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**The Magician's Choice: Providing illusory choice and sense of agency with the  
Equivoque forcing technique.<sup>1</sup>**

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## **Abstract**

Forcing techniques allow magicians to subtly influence spectators' choices and the outcome of their actions, and they provide powerful tools to study decision-making and the illusory sense of agency and freedom over choices we make. We investigate the Equivoque force, a technique that exploits semantic ambiguities and people's failure to notice inconsistencies, to ensure that a spectator ends up with a pre-determined outcome. Similarly to choice blindness paradigms, the Equivoque forces participants to end up with an item they did not choose in the first place. However, here, the subterfuge is accomplished in full view. In three experiments, we showed that the Equivoque is highly effective in providing participants an illusory sense of agency over the outcome of their actions, even after two repetitions of the trick (experiment 2), and using items for which pre-existing preferences can be present (experiment 3). Across all experiments, participants were oblivious to inconsistencies in the procedure used to guide their decisions, and they were genuinely surprised by the experimenter's matching prediction. Contrary to our prediction, the Equivoque force did not significantly change participants' preference for the chosen item. We discuss the results with regards to other illusions of agency (e.g. forcing, choice blindness), failures in noticing semantic inconsistencies (e.g. Moses illusion), and issues surrounding choice-induced-preference literature.

**Keywords:** forcing technique, equivoque, sense of agency, illusion of freedom, choice-induced preference.

## Introduction

We typically perceive ourselves as the causal agent of an event, even when our actions have no direct impact on the outcome. Such illusions of causality are well documented. For example, people often overestimate their ability to control random events (Langer, 1975; Presson & Benassi, 1996), or report illusory causality between unrelated events (Blanco, Matute, & Vadillo, 2011; Matute et al., 2015; Matute, Yarritu, & Vadillo, 2011). Wegner's apparent mental causation model suggests that our experience of willing an action simply arises from interpreting our thoughts as the cause of our actions (Wegner, 2002; Wegner & Wheatley, 1999). Wegner describes this as "the mind's best trick" (Wegner, 2003), in that we experience "conscious will" as we retrospectively attribute our action to the content of our thoughts. As we have suggested elsewhere (Pailhès & Kuhn, 2020c), people can also experience an apparent *action* causation, which provides the illusion that our *actions* caused an unrelated outcome of the event sequence.

Choice blindness is a cognitive failure that vividly illustrates the ease by which we fall into the trap of illusory causality, in that we fail to detect the mismatch between our choice and the outcome of this choice (Hall & Johansson 2008; Johansson Petter, Hall Lars, Sikstrom Sverker, & Olsson, 2005). In these experiments people consciously choose item A and fail to notice that they ended up with item B - the experimenter surreptitiously switches the chosen item for the rejected one. When asked to justify their choice, people often confabulate reasons to justify why they chose the previously rejected item, which suggests that we have poor insights into the cognitive mechanisms that drive our choices. Choice blindness is a robust phenomenon and it has been demonstrated in a wide range of domains (e.g. attitude formation, consumer choices, political preferences)(Hall, Johansson, Tärning, Sikström, & Deutgen, 2010; Hall et al., 2013; Johansson, Hall, & Sikström, 2008). These findings suggest that we actively

construct our sense of agency alongside the feedback that we receive following our choice (see also Nisbett & Wilson, 1977). In other words, we accept the switched outcome as our own.

Choice blindness relies on elaborate covert deception to conceal the switch between the participants' choice to the changed outcome (e.g. Hall, Johansson, Tärning, Sikström, & Deutgen, 2010; Hall et al., 2013; Stille, Norin, & Sikström, 2017). However, we believe that it is possible to experience an illusory sense of agency over an event outcome even when the deception is fully transparent. Unlike previous choice blindness paradigm, the Equivoque principle – a magicians' forcing technique – does not rely on elaborate covert deception and instead exploits linguistic ambiguities, and our tendency to ignore inconsistencies.

Magicians are highly experienced in controlling our attribution processes (Kelley, 1980) and magic tricks provide a useful tool to study these illusory causalities (Kuhn, 2019; Rensink & Kuhn, 2015). A growing number of scientists are using magic tricks to study a wide range of psychological processes, such as attention (Demacheva, Ladouceur, Steinberg, Pogossova, & Raz, 2012; Kuhn & Findlay, 2010; Kuhn & Tatler, 2005; Kuhn, Teszka, Tenaw, & Kingstone, 2016), perception (Kuhn & Rensink, 2016; Thomas & Didierjean, 2016b), problem-solving (Thomas & Didierjean, 2016a; Thomas, Didierjean, & Kuhn, 2018), and belief formation (Lan, Mohr, Hu, & Kuhn, 2018; Mohr, Lesaffre, & Kuhn, 2019). Another promising area of research has focused on magicians' forcing techniques. Forcing techniques, also called 'forces', refer to magic principles that allow magicians to covertly influence a spectator's choice or the outcome of this choice. Forcing is often used to produce effects such as predictions or mind-reading, and they provide powerful tools to study diverse psychological mechanisms related to decision-making and illusory sense of agency and freedom over choice.

We have recently started to categorize forcing techniques (Pailhès & Kuhn, 2019) and have identified two main types of forcing categories: The first group of forces rely on directly influencing the spectator's decision (Annemann, 1933; Banachek, 2002; Jones, 1994). These

*Decision forces* encompass a large number of techniques in which magicians covertly influence spectators' decision, and several of these techniques have been empirically investigated. For example, people can be covertly influenced by the positioning of a card among others (Kuhn, Pailhès, & Lan, 2020; Pailhès & Kuhn, 2020b), the timing on which cards are handled by the magician, subtly pushing the target card when the spectator's fingers are reaching the deck to take one (Shalom et al., 2013), the visual saliency of the target card (Olson, Amlani, Raz, & Rensink, 2015), or even subtle gestures that prime a specific card (Pailhès & Kuhn, 2020a). It is important to note that whilst many of these techniques are highly effective, there is no guarantee that they will work. This is why in these instances, the magician will require a backup plan in case the force fails.

The second category of forces, are *outcome forces*, and they provide the spectator with a genuinely free choice, but unknown to them, this choice has no impact on the outcome of the trick (i.e. the card or item the spectator ends up with). Unlike with the *decision force*, *outcome forces* guarantee that the spectator ends up the forced item, which is why they are frequently used by working magicians. To our knowledge, only one forcing principle that falls within this category – the Criss Cross force – has been studied scientifically (Pailhès & Kuhn, 2020c). Here participants are asked to cut to a playing card, and the magician uses a simple and transparent, yet highly deceptive procedure that ensures the spectator ends up with a predetermined card, rather than the one that he/she has cut to. We have recently shown that this type of force is highly effective in providing people with an illusory sense of agency over an outcome they did not control (i.e. they feel their card cutting actions had a direct impact on the card they received). A large number of different forces fall within this category, and many of them rely on a simple information gap or failure principle. In other words, the trick creates the illusion of a free decision in a situation where all choices lead to the same result, but the audience does not know that their choice has no impact on the outcome.

In this paper, we investigate one of these outcome forces called *Equivoque*. Also known as ‘the magician’s choice’, the Equivoque is one of the strongest tools mentalists can use to force a card or item (Banachek, 2009, p.22; Goldstein, 1976), and it uses semantic ambiguity when asking spectators to make choices. The magician predetermines a target card, or object, among others, and provides the spectator with a set of alleged free choices. These choices are framed in such a way that each decision leads to the same outcome. For example, the magician deals four cards on a table and asks the spectator, who we will call Bob, to touch two of them. From the beginning, the conjurer knows they want Bob to end up with the third card from Bob’s left. If Bob touches the two cards on his right, the magician keeps these choices and discards the others. If Bob touches the cards on the left, the magician discards these choices and keeps the ones on the table. In the second phase, the magician asks Bob to touch only one card, and this time if Bob touches the card on his far right the magician discards it and keeps the card. If Bob touched the one on the left, Bob is left with the predetermined card on the table. Although inconsistencies can appear in the magician’s action (e.g. once keeping the spectator’s choices, the next time discarding them, see figure 1), anecdotally the Equivoque produces a strong illusion of agency over the outcome card or item. The double entendre wording allows the spectator to be actively involved in the choices, but they have no impact on the outcome. In our example, the magician purposefully asks the spectator to “touch” the cards, and not to “pick” or to “take” or “choose”. Thanks to the ambiguity of this wording, the outcome of the spectator’s choice can be easily changed as the magician wishes. The performer simply removes the items they do not want the spectator to end up with.

We believe that the Equivoque relies on the spectator’s failure to register important inconsistencies in the selection process. In our day to day lives, we frequently accept small distortions even without noticing that they occurred. Indeed, much of research shows that we are highly adaptive and tolerant of distortions so that we can function more optimally (Erickson

& Mattson, 1981; Shafto & MacKay, 2000). Many of our daily cognitive operations are based on heuristics rather than systematic, analytical processes (Kahneman, 2002), and the “Moses Illusion” illustrates just how easily we tolerate inconsistencies. For example, when asked “*How many animals of each kind did Moses take on the Ark*”, most people answer “two”, even though they know that Noah, and not Moses, took the animals on the Ark (Erickson & Mattson, 1981). The Moses Illusion demonstrates that people often fail to notice anomalies, and this occurs despite knowing the correct answer, and fully processing the question (Bottoms, Eslick, & Marsh, 2010; Davis & Abrams, 2016; Song & Schwarz, 2008). The Moses Illusion is well documented and several theoretical accounts for its occurrence have been proposed (Reder & Cleeremans, 1990; Reder & Kusbit, 1991). The partial-match hypothesis states that the illusion results from an incomplete match between the question probe and the retrieved information (Kamas, Reder, & Ayers, 1996; Reder & Kusbit, 1991). Accordingly, when the input does not completely match the stored representation, we still accept the distortion as long as there is a sufficient match. In normal verbal conversations, we often encounter small inconsistencies (e.g. subtle linguistic errors) and ignoring such inconsistencies eases comprehension. Indeed, the more semantically and phonologically related the distortion is to the stored representation about what is asked, the less likely the cognitive system flags the mismatch, and the better the illusion works. Likewise, it has been proposed that if the erroneous term fits the global situation well or is out of focus, the anomaly can pass undetected (Sanford & Sturt, 2002). In much of our daily lives, ignoring such inconsistencies provides a useful strategy, or heuristic, to facilitate comprehension.

Similarly to the Moses illusion, we believe the Equivoque procedure is successful because people omit the possible inconsistencies happening to their choice, and the actions of taking away the selected items or the non-chosen ones are sufficiently similar not to be noticed. The inconsistencies in the magician’s actions are performed fluently and without drawing any



attention to them. Because of this, the spectator experiences an illusory sense of control over the forced card, and believe they freely chose it themselves.

Although the Equivoque is frequently used by magicians, and known to be a very powerful forcing principle (Annemann, 1933; Banachek, 2002, 2009; Turner, 2015), it has never been scientifically investigated. Research using forcing techniques have shown that participants tend to report free choices when they were objectively forced. Likewise, we argue that the Equivoque provides a powerful tool to study illusory agency over an outcome, as well as to investigate choice-induced preference effect.

The current paper presents three experiments. We aimed to provide empirical evidence of the efficiency of the Equivoque (Experiment 1), investigate its robustness when repeated on the same spectator (Experiment 2) and test whether this principle could be applied to items for which people have pre-existing preferences (Experiment 3). Moreover, our last experiment examined whether the Equivoque procedure can change people's attitudes towards the chosen object (i.e. their preference).

We confirm that for all three experiments we reported all measures, conditions, data exclusions and how we determined our sample sizes.

## **Experiment 1.**

The aim of the first experiment was to objectively evaluate whether the Equivoque can effectively force a card without people realizing that their choices had no impact on the outcome they get. In other words, we sought to investigate whether it was possible to induce an illusory sense of agency over the outcome card, which is predetermined and objectively forced by the experimenter. Moreover, we aimed to investigate whether the consistency of whether

participants' choices are always kept/discarded or not has an impact on how much control they feel over the outcome card. We predicted that participants would feel high levels of freedom and control over the outcome card even though they were manipulated. Research on the Moses Illusion suggests that we ignore semantic inconsistencies when they are presented within the context of a question, even when participants are encouraged to monitor for inconsistencies (Brédart & Docquier, 1989; Davis & Abrams, 2016; Erickson & Mattson, 1981; Song & Schwarz, 2008). We therefore expected participants to omit the inconsistencies of the experimenter's actions regarding their choice, and the procedure to be efficient regardless of the route consistency.

## **Methods**

### *Participants*

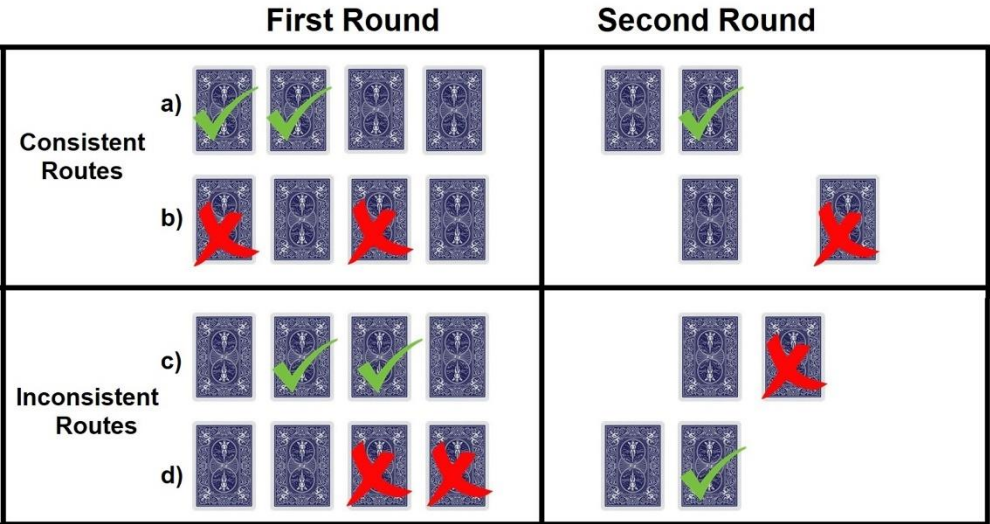
101 participants (56 females) were recruited on Goldsmiths University campus (Mean Age=26.6,  $SD= 10.11$ ). Goldsmiths Psychology Department provided ethical approval for the three experiments. We ran an a priori power analysis for a t-test with a power of .80,  $\alpha=.05$ , and a moderate effect size of .50. The output was a sample size of 101 participants. As the Equivoque was not previously investigated, we based our effect size estimate on the fact that the magic literature describes the force as a very powerful procedure (Annemann, 1933; Banachek, 2002; Turner, 2015).

### *Procedure*

The experimenter/magician sat at one of Goldsmiths' cafeteria tables with the 4 cards already laid out in a row on the table. Participants were invited to sit facing the experimenter

and signed the consent forms which also explained that the experiment was a study about decision-making and magic tricks.

The experimenter then proceeded to the Equivoque force, in which the forced card was always the same for all participants (i.e. the 3<sup>rd</sup> one from their left, always the 3 of Diamonds). First, the participants were asked to touch two cards. Depending on the cards the participant touched, the experimenter either discarded them by taking them away or kept them by taking away the two other cards. Then, participants were asked to touch just one card. This time again, depending on the card that was touched, the experimenter either took it away or took the other one away, to assure that the forced card was the only one left (see Figure 1). These actions were done casually and in silence, without any comments. This ended up in 4 possible routes, with two consistent and two inconsistent ones that the experimenter took note of (see Figure 1). After only the forced card remained on the table, the experimenter slightly pushed it towards the participant while saying “OK so this is your card, don’t look at it yet.”, and asked them to answer the questions on the paper questionnaire.



**Fig. 1.** Consistency of the possible Equivoque routes regarding the two rounds (steps) of the trick. At first, participants are asked to touch two cards of the four presented. Depending on whether one of the two touched cards is the target one (here 3<sup>rd</sup> card from the left, from the spectator’s point of view), the experiment either kept (a and c) or discarded them (b and d). Then,

when two cards are left (second round), participants are asked to touch just one card. Again, if the participant touches the target card (a and d) it was kept. If the other one was touched, the choice was therefore discarded (b and c).

First, participants were asked how free they felt about choosing the card they touched. We used this measure because it incorporates a key component of a successful forcing technique is that the spectator has to feel he or she is making free choices (Kuhn, Amlani, & Rensink, 2008; Pailhès & Kuhn, 2019, 2020b).

Second, and most importantly, participants were asked about how much impact they felt their choices had on the card they ended up with. We used this measure to assess participants' illusory sense of agency over the outcome of the card selection. Both questions were displayed with a scale from 0 (not at all) to 100 (extremely).

Before the debriefing, the experimenter revealed a prediction she had written down on a piece of paper (i.e. "You will choose the 3 of diamonds") and then asked the participants to look at their card (and not the other ones). This was an informal way to verify participants' sense of surprise when the magician successfully predicted their choice, and it provides an additional measure of whether they understood that their choice was forced. A more systematic measure of surprise was taken in our second experiment.

## **Results & Discussion**

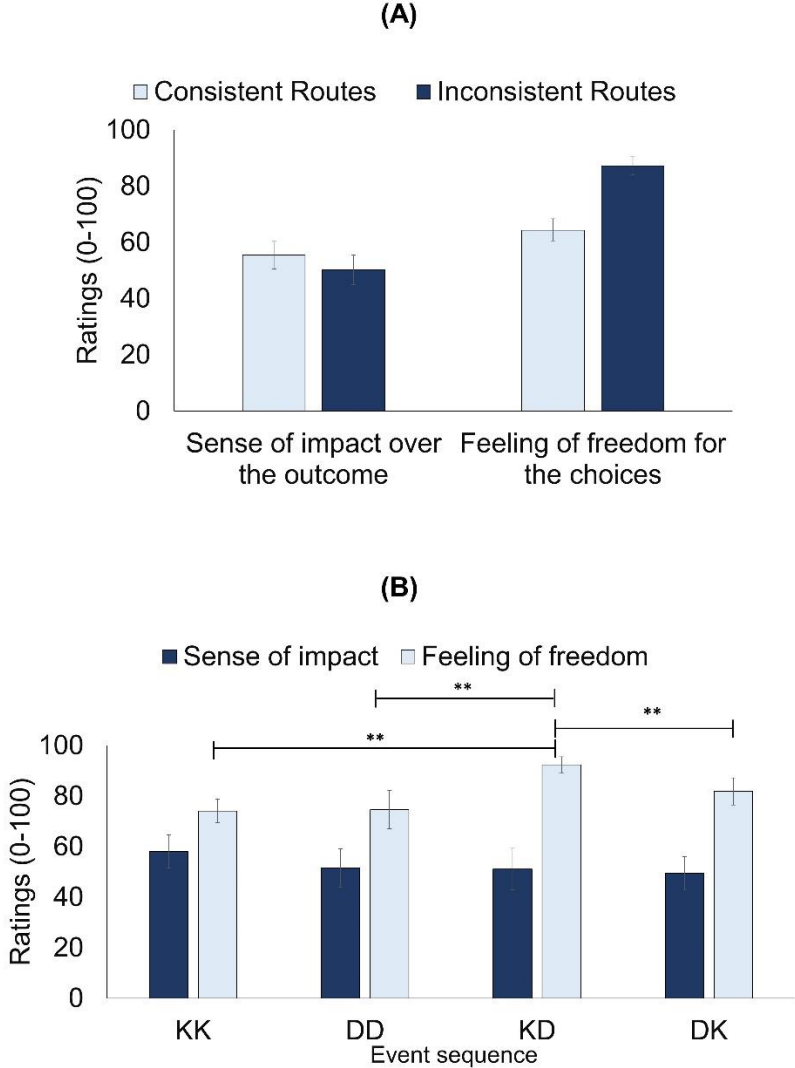
We excluded 4 participants from the analysis as the experimenter made some minor mistakes in the procedure, by miming a pushing or discarding gesture while asking participants to touch the cards.

Overall, participants felt a strong sense of freedom for touching the cards they wanted ( $M= 80.3$ ,  $SD=26.4$ ), and a moderate sense of control over the card they ended up with ( $M=53.1$ ,  $SD= 35.2$ ). When asked to justify their answer, participants typically reported that they did not

feel a very strong sense of control because only 4 cards were displayed from the beginning and they therefore could not have a large impact on the outcome (i.e. choosing one of the other 48 cards). We previously found similar ratings of sense of control ( $M=45$ ) in experiments using the Criss-Cross force (Pailhès & Kuhn, 2020c) and for which participants did not understand they were manipulated. However, higher ratings were found in our research using the Position force technique ( $M=82$ , Pailhès & Kuhn, 2020a). Contrary to the Position force, both the Equivoque and the Criss-Cross are outcomes forces, in which the magician physically intervenes during the trick. The Position force is a decision force, for which the magician simply asks the spectator to physically push a card among three others presented in a row. The force relies on the ease with which the forced card (third from participants' left) is the most easily reached by their dominant hand (most people being right-handed). Here, as in the Criss-Cross force, participants typically reported feeling moderately high levels of control over the outcome card. Even though they did not attribute it to the experimenter physically handling the selected cards (e.g. often reporting not being able to see the faces of the cards, being presented with a limited number of possibilities etc), we suggest it is possible that this factor unconsciously affected their ratings. It is common for people to confabulate the reasons for their thoughts and behaviours when they do not have access to the real ones (Johansson, Hall, Sikström, Tärning, & Lind, 2006; Nisbett & Wilson, 1977), and this phenomenon might play a part in the present results.

Figure 2A shows participants' freedom ratings and their impact over their chosen card, as a function of whether the chosen path was consistent or not. We examined whether path consistency influenced the participants' ratings. Consistent routes were trials on which the experimenter consistently either kept or discarded the touched cards. Inconsistent routes were trials in which the experimenter inconsistently kept or discarded participants' choices. Fifty-four per cent of the participants experienced consistent routes and 46% experienced inconsistent

routes. As the data were not normally distributed, we used two-tailed Mann-Whitney analyses, which showed no significant difference regarding the consistency of the routes on participants' feelings of impact over the final card ( $W=1078, p=.503, r_{rb}= -0.08$ ). However, contrary to our prediction participants reported significantly higher feelings of freedom over which card they chose for the inconsistent than consistent routes ( $W=1493, p=.015, r_{rb}=.276$ ).



**Fig. 2.** (A) Participants' sense of impact over the outcome forced card and their feeling of freedom for touching the cards they wanted according to (A) the consistency of the Equivoque routes and to (B) the specific event sequence they experienced. Their chosen cards were either first kept (K) or discarded (D) during the first and second rounds. Therefore, KK represents a route where participants' choices were kept for both rounds, DK

represents a trial in which participants' choices were first discarded and then kept, etc. Error bars represent the standard errors of the mean.

We were surprised by these findings and therefore examined the different decision routes more closely by separating them into 4 conditions depending on whether the experimenter first kept (K) or discarded (D) the two touched cards in the first round, and then kept or discarded the touched card in the second round. We therefore had 2 consistent (KK and DD) and 2 inconsistent (KD and DK) possible routes (see figure 2B). With regards to people's sense of impact on the outcome of the chosen card, A Kruskal-Wallis test found no significant effect of the different routes on participants' sense of impact over the outcome card ( $X^2(3, 97) = 0.98, p = .806, \eta^2 = .010$ ). However, there was a significant difference among the 4 different routes regarding participants' sense of freedom ( $X^2(3, 97) = 8.68, p = .034, \eta^2 = .079$ ). More specifically, a deviation contrast analysis showed that one specific inconsistent route (KD) led participants to feel significantly freer for their choice, ( $t(97) = 2.52, p = .013, d = .707$ ).

None of the participants expressed that they understood they were forced and that they understood the trick. The typical reaction after the experimenter revealed the prediction was surprise, and if not, to look at all the other cards to check if they were all the same (they were all different). These first results suggest that the Equivoque is a very effective forcing technique providing participants with the illusion that they freely selected one item out of four when they are in fact completely manipulated and forced to have a predetermined card. We cannot find any explanations for why participants felt significantly freer in the path for which their choice

was first kept and then discarded. We acknowledge that while it is one of the inconsistent paths, the sequencing of keep and then discard is unique in nature, considering the manual actions of keep and discard are not identical and might be perceived uniquely by the participant. As this result was unexpected, we investigated it further in our second experiment.

## **Experiment 2.**

The previous study showed that the Equivoque force is highly effective at providing people with an illusory sense of control over the outcome of an event even if they have no control over it. Participants were surprisingly oblivious towards the inconsistency in the choice procedure. In the second experiment, we firstly aimed to replicate these results and we wanted to further investigate the quirky results with regards to participants' higher freedom ratings for one specific route sequence (Keep – Discard).

Secondly, we examined whether the trick would lose its efficiency after being repeated twice in succession. One of the key rules in magic states that magic tricks that rely on the same method should never be repeated since this increases people's chances of discovering the secret method (Ekroll, De Bruyckere, Vanwezemael, & Wagemans, 2018; Kuhn, 2019). Indeed, much of the empirical research supports this view and tricks that rely on attentional misdirection (Kuhn & Tatler, 2005; Kuhn, Tatler, Findlay, & Cole, 2008) are far less effective when viewed for the second time. Recent studies have investigated the impact that repeated viewing has on magic tricks relying on perceptual mechanisms that are typically impenetrable to top-down control, and showed that they were considerably more robust to repetition than tricks based on attentional misdirection (Svalebjørg, Øhrn, & Ekroll, 2020). In the Moses illusion, the detection rates are higher under instructions that stress accuracy (Van Jaarsveld, Dijkstra, & Hermans, 1997). When participants are only required to monitor for distortions rather than answer the



questions, more inconsistencies are detected (Kamas et al., 1996). Moreover, it has also been shown that people detect distortions more often when the sentences' focus is on critical terms (Bredart & Modolo, 1988). We predicted that as trials progressed, participants would have more opportunities to detect the inconsistencies and understand they were forced, therefore feeling less impact on the outcome card. We expected the feelings of freedom to remain the same, as participants were indeed always free to touch the cards they wanted.

Our third aim was to measure the degree of surprise participants experienced when the experimenter revealed her matching prediction. Magic tricks elicit a wide range of emotional responses, but at the centre of the experience lies a cognitive conflict between the things we believe to be possible and the things we experience (Kuhn, 2019; Lamont, 2017; Leddington, 2017; Leddington, 2016). Curiosity resulting from such incongruity is marked by acute feelings of surprise and confusion (Brod, Hasselhorn, & Bunge, 2018; D'Mello, Lehman, Pekrun, & Graesser, 2014). The way in which a magic trick is framed can have a significant impact on how it is experienced. Here, since we only used four cards, there was a 25% chance of ending up with the predetermined card by chance; Although the principle itself is not powerful, Experiment 1 and some of our previous work (Kuhn et al., 2020) has shown that effects such as the reveal of a prediction card tends to elicit some surprise and wonder. Measuring participants' surprise when the choice matched their prediction therefore provides a more implicit measure of participants' understanding of the force and of the fact that they had no control over the outcome card. We predicted that the degree to which participants experienced an illusory control over the outcome card would positively correlate with the degree of surprise regarding the prediction.

## **Method**

## *Participants*

50 participants (36 females) were recruited on the Goldsmiths University campus (Mean Age=25.3,  $SD= 11.07$ ). Prior to the experiment, we ran a power calculation for a repeated-measures ANOVA, with  $\alpha = 0.05$ , a medium effect size of .25, power of .80 and a small correlation among repeated measures of .15, as we expected participants' feelings of control to gradually reduce over the repetitions. The output of the calculation was a total sample size of 46 participants.

## *Procedure*

The procedure was identical to the one we used in Experiment 1, except that we repeated the trick twice, therefore ending with three different trials of the Equivoque. The same measures of the feeling of freedom and sense of impact over the outcome were used after each trial. The same card (3<sup>rd</sup> from the participants' left, 3 of Diamonds) was forced for this experiment and each trial. Therefore, here, the Equivoque procedure always forced the card in the third position, regardless of which card the participants decided to touch (the value of which only matters on the final trial). Participants were asked to answer the questions regarding their feeling of freedom and sense of impact without looking at the face of the card. At the end of the third trial, the experimenter revealed the written prediction ("You will choose the 3 of Diamonds") after the participants looked at their card. This time, a measure of their feeling of surprise about the matching prediction was taken (from 0 not surprised at all to 100 extremely surprised). We also asked participants if they had any idea about how the trick was done before completely debriefing them.

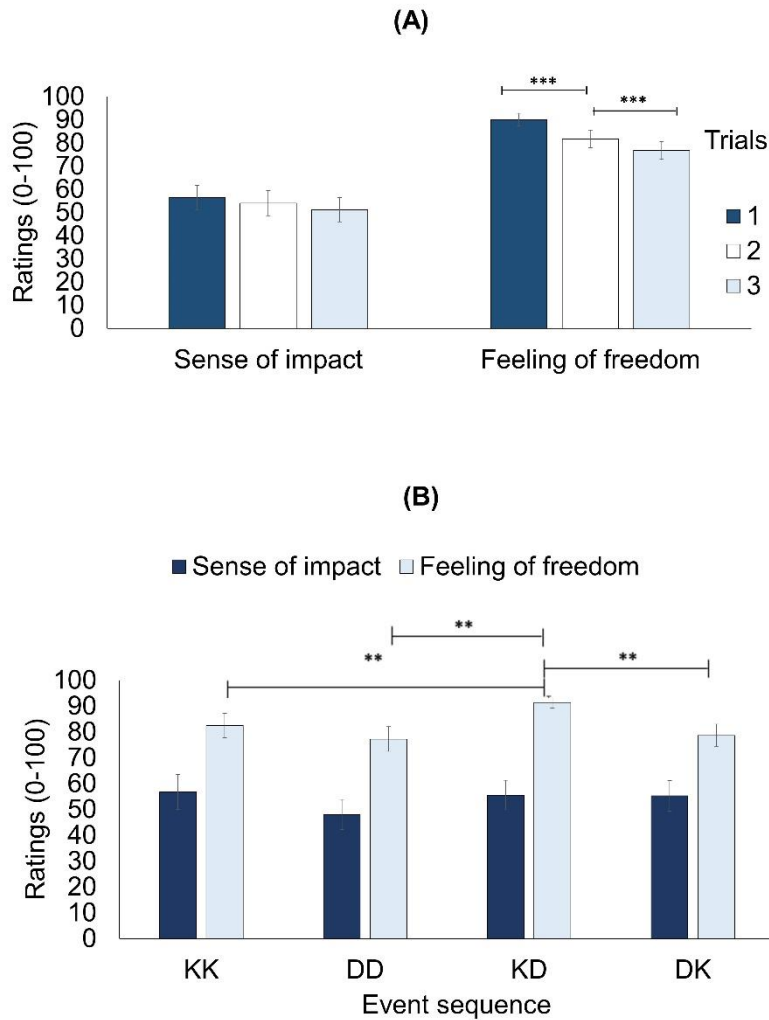
## **Results & Discussion**

As in experiment 1, the feeling of freedom for choosing which card(s) they touch was high ( $M=82.8$ ,  $SD=25.3$ ), and the sense of impact over the outcome card moderate ( $M=53.9$ ,  $SD=37.1$ ). We therefore replicate the results found in Experiment 1. The feeling of surprise at the end of the 3<sup>rd</sup> trial was also moderate ( $M=53$ ,  $SD=36.6$ ). Previous research investigating the Position force technique showed that participants also experienced a moderate sense of wonder ( $M=5.5$  on a scale from 1 to 10) regarding the magician's matching prediction. As we have previously suggested, these relatively low levels of ratings may rely on the fact that when presented with a magic trick, participants can assume that the magician will predict their choice under all circumstances (Kuhn et al., 2020).

### *Trials*

As data were not normally distributed, we used nonparametric tests throughout the analyses. A Friedman test of differences among repeated measures which showed that contrary to our predictions, participants' sense of impact over the outcome card did not differ among the trials ( $X^2(2,98) = 1.53$ ,  $p = .466$ , see Figure 3A). Therefore, even after two repetitions of the trick, participants did not understand that they were forced to have the card in the third position and that their choice had no impact on their outcome card. Some studies have investigated the effect of expertise on participants' oversight to semantic illusions (e.g. history graduates asked "In what US state were the forty-niners searching for oil?"). Results showed that expertise does not eliminate the illusion, even when errors were underlined or bolded (Cantor & Marsh, 2017). This suggests that even strong prior knowledge does not guarantee that we will notice inconsistencies and that we still often use adaptive heuristics and shortcuts. As the Equivoque seems to be related to such illusions, it is possible that the same type of shortcuts was used here,

even when participants had prior knowledge of the procedure and experienced it three times in a row.



**Fig. 3.** Participants’ sense of impact over the outcome forced card and their feeling of freedom for touching the cards they wanted (A) among the 3 trials. And (B) according to the specific route they experienced. Their chosen cards were either first kept (K) or discarded (D) during the first and second rounds. Error bars represent the standard errors of the mean.

Looking at participants’ feelings of freedom, a Friedman test showed that they felt significantly different levels of freedom among the trials ( $\chi^2(2,98) = 18.8, p < .001$ , Figure 3A).

A polynomial linear contrast analysis confirmed that participants' feelings of freedom for their choice significantly decreased over the 3 trials ( $t(50) 3.30, p = .001$ ). A possible explanation is that even though participants did not explicitly understand the trick and the fact that they were forced, they implicitly felt something outside their control was happening and leading them to end up with the same card.

### *Route consistency and event sequences*

We then looked at the impact of the route consistency on participants' feelings of freedom and impact across all trials. Looking at the routes across the trials, 58% participants in trial 1, 48% in trial 2 and 46% in trial 3 experienced a consistent route. Figure 3B shows participants' ratings according to the event sequence they experienced. A Mann-Whitney test showed that whether the two rounds were consistent ( $M=51.7$ ) or not ( $M=56.1$ ) had no significant effect on participants' sense of impact over the outcome card ( $W=2961, p = .573, r_{rb} = .053$ ). Likewise, participants' feelings of freedom for their choice did not significantly differ in consistent ( $M=79.6$ ) or inconsistent ( $M=86.2$ ) routes ( $W= 2968, p = .539, r_{rb} = .055$ ).

Next, we took a closer look at the impact that the different decision routes had on our measures. Figure 3B shows the sense of freedom and impact ratings for each decision route (final trial). A Kruskal-Wallis test ( $X^2(3, 50) = 9.94, p = .030, \eta^2 = .051$ ) and a deviation contrast analysis ( $t(50) 2.62, p = .010, d = .545$ ) replicated the results from Experiment 1 in that participants felt significantly more free for their choice of cards in the inconsistent route first keeping the touched cards and then discarding the touched one. As in Experiment 1 however, the type of sequence had no significant effect on participants' sense of impact ( $X^2(3, 50) = 1.44, p = .697, \eta^2 = .009$ ). Something leads participants to retrospectively feel they were freer to

choose which cards to touch when the experimenter first kept their choice and then discarded them. Even though in all possible event sequences participants were equally free to touch the cards of their choice, this particular sequence leads them to feel an illusory higher degree of freedom for their choice. Although these results were not expected in the first place, we replicated them again. Therefore, this effect does not seem random. The experiment was conducted by a different person who was blind about the effect found in Experiment 1. We can therefore confidently say this is not due to the person performing the trick. It is possible, though we are simply speculating, that the act of keeping and discarding chosen items are inherently different, and participants might intuitively expect touched/chosen items to be subsequently kept, and different outcomes (e.g. one's choices being kept and discarded) following the same action (e.g. touching the items) might produce a greater feeling of freedom when asked to judge it.

### *Surprise*

Finally, we looked at participants' degree of surprise after discovering the matching prediction and its correlation with their feelings of freedom and impact over the last trial. As predicted, there was a significant positive correlation between the degree of impact participants felt they had over the outcome card and the amount of surprise they reported regarding the prediction ( $r_s=.305$ ,  $p = .031$ ). No statistically significant correlation was found between the feelings of freedom over the touched cards and the degree of surprise ( $r_s = .195$   $p = .175$ ). These results confirm our prediction that when participants experienced an illusory sense of agency over the outcome card, they did not understand that their choice was pre-determined. The last trial's route consistency ( $W= 241$ ,  $p = .171$ ,  $r_{rb} = -.226$ ) and event sequence ( $H(2, 50) = 2.01$ ,  $p = .570$ ) did not have an impact on participants' level of surprise.

This second experiment replicates findings from Experiment 1 and confirms that the Equivoque is a powerful technique to provide an illusory sense of agency over a predetermined outcome. Moreover, it shows that the force is still efficient after being repeated twice in succession. Participants' feeling of surprise provides a reliable implicit measure of participants' understanding of the trick. Finally, and to our surprise, we replicated the results regarding participants' feelings of freedom in the keep/discard inconsistent route. Unfortunately, we cannot find any explanation for this strange effect, and it might be worth investigating further.

### **Experiment 3**

Our third experiment had two aims. Firstly, we examined whether the Equivoque force is effective when participants make choices about items where they can have strong a priori preferences. The magic literature suggests that this force can be used with items other than playing cards (Jones, 1994; Turner, 2015), and we therefore expected participants to experience an illusory sense of agency over the outcome when choosing objects that have clearly different levels of value (i.e. holiday destinations).

Secondly, we examined whether the force can induce a preference change for the forced item. Previous research has shown that it is possible to induce a preference for an item when the person thinks they chose it (Coppin, Delplanque, Cayeux, Porcherot, & Sander, 2010; Rozin, Scott, & Dingley, 2011; Sharot, Martino, & Dolan, 2009; Sharot, Velasquez, & Dolan, 2010), and it has been suggested that mental process of making a choice changes someone's preferences (Brehm, 1956). However, it is possible that the act of choosing simply reveals pre-existing preferences (Chen & Risen, 2010). Moreover, many of these previous experiments suffer from important methodological flaws, allowing participants' real preferences to guide their choices (Chen & Risen, 2010; Risen & Chen, 2010). To address this issue, some authors have invented procedures such as blind choice (Sharot, Velasquez, et al., 2010) or choice

blindness paradigms (Johansson, Hall, Tärning, Sikström, & Chater, 2014) and have shown similar effects. Some of the research using choice blindness paradigms suggests that it is possible to induce a preference change for the switched item (Johansson, Hall, & Chater, 2012; Johansson et al., 2014). Johansson and colleagues (2014) asked participants to choose which of a pair of faces they found the most attractive, and covertly switched the chosen face for the other. Participants then had to justify their alleged choice and rate both faces. Then, the authors included a second round of choices with the same face pairs (and no manipulation of the choices), as well as another stage of post-choice attractiveness rating of the faces. Participants tended to choose the initially rejected face more frequently in the second round and the perceived attractiveness increased when they were led to believe they chose it. In other words, when participants make a blind choice which cannot be guided by pre-existing preferences, they end up preferring the item they believe was their choice. The Equivoque force provides a tool to address previous criticism on preference change, as participants' preferences are not guiding by the outcome of the procedure. Moreover, the Equivoque relies on a much flexible procedure than typical choice blindness paradigms, which means it could potentially be easily implemented in context where people make choices that have real consequences (e.g. food or objects). Here, we investigate whether participants can be led to prefer a holiday destination because they think they chose it.

We predicted that the Equivoque can effectively force the choice of an imaginary holiday destination. Moreover, we predicted that participants would prefer the forced holiday destination when they experienced an illusion of choice, that is, in the Equivoque procedure rather than in a situation where the experimenter explicitly states they are forcing the participants to have the outcome item.

## **Method**



### *Participants*

84 participants (55 females) were recruited on the Goldsmiths University campus (Mean age= 24.1, SD=7.70). The sample was therefore similar to the two previous experiments.

We ran an a priori power analysis for a t-test with independent groups, a power of .80,  $\alpha = 0.05$ , and  $d=.55$ . We based the effect size on two main things. First, based on the two prior experiments, we expected a medium to strong effect of the Equivoque procedure on participants' sense of agency over their choice when compared to an explicit forced-choice procedure. Second, we suggest the Equivoque resembles a choice blindness paradigm which follows Risen and Chen's recommendations (Risen & Chen, 2010) and has shown medium to strong effect sizes on participants' induced preference change (Johansson et al., 2014). The output of the calculation was 84 participants.

### *Procedure*















To investigate our hypotheses, we used 4 holiday destinations written on 4 blank pieces of paper (10x5cm). The destinations were chosen based on an online pilot study for which participants had to rate how much they liked each of 16 different holiday destinations on a scale from 0 to 100. We took the 4 destinations which had close mean results to avoid any bias in pre-existing preferences (means from 71.5 to 76.2). As in previous experiments, the experimenter sat at a table in one of Goldsmiths' cafés with the 4 holiday destinations already on the table. These were always presented in the same order (Sydney, Bali, Paris, Mykonos) for each experimental group and participant, and Paris was always the forced destination.

Participants were randomly allocated to one of two experimental conditions (Equivoque vs. Explicit Force, see Figure 4). In the Equivoque, the experimenter stated, "Here are 4 holiday destinations", and then proceeded to the usual Equivoque procedure by asking participants to

touch two of them, discarding or keeping their choice, and then asking to touch one of the two which were kept on the table. At the end of the Equivoque procedure, as Paris was the last destination on the table, the experimenter slightly pushed it towards the participants while saying “OK, so here is your destination” and asked participants to answer the questions on the paper questionnaire.

In the Explicit Force condition, we tried to keep the event sequence as close as possible to the Equivoque, while making it obvious that participants ended up with Paris because the experimenter explicitly chose it for them. For this, the experimenter started by saying “Here are 4 holiday destinations. For this exercise, you are going to have Paris. Before I give it to you, could you please touch two destinations?”. The experimenter waited for the participants to touch two destinations, and then simply asked them to touch only one. Like this, participants made the same number of choices, but the Equivoque procedure was not implemented (keeping or discarding the choices to force one of them). In other words, the experimenter did not touch the choices made by the participants.

Participants were then asked to fill in the paper questionnaire. First, they were asked to rate how much they liked each of the 4 destinations, how free they felt about touching the destinations they wanted, and how much impact they felt these choices had on the final destination. Participants were also asked to state how much they agreed with the statement “I was the one choosing the final destination”. After filling in this first part, the experimenter asked participants to open the prediction which was on the table from the beginning and in which “You will choose Paris” was written. Participants then had to rate how surprised they were about this matching prediction. All the measures were taken on a scale from 0 to 100.

Equivoue	Explicit Force
<p>Here are 4 holiday destinations. Could you touch 2 of them?</p> 	<p>Here are 4 holiday destinations. For this exercise you are going to have Paris. Before I give it to you, could you touch 2 destinations?</p> 
	
	
<p>Perfect, now could you touch just one of them please?</p> 	<p>Perfect, now could you touch just one of them please?</p> 
	
	
<p>Great, so here is your destination.</p> 	<p>Great, so here is your destination.</p> 

**Fig. 4.** Equivoue and Explicit Force procedures representing the two experimental conditions.

## Results

Participants' overall feelings of freedom ( $M=81.4$   $SD=22.9$ ), sense of impact ( $M=52.6$ ,  $SD=33.5$ ) and level of surprise ( $M=54$ ,  $SD=39.1$ ) were similar to those of experiments 1 and 2.

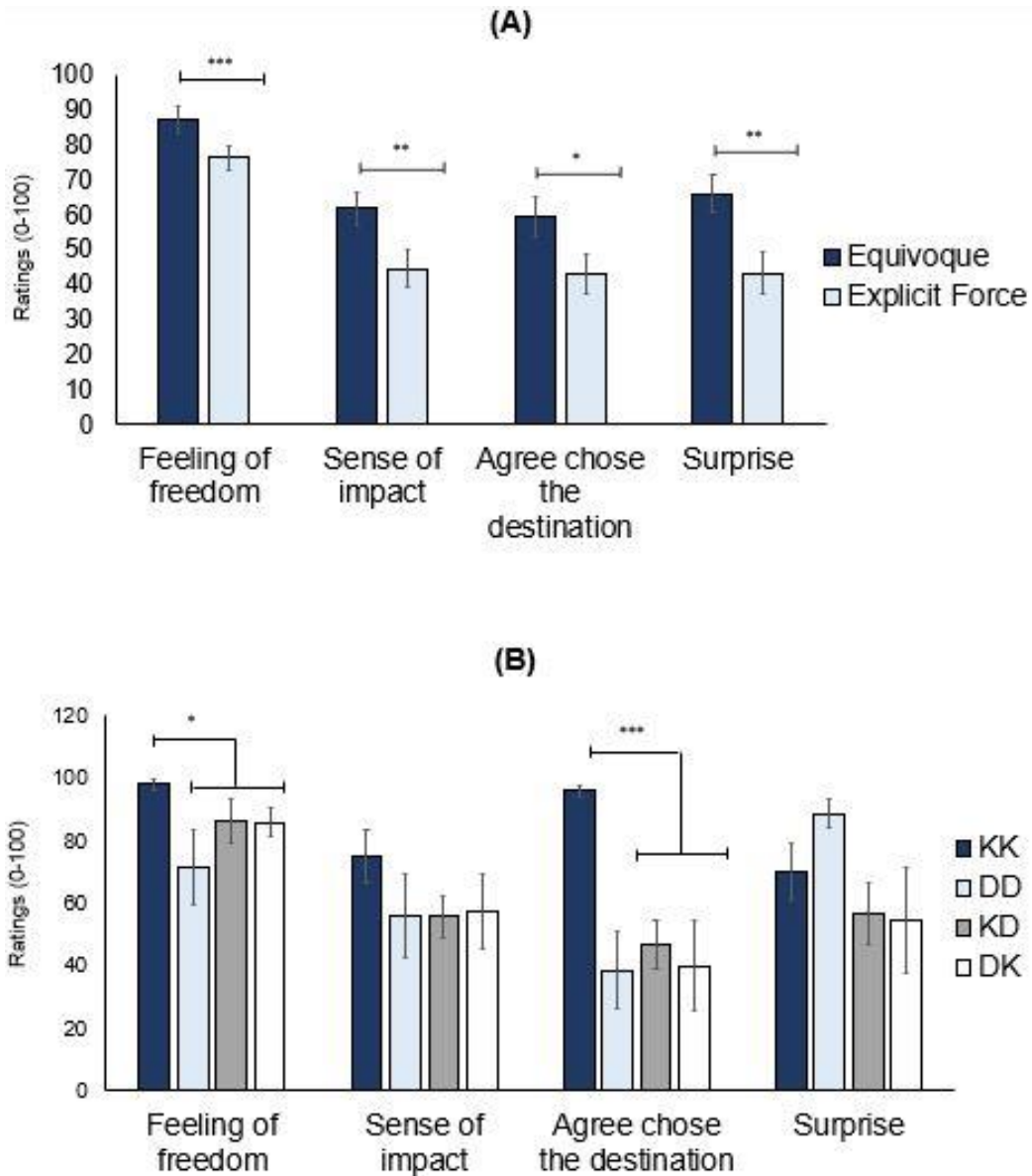
Again, data were not normally distributed and we used nonparametric tests throughout the analyses.

### *Equivoque Efficiency*

Figure 5A shows the mean ratings as a function of whether the choice was forced, using the Equivoque or the explicit force. Participants felt significantly more impact over the outcome destination ( $W=1138$ ,  $p=.010$ ,  $r_{rb}= .293$ ) and freer for touching the destinations they wanted ( $W=1210$ ,  $p=.001$ ,  $r_{rb}= .375$ ) in the Equivoque procedure ( $M$  impact=61.8,  $M$  freedom=87.1) than in the Explicit Force condition ( $M$  impact=44.3,  $M$  freedom=76.1).

Likewise, they significantly agreed more with the statement "I was the one choosing the final destination" ( $W=1110$ ,  $p=.019$ ,  $r_{rb}= .262$ ) and were more surprised by the matching prediction ( $W=1175$ ,  $p=.004$ ,  $r_{rb}=.336$ ) with the Equivoque.

These results illustrate that the Equivoque force is also effective in situations where people have a priori preferences for an item. In other words, these results suggest that it is possible to make people feel they freely chose a specific holiday destination even though they were objectively manipulated toward it.



**Fig. 5.** (A) Mean ratings of participants feeling of freedom to touch the destinations of their choice, sense of impact over the final destination, agreement that they were the ones choosing the destination, and surprise regarding the matching prediction according to the experimental conditions. Bars display standard errors of the means. Figure (B) represents the means according to the event sequence in the Equivoque condition. Bars display standard errors of the mean. \*  $p < .05$  ; \*\*  $p < .01$  ; \*\*\*  $p < .001$ .

*Route consistency and event sequence*

Next, we looked at participants in the Equivoque condition only, and the impact of route consistency and specific event sequence on participants' ratings (Figure 5B). With the Equivoque, 47.5% of participants experienced a consistent route and 52.5% an inconsistent one. Mann-Whitney tests show that route consistency did not have a significant effect on participants' feelings of freedom for their choice ( $W=185, p = .677, r_{rb} = -.073$ ), sense of impact over the final destination ( $W=142, p=.123, r_{rb}=-.286$ ) or surprise over the matching prediction ( $W=169, p = .059, r_{rb}=-.348$ ). However, consistency had a significant impact on how much people agreed they were the ones choosing the destination ( $W=96, p = .005, r_{rb}=-.519$ ), with people experiencing a consistent route feeling they were the ones choosing the destination more than participants experiencing inconsistent routes (Means= 74.7 vs 44.9). Looking closer at the event sequences, Kruskal-Wallis tests followed by deviation contrast analyses showed that participants felt freer for touching the destinations they wanted ( $X^2(3, 84) = 9.95, p = .019, \eta^2=.148$  and  $t(84) 2.11, p = .042$ ) and that they were the ones choosing the outcome destination ( $X^2(3, 84) = 20.62, p < .001, \eta^2=.474$  and  $t(84) 5.66, p < .001$ ) significantly more when their choices were kept in both rounds (KK event sequence, Figure 5B). This makes sense as it is possible that participants who experienced an event sequence in which their choices were kept in both rounds are participants who consciously chose the forced destination by themselves (i.e. touching the destination in both rounds). However, no significant effect of the event sequence was found for participants' sense of impact over the final destination ( $H(3, 84) = 4.37 p = .224, \eta^2=.089$ ) or amount of surprise ( $H(3, 84) = 4.60, p = .203, \eta^2=.125$ ).

### *Surprise*

Next, we looked at participants' levels of surprise regarding the matching prediction "You will choose Paris". Overall, Spearman correlations show that the more participants felt their choices

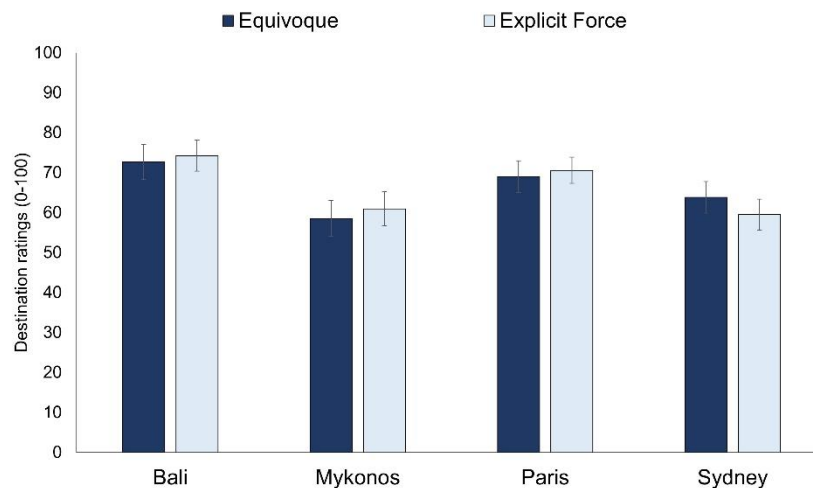
had an impact on the final destination, the greater was the amount of surprise regarding the matching prediction ( $r_s = .299, p = .003$ ). Likewise, the more participants felt that they were the ones choosing the destination, the more surprised they were ( $r_s = .358, p < .001$ ). However, as predicted, the feeling of freedom over which destination to touch did not correlate with participants' surprise ( $r_s = -.078, p = .759$ ).

Looking at participants in the Equivoque condition only, there was no statistically significant correlation between their sense of impact ( $r_s = .048, p = .770$ ), feeling of freedom ( $r_s = .055, p = .736$ ), or feeling that they were the ones choosing the destination ( $r_s = .122, p = .452$ ) and their amount of surprise. It was common for participants to try to rationalize what just happen regarding the matching prediction in this condition. When asked to explain their low ratings of surprise even when they felt they were the ones controlling the final choice, participants typically reported that the experimenter probably knew Paris was the most commonly chosen destination, or that Paris was obviously the best one, or the geographically closest one, so they assumed it was the reason for the successful prediction.

### *Induced choice preference*

Finally, we examined whether the Equivoque induced a preference towards the forced destination (i.e. Paris, see Figure 6). Looking at the destinations' rating participants reported preferring Bali ( $M=74.5, SD=26.5$ ) and then Paris ( $M=69.9, SD=23.1$ ), Sydney ( $M=61.8, SD=25.2$ ) and Mykonos ( $M=59.7, SD=28.2$ ). We ran a 2x4 Kruskal-Wallis test to investigate the differences in ratings across the different destinations and experimental conditions. The destinations were rated significantly differently ( $H(3) = 17.5, p < .001, \eta^2 = .047$ ).

Contrary to our prediction, participants preferred Paris slightly more in the Explicit Force condition ( $M=71.6$ ,  $SD= 21.9$ ) than in the Equivoque one ( $M=67.9$ ,  $SD=24.6$ ) ( $H(1) = .002$ ,  $p = .965$ ,  $\eta^2 = .000$ ).



**Fig. 6.** Participants ratings of how much they like the destinations according to the experimental conditions. Bars display standard errors of the means.

Looking at participants in the Equivoque condition only, Spearman correlation shows that the more participants felt they were the ones choosing the destination, the more they preferred the forced destination over the others ( $r_s = .497$ ,  $p = .001$ ). However, when omitting the participants who chose Paris in both rounds of the Equivoque (KK event sequence, who are therefore highly likely to have a pre-existing preference for it), the correlation disappears ( $r_s = .319$ ,  $p = .105$ ). These results suggest that the induced choice preference effect might be smaller than what is reported in the literature (Coppin et al., 2010; Coppin, Delplanque, Porcherot, Cayeux, & Sander, 2012; Harmon-Jones & Harmon-Jones, 2002; Imada & Kitayama, 2010; Kimel, Grossmann, & Kitayama, 2012; Lee & Schwarz, 2010; Sharot et al., 2009; Sharot, Shiner, & Dolan, 2010), or based on methodological limitations allowing for pre-existing preferences to guide participants' choices. Indeed, some authors already pointed out



that free-choice paradigms used to investigate preference change rather created an artificial spreading of alternatives than a true reflection of preference change (Risen & Chen, 2010). Moreover, a meta-analysis (Izuma & Murayama, 2013) showed that the big effect sizes found in most papers drop when the issues are addressed and recommendations are followed.

It is worth noting that of the 44 participants in the Explicit Force condition, 11 did not remember that the experimenter told them that they were going to have Paris, and they were really surprised about the prediction ( $M=91.4$ ,  $SD=8.09$ ). They also agreed that they chose the destination to a greater extent than the participants in the Equivoque condition ( $M=64.1$  vs  $59.1$ ). We carried out an additional analysis that excluded these participants - all the results remained the same, with even stronger effect sizes. We were however rather baffled that in such explicit conditions, participants could completely forget the experimenter instructions and ended up thinking they chose the force destination by themselves. Moreover, only one of them ended the second round by touching Paris. The fact that participants ended up with the forced destination next to them on the table (as the experimenter pushed it towards them and asked them to take it) combined with reading the prediction “You will choose Paris” may have produced a form of suggestion and misinformation leading people to misremember the sequence of event.

It has already been shown that more suggestible participants (i.e. perceiving a key bending when it was stationary) were also significantly more likely than others to omit that the performer verbally suggested it (i.e. “The key is still bending”)(Wiseman & Greening, 2005). This effect could be interpreted in several ways. It is possible that the participants who did not remember the experimenter’s instructions simply did not attend to this piece of information (i.e. “You will have Paris”). It is also possible that the situation combining reading the prediction and having the forced destination close to them exerted some sort of misleading information,

having an impact on participants' memory of the event. This second interpretation seems more likely, as even if participants did not attend the experimenter's instructions, we would still have to explain why they think they chose the destination themselves. We suggest that this effect could be worth investigating further in future research, as this could have important practical implications, especially linked in eyewitness testimonies and other judiciary situations such as criminal identifications. These results are also very closely linked to choice blindness effects, during which participants fail to see the mismatch between their choice and the outcome of this choice (Hall & Johansson, 2008; Hall et al., 2010). For example, it has been shown that it is possible to covertly change participants' political attitude responses on a survey and make them accept and endorse this altered political score (Hall et al., 2013).

## **General Discussion**

This paper describes three studies that explored a magician forcing technique called the Equivoque. In all experiments, participants were forced to end up with a target item (i.e. playing card or holiday destination) while the trick's procedure led them to feel they freely chose this item themselves. Our results show that participants experienced an illusory sense of agency over the outcome (their chosen item) even though their actions had no impact on it. Regardless of whether the experimenter was consistent or not with participants' choices (i.e. whether the choices were always kept/discarded or not), participants felt that their decisions had the same amount of impact on the outcome they got.

Our findings support previous results showing a dissociation between our subjective sense of control and the objective one (Gauchou, Rensink, & Fels, 2012; Haggard, Martin, Taylor-Clarke, Jeannerod, & Franck, 2003; Olson et al., 2015). This past research shows that

at times we may feel that we are not in control of our own actions when in fact we are (Hon, Poh, & Soon, 2013; Olson, Landry, Appourchaux, & Raz, 2016; Terhune & Hedman, 2017). Likewise, we may fail to understand that we are not the ones controlling external circumstances (Aarts, Custers, & Wegner, 2005; Sato & Yasuda, 2005; Tobias-Webb et al., 2017). Our results also dovetail findings from choice blindness research, which show that people often fail to recall a choice immediately after having made that choice. However, in choice blindness paradigms, elaborate covert deceptive procedures are used to conceal a switch between participants' choice and the changed outcome (Hall & Johansson, 2008; Hall et al., 2010; Johansson et al., 2008). In the Equivoque procedure, the deception is fully visible and yet participants still believe they chose the outcome. Our results have important theoretical and practical implications. For example, we have implemented the Equivoque procedure in an online game and shown that gamers can feel in control of the story presented to them when they are not (Kumari, Deterding, & Kuhn, 2018; Kumari, Deterding, Pailhès, & Kuhn, in preparation). More worryingly, this type of deception could potentially be exploited in other decision-making processes such as in consumer behaviours and politics (Hall et al., 2010, 2013).

Similarly to the Moses Illusion (Erickson & Mattson, 1981), people fail to notice inconsistencies in their environment. In this illusion, participants often fail to notice contradictions with stored knowledge, and many errors are overlooked. In the Equivoque, participants also failed to notice the discrepancies between what the experimenter did with their chosen items. If participants noticed this discrepancy, they should understand that they were not controlling the outcome item. This cognitive failure led participants to experience an illusory sense of agency over the outcome of their action. People's failures to catch semantic errors can result from a type of knowledge neglect (Bottoms et al., 2010; Bredart & Modolo, 1988), and we suggest that the Equivoque force relies on a form of 'event neglect' in which people fail to catch inconsistencies in their environment. Since the procedure is performed

fluently no attention is drawn to the inconsistent actions, the experimenter's incoherencies are easily overlooked.

One of the golden rules in magic is not to repeat the same trick with the same method (Ekroll et al., 2018). Experiment 2 showed that the Equivoque remains effective after being repeated twice, which suggests that the procedure is very robust. However, across the two first experiments, participants reported moderate feelings of impact over the outcome card (Exp 1  $M=53.5$ , Exp 2  $M=61.8$ ). It was common for participants in the first two experiments to explain these ratings by stating that since only a few items were presented there was limited choice. Others claimed that since the choices were meaningless (because cards were used and there were 'no stakes') their actions had little consequence. In the final experiment participants were asked to choose an item for which people have genuine preferences, and indeed we observed higher ratings. It is important to note that even though the ratings were moderate, during debriefings when asked whether they knew how the prediction had been achieved, very few participants expressed that they understood the procedure (none in experiments 1 and 2).

Our third experiment assessed whether the Equivoque can force a choice for which people have pre-existing preferences (i.e. holiday destinations). Our results showed that participants could be led to believe they chose Paris as their destination even when this outcome was forced. These results illustrate that the Equivoque is not limited to playing cards, but can be applied to other items. This last experiment also investigated whether the Equivoque could induce a preference for the forced item. Previous studies have shown that people tend to prefer an item over others if they believe they chose it (Coppin et al., 2010; Johansson et al., 2012; Sharot et al., 2009). Our participants did not prefer the forced holiday destination compared to when they were explicitly given that item. Even though there was a significant correlation between how much participants felt they were the ones choosing the destination and their amount of preference for it, this correlation was weaker and not statistically significant once

we removed participants who were likely to have had a pre-existing preference for the forced outcome (i.e. touching it in each round of the procedure). This caveat is important in the contexts of some of the past literature on induced choice preference. Risen and Chen (2010) already pointed out important methodological flaws in these past paradigms, and argued that the evidence for this effect was insufficient and unreliable. However, most studies continued using the traditional free-choice paradigm without addressing these methodological limitations, and a meta-analysis (Izuma & Murayama, 2013) casts more doubt on these findings. Two points therefore seem important to note here. Firstly, our study, using the Equivoque procedure, provides a way to investigate the effect by addressing some of the previous methodological criticism: the task does not reflect participants' preference, as the same item is always forced by the experimenter. With this in mind, our results do not provide any evidence for an induced preference over the final item, which adds to the suggestions that the real effect size is smaller than what was previously reported (Izuma & Murayama, 2013). Our results do however, conflict Johansson et al. (2013) who used a choice blindness procedure to show moderate to strong effect sizes of the induced choice preference. Although there are similarities between our paradigms, there are two important differences that may account for this discrepancy. Firstly, choice blindness paradigms are by nature about preferences. Participants are not required to only choose one item among several, but make a choice that is based on their preference (e.g. faces attraction, political opinions, taste preferences...). As participants rate the switched item, they erroneously believe it is an item they preferred in the first place. This erroneous belief might account for the preference change effect in this type of paradigm. Secondly, the induced preference may have resulted from asking participants to justify their 'choice'. Johansson and colleagues asked participants to justify their alleged choice (i.e. the firstly rejected item switched for the chosen one) before asking them to rate it. Therefore, it is possible that elaborating a confabulation about a choice induce a cognitive dissonance (Brehm,

1956) itself leading to an induced preference for the item. In our study, participants were not asked to justify their alleged choice, and this might have been why we failed to see an induced choice preference for the forced item.

Finally, experiment 3 also provided unexpected and surprising results. In the Explicit Force condition, the experimenter explicitly stated that she was going to give them the target destination in the end (“You will have Paris”), and yet 25% of the participants forgot this statement. Moreover, these participants were genuinely surprised when the experimenter revealed the prediction about their “choice”. In this condition, participants’ manual touching actions had literally no impact on the outcome, and yet they erroneously believed they had chosen the item. Our memory is highly malleable (Loftus, 2005), and previous studies have demonstrated that misleading post-event information can affect people’s memories (Loftus & Hoffman, 1989; Wright & Loftus, 1998). It is possible that a conjunction of choice blindness (i.e. our participants failing to see the difference between *their* choice and the forced outcome they had) and misinformation effect (i.e. “You will choose Paris” written prediction) impacted our participants’ memory of the events, leading them to think they chose the target destination in the first place. Others have shown that merging choice blindness paradigm and the misinformation effect can affect eyewitnesses’ recollections of an event (Stille et al., 2017), and create memory distortions (Pärnamets, Hall, & Johansson, 2015). Our results dovetail with these findings and suggest the same results can be created with participants’ memory of what they chose.

To conclude, we show that Equivoque force provides people the illusion of choice, when in reality their action had no impact on the outcome. Participants were oblivious to inconsistencies in decision paths, even when the procedure was repeated several times. Our paper shows that this forcing principle is not limited to playing cards, but can be applied to situations in which people chose items for which they have pre-existing preferences. These

findings open up the possibility of applying this principle to areas where it is desirable to provide people the illusion of choice (e.g. gaming). The Equivoque force demonstrates the ease by which we can experience an illusory sense of agency over the outcome of our actions, and highlights a surprising blindness over semantic inconsistencies in event sequences.

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