



The effects of extrinsic motivation on signature authorship opinions in forensic signature blind trials



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ABSTRACT

Expertise studies in forensic handwriting examination involve comparisons of Forensic Handwriting Examiners' (FHEs) opinions with lay-persons on blind tests. All published studies of this type have reported real and demonstrable skill differences between the specialist and lay groups. However, critics have proposed that any difference shown may be indicative of a lack of motivation on the part of lay participants, rather than a real difference in skill. It has been suggested that qualified FHEs would be inherently more motivated to succeed in blinded validation trials, as their professional reputations could be at risk, should they perform poorly on the task provided. Furthermore, critics suggest that lay-persons would be unlikely to be highly motivated to succeed, as they would have no fear of negative consequences should they perform badly. In an effort to investigate this concern, a blind signature trial was designed and administered to forty lay-persons. Participants were required to compare known (exemplar) signatures of an individual to questioned signatures and asked to express an opinion regarding whether the writer of the known signatures wrote each of the questioned signatures. The questioned signatures comprised a mixture of genuine, disguised and simulated signatures. The forty participants were divided into two separate groupings. Group 'A' were requested to complete the trial as directed and were advised that for each correct answer they would be financially rewarded, for each incorrect answer they would be financially penalized, and for each inconclusive opinion they would receive neither penalty nor reward. Group 'B' was requested to complete the trial as directed, with no mention of financial recompense or penalty. The results of this study do not support the proposition that motivation rather than skill difference is the source of the statistical difference in opinions between individuals' results in blinded signature proficiency trials.

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1. Introduction

Since the publication of the landmark work in 1989 by Risinger, Denbeaux and Saks [1], the field of forensic handwriting examination has been exposed to a relatively constant stream of academic and judicial criticism [1–18]. Nevertheless, challenges to evidence in the United States of America (USA) based on the critics' views, resulted in a relatively small number of limitations and exclusions of handwriting evidence by the judiciary [19]. As a consequence some practitioners were quick to dismiss the critics' views as irrelevant and uninformed. The 2009 United States

National Research Council of the National Academies report on identifying the Needs of the Forensic Science Community [20] vindicated critics long held views by concluding that forensic science does have serious deficiencies, resulting in a well publicized call for major reforms and new research. A myriad of critical issues have been raised including method development and validation, error rate testing, context information bias and management and logical standardized reporting procedures. In the practical sense, the comprehensive characterization of FHE expertise will take some time. The role of the FHE and the examinations that they carry out require breaking down and testing into discrete sub tasks. Each claim to expertise that FHEs state needs to be challenged, examined and researched, in an effort to produce a body of data that either supports or refutes each claim, as it is not possible to validate the discipline as a whole.

One regularly queried element of forensic handwriting examination is whether the claimed expertise exists at all. Since FHEs are claiming a skill which is typically considered by the court to be 'expert' in nature, there is a reasonable expectation that there

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exists a body of empirical evidence supporting these claims and that the opinions of FHEs are more reliable than that of lay people. Although the amount of available evidence is not large, and a number of subtasks within handwriting examination are yet to be studied, some progress has been made in regards to signature comparison [21–23]. In each of the published studies blind tests were used to compare the performance of FHEs in comparison to lay groups. All studies found evidence that FHEs' skill is real, demonstrable and superior to that of lay people.

In spite of, or perhaps because of, the favorable results reported on expertise trials, the research design of these instruments has been the subject of criticism [24,25]. It has been suggested that the differences found between lay and expert participants might be the product of motivational variation between the two groups. Critics have suggested that qualified FHEs achieve higher success rates in proficiency trials compared to that of lay participants, as they are extrinsically more motivated to succeed. After all, a bad performance by an expert may lead to questions as to their skill which could impact negatively on their professional reputation. Whereas lay people, whilst they may be intrinsically motivated, would experience little to no extrinsic motivation to succeed, nor fear of consequences or retribution should they perform badly.

Test-taking motivation in the broader sense can be thought of as the extent to which test-takers exert their 'best effort to the task at hand' [26] and issues surrounding test-taking motivation are not unique to expertise studies. It has been postulated that in high-stakes situations, test-takers would have a high degree of motivation to perform well. Conversely in low-stakes situations, test-taking motivation is likely to be much more variable, with some individuals investing considerable effort and other individuals investing little. Knowledge of how individuals perceive the tests they are assigned to complete, and their motivation to do their best on these tests, is scarce, not least in the context of large scale, comparative studies [27,28]. Previous research regarding test taker motivation indicates that; individuals are quite motivated even when the test is low-stakes, raising the stakes does not always contribute to a corresponding rise in motivation and achievement, and that reported level of test-taking motivation, at best, is only weakly associated with subsequent performance [29–32,27]. However, some studies have indicated that the stakes of the test do have an impact on motivation and performance, and trial and proficiency test results should be viewed with this in mind [33–35]. Therefore, from previous empirical studies it is not clear whether the validity of low-stakes tests is threatened by a lack of motivation among the participants. This is because it is not clear if (a) the test-takers are lacking motivation at all and/or (b) it is not clear whether rated level of test-taking motivation interacts with test performance at all. The issue of test-taking motivation thus impacts on experimental validity and therefore the trustworthiness of the test results that support claims to expertise.

Kam et al. had reported on two expertise trials involving handwritten text which illustrated the presence of FHE skill [36,37]. They reported the results of a monetary incentive experiment in response to criticisms that their previous results were skewed due to motivational differences between the professional and non-professional test takers. Kam's approach was to offer non-professional participants a guaranteed \$25.00 participation fee, reward \$25.00 for true positive responses, deduct \$25.00 for false positive responses, deduct \$10.00 for false negative responses and neither reward nor fine for true negative responses. They concluded that monetary incentives offered to the non-professionals appeared to make little difference to the results.

This incentive regime was criticized for a number of reasons, including unnecessarily rewarding participants by guaranteeing them a \$25.00 participation fee, irrespective of performance. This may have created an environment in which there was no real

incentive to avoid false positive responses (in which participants would be penalized \$25.00), as participants were always going to 'walk away' with \$25.00, no matter what they did. The regime was such that if participants were unsure, it was financially more prudent to guess a 'match' rather than a 'non match', so as to maximize profits, or at least 'break even' [38]. Finally, it was suggested that false positives should have been more harshly penalized than true positives rewarded, so as to more accurately reflect the reality faced by real world FHEs. In addition, concerns were raised with respect to the potential for the 'lottery effect', which is the tendency for individuals to become risk preferring in circumstances of potential high reward and low cost, regardless of the odds.

The research reported here attempts to investigate motivational differences between test takers and address the criticisms leveled at Kam's incentive system. In the current study monetary incentives are investigated as a potential motivator of test takers. Those test-takers provided with monetary incentives are denied a base rate participation fee, are rewarded for accurate declarations of 'non matches', and their false positives are more harshly penalized than true positives. The details of the motivational incentive scheme are provided in Table 1.

2. Method

2.1. Participants

Forty lay volunteers, 19 male and 21 female, of an average age of 40 years, participated in the trial. Each participant was required to compare 25 known (specimen or exemplar) signatures with one hundred questioned signatures (where the authorship of the questioned signature was known to the experimenters but not the participants). Participants were informed that the one hundred questioned signatures were comprised of genuine, disguised and simulated signatures. Participants were requested to express an opinion as to whether each of the questioned signatures was or was not written by the writer of the known signatures, or whether they were unable to say.

The 40 participants were divided into two separate groups of 20 individuals (Group A and Group B). Participants from both Groups A and B were provided with identical signature packages to examine and compare. The groups differed in that one group received added pecuniary motivation by way of a financial penalty or reward system and the other group did not. Group (A) were informed that for each correct response they would receive \$1.00, for each incorrect response they would be penalized \$2.00 and for each inconclusive response they would receive neither penalty nor reward (Table 1). Group (B) was directed to complete the trial, with no mention of a financial penalty or reward.

2.2. Materials

The one hundred questioned signatures consisted of three genuine signatures (written by a known writer in their usual

Table 1
Pecuniary incentive scheme as used in the study reported here. Pecuniary incentive scheme as used by Kam et al. [29] in parentheses.

		Reality	
		Match	Non match
Opinion formed	Match	True +ve +\$1.00 [+\$25.00]	False +ve –\$2.00 [–\$25.00]
	Non match	False –ve –\$2.00 [–\$10.00]	True –ve +\$1.00 [\$0.00]

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