The as the ability to focus one’s mind

Thehuman mind’s capacity to perform cognitive tasks hugely depends on theselective functions of attention as well as the ability to retain informationthrough memory. The areas of the brain responsible for one’s attentive abilityare the prefrontal cortex and the parietal cortex. The areas securing thefunctioning of one’s memory are the hippocampus and the amygdala, located inthe frontal portion of the temporal lobe. There are many different approachesto measuring both of these characteristics of the cognitive functions. Thesetests are usually tasks which require behavioral reactions to changes that arevisualized on a screen. For example, the tests assessing attention are thePsychomotor Vigilance Test, the Change Blindness test as well as the Dot Probe. In addition, the N-back, the Delayed Free Recall and the Eyewitness Recalltests are used to evaluate one’s capacity to store, retain and recallinformation. However, there are certain mental states that satisfy a criteriafor memory impairment and can be categorized as different types of dementia.

Onthe other hand, damages to parts of the brain responsible for attention arebound to cause diseases manifested with an attention deficit (along withadditional disruption of the impulse control mechanisms). IntroductionTheability to process and encode information (attention) as well as subsequentlystoring it (memory), is essential for the way we shape the narrative of ourlives due to attention and memory being very important aspects of ourcognition. AttentionAs a vitalcharacteristic of our cognitive capacity, attention can be referred to as theability to focus one’s mind into concentrating on only one aspect of one’ssurroundings, simultaneously

disregarding other things. One of the most basiccharacteristics attention has is the fact that it is limited in its potentialas well as duration.

The other two attributes of attention are that it isselective (as mentioned before, the ability of focusing on one particular thing)and plays a big part in the cognitive system. The two brainareas activated when one is paying attention are the prefrontal cortex (this islocated at the front of the brain and is responsible for willful concentration)as well as the parietal cortex (this is found above the occipital lobe and isactivated during a sudden change in the environment). Attention can bemeasured using many tests, including the ‘ Psychomotor Vigilance Test’ (or PVT).

This test activates the prefrontal cortex and can be completed by tapping thespace bar on the keyboard whenever the circle (shown on the computer screen)changes to a number. The ‘ Change Blindness’ test is concluded by counting howmany passes the basketball team (in the video shown) makes. This takes one’sattention off of the moonwalking bear behind the people in the video, meaningthis experiment requires selective attention.

Another experiment measuringone’s attentive capacity is the ‘ Dot Probe’, where one has to press the ‘ F’ or’J’ key on the keyboard once the images on the computer screen disappear (theperson experimented on also has to remember the pictures shown). ADHD An example of oneof the many disorders that have an effect on one’s attentive capacity isAttention Deficit Hyperactivity Disorder (ADHD). ADHD affects children andadolescents and may persist into adulthood. Having ADHD almost curses one with the inability to controlcertain impulses, making it harder to deal with the

obstacles their day-to-daylife sets upon them. The symptoms in children are categorized into threedifferent sections: inattention, hyperactivity as well as impulsivity. However, these symptoms may be altered as the child progresses into adulthood (theseinclude anxiety, procrastination, mood swings and depression). Moderntechnology has evolved so drastically, it is now able to enable us to marvelupon the structure of one’s brain and the changes that come upon it during ordue to the development of a mental illness. For example, MRI scans indicatethat the brains of children with ADHD were 4% smaller than the brains of boysand girls without ADHD.

This means a severely afflicted child suffering fromADHD would have a smaller frontal lobe (responsible for creative thinking andproblem solving) and cerebellum (responsible for controlling and coordinatingthe movements of muscles). Although there isno known cure for ADHD, scientists have discovered that a 20 minute walk wasalmost equivalent to the effect of various drugs (these findings indicate thatnature promotes self-discipline). SchizophreniaAnother exampleof attention deficit takes the form of schizophrenia. This mental disorder isnot only long term, but affects the person in such a way that they lose theability to tell the difference between what is real and what is not. Scientistshave found that attention is distorted in schizophrenic patients when they haveto perform tasks requiring stimuli. As the dysfunction of the frontal andtemporal lobes (as well as the basal ganglia) is one of the characteristics ofschizophrenia, attention is one of the cognitive impairments that lead to apoor performance in attentive tasks. For example, people diagnosed with thedisorder may show signs of distraction caused by hallucinations as well as alack of motivation in completing certain

tasks (they may also show suppressionof verbal responses). MemoryMemory is yetanother fundamental aspect of our cognition and can be interpreted as the waythe mind encodes various aspects of personal experience into many differentforms of representation.

There are ninetypes of memory, these include: semantic memory, episodic memory, proceduralmemory, declarative memory, implicit memory, explicit memory, long-term memory, short-term memory and, lastly, sensory memory. Short-term memoryconsists of three major aspects: a limited capacity (meaning its storage limitsthe number of items it can store to seven), a limited duration (loss ofinformation can be caused by progression of time as well as distraction) and, lastly, encoding (the visual information the occipital lobe stores istranslated into sound). Long-term memory is when the information is alwaysthere, even though there may be some impediments as to how accessible it is(for example, revising for a test a month before it actually is andsubsequently storing the information you need to remember). Sensory memoryretains information (acquired by the five senses of hearing, seeing, smelling, touching and tasting) regarding our surroundings, allowing us to briefly focusour attention on relevant details (an example of this may be hearing anambulance go past while doing homework). Conscious thought is very importantfor explicit memory (which often creates links between different memories). Anexample of this would be recalling who you had dinner with two or three daysago. Implicit memory, on the other hand, is the exact opposite of explicitmemory as conscious thought isn’t needed (remembering song lyrics is an exampleof this).

Declarative memory involves the conscious recall of specific factsand events. For example, knowing your grandad’s birthday. Procedural memory isresponsible for automatic actions (or motor skills such as knowing how to playan instrument), storing information on how to perform basic tasks. Episodicmemory is a unique perception of an event that would be different from someoneelse’s experience of that same event (an example of this may be someone’s firstday at a new school). Lastly, semantic memory consists of concepts that aren’tperceived from one’s own experience but by general knowledge (for example, knowing that the sky is blue or that pure water is clear). The two brainregions responsible for all of these types of memory are the hippocampus (thisis needed in order to form new memories however it only temporarily storesinformation) and the amygdala (responsible for memorizing and responding toemotions, especially fear). Memory can beassessed using many tests, such as the ‘ N-back’. This test assesses short-termmemory and can be completed by pressing the space bar on the keyboard when anumber, which was shown on the computer screen two numbers previously, is shownagain.

The ‘ Delayed Free Recall’ test assesses episodic memory and is concludedby remembering eight items previously placed in front of the person, and thenattempting to recall them about ten minutes later. Lastly, the test thatassesses nearly every type of memory there is (the ‘ Eyewitness Recall’ test) iscompleted whilst watching a video and consequently answering specific questionsabout it. DementiaOne of the majormental illnesses (that lead to an impairment of one’s memory) is called dementia; a disorder known to cause a decline in the ability to perform certainday-to-day

actions. The word itself illustrates symptoms that include moodswings, memory loss and difficulties with problem-solving, language andthinking. Shrinkage of brain tissue (in almost ‘ restricted’ parts of the brain)has been discovered amongst people diagnosed with dementia. However, as thedamage extends to other parts of the brain, symptoms involving a lot of differenttypes of dementia may become more similar.

Alzheimer’sAn example of a type of dementia is Alzheimer’sdisease. The hippocampus (as well as its attached structures) is one of thefirst areas to suffer damage caused by this disease. This results in difficultywith formation of new memories as well as the intake (or encoding) of newinformation. A person diagnosed with Alzheimer’s may even find themselves forgettingwhat they said earlier in the conversation, leading to a large amount ofrepetition. However, they are more likely to remember where they went onholiday as a child. This is because the hippocampus is essential for theretrieval of memories although those made a longer time ago require less of thehippocampus, meaning a damaged one would only effect short-term memory insteadof long-term. The second, later affected area of the brain, is the amygdala, meaning someone with Alzheimer’s is more susceptible to the recall of theemotion they gained at a certain event instead of the event itself. As the disease expands throughout the brain, other areas of the brain (like the lobes) become impaired.

For example, damagecaused to the system responsible for vision in the temporal lobes, would makerecognition of faces and objects much harder. One may even forget who one oftheir family members are (however one may remember them once that family memberspeaks because visual and hearing

routes are separate). In addition, impairmentcaused to the right parietal lobe would provide difficulty in activities suchas navigating stairs. The cortex is affected as well due to becoming thinner, influencing the long-term memory. Overall, one’s whole brain gradually becomessmaller. As a compensation to all of these losses, numerous abilities(especially those acquired in the past) are retained. Skills relying onprocedural memories (for example, playing the violin) are maintained due tobeing stored deeply within the structures of the brain. In Alzheimer’s, skillslike these are known to be sustained the longest.

KorsakoffAnother example of a mental illness involvingmemory loss is Korsakoff’s syndrome; a chronic memory disorder which issubstance-induced (meaning its problems are caused directly by the effects thatsubstances provide). It is known to be associated with excessive intoxicationand thiamine deficiency (thiamine/vitamin B-1 helps brain cells in producingenergy from sugar however when thiamine levels fall too low, the brain cellsare stripped of their ability to generate energy, leading to them stoppingworking properly). The first phase of Korsakoff’s syndrome isknown as Wernicke’s encephalopathy, people experiencing its symptoms usuallysuffer from mental confusion, eye movement disorders and poor motorcoordination (the most fundamental symptom is said to be mental confusion aswell as memory problems). Eye movement disorder is usually caused by paralysisof the muscles which control eye movement itself. This means that if patientsdiagnosed with this were to be tested on, they would find it difficult to movetheir eyes in following some sort of a visual stimulus. Poor motorcoordination, on the other hand, (also referred to as ataxia) would causeproblems with keeping balance while standing or walking. Even though

most of these symptoms have achance of resolving spontaneously, memory disorder still sustains its role as acharacteristic of Korsakoff’s syndrome.

Upon first look, a person diagnosedwith Korsakoff would look quite ordinary due to having the ability to lead a conversation. Individuals with the syndrome are also able to recall incidents taking placeprior to being diagnosed with the disorder as well as recognizing familiarfaces of either friends or family. However, it is nearly impossible for aperson to form new memories. Researchers have also discovered that thesyndrome does not affect one’s implicit memory (as mentioned before, this typeof memory is one that does not require conscious thought). This has maderesearchers want to explore how classical conditioning is involved inremembering specific people.

Classical conditioning is the process in which thelinkage between two stimuli creates a freshly learned response in either aperson or animal. Ivan Pavlov tested this conclusion by ringing a bell prior toserving food to his dogs. After doing this time and time again, he found thatthe dogs salivated when he rang the bell, even if there was no food served. Unfortunately, researchers have also foundthat 80% of the people diagnosed with Korsakoff’s syndrome will nevercompletely recover, meaning they would permanently lose the ability to intakenew information.