JOURNAL OF FORENSIC SCIENCES

J Forensic Sci, May 2019, Vol. 64,
doi: 10.1111/1556-4029.13923
Available online at: onlinelibrary.wiley.com

CASE REPORT

PSYCHIATRY & BEHAVIORAL SCIENCE

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Feigning Hand Preference? A Case Report Preliminary Data

ABSTRACT: Hand preference may be crucial in the forensic domain, notably in cases where the assailant is known to be left-handed and the defendant claims to be right-handed (or vice versa). In such cases, forensic psychologists or physicians may be asked to test the hand preference of the defendant. However, hand preference may be faked. The case described here illustrates this problem and addresses potential solutions. We also present preliminary data showing that a standard instrument for measuring handedness is sensitive to feigning. We conclude that when hand preference is determined, multiple sources of information should be assessed in order to identify possible feigning.

KEYWORDS: forensic science, hand preference, self-report bias, feigning, symptom validity testing, neuropsychology

Much has been written in neuropsychology about hand preference (1,2). While the vast majority of right-handed individuals display left cerebral dominance for language, indicating predominant involvement of left-hemispheric networks in language, left-handers deviate from this standard pattern in that some of them show more right-hemispheric or bilateral language activity. Thus, lateralization in left- and right-handers is different, which makes handedness a relevant variable in clinical practice and research.

In some criminal cases, hand preference may become an issue. This is, for example, the case when self-inflicted injuries are presented as results of a violent attack by others in an attempt to gain affection. Often, these self-inflicted injuries are located at the left arm/hand in right-handed people and vice versa (3). Another example of hand preference as a forensically relevant variable is the situation in which it has been reliably established that the assailant stabbed a victim with a knife that he held in his left hand. Assuming that the act of stabbing was done intentionally and the attacker used his dominant hand, this would point in the direction of a left-handed perpetrator and would exclude right-handed suspects. The current case report focusses on this type of problem. How can the forensic expert determine the hand preference of a suspect? Of course, the expert could simply ask the suspect about his hand preference. In a clinical setting, this might perhaps provide the expert with a trustworthy answer. Yet, in a forensic setting, examinees' self-reports may be notoriously unreliable (4). Another option might be to administer a structured test. Several tests for hand preference have been developed and one of the most widely used measures is the Edinburgh Handedness Inventory (EHI) that was developed by Oldfield (5,6). Basically, the EHI asks respondents about their hand preference when performing ten common activities (e.g., combing your hair, striking a match). Respondents indicate the hand they prefer to use for each activity by putting a plus in columns labeled "Left" and "Right". Left and right pluses are summed and then a handedness score can be calculated by subtracting the left pluses from the right pluses. The higher the score, the stronger the right dexterity.

Hundreds of studies have used the EHI and so, in principle, there are normative data available for evaluating the meaning of EHI scores of particular individuals such as defendants (6). However, as the EHI is a self-report measure, it is possible that people who want to feign being left- or right-handed on the EHI succeed in doing so. Inspired by a criminal case in which the pathologist concluded that a murder had been committed by a left-hander, whereas the defendant claimed to be right-handed, McNamus and coworkers conducted a study in which they gave various hand preference tests and tasks, including EHI items, to left- and right-handers who were either instructed to answer honestly or to feign the opposite handedness (7). Feigners were able to generate the correct answers to the EHI items, although fake left-handers had a stronger tendency to go over the top (i.e., to dogmatically endorse left preference) than fake right-handers. As well, simple motor tasks were not very successful in distinguishing between true and feigned hand preference. Feigning was best detected with a timed task in which respondents were instructed to write a sentence in cursive lower-case script. Individuals wrote more slowly and made more errors with their faked dominant hand than with their real dominant hand.

Case

In 2005, a Dutch court sentenced a middle-aged man who was a member of a motorcycle gang to life imprisonment. The court considered it proven that he had killed a woman and her two children. The woman was a former girlfriend of the defendant. The evidence included three independent witnesses who had heard the defendant say that he had, indeed, murdered the woman and her children. Also, a friend testified that right after

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Received 29 June 2018; and in revised form 7 Sept. 2018; accepted 13 Sept. 2018.

the weekend in which the victims were killed, the defendant had been hiding from the police at her house and had asked her to wash a jacket that had bloodstains on it.

During the post-appeal phase, the lawyer of the convicted defendant filed a request at the attorney general of the Dutch Supreme Court to reopen an investigation into the case so as to examine whether there were grounds for a revision. In Dutch law, a revision might be granted by the Supreme Court when the defense is able to bring forward a so-called novum, that is, a new fact or insight that had it been known to the original judges might have led to a different verdict. The lawyer argued that the hand preference of his client might be such novum. Sometime after the verdict, the lawyer hired two experts to look into the hand preference of the perpetrator and that of his client. Specifically, a neuropsychologist examined forensic photography of the stab wounds of the victims and concluded that the perpetrator must have been left-handed. As well, a neuroscientist tested the hand preference of the convicted defendant. This expert first read the expert opinion of the neuropsychologist and then administered the EHI to the convicted defendant. The convicted defendant attained an extremely right-handed score on the EHI.

The attorney general consulted the criminal cases review commission about the new expert evidence presented by the lawyer. This commission concluded that the expert evidence about the alleged discrepancy between the attacker's left-handedness and the extreme right-handedness of the convicted defendant was weak on several counts. First, it was a neuropsychologist rather than a forensic pathologist who gave an expert opinion about the hand preference of the assailant on the basis of forensic photography of the stab wounds. The point is important, because the forensic pathology literature is pessimistic about the possibilities of inferring hand preference of the perpetrator from the pattern of injuries. For example, forensic pathologists Prahlow and Denton wrote that stabbing is a dynamic event in which the assailant can stand before or behind the victim. This makes it in retrospection and on the basis of the patterns of stab wounds alone virtually impossible to deduce the hand preference of the assailant. These authors went so far as to say that it is a Hollywood myth to believe that the forensic pathologist is able to determine the handedness of the assailant (8).

Second, the neuroscientist who examined the hand preference of the convicted defendant had done so after he had read the conclusion of the neuropsychologist. Such context information may bias the expert when gathering and interpreting his findings. Ideally, forensic experts are blind as to the conclusions of others who act as expert witness in the same case (9). Third, the neuroscientist administered the EHI to the convicted defendant, but did not take feigning of handedness into account. It might be easy for a defendant to feign another dominant hand—in this case: extreme right-handedness—on the EHI (7).

In the forensic literature, other cases have been described in which the hand preference of the accused became an issue (10). For example, eyewitnesses to a shooting may report that the perpetrator had a gun in his right hand, whereas the accused claims to be left-handed (or vice versa).

Empirical Intermezzo

There is extensive literature on feigning symptoms and how to detect feigning with so-called symptom validity tests (11,12). One recurrent theme in this research domain is that feigners overplay their role and tend to endorse extreme symptoms in an attempt to persuade others (13). Accordingly, many symptom validity instruments to detect feigners include bogus items that tap into extreme responding. We wondered whether a similar technique could be applied to the EHI. We explored this issue by adding five bogus items to the original 10-item EHI. Examples of bogus items are: "Your fingernails grow faster at your. . .hand" and "When you shake hands with a person, you have the instinctive tendency to use your. . .hand" (see Appendix 1). Regardless of their hand preference, people answering honestly would be expected to respond to some of these items with "left hand" (−1), to other items with "right hand" (+1), and to still others with "both hands" (0). Thus, when summing the responses to the five bogus items, one anticipates modest rather than extreme scores. One would also expect that scores on bogus items are unrelated to real hand preference.

To test this line of reasoning, we conducted a pilot study in 59 undergraduates (43 women; 16 men; mean age = 23.4 years; SD = 6.1) who were instructed to complete the EHI and the embedded bogus items in an honest way. The Pearson product-moment correlation between handedness as measures by the EHI and the bogus items was $r = 0.14$ ($p > 0.30$), indicating that these items measure something different than handedness. There were five left-handers (9%) in the sample, using the criterion of endorsing a left-hand preference for at least five of the 10 activities listed by the EHI. On average, left- and right-handers had equivalent scores on the five bogus items, means being +1.2 (SD = 0.84) and +1.8 (SD = 1.2), respectively [$t(57) = 1.15$, $p = 0.26$]. The large majority ($n = 54$; 92%) had a sum score on the bogus items that lay between 0 and 3.

In a second study, we tested whether bogus items scores of <0 or >3, that is, extreme responses, are a reliable indicator of feigned handedness, that is, a red flag that detects most feigners. We instructed 23 undergraduate students (6 men; 17 women; mean age = 23.9 years; SD = 1.5) to complete original EHI and embedded bogus items twice: once honestly and once while feigning the opposite handedness. The results were as follows. First, in the honest condition, participants attained a mean score of +8.2 (SD = 3.0) on the original EHI items (i.e., on average they indicated to prefer the right hand 8 times for the 10 activities listed by the EHI). In the feigning condition, this score was −8.0 (SD = 3.8), illustrating once more that it is easy to feign the opposite hand dominance on the EHI. Second, in the feigning condition, only eight participants (35%) attained a score on the bogus items that signaled extreme responding. Apparently, many feigners intuitively understand that there are exceptions to one's hand preference (e.g., left-handers shaking hands with their right hand; right-handers holding their cell phone preferably in their left hand) and that extreme responses are not needed to successfully feign handedness. Thus, our data suggest that embedding bogus items in the original EHI is an imperfect strategy to detect feigned handedness. Meanwhile, the studies summarized here are preliminary and have several limitations: The sample sizes were suboptimal, and the number of bogus items for the detection of feigned handedness was relatively small. One important consideration in this respect is that effective symptom validity tests (i.e., tests with high sensitivity and high specificity) usually contain many bogus items based on the principle that more items generate higher detection rates (14). Future studies might want to test whether adding more bogus items to the EHI increases the detection of feigned handedness. Clearly, when only a limited number of items is used for this purpose, additional tasks are needed, for example the writing task described by McManus et al. (7), and collateral information has to be gathered (i.e., objective records documenting handedness such as video footage).

Conclusion

In fiction, you can tell the handedness of the attacker. For example, in the Boscombe valley mystery (15), Sherlock Holmes realized that the left parieto-occipital injuries to the skull of the deceased victim implied that the attacker was left-handed. However, in the universe of Holmes, things are fixed: Holmes knew for sure that the attacker was standing behind his victim and also, once arrested, the defendant did not try to hide his real hand preference.

In real life, forensic experts only rarely know where precisely victims and assailants were located relative to one another. Also, defendants might want to feign their hand preference. The incentives for doing so might be high. Self-report measures of hand preference that are widely used in neuropsychology such as the Edinburg Handedness Inventory (EHI) offer no solution: these measures are susceptible to feigning, as our data and those others (7) show. This problem cannot be fully solved by simply adding a small number of bogus items. To rule out feigned handedness, a more thorough approach is needed in which the forensic expert not only administers self-report questionnaires along with embedded bogus items and writing test of the sort described by McManus et al. (7) but also collects collateral data.

References

1. Hardyck C, Petrinovich LF. Left-handedness. Psychol Bull 1977;84 (3):385–404.
2. Corballis MC, Häberling IS. The many sides of hemispheric asymmetry: a selective review and outlook. J Int Neuropsychol Soc 2017;23(9–10):710–8.
3. Karger B, DuChesne A, Ortmann CH, Brinkmann B. Unusual self-inflicted injuries simulating a criminal offence. Int J Legal Med 1997;110(5):267–72.
4. Richards PM, Geiger JA, Tussey CM. The dirty dozen: 12 sources of bias in forensic neuropsychology with ways to mitigate. Psychol Inj Law 2015;8(4):265–80.
5. Oldfield RC. The assessment and analysis of handedness: the Edinburgh inventory. a. Neuropsychologia 1971;9(1):97–113.
6. Edlin JM, Leppanen ML, Fain RJ, Hackländer RP, Hanaver-Torrez SD, Lyle KB. On the use (and misuse?) of the Edinburgh handedness inventory. Brain Cogn 2015;94:44–51.
7. McManus IC, Buckens G, Harris N, Flint A, Ng HLA, Vovou F. Faking handedness: individual differences in ability to fake handedness, social cognitions of the handedness of others, and a forensic application using Bayes' theorem. Laterality 2018;23(1):67–100.
8. Prahlow JA, Denton JS. Forensic autopsy of sharp force injuries. Medscape 2016.
9. Kassin SM, Dror IE, Kukucka J. The forensic confirmation bias: problems, perspectives, and proposed solutions. J Appl Res Mem Cogn 2013;2(1):42–52.
10. Geserick G, Krocker K, Schmeling T. On manual laterality (handedness) in humans and its forensic significance-a literature review. Arch Kriminol 2016;239(5–6):145–66.
11. Bass C, Halligan P. Factitious disorders and malingering: challenges for clinical assessment and management. Lancet 2014;383(9926):1422–32.
12. Tracy DK, Rix KJ. Malingering mental disorders: clinical assessment. BJPsych Adv 2017;23(1):27–35.
13. Conroy MA, Kwartner PP. Malingering. Appl Psychol Crim Justice 2006;2(3):30–51.
14. Merten T, Merckelbach H. Forced-choice tests as single-case experiments in the differential diagnosis of intentional symptom distortion. J Exp Psychopathol 2013;4(1):20–37.
15. Conan Doyle A. The Penguin complete Sherlock Holmes. Harmondsworth, U.K.: Penguin, 1981.

Appendix 1: Examples of bogus items for detecting feigned (left, right) hand preference.

When you start the car (left-hand drive), you have the ignition key in your. . .

The same objects (for example a coin) feel heavier in your. . .

A burn is more painful at your. . .

Your fingernails grow faster at your. . .

When you shake hands with a person, you have the instinctive tendency to use your. . .