Cognitive Human Factors and Call Accuracy in Limited-Information Signature Identification Tasks

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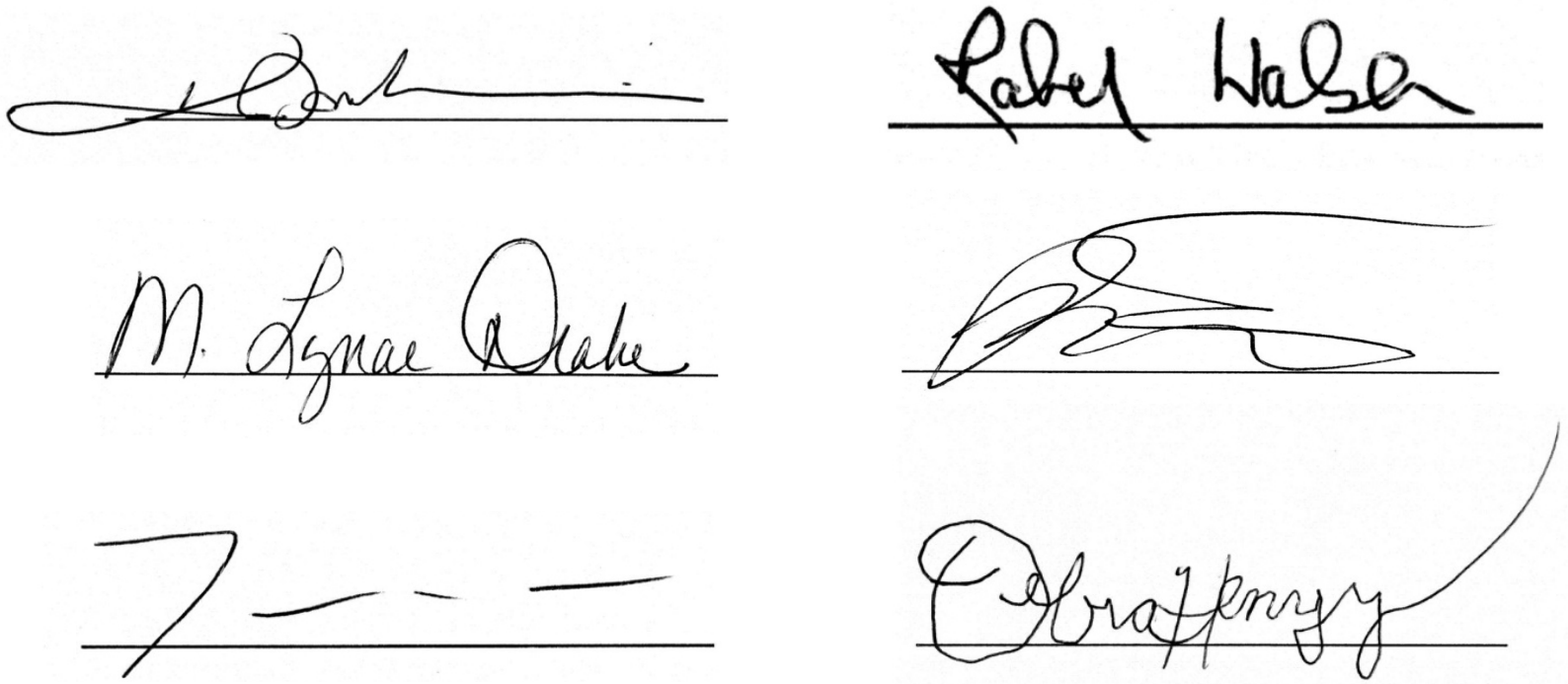
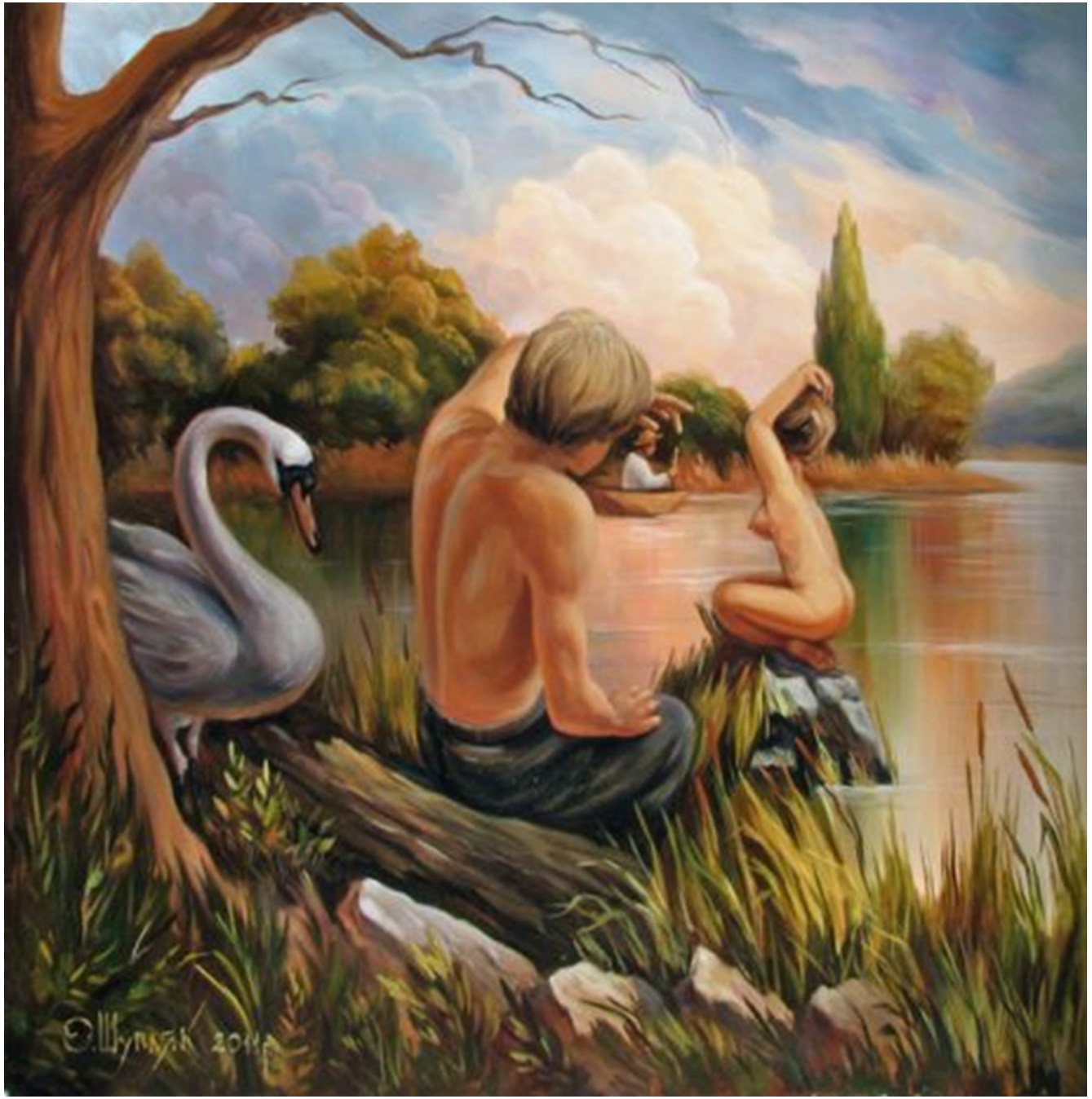
Evaluating Questioned Signatures



As you look at these signatures, what questions come to your mind?

Watch Closely—
What Do You See?



Effortful and Automatic Cognitive Processing

- **Top-Down (Large-Chunk) Processing:**
- Starting with the larger concept and working down to the finer details

- **Bottom-Up (Small-Chunk) Processing:**
- Starting with the fine details of and then building upward until we have a solid representation of it in our minds.

Look Again—
What Do You See?

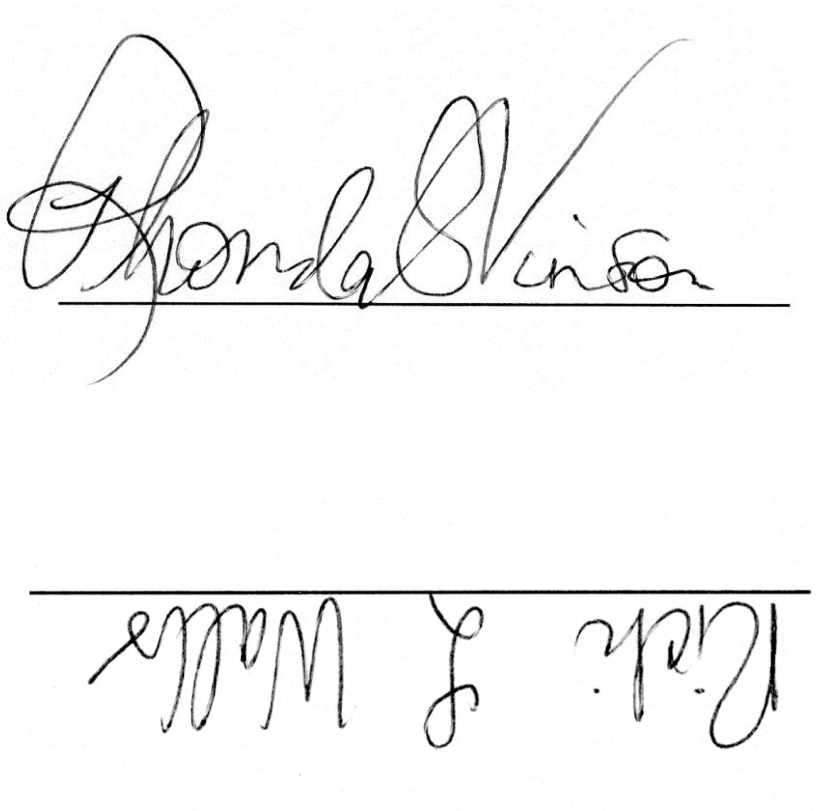
Oleg Shuplyak

Single-Signature Trials

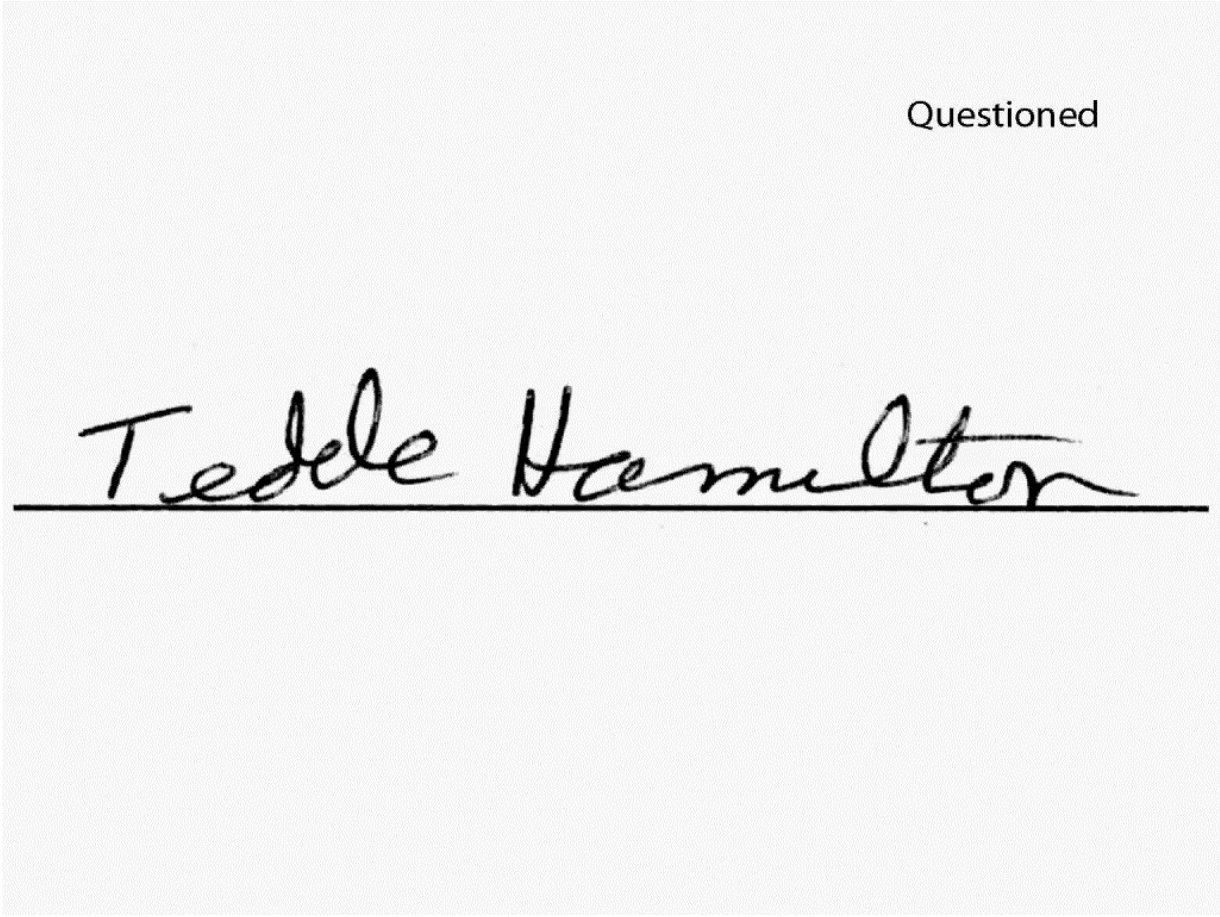
- Five sets, consisting of six signatures each
- Process decision (genuine, simulated)
- Confidence in authorship decision (not at all confident – extremely confident)
- *Purpose: Isolation of features that are indicators of internal signature consistency.*

Tachistoscope/Extended View Protocol

- ***REALLY, REALLY* ISOLATING SIGNATURE FEATURES**
- Four sets consisting of five signatures (10 right side up, 10 upside down)
- Rapid presentation of signature (1 s)
  - Process decision (genuine, simulated) and confidence
- Extended presentation of signature
  - Process decision (genuine, simulated) and confidence



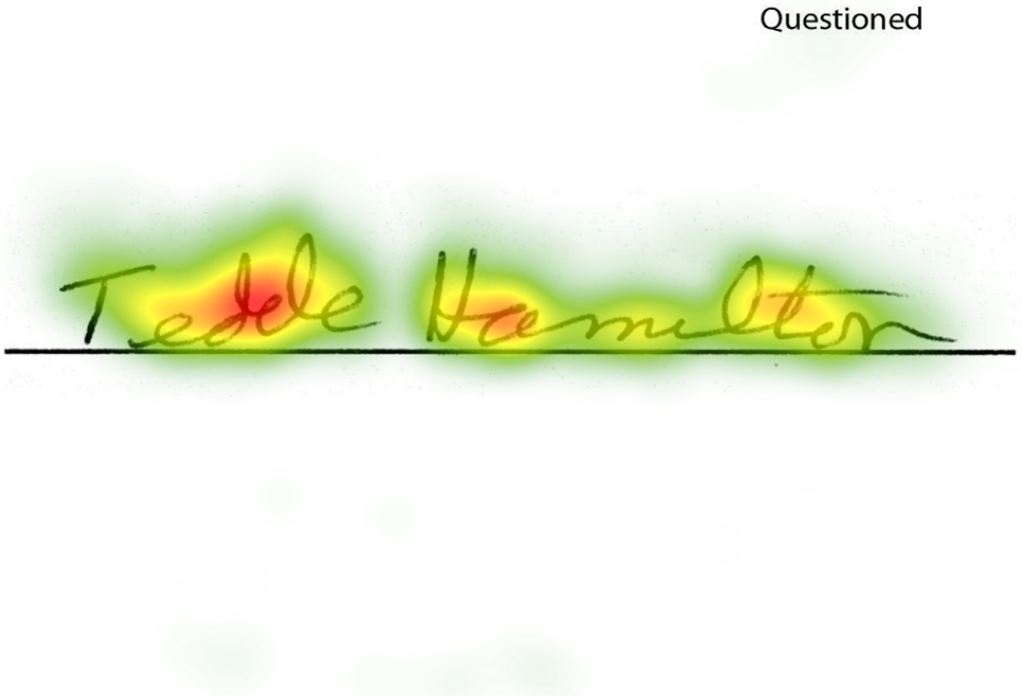
Examine this Signature



Would you say that this TEXT-BASED signature is GENUINE or SIMULATED?

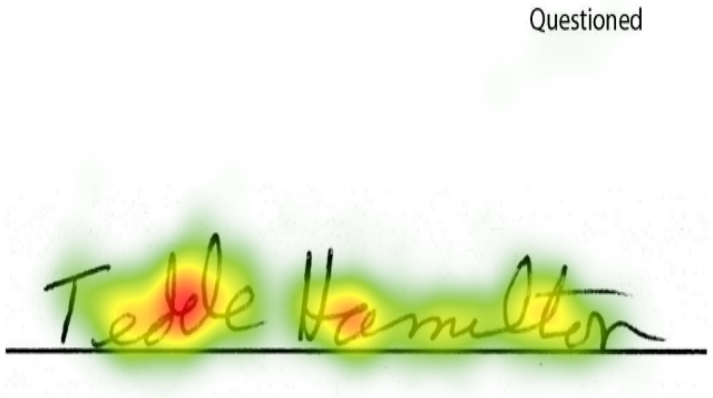
TEDDE HAMILTON (Genuine)

This signature is classified as a high complexity, text-based signature.



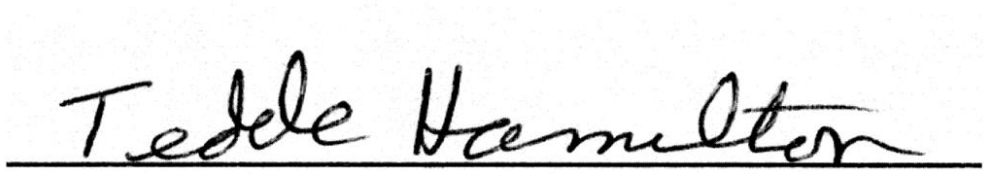
ALL FDE

ALL LAY



Hamilton Results

Questioned

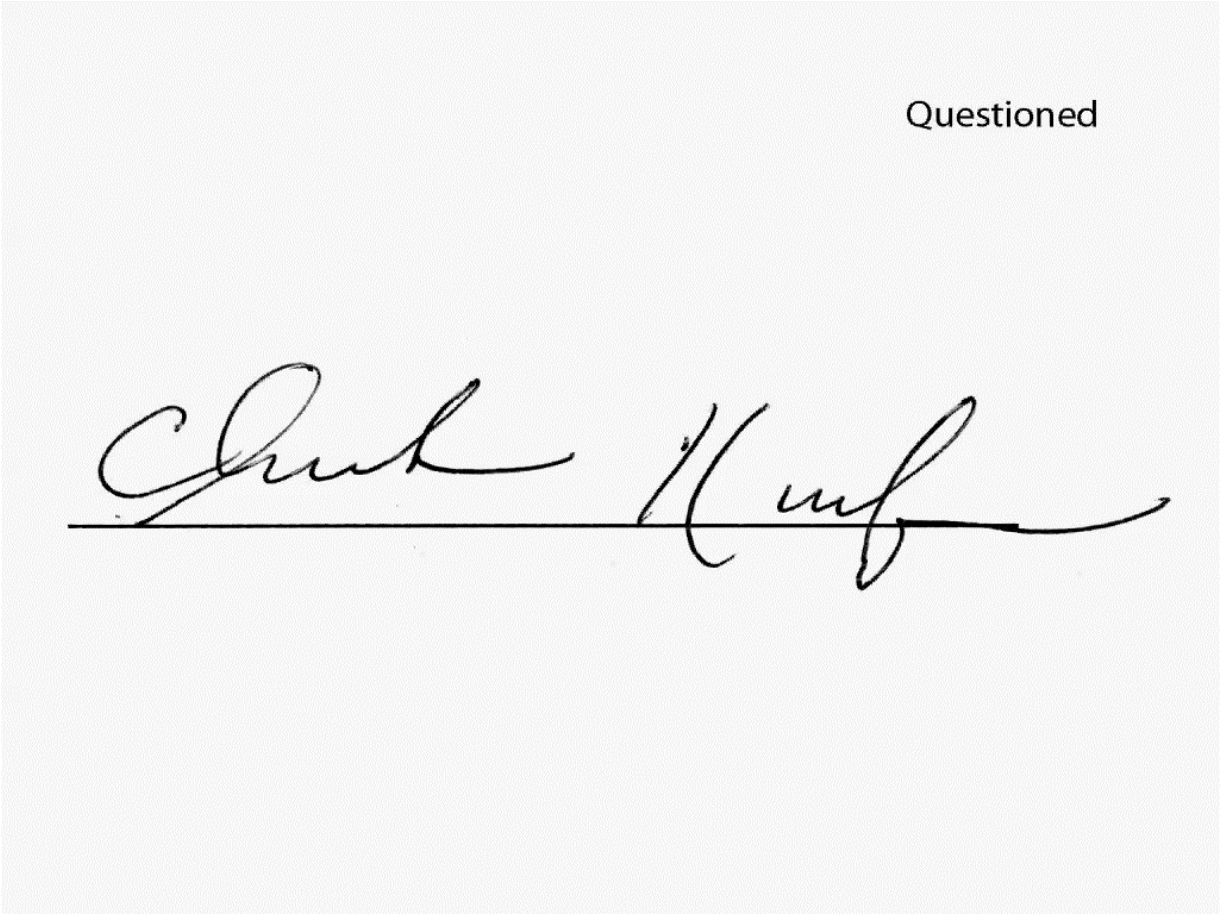


- **38 FDEs responded correctly** that the signature was genuine, and 9 responded that it was non-genuine. One FDE declined to respond.
- **21 Lay participants responded correctly** that the signature was genuine, and 22 responded that the signature was non-genuine.

This difference was statistically significant

$$\chi^2 (1, N = 92) = 10.19, p = .001.$$

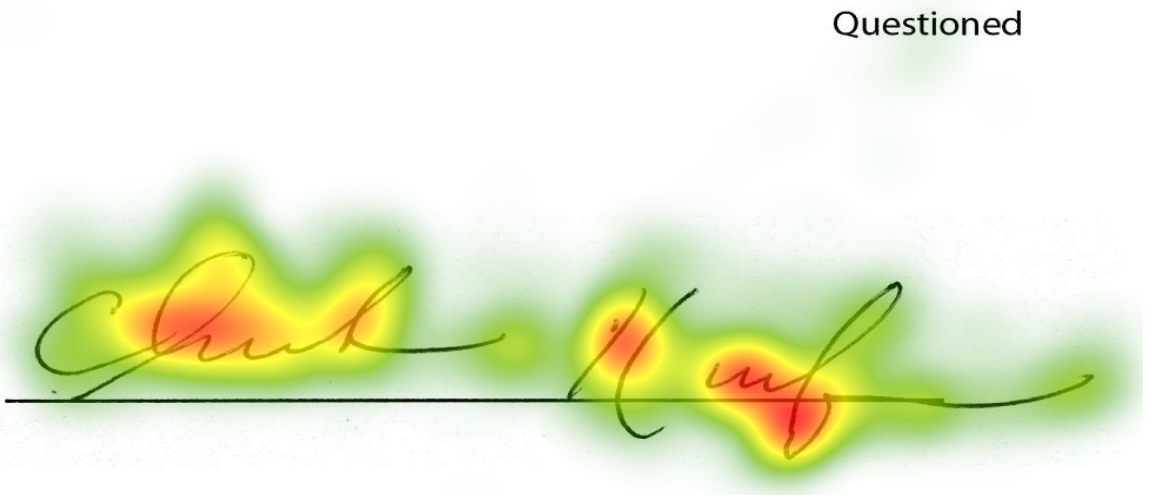
Examine this Signature



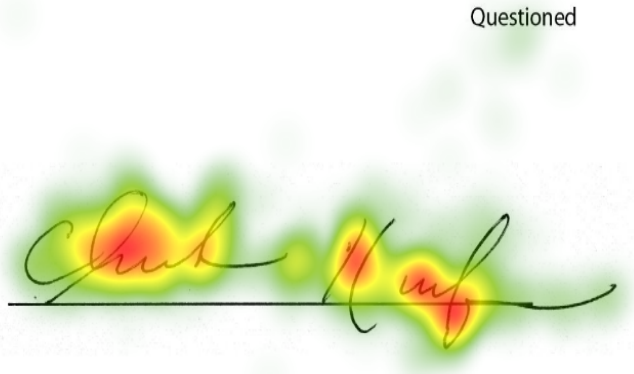
Would you say that this MIXED signature is GENUINE or SIMULATED?

CLINTON KINSLER
Signature 4
(Simulated)

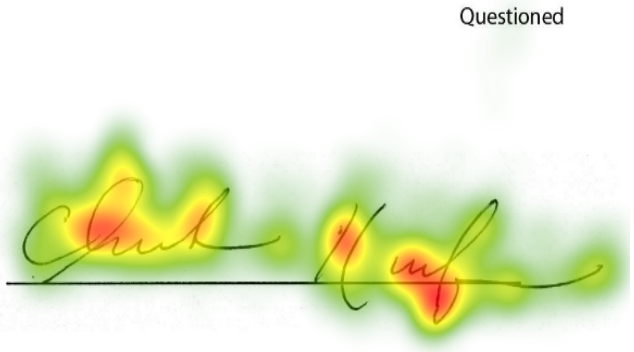
This signature is classifi
as a low complexity,
mixed signature.



ALL FDE

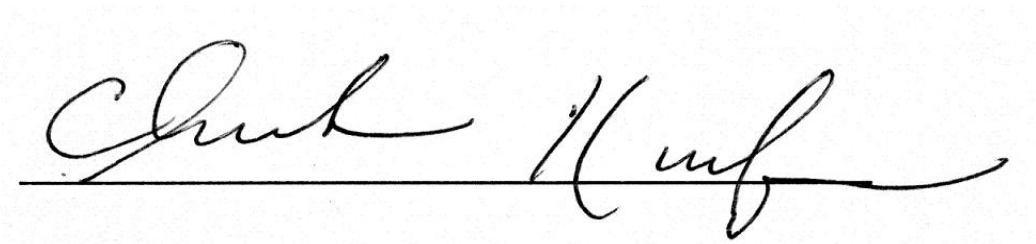


ALL LAY



Kinsler Results

Questioned

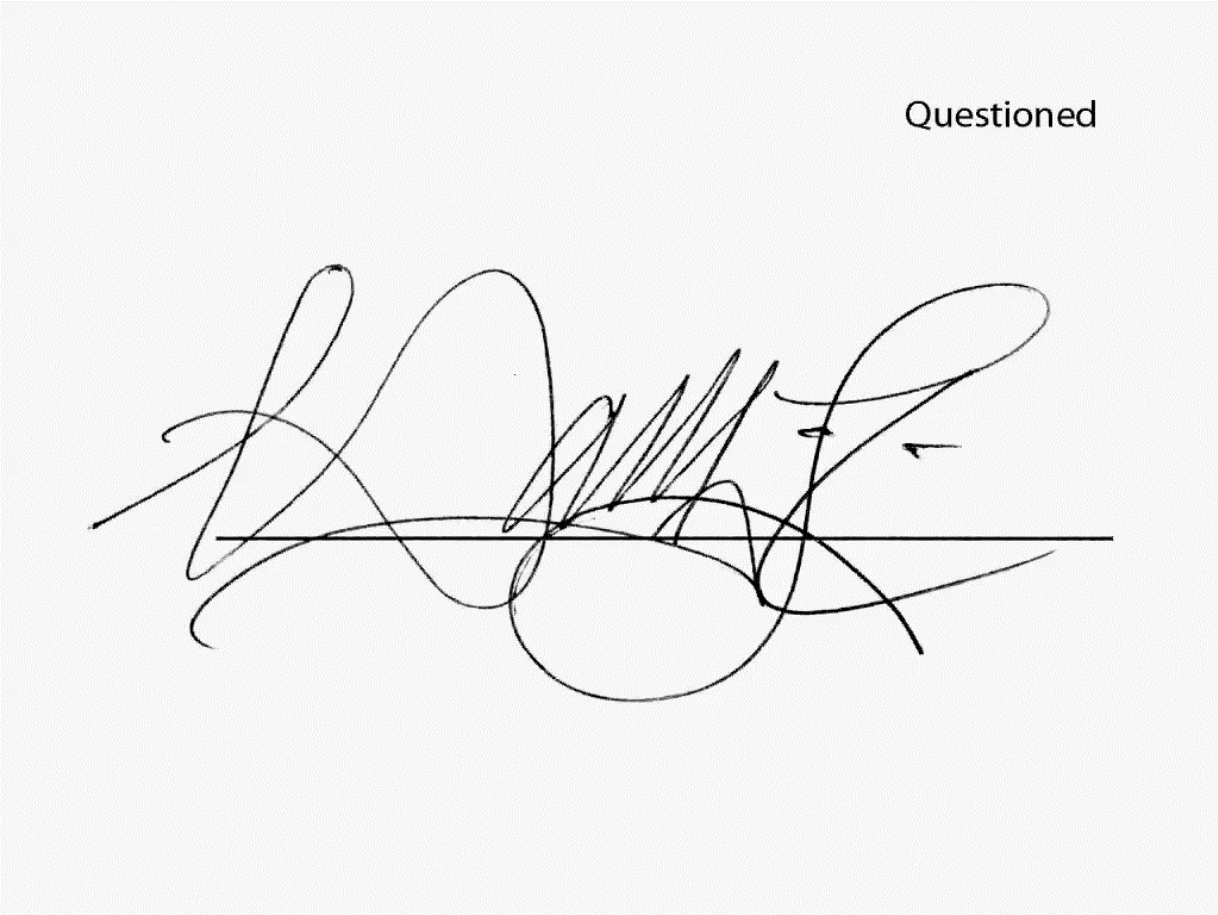


- **24 FDEs responded correctly** that the signature was non-genuine, and 24 responded that it was genuine. One FDE declined to respond.
- **25 Lay participants responded correctly** that the signature was non-genuine, and 18 responded that the signature was genuine.

This difference was statistically significant

$$\chi^2 (1, N = 91) = 0.61, p = .437, ns.$$

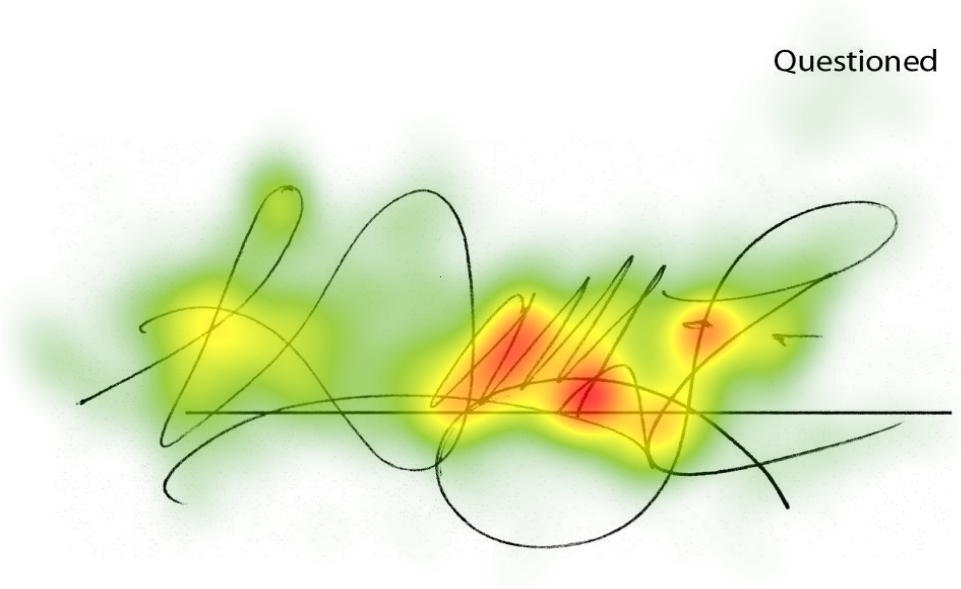
Examine this Signature



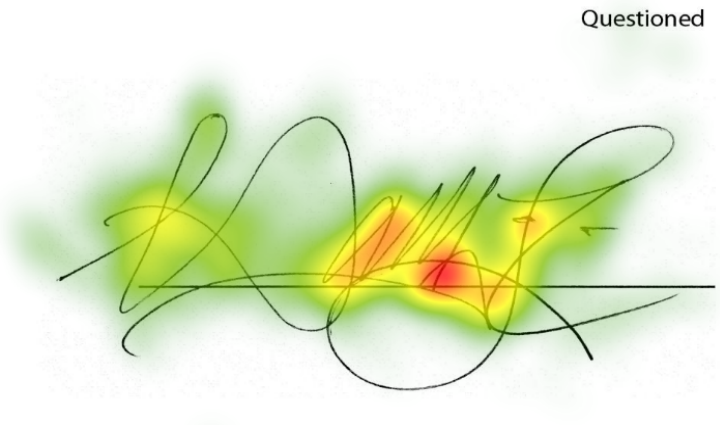
Would you say that this STYLIZED signature is GENUINE or SIMULATED?

GARY FEILMEIER (Simulated)

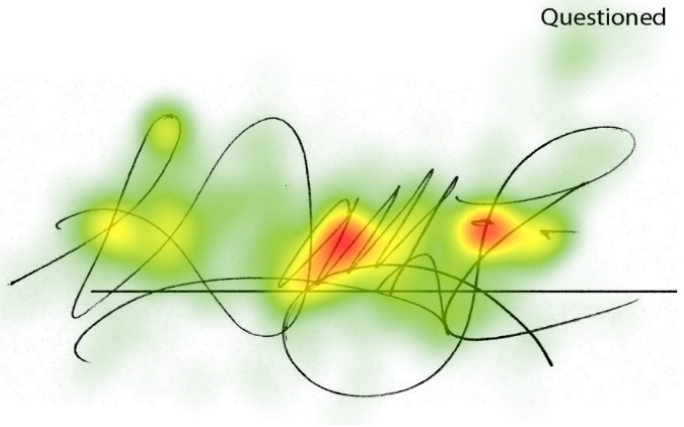
This signature is classified as a high complexity, stylized signature.



ALL FDE

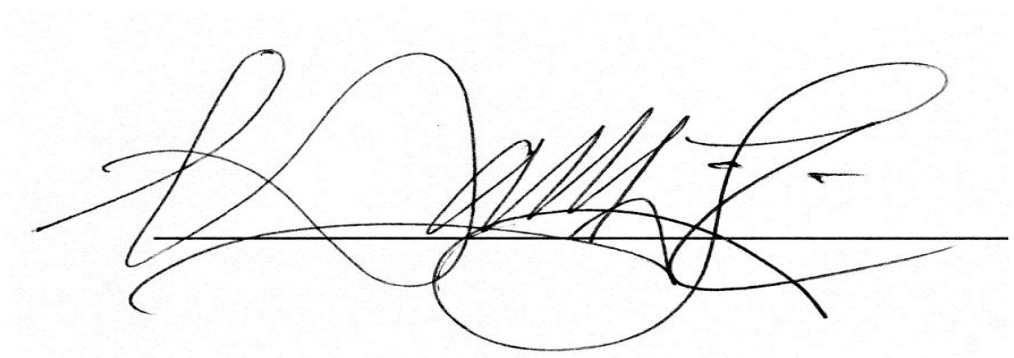


ALL LAY



Feilmeier Results

Questioned



- **49 FDEs responded incorrectly** that the signature was genuine, and 0 responded that it was non-genuine.
- **30 Lay participants responded incorrectly** that the signature was genuine, and 13 responded that the signature was non-genuine.

This difference was statistically significant

χ^2 **(1, N = 92) = 17.25,** p **< .001.**

FDE/Lay Participant Overall Call Accuracy

Overall Correct Call *T*-Test Analysis Results by Experimental Protocol

Protocol	Participant	*t*	df	*p*	*M*	*SD*	n
Questioned/Known	FDE	6.74	87	< .001	45.00	6.12	46
	Lay				35.58	7.06	43
Single Signature	FDE	5.66	87	< .001	20.26	2.65	46
	Lay				16.74	3.2	43
Tachistoscope	FDE	2.98	87	.004	13.61	1.81	46
	Lay				12.44	1.88	43
Extended View	FDE	3.77	87	< .001	14.78	1.81	46
	Lay				13.35	1.77	43

NUMBER OF YEARS AS A PROFESSIONAL FDE UNRELATED TO:

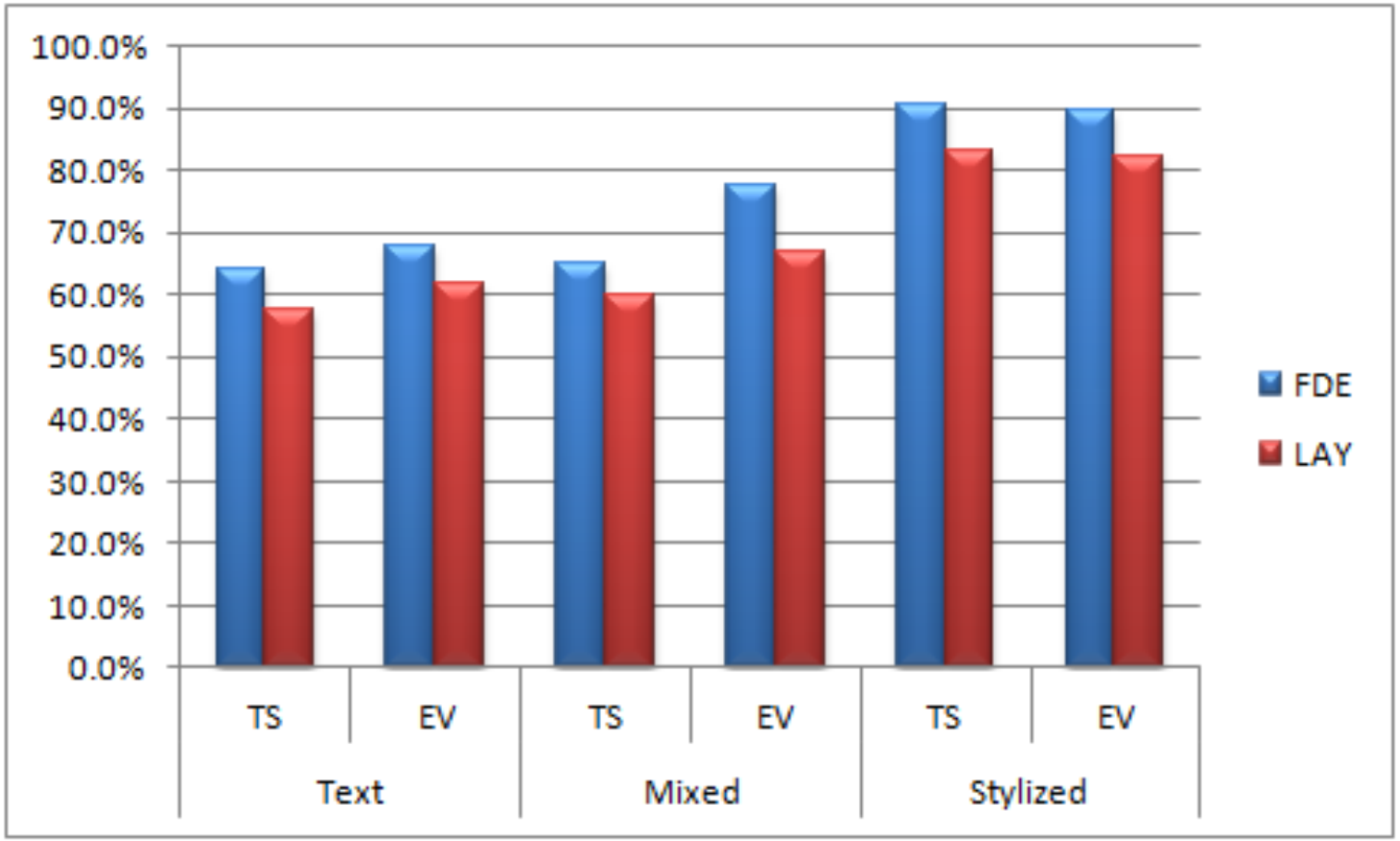
correct single signature process calls

correct questioned/known comparison calls

correct tachistoscope calls

correct extended view calls

Overall Tscope/Extended View Call Accuracy by Signature Type, Participant Type, and View



Future Directions

- **Expertise**
  - Cognitive Stage
    - Committing to memory a set of facts relevant to the skill (declarative encoding)
  - Associative Stage
    - Detect and eliminate errors in initial understanding
    - Strengthen connections among the elements of the skill (declarative encoding and procedural knowledge)
  - Autonomous Stage
    - Central cognition drops out and the procedure becomes more automated and rapid
- **The Comparison Process**
  - What are the characteristics of the comparison process?
  - How does the interaction between attention, perception, and comparison process relate to decision making?
- **Judgment**
  - What is the utility and practicality of probability- vs. frequency-based judgment?
  - What are the metric properties of the 9-point, 7 point, or 5-point decision scale?

Acknowledgements and Contact Information

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