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BRAIN-COMPUTER INTERFACES AND EVIDENCE-TAKING:

Dehumanization Risks in Croatian Procedural Law

>_ PROPOSITION.MAIN

Everyone expects the central problem to be *accuracy*. The deeper problem is that the technology **mediates mental content** through a computational process.

■ _____ >_ AND THE CONSEQUENCE

That mediation puts pressure on the principles that keep a person a *subject* of the proceedings, with the standing that role carries.

EXECUTION SEQUENCE.

§01

THE TECHNOLOGY

How neural activity becomes a probabilistic digital output, and the black-box problem.

§02

EVIDENTIARY CLASS

Why a BCI output behaves more like testimonial evidence than like a fingerprint.

§03

PRINCIPLES UNDER STRAIN

Free evaluation, *nemo tenetur*, immediacy, orality, adversarial testing.

§04

SAFEGUARDS

Four protections *de lege ferenda* to keep adjudication human-centred.

§01

The technology, and what it actually does

FOUR PHASES, ONE SYNTHETIC OUTPUT

A continuous biological waveform is progressively rewritten into a best-estimate result.

[01]

BIOLOGICAL

Sensors record the brain's electrical or metabolic activity. A continuous biological waveform, unreadable to a human observer.

[02]

FILTERING

Preprocessing strips out noise. The first act of mediation: the system decides what counts as signal and what gets discarded.

◆ **RAW SIGNAL IN** *the brain's activity, recorded and then cleaned.*

FOUR PHASES, ONE SYNTHETIC OUTPUT

The cleaned signal is now interpreted, scored, and turned into a number.

[03]

TRANSLATION

Feature extraction and a machine-learning model score the signal against a training set, often built from other people's neural data.

[04]

OUTPUT

A human-readable result, expressed as a probabilistic inference, for example “95% probability of recognition”.

◆ **WHAT REACHES THE COURT** *is the output of phase 04, the processed result, after the raw neural event is gone.*

CAN WE RETRACE THE REASONING?

[INTERPRETABLE]

Glass-box classifiers

Linear Discriminant Analysis, Support Vector Machines, and similar models.

The path from signal to result can be followed and inspected step by step.

> auditable, but lower performance

[OPAQUE]

The 'black box'

Modern systems lean on deep-learning architectures. The pathway from raw signal to output cannot be retraced transparently. Even an accurate output stays unexplained.

> higher performance, no audit trail

The deeper issue survives both: a BCI output works as a mediated inference about a cognitive state. It is an interpretation, and that is a different thing from a direct evidentiary object.

USE CASES: THE CRIMINAL CASE

> TODAY

> THEORETICALLY POSSIBLE

■ CRIMINAL

// the obvious one

The P300 concealed-information test exists today as an investigative aid. Accuracy is high in the lab, but field reliability is strongly contested, and can drop under stress, fatigue, or simple countermeasures.

Decoded recognition, memory, or intent, offered as substantive evidence of guilty knowledge.

>_ THE RELIABILITY GAP

Laboratory P300 studies report very high accuracy. Field performance is another matter: it is strongly contested, varies between individuals, and can be defeated by simple countermeasures. A courtroom is a field setting, not a laboratory.

This is where the application is most visible, and the one where the reliability of the underlying science is already disputed.

USE CASES: CIVIL & ADMINISTRATIVE

> TODAY

> THEORETICALLY POSSIBLE

■ CIVIL

// less obvious

No operational courtroom use. But the taxonomy of personal versus material evidence already exists in the Civil Procedure Act.

Probing testamentary capacity, genuine intent at contract formation, or knowledge in tort. A litigant's word displaced by a readout.

■ ADMINISTRATIVE

// less obvious

No operational use. Courts retain direct investigative powers, the judge as *iudex peritus peritorum*, the expert of experts.

Asylum credibility checks, cognitive-capacity or fitness determinations, benefit-fraud 'knowledge' screening.

⚠ *Speculative for now, but the legal tensions appear the moment any such output enters the file.*

§02

What kind of evidence is this?

TWO KINDS OF EVIDENCE

Croatian procedural law draws an implicit line between evidence from persons and evidence from objects.

[MATERIAL]

The body as object

Fingerprints, bodily impressions, blood, urine, genetic samples. Physical characteristics.

May be collected compulsorily, even **without consent.**

[TESTIMONIAL]

The mind as subject

Communication of mental content.
Statements, recognition, intent.

Protected by nemo tenetur: the right **not to incriminate oneself.**

CrimPA, CivPA, AdminPA, AdminDA *all carry a version of this distinction.*

WHY BCI OUTPUT IS TESTIMONIAL

>_ IF WE CALL IT MATERIAL

A sensor records it, so it looks physical.
But classify it as material and it could be taken compulsorily, by analogy to a blood sample.

That is a technological bypass of the right against self-incrimination.

>_ WHAT IT ACTUALLY IS

A dynamic digital translation of an internal cognitive state.

Its status follows the nature of the information communicated. The mode of collection should not decide it.

So the line between persons and objects is preserved only if the mind stays on the testimonial side.

§03

The procedural principles under strain

THE “95% PROBABILITY” TRAP

95%

PROBABILITY OF RECOGNITION

A statistical estimate, well short of
legal certainty.

THE JUDGE’S DUTY

Free evaluation means the court forms its own reasoned conviction. A black-box output cannot be retraced, so the court cannot fully reason it.

◆ AUTOMATION BIAS

A precise-looking number reads as objective.

Decision-makers over-trust quantified outputs.

**The court’s own judgment risks being displaced
by the apparent authority of the software.**

AUTONOMY, AND THE LIVE HEARING

■ NEMO TENETUR

Because these neural responses are involuntary, the individual loses control over what is communicated from their own mind. Treating that as ordinary data collapses the autonomy the principle protects.

■ IMMEDIACY

The court is meant to perceive the evidence in its primary form. A BCI output has already been filtered and classified before it arrives: mediated, at one remove from the event.

■ ORALITY & ADVERSARIAL

Parties may read the report, but cannot access the reasoning from signal to classification. The right to comment risks becoming an empty formality.

*In criminal cases this meets **Article 6 ECHR**: decisive evidence must be capable of effective challenge.*

§04

Safeguards *de lege ferenda*

FOUR SAFEGUARDS

01

CLASSIFY CLEARLY

Treat BCI data as a dynamic translation of cognitive states, within testimonial safeguards, and outside the category of physical evidence.

02

NO COMPELLED COLLECTION

A statutory prohibition on compelled neural data collection, protecting the line between body and mind.

03

SCRUTINISE THE METHOD

Heightened judicial scrutiny of the methodology and of how a probability enters judicial conviction.

04

ADAPT ADVERSARIAL RIGHTS

A right to independent expert review of the method, so the challenge becomes meaningful in practice.

THE PERSON STAYS A SUBJECT OF THE PROCEEDINGS.

■

With the standing that role carries.

LEGAL DISCLAIMER

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