Emulating future neurotechnology using magic

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Supplementary methods

Phase 1: Simulating brain reading of preferences and attitudes

The machine appeared to accurately guess the participants' responses to their consumer preferences. In reality, the experimenter — who was a former magician — discreetly wrote down the number after the participant had stated it, ensuring that the numbers matched. From the participant's perspective, the number was written down before it was said.

We accomplished this accurate guessing using a magic trick common in mind-reading performances (see Corinda, 1968, "Step One"), though several equivalent methods can be used to achieve the same effect (cf. Rensink & Kuhn, 2015). This technique was initially developed by fraudulent mediums to mimic the appearance of supernatural writing (Truesdell, 1884) and was later adapted by magicians. See Table 1 for a comparison of what the participant sees versus what the experimenter does behind the scenes.

Table 1: Explanation of ostensible neural decoding of consumer preferences with assistance from the experimenter.

#	Participant (P)	Experimenter (E)
1	P concentrates on numerical answer to questionnaire item	—
2	Machine prints output showing various statistics	In reality, E printed bogus output
3	E consults machine screen and output then writes machine's numerical guess on output	E pretends to consult machine and pantomimes writing number
4	—	E asks P to verbally confirm number

#	Participant (P)	Experimenter (E)
5	P says number	E discreetly writes this number on output
6	E shows written number and P sees that it is correct	—

After this calibration, we made it appear as if the machine was able to infer the participants' attitudes without the experimenter interpreting the output. A research assistant in a side room behind a one-way mirror helped accomplish this feat. From the participant's perspective, there was no research assistant and the experimenter was not even observing the written answers. Further, the machine appeared to print out corresponding answers before the participant had written anything down. This illusion was again inspired by fraudulent mediums and adapted by magicians (Abbott, 1908). In short, the assistant would first print a blank page, and then print subsequent sheets corresponding to the participant's *previous* response. This method ensured that the printer would appear to correctly guess all but one (i.e., the first) of the participant's responses; the experimenter would simply not show the participant the blank page (Table 2).

Table 2: Explanation of ostensible neural decoding without assistance from the experimenter. The study procedure used five questions, rather than the three described here for brevity, but the logic was the same.

#	Participant (P)	Research assistant (RA)	Experimenter (E)
1	P concentrates on first number	—	—
2	Printer prints output (face down) which P believes contains first number	In reality, RA printed blank page	—
3	P writes first number	RA discreetly observes first number	—
4	P concentrates on second number	—	—
5	Printer prints output which P believes contains second number	In reality, RA printed *first* observed number	—
6	P writes second number	RA discreetly observes second number	—
7	P concentrates on third number	—	—

#	Participant (P)	Research assistant (RA)	Experimenter (E)
8	Printer prints output which P believes contains third number	In reality, RA printed *second* observed number	—
9	P writes third number	—	—
10	E appears to collect all three output pages	—	E discreetly moves first (blank) output to end of stack
11	E shows first number output, which matches P's first answer	—	—
12	E shows second number output, which matches P's second answer	—	—
13	E checks third number output and says it matches	—	E pretends to check output, but tilts page away from P to hide the fact that it is blank

Phase 2: Simulating human error detection

Second, we made it appear as if the participant had made an error on the questionnaire which the machine detected. To accomplish this, we discreetly switched the participant's questionnaire (cf. Hall et al., 2012) with an erroneous duplicate (see Table 3). This switch leveraged a principle in magic that was traditionally used to create transformations of writing slates in mediumship performances (Robinson, 1898).

Table 3: Explanation of ostensible error detection.

#	Participant (P)	Research assistant (RA)	Experimenter (E)
1	P completes questionnaire described previously	RA observes answers and makes duplicate questionnaire with one error	—
2	E leaves room apparently to get another pen	RA puts glue on back of questionnaire and gives to E	E hides this duplicate questionnaire under notepad
3	E returns and appears to check P's questionnaire	—	E subtly glues duplicate atop P's original questionnaire

#	Participant (P)	Research assistant (RA)	Experimenter (E)
4	E notices discrepancy between machine's output and P's responses; the machine appears to show P's intended response	—	—

Phase 3: Simulating insight into attitudes

In the final phase, the participant completed the questionnaire and the machine printed its output once at the end rather than after each question. We accomplished this simply by having the research assistant discreetly observe each of the participant's answers and then print them all at the end.

References

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