

SHORT AND SWEET**The effects of social misdirection on magic tricks:
How deceived and undeceived groups differ****Ryo Tachibana**Department of Psychology, Graduate School of Arts and Letters, Tohoku University, 27-1 Kawauchi, Aoba-ku, Sendai 980-8576, Japan; e-mail: ryo-ta@s.tohoku.ac.jp**Hideaki Kawabata**Department of Psychology, Keio University, 2-15-45 Mita, Minato-ku, Tokyo 108-0073, Japan; e-mail: kawabata@flet.keio.ac.jp

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Abstract. Characteristics of perception and cognition in our daily lives can be elucidated through studying misdirection, a technique used by magicians to manipulate attention. Recent findings on the effects of social misdirection induced by joint attention have been disputed, and differences between deceived (failed to detect the magic trick) and undeceived (detected the magic trick) groups remain unclear. To examine how social misdirection affects deceived and undeceived groups, we showed participants movie clips of the “cups & balls,” a classic magic trick, and measured participants’ eye positions (i.e. where participants looked while viewing the clips) using an eye tracker. We found that the undeceived group looked less at the magician’s face than the deceived group. These results indicate that deceived individuals have difficulty trying not to allocate attention to the face. We conclude that social misdirection captures attention, influencing the emergence of deception.

Keywords: eye movements, magic trick, misdirection, social misdirection, visual attention.

In order to perform persuasive magic tricks, magicians have developed numerous techniques for manipulating an audience’s attention. Only recently have psychologists focused on magicians’ techniques, such as misdirection, to examine characteristics of attention, thought and memory (e.g. Kuhn & Martinez, 2011). Successful magic tricks require diverting audiences’ attention toward a distracting act, keeping observers from being aware of how the trick works, while simultaneously performing what would be an otherwise obvious act (Lamont & Wiseman, 1999).

In investigations of misdirection used to manipulate visual attention, effects of social misdirection, which is induced by joint attention using gaze direction as a social cue, have been hotly disputed. Although Kuhn and Land (2006) showed that social misdirection provided by gaze cues strengthens misdirection for successful magic tricks, Cui, Otero-Millan, Macknik, King, and Martinez-Conde (2011) and Rieiro, Martinez-Conde, and Macknik (2013) recently demonstrated that social misdirection has less of an impact on misdirection. These results surprised magicians and psychologists alike, who had often believed that social misdirection was essential for deploying successful tricks.

However, studies indicating that social misdirection has less of an effect did not clearly identify differences between participants who could detect the magic trick (“undeceived” individuals) and those who failed to detect the trick (“deceived” individuals). Due to social misdirection affecting visual attention, we perceive an illusory event as an event even if it does not actually take place (Kuhn & Land, 2006). This suggests that misdirection as a social cue prevents participants from seeing an event, which results in participants being deceived (Kuhn, Tatler, & Cole, 2009). If deceived and undeceived participants can be influenced differently by social misdirection, whether or not an individual is deceived might reflect attention modulation by a social cue (e.g. gaze). Nevertheless, it remains unclear whether social misdirection enhances the effect of misdirection for a successful magic trick.

The present study examined how social misdirection might affect deceived and undeceived participant groups by measuring participants’ eye positions. While Kuhn and Tatler (2005) showed that gaze position had nothing to do with the detection of magic tricks when participants were misdirected, the misdirected positions were identical (i.e. to the right) in their experiment. We were not only interested in social misdirection (i.e. the magician’s gaze) but also the influence of different misdirected positions.

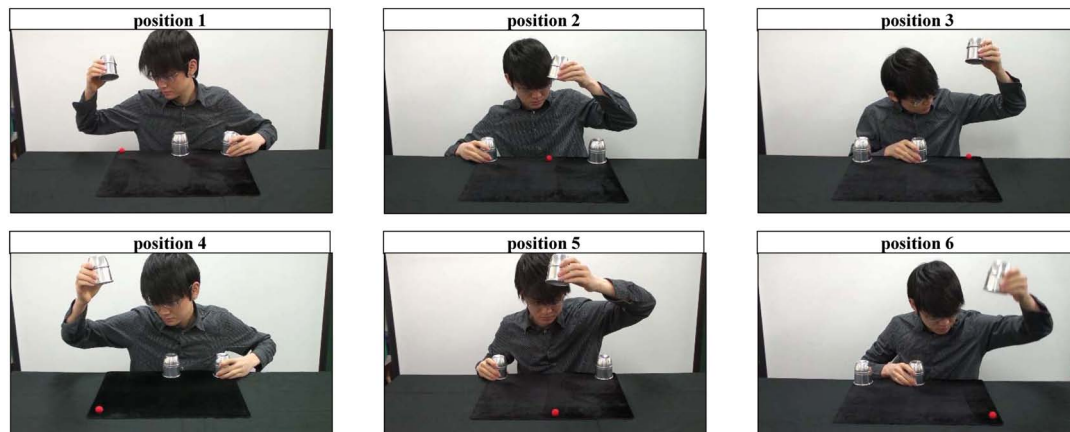


Figure 1. Summary of the experimental conditions. There were six misdirected positions where a magician raised one of three cups. In positions 1, 2, and 3, the misdirection was performed where the cup originally was placed. In positions 4, 5, and 6, the misdirection was performed where the cup was pushed ahead to the corner of the table mat.

Twenty healthy participants (10 females, mean age = 20.35 years, $SD = 0.96$) who did not know the “cups & balls” trick watched 12, randomly presented movie clips, as shown in [Figure 1](#) (see also supplemental Videos 1 and 2). In each clip, a magician placed down and shuffled three cups on a table before a superimposed screen was presented; here, we asked participants under which of the three cups a ball was placed. When participants responded by pressing a key to indicate the cup under which they thought the ball was hidden, the clip restarted to show the magician raising one of the cups to reveal the ball underneath. In all clips, the magician looked toward misdirected positions in order to deceive the participant as to the ball’s location, helping to induce misdirection as to where participants should look. There were six misdirected positions across two misdirection conditions: one was a misdirection with-trick condition, and one was a without-trick condition. The magician performed the misdirection using one ball in the without-trick condition but used one ball and an extra ball in the with-trick condition in which the extra ball was hidden under one of the cups in advance. In our experiment, the magic trick took place only in the with-trick condition. When the misdirection was performed, participants were misdirected toward the extra ball from the wrong cup while the original ball (which participants were to focus upon) was dropped under the table by tilting a cup. Thus, it was critical for participants to notice the tilted cup and the original ball dropping. After watching all 12 video clips, participants filled out a questionnaire regarding whether they detected the magic trick, the video presented where participants knew the nature of the trick, and how the trick was performed. During the presentation of each clip, eye position was recorded with a Tobii X120 eye-tracker (120 Hz) at a viewing distance of 60 cm with a chin-rest. We calculated the ratio of fixation time in each of three areas of interest (AOI)

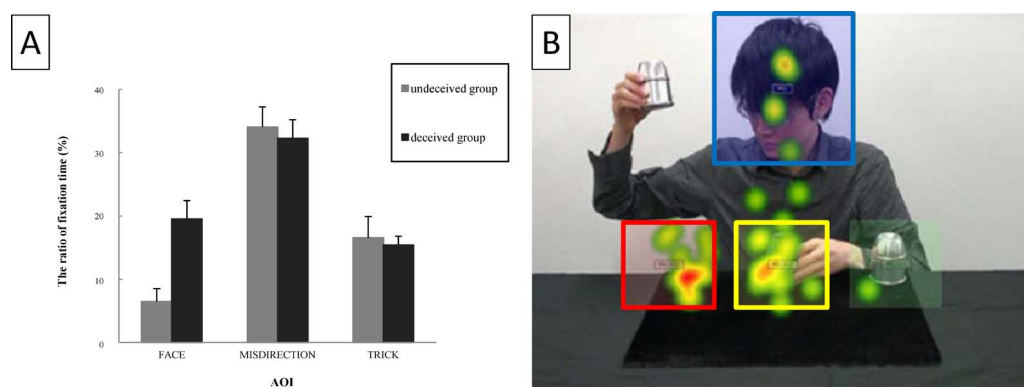


Figure 2. (A) The ratio of fixation time among the undeceived and deceived groups in each area of interest (AOI). (B) AOIs overlaid onto a sample picture in misdirected positions 1–3. Blue, red and yellow rectangles represent face, misdirection and trick AOIs, respectively. In misdirected positions 4–6, AOIs for the misdirected positions were moved further ahead and to the side of the table mat.

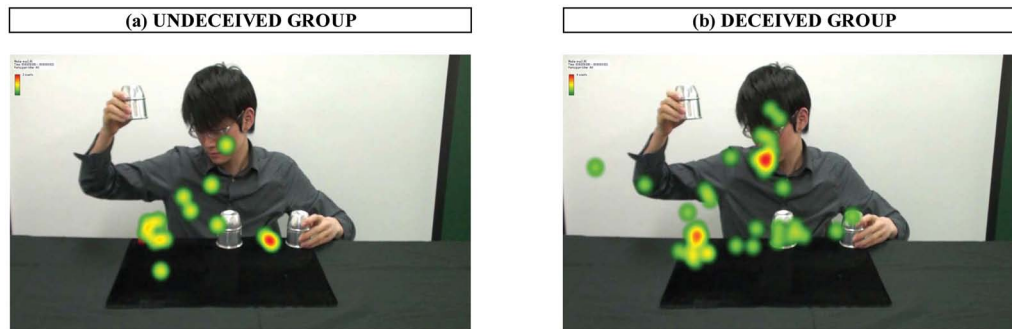


Figure 3. A fixation example for individuals in the undeceived and deceived group: (a) fixations of the undeceived group (who detected the magic trick). (b) fixations of the deceived group (who failed to detect the magic trick).

during the magician's misdirection over a 3–3.5 s period: one set of AOIs was for the misdirected and trick cups ($5.72^\circ \times 5.72^\circ$ visual angle), and one AOI included the magician's face ($8.58^\circ \times 8.58^\circ$).

Nine participants noticed the trick (“undeceived” group), and the other 11 did not (“deceived” group). A MANOVA [2 (misdirection) \times 6 (misdirected position) \times 2 (group)] for the three AOIs revealed significant main effects of position ($F_{(3, 199)} = 17.72, p < .0001, \eta_p^2 = .21$) and group ($F_{(3, 199)} = 8.03, p < .001, \eta_p^2 = .11$) but no effect of misdirection nor an interaction ($p > .05$). Therefore, we separated analyses into a position \times AOI ANOVA and group \times AOI ANOVA. The former analysis showed a significant interaction between position and AOI ($F_{(10, 190)} = 2.92, p < .01, \eta_p^2 = .38$), suggesting that misdirection in positions 1, 2 and 3 were viewed significantly longer than 4, 5 and 6 ($p < .001$), whereas there was no significant difference among positions 1, 2, 3 and 4, 5, 6. The latter analysis showed a significant interaction between group and AOI ($F_{(2, 36)} = 7.31, p < .01, \eta_p^2 = .40$), suggesting that the misdirection AOI was viewed significantly longer than the trick and face AOIs ($p < .0001$). Additionally, the undeceived group looked less at the magician's face than the deceived group ($p < .0001$), whereas there was no significant difference in fixation between groups in the misdirection and trick AOIs (Figures 2 and 3).

Results showed that the deceived group looked at the magician's face more than the undeceived group, suggesting that participants in the former group were deceived by the magic trick. This might have been due to social misdirection provided by the direction of the magician's face. A face presented in a social situation (e.g. video clip) and not in isolation often draws an observer's attention before the observer directs his/her eye movement to the object of interest (e.g. what the face in the video is attending to; Castelhana, Wieth, & Henderson, 2007). When viewing a magic trick, the magician as a social cue (e.g. his/her gaze) spontaneously triggers an observer's attention in order to prevent the observer from seeing what the magician is manipulating (Kuhn et al., 2009). We conclude that deceived participants tend to look at the magician's face, thereby inducing social misdirection that implies something is present when nothing is there.

Deception by social misdirection is natural because this technique utilises social attention. Social attention, especially gaze direction, has a strong effect on the process of aligning attention (Nuku & Bekkering, 2008). However, the present study still included undeceived participants; thus, the type of social attention might matter. Whether and how social misdirection affects audiences during a magic trick are important research controversies warranting further investigation.

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