

Goldsmiths Research Online

*Goldsmiths Research Online (GRO)
is the institutional research repository for
Goldsmiths, University of London*

Citation

Pailhes, Alice and Kuhn, Gustav. 2020. Influencing choices with conversational primes: How a magic trick unconsciously influences card choices. *Proceedings of the National Academy of Sciences*, 117(30), pp. 17675-17679. ISSN 0027-8424 [Article]

Persistent URL

<https://research.gold.ac.uk/id/eprint/28626/>

Versions

The version presented here may differ from the published, performed or presented work. Please go to the persistent GRO record above for more information.

If you believe that any material held in the repository infringes copyright law, please contact the Repository Team at Goldsmiths, University of London via the following email address: gro@gold.ac.uk.

The item will be removed from the repository while any claim is being investigated. For more information, please contact the GRO team: gro@gold.ac.uk

Classification: Social Sciences, Psychological and Cognitive Sciences.

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

Alice Pailhès & Gustav Kuhn

Psychology Department, Goldsmiths, University of London, UK

Address for correspondence:

Department of Psychology

Goldsmiths University of London

New Cross, London SE14 6NW

United Kingdom

apail001@gold.ac.uk

Declaration of interest: None.

Abstract

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 non-verbal 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.

Keywords: priming, magic trick, influence, decision-making.

Significance Statement:

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.

The question of how unconscious processes influence our thoughts and behaviours remains amongst 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 allows researchers to investigate psychological processes (e.g. priming, attention, perception) under controlled, yet realistic conditions (13). Forcing refers to conjuring techniques that allow magicians to covertly influence a spectator’s choice (14), 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 (15–17). In this paper, we examine a forcing technique that relies on subtle conversational non-verbal and verbal primes: the Mental Priming Force. This force was created by British illusionist Derren Brown (18) and uses subtle verbal and non-verbal primes to influence the spectator to think about the three of Diamonds (see Figure 1).

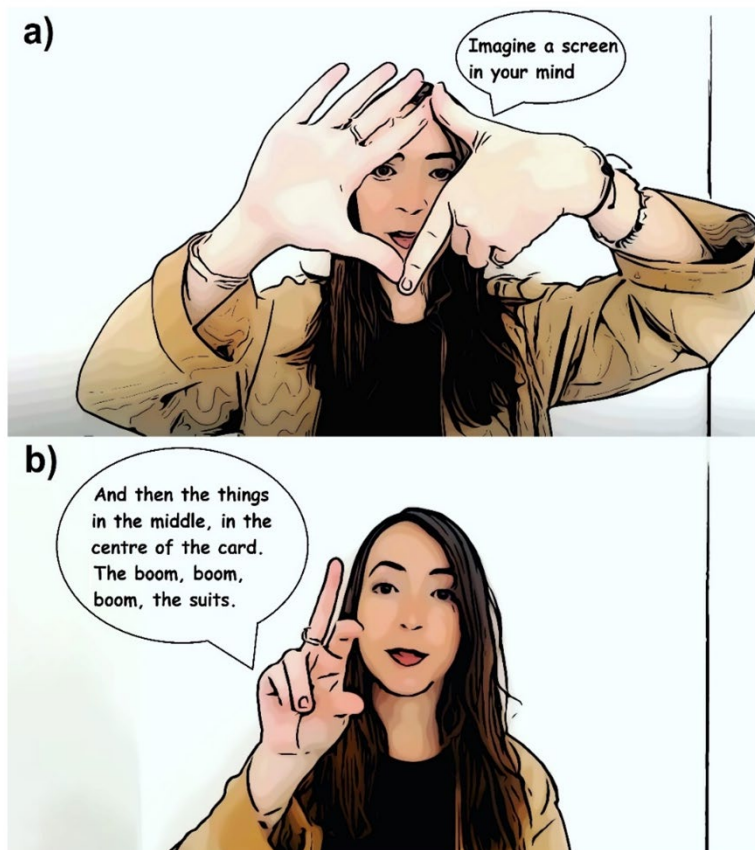


Fig.1. Examples of gestures priming the Diamond suit (a) and the number three (b). For the diamond, the magician performs the gesture displayed in (a) while asking the participant to imagine a screen in their mind. Then, the performer does the pointing gesture shown in (b) while asking the spectator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

The magician asks a spectator to think of a card that the magician will ‘transmit’ to him or her, whilst using gestures and keywords to bias the card that comes to mind (see 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 amongst a broad range of alternatives. More specifically, this technique allows us to investigate whether relatively abstract primes can unconsciously influence people's mental processes.

Firstly, 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. Secondly, 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 (18, 19). Indeed, previous empirical forcing studies have found smaller success rates with computer-presented tricks (15, 16) 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. Firstly, participants' feeling of freedom is one of the key elements of a successful forcing technique (15, 17, 20). 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. Secondly, 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 (15, 16) used measures of the feeling of freedom to investigate participants' ability to identify whether

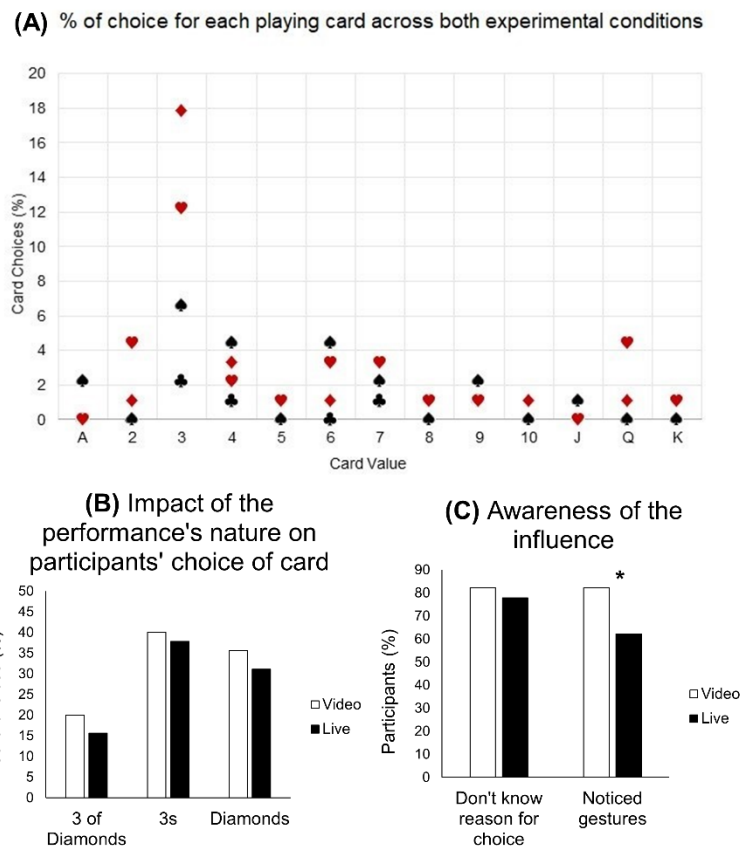
their choices were made freely or forced by external parameters (here, the primes). The Mental Priming Force primes two separate features – number (three) and suit (Diamonds). For the purpose of our hypothesis, we considered the main target card to be the three of Diamonds. In the second instance, we 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

Figure 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, see 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 ($X^2(1, N=113) 4.76, p=.029, \phi =.201$) and a random distribution ($X^2(1, N=142) 7.861, p=.005, \phi =.229$). In the same way, participants chose a three significantly more often than the video without prime ($X^2(1, N=113) 1.58, p=.006, \phi =.251$) and a random distribution ($X^2(1, N=142) 16.1, p<.001, \phi =.319$). Moreover, norming data by Olson et al. (21) shows 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 , $p=.506$, $\phi=.062$) as well as to a random distribution (X^2 (1, $N=142$) 1.08 , $p=.298$, $\phi=.087$).

1



2

3

Fig.2. (A) shows participants' choice of cards across both general conditions. (B) shows the results

4

regarding the target card and features according to the experimental conditions. (C) displays participants' reports

5

on whether they knew the reason for their choice and noticed the experimenter's gestures according to the

6

experimental conditions.

* Our participants chose a card of red colour significantly more often than the random distribution (X^2 (1, $N=142$) 7.07 , $p=.008$, $\phi=.218$) but not than the video without prime (X^2 (1, $N=113$) 1.12 , $p=.289$, $\phi=.099$). 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 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 colour red are found.

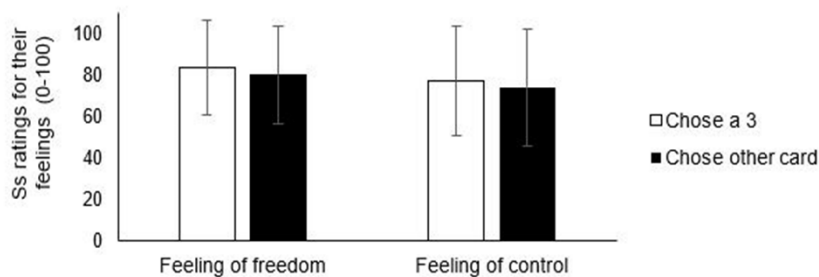
7

8 Next, we examined whether the force relied on real social interaction (Figure 2).

9 Contrary to our prediction, participants did not choose the target cards significantly more often

10 during the live performance compared to the video one ($X^2(1, N=90) 0.30, p=.581, \phi =.058$ for

11 the three of Diamonds, $X^2(1, N=90) 0.05, p=.829, \phi =.023$ for the three).



12

13 **Fig. 3.** Feelings of freedom and control over the choice of card as a function of participants' choice.

14 Errors bars indicate standard deviations of the means.

15

16 Looking at participants' conscious awareness of the force, the nature of the performance

17 did not affect participants' feelings of freedom ($M_{Video}=83.1$ vs $M_{Live}= 79.7, W= 1019,$

18 $p=.963, r_{pb}=.006$) or control over their choice ($M_{Video}= 73.9$ vs $M_{Live}=76.4 W=1141, p=.291,$

19 $r_{pb}=.126$). More importantly, whether participants chose a three of Diamonds ($M=83.5$) or not

20 ($M=80$) had no significant impact on their feelings of freedom ($W= 599, p=.943, r_{pb}=.012$). In

21 the same way, whether participants chose a three of Diamonds ($M=.77.1$) or not ($M=73.9$) had

22 no impact on their feelings of control over their thought of card ($W=630, p=.6845, r_{pb}=.064$).

23 The results remained the same looking at whether participants chose a three or another card

24 (see Figure 3).



25

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

28

29 Finally, out of the 16 participants (18%) who chose the three of Diamonds, only 3 (19%)
 30 stated that they knew the reason for their choice. This was not significantly different from the
 31 participants who chose any other card ($X^2(1, N=90) 0.02, p=.89, \phi =.015$). Likewise, out of the
 32 35 participants (19%) who chose a three, only 7 (20%) claimed they knew the reason for their
 33 choice, and this result was not significantly different from the participants who chose any other
 34 card ($X^2(1, N=90) 0.000, p=1.00, \phi =.000$ see Figure 4).

35 Looking closer at the qualitative data, out of the 7 participants who chose a three and
 36 stated they knew why, only 3 provided explanations that were related to the performer's
 37 gestures. The 4 remaining participants came up with confabulations (e.g. "I always seem to
 38 count in 3s, and diamond because I hate jewellery"), or said they chose it "randomly".
 39 Participants who chose other cards and said they knew why, gave various explanations (e.g.
 40 favourite number).

41 Overall 72.2% of the participants stated they detected at least some of the performer's
 42 gestures, but gesture detection was independent of whether they chose the three of Diamonds
 43 or another card ($X^2(1, N=90) 0.79, p=.374, \phi =.093$). The same was true for those naming the

44 number three ($X^2(1, N=90) 0.02, p=.893, \phi =.014$). Among all the participants declaring they
45 saw gestures, none of them recollected all the priming gestures, and they typically provided
46 rather vague answers (e.g. saying they saw pointing to the locations of the card's features).
47 Nineteen out of 65 participants talked about a rectangle/screen/diamond shape the experimenter
48 gesticulated with both hands. Participants did not declare knowing the reason of their choice
49 more often in one of the two conditions ($X^2(1, N=90) 0.278, p=.598, \phi =.055$, see Figure 2).
50 However, they declared noticing gestures significantly more often for the video performance
51 rather than for the live one ($X^2(1, N=90) 4.49, p=.034, \phi =.218$, see Figure 2).

52

53 **Discussion**

54 Our results illustrate that the Mental Priming Force significantly influenced
55 participants' choice among a large number of alternatives, and it works just as effectively when
56 presented on video compared to when it is performed by a real person. Eighteen percent of our
57 participants chose the target card, and most were oblivious to the force itself. Indeed, even
58 though the force resulted in a nine-fold increase chance of participants choosing the three of
59 Diamonds, participants reported that their choice was free and that they were in control of it.
60 Investigating the way implicit cues unconsciously influence people's thoughts provides
61 important insights into the nature of human cognition. However, in the last decade, many
62 priming studies have been at the centre of the replication crisis (22–24), and the difficulty to
63 replicate a number of well-known effects has raised much skepticism about priming more
64 generally. At this point, we would like to note that we have investigated the Mental Priming
65 Force several times and with large sample sizes, and always found it to be effective (see SI
66 Appendix). For example, another unrelated study involving 240 participants showed that 15.4%

67 of participants chose the three of Diamonds (most frequently chosen card) and 33.8% chose a
68 card with the number three.

69 Naturally embedding primes within a person's speech and gestures effectively
70 influenced people's decision making. Despite the primes being fully visible (and audible)
71 participants were unaware that the primes may have influenced their decisions. Our results
72 dovetail findings from choice blindness literature, which illustrates that people often do not
73 know the real reason for their choice (25–28).

74 We believe that most forcing principles can be applied to decision-making processes
75 that are not restricted to playing cards. For example, research from our lab shows that some
76 psychological principles applied to card forces generalize to contexts where people have
77 stronger preferences (e.g. holiday destinations, (29)), or the outcome of a computer game. With
78 regards to the Mental Priming Force, others have shown that misinformation from gestures can
79 also influence eyewitnesses' memory reports (30, 31) and that gestures could prime words (32).
80 Despite their implicit nature, these nonverbal cues can influence both memory and decision-
81 making processes in contexts outside the magic performance.

82 Our study shares some of the characteristics of previous research on social
83 psychological priming and embodied effects, which have been heavily criticized and found hard
84 to replicate (33–36): our primes were naturally embedded within the context of the experiment.
85 However, the cognitive mechanisms that are being activated seem to differ. As Newell and
86 Shanks (1) point out, standard priming effects such as lexical and repetition priming rely on
87 well-established cognitive mechanisms, but it is often difficult to explain embodied priming
88 effects on theoretical grounds. We appreciate that further research is required to help understand
89 the cognitive mechanism that underpins the Mental Priming Force, but we believe that it relies
90 on semantic priming. Several studies have shown that people process specific gestures

91 semantically (37–39) and it is likely that they evoke similar semantic activation that is found
92 for words or pictures (40). We therefore suggest that the Mental Priming Force relies on
93 gestures and speech segments evoking simple semantic activation that make the number 3 and
94 diamond shape more accessible.

95 The Mental Priming force is less reliable than most other forcing principles (15–17, 41,
96 42), and it is rarely used by magicians. Nevertheless, it was surprisingly effective. Although
97 magicians often rely on more powerful tricks, they always have a ‘way out’ for tricks relying
98 on small probabilities of success rate like this one. Most conjuring techniques are very reliable,
99 and we have investigated a wide range of forcing techniques (17, 29, 41, 42) that are far more
100 reliable than the Mental Priming Force. However, as we mentioned, previous findings have for
101 example shown that gestural misinformation (i.e. subtle hand gestures) can influence an
102 eyewitness testimony and implant false memories about objects that are associated with the
103 gesture (i.e. a specific jewellery such as a bracelet or ring) (43), and that words (e.g. bird) could
104 be primed through iconic gestures (e.g., a pair of hands flapping)(32). Our results, using the
105 force, add to these findings and confirm that forcing techniques provide a reliable way of
106 studying diverse mental processes (44). Moreover, our results, linked to these findings, raise
107 the possibility that this form of mind control could be used to effectively manipulate other
108 mental processes such as memory and word retrieval.

109

110 **Acknowledgments:**

111 We acknowledge Vivian Kwok, Sara Lang and Megan Knox for their research
112 assistance.

113

115 **REFERENCES**

- 116 1. B. R. Newell, D. R. Shanks, Unconscious influences on decision making: A critical
117 review. *Behav. Brain Sci.* **37**, 1–19 (2014).
- 118 2. J. DeCoster, H. M. Claypool, A Meta-Analysis of Priming Effects on Impression
119 Formation Supporting a General Model of Informational Biases. *Personal. Soc.*
120 *Psychol. Rev.* (2004), , doi:10.1207/S15327957PSPR0801_1.
- 121 3. M. Lucas, Semantic priming without association: A meta-analytic review. *Psychon.*
122 *Bull. Rev.* (2000), doi:10.3758/BF03212999.
- 123 4. E. Van den Bussche, W. Van den Noortgate, B. Reynvoet, Mechanisms of Masked
124 Priming: A Meta-Analysis. *Psychol. Bull.* (2009), doi:10.1037/a0015329.
- 125 5. S. Dehaene, L. Naccache, G. Le Clec'H, E. Koechlin, M. Mueller, G. Dehaene-
126 Lambertz, P. F. Van De Moortele, D. Le Bihan, Imaging unconscious semantic
127 priming. *Nature* (1998), doi:10.1038/26967.
- 128 6. B. Ocampo, Unconscious manipulation of free choice by novel primes. *Conscious.*
129 *Cogn.* **34**, 4–9 (2015).
- 130 7. R. W. Kentridge, C. A. Heywood, L. Weiskrantz, Attention without awareness in
131 blindsight. *Proc. R. Soc. B Biol. Sci.* (1999), doi:10.1098/rspb.1999.0850.
- 132 8. E. Rusconi, K. Priftis, M. L. Rusconi, C. Umiltà, Arithmetic priming from neglected
133 numbers. *Cogn. Neuropsychol.* (2006), doi:10.1080/13594320500166381.
- 134 9. U. Mattler, S. Palmer, Time course of free-choice priming effects explained by a
135 simple accumulator model. *Cognition.* **123**, 347–360 (2012).

- 136 10. J. Parkinson, P. Haggard, Subliminal priming of intentional inhibition. *Cognition*. **130**,
137 255–265 (2014).
- 138 11. R. Cetnarski, A. Betella, H. Prins, S. Kouider, P. F. M. J. Verschure, Subliminal
139 response priming in mixed reality: The ecological validity of a classic paradigm of
140 perception. *Presence Teleoperators Virtual Environ.* (2014),
141 doi:10.1162/PRES_a_00171.
- 142 12. G. Kuhn, A. A. Amlani, R. A. Rensink, Towards a science of magic. *Trends Cogn. Sci.*
143 **12**, 349–354 (2008).
- 144 13. G. Kuhn, R. Teszka, in *The Handbook of Attention* (2016).
- 145 14. G. Kuhn, A. A. Amlani, R. A. Rensink, Towards a science of magic. *Trends Cogn. Sci.*
146 (2008), , doi:10.1016/j.tics.2008.05.008.
- 147 15. J. A. Olson, A. A. Amlani, A. Raz, R. A. Rensink, Influencing choice without
148 awareness. *Conscious. Cogn.* **37**, 225–236 (2015).
- 149 16. D. E. Shalom, M. G. de Sousa Serro, M. Giaconia, L. M. Martinez, A. Rieznik, M.
150 Sigman, Choosing in Freedom or Forced to Choose? Introspective Blindness to
151 Psychological Forcing in Stage-Magic. *PLoS One*. **8** (2013),
152 doi:10.1371/journal.pone.0058254.
- 153 17. G. Kuhn, A. Pailhès, Y. Lan, Forcing you to experience wonder: Unconsciously
154 biasing people’s choice through strategic physical positioning. *Conscious. Cogn.*
155 **102902** (2020).
- 156 18. D. Brown, *Pure effect* (H & R Magic Book, 2002).
- 157 19. P. Turner, *Psychological Playing Card Forces* (2015).

- 158 20. L. Jones, *Encyclopedia of Impromptu Card Forces* (H&R Magic Books, 1994).
- 159 21. J. A. Olson, A. A. Amlani, R. A. Rensink, Perceptual and cognitive characteristics of
160 common playing cards. *Perception*. **41**, 268–286 (2012).
- 161 22. H. Pashler, E.-J. Wagenmakers, Introduction to the Special Section on Replicability.
162 *Perspect. Psychol. Sci.* (2012), doi:10.1177/1745691612465253.
- 163 23. C. R. Harris, N. Coburn, D. Rohrer, H. Pashler, Two Failures to Replicate High-
164 Performance-Goal Priming Effects. *PLoS One* (2013),
165 doi:10.1371/journal.pone.0072467.
- 166 24. D. R. Shanks, B. R. Newell, E. H. Lee, D. Balakrishnan, L. Ekelund, Z. Cenac, F.
167 Kavvadia, C. Moore, Priming Intelligent Behavior: An Elusive Phenomenon. *PLoS*
168 *One* (2013), doi:10.1371/journal.pone.0056515.
- 169 25. P. Johansson, L. Hall, S. Sikström, From change blindness to choice blindness.
170 *Psychologia* (2008), doi:10.2117/psysoc.2008.142.
- 171 26. L. Hall, P. Johansson, B. Tärning, S. Sikström, T. Deutgen, Magic at the marketplace:
172 Choice blindness for the taste of jam and the smell of tea. *Cognition* (2010),
173 doi:10.1016/j.cognition.2010.06.010.
- 174 27. P. Johansson, L. Hall, S. Sikström, B. Tärning, A. Lind, How something can be said
175 about telling more than we can know: On choice blindness and introspection.
176 *Conscious. Cogn.* **15**, 673–692 (2006).
- 177 28. Nisbett & Wilson, Telling more than we can know: Verbal reports on mental processes.
178 *Psychol. Rev.* **84**, 231 (1977).
- 179 29. A. Pailhès, G. Kuhn, The Magician’s Choice: Providing illusory choice and sense of
180 agency with the Equivoque forcing technique.

- 181 30. D. J. Gurney, K. J. Pine, R. Wiseman, The gestural misinformation effect: Skewing
182 eyewitness testimony through gesture. *Am. J. Psychol.* (2013),
183 doi:10.5406/amerjpsyc.126.3.0301.
- 184 31. D. J. Gurney, L. R. Ellis, E. Vardon-Hynard, The saliency of gestural misinformation
185 in the perception of a violent crime. *Psychol. Crime Law* (2016),
186 doi:10.1080/1068316X.2016.1174860.
- 187 32. D. F. Yap, W. C. So, J. M. Melvin Yap, Y. Q. Tan, R. L. S. Teoh, Iconic gestures
188 prime words. *Cogn. Sci.* **35**, 171–183 (2011).
- 189 33. D. Lynott, K. S. Corker, J. Wortman, L. Connell, M. B. Donnellan, R. E. Lucas, K.
190 O'Brien, Replication of “experiencing physical warmth promotes interpersonal
191 warmth” by Williams and Bargh (2008). *Soc. Psychol. (Gott)*. (2014),
192 doi:10.1027/1864-9335/a000187.
- 193 34. C. F. Chabris, P. R. Heck, J. Mandart, D. J. Benjamin, D. J. Simons, No Evidence That
194 Experiencing Physical Warmth Promotes Interpersonal Warmth: Two Failures to
195 Replicate. *Soc. Psychol. (Gott)*. (2019), doi:10.1027/1864-9335/a000361.
- 196 35. F. H. Durgin, J. A. Baird, M. Greenburg, R. Russell, K. Shaughnessy, S. Waymouth,
197 Who is being deceived? The experimental demands of wearing a backpack. *Psychon.*
198 *Bull. Rev.* (2009), doi:10.3758/PBR.16.5.964.
- 199 36. J. J. Hutchison, J. M. Loomis, in *Spanish Journal of Psychology* (2006).
- 200 37. K. Chui, C. Y. Lee, K. Yeh, P. C. Chao, Semantic processing of self-adaptors,
201 emblems, and iconic gestures: An ERP study. *J. Neurolinguistics* (2018),
202 doi:10.1016/j.jneuroling.2018.04.004.
- 203 38. V. K. Lim, A. J. Wilson, J. P. Hamm, N. Phillips, S. J. Iwabuchi, M. C. Corballis, F.

- 204 Arzarello, M. O. J. Thomas, Semantic processing of mathematical gestures. *Brain*
205 *Cogn.* (2009), doi:10.1016/j.bandc.2009.07.004.
- 206 39. A. Özyürek, Hearing and seeing meaning in speech and gesture: Insights from brain
207 and behaviour. *Philos. Trans. R. Soc. B Biol. Sci.* (2014), , doi:10.1098/rstb.2013.0296.
- 208 40. Y. C. Wu, S. Coulson, Are depictive gestures like pictures? Commonalities and
209 differences in semantic processing. *Brain Lang.* (2011),
210 doi:10.1016/j.bandl.2011.07.002.
- 211 41. A. Pailhès, G. Kuhn, The Apparent Action Causation: Using a magician forcing
212 technique to investigate our illusory sense of agency over the outcome of our choices.
- 213 42. A. Pailhès, G. Kuhn, Subtly encouraging more deliberate decisions: Using a forcing
214 technique and population stereotype to investigate free will.
- 215 43. D. J. Gurney, K. J. Pine, R. Wiseman, The gestural misinformation effect: Skewing
216 eyewitness testimony through gesture. *Am. J. Psychol.* **126**, 301–314 (2013).
- 217 44. R. A. Rensink, G. Kuhn, A framework for using magic to study the mind. *Front.*
218 *Psychol.* **6**, 1–14 (2015).

219

220

221 **Author Contributions:**

222 Alice Pailhès conducted the experiment, statistical analyses and co-written the paper. Gustav
223 Kuhn supervised the whole research and co-written the paper.

224

225 **Supplementary Information is available for this paper.** Correspondence and requests for
226 materials should be addressed to Alice Pailhès at apail001@gold.ac.uk.

227 **Methods**

228 *Participants*

229 90 participants (62 women) between 18 and 60 years old ($M=22.7$, $SD=7.38$) recruited
230 on Goldsmiths University campus took part in the experiment. Goldsmiths Psychology
231 Department provided ethical approval for the experiments.

232

233 *Procedure*

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

248

249 *The Mental Priming Force*

250 The mental force was carried out according to the Brown's method (2000). Firstly, to influence
251 the spectator to think about a red card, the magician asks the participant to imagine that she's
252 trying to mentally transmits the identity of a playing card, and asks to first "make the colour
253 bright and vivid". This is intended to implicitly prime the observer to think of a red, rather than
254 a black card. Then for the suits, the observer is asked to imagine a screen while miming a
255 diamond shape with two hands (see Figure 1), which is intended to prime the observer to think
256 of a diamond.

257 To prime the number three, the spectator is asked to imagine the "little numbers low
258 down in the corner of the card and in the top" while the performer quickly draws little 3s in the
259 air on the imaginary card with the index finger. The magician then finishes the force while
260 asking the spectator to imagine the "things in the middle of the card, the boom-boom-boom, the
261 suits", while pointing at three imaginary symbols (Figure 1). The force is performed relatively
262 quickly and only lasts around 15 seconds, and if successful should prime the observer to think
263 of the 3 of Diamonds. We realised a video of the force for the video performance condition,
264 which is available in the Supplementary Appendix.

265 All data and videos of the Mental Priming force performances with and without primes
266 can be found at https://osf.io/2z6rw/?view_only=e3650ed496dd47b3a8b71ef1fb631202.

267