

IMAGE SAMPLING IN FINGERPRINT RECOGNITION

AIMS

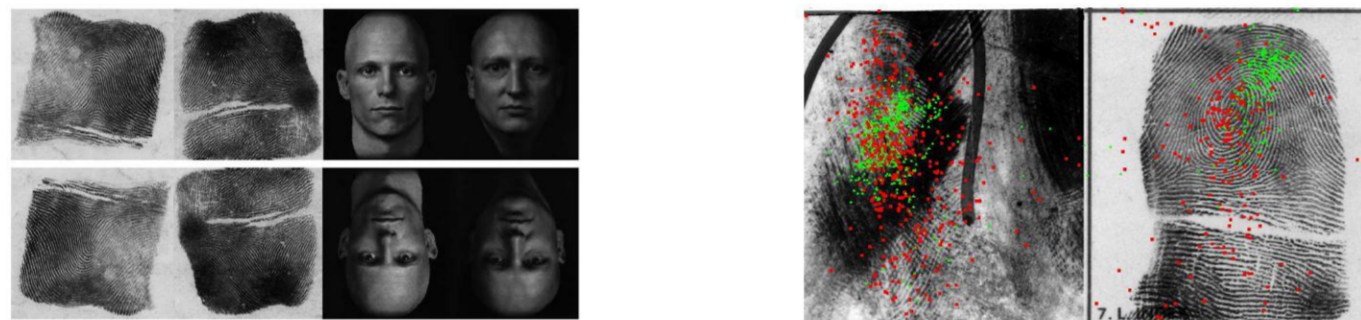
- **General project:** What makes fingerprint examiners good at what they do? What special visual abilities do they have? What image features do they use when examining and comparing prints?
- **First experiment:** Are regions within the fingerprint equally informative? Do fingerprint examiners sample or weigh information from various fingerprint regions differently to novices?

IMPACT

- Understanding the visual processes underlying fingerprint examination can improve recruitment, training and examination guidelines, and support expert witnesses in court
- Perception is an active process based on sensory information, inference and stored knowledge. Studying perceptual processes helps us understand how we make sense of the world

1. BACKGROUND

- a) Fingerprint examiners can match similar and non-similar prints more accurately than novices when presented for as little as 250ms¹. There is further evidence that fingerprint examiners process fingerprints configurally, or as a whole - the way most people process faces².

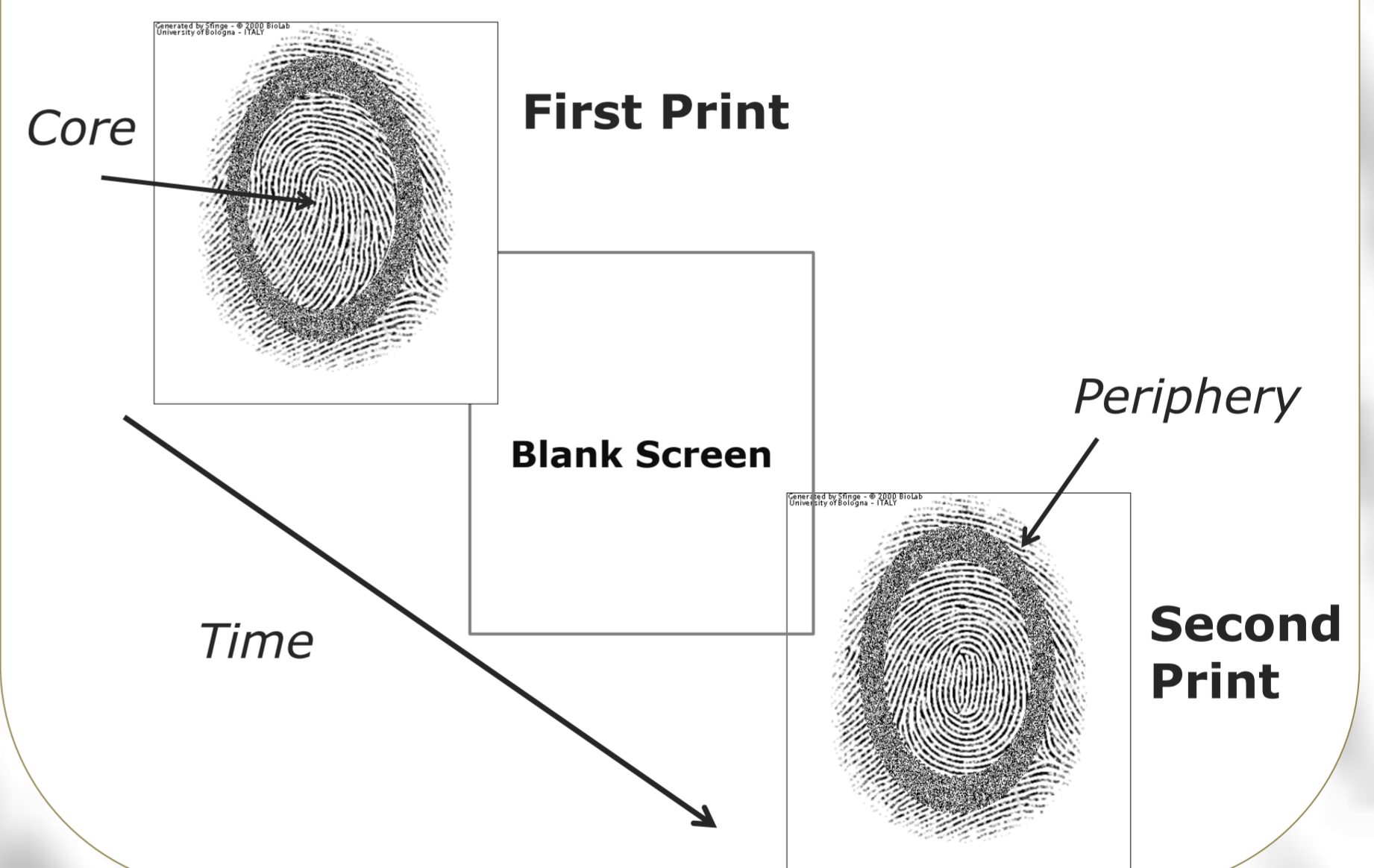


- b) Fingerprint examiners appear to rely on a common set of features when comparing prints, as well as being able to identify more corresponding areas in a shorter time than novices^{3,4}.
- c) We know that error rate & perceived difficulty of a match can be determined by basic image features (e.g. intensity & contrast information, total fingerprint area, presence & clarity of global features, ridge thickness)⁵.

2. METHODS

Is information from the fingerprint core more useful than information from the periphery?

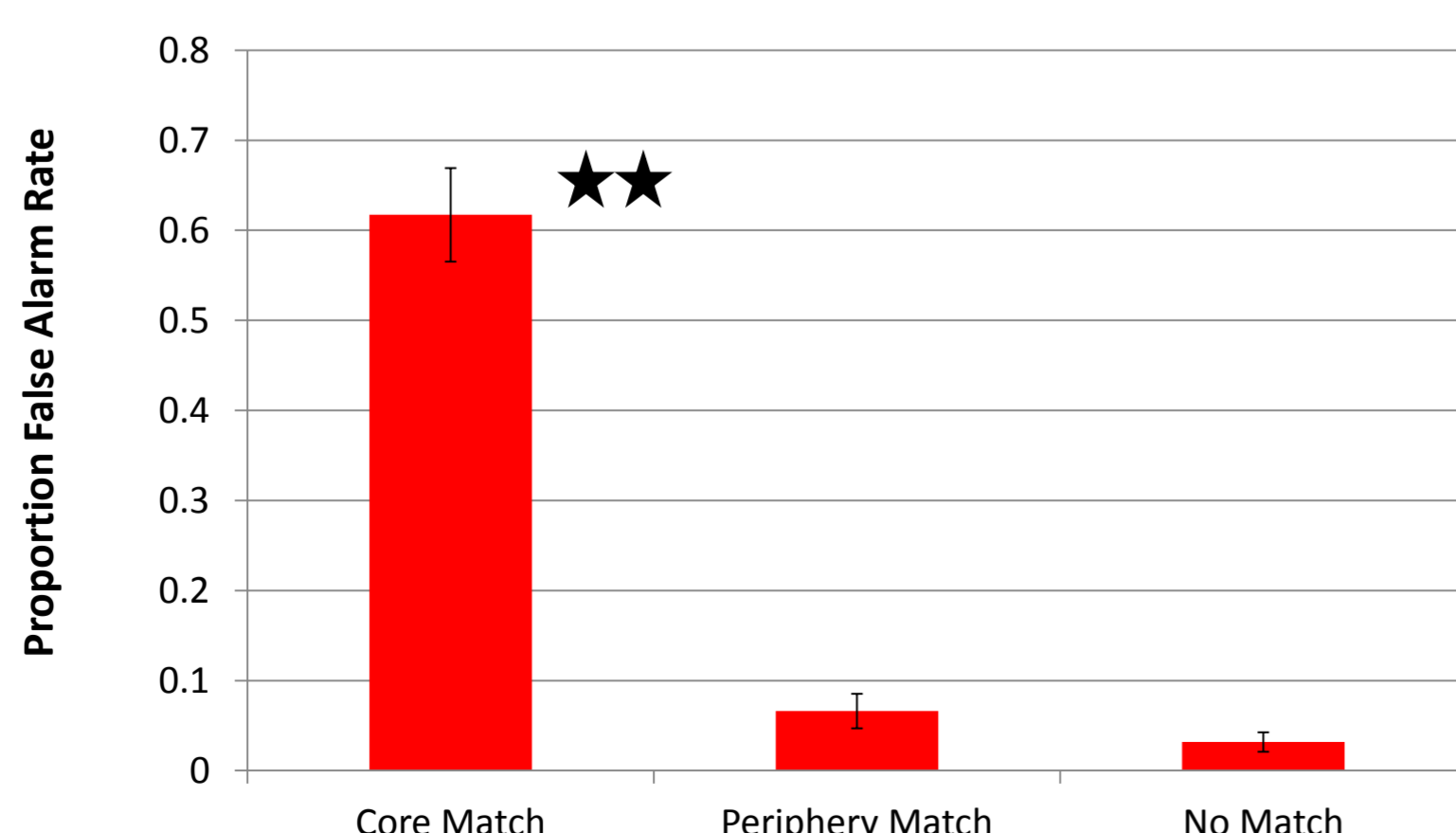
- Participants: 8 undergraduate students (fingerprint novices)
- Task: **Are the first and second fingerprint the same or different?**



3. RESULTS

Participants made significantly more false identifications when the cores matched and the peripheries were different ($M = 0.62$, $SD = 0.15$) than when the peripheries matched and the cores were different ($M = 0.07$, $SD = 0.05$) or when both cores and peripheries were different ($M = 0.03$, $SD = 0.03$); both $p < 0.00001$.

False Alarm Rates for Stimulus Types



4. DISCUSSION

• Fingerprint novices appear to use information sampled from the core to a much larger extent than information from peripheral regions. Do fingerprint examiners use more peripheral information? What happens in parallel presentation, or with different time limits?

- What about general visual abilities of fingerprint examiners?

