

It's your choice! – Or is it really?

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For most of us it is difficult to imagine that we could decide to buy a v-neck sweater and end up with round-neck collar without even noticing the difference. If this happened in a wide variety of situations, it would mean that we are often not fully aware of the decisions we make. According to researchers studying a phenomenon called choice blindness, this is precisely the case. Numerous studies have shown that we often fail to detect changes in our decisions (e.g., which of two jams we prefer) when that choice is secretly changed. In the present article, we examine when and why this phenomenon occurs, as well its implications for various real-world settings.

In the 1936 movie “Modern Times”, Charlie Chaplin struggles to live in the fast-paced modern society. As we move from the industrial age to the information age, societal demands on our mental capabilities are no less taxing. We are constantly required to process a wide range of information to make decisions. Sometimes, these decisions are trivial, such as what marmalade to buy. At other times, the stakes are higher, such as deciding which symptoms to report to the doctor. However, the fact that we are accustomed to processing large amounts of information does not mean that we are better at it (Chabris & Simons, 2009). Our sensory and cognitive systems have systematic ways of failing of which we are often (perhaps blissfully) unaware of. In the present article, we discuss two such fallacies of human cognition: change blindness and choice blindness. We will first provide an overview of these phenomena and then focus on the theoretical and practical implications of choice blindness in a variety of settings.

Enjoying a Walk and Being a Witness



Imagine that you are taking a walk in your local city park when a tourist approaches you asking for directions. During the conversation, two men carrying a door pass between the two of you. If the person asking for directions had changed places with one of the persons carrying the door, would you notice? Research suggests that you might not. Harvard psychologists Simons and Levi (1998; see <http://www.youtube.com/watch?v=FWsXSQsspiQ>) conducted a hilarious field study using this exact set-up and found that the change in identity went unnoticed by 7 (46.6%) of the 15 participants. This phenomenon has been termed change blindness and refers to the difficulty that observers have in noticing changes to visual scenes (e.g., the person swap), when the changes are accompanied by some other visual disturbance (e.g., the passing of the door).

Over the past decade, the change blindness phenomenon has been replicated many times (Davis, Loftus, Vanous, & Cucciare, 2008; Levin, Simons, Angelone, & Chabris, 2002). Especially noteworthy is an experiment by Davies and Hine (2007) who studied whether change blindness affects eyewitness identification. Specifically, participants were presented with a video enactment of a burglary. In the video, a man entered a house, walking through the different rooms and putting valuables into a

knapsack. However, the identity of the burglar changed after the first half of the film while the initial burglar was out of sight. Out of the 80 participants, 49 (61%) did not notice the change of the burglar's identity, suggesting that change blindness may have serious implications for criminal proceedings.

To most of us, it seems bizarre that people could miss such obvious changes while they are paying active attention. However, to catch those changes, attention must be targeted to the changing feature. We either need to expect the change to happen or our attention needs to be guided towards the changing feature (Simons & Rensink, 2005; Williams & Simons, 2000). In the study described above, participants were likely not expecting the change to happen, and so their attention may have been focused on the valuables the burglar was collecting rather than the burglar. This also explains, for example, why, while watching *Ocean's Eleven*, you might not notice Brad Pitt's cocktail glass filled with shrimps changing into a plate after an angle change, and then back into a glass again, while he is talking to Matt Damon in the Botanical Gardens. Similar changes occur in the *Godfather*, where the front windshield breaks when Sonny gets shot but is intact again only seconds later, or in *Titanic* where the deck anchor changes in the famous scene of Leonardo DiCaprio and Kate Winslet at the stern (retrieved from <http://www.moviemistakes.com>).

Drawing from change blindness research, scientists have come to the conclusion that we perceive the world in much less detail than previously thought (Johansson, Hall, & Sikström, 2008). Rather than monitoring all of the visual details that surround us, we seem to focus our attention only on those features that are currently meaningful or important, ignoring those that are irrelevant to our current needs and goals (O'Regan & Noë, 2001). Thus at any given time, our representation of the world surrounding us is crude and incomplete, making it possible for changes or manipulations to go undetected (Chabris & Simons, 2010).

From Change Blindness to Choice Blindness

Given the difficulty people have in noticing changes to visual stimuli, one may wonder what would happen if these changes concerned the decisions people make. For example, imagine that you are sitting outdoors on a sunny spring day and hear that the person sitting next to you orders black coffee. The waiter comes back with a cappuccino. Do you think you would notice this? Drawing from the findings on change blindness, there is reason to believe that you would not. What, however, if it were you who ordered black coffee and ended up with a cappuccino? Obviously, there is a difference between passively observing the scene and being actively involved in decision making and ordering. In the latter case, it is *your* intentions and actions that are targeted. This should make a difference – shouldn't it?

A group of Swedish researchers explored whether people may at times be blind to changes that involve not the visual scene, but their own intentions, actions, and **introspections**. To address this issue, Johansson, Hall, Sikström, and Olsson (2005) modified the change blindness paradigm to apply it to a decision making task. They showed participants pairs of female faces and asked them to choose which one they found



more attractive. After a decision had been made, participants were presented with the selected face and were asked to explain their choice. However, in three out of 15 trials, their choice was manipulated and

participants were shown the very face they had *not* chosen previously (see <http://www.youtube.com/watch?v=wRqyw-EwgTk> for a demonstration). Only 26% of the manipulated trials were detected, suggesting that people are often blind to manipulations of their choices. Johansson and colleagues (2008) termed this effect **choice blindness**. A critical reader may argue that participants might simply have refrained from revealing that they noticed the manipulation. However, the fact that many participants noticed one of the changes, but not the other two, suggests that this is not the case. To examine whether choice blindness also occurs in other situations, Hall and colleagues (2010) invited supermarket customers to sample two different kinds of jams and teas. After participants had tasted or smelled both samples, they indicated which one they preferred. Subsequently, they were purportedly given another sample of their preferred choice. On half of the trials however, these were samples of the non-chosen jam or tea (see http://www.youtube.com/watch?v=_VPcl04Adh8). Again, only about one-third of the participants detected this manipulation. Based on these findings, Hall and colleagues (2010) proposed that choice blindness is a phenomenon that occurs not only for choices involving visual material, but also for choices involving **gustatory** and **olfactory** information. Recently, the phenomenon has also been replicated for choices involving auditory stimuli (Sauerland, Sagana, & Otgaar, 2012). Specifically, participants had to listen to three pairs of voices and decide for each pair which voice they found more sympathetic or more criminal. The voice was then presented again, however, the outcome was manipulated for the second voice pair and participants were presented with the non-chosen voice. Replicating the findings by Hall and colleagues, only 29% of the participants detected this change.

Merckelbach, Jelicic, and Pieters (2011b, Experiment 2) investigated choice blindness for intensity ratings of one's own psychological symptoms. Their participants had to rate the frequency with which they experienced 90 common symptoms (e.g., anxiety, lack of concentration, stress, headaches etc.) on a 5-point **Likert scale**. Prior to a follow-up interview, the researchers inflated ratings for two symptoms by two points. For example, when participants had rated their feelings of shyness, as 2 (i.e., *occasionally*), it was changed to 4 (i.e., *all the time*). This time, more than half (57%) of the 28 participants were blind to the symptom rating escalation and accepted it as their own symptom intensity rating. This demonstrates that blindness is not limited to recent preference selections (Hall et al., 2010; Johansson et al. 2005), but can also occur for intensity and frequency ratings that rely on long-term episodic memory.

Inspired by these findings, Sauerland, Schell, Collaris, Reimer, Schneider, and Merckelbach (2012) tested blindness for one's own history of norm-violating behaviors. Specifically, they explored whether choice blindness might be relevant to suspects' **false confessions**. Participants were presented with an 18-item questionnaire about their history of norm violation which asked them to rate how often they had displayed each behavior on a 4-point Likert scale. Participants were later interviewed about four of those items, two of which had covertly been manipulated. For example, the response to the item "I have never committed small-scale shop lifting" was changed from *never* to *sometimes*. As expected, a substantial proportion (25%) of participants failed to notice changes of their own ratings. Importantly, detection varied as a function of the interval between completing the questionnaire and being interviewed about the manipulated outcome. Participants in Experiment 1 who were presented with the manipulated outcome after 10 minutes were more likely to notice the change in their response compared to Experiment 2 participants who were presented with the manipulation after a week (75% and 55%, respectively). Thus, the longer interval resulted in a decrease of the detection rate.

Together, these studies suggest that choice blindness can occur in a wide variety of situations. Although the mechanisms behind these effects remain unclear, we believe ambiguity may play a key role. It may be inherent to the *task*, as it is for example with evaluative choices (Hall et al., 2011; Johansson et al., 2005) which are less clear cut than tasks involving an objectively correct or incorrect outcome. In studies involving self-reported ratings, the items being measured are not easily defined (such as the intensity of one's symptoms), making changes difficult to detect. Finally, ambiguity can also be introduced by increasing the time between the decision and the presentation of the chosen item.

Choice Blindness in Eyewitness Settings

With these studies in mind, we wondered what the implications of choice blindness for eyewitness settings could be. After identifying a suspect from a **lineup**, eyewitnesses are frequently required to identify him/her again inside the courtroom. Consider a situation where the **lineup administrator** - intentionally or unintentionally - writes down a choice other than the one made by the witness. Given the current evidence on choice blindness, one might worry that a considerable proportion of eyewitnesses may not notice that change. This, of course, could have devastating consequences for the defendant.

We recently addressed this question in a study (Sagana, Sauerland, & Merckelbach, 2012, Experiment 1). Participants watched four video fragments, each showing a mock crime. Four different actors were involved in each fragment: a perpetrator, a victim, and two bystanders. After each fragment, participants were asked to identify each of the four actors from four different lineups (they were not given the option to reject a lineup). In total, participants had to make 16 identification decisions. After each decision there was a short delay before participants were presented with their choice again and asked to explain their decision. At this point, however, some of the participants' choices were manipulated so that they were presented with a *non*-chosen lineup member. To our surprise, 36 out of the 37 participants (97%) detected the manipulation. Furthermore, participants were highly accurate in their identification decisions in both manipulated and non-manipulated trials (both 73%).

In a follow-up experiment, we inserted a longer time interval between making the identification decision and being questioned. This not only created a more ecologically valid situation, but was also meant to increase the ambiguity of the situation. Specifically, participants were presented with the manipulated outcome 48 hours after their identification decision (Sagana et al., 2012, Experiment 4). Preliminary results from 30 participants showed that 21 (35%) out of 60 manipulated trials were not detected. Thus, choice blindness is a relevant factor in identification decisions, particularly when ambiguity is added to the task, resulting in possibly devastating consequences for the defendant and the judicial system.

Carry-Over Effects of Choice Blindness

Apart from the immediate impact of choice blindness, accumulating evidence indicates that this phenomenon may continue to influence decision making beyond the time of the initial manipulation. For example, in their face-preference study, Hall, Johansson, Tärning and Sikström (in preparation; as cited in Johansson et al., 2008) observed that when participants had to indicate their preference again in a second round directly following the first one, choice-blind participants were significantly more likely to select the manipulated face. In their study on symptom escalation and choice blindness, Merckelbach, Jelicic, and Pieters (2011a) found that blind participants were more likely to report increased symptom ratings at a re-test one week later. Similarly, Sauerland, Schell and colleagues (2012) noted that four

weeks after the initial interview, blind participants tended to increase their ratings on how often they had committed certain norm-violating behaviors.

Choice blindness can also influence how confident participants are in their ratings. In our line-up experiments (Sagana et al., 2012, Experiments 1, 4), eyewitnesses had considerably less confidence in their identifications when their decision had been manipulated, compared to non-manipulated identifications. This was true even for eyewitnesses who had noticed the manipulation. That means that participants' confidence ratings were deflated, even if they realized that a switch had taken place. Research on eyewitness identification shows that high confidence levels can be a reliable indicator of accuracy (Brewer & Wells, 2006; Sauerland, Sagana, & Sporer, in press; Sauerland & Sporer, 2009). The more certain witnesses feel about the identification, the higher are the chances that they are correct. However, if choice manipulations can alter confidence, then the linearity of the relation is destroyed and hence, confidence is no longer diagnostic of identification accuracy.

Final Remarks

The psychological literature on choice blindness shows that it is a robust phenomenon that persists across different modalities and different types of decisions. So yes, in retrospect, we cannot always determine what our original choice was. Under certain circumstances, our decisions may be sensitive to the manipulations of clever marketers, careless doctors, and ruthless police officers. However, choice blindness does not imply that human decisions are always sensitive to corruptive influences. We would likely notice if the person we are out on a date with was swapped, or if the color of the new car we just bought was different from the one we ordered. Instead, the current findings point to more ambiguous situations in which discrepancies between the choices made and the observed outcome may indeed go unnoticed. Nevertheless, in those situations, choice blindness can have serious implications for medical and judicial outcomes. Future research is needed to determine how, in those situations, choice blindness can be avoided.

From a scientific point of view, choice blindness is a fascinating phenomenon that has stimulated new research on the limits of human perception and decision making (Hall et al., 2010; Moore & Haggard, 2006). Future research examining the underlying mechanisms of this effect promises to be a fascinating endeavour, and we anticipate that choice blindness will be a key aspect in future discussions regarding decision making processes and preference formation.

Glossary

- **Change blindness:** Difficulty observers have in noticing changes to visual scenes, when the change is accompanied by some other visual disturbance.
- **Choice blindness:** Failure to detect changes in a decision outcome when the choice was covertly manipulated.
- **False Confession:** When a person confesses to a crime that they did not actually commit. Often occurs as a result of inappropriate interrogation and/or mental impairment.
- **Field study:** A research project conducted in everyday, real-world settings.

- **Gustatory stimuli:** Stimuli related to the sense of taste.
- **Introspection:** The act or process of self-examination, or inspection of one's own thoughts and feelings.
- **Likert-scale:** A rating scale commonly used in questionnaires when researchers want to measure the intensity (of an attitude, for example) or frequency of something. The respondent is asked to indicate their response (generally the level of agreement or disagreement with a statement) on a scale that is considered symmetric or "balanced" because there are equal numbers of positive and negative positions.
- **Lineup:** A lineup is constructed by placing a person suspected of committing a crime (the suspect) among a collection of innocent people (fillers). An eyewitness is asked to identify the offender from this collection, with a suitable admonition that the offender may not be present.
- **Lineup administrator:** The police officer who guides the witness during the lineup identification procedure. S/he provides instructions and takes notes regarding the identification decision.
- **Linear relationship:** A relationship in which any given change in an independent variable will always produce a corresponding change in the dependent variable.
- **Olfactory stimuli:** Stimuli related to the sense of smell.

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