

Ranking Handwriting Attributes in the Signatures of One Person: A Survey of Forensic Document Examiners

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(Presented at the 65th Annual Conference of the American Society of Questioned Document Examiners, Boulder, CO, August 11-16, 2007)

A survey was designed to capture how forensic document examiners evaluate a set of signatures by 1 person and rank the significance of various handwriting aspects in terms of individualizing quality. Examiners were asked to rank the individualizing quality of a total of 40 handwriting attributes chosen by the author. Sixteen examiners completed the survey. The rankings were compiled and showed moderate to excellent consensus in the ranking of 92% (37) of the attributes and a lack of consensus in the ranking of only 8% (3) of the attributes.

Introduction

One element of a sound scientific practice is that practitioners from a variety of regions, training histories, and experience will evaluate the same evidence and arrive at findings in a similar way. Properly trained and experienced forensic document examiners possess the skills necessary to evaluate and rank handwriting attributes in a signature comparison problem. Evaluating the relative significance of handwriting features in signatures is part of the process used by examiners when performing a comparison and making a finding.

The purpose of this survey was to see whether, given a set of known signatures by 1 writer, examiners would rank the relative significance of handwriting attributes in a similar manner. This exercise did not directly address the procedures used by examiners when conducting a comparison of questioned and known signatures. For actual case comparisons of questioned and known writing, all handwriting aspects are significant because they are all evaluated during the comparison to assess handwriting variation and to weigh similarities and dissimilarities. This survey addressed whether or not there was general consensus on the relative significance of observed attributes as repeated habits of 1 writer. It is similar to the survey conducted by the author

in 1995 where participants were asked to evaluate the hand-printed material of 1 writer.

Methods and Materials

Eight known (collected, contemporary) signatures of 1 writer were submitted for examination and intercomparison (Figure 1). There were 2 signature styles represented, "Gerald Smith" and "G. Andrew Smith." Following the instructions provided, participants ranked 40 signature attributes (Table 1). These attributes represented many of the 21 elements described by Huber and Headrick (1999), concentrating on those elements typically observed in signatures. They also represented several of the characteristics that were cited as having high discriminatory value among participants in the survey conducted by Hanlen, et al. (1999). Participants were reminded that this exercise was attempting to capture how they placed discriminating value on elements in the context of the submitted signatures only and not how the same elements might be valued in other signatures or other types of writing. Participants were also instructed to add, if desired, and rank any aspects not included in the survey. Like the Hanlen, et al. survey, 3 ranking choices were defined:

- Rank 1 = low individual quality
- Rank 2 = average individual quality
- Rank 3 = high individual quality



Figure 1. Known Signatures of Gerald Andrew Smith

Results

Sixteen survey responses were received and compiled. The instructions and responses are shown in Table 1. The response spreads were split into 4 categories:

1. Excellent consensus = 13 to 16 responses in the same rank
2. Significant consensus = 10 to 12 responses in the same rank
3. Moderate consensus = 7 to 9 responses in 1 or 2 ranks
4. Lack of consensus = approximately 5 responses in each rank

Six additional attributes were added and scored by the participants as Significant to Excellent

(Table 3), but the scores were not incorporated into the overall summary of responses.

Table 2 shows a summary of the ranking spreads. Combining the Excellent and Significant groups of consensus and the Moderate and Lack groups of consensus, there was a near-even split (50:50) between the number of respondents in each of these broader sets. There was measurable consensus (Moderate to Excellent) in 37 of the 40 (92%) attributes and a lack of consensus in only 3 of the 40 (8%) listed attributes. Figure 2 illustrates 2 of the attributes that lacked consensus: the "A-n" relationship and the "n-d" relationship. These parts of the signature exhibited a wide range of variation. The 3rd attribute that lacked consensus was the letter "m."

Instructions: Rank each handwriting aspect below as it relates to individuality or discrimination potential. Rank 1 = low individual quality, Rank 3 = high individual quality. Remember, this is not a global assessment but rather an assessment of 1 writer's signature individuality. Discriminating elements have been selected by the author but are not all-inclusive. Please note and rank any additional significant handwriting aspect in the space provided. Also note: signatures are not all enlarged to same scale.

Letter Form	Rank 1	Rank 2	Rank 3
G	1	5	10
e	15	1	0
r	11	5	0
a	1	9	6
l	3	9	4
d	2	7	7
A	2	8	6
n	5	10	1
d	2	11	3
r	11	5	0
e	16	0	0
w	1	11	4
S	0	0	16
m	6	6	4
i	10	5	1
t	2	9	5
h	2	4	10
Letter Relation	Rank 1	Rank 2	Rank 3
G - e	6	8	2
e - r	12	4	0
r - a	5	8	3
a - l	3	8	5
l - d	2	4	10
G.- A	5	7	4
A - n	5	5	6
n - d	5	5	6
d - r	6	9	1
r - e	11	4	1
e - w	6	7	3
S - m	0	2	14
m - i	2	7	7
i- t	3	5	8
t - h	0	3	13
Other Attributes	Rank 1	Rank 2	Rank 3
Alignment to baseline	3	5	8
Size-height ratios	2	4	10
Relative letter size	2	9	5
Spacing of letters	2	9	5
Terminal strokes	0	4	12
Spacing of 1st and last names	4	9	2
Variation in any aspect	2	2	11
Line quality	3	3	10
Additional attribute: Describe:	See Table 3	See Table 3	See Table 3

Table 1. Survey Instructions and Results

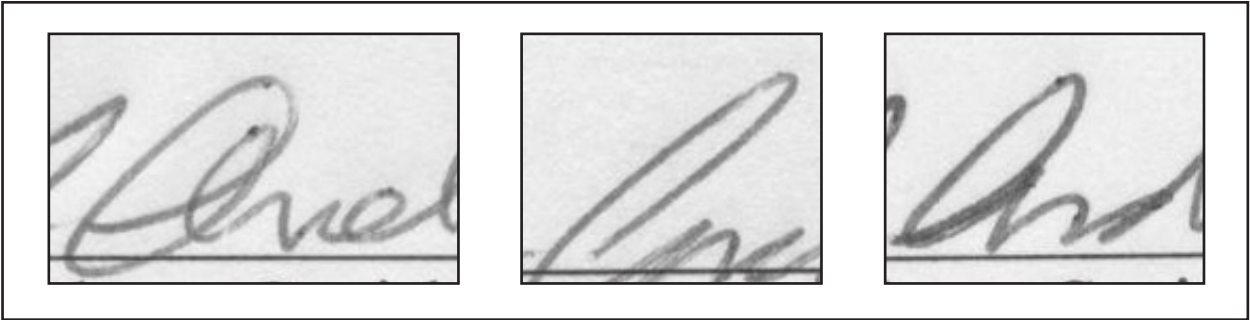


Figure 2. Two attributes that lacked consensus: “A-n” connection and “n-d” connection (signatures 3, 5, and 8). The 3rd attribute that lacked consensus was the letter “m” (Smith).

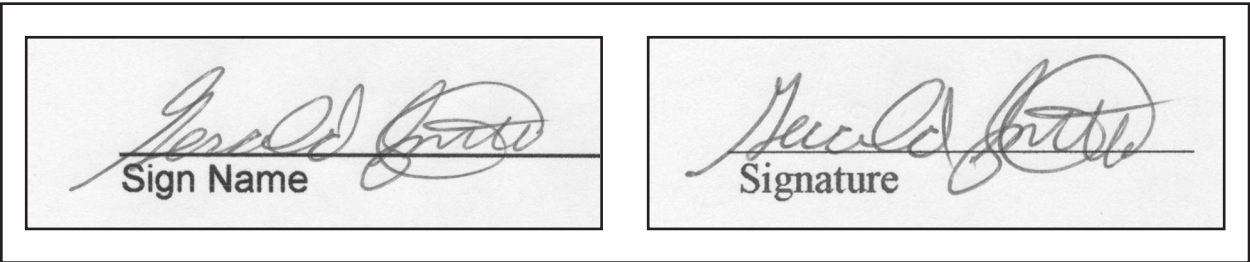


Figure 3. Letter relationship “l-d” in signatures 1 and 2 was reported as highly individual by 63% of participants.

Consensus	Number of Attributes	Percentage of Attributes
Excellent	5	12
Significant	15	37
Moderate	17	42
Lack	3	8

Table 2. Summary of Responses

Description of Added Handwriting Element	Respondents (N)
Space between G and A	1
Skill level	1
i-dots	2
Starting location of signature relative to line	3
Initial strokes	3
Internal proportion of letters	1

Table 3. Elements Added by Respondents

Many of the attributes that showed moderate consensus were closely split between 2 ranks. For example, the "G-e" letter relationship was scored Rank 1 by 6 participants and Rank 2 by 8 participants.

An important result of this survey is the consensus among examiners to place less significance on simple letter forms (e.g., "e" and "i") and to place more value (individual quality) on some complex letter forms (e.g., "w," "S," "h") and other attributes, such as letter-relationships, size-height ratios, and formatting attributes (see Figure 3). Since these types of attributes are more difficult to recognize and imitate than letter forms, they often provide strong evidence for determining whether a signature is genuine or nongenuine.

Discussion

The number of respondents to this survey is too small to represent a consensus among the forensic document examiner community. Additional surveying, with a larger number of participants, and perhaps including a control group of lay persons, would be worthwhile for future study.

References

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