Influencing choices with conversational primes: How a magic trick unconsciously influences card choices

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Past research demonstrates that unconscious primes can affect people's decisions. However, these free choice priming paradigms present participants with very few alternatives. Magicians' forcing techniques provide a powerful tool to investigate how natural implicit primes can unconsciously influence decisions with multiple alternatives. We used video and live performances of the mental priming force. This technique uses subtle nonverbal and verbal conversational primes to influence spectators to choose the three of diamonds. Our results show that a large number of participants chose the target card while reporting feeling free and in control of their choice. Even when they were influenced by the primes, participants typically failed to give the reason for their choice. These results show that naturally embedding primes within a person's speech and gestures effectively influenced people's decision making. This raises the possibility that this form of mind control could be used to effectively manipulate other mental processes.

priming | magic trick | influence | decision-making

The question of how unconscious processes influence our thoughts and behaviors remains among the most controversial topics in psychology (1–4). Various studies have shown how visual primes can facilitate the processing of related targets (5–8). Vicary's fabricated subliminal advertising study caused much controversy and skepticism, but more recent research suggests that unconsciously presented primes can influence the choices people make (6, 9, 10). However, to this day, these free choice paradigms present participants with very few alternatives (typically only two or three), and we do not know their impact on decisions with a large number of options. Moreover, most reliable unconscious priming paradigms rely on tightly controlled stimulus presentation parameters, which restricts this type of research to highly controlled laboratory environments (11). The extent to which these results generalize to more ecologically valid contexts is unclear.

Magic tricks provide a valuable tool to investigate psychological processes within a highly natural environment (12). Most magic principles rely on tightly structured action and language scripts, which allow researchers to investigate psychological processes (e.g., priming, attention, and perception) under controlled, yet realistic conditions (13). Forcing refers to conjuring techniques that allow magicians to covertly influence a spectator's choice (12), and they provide unique tools to investigate how primes unconsciously influence people's decisions when there is a broad range of alternatives (i.e., 52 playing cards). Many of these forces are commonly used within a magic performance context, but only a few have been empirically investigated (14–16). In this paper, we examine a forcing technique that relies on subtle conversational nonverbal and verbal primes: the mental priming force. This force was created by British illusionist Derren Brown (17) and uses subtle verbal and nonverbal primes to influence the spectator to think about the three of diamonds (Fig. 1).

The magician asks a spectator to think of a card that the magician will "transmit" to him or her, while using gestures and keywords to bias the card that comes to mind (*SI Appendix*, *Mental Priming Force Script*). This technique, contrary to typical free choice paradigms, does not mask the primes to people's conscious awareness but subtly integrates them in the performance.

Anecdotal evidence suggests that this form of priming is effective, but it has never been studied scientifically before, nor do we know to what extent observers are consciously aware of the primes. The mental priming force could shed light on how subtle conversational primes can influence people's choices among a broad range of alternatives. More specifically, this technique allows us to investigate whether relatively abstract primes can unconsciously influence people's mental processes.

First, we aimed to investigate whether abstract gestures can unconsciously influence a person's decision when they are provided with a wide range of alternatives. We predicted people should be more likely to choose the three of diamonds (target card) and that most participants would not be aware of the influence of the primes. Second, we examined whether the force relied on the nature of the interaction. Most conjuring forces rely on real social interactions and are thought to work better when some sort of rapport/relationship is established between the magician and the spectator (17, 18). Indeed, previous empirical forcing studies have found smaller success rates with computer-presented tricks (14, 15) than when they are performed live. We therefore presented the force in two ways: video and live. We predicted that the force would be more effective in a live performance than on video.

We recruited 90 participants (62 women) who were randomly allocated to the video or live performance groups. After watching the performance, participants were asked to write down the card they chose and rate on a scale from 0 to 100 how free and in control they felt about this choice. Two reasons guided these measures. First, participants' feeling of freedom is one of the key elements of a successful forcing technique (14, 16, 19). If the magician manages to force a card but this person feels constraint and not free for their choice, the trick does no longer work.

Significance

This paper shows that naturally embedding primes within a person's speech and gestures effectively influences people's decision making. Likewise, our results dovetail findings from choice blindness literature, illustrating that people often do not know the real reason for their choice. Magicians' forcing techniques may provide a powerful and reliable way of studying these mental processes, and our paper illustrates how this can be done. Moreover, our results raise the possibility that this form of mind control could be used to effectively manipulate other mental processes.

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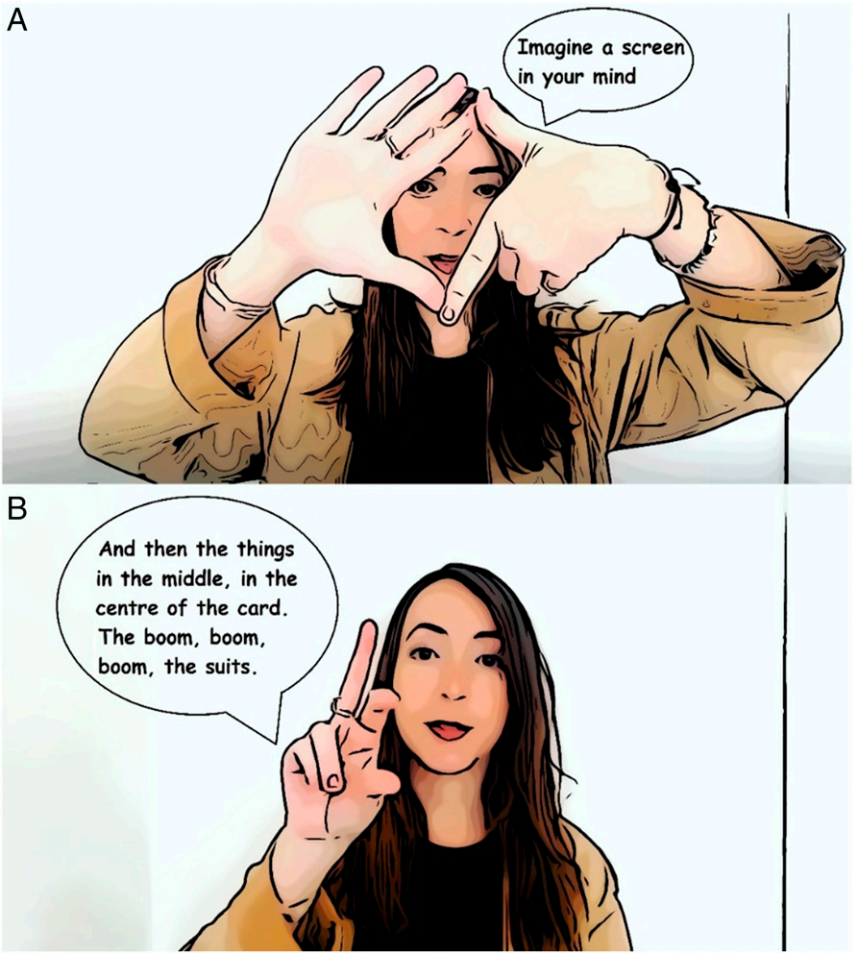

Fig. 1. Examples of gestures priming (*A*) the diamond suit and (*B*) the number three. For the diamond, the magician performs the gesture displayed in *A* while asking the participant to imagine a screen in their mind. Then, the performer does the pointing gesture shown in *B* while asking the spectator to imagine the symbols in the center of the card.

Second, we used these measures as an indirect way to assess participants' awareness of how they were manipulated. We expected that if participants understood that the experimenter tried to influence their choice, we would see these feelings of freedom and control drop. Indeed, previous papers investigating forcing techniques (14, 15) used measures of the feeling of freedom to investigate participants' ability to identify whether their choices were made freely or forced by external parameters (here the primes). The mental priming force primes two separate features: number (three) and suit (diamonds). For the purpose of our hypothesis, we considered the main target card to be the three of diamonds. In the second instance, we focused on the number (three) and suit features (diamonds). After completing the questions, participants were asked whether they knew why they chose that card, and if so, they were asked to explain. The last question asked if they noticed any of the performer's gestures and, if yes, to write them down. These measures followed a funneling procedure, which provided an indirect way of assessing participants' ability to identify whether their choice was forced by external parameters (i.e., the primes).

Results

Fig. 2 shows the percentages of participants who chose each of the cards. Overall, 17.8% of the participants chose the three of diamonds, 38.9% chose a three (all suits combined) and 33.3% chose a diamond (all numbers combined). The three of diamonds was the most commonly chosen card, closely followed by the three of hearts. To carry out statistical analyses, we compared these results to a condition in which participants were asked to choose a card after watching a video of the same performer and script without using any specific prime (0 out of 23 named the three of diamonds; *SI Appendix*) as well as to a random distribution (i.e., 52 different playing cards). Our participants chose the three of diamonds significantly more often than the video without prime (X^2 [1, n = 113] 4.76, P = 0.029, φ = 0.201) and a random distribution (X^2 [1, n = 142] 7.861, P = 0.005, φ = 0.229). In the same way, participants chose a three significantly more often than the video without prime (X^2 [1, n = 113] 1.58, P = 0.006, φ = 0.251) and a random distribution (X^2 [1, n = 142] 16.1, $P < 0.001$, φ = 0.319). Moreover, norming data by Olson et al. (20) show that the three of diamonds is not commonly named. However, the diamond alone did not have any significant effect compared to the video without prime (X^2 [1, n = 113] 0.44, P = 0.506, φ = 0.062) as well as to a random distribution (X^2 [1, n = 142] 1.08, P = 0.298, φ = 0.087).*

*Our participants chose a card of red color significantly more often than the random distribution (X2 [1, n = 142] 7.07, P = 0.008, φ = 0.218) but not than the video without prime (X2 [1, n = 113] 1.12, P = 0.289, φ = 0.099). Moreover, in addition to the main analyses and as the script of the force asked participants to imagine the numbers on the card, we ran analyses comparing our results to a distribution of 40 cards, excluding all of the picture cards. When considering the correct distribution to be 40 cards and treating participants who chose a picture card as N/A (not following the instructions), the same results regarding the three of diamonds, three, diamond suit, and color red are found.

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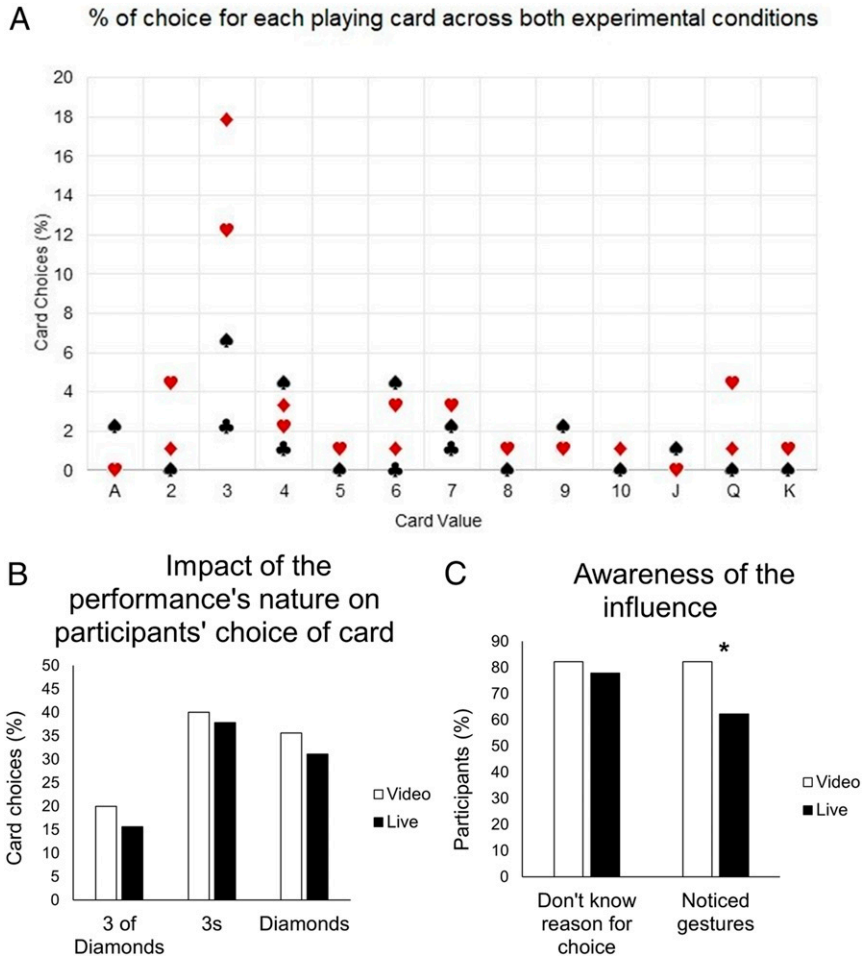

Fig. 2. (*A*) Participants' choice of cards across both general conditions. (*B*) The results regarding the target card and features according to the experimental conditions. (*C*) Participants' reports on whether they knew the reason for their choice and noticed the experimenter's gestures according to the experimental conditions.

Next, we examined whether the force relied on real social interaction (Fig. 2). Contrary to our prediction, participants did not choose the target cards significantly more often during the live performance compared to the video one (X^2 [1, n = 90] 0.30, P = 0.581, φ = 0.058 for the three of diamonds, X^2 [1, n = 90] 0.05, P = 0.829, φ = 0.023 for the three).

Looking at participants' conscious awareness of the force, the nature of the performance did not affect participants' feelings of freedom (MVideo = 83.1 vs. MLive = 79.7, W = 1,019, P = 0.963, r_{pb} = 0.006) or control over their choice (MVideo = 73.9 vs. MLive = 76.4, W = 1,141, P = 0.291, r_{pb} = 0.126). More importantly, whether participants chose a three of diamonds (M = 83.5) or not (M = 80) had no significant impact on their feelings of freedom (W = 599, P = 0.943, r_{pb} = 0.012). In the same way, whether participants chose a three of diamonds (M = 0.77.1) or not (M = 73.9) had no impact on their feelings of control over their thought of card (W = 630, P = 0.6845, r_{pb} = 0.064). The results remained the same looking at whether participants chose a three or another card (Fig. 3).

Finally, out of the 16 participants (18%) who chose the three of diamonds, only 3 (19%) stated that they knew the reason for their choice. This was not significantly different from the participants who chose any other card (X^2 (1, n = 90) 0.02, P = 0.89, φ = 0.015). Likewise, out of the 35 participants (19%) who chose

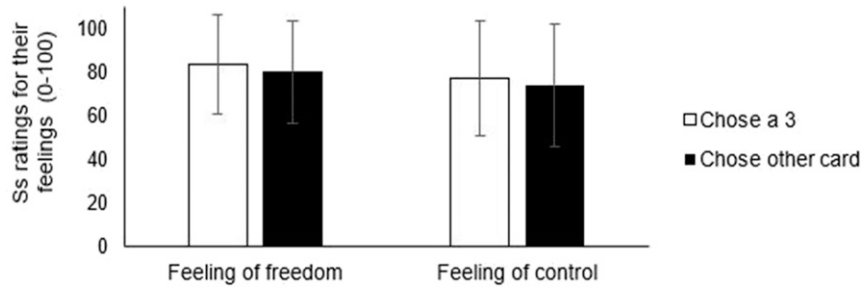

Fig. 3. Feelings of freedom and control over the choice of card as a function of participants' choice. Errors bars indicate SDs of the means.

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Fig. 4. Percentages of participants who declared knowing the reason for their choice and noticing some gestures of the experimenter as a function of their choice of card.

a three, only 7 (20%) claimed they knew the reason for their choice, and this result was not significantly different from the participants who chose any other card (X^2 [1, n = 90] 0.000, P = 1.00, φ = 0.000; Fig. 4).

Looking closer at the qualitative data, out of the seven participants who chose a three and stated they knew why, only three provided explanations that were related to the performer's gestures. The four remaining participants came up with confabulations (e.g., "I always seem to count in threes, and diamond because I hate jewelry") or said they chose it "randomly." Participants who chose other cards and said they knew why gave various explanations (e.g., favorite number).

Overall, 72.2% of the participants stated they detected at least some of the performer's gestures, but gesture detection was independent of whether they chose the three of diamonds or another card (X^2 [1, n = 90] 0.79, P = 0.374, φ = 0.093). The same was true for those naming the number three (X^2 [1, n = 90] 0.02, P = 0.893, φ = 0.014). Among all of the participants declaring they saw gestures, none of them recollected all of the priming gestures, and they typically provided rather vague answers (e.g., saying they saw pointing to the locations of the card's features). Nineteen out of 65 participants talked about a rectangle/screen/diamond shape the experimenter gesticulated with both hands. Participants did not declare knowing the reason of their choice more often in one of the two conditions (X^2 [1, n = 90] 0.278, P = 0.598 φ = 0.055; Fig. 2). However, they declared noticing gestures significantly more often for the video performance rather than for the live one (X^2 [1, n = 90] 4.49, P = 0.034, φ = 0.218; Fig. 2).

Discussion

Our results illustrate that the mental priming force significantly influenced participants' choice among a large number of alternatives, and it works just as effectively when presented on video compared to when it is performed by a real person. Eighteen percent of our participants chose the target card, and most were oblivious to the force itself. Indeed, even though the force resulted in a ninefold increase chance of participants choosing the three of diamonds, participants reported that their choice was free and that they were in control of it. Investigating the way implicit cues unconsciously influence people's thoughts provides important insights into the nature of human cognition. However, in the last decade, many priming studies have been at the center of the replication crisis (21–23), and the difficulty to replicate a number of well-known effects has raised much skepticism about priming more generally. At this point, we would like to note that we have investigated the mental priming force several times and with large sample sizes and always found it to be effective (*SI Appendix*). For example, another unrelated study involving 240 participants showed that 15.4% of participants chose the three of diamonds (most frequently chosen card) and 33.8% chose a card with the number three.

Naturally embedding primes within a person's speech and gestures effectively influenced people's decision making. Despite the primes being fully visible (and audible), participants were unaware that the primes may have influenced their decisions. Our results dovetail findings from choice blindness literature, which illustrates that people often do not know the real reason for their choice (24–27).

We believe that most forcing principles can be applied to decision-making processes that are not restricted to playing cards. For example, research from our laboratory shows that some psychological principles applied to card forces generalize to contexts where people have stronger preferences [e.g., holiday destinations†] or the outcome of a computer game. With regards to the mental priming force, others have shown that misinformation from gestures can also influence eyewitnesses' memory reports (28, 29) and that gestures could prime words (30). Despite their implicit nature, these nonverbal cues can influence both memory and decision-making processes in contexts outside the magic performance.

Our study shares some of the characteristics of previous research on social psychological priming and embodied effects, which have been heavily criticized and found hard to replicate (31–34): our primes were naturally embedded within the context of the experiment. However, the cognitive mechanisms that are being activated seem to differ. As Newell and Shanks (1) point out, standard priming effects such as lexical and repetition priming rely on well-established cognitive mechanisms, but it is often difficult to explain embodied priming effects on theoretical grounds. We appreciate that further research is required to help understand the cognitive mechanism that underpins the mental priming force, but we believe that it relies on semantic priming. Several studies have shown that people process specific gestures semantically (35–37), and it is likely that they evoke similar semantic activation that is found for words or pictures (38). We therefore suggest that the mental priming force relies on gestures and speech segments evoking simple semantic activation that make the number three and diamond shape more accessible.

The mental priming force is less reliable than most other forcing principles (14–16, 39, 40), and it is rarely used by magicians. Nevertheless, it was surprisingly effective. Although magicians often rely on more powerful tricks, they always have a "way out" for tricks relying on small probabilities of success rate like this one. Most conjuring techniques are very reliable, and we have investigated a wide range of forcing techniques (16, 39, 40)‡ that are far more reliable than the mental priming force.

†A. Pailhès, G. Kuhn, The Magician's Choice: Providing illusory choice and sense of agency with the Equivoque forcing technique.

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However, as we mentioned, previous findings have, for example, shown that gestural misinformation (i.e., subtle hand gestures) can influence an eyewitness testimony and implant false memories about objects that are associated with the gesture (i.e., a specific jewelry such as a bracelet or ring) (28) and that words (e.g., bird) could be primed through iconic gestures (e.g., a pair of hands flapping) (30). Our results, using the force, add to these findings and confirm that forcing techniques provide a reliable way of studying diverse mental processes (41). Moreover, our results, linked to these findings, raise the possibility that this form of mind control could be used to effectively manipulate other mental processes such as memory and word retrieval.

Methods

Participants. A total of 90 participants (62 women) between 18 and 60 y old ($M = 22.7$, SD = 7.38) recruited on Goldsmiths University campus took part in the experiment. Goldsmiths Psychology Department provided ethical approval for the experiments.

Procedure. The experimenter/magician sat at one of Goldsmiths' cafeteria tables. Participants were randomly attributed to one of the two experimental conditions: video or live performance. They sat facing the experimenter and signed the consent form presenting the experiment as a study on magic tricks and decision-making. Then, they were asked to read the instructions on the paper form stating that the experimenter was going to ask them to follow instructions and visualize and imagine some things (*SI Appendix, Mental Priming Force Script*). Depending on what condition they were in, they then watched either the video performance on the laptop with headphones (Sony ZX310) or the live performance of the experimenter. At the end of the performance, they had to fill in the paper questionnaire. Participants had to write which card they chose and how free and in control they felt for their choice on a scale from 0 to 100. Then, they were asked whether they knew the reason for their choice and explain it if they answered yes. The last question asked if they noticed any gestures the experimenter did during the performance. This time again, they had to write down which gestures they saw if they answered yes.

The Mental Priming Force. The mental force was carried out according to the Brown's method (17). First, to influence the spectator to think about a red card, the magician asks the participant to imagine that she is trying to mentally transmit the identity of a playing card and asks to first "make the color bright and vivid." This is intended to implicitly prime the observer to think of a red, rather than a black card. Then for the suits, the observer is asked to imagine a screen while miming a diamond shape with two hands (Fig. 1), which is intended to prime the observer to think of a diamond.

To prime the number three, the spectator is asked to imagine the "little numbers low down in the corner of the card and in the top" while the performer quickly draws little threes in the air on the imaginary card with the index finger. The magician then finishes the force while asking the spectator to imagine the "things in the middle of the card, the boom, boom, boom, the suits," while pointing at three imaginary symbols (Fig. 1). The force is performed relatively quickly and only lasts around 15 s and if successful should prime the observer to think of the three of diamonds. We realized a video of the force for the video performance condition, which is available in *SI Appendix*.

All data and videos of the mental priming force performances with and without primes can be found at the Open Science Foundation database at https://osf.io/2z6rw/?view_only=e3650ed496dd47b3a8b71ef1fb631202.

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