Phenomenon of change blindness

The phenomenon of change blindness refers to the extensive finding that people often fail to detect large changes in an object or visual scene. (Rensink, O'Regan & Clark, 1997; Simons & Levin, 1997; Simons and Rensink, 2005). Such a phenomenon has generated a great deal of interest within the discipline of psychology, resulting in a considerable amount of research being conducted in this subject area. Moreover, this subject has led to a whole host of explanations being developed to determine the cause of this phenomenon (Levin & Simons, 1997; Rensink, O'Regan & Clark, 1997; Simons & Levin, 1997; Fernandez-Duque & Thorton, 2000; Landman, Spekreijse & Lamme, 2003; Simons, et. al., 2001; Eysenck & Keane, 2005; Simons & Ambinder, 2005; Simons and Rensink, 2005; Rensink, 2008; Sternberg, 2008). This paper will describe the phenomenon of change blindness and critically evaluate two explanations for this occurrence, with reference to empirical evidence.

As mentioned above, change blindness is the phenomenon whereby individuals regularly fail to detect large changes in a visual scene or an object when suck a task should happen immediately (Levin & Simons, 1997; Rensink, O'Regan & Clark, 1997; Simons & Levin, 1997; Fernandez-Duque & Thorton, 2000; Landman, Spekreijse & Lamme, 2003 Simons, et. al., 2001; Simons & Ambinder, 2005; Eysenck & Keane, 2005; Simons and Rensink, 2005; Sternberg, 2008). Such a phenomenon has been demonstrated to occur during a short interstimulus interval and during a saccade (eye movement) (Grimes, 1996, as cited by Rensink, O'Regan & Clark, 1997, p. 368; Rensink, O'Regan & Clark, 1997), which suggests that change blindness is the result of forgetting or distraction. Levin and Simons (1997)

demonstrated in a naturalistic setting that observers fail to detect instances where central actors in the scene were changed. In addition to this, a saccade study conducted by Grimes (1996, as cited by Simons & Rensink, 2005, p. 368) found that during eye movement observers significantly failed to detect large changes in photographs, such as, changes of faces in these photographs. In addition, it was found that this occurred in the absence of any eye movement.

Much of this research has been conducted in laboratory settings in order to demonstrate change blindness. Such an artificial setting produces criticisms of low ecological validity, as participants may have failed to detect the change in the stimulus due to unnatural experimental setting. In spite of this, the phenomenon of change blindness has been found to occur in real-world situations (Simons et. al., 2001; Simons & Ambinder, 2005; Simons & Rensink, 2005; Rensink, 2008). In light of this, change blindness has been validated as an actual phenomenon and not a product of the experimental situation. As such, a comprehensive understanding of this phenomenon can have extensive real-world applications. For example, the study of change blindness has greatly contributed to the development of novel methods of studying perception, consciousness and experience (Simons and Rensink, 2005; Rensink, 2008). Hence, the study of change blindness can be seen as a highly useful enterprise. Change blindness research has added to the understanding of many different mechanisms of visual perception (Simons & Ambinder, 2005; Simons and Rensink, 2005; Sternberg, 2008; Rensink, 2008). In light of this, change blindness is a useful phenomenon to study on

many levels and has a great many potential real-world applications for the general population.

There have been many explanations developed to account for this phenomenon. One explanation for the phenomenon of change blindness is that of improper attention given to the stimulus (Wolfe, Cave & Franzel, 1989, as cited by Rensink, O' Regan & Clark, 1997, p. 373; Rensink, O' Regan and Clark, 1997; Simons & Levin, 1997; Rensink, 2008; Sternberg, 2008) and is that of distraction. For example, a study by Rensink, O' Regan and Clark (1997) consisting of three flicker sequence experiments aimed to establish change blindness in a laboratory situation. This study supported the belief that an absence of attention to the stimuli is a causal factor for change blindness in that the observer is required to have focused attention on the target if visual perception of the change is to occur. The absence of focused attention leads to improper perception that can account for these failures in detection. Furthermore, these researchers proposed that this phenomenon may be caused by problems with the allocation of attention (Wolfe, Cave & Franzel, 1989, as cited by Rensink, O' Regan & Clark, 1997, p. 373; Rensink, O' Regan & Clark, 1997; Rensink, 2008). These findings have been backed by a great deal of empirical evidence (Levin & Simons, 1997; Simons & Levin, 1997; Fernandez-Duque and Thornton, 2000; Landman, Spekreijse & Lamme, 2003), suggesting that this finding is high in external reliability. A problem with this study is that it was a within-subjects design, using the same forty-eighty stimuli and that the sample consisted of ten participants. For this reason, the study could potentially suffer from order effects, which reduces the power and reliability of its findings. What is more,

the use of such a small sample reduces its representation of the wider population and so the results of this study are low in generalisability that would cause the results to lack any real-world application. Nevertheless, this is empirical evidence that demonstrates that improper attention leads to the failures in detection.

It has been argued that the explanation of a lack of attention is insufficient in accounting for this phenomenon (Levin & Simons, 1997; Fernandez-Duque and Thornton, 2000; Sternberg, 2008). Such an explanation for this phenomenon could be accounted for by the artificial situation of the experimental setting. Accordingly, it is the case that such an explanation is low in construct validity and internal reliability. Future research should continue to test the reliability of these findings so as to determine whether improper attention is a causal factor for change blindness.

In refutation of this explanation, Fernandez-Duque and Thornton (2000) conducted a series of four experiments to investigate the causes of change blindness. It was found that the changes in the visual scene did not capture the attention of the observer and so these were not detected immediately. Although, the findings of this study did suggest that a lack of attention may be the cause of change blindness, the results of this study also suggested that attention was not always required to detect changes in the stimulus. In addition, the results suggested that it could be the case that the participant’s were merely mislabelling conscious responses with those of unconscious ones. In light of this, a problem with the study by Fernandez-Duque and Thornton is that it produced a series of explanations for this phenomenon, some of which conflicted with others. As such, this casts doubt on the

reliability and validity of the research findings, as well as the usefulness of this study in producing a definitive explanation for change blindness. However, this could be indicative of this phenomenon in that one causal explanation is insufficient for accounting change blindness (Fernandez-Duque & Thornton, 2000; Simons et. al., 2001; Landman, Spekreijse & Lamme, 2003; Eysenck & Keane, 2005; Rensink, 2008; Sternberg, 2008) and that a holistic stance should be taken when explaining its occurrence. Another strength of this study is that it is high in internal reliability because the measures within it were consistent with one another and as four experiments were conducted. On a similar note, this study is high in external reliability due to the standardised procedures employed. This makes this study easily replicable and potentially yielding more truthful results, as similar studies would be likely to produce similar results, making these findings more valuable in explaining change blindness. From this evidence, perhaps poor attention is not a wholly valid means of explaining this phenomenon and it is low in construct validity.

A second explanation for change blindness is that it is caused by a limited memory capacity for encoding and the retention of visual information (Simons & Levin, 1997; Simons, et. al., 2001; Simons & Ambinder, 2005; Sternberg, 2008) and so change blindness could be said to be the result of forgetting. This explanation states that observers are unable to effectively store the visual information presented to them quickly and thus leads to the information being lost. This problem with memory capacity could be due to the time limitations of the methods employed by researchers examining change blindness (Rensink, O’ Regan and Clark, 1997).

This explanation has been defended by Simons & Ambinder (2005). The researchers carried out a review study of a wide range of empirical evidence examining change blindness. It was found that change blindness is caused by ineffective encoding and retention of the visual information. From this evidence, it can be determined humans have a limited capacity for storing and retaining this information that indicates that a momentary glance is not sufficient to process the stimulus. This means that more time is required for effective encoding to occur (Landman, Spekreijse & Lamme, 2003; Simons & Ambinder, 2005). A review study is an excellent way in which to study psychological evidence, as it enables a large amount of empirical evidence to be collected and analysed in an efficient and objective manner. Moreover, a review study can produce a more holistic understanding of the subject matter. In this case, this study has produced a greater understanding of how limited memory encoding and retention can influence perception. As such, this study could be said to be high in usefulness, as it offers a more valid representation of change blindness. On the other hand, a problem with review studies is that they can suffer from researcher and publication bias wherein the research represents the opinions of the researcher. Such a problem reduces the truthfulness and predictive power of the findings that would consequently reduce the usefulness of the study. Furthermore, bias could ultimately lead research in different and unsuitable directions. However, it should be hoped that the researchers made a conscious effort to avoid researcher bias and produced an objective representation of the subject under investigation. Hence, this study adds support in the form of construct validity to this explanation, increasing its explanatory power.

Evidence to the contrary demonstrates that this explanation is not a causal factor for change blindness (Rensink, O'Regan & Clark, 1997; Simons et. al., 2001; Eysenck & Keane, 2005; Sternberg, 2008). For example, Simons et. al. (2001) performed three naturalistic experiments, which aimed to investigate memory retention and representation of visual information. It was found that the participants were able to verbalise the detection of the changes in visual information if they were provided with verbal prompts from the researchers. This would suggest that people are able to effectively encode and retain information pertaining to visual information but may be unable to consciously express this due to the unconscious process of encoding (Simons et. al., 2001; Eysenck & Keane, 2005; Sternberg, 2008). In support of this, Rensink, O'Regan & Clark (1997) found that time restrictions did not account for change blindness. Therefore, this refutes the notion that memory acquisition for visual information is limited. A problem with this study is that the results are low in external reliability as the uncontrollable experimental situation, though standardised procedures were put in place in order try to reduce the effect of confounding variables. However, a strength of this study is that it is high in ecological validity as it used naturalistic settings in which to examine the subject matter. Nonetheless, the findings of this study do cast doubt on the construct validity of this as an explanation of change blindness.

In conclusion, change blindness refers to instances where individuals fail to detect large changes in the visual scene or an object. From the empirical evidence in this paper, it is clear to see that change blindness has significantly contributed to our understanding of normal visual perception

and how dramatically perception can malfunction. Moreover, such research has further added to our knowledge of consciousness. It is increasingly apparent that change blindness research has many real-world applications, making the study of this phenomenon a highly useful enterprise. Two explanations for this occurrence have been critically evaluated in this paper. The first was that of improper or an absence of attention given to the visual scene or object that results in this failure and that the focused attention of the observer is required to notice the change. This explanation has been supported by a wide range of research, which means that this explanation is high in construct validity. In spite of this, this explanation has been refuted by past research that would suggest that improper or absence of attention is not a wholly sufficient explanation to account for this phenomenon. The second explanation of change blindness discussed was that this occurs due to the limited capacity for memory encoding and retention, possibly enhanced in experiments by time limitations of procedures. Nevertheless, the extent to which this is the case is decidedly questionable. Therefore, change blindness is the result of a whole host of causes, which advocates a holistic stance on the explanation of this phenomenon in the future. An exciting new direction for change blindness research would be to investigate this phenomenon in commercial settings and in the media to examine whether such changes can influence individual’s behaviour or decisions.