Spoofing and Anti-spoofing: The Wider Human Context

A Historical Perspective

Simon A. Cole

Department of Criminology Law & Society

University of California, Irvine

No. 11-70705 PRO BONO

IN THE UNITED STATES COURT OF APPEALS
FOR THE NINTH CIRCUIT

NELSON ACOSTA-ROQUE,
A#07-523-551
Petitioner,

v.

ERIC HOLDER, ATTORNEY GENERAL,

Respondent.

On Petition for Review of an Order of the Board of Immigration Appeals

BRIEF FOR PETITIONER

ISSUE PRESENTED

Whether a fingerprint examiner's comparison of two print cards is sufficient to prove by clear and convincing evidence that Nelson Acosta is really Victor Aromboles, when

(1) the comparison is the government's sole evidence;

(2) the details of the comparison are unknown and undocumented; the comparison and verification were non-blind; and the examiner violated the "one dissimilarity rule" by failing to explain a dissimilarity;

(3) the examiner's testimony included misleading and unjustified assertions;

(4) the record contains countervailing physical, testimonial, and circumstantial evidence.

STATEMENT OF THE CASE & DETENTION STATUS

Petitioner Nelson Acosta-Roque ("Acosta"), a legal permanent resident ("LPR") of the United States, and national of the Dominican Republic, was deported based on the Immigration Judge's ("IJ's") determination that he is really Victor Antonio Pecheca-Aromboles ("Aromboles"), a Dominican national deported in 1991 following a drug conviction. (R. at 3, 64, 77, 200.)[1] Acosta maintains that he is not Aromboles and all the charges are based upon mistaken identity. (R. at 270.)

And there remains the three-inch height difference. According to the government's own records, Acosta is 5'11," while Aromboles is 5'8". Did he grow between the ages of 35 and 54? Are police height records inaccurate? Are DHS height records inaccurate? One of these three possibilities must be true if they are indeed the same person. Yet the government made no effort whatsoever to reconcile this obvious discrepancy in the physical records.

Amicus Curiae Brief

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BRIEF OF SCIENTISTS AND SCHOLARS OF FINGERPRINT IDENTIFICATION AS AMICI CURIAE IN SUPPORT OF PETITIONER AND IN FAVOR OF REVERSAL

ERWIN CHEMERINSKY
UNIVERSITY OF CALIFORNIA,
IRVINE SCHOOL OF LAW
IRVINE, CA 92617
(949) 824-7722
echemerinsky@law.uci.edu

Attorney for Amici Curiae

Interest of Amici Curiae

Amici are thirty-nine scientists, scholars, and attorneys who are familiar with the scientific literature concerning fingerprint identification. Amici are an international, interdisciplinary group encompassing a wide variety of perspectives on fingerprint identification. Amici include scholars drawn from eight different countries and from a variety of academic fields ranging from law to forensic science to psychology and other disciplines, as well as forensic scientists employed by forensic laboratories. Amici include several

Amici have been informed that the court has been presented with the issue of whether a fingerprint comparison is sufficient to prove by clear and convincing evidence that an individual in custody is the same person as an individual who was in custody at a previous time. While amici take no position on either the legal or the factual issues, amici understand that the petitioner, Nelson Acosta, contends that in this case the fingerprint "examiner's testimony included misleading and unjustified assertions."[1] Amici agree.

Biometric Identification

- Though very old, earliest biometric *systems:*
  1. Anthropometry
  2. Fingerprinting
- "Biometrics as we know it today can be viewed as extension of Bertillon's anthropometric approach."
  - Dessimoz & Champod (2008)

Spoofing and anti-spoofing as old as biometrics

FIGURE 13.

LEFT FOOT.

Second and Third Movements.

The operator pushes forward the slide with the right hand, requests the subject to slightly bend the left knee, presses down the first and second joints of the big toe, sees that the other toes are not bent, rectifies if necessary the position of the instrument and reads the figures indicated

1. Have the subject take the position represented . . . To do this easily, analyze each movement as you proceed, observing scrupulously the following instructions:
2. The operator gives the order: “Place your left foot on the tracing,” and when this is done, “Lean your body forward;” then: “Put your right hand on the handle of the table;” and then only does he add: “Stand on the footstool on one foot only.”
3. These commands, announced rigorously in the order given above, will in a few second make the most stupid individual place himself in the proper position.
4. The object of this position is to force the weight of the body to rest entirely on the left foot, which, being opposite the right hand of the operator, is more easily measured than the right foot would be. By making the subject lean his right hand on a point of support a little in front of him, the operator causes him to displace his center of gravity in the same direction; a movement which produced an automatic extension of the toes.
5. Before placing the instrument, the operator should assure himself that the toe are well in place and particularly that the great toe does not rest sideways on the stool, which would cause a deviation in it direction, and consequently a small diminution in the length of the foot. It goes without saying that if it were bent, either voluntarily or involuntarily, the operator should correct its position himself by taking hold of it with his fingers and straightening it out.
6. As a general thing, when the great toe is bent intentionally the operator will perceive it immediately by the position of the other toes, which follow involuntarily the movement of the great one, and THE WRINKLED SKIN of which will strike one at the first glance. It is difficult, however, for a subject to maintain this false position for more than a minute. To make the toe assume its natural position it would be sufficient, in case of suspected trickery, to slightly bend the knee which supports the weight of the body; the flexion will usually cause the extension of the other toes.

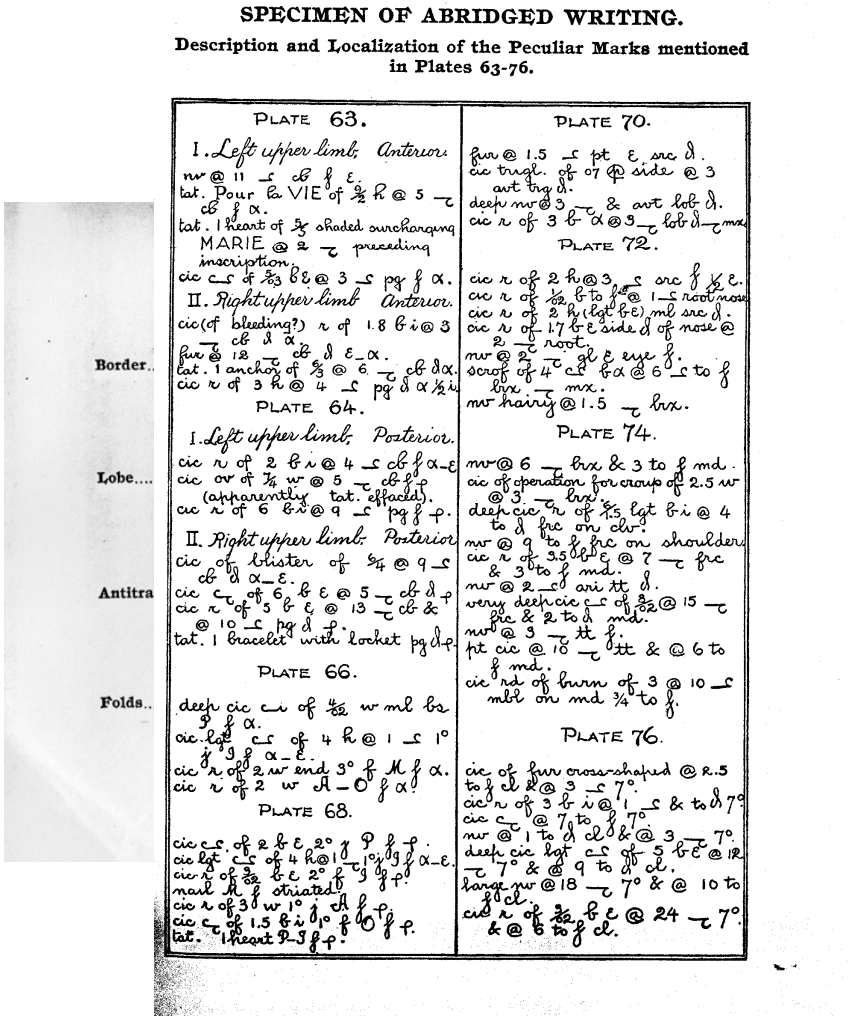
– Bertillon 1889

Contemporary anti-spoofing

1. Multi-modal biometrics
2. “Soft” biometrics

Bertillon system as multi-modal biometrics

1. Anthropometric measurements
2. Facial description
3. Peculiar marks



SPECIMEN OF ABRIDGED WRITING.

Description and Localization of the Peculiar Marks mentioned in Plates 63-76.

PLATE 63.

I. *Left upper limb. Anterior.*

nv @ 11 — c cb f ε.
tat. Pour la VIE of ½ h @ 5 — c cb f α.
tat. 1 heart of ½ shaded ourcharging MARIE @ 2 — c preceding inscription.
cic c—c of ⅔ b ε @ 3 — c pg f α.

II. *Right upper limb. Anterior.*

cic (of bleeding?) r of 1.8 b i @ 3 — c cb d α
fur @ 12 — c cb d ε—α.
tat. 1 anchor of ⅔ @ 6 — c cb d α.
cic r of 3 h @ 4 — c pg d α ½ i.

PLATE 64.

I. *Left upper limb. Posterior.*

cic r of 2 b i @ 4 — c cb f α—ε
cic ov of ⅞ w @ 5 — c cb f ρ (apparently tat. effaced).
cic r of 6 b i @ 9 — c pg f ρ.

II. *Right upper limb. Posterior.*

cic of blister of ¾ @ 9 — c cb d α—ε.
cic c—c of 6 b ε @ 5 — c cb d ρ
cic r of 5 b ε @ 13 — c cb & @ 10 — c pg d ρ.
tat. 1 bracelet with locket pg d ρ.

PLATE 66.

deep cic c—c of ⅝ w ml bs f α.
cic lgt c—c of 4 h @ 1 — c 1° f α—ε.
cic r of 2 w end 3° f M f α.
cic r of 2 w A—O f α.

PLATE 68.

cic c—c of 2 b ε 2° f P f ρ.
cic lgt c—c of 4 h @ 1 — c 1° f α—ε.
cic r of ⅝ b ε 2° f f ρ.
nail R f striated.
cic r of 3 w 1° f A f ρ.
cic c—c of 1.5 b i 1° f O f ρ.
tat. 1 heart R-3 f ρ.

PLATE 70.

fur @ 1.5 — c pt ε src d.
cic trngl. of ·07 ♎ side @ 3 ant trg d.
deep nv @ 3 — c & ant lob d.
cic r of 3 b α @ 3 — c lob d — c mx.

PLATE 72.

cic r of 2 h @ 3 — c src f ½ ε.
cic r of ½ b to f @ 1 — c root nose.
cic r of 2 h (lgt b-ε) ml src d.
cic r of 1.7 b ε side d of nose @ 2 — c root.
nv @ 2 — c gl ε eye f.
scrof of 4 c—c f α @ 6 — c to f brx — c mx.
nv hairy @ 1.5 — c brx.

PLATE 74.

nv @ 6 — brx & 3 to f md.
cic of operation for croup of 2.5 nv @ 3 — c brx.
deep cic r of ·5 lgt b i @ 4 to d frc on clv.
nv @ 9 to d frc on shoulder.
cic r of 3.5 b ε @ 7 — c frc & 3 to f md.
nv @ 2 — c ari tt d.
very deep cic c—c of ⅜ @ 15 — c frc & 2 to d md.
nv @ 3 — c tt f.
pt cic @ 10 — c tt & @ 6 to f md.
cic rd of burn of 3 @ 10 — c mbl on md ¾ to f.

PLATE 76.

cic of fur cross-shaped @ 2.5 to f cl d @ 3 — c 7°.
cic r of 3 b i @ 1 — c & to d 7°.
cic c—c @ 7° to f 7°.
nv @ 1 to d cl & @ 3 — c 7°.
deep cic lgt c—c of 5 b ε @ 12 — c 7° & @ 9 to f cl.
large nv @ 18 — c 7° & @ 10 to f cl.
cic r of ⅝ b ε @ 24 — c 7° & @ 6 to f cl.

Border..
Lobe....
Antitra
Folds..

Unique features is not the problem

Some one once said long ago that it is impossible to find two leaves exactly alike; Nature never repeats herself. Select no matter what part of the human body, examine and compare it carefully in different subjects, and the more minute your examination is the more numerous the dissimilarities will appear: exterior variations, interior variations in the bony structure, the muscles, the tracing of the veins; physiological variations in the gait, the expressions of the face, the action and secretion of the organs, etc. . . .

Unique features is not the problem

. . . Thus, the solution to the problem of judicial identification consists less in the search for new characteristic elements of individuality than in the discovery of a method of classification. Certainly, I do not deny, to speak only of the Chinese method, that the filigreed arabesques found on the epidermis of the anterior face of the thumb may be at the same time permanent in the same subject and extraordinarily variable from one subject to another; and that every individual may thus possess a species of seal, original and entirely distinctive. Unfortunately, it is quite as undeniable, in spite of the ingenious investigations made by Mr. Francis Galton in England, that these designs taken by themselves do not present elements of variability sufficiently well-defined *to serve as a basis of classification* in a file of several hundred thousand cases.

– Bertillon 1896

Independent checks

Nevertheless, what ever may be the similarity in the figures of the two signalments, however abnormal from an anthropometrical point of view they may be supposed to be, they could not in themselves be sufficient to satisfy the demands of a court . . . It is of the first necessity, in order to render the identification indisputable, that it should be subsequently confirmed by a body of independent facts which do not come under consideration during the classification and search of the signaletic card; such is the function of the descriptive information and the statement of peculiar marks, which ought to be attached to every signalment

– Bertillon (1896)

Fingerprinting

"Biometric identifiers—conceptually unique attributes—are often portrayed as the panacea for identity verification."

– Dessimoz *et al.* (2007)

Uniqueness

- Uniqueness is not the issue
- Associability using existing detection systems (machine or human)

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Forensics without uniqueness, conclusions without individualization: the new epistemology of forensic identification†

SIMON A. COLE*
Associate Professor of Criminology, Law and Society, University of California Irvine, Irvine, CA 92697, USA

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Among the causes of the current sense that the forensic identification disciplines are 'under siege' are conceptual difficulties in these disciplines. Forensic identification disciplines either claim to achieve or strive to achieve conclusions of 'individualization', the reduction of the donor pool to a single source. They tend to support such claims by reference to the supposed 'uniqueness' of their objects of analysis. Both these notions remain extremely salient among practitioners and courts. And yet, a broad consensus in the forensic literature holds that individualization is unachievable and uniqueness is largely irrelevant to supporting claims of individualization. Focusing on latent print evidence, this article provides a clear articulation of the need to make a clean break from both individualization and uniqueness as forensic concepts. It argues that trace evidence disciplines can live without these concepts, and it explores what defensible conclusions might look like and how they might be supported.

Keywords: individualization; unique; forensic identification; philosophy; epistemology; fingerprint.

An object can be identical only to itself.
– Gottfried Wilhelm Leibniz (1686)

Criminalistics is the science of individualization.
– Paul Kirk (1963)

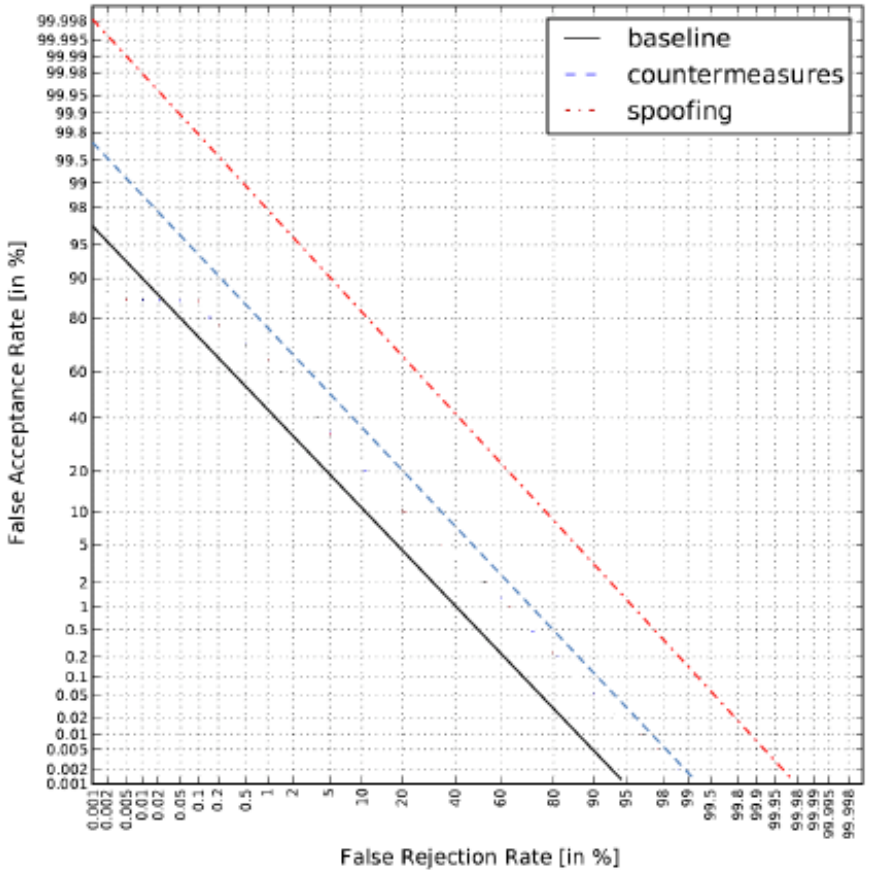
Roughly speaking, to say of two things that they are identical is nonsense, and to say of one thing that it is identical with itself is to say nothing at all.
– Ludwig Wittgenstein (1922)

"A thing is identical with itself." – There is no finer example of a useless proposition.
– Ludwig Wittgenstein (1953)

Science cannot utter a single word about an individual molecule, thing, or creature in so far as it is an individual but only in so far as it is like other individuals.
– Walker Percy (1954)

We're one, but we're not the same.
– U2 (1991)

Biometric engineering

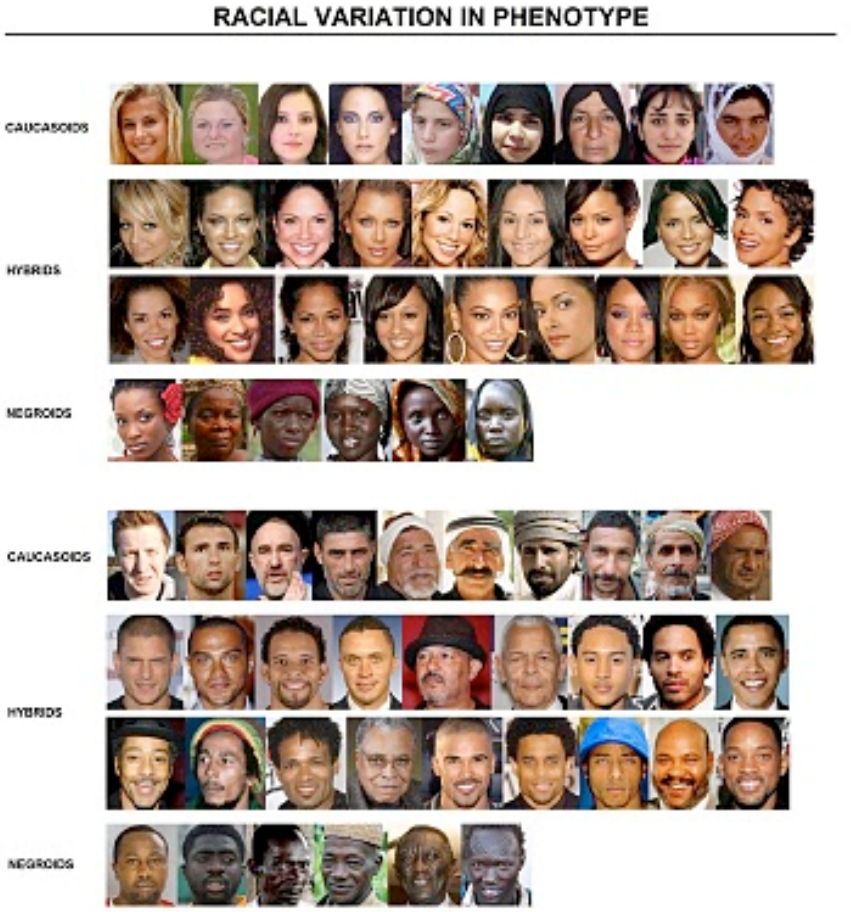


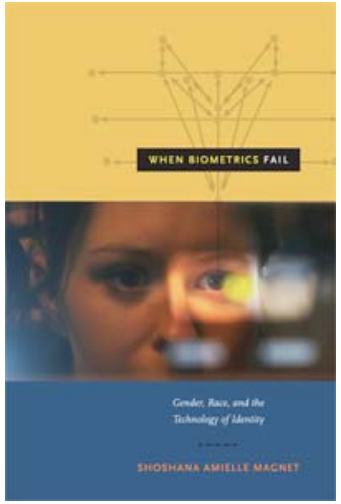
“The Yellow File” – New York Police Department, c. 1925

About 3 years ago, I inaugurated a new file in my bureau, which I have chosen to call the “yellow file.” In New York City we have quite a number of Chinese who are residents of the city, and quite a number of visiting Chinese from Boston and Newark, and I found out that it would be very well for us to have a yellow file in addition to a black file. You identification men know a Chinaman when you see one or a Japanese; you will not make a mistake in that, and, therefore, when a Chinaman or a Japanese is brought into your bureau, you can simply mark on the front of the card, “Yellow,” the same as you would mark it “Black” for a negro, and file that file in a separate file.

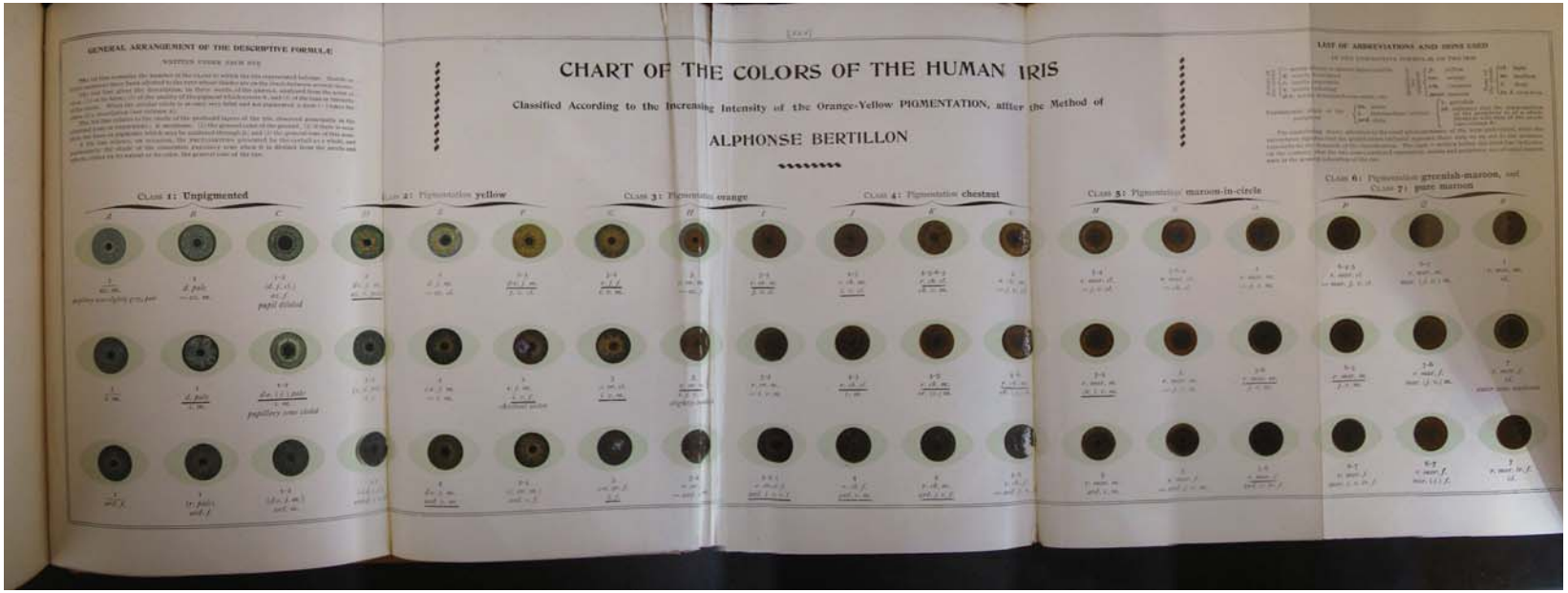
– International Association for Identification, Proceedings of the Annual Convention (1925), p. 60

“Soft biometrics”

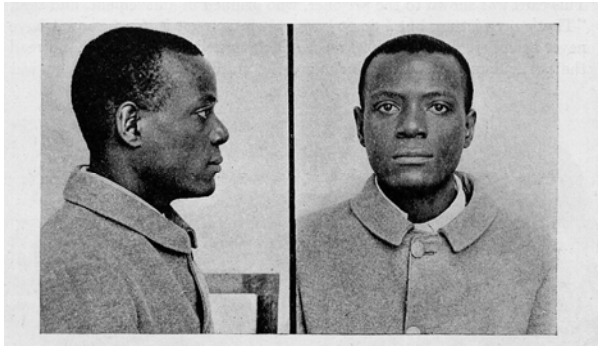


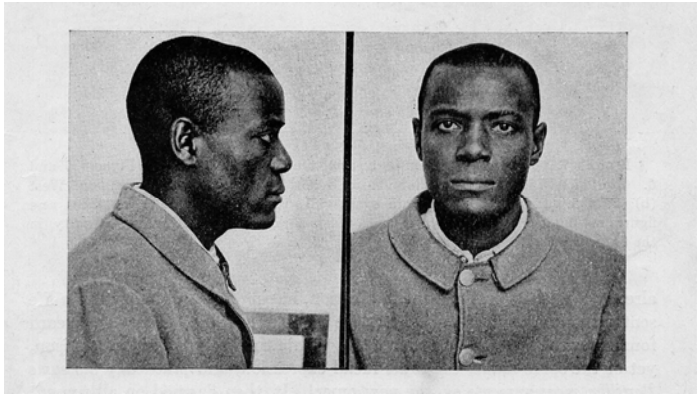


Physiognomic Variety under Bertillonage



Will Wests Case





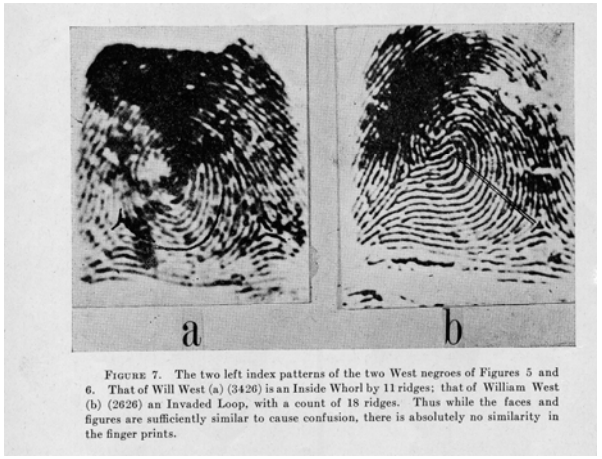


FIGURE 7. The two left index patterns of the two West negroes of Figures 5 and 6. That of Will West (a) (3426) is an Inside Whorl by 11 ridges; that of William West (b) (2626) an Invaded Loop, with a count of 18 ridges. Thus while the faces and figures are sufficiently similar to cause confusion, there is absolutely no similarity in the finger prints.

Table 1. Anthropometric measurements of "the two Will Wests" as reportedly recorded at Leavenworth, 1903.

Measurement	Head length	Head breadth	Middle finger	**Foot length**	Forearm length	Height	Little finger	Trunk	Arm span	Ear length	Cheek width
Will West	19.7	15.8	12.3	**28.2**	50.2	178.5	9.7	91.3	187.0	6.6	14.8
William West	19.8	15.9	12.2	**27.5**	50.3	177.5	9.6	91.3	188.0	6.6	14.8

Source: Harris Hawthorne Wilder and Bert Wentworth. *Personal Identification: Methods for the Identification of Individuals, Living or Dead.* Boston: Gorham, 1918, 33.

Possible implications for contemporary anti-spoofing

Multi-modalism

- Heir to anthropometry
- May have some privacy-enhancing characteristics
  - Probabilistic interpretation
  - Redundancy and (statistically) independent checks
  - Data minimization
  - Sensitivity to continuum of human variation

Soft biometrics

- Heir to fingerprinting
- May have some negative ethical implications
  - Categorical interpretation
  - Reliance on single “unique” identifier
  - Data maximization
  - Resurrection of crude, unscientific categories based on “commonsensical” observations