

Attention and change detection psychology essay



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In recent years psychological literature has focused on attention and change detection. This paper examines the several key phenomena that comprise this process. Essentially the premise asserts that we do not see or detect everything that takes place in front of our eyes. Change Detection is based upon two key phenomenon: (1) Inattention blindness and (2) Change blindness. Attention has become more intensively studied in recent years because of its links to cognitive psychology and neuroscience. The paper demonstrates the practical application of attention and change detection from the lens of psychology. Research has indicated that in order to see change you must pay attention to it. (Rensink, R. A. 2002).

CONCEPT OF ATTENTION

Attention may be defined as a subject area within the field of cognitive psychology. As such it refers to a process about targeted information within our environment. It is the concept of awareness of those things that are taking place around you via our senses of sight, sound and sensation. It was the philosopher and Psychologist William James who placed this into better perspective by stating attention is to take control of our mind; the ability to assimilate several objects at the same time and the ability to filter out certain elements to focus on those that matter. (Anderson, J. R. 2004)

Attention is therefore a cognitive process that facilitates concentration whilst being enabled to filter out non-relevant subject matter. In recent years this has received intense research interest within the fields of cognitive psychology and neuroscience. Specific attention being focused on sources of the signals i. e. sensory neurons and relationships between other cognitive functions like memory and vigilance. It has also been linked to the two key

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phenomena of inattentive blindness and change blindness. Attention has been widely studied in school and educational settings looking at the behavioural patterns of children. (Chavajay, P. 1999)

inattentive blindness & change blindness

The two key phenomena of attention are: (1) Inattentive blindness and (2) Change detection. With change blindness researchers have demonstrated that changes can occur in a picture without the observers noticing or being aware of that change. This causes the phenomena of change blindness. The phenomenon of inattentive blindness is the inability to observe a specific stimulus; we are overloaded with lots of different stimuli working simultaneously and as such we cannot be aware of all of them. (Pashler, H. E. 1999)

inattentive blindness

One of the most famous tests for inattentive blindness was the invisible gorilla test. This was carried out by two researchers from the University of Illinois and Harvard University. The participants were asked to study a video clip of a basketball game and to focus on the number of times the ball was passed i. e. Ground and aerial passes. The two groups of people wore black and white T shirts to differentiate themselves. During the clip a woman passes through the scene wearing a gorilla costume . After viewing the participants were asked if they noticed anything out of the ordinary and in most groups 50% of the subjects claimed not to have seen the gorilla. The participant's attention was focused upon counting the complex number of passes and screening out those stimuli considered distracting to the focused effort. (Choi, C. Q. 2013)

Other examples included an airline pilot and his crew focusing on the causes of an unknown flashing light on the aircraft control panel without noticing that they were rapidly approaching the ground resulting in a crash that killed over 100 people. (Ward, T. A. 2004).

change blindness

In the concept of change blindness researchers have demonstrated that even large changes in the confines of a picture can go unnoticed. This particularly where a simultaneous event takes place like a short disruption in visual continuity i. e. a retinal disturbance caused by the eye saccade. (O`Reagan, J. K. 2000).

Research investigations into change blindness have focused upon links with working memory and eye movements. Working memory may be good in the recall of an image but less reliable in relating smaller details as applicable to the image. This is particularly true of a complex image. Our memory can recall the general content of the image but is impeded on recalling smaller levels of detail. This was demonstrated by a study carried out by Rensink O`Regan and Clarke in the 1990`s. They got the eye to focus on a specific image. This was then followed by a blank slide before the image was brought back with a modification. The masking movement of the blank side was aimed at recreating the stimulus of the saccadic movement of the human eye and as such made it difficult for the person to detect the change in the image. (Grimes, J. 1996).

Attention is of paramount importance for the organism (eye) to detect change. In order to enable this a visual stimulus has to be passed through

the eye and passed through to the brain. As such the eye needs to focus or attend on the change that is taking place. Age is also a factor and people over the age of 65 are much more prone to not notice changes in images.

Theoretical aspects

Broadbent described the human processing system and as such the early representation of attention. The important concept of the selective filter that is needed for information processing. He also asserted that the sensory store had a limited capacity to deal with the inputs and it was certain physical characteristics that allowed for stimuli to pass the selective filter. This sometimes created a bottleneck and some stimuli is lost within this process (Friedenberg, J. 2012)

More modern perspectives including the views of Treisman believed that Broadbent's model did not fully explore all of the findings. Essentially instead of the filter Treisman believed humans possessed an attenuator that identified message by the physical properties attached to it as such the messages are perceived but at a lower order of magnitude thus it is received but not really blocked out. These contradicted Broadbent's theory because he asserted that people were incapable of making truly meaningful connections. (Driver, J. 2001).

Deutsch and Deutsch (1963) contrasted with Broadbent's theory in that they assumed that a stage of awareness was only achieved after the decision had been made to address the percept that had already been formed. (Deutsch J. A. and Deutsche, D. 1963). In 1973 Kahneman devised his capacity model of

attenuation which asserted that a person had a limited capacity to perform practical applications (Friedenberg, J. 2011).

change detection

The concept of change detection or change blindness relates to when there is a visual change and that change occurs without being noticed. The concept of an undetected difference between two images. In the example below look at the two images of the Sphinx and the tourists. There appears to be no difference to the two images but if you look more carefully you will see that some trees have been carefully erased behind the head of the Sphinx. The white borders indicate a blank slide that causes a short disruption in visual continuity i. e. a retinal disturbance caused by the eye saccade. It does not really impact the individual other than expose that we do not always see a complete image. Certain levels of detail are often discarded or filtered out as we focus on the important matters of the image. In this case the People and the Sphinx, we are not really concerned with the detail of the backdrop. (Enns, J. T. 2013).

Neuroanatomy of change blindness

Research has indicated that aging, particularly those over age 65, are more vulnerable to aspects of change blindness. It can also be an early indicator to a more serious neurological disorder and the early onset of Alzheimer ' s disease. Dr. A. L. Benton conducted a number of research tests in this area. He conducted a number of experiments that examined different stimuli and the impact on the behaviour of the brain. Benton developed a number of important test scenarios including that of : Benton Visual Retention Test (BVRT) and Line Orientation (JLO) test. (Matthew R. 2009.)

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how individuals may be impacted

Change blindness can impact individuals in real life settings. It may be an early indication of the onset of Alzheimers disease. The condition is related to the PSI gene providing the link to change blindness. (Matthew, R. 2009). Other aspects relate to that of moles that grow over long periods of time and may have the potential to turn cancerous. Most common moles do not turn cancerous but risk does increase with age. (National Cancer Institute, 2012).

Change blindness is rather a remarkable phenomenon and can also be linked to attention deficit. It reveals from a cognitive perspective the limits on conscious awareness and highlights the differences in what we see and perceive. Raising the knowledge of people in this area can help accentuate their awareness and help them to focus on change detection. This improving memory stimulation and helping to eliminate the consequences of awareness. (Ambinder, M. S. 2005)

Practical applications

the eye witness testimony

When a subject is witnessing an attack the focus of attention is centred on the weapon as opposed to looking at the clothes and face of the assailant. As such eye-witness testimonies are not always reliable as stand-alone evidence and may result in wrong convictions. A research study carried out at the University of Leicester focused on participants looking at a video of a burglary and half way through the image of the burglar was changed. 61% of the participants viewing the video failed to notice the identity switch. (Hine, S. 2007).

driving ability

Older drivers are often more prone to accidents than younger drivers. As the older drivers often notice change at a slower rate and this can considerably reduce their response time in terms of changes that impact the driver's central field of vision. This has raised the question of whether there should be an age limit for older drivers in order to reduce car accidents. Research has also shown that the location and relevance of change directly impacts what is observed whilst driving. (Horrey, W. J. 2005)

military commanders

Those station commanders that are viewing many different computer screens at the same time are prone to change blindness. This can be attributed to time delays on screen refresh and the inability to verify changes that have occurred. Improved ergonomics and screen design can help to reduce the incident of error and potential errors in decision making. (Linville, W. 2004).

Inattentional blindness

practical applications

Inattentional blindness results in missing what others see as obvious. It is caused by the limited attention to focus on a specific area and become distracted.

the distracted driver

A driver using a mobile phone in the car misses a red light at a junction and becomes involved in a serious car crash. The brain is analysing the input from the phone and providing responses for the conversation. The driving

becomes a secondary objective and loss of attention occurs in the differentiation of the colours in the traffic lights.

The pilot and the crop circle

A pilot charted a course to look at a new crop circle near Stonehenge. After seeing the site he made a landing to re-fuel before setting off on another trip that co-incidentally took him over the same crop circle site. On the second trip he noticed a second crop circle close to the first site. He swore that it was not there 45 minutes earlier. The more plausible answer being inattentive blindness whilst he was focused upon more important matters in the cockpit and as such he did not notice the second circle. (Carroll, R. T. 2013)

conclusions

The concept of 'Attention' within cognitive psychology is perhaps the key determinant that links change blindness and inattentive blindness. As attention is selective it does not always filter in all of the images within a targeted visual scene. The human brain has a limited capacity of information that it can process at a given time. Equally, this can be easily distracted causing a loss of focus on specific non-key events.

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