. For example, "AJ", who has the first documented case of hyperthymesia, has difficulty consciously applying her memory strategies to help her memorize new knowledge, making her rote memorization abilities about average.

Neuroscience

Because it is a recently discovered memory capability, neuroscientific explanations of hyperthymesia are scarce. McGaugh, who coined the term, provides mostly speculation in "A Case of Unusual Autobiographical Remembering". He suggests that "AJ"'s superior autobiographical memory is largely the result of specific impairments rather than enhancements. Her sensitivity to cues that trigger her memories suggest that "AJ" has trouble inhibiting episodic-retrieval mode, which is the neurocognitive state required for present stimuli to be interpreted as memory cues. Because she is unable to "turn off" her retrieval mode, the smallest associations may bring on detailed recollections of "AJ"'s past.

Inhibition in itself is a type of executive functioning, thought to be associated with the right inferior frontal cortex. Although "AJ" is not autistic, McGaugh and colleagues note that she shares some of the executive-functioning deficits that occur with autism. These deficits, along with anomalous lateralization and "AJ"'s obsessive-compulsive tendencies, point to a neurodevelopmental

frontostriatal disorder common in autism, OCD, ADHD, Tourette's syndrome, and schizophrenia. The frontostriatal system is made up of the dorsolateral prefrontal cortex, lateral orbitofrontal cortex, cingulate, supplementary motor area, and associated basal ganglia structures.

Cases

There are 6 true cases of hyperthymesia that have been confirmed worldwide. Cases of hyperthymesia differ from related cases of savant memory in that savants have an extraordinary memory for specific hobbies, and events of a narrow basis, whereas cases of confirmed hyperthymesia show surprisingly detailed memory for specific and general events. One example is the case of AJ (revealed, since May 2008, to be the school administrator Jill Price) who, given any date in history, can recall what the weather was like on said date, personal details of her life at the time, and other news events that occurred at that time. Details of what AJ recalls may be significant to her in some way, but they may not. Personal meaning does not seem to affect AJ's memory - she simply recalls everything. Brad Williams, another confirmed case of hyperthymesia, displays similar remarkable memory abilities. For example, when shown a photograph from his past Brad can recall the date it was taken, where it was taken, what he had done that day, and even more detailed information such as the temperature on said day. Rick Barron has also been diagnosed with hyperthymesia and shares the same superior abilities of AJ and Brad. Individuals with hyperthymesia clearly have a superior degree of recall ability.

Drawbacks

AJ, one of the most famous cases of hyperthymesia, describes her memory as a "running movie that never stops". She views the world in "split screen," with the past constantly playing at the same time as the present. She explains that although, "most have called it a gift," she calls it a "burden." AJ's superior memory does not seem to be due to a desire to apply memorizing techniques, her memorization of autobiographical information is non-conscious. It is possible that AJ's memory could stem from the traumatic experience of having her family move when she was 8, at which point she began to "organize her memories" and think about the life she had left behind a great deal. AJ reports years of migraines lasting from childhood into her late thirties. She had other health problems (sore throats and ear infections) in childhood, as well as being on medication for anxiety for many years, and a long period of depression in her mid to late twenties. She battled insomnia up until her thirties and complains of various phobias.

Eidetic memory

Eidetic memory, photographic memory, or total recall refers to the ability of an individual who can accurately recall a large amount of images, sounds and objects in an unlimited volume. Eidetic has

a meaning of "related extraordinarily detailed and vivid recall of visual images" in Greek. The term eidetic memory can become more clinical when the memory experts use the picture elicitation method to detect the ability. In the picture elicitation method, children are asked to study an image for approximately thirty minutes, and then the researchers remove the picture, it has been found that children with such ability are able to recall the image with perfect accuracy after the picture has been removed. It has been suggested that children with eidetic memory can maintain the image in their memory as vividly as if it were still there.

Criticism

Marvin Minsky has argued in his book The Society of Mind that the reported cases of eidetic memory should be considered as "unfounded myth". This view was supported by an experimental study conducted by psychologist Adriaan de Groot. The experiment was intended to investigate chess Grandmasters' ability to memorize positions of chess pieces on a chessboard. When those chess experts were provided with arrangements that were inconsistent with a real chess game, their performance was about the same as non-experts. These results indicate that the eidetic ability of those chess Grandmasters' were not innate, but a learned strategy with certain types of information. Also Wilding and Valentine held a search for people claiming to have an eidetic or otherwise superior memory via public media. Out of the 31 people who called in only three actually had a significantly above-average memory - and none of those three had an eidetic memory.

Further cause for skepticism is given by a non- scientific event: The World Memory Championships. Held since 1991, this is an annual competition in different memory disciplines and is nearly totally based on visual tasks (9 out of 10 events are displayed visually, the tenth event is presented by audio). Since the champions can win interesting prizes (the total prize money for the World Memory Championships 2010 is $90,000), it should attract people who can beat those tests easily by reproducing visual images of the presented material during the recall. But indeed not a single memory champion ever reported to have an eidetic memory. Instead without a single exception all winners consider themselves mnemonists (see below) and rely on using mnemonic strategies, mostly the method of loci.

Cases

Cases of eidetic memory have been reported for generations, with a 1970 study on a woman named Elizabeth being called the most convincing documentation yet. Elizabeth's memory was extraordinary in that she could see an image once and retain it in memory for years to come. The classic study of Elizabeth's memory documents her writing out poetry in a foreign language, of which she had no prior knowledge, years after seeing the original text. This suggests that Elizabeth's memory retained the image of the foreign words vividly enough to recall years later.

Reports also suggest that Elizabeth's memory was so vivid that she could obscure other parts of the present visual field with these past memories. However, Elizabeth remains the only person to have passed such a test, and the credibility of the findings about Elizabeth are highly questionable given that the researcher married his subject, and the tests have never been repeated. Elizabeth refused to repeat them. The study fueled strong skepticism about studies of eidetic memory for several decades thereafter. Recently there has been a renewal of interest in the area, with more careful controls, and far less spectacular results.

Andriy Slyusarchuk, a Ukrainian professor from Lviv, has been reported to have memorized up to 30 million places of pi. Although he did not recite them all, the reports stated that he could recite any randomly selected sequences.

Unusual cases of eidetic memory include: Sergei Rachmaninov, a composer and pianist can recall a musical score after sight reading twice, savant Stephen Wiltshire is able to draw a skyline in detail after a single helicopter ride, and philosopher Swami Vivekananda was able to memorize ten volumes of the encyclopedia in only a few days. Many more cases of eidetic exist are claimed, but mostly unfounded (see above).

Drawbacks

Eidetic imagery can be so vivid as to mimic actual perception of stimuli, which can be much like a hallucination. Some researchers of eidetic imagery have proposed a link between this ability and psychosis, such as in schizophrenic populations.

Mnemonists

Mnemonist is derived from the term mnemonic, it refers to the individuals with the unusual ability to recall long lists of information including names, numbers, etc. It has been suggested that individuals with such ability may possess eidetic memory. However, although it is not uncommon that such individuals frequently become the subjects of scientific studies, it still remains controversial on whether such ability is inborn or acquired it through learning. A mnemonic device is said to be a memory aid that used to help an individual remember and recall information. Mnemonic devices are usually verbal, such as a special phrase or word or a short poem that individuals are familiar with.

Each individual has two types of memory, one is "natural memory" and the other one is "artificial memory". Mnemonic strategy is said to help develop artificial memory through learning and practicing memory techniques.

Common mnemonics for memorizing lists of words is through the use of acronym, which is the

abbreviation that consists of the initial letter in a phrase or word. For example, HOMES is often used to help remember the names of the Great Lakes of North America. Most techniques for memorizing numbers involve turning the numbers into visual images that are then placed along points of an imaginary memory journey. The mind has difficulty remembering abstract concepts like numbers, but can easily remember visual images. The imaginary memory journey orders the images in the correct sequence. One of the most common techniques for converting numbers into visual images is the Mnemonic major system.

Neuroscience

No structural differences have been found in the brains of accomplished memorists, who have achieved superior memory with the practiced use of mnemonic devices. One study that sought to locate the neural differences between these and people with typical memory abilities using fMRI, was unable to find any differences. For memorists, the right cingulate cortex, ventral fusiform cortex, and left posterior inferior frontal sulcus were more active for digit span memorization (a feat memorists are often very good at). However, all superior memory participants reported the use of mnemonics.

Cases

One well known case of excellent recall ability is the case of Solomon Shereshevskii also known as "S". "S" suffered from synaesthesia, a condition in which the stimulation of one sense prompts a reaction in another sense. He had the unique ability to recall almost everything he heard or saw. There are several reports of "S" recalling a speech word for word without taking notes along with his peers. "S" is one well known case of superior recall.

Another interesting case of recall is of the subject S.F., who began testing with an average intelligence and average memory capabilities. With the use of mnemonic strategies (practice sessions in the laboratory) he was able to increase his digit span from 7 to 79. Using mnemonics for memory recall may also have played a part in Akira Haraguchi's world record citation of mathematical pi. Cases such as these suggest that superior memory can be achieved with the proper mnemonic techniques.

Also all competitors of the annual World Memory Championships name mnemonic strategies the source for their performances (including performances like memorizing a list of more than 2000 digits in an hour, 280 words in 15 minutes or the order of a deck of cards in under 25 seconds).

Drawbacks

Solomon Shereshevskii or 'S', was viewed by peers as disorganized and unintelligent. His extreme

case of synesthesia, causing highly detailed and recallable memory traces, made understanding abstract concepts not based on sensory and perceptual qualities very difficult for him. His personal life is described as being lived in a "haze," and eventually he was confined to a mental institution because of the burden of his exceptional abilities. But S is a rare exception and drawbacks are not normally associated with the acquisition of an exceptional memory by using mnemonics.

Savants

Savant syndrome, also known as savantism, is a condition in which individuals with a developmental disorder are exceptional in one or more areas.

Neuroscience

Autism spectrum disorders (ASD) are characterized by difficulties in reciprocal social behaviour and communication, stereotyped patterns of behaviour, and restricted interests. They are also associated with typical and atypical functioning in memory. Structural abnormalities have been found to affect the hippocampus, with the perirhinal, entorhinal, and parahippocampus less affected (these are areas in the medial temporal lobe outside of the hippocampus). The hippocampus is thought to be involved in domain-general relational processes, with surrounding areas mediating more domain and item-specific and contextual processing. This is consistent with observed memory effects of ASD which shows superior low-level and item-specific processing, at a cost of having impairments in higher level relational processes.

One example found in the literature is J.S., with high functioning autism. J.S. has no episodic memory (which is highly associative or relational in nature) and must rely on memorizing facts. He will memorize entire conversations, so as to remember even general content later. He also remembers events by memorizing A-B-C predicates - item-specific memory with a memorized (specific) association connecting them.

Cases

Savant syndrome is elaborate abilities (including memory) in specialized areas such as a hobby or event, or a certain type of information. One of the most well known cases of savant memory is Kim Peek, the man on which the movie Rain Man was based. Peek has a reported savant memory for most information, not just specialized pieces, and was able to memorize large pieces of information from the age of 16 months. Tony DeBlois and Derek Paravicini also show superior memory for music. Deblois can play 8000 songs from memory on 20 different instruments, and Paravicini can play a piece of music after only hearing it once. Another case of savant memory is that of Richard Wawro. Wawro is known for his paintings of landscapes and seascapes, all done in elaborate

detail. What is interesting about Wawro's art is that he paints from seeing a scene only once and does not use a model. His memory for the scene is so elaborate that he can also report where he drew the picture and when. Similarities across cases indicate that savant memory may be similar to eidetic memory.

Drawbacks

Autistic individuals are more likely to have savant skills, the obvious drawback here being autism itself. Most cases of calendrical calculation involve individuals with IQ's that are below average. Autism spectrum disorders contain criteria for diagnosis based on difficulties with social behaviour and communicating with others, amongst other debilitating criteria Researchers have proposed two hypotheses to explain how autistic individuals may develop advanced skills; the first is the obsession with constricted areas of interest (a common symptom of autism) and central coherence. Central coherence is a style of cognitive processing indicative of an autistic individual, which involves a focus on local features during processing. Researchers feel that this style of processing may aid in the increase of savant skills, but this style also sacrifices global processing in the process.