

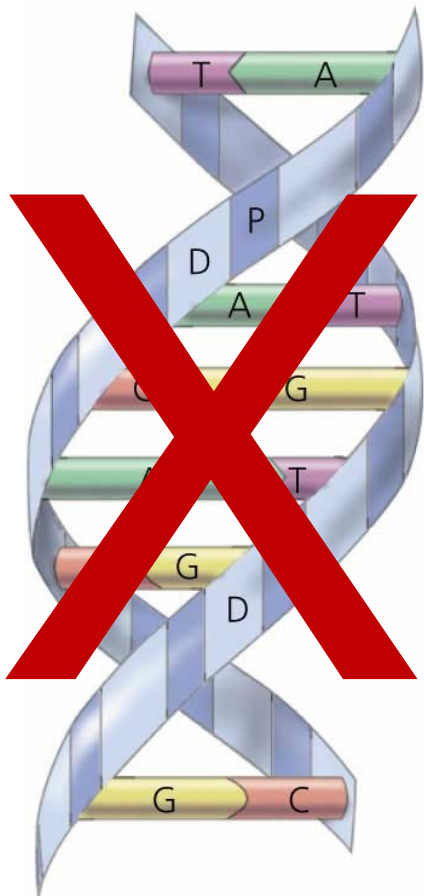


Faculty of Health and Medical Sciences



Gait as evidence

Niels Lynnerup
nly@sund.ku.dk



Subject of study:

The entire human body

Specific features

Static – *In motion*



Evidence based

Judicial requirements
Scientific requirements

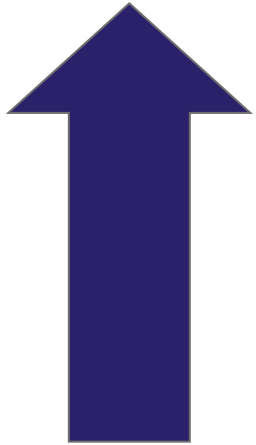


Evidence based

Judicial requirements
Scientific requirements



Hierarchy of evidence



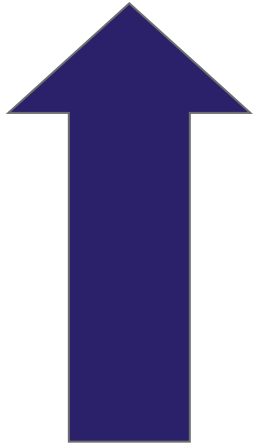
Systematic reviews and meta-analyses

Randomised, blind trials

Case reports



Hierarchy of evidence



Systematic reviews and meta-analyses

Randomised, blind trials

Case reports

Including biometric /biometric database based work



Evidence based

Judicial requirements
Scientific requirements



Expert Opinion Evidence

In Denmark:

Whatever the judge decides.

It is solely for the judge to decide if the witness is "expert", and whether the opinions expressed are "expert".



Expert Opinion Evidence

- The matter in question must be outside the experience of the factfinder.
- The witness must be appropriately qualified to give evidence on the matter.
- The evidence should meet a threshold of reliability



Forensic Science, Statistics & the Law

Commentary on news and publications at the intersections of scientific evidence, forensic science, and statistics.

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SATURDAY, JUNE 4, 2011

R. v. Smith: Court of Appeal Rebukes Latent Fingerprint Identification in Britain for Being Out of Step with Modern Forensic Science

Displaying grave dissatisfaction with police-dominated latent fingerprint identification practices in England and Wales, the Court of Appeal in *R. v. Smith*, [2011] EWCA Crim 1296, quashed a homicide conviction. Hilda Owen, a 71-year-old woman, was found murdered in her home. The accused murderer was a neighbor, Peter Smith. He was in financial distress and stood to benefit from her will. A police fingerprint officer with more than 21 years experience and two colleagues who "independently" verified his work testified that they were certain that "a red blood-like substance" found on a door handle was Smith's.

ABOUT DHK



 DH Kaye

Professor & Author

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POPULAR POSTS

R. v. Smith: Court of Appeal Rebukes Latent Fingerprint Identification in Britain for Being Out of Step with Modern Forensic Science
Displaying grave

PLACES TO VISIT, BOOKS TO READ

- [DHK home page](#)
- [The New Wigmore: Expert Evidence](#)
- [The Douvle Helix and the Law of Evidence](#)
- [Double Helix Law blog](#)

R. v. Smith [2011]

- For judge to decide who is a competent expert in a particular field.
- Essential for the proper administration of justice that there are independent expert.
- Competent scientist should keep detailed notes of his examination and the reasons for his conclusions.
- Modern methods of presentation of expert evidence should be used to make evidence accessible to jury and save court time.



R v Barnes and another

Source: All England Reporter

Publisher Citation: [2012] All ER (D) 33 (Oct)

Neutral Citation: [2012] EWCA Crim 1605

Court: Court of Appeal, Criminal Division

Judge: Pitchford LJ, Lloyd Jones J and the Recorder of Birmingham

Representation Gareth Branston (assigned by the Registrar of Criminal Appeals) for the first defendant.

James Beck (assigned by the Registrar of Criminal Appeals) for the second defendant.

Richard Thatcher (instructed by the Crown Prosecution Service) for the Crown.

Judgment Dates: 27 June 2012

Catchwords

Criminal Evidence - Evidence - Admissibility - First and second defendants being charged with conspiring to commit robbery and possession of firearm following incident at post office involving two men wearing bandanas covering faces - One of men holding shotgun - Judge allowing into evidence reverse projection evidence of CCTV manager for purpose of providing approximation of gunman's height - First defendant being convicted of both counts and second defendant being convicted of robbery offence - Defendants appealing - Whether judge erring in admitting reverse projection evidence - Whether judge erring in rejecting second defendant's submission of no case to answer - Whether convictions unsafe.

The Case

Criminal Evidence Evidence. The Court of Appeal, Criminal Division, in dismissing the defendants' appeals against conviction for conspiring to commit robbery and possession of a firearm whilst committing a Schedule 1 offence, contrary to s17(2) of the held that there was no sound basis for doubting the safety of the verdicts. In particular, the judge had not wrongly admitted evidence from a CCTV expert.



R. v. Barnes [2012]

“Reverse projection evidence”

- Evidence admissible.
- Not new science, but employed photographic techniques.
- Because the expert was applying techniques with which he was familiar, all that was required was the production of film which could provide a fair and accurate comparison with the crime scene recording.

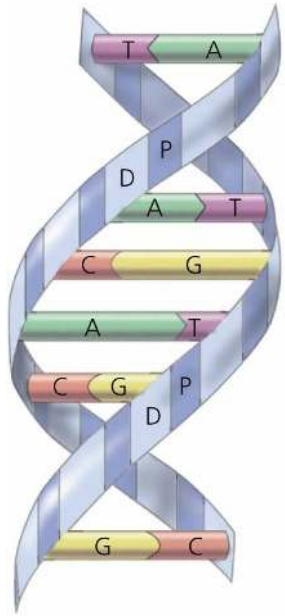


Daubert

A non-exclusive four-part test:

- (1) whether the expert's methodology can or has been tested;
- (2) whether it has been subject to peer review and publication;
- (3) its known or potential error rate and the existence and maintenance of standards controlling its operation; and
- (4) whether it has attracted widespread acceptance within the relevant scientific community





Corroborative evidence

- Technical aspects:

footage useful?

- Gait analysis:

applying aforementioned guidelines.



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- Direct comparison: "1 to 1"
- *Not judged against laboratory data nor biometric databases*



Traits which indicate congruent identity

Traits which indicate non-congruent identity

Conclusion





Expert Working Group Marks

Expert Working Group Marks

ENFSI

EWGM Statute

EWGM Steering Committee

EWGM Projects »

Project Application Form

Conclusion Scale for
Interpreting Findings within
EWG Marks

Meetings »

IBSTE »

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Wanted page

Feedback



EWGM Projects

PROJECTS

The ENFSI Expert Working Group Marks has an aim to promote the area of marks examinations. To help to achieve our aim we are using a number of projects. The subject matter for these projects has normally been chosen because it is considered to be necessary and important to the marks area. The examiners of the mark area are invited to send your ideas for the topics of future projects with the Project Application Form (see the navigation).

Scale Committee

The idea of starting the Scale Committee of the ENFSI Working Group Marks occurred after two proficiency tests arranged by shoeprint/toolmarks examiners of the National Bureau of Investigation, Finland (1995, 1997).

The Scale Committee was established in the 3rd European meeting for Shoeprint/Toolmark Examiners, arranged in Stockholm, Sweden 1999.

Members:

Dr. Horst Katterwe (chair)

Charles Belser

John Birkett

Alexandre Girod

Isaac Keereweer

Michel Moes

Gerrit Volckeryck

Yaron Shor

Anja Ytti

The main aim of the Conclusion Scale Committee of the ENFSI EWG Marks was to produce a conclusion scale that would enable practitioners to understand the meaning of conclusions formed by examiners across Europe. It takes into consideration the criminal justice systems that exist and provides a scale for communication. The harmonised conclusion scale (a level scale) is meant to be used with collaborative footwear tests of ENFSI EWG Marks.

The final result of the Scale Committee is an ENFSI Work Instruction Document *Conclusion Scale for Interpreting Findings in Proficiency Tests and Collaborative Exercises within the WG Marks* (see the navigation).



“The opinion of the members of the Conclusion Scale Committee is that only the legal systems within the particular countries (and not a Standing Committee of ENFSI or not the Board of ENFSI) may decide on approval regarding interpreting evidence of the forensic scientific experts reports.”

“The special requirement for the harmonised conclusion scale for interpreting findings in proficiency tests in marks cases is, that the proposed scale must allow to communicate results what ever method an examiner uses (Classical Approach, Likelihood-Ratio Approach, Full Bayes` Approach).”



HARMONISED CONCLUSION SCALE OF THE ENFSI WG MARKS

Level	Likelihood Ratio (partial Bayes' rule)	Probability (full Bayes' rule)
1	Identification	Identification
2	Very strong support for proposition A Strong support for proposition A	Very probably
3	Moderately strong support for proposition A Moderate support for proposition A Limited support for proposition A	Probably
4	Inconclusive	Inconclusive
5	Limited support for proposition \oplus ($\oplus = \text{NotA}$) Moderate support for proposition \oplus Moderately strong support for proposition \oplus Strong support for proposition \oplus Very strong support for proposition \oplus	Likely not
6	Elimination	Elimination

(A) = hypothesis: the questioned tool produced the mark;

(NotA) = alternative-hypothesis: the questioned tool didn't
produce the mark.

(here assumed: even prior odds)



- Direct comparison: "1 to 1"

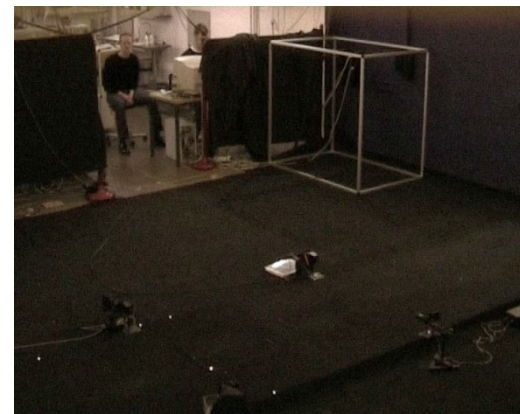
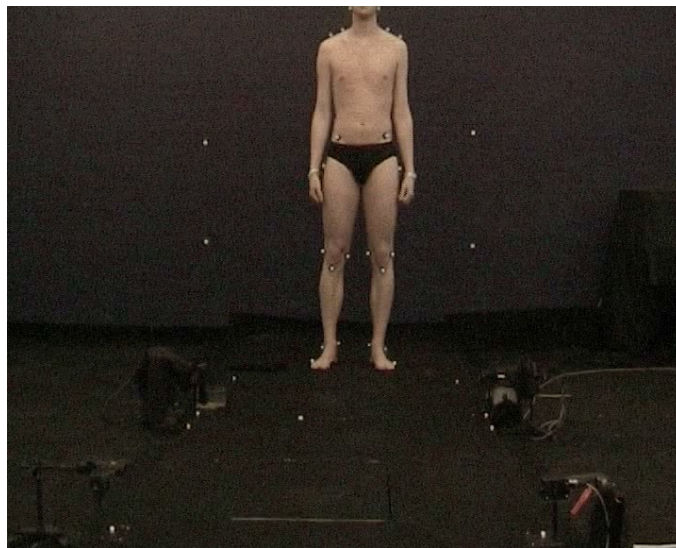
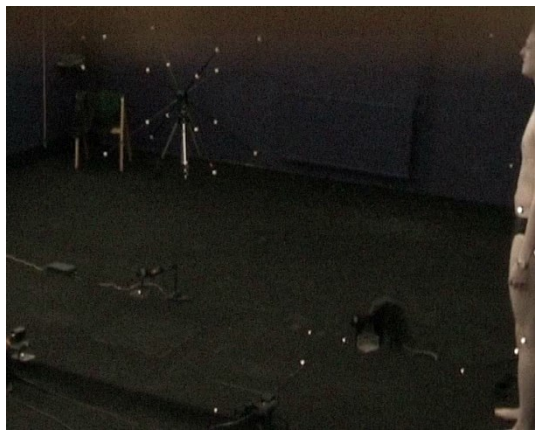
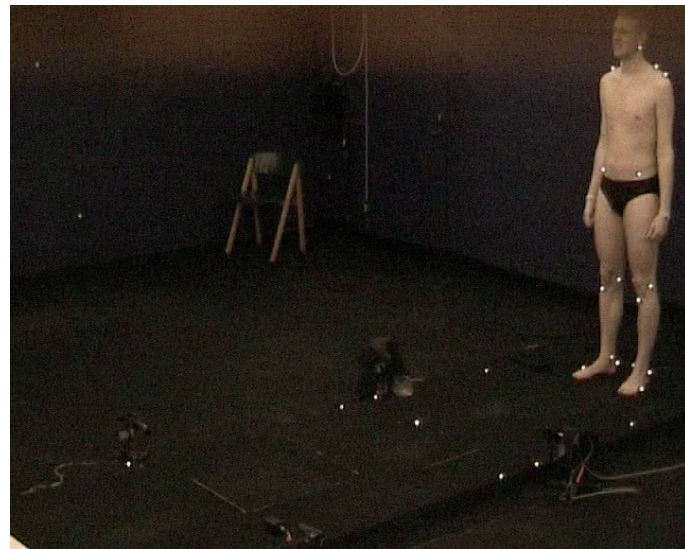
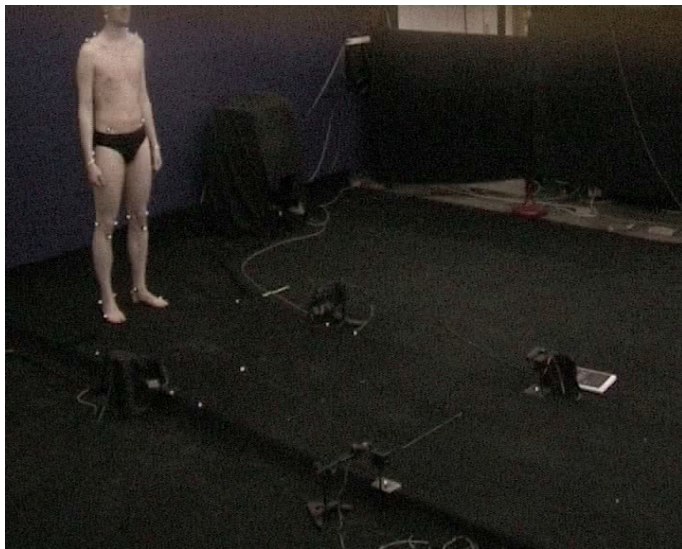
"Could it be someone else?"



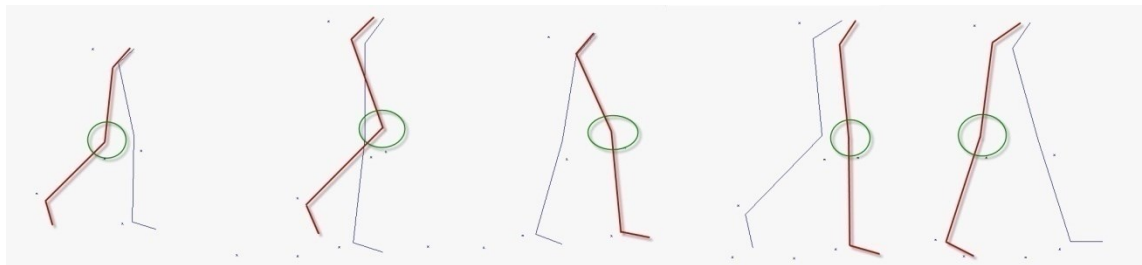
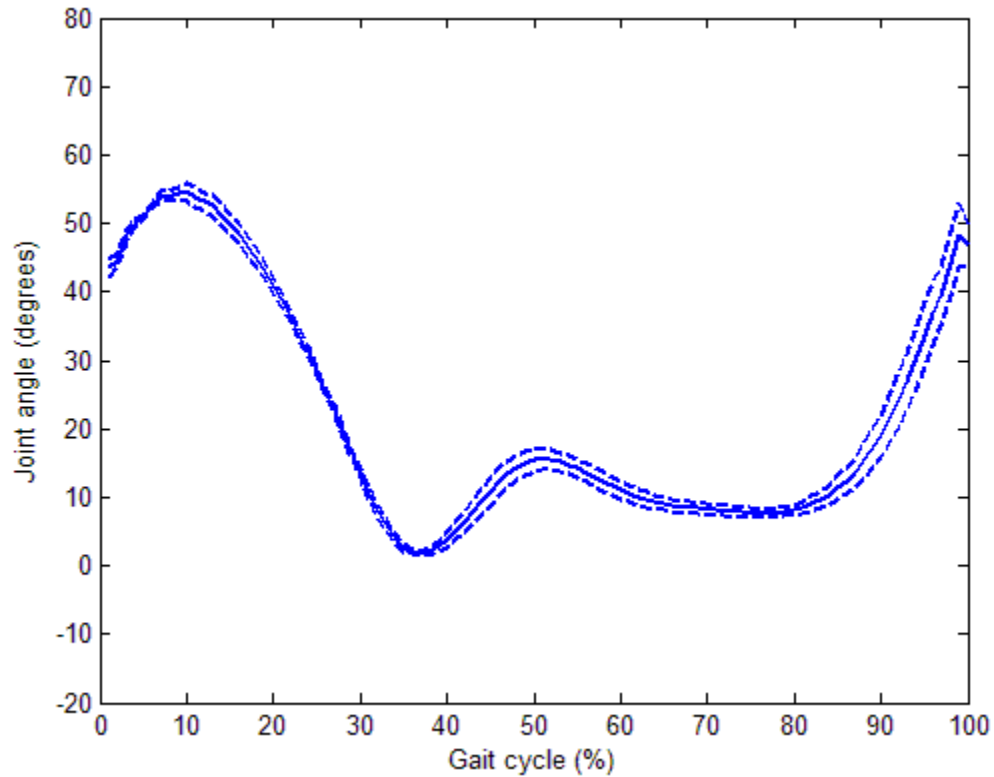
- Direct comparison: "1 to 1"
- *No judged against laboratory data nor biometric databases*
 - *But laboratory data or biometric data is gathered in order to better understand variation and test for error*



Method

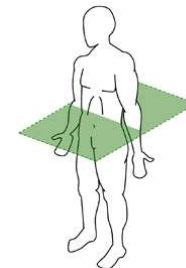
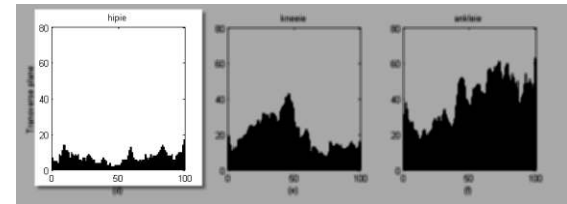
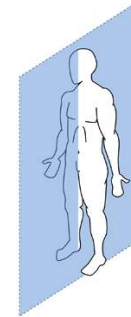
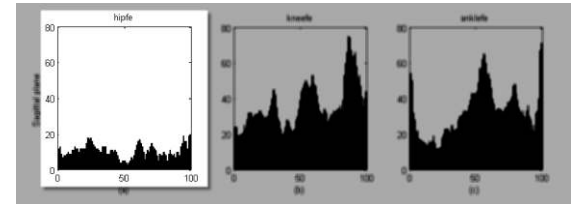


Method



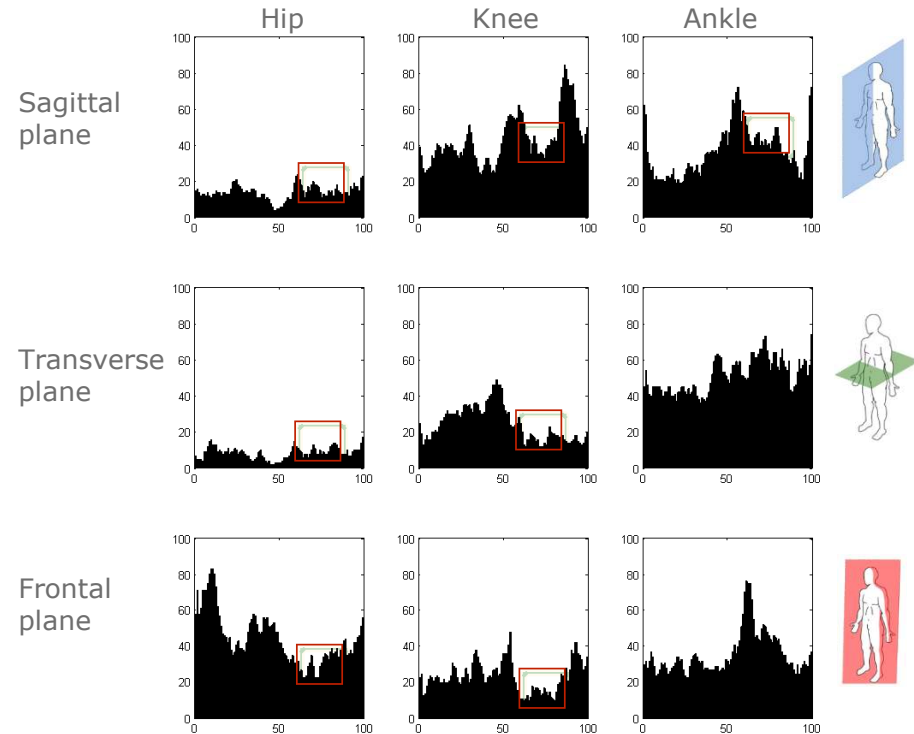
Conclusion

- The sagittal plane has the highest discriminatory power
- The hip flexion/extension angle has the highest discriminatory power

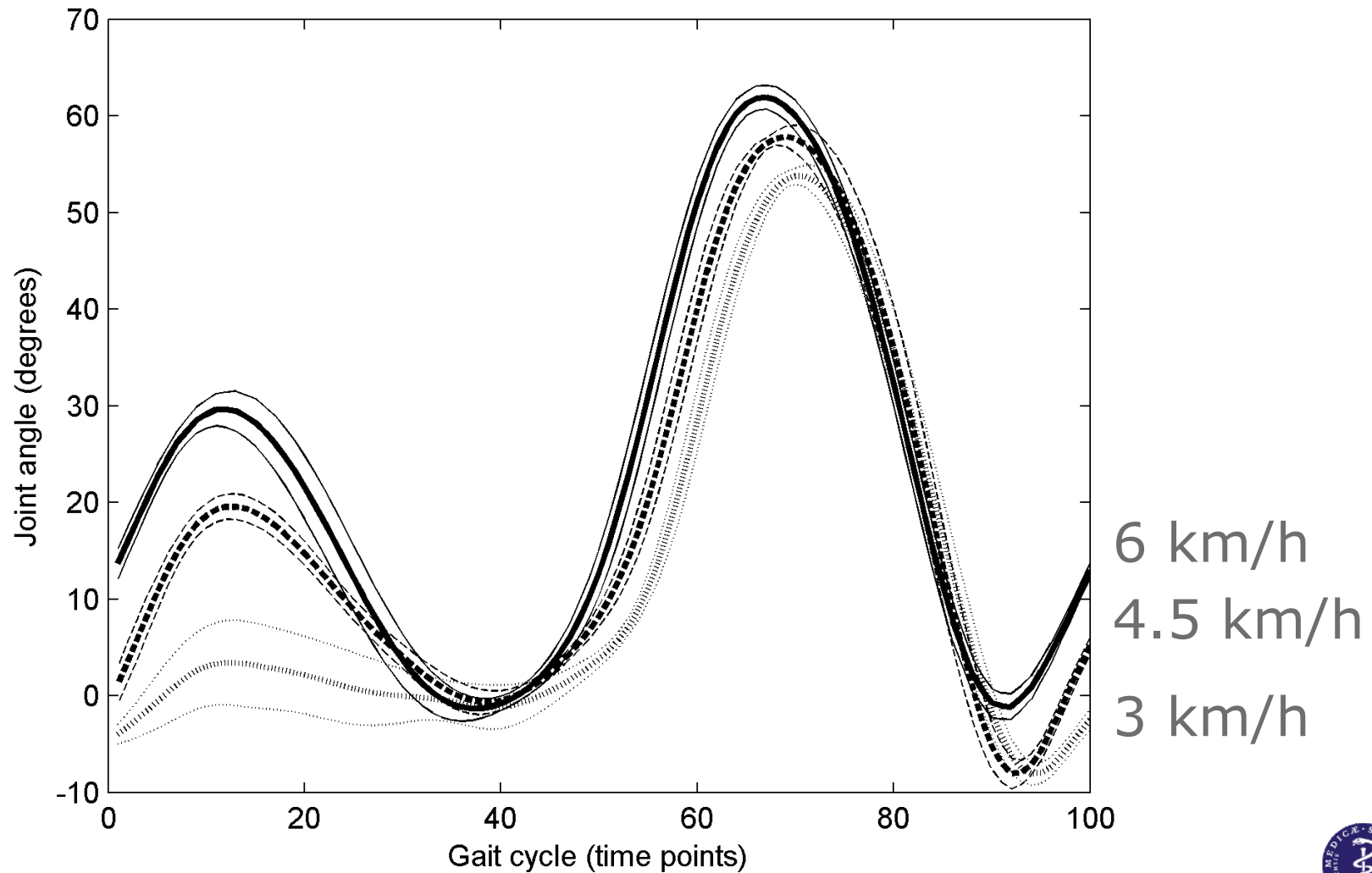


Conclusion

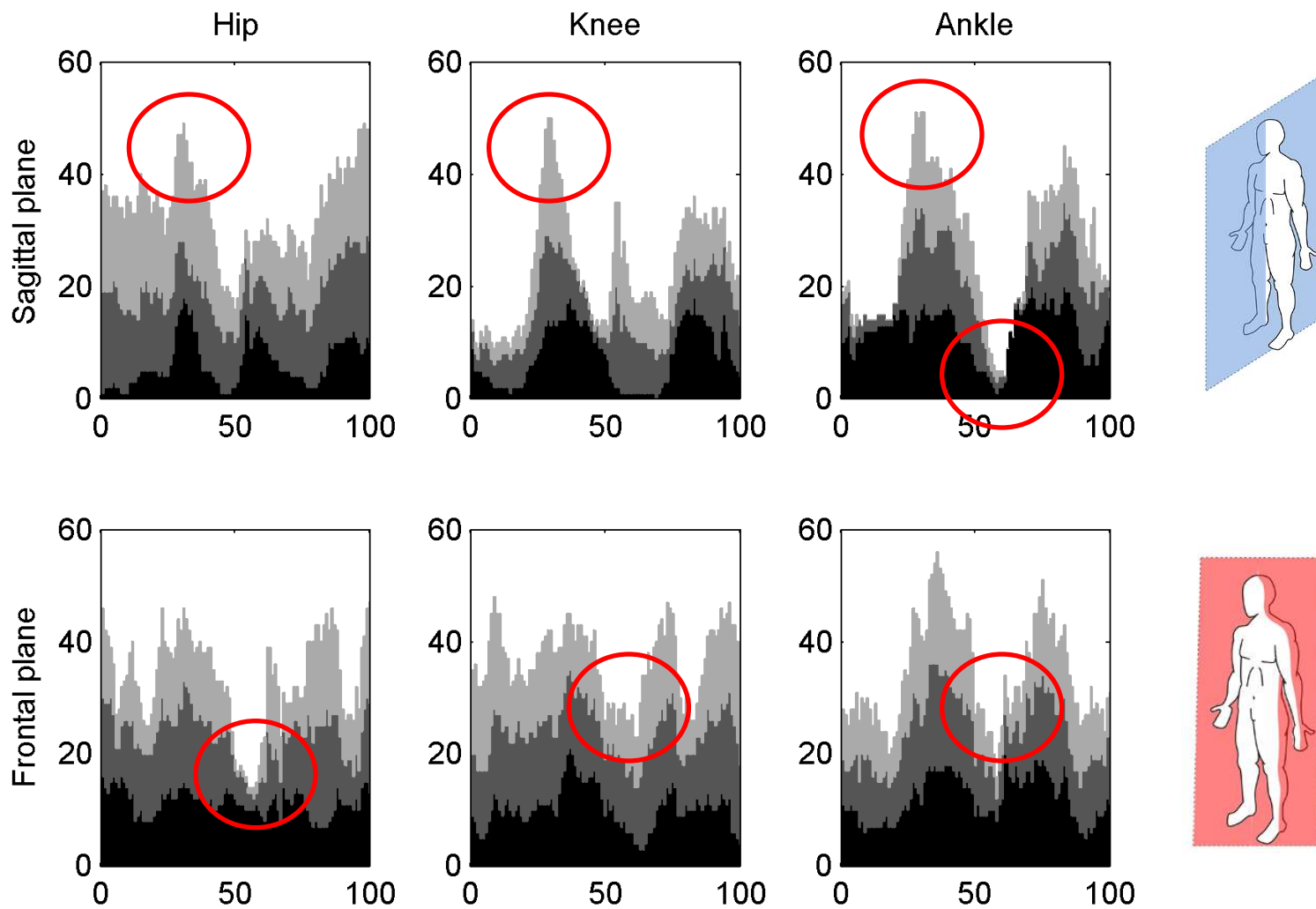
- Different angles have the peak discriminatory power at different places in the gait cycle



Gait for three velocities: Method



Gait for three velocities: Results



Future aspects

- Markerless systems
- More advanced statistical models
- Other parameters



Daubert

A non-exclusive four-part test:

- (1) whether the expert's methodology can or has been tested;
- (2) whether it has been subject to peer review and publication;
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Lynnerup N, Vedel J, 2005. **Person Identification by Gait Analysis and Photogrammetry**. Journal of Forensic Sciences, 50(1): 112-118.

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Thank you for your attention!

nly@sund.ku.dk

