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Abstract

The key element of this study was to explore the reconstruction process in viewing magic tricks and to identify key psychological variables that may lead to a correct interpretation of how the trick was done. While it was hypothesised that respondents who scored high in system 2 thinking, self-efficacy, and self-esteem would be better predictors of how the trick was done significant data could only be found in relation to self-efficacy scores. It was predicted identifying the moment the pen left the magicians hand would play an important role in knowing how the trick was done; this however was not proven to be true.
Introduction

The routes of magic can be traced back as far as 1700 BC (Einhorn, 2010). Therefore it goes as no surprise to learn that psychology has interested itself with the art of deception for over a Century. A more recent rise in research, according to Lamont, Henderson and Smith (2010) is due to the publication of two papers in Nature Reviews and Neuroscience and Trends in Cognitive Science (Kuhn, Amlani & Rensink, 2008; and Macknik, King, Randi, Robbins, Teller, Thompson & Conde, 2008). There has also been a surge of interest from the magician’s themselves with Derren Brown, one of the top magician’s in Ireland and the UK referring to himself as psychological illusionist, and admitting that he uses and relies on psychological principles (Brown, 2007).

A Science of Magic

There have been a number of people who have said that a scientific theory of magic is uncalled for and that research has been misled by a failure to understand one of magic’s key principles; misdirection (Lamont et al., 2010). Kuhn and his colleagues define misdirection as the “direction of attention away from the method” by the carrying out irrelevant tasks to mislead an audience (2008). This definition has come under fire from Lamont and his colleagues, (2010) who argue that magicians and psychologists should separate misdirection from distraction, believing misdirection to be more than a subtle distraction by means of irrelevant stimuli. Instead it is argued that misdirection is a method which appears naturally and directs attention to what the audience may feel is an important part of the trick (Lamont et al., 2010). It is wise to work under the consideration that misdirection as a concept is hard to define and can be seen as an umbrella term (Fitzkee, 1987). It has been suggested a dual definition of misdirection is best; covert misdirection where the spectator’s attention is led
away from the method without the need or want to alter the gaze of the audience and overt misdirection where the spectators gaze is redirected away from the method (Macknik et al., 2008). Due to this fact, psychology, to this date, has found it hard to fully understand and define one of the key principles of conjuring.

Macknik and his associates (2008) were able to situate magic and psychology together. They linked firstly how visual illusions used by neuroscientists to “dissociate the neural activity that matches the perception of a stimulus from the neuronal activity that matches the physical reality” to that of the spoon bending trick where the spoon bends as if by the power of the mind (Macknik et al., 2008). The basis of this trick can be found in neuroscience and in neurons that respond to motion and the stopping of an edge in the primary visual cortex and V5 (temporal visual). These neurons act differently to that of non-end-stopped neurons and it is this reaction that leads to the illusion of the spoon looking as though it is bent in the middle (Macknik et al., 2008).

It has been shown that magicians manipulate bottom-up and top down attentional control to misdirect viewers’ attention (Macknik et al., 2008). Salient objects (objects that stand out against others) catch audience’s attention. To demonstrate this, Macknick et al., use the example of a magician producing a dove as a means of controlling bottom up attention (2008). The attention gathered by the dove (salient object) being released creates the opportunity for the magician to perform the sleight of hand necessary to create an illusion. A magicians goal is to direct the audience’s attention to the moment of magic rather than the underlying method that is performed (Macknik et al., 2008). Audiences are often unaware that the action to create the illusion of magic happens before they even believe the trick to have started (Macknik et al., 2008).
Lamont et al., (2010) make two interesting points that relate to the above: Firstly studies by Simons and Chabris (1999) have demonstrated that inattentinal blindness means that people can miss events that seem indifferent in the visual field. However it has been argued that magic is not unique in the sense that it is not the only form of entertainment where audiences are focused in on a key event (Lamont et al., 2010). Secondly research which links eye gaze to changes in visual attention (Kuhn et al., 2008) is not restricted to magic and is a method that is used in many forms of entertainment (Lamont et al., 2008). It has been argued why and how a scientific theory of magic could be created (Lamont et al., 2008). Demacheva, Ladouceur, Steinberg, Pogossova and Raz (2012) have played a crucial role in our understanding for a science of magic. Demacheva and her colleagues (2012) put forward a three network model of Attention (Raz, 2009: Posiner & Peterson, 1990) which places attention into three different stages, alerting, orienting and executive attention. This network creates a link between magic and the scientific study of attention because the networks relate to the when (altering) the where (orienting) and the resolving of conflict (executive) (Demacheva et al., 2012). Magicians are able to manipulate and use this network to their benefit by directing attention to the shortcoming of the spectator (Demacheva et al., 2012). Magic tricks can also be used in a much more practical way within the field of psychology. One study has used magic to increase self-esteem levels in children with disabilities (Ezell, D. & Ezell E., 2003). Self-esteem and self-confidence were measured (n=26) before and after the children where thought magic tricks. Results showed an increase in both self-esteem and self-confidence scores (Ezell et al., 2003). According to the researchers (Ezell et al., 2003) the teachers whose role it was to teach the tricks were inundated with requests to teach more magic. Giving that an increase in the amount of studies in relation to magic and psychology is leading researchers to look at magic from a wider perspective (Lamont, 2010) and given the practical implications of magic (Ezell et al., 2003) it is important that psychology seeks to
explain the art of conjuring in a scientific manner that takes into consideration both the performer and the spectator.

The Magician and the Reconstruction Process

While research is varied there is very little research into how a spectator reconstructs a magic trick and why one person likes watching magic and another person does not. It has been noted by magicians that if approaching a couple on a date it is usual to expect hostility from the male (Brown, 2010). This person fits the category of a person who will interrupt a trick and often make sarcastic comments (Brown, 2010). Derren Brown, well known TV and stage magician learned to only approach tables that he deemed to be friendly and states that he has learned to make fast judgments in order to protect him from sarcastic and nasty comments (2010). David Blaine, perhaps the most recognisable magician in the world believes magic has the potential to strip away logic and if performed well magic can make a lasting impression on a person (Blaine, 2002). Some people believe they know how a trick is done because they may have seen a little move made by the magician. What the audience fails to see is all the other parts/aspects that are needed to create the illusion of magic. To use the example given by Steven Frayne (A.K.A Dynamo) “I saw you do something behind your back.” “Oh right what did you see?” “Well, I don’t know, but you did something, so that’s how you did it” (Frayne, 2012, p. 41). It is widely accepted among magicians that after a trick is performed the spectator will start to relive the trick in order to find a logical solution and as highlighted by professional magicians a person who believes they know the secret to the trick is often quiet easier to fool (Lamont & Wiseman, 2008). While the majority of examples chosen above are used to give insight into the world of a magician they can by no means offer the reader a comprehensive view as to what it’s like to be a magician, instead they are
intended to show what magicians often put up with and lay the foundations for how we can explain the behaviour of the spectator.

The reconstruction process can be considered in a number of ways. Firstly some people may think longer on the events; however poor imagination or a poor analytic approach often leads to failure. Even those who reconstruct a trick imaginatively and analytically may be doomed to fail due to the lack of conjuring knowledge and knowledge of scientific principles. A spectator may reject an explanation because the idea seems too obscure or even because the explanation seems to simplistic. It is often the case that a spectator may be duped by the magician into believing something happened when in actual fact the event never occurred in that way; this is a result of misdirection (Lamont et al., 2008). An audience member may simply misremember what they saw, one study found that 80% of an audience remembered seeing a trick (coin transposition) while in fact the trick had only been described to them (Siegal, 1991). It is not unknown for spectators to over exaggerate a trick when recalling it to a friend, this may be due to the fact that the person does not want to admit that they have been fooled and also risk the fear they may have overlooked something that somebody else may see (Lamont et al., 2008). The above offers a brief yet concise view of magic theory and its relation to the reconstruction process, the main problem with this approach is the overwhelming amount of literature available on magic theory. The examples provided above where chosen due to their emphasis on the psychological elements of magic. Giving that magicians are giving examples of people’s attitudes towards viewing magic (Brown, 2010; Dynamo, 2012; Blain, 2002; and Lamont et al., 2008) and we can understand how people reconstruct a trick (Lamont et al. 2008) we can now argue that psychological variables such as self-esteem and self-efficacy may play a role in how a person thinks, feels and reconstructs a magic trick.
Self-esteem

Research into self-esteem is a vast topic in psychology and it may be able to help us understand how a person reconstructs a magic trick and believes it to be the correct conclusion. Rhodes and Woods (1992) conducted a meta-analysis into the relationship between self-esteem and influenceability. The analysis consisted of 57 reports with a median number of 66 people. Articles where selected through computer searches and used the words attitude change, self-esteem and influence in their search. Studies were used to compare high levels of self-esteem against low levels of self-esteem. The analysis found that people with low self-esteem are more open to influence and easier to persuade than that of people who scored higher on self-esteem scores (d = -0.16, 95% CI = -0.41/-0.21, N = 23). When all three categories of self-esteem where taken into consideration, high, medium and low, it was found that people who scored in the medium were easier to persuade than both the higher and lower categories. Effects of age where taken into consideration but no differences were found in relation to college students and adults (Rhodes et al., 1992). This study is prohibited as it is not directly linked to magic and given the nature of the meta analysis and its size it is easy to argue that something could have been overlooked. As the goal of misdirection is to influence and persuade it is predicted that there is a significant relationship between self-esteem and an individual’s response to knowing how a magic trick is done.

Previous Study

To test this measure it is necessary to be able to evaluate how a person believes a trick is done. To do this, this research will be using the method devised by Demacheva et al., (2012). The study they conducted was interested in looking at the thought process associated with viewing magic. They created a 15 second video of a magician making a pen disappear from his hands. They highlight that though a magician can perform this trick in a number of ways a
visual yet subtle hue is given on the 4:15 counter stamp, it is at that mark the pen leaves the magicians hands. The participants in this study were students from Canada, more specifically students from McGill University in Montreal (n=1003). Some non-students did take part in the study and are reported as friends of the researchers. The age of respondents ranged from 13-90 (M=22.2; SD=6.6) 31% male 69% female. Scores were determined on a five point Likert scale where a score between 4 and 5 was considered a correct explanation and 3 or lower was deemed incorrect. An experienced magician rated each score and for reliability another magician was brought in, scores strongly correlated between the two. Data showed the identification of the critical time significantly increased the chances of a person providing a correct answer. It was also found that even though 141 people responded by saying they knew how the trick was done only 52 of these could provide a correct explanation. Even more than this only 11% of the 282 respondents who indicated the correct time the pen left the magicians hand gave a correct explanation of how the trick was done. The questionnaire provided a chance of an initial explanation of the trick. Once this question was answered respondents were free to answer the other questions which were created to give the respondent a fair chance of figuring out the method. Only five percent of the respondents (49) gave a correct revised explanation meaning 64% of the participants did not change their initial explanation (Demacheva et al., 2012). Giving that this study (Demacheva et al., 2012) has given us a way to quantify how well a person thinks they know how a magic trick is done, one of the main aims of this paper is to replicate the study conducted by Demacheva and her colleagues (2012) and introduce a measure for self-esteem. The main issue with this approach was the use of the video, using this method means there is no interaction between the participant and the magician. Also it is important to note that in the video the magicians face was never shown meaning the viewer was denied facial cues which may have led him/her to the finding of the correct method.
Self-efficacy

Self-efficacy is a person’s belief in their capacity to perform behaviours that produce a favourable outcome (Passer, Smith, Holt, Bremner, Sutherland & Vliek, 2009). According to Passer et al, a large amount of research has been conducted into the factors that create differences in self-efficacy and four determining factors have been identified as playing a key role (2009). Performance experience including both successful and negative, observational learning, verbal persuasion and emotional arousal (Passer et al., 2009). Self-efficacy has been found to be a predictor of performance across tasks of differing complexities (Wood, Atkins, & Tabernero, 2000). It has been found that people who believe they will do better in a task will do better than those who believe they will fail (Mitchel & Gist, 1992). While self-efficacy is related to skill levels, the task which is being performed must be taken into consideration, giving that most people do not spend a lot of time figuring out how magic tricks are done it is best to link magic with puzzle solving (Lamont et al., 2008). As self-efficacy is linked to one’s ability to believe in their capabilities (Mitchel et al., 1992) it is predicted that participants with high self-efficacy scores will be better predictors of how the trick is done compared to those with lower self-efficacy scores. The inclusion of self-efficacy in this study is also based on the research of Judge, Erez, Thoresen, & Bono, (2002); their work has indicated a relationship between self-esteem, neuroticism, locus of control and self-efficacy. Giving Browns accounts of being lashed out against (2010) it may be possible to draw conclusions on Kohurts theories that suggest when a person is outperformed the activation of the grandiose self reflects an attempt to disengage feelings of worthlessness. Evidence to support this theory can be found in research; one such study (Morf, & Rhodewalt, 1993) looked to examine the effects of threats to the self and the efforts taken to maintain a positive self-evaluation. All the participants were male students (N= 26) and had differing levels of narcissism. Participants were given negative feedback on tasks they had
been outperformed in and then asked to rate the person who out performed them on a personality scale. They found that when people with narcissistic personalities are outperformed they negatively score the person who outperformed them (Morf et al., 1993).

**Dual processing**

Another aspect of psychology that may help us understand magic and the reconstruction process is that there is evidence that supports a dual cognition style of thinking (Witterman, Bercken, Laurance & Godoy, 2009), Meaning that information can be processed in two very distinct styles, rationally and intuitively. Kahneman & Frederick refer to these two styles as system 1 and system 2 (2002). There is agreement among researchers that both are distinguished methods of processing; system 1 being an unconscious and rapid form of high capacity thinking and system 2 as a slow, conscious and deliberate form of thinking (Evans, 2008). System 2 thinking is linked with language and the ability to think hypothetically and is used often when a person is met with counterfactual possibilities (Evans, 2008). Including a measure for dual processing in this study may lead to significant data, as people who think a trick through have a better chance of discovering the method used by the magician (Lamont et al., 2008). Therefore it is predicted that people who show a preference for system 2 thinking will be better at predicting how the magic trick is done.

The key aim of this study is to address what is happening when a person is watching and reconstructing a magic trick. While some research is available on the relationship between magic and self-esteem, these studies have been more focused on how to increase self-esteem (Ezell et al., 2003). This study is therefore looking at the unstudied (to this researcher’s best knowledge) relationship between self-esteem and magic in relation to an individual’s response to knowing how a magic trick is done. Given the relationship between self-esteem and self-efficacy (Judge et al., 2002) and that Self-efficacy has been found to be a predictor
of performance across tasks of differing complexities (Wood et al., 2000) this study will look to see if participants with high self-efficacy scores will be better predictors of how the trick is done compared to those with lower self-efficacy scores. The study also aims to replicate the work of Demacheva et al., (2012) in relation to the identification of the critical time being important but not critical in the identification of the method. Finally the study will look at the unstudied relationship (to the best of this researcher’s knowledge) between system 1 and system 2 thinking and magic. Predicting that people who show a preference for system 2 thinking will be better predictors of how the trick is done.

**Hypotheses**

It is hypothesised that there is a significant relationship between self-esteem and an individual’s response to knowing how a magic trick is done.

It is hypothesised that the identification of the critical time will be important but not a significant factor in the correct explanation of how the trick is done.

It is hypothesised that participants with high self-efficacy scores will be better predictors of how the trick is done compared to those with lower self-efficacy scores.

It is hypothesised that that people who show a preference for system 2 thinking will be better at predicting how the magic trick is done.
Method Section

Participants

Participants consisted of a convenient sample of 70 people, the majority were students at the Dublin Business School but the population did contain friends and family of the researcher. Each student was asked to fill in the questionnaire and was told that it was an undergraduate study; no money was given in return for doing the questionnaire. Males represented 40% of the population (n=28) and Females 60% (n=42).

Design

The design was quasi-experimental. The independent variable was represented by scores which indicated how well a participant knew how the magic trick was done. The dependent variables consisted of self-esteem, self-efficacy, confidence and system one and system two thinking scores along with the identification of the critical time. All respondents were asked how knowledgeable they were about magic on a five point scale and the mean score was 1.2. Participants were also asked if they had seen the trick before, 18 people verified they had. Nobody was excluded from the study for the above reasons as no participant was deemed to fully explain the modus operandi.

Apparatus /Materials

Four questionnaires were used to gather scores; The Rosenberg Self-esteem Scale was used to compute elf-esteem scores. The questionnaire consists of ten questions which were answered on a four point scale; an example of one of the questions used is “I take a positive attitude toward myself” (Rosenberg, 1989). The Rational-Experiential Inventory 40 (REI) was used to measure for preferences in system one and system two thinking. The REI is made up of forty questions which are answered on a five point scale ranging from completely false
to completely true. It is divided into four sub categories, rational ability, rational engagement, experiential ability and experiential engagement (Pacini, & Epstein, 1999). The Generalised Self-Efficacy Scale (Schwarzer, 1992) consists of ten questions “I try to avoid situations that require thinking in depth about something” and is measured on a four point scale ranging from “not at all true” to “exactly true”. There are no cut off points for the scale higher scores indicate high self-efficacy levels. The fourth questionnaire was designed by Demacheva et al (2012) and is used to judge how well a respondent perceives a classic pen vanish. A corresponding video also created by Demacheva and her colleagues was shown via a computer and projector (2012). The video shows a magician making a pen disappear. The muted 15 second clip was played on repeat until all of the participants had answered all of the questions. Counter stamp 4:15 indicates the critical event in the modus operandi and acts as a subtle visual cue which reveals the specific method used in this video as the effect can be achieved by magicians in a number of ways (Demacheva et al, 2012). Some questions were left out of the magic questionnaire which related to demographic questions. Excluded questions are Q 2 “what is your mother tongue?” Q4 “highest level of education reached?” Q5 “please state your line of work?” Q6 “please provide descriptions of your ethnicity?” and Q7 “what country do you associate with most closely?” (Demacheva et al, 2012). The reason for these exclusions is based on the fact that the questionnaire was originally designed for an online population. One further change to the questionnaire relates to question 10 “Do you think you know how magicians perform this trick?” The questions which had been previously asked on a categorical level (Yes, No) was changed to a five point scale where respondents were asked to rate how confident they were that they knew how the magician performed the trick. This change was made so data in relation to this matter could be explored on a continuous scale.
**Procedure**

All respondents were told that the questionnaire was designed to see how people perceive magic tricks and were kept in the dark to the true nature of experiment until after completing the questionnaire. Each respondent was given the chance to opt out. Respondents were sat down in front of a projector screen and asked to watch the video a number of times before answering the questions that followed. They were told that the video would play on repeat until they were finished. After the initial measure for confidence, confidence was measured three times. (1) After the initial explanation (2) after exploring the questionnaire, respondents were asked to re-rate their first explanation score (3) after the revised explanation of the trick. The times at which the participants answered the questions varied as permission to enter classes varied on the times given by lecturers. Overall the majority of participants were tested prior to formal lectures but in some cases the task was administrated during and after formal lectures.

After the collection of questionnaires respondents were told the true aim of the study and allowed to ask questions. However keeping in line with the previous study conducted by Demacheva et al, questions in relation to the Modus operandi were not answered (2012). Instead participants were told that the trick could be done in a number of a ways and it was suggested to them that if they needed to know how a magician can make a pen disappear they could find examples on YouTube and the internet. The contact details of the researcher were given on the questionnaire so further questions could be asked of the researcher if respondents did not feel comfortable in a group atmosphere.
Results

Descriptive Statistics

The total number of respondents was 70, out of this 5.7% where deemed to know how the trick was done however over 20% of the population indicated they were above a little confident in their belief of knowing how the trick was done. In relation to the identification of the critical time 21% where deemed to have indicated the correct time, two scores were recorded as missing due to missing scores. Confidence scores after the initial explanation indicate that 27% (m=2) of the respondents were greater than a little confident in their explanation of how the trick was done. After exploring the questionnaire 54% (m=2.7) of respondents indicated that they were still happy with their original explanations. After the revised explanation of the trick 53% (m=2.6) of respondents reported that they were above a little confident in their explanation of how the trick was done. The average scores for self-esteem and self-efficacy were 29.6 and 18.9 respectively. REI scores showed that 33% of participant’s had a preference for rational ability while the majority of respondents 67% showed preference for experiential ability.

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Mean</th>
<th>SD</th>
<th>Minimum Possible</th>
<th>Maximum Possible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confidence in knowing how the trick is done</td>
<td>1.771</td>
<td>1.051</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Confidence in first explanation of the trick</td>
<td>2.028</td>
<td>1.166</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Confidence after exploring first part of questionnaire</td>
<td>2.714</td>
<td>1.229</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Experiential engagement</td>
<td>3.431</td>
<td>.729</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Experiential Ability</td>
<td>3.367</td>
<td>.657</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Rational engagement</td>
<td>3.402</td>
<td>.676</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Values</td>
<td>SD</td>
<td>Mean</td>
<td>N</td>
</tr>
<tr>
<td>--------------------------</td>
<td>--------</td>
<td>-----</td>
<td>------</td>
<td>----</td>
</tr>
<tr>
<td>Rational ability</td>
<td>3.178</td>
<td>.527</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>29.628</td>
<td>4.177</td>
<td>10</td>
<td>40</td>
</tr>
<tr>
<td>Self-esteem</td>
<td>18.885</td>
<td>5.989</td>
<td>0</td>
<td>30</td>
</tr>
</tbody>
</table>

Table 1. Descriptive table for outcome measures and predictors

**Analysis of Data**

To see if the identification of the critical time (yes, no) was significant in knowing how the magic trick was done (yes, no) a 2 x 2 chi-square test was used. Giving that 25% of the cells had an expected frequency of less than 5 the Fishers Exact Probability was utilized. This gave p = .141 for a two-tailed hypothesis. The Cramer’s V was 0.16, showing that the relationship between the identification of the critical time and knowing how the trick was done was almost zero, therefore showing no evidence to suggest an association between the two.

An independent Samples t-test was used to check for effect on having seen the trick before and confidence scores, no significant data was found (t (68) = .029; p>0.977). Another independent t-test was run to check for an effect between gender and confidence in knowing how the trick was done and no significant data was found (t (68) = 1.02; p> 0.311).

Linear regression was conducted to test the relationship between self-efficacy and self-esteem. It was found that for every self-efficacy score self-esteem scores increased .281. Confidence limits were narrow showing we are 95% confident that the population slope is between .127 and -10.47 (1, 68) = 13.196, p < 0.001).

Correlational analysis was run on magic scores (how well the person knew how the trick was done) and the main predictors (Rational ability scores, rational engagement scores, experiential ability scores, experiential engagement scores, confidence in knowing how the
trick was done, confidence scores after exploring the first part of the questionnaire, confidence in revised explanation, self-efficacy scores and self-esteem scores). The relationship between magic scores and self-efficacy was found to be positively related ($r = + .262$, $p < .028$). To further test the relationship linear regression was carried out to test the effect of higher self-efficacy scores on magic scores. It was found that for every one magic score self-efficacy scores increased by .052, which represented nearly 1 deviation. Confidence limits were narrow showing that we are 95% confident that the population slope lies between .006 and .098 ($F (1, 68) = 5.03$, $p < .028$).

<table>
<thead>
<tr>
<th>Predictors</th>
<th>Confidence in knowing how the trick is done</th>
<th>Confidence in first explanation of the trick</th>
<th>Confidence after exploring first part of questionnaire</th>
<th>Confidence after second explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-efficacy</td>
<td>.277*</td>
<td>.163</td>
<td>.191</td>
<td>.279*</td>
</tr>
<tr>
<td>Self-esteem</td>
<td>.127</td>
<td>-.099</td>
<td>.068</td>
<td>-.022</td>
</tr>
<tr>
<td>Rational ability</td>
<td>.293*</td>
<td>.055</td>
<td>.152</td>
<td>.322**</td>
</tr>
<tr>
<td>Rational engagement</td>
<td>.211</td>
<td>-.063</td>
<td>.022</td>
<td>.191</td>
</tr>
<tr>
<td>Experiential ability</td>
<td>-.174</td>
<td>-.178</td>
<td>.158</td>
<td>.014</td>
</tr>
<tr>
<td>Experiential engagement</td>
<td>-.011</td>
<td>-.006</td>
<td>.034</td>
<td>.052</td>
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</tbody>
</table>

Table 2. Correlations between Confidence measures and main predictors ($p<.01**$ $p<.05*$)

Correlational analysis was also run on confidence in knowing how the trick was done and key predictors. The relationship between confidence and rational ability was found to be positively related ($r = + .293$, $p < .014$) as to was the relationship between confidence and self-efficacy ($r = + .277$, $p < .020$). A near significant result was found between rational engagement and confidence ($r = + .211$, $p < .080$). However further analysis of these three results by means of regression found no significant data. Correlation analysis was also run on the remainder of confidence scores (confidence after initial explanation and confidence after
exploring first part of the questionnaire) and no significant data was recorded. As a final model linear regression was conducted to determine the effect of self-efficacy scores and rational ability scores, no significant data was recorded either (see table 3).

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
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<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>-.671</td>
<td>.914</td>
<td>-.735</td>
</tr>
<tr>
<td></td>
<td>Rational Ability Scores</td>
<td>.395</td>
<td>.287</td>
<td>.198</td>
</tr>
<tr>
<td></td>
<td>Self-efficacy Scores</td>
<td>.040</td>
<td>.036</td>
<td>.159</td>
</tr>
</tbody>
</table>

*Table 3.* Regression table of effect of self-efficacy and rational ability scores on confidence on knowing how the trick was done.
Discussion

The hypotheses that there is a significant relationship between self-esteem and an individual’s response to knowing how a magic trick is done was not supported. No relationship was found that supports the theory that people with high and low self-esteem are more easily influenced (Rhodes et al, 1992). This may be due to the fact that self-esteem is a heterogeneous category which consists of people who can accept their good personality traits along with people who rely on defence mechanisms (Baumeister, Campbell, Krugger, & Vohs, 2003). It has been found that correlations between self-esteem and school performance do not show that high self-esteem leads to better performance but in contrast high self-esteem can be the result of good results in relation to academia (Baumeister et al, 2003). It has also been demonstrated that studies have failed to find a comprehensive relationship between self-esteem and good task performance.

The hypotheses that the identification of the critical time was important but not a significant factor in the correct explanation was not found to be true. Therefore it is impossible on these findings to draw on the same conclusions as Demacheva et al, (2012); that a correct explanation of a conjuring effect relies on interaction between the when and where attention modules (2012). A study by Smith and Sewell was interested in describing attentional selection in multielement displays (2009). They found that selection changes in respect to that of changes that occur in attention due to a distractor effect can be viewed as competitive selection process (Smith et al, 2009). This competitive nature may have played a determining role in the rejection of the hypotheses as a magician uses different forms of misdirection to address a spectator’s visual attention to certain areas therefore concealing the critical moment.
No significant data was found to support the hypothesis that that people who show a preference for system 2 thinking would be better at predicting how the magic trick was done. While Lamont argues that people who think a trick through have a better chance of discovering the method this research has found no evidence to support his argument (2010). While evaluating the impact of confidence on knowing how the trick was done on Rational engagement scores indicated a near significant result ($r = +.211, p>.080$). Meaning that people who scored high on system 2 thinking had greater belief in their ability to believe that they knew how the trick was done.

The hypotheses that participants with high self-efficacy scores will be better predictors of how the trick is done compared to those with lower self-efficacy scores was supported. Therefore this research finds in favour of Wood et al, whose research argues Self-efficacy is a predictor of performance across tasks of differing complexities (2000). While self-efficacy is positively related to self-esteem it remains unclear if the correlation between the two is related to magician’s reports of being lashed out at as self-esteem was found not to correlate with confidence in knowing how the trick was done. Kohut's theory suggests that people who are outperformed may disengage feelings of worthlessness however if this was the case we would have expected to find respondents with higher self-esteem scores reporting higher confidence rates in knowing how the trick was done. Bandura believed that high self-efficacy was specific to certain situations meaning a person with high self-efficacy in one circumstance may have low self-efficacy in another (Passer et al., 2009). This is a confounding variable as the mean score for previous magic knowledge in this study was $m=2$. Like Wood et al, (2000) Bandura was under the same strain of thought as he to believed self-efficacy to be a good predictor of future performance (cited in Passer et al., 2009).

While some people have said the study of magic is not unique and that magic is no different in the way in which it manipulates psychological variables (Lamont et al, 2010) this study has
provided evidence that suggest that it is unique from that other studies such as the work by Rhodes et al. whose meta-analysis concluded that people with low self-esteem scores are easier to manipulate (1992). If this was the case we would have expected to find a negative relationship between low self-esteem scores and magic scores because as highlighted in the introduction to this paper one of the key aims of misdirection is the manipulation of visual and attentional fields. In general the inclusion of magic in psychology may be of great significance to research involving deception as it offers a way to mislead participants without having to lie to them (Demacheva et al., 2012). However what remains clear is that if research is to continue in a psychological explanation of magic a closer relationship between researchers and magicians must be formed as both fields have differing concepts of important variables such as attention and misdirection (Demacheva et al., 2012).

It is not only psychology that stands to gain from a joint venture with magic as magicians can greatly improve performance with knowledge of the psychological aspects that accompany illusions (Lamount et al., 2010). While the extent to which magic theory is written about is beyond compression very few books exist that deal solely with the psychological principles of magic (Lamount et al., 2010). By making magician’s aware of these elements psychologists can give the them not only the potential to improve their performance but also the chance to appreciate the underlying scientific principles that make up each and every illusion that the magician has slaved to perfect and create.

**Limitations**

This study was limited by the size of its population; the small number of respondents may have played a significant result in this study. Therefore it is suggested that any future studies would use a larger population. The differing times that the participants took part in this study may have played a role in the overall results, as some students were measured before, during,
and after lectures. Those who took part during and after class may have been significantly more tired than those who took part in the study before lectures started. To control for this in the future it would be suggested that all participants take part before lectures commence. The study was also limited by the use of the video as magicians usually perform live in a room rather than appear on a screen (Demacheva et al., 2012). However the video did ensure that each participant viewed the same trick in the same conditions. As magicians rarely repeat the same trick twice this video gives the spectator an advantage they would not have if they were to encounter a magician doing this trick as part of a routine (Hugard & Braue, 2008). As the video showed only the magicians’ hands, respondents were starved of important visual clues such as body language. The fact that the video is muted means that there is no patter between the magician and the spectator. Patter is a technical term used to describe the conversation accompanying a trick. Patter is used for entertaining purposes but also adds to the concealment of the modus operandi (Hugard et al, 2008).

While the imitation of the breaking of the pen can be seen as the form of misdirection in this trick, as a whole it lacks the context of how the trick would be performed by a magician. If the aim of science is to replicate real life conditions in a controlled environment then the exclusion of patter can be seen as a significant limitation in this study. In future studies more significant results could possibly be found if participants were to view a classic trick such as the “pen vanish” in a classic routine. This would allow participants full use of all their senses and allow the magician to perform in a comfortable and familiar environment. Cui, Otero-Millan, Macknik, King & Martinez-Conde, (2011) have found new evidence that suggests social cues that are associated with conjuring may not be as influential as once thought (cited in Demacheva et al., 2012). So while it may be accepted to find different results under the above suggested conditions this may not be the case. Future research in magic and psychology could set about searching for differences in results in relation to altering attention
in other disciplines. If divisions are found to be persistently different then a call for scientific explanation of magic would be further warranted.

In the original study conducted by Demacheva et al., (2012) a professional magician was brought in to rate each explanation of the trick. Furthermore a second magician was brought in to rate the explanations. It was found that both scores strongly correlated (Demacheva et al., 2012). While the present researcher has a strong grounding in magic theory no second magician was asked to rate the scores. In future studies it would be strongly recommended that two magicians rate the scores and that there is a check for a correlation between the two as per the original study.

**Conclusions**

This study was greatly halted by the lack of previous research available on magic in relation to this studies main objective. While there is a growing amount of research available and more so becoming available it remains limited in its means. While the use of conjuring tricks in studies offers many advantages in relation to attention and eye gaze, magic tricks for the moment remain a vastly unused tool in psychology’s ever growing tool box.

The findings of this paper suggest that self-efficacy plays a significant role when it comes to people knowing how a trick is done and supports the evidence that suggest self-efficacy is a predictor of performance across tasks of differing complexities (Wood, et al, 2000). While self-esteem and system 2 thinking play no direct role in knowing how the trick was done. The identification of the critical time was found to be of no importance but that may due to the complex nature of attention selection in the presence of distracting effects. Giving that magic tricks are so varied and that one illusion can often be replicated in a number of different ways applying these findings to other magic tricks may be a false endeavour. Magic as a form of entertainment has stood the test of time and continues to be a popular part of culture because
it has the ability to make the impossible seem possible. It has been cast aside by many researchers as having no unique prospects to study. To them it is put, what other field offers the potential to strip away logic? This paper concludes in that as the same way of Irina Demacheva and her colleagues (2012) and suggests that studies of magic can further are knowledge of human behaviour.
Reference List


Appendices

Magic Questionnaire

1. Sex:
   - Female ☐
   - Male ☐

2. How knowledgeable are you about magic? _____
   
   \(1 = \text{not at all}/5 = \text{extremely}\)

3. Have you seen this trick before?
   - Yes ☐
   - No ☐

4. How confident are you that you know how magicians perform this trick?
   
   \(1 = \text{not at all}/5 = \text{extremely}\) _____

5. Regardless of your answer to the previous question, please explain how magicians may perform this trick:

   

6. How confident are you of this explanation?
   
   \(1 = \text{not at all}/5 = \text{extremely}\) _____

7. Do you think video-editing is necessary to achieve this effect?
   - Yes ☐
8. Please re-watch the first video and indicate the exact time the pen leaves the magician’s hands. Kindly use the **last 4 digits** of the TCG timer. (e.g., if you think the pen is no longer in magician’s hands at TCG + 00:00:12:17, your answer should be 1217) The answer to this question should be in the range of 0310 and 1530. ____________

9. If you were to perform this trick, choose the elements that you would need:
   (check any that apply)
   - String ☐
   - Safety pin(s) ☐
   - Magnets ☐
   - Specific angle of camera to create optical illusion ☐
   - Special clothing (i.e., certain colour, with pockets) ☐
   - Stickers ☐
   - Elastics ☐
   - Chemicals ☐
   - Mirrors ☐
   - Pen ☐
   - Other:_________
10. What psychological or scientific concepts are at work?
   (check any that apply)
   - Misdirection of attention  
   - Paranormal energy  
   - Optical illusion (i.e., the pen is still there)  
   - Chemical reaction  
   - Gravity  
   - Memory manipulations  
   - Changing potential energy into kinetic energy  
   - Other ________________

11. Please check the statement(s) that you believe to be TRUE:
   (check any that apply)
   - The magician is using a genuine pen.  
   - The pen actually breaks.  
   - The magician drops the pen below the camera’s frame.  
   - This special pen dissolves upon contact with heat from magician’s hands.  
   - The magician conceals this collapsible pen between his fingers.  
   - None of the above.  

12. Please provide an estimate of how many times you watched this video: ___________

13. Given all that has transpired since your initial explanation/speculation regarding the trick, are you still comfortable with your original stance?
   (1 = not at all/5 = extremely) _____

14. Please provide a revised/detailed explanation of the trick:
15. How confident are you of this explanation?
(1 = not at all/5 = extremely) ________

Please tick the box you feel to be most true.

<table>
<thead>
<tr>
<th></th>
<th>Not at all true</th>
<th>Barely True</th>
<th>Moderately true</th>
<th>Exactly true</th>
</tr>
</thead>
<tbody>
<tr>
<td>16. I can always manage to solve difficult problems if I try hard enough.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>17. If someone opposes me, I can find means and ways to get what I want.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>18. It is easy for me to stick to my aims and accomplish my goals.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>19. I am confident that I could deal efficiently with unexpected events.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>20. Thanks to my resourcefulness, I know how to handle unforeseen situations.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>21. I can solve most problems if I invest the necessary effort.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>22. I can remain calm when facing difficulties because I can rely on my coping abilities.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>23. When I am confronted with a problem, I can usually find several solutions.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>24. If I am in a bind, I can usually think of something to do.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>25. No matter what comes my way, I’m usually able to handle it.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
Please tick the box you feel to be most true.
1= Strongly agree
2=Agree
3=Disagree
4=Strongly disagree

<table>
<thead>
<tr>
<th>Question</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>26. On the whole, I am satisfied with myself.</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>27. At times, I think I am no good at all.</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>28. I feel that I have a number of good qualities.</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>29. I am able to do things as well as most other people.</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>30. I feel I do not have much to be proud of.</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>31. I certainly feel useless at times.</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>32. I feel that I’m a person of worth, at least on an equal plane with others.</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>33. I wish I could have more respect for myself.</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>34. All in all, I am inclined to feel that I am a failure.</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>35. I take a positive attitude toward myself.</td>
<td>1 2 3 4</td>
</tr>
</tbody>
</table>

Please use the following scale to answer these questions.

1 2 3 4 5
(1 = definitely not true of myself to 5 = definitely true of myself)

35. _____ I have a logical mind.
36. _____ I prefer complex problems to simple problems.
37. _____ I believe in trusting my hunches.
38. _____ I am not a very analytical thinker.
39. _____ I trust my initial feelings about people.
40. _____ I try to avoid situations that require thinking in depth about something.
41. _____ I like to rely on my intuitive impressions.
42. _____ I don’t reason well under pressure.
43. _____ I don’t like situations in which I have to rely on intuition.
33

44. _____ Thinking hard and for a long time about something gives me little satisfaction.
45. _____ Intuition can be a very useful way to solve problems.
46. _____ I would not want to depend on anyone who described himself or herself as intuitive.
47. _____ I am much better at figuring things out logically than most people.
48. _____ I usually have clear, explainable reasons for my decisions.
49. _____ I don’t think it is a good idea to rely on one’s intuition for important decisions.
50. _____ Thinking is not my idea of an enjoyable activity.
51. _____ I have no problem thinking things through carefully.
52. _____ When it comes to trusting people, I can usually rely on my gut feelings.
53. _____ I can usually feel when a person is right or wrong, even if I can’t explain how I know.
54. _____ Learning new ways to think would be very appealing to me.
55. _____ I hardly ever go wrong when I listen to my deepest gut feelings to find an answer.
56. _____ I think it is foolish to make important decisions based on feelings.
57. _____ I tend to use my heart as a guide for my actions.
58. _____ I often go by my instincts when deciding on a course of action.
59. _____ I’m not that good at figuring out complicated problems.
60. _____ I enjoy intellectual challenges.
61. _____ Reasoning things out carefully is not one of my strong points.
62. _____ I enjoy thinking in abstract terms.
63. _____ I generally don’t depend on my feelings to help me make decisions.
64. _____ Using logic usually works well for me in figuring out problems in my life.
65. _____ I think there are times when one should rely on one’s intuition.
66. _____ I don’t like to have to do a lot of thinking.
67. _____ Knowing the answer without having to understand the reasoning behind it is good enough for me.
68. _____ Using my gut feelings usually works well for me in figuring out problems in my life.
69. _____ I don’t have a very good sense of intuition.
70. _____ If I were to rely on my gut feelings, I would often make mistakes.
71. _____ I suspect my hunches are inaccurate as often as they are accurate.
72. _____ My snap judgements are probably not as good as most people’s.
73. _____ I am not very good at solving problems that require careful logical analysis.
74. _____ I enjoy solving problems that require hard thinking.