

# Good example of essay on use of technology in investigation of cognitive processes...

[Health & Medicine](#)



This paper seeks to establish the use of technology in the investigation of cognitive processes. Cognitive processes are the mental functions of intuition, sensing, feeling and thinking. These functions divide along the lines of; processes of perception and processes of judgment. Sensory and intuitive processes help the brain in perceiving the environment and collecting information. Thinking and feeling processes apply in making appropriate decisions as may be required of the situation.

Owing to the immense value of cognitive Processes to humanity, it is important that they are apparent. The use of technology has changed the manner in which psychology studies happen in relation to cognitive processes.

### **There are various methods used in the investigation of cognitive processes such as;**

1. fMRI (Functional magnetic resonance imaging)
2. PET scan (positron emission tomography scan)
3. MRI (magnetic resonance imaging)
4. CAT (computerized Axial tomography)

The listed methods aid the researcher in identifying the brain sections active during the execution of various cognitive processes. Each method has its advantages and limitations in application, while some methods work better in the study of specific processes than others.

### **FMRI (functional magnetic resonance imaging)**

This method is used in providing an activated three-dimensional picture of the brains it performs certain cognitive processes. The imaging device utilizes the use of oxygen in the body to collect data. Iron ions are a major  
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composition of hemoglobin. This property of blood makes it magnetic. The FMRI utilizes this property in that deoxygenated blood is more magnetic than oxygenated blood. The detection of an increase in deoxygenated blood in specific parts of the brain indicates increased mental/cognitive processes in that part of the brain. When subjects performed certain tasks while, under the observation of an FMRI, the FMRI identifies the brain areas responsible for the execution of the task. In a research conducted in the University of Toronto, the FMRI tested brain activity among young and older by people. The cognitive process tested was memory. Images provided to the participants and asked to use their memory to remember the images displayed from a collection of images. The researchers sought to identify network of the brain area influenced by years of education. the results of the study showed younger participants had a higher rate of recognition of correct images in comparison with, the older participants. Further, the older participants appeared to use different areas of their brain in encoding information to memory in comparison to, the younger participants.

### **PET scan (positron emission tomography scan)**

This scan detects radioactively labeled tracers injected into the body. The activity of the brain manifests by observing blood flows into the brains well as consumption of glucose during thought process. When an area of the brain is active, blood and glucose flows to the area increase due to increased metabolism. The observation of this phenomenon enables researchers to identify which areas of the brain are active during the execution of assigned cognitive tasks. PET scans apply extensively in the study of brain disorders and tumors, and largely in the study of nature of the Alzheimer's disease.

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The New York University School of Medicine researchers have developed PET brain scan computer program. The technology has proven revolutionary as it measures the metabolic activity in the hippocampus, the memory processing area of the brain. They used this technology to study Alzheimer's disease.

Their findings established that there is a reduction in metabolism in the hippocampus, in the early stages of development of the Alzheimer's disease.

A longitudinal study of 53 healthy participants under study for the duration of between 9 to 24 years supports these results.

The findings of the study offer hope for the future in the screening for Alzheimer's disease in patients who do not exhibit signs yet.

## **Magnetic resonance imaging**

Magnetic resonance imaging uses magnetism and radio waves to produce a three-dimension image of the brain. Use of magnetic waves and radio waves rather than x-rays reduces the risk associated with damage of the brain from unwanted exposure to harmful radiation. The MRI has previously found use in the identification of injuries to the brain and tumors. However, the MRI has found use in the study of cognitive processes of the brain by detecting shrinkage in the hippocampus, an area associated with memory. The shrinkage of the hippocampus is a common identifier of Alzheimer's disease. Study conducted by Milner and Scoville (1957), where a patient suffered epileptic seizures after a head injury. After doctors had performed surgery to stop the seizures, tissue from the temporal lobe and the hippocampus removed which resulted in the patient developing anterograde amnesia. This means that the patient only recalled information from early life but could not form new memories. After these developments, an MRI applies in the patient

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study. The findings revealed that the hippocampus, the amygdale as well as areas around the hippocampus showed damage. In this study, the researchers were able to make a correlation between memory and the brain areas associated with it.

In another study conducted in London, among taxi drivers, Maguire established that taxi drivers posses larger hippocampi compared to healthy males who were not taxi drivers. This conclusion indicated that the hippocampus of the drivers aligned accordingly in order to accommodate room to remember routes. The MRI assisted Maguire in observation of brain structures and thus finding a correlation between the cognitive processes of memory to the hippocampus.

### **CAT (computerized axial tomography)**

The computerized axial tomography technique utilizes an X-ray source that rotates around the brain. X-RAY ray detectors on the opposite side of the source record absorption in the brain. This information is then fed unto a computer that produces two and three-dimensional views of the brain. This method finds its use mainly in the structural study of the brain. Dense matter appears as dark regions in the CAT scan; while less-dense matter appears as lighter regions. In this relation, therefore, the CAT scan has found numerous applications in detecting anomalies in the brain before employed advanced methods of imaging. The CAT scan has proven indispensable especially in the developing world due to its availability and low cost of acquisition.

The CAT scan applies in the study of brain structure in identifying individuals with the schizophrenia disease. The CAT scan is useful in the determination of the size of brain ventricles. Individuals with schizophrenia have typical

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fluid filled cerebral ventricles in comparison with un-affected controls. In a study conducted on the size of ventricles in patients suffering from schizophrenia, Gur et al. reported an increase of 16% in ventricular size in patients who never received schizophrenia treatment, against a control of 65 non-affected controls.

It is apparent that the application of technology in the study and correction of cognitive disorders has greatly improved the detection and correction of major cognitive diseases. Technology has also improved our understanding of cognition in man and as such, we are able to appreciate the different functionalities of the human brain.

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