

Introduction to Social AI

Lecture 01

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Outline

- Intelligence and Social Intelligence
- Social AI: what and why
- Course Plan, Focus and Goals

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Intelligence

- For long time, all definitions of intelligence revolved around the **ability to use language and to solve logical and mathematical problems**, like in Intelligence Quotient (IQ) tests;
- However, it is a common observation that people manifest a **much wider spectrum of skills** than those assessed in IQ tests;
- The assumptions underlying the IQ tests were finally challenged in 1983, when Howard Gardner published his seminal book “**Frames of Mind**”.

The Theory of Multiple Intelligences

“[...] individuals possess **eight or more relatively autonomous intelligences** [and] draw on these intelligences [to] solve problems that are relevant to the societies in which they live.”

The Criteria

- **Isolation** (high or low capacity levels)
- **Neural Substrate** (specific brain areas)
- **Distinct Development** (appears at specific ages)
- **Evolutionary Value** (it increases survival chances)
- **Symbolic** (it can be formalized)
- **Measurability** (it can be measured)
- **Experimental Evidence** (it can be observed)
- **Mental Substrate** (distinctive cognitive processes)

The Intelligences

- **Linguistic** (oral and written language)
- **Logical-Mathematical** (abstraction / formalisation)
- **Spatial** (orientation and place recognition)
- **Musical** (sound recognition and generation)
- **Naturalist** (making sense of nature)
- **Bodily-Kinesthetic** (physical movement)
- **Interpersonal** (social interactions)
- **Intrapersonal** (introspection and self-awareness)

Linguistic



Logical-Mathematical



Spatial



Musical



Naturalist



Bodily-Kinesthetic



Interpersonal



Intrapersonal



Interpersonal (Social) Intelligence

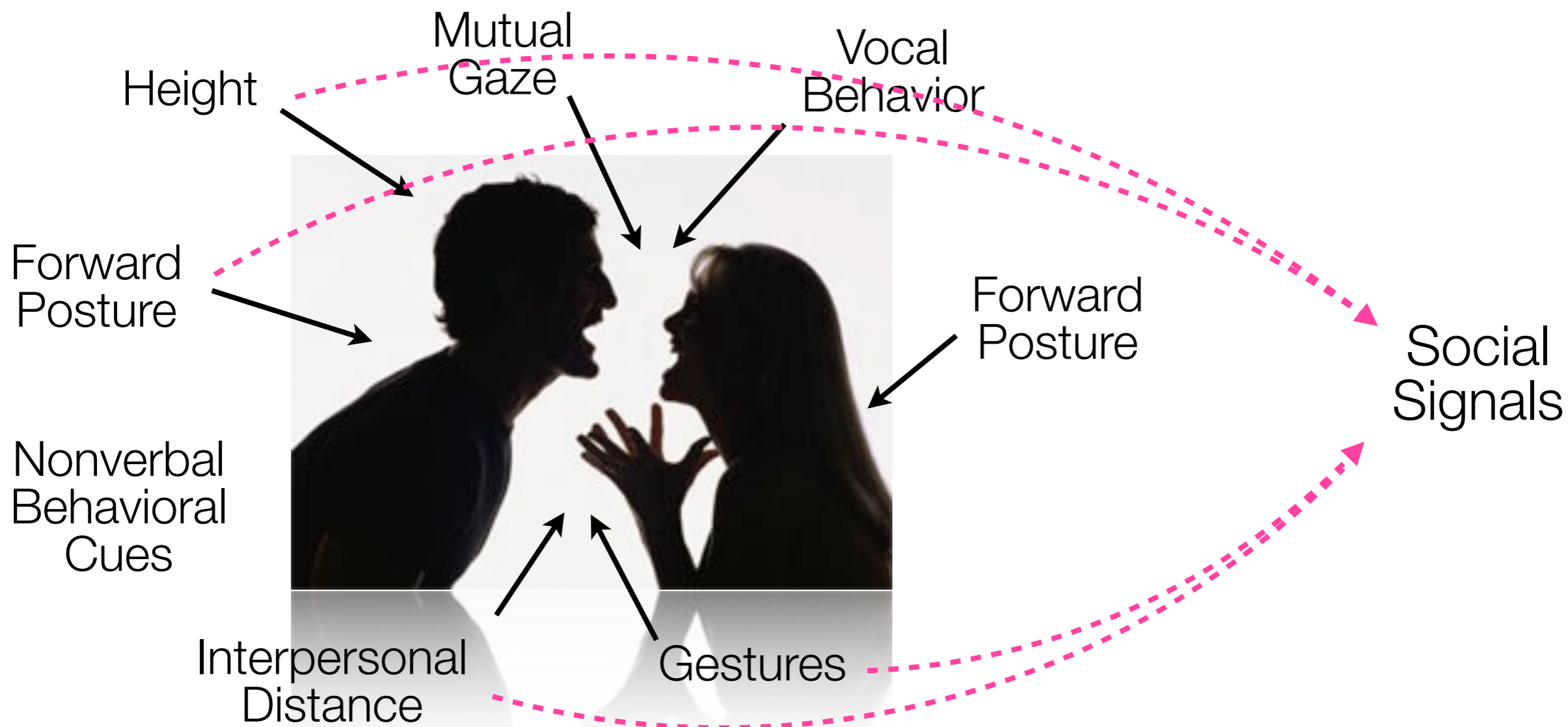
“An ability to recognise and understand other people’s moods, desires, motivations, and intentions.”

Intrapersonal Intelligence

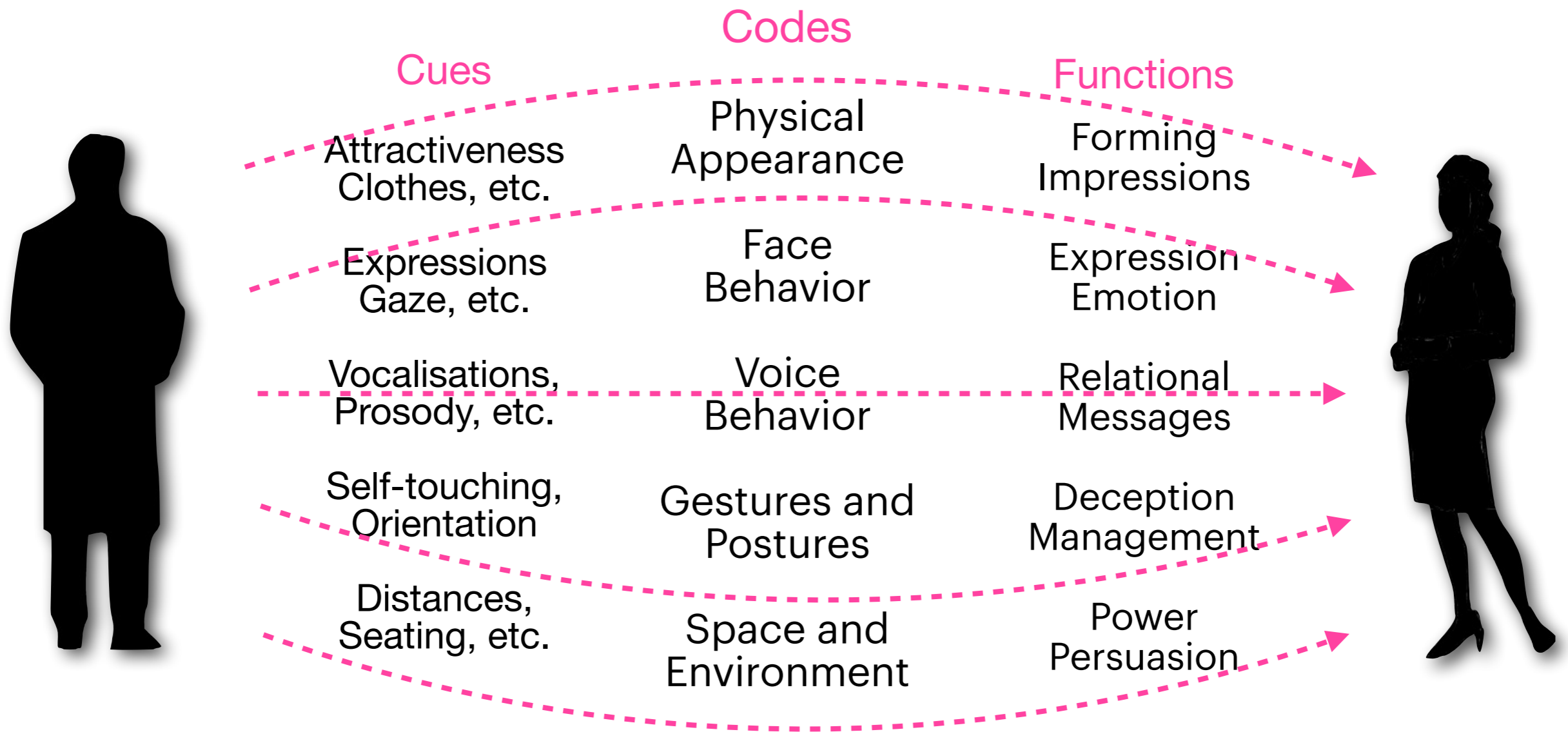
“An ability to recognise and understand **one’s own** moods, desires, motivations, and intentions.”

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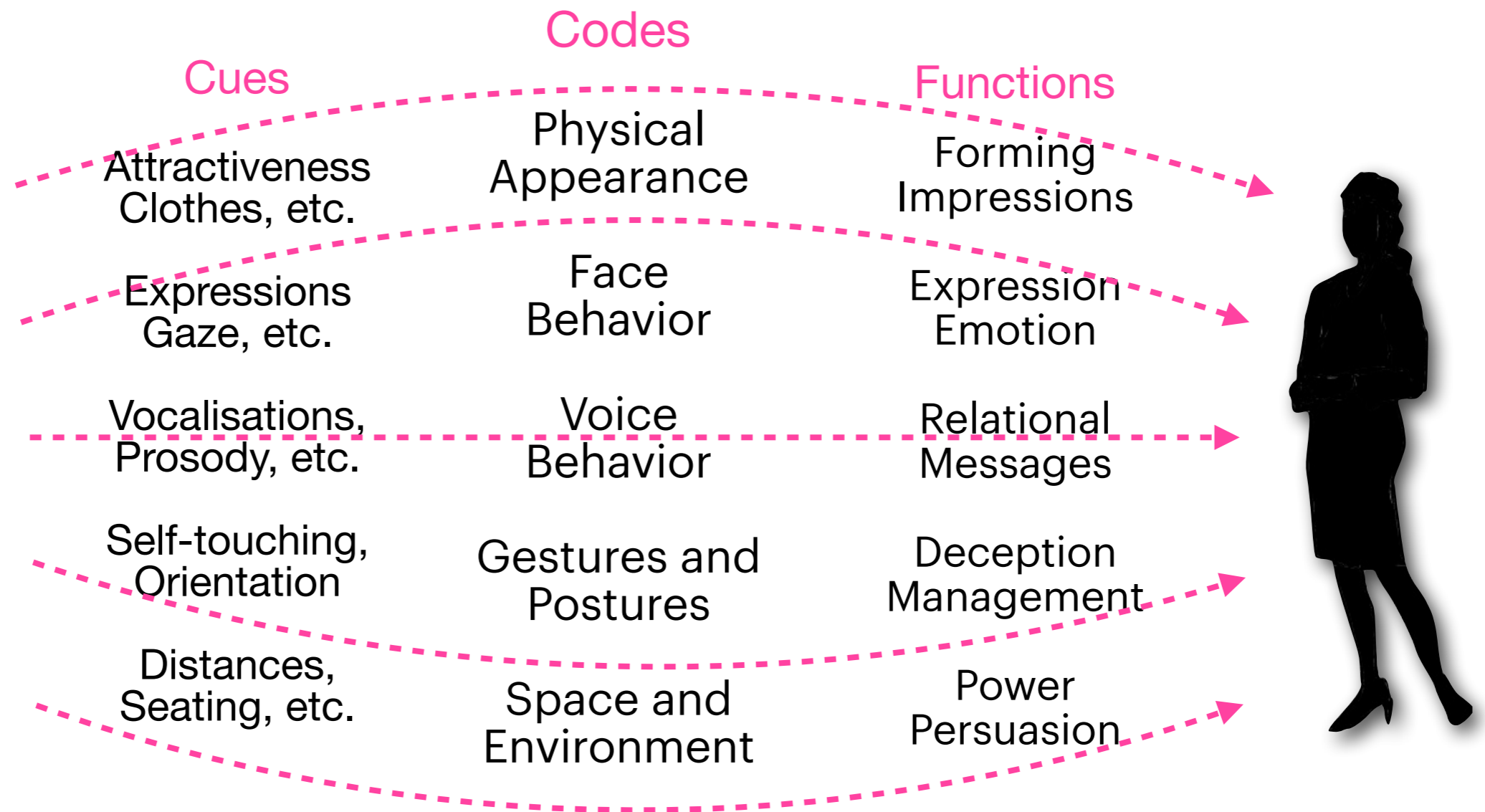
Vinciarelli, Pantic and Bourlard, "Social signal processing: Survey of an Emerging Domain", *Image and Vision Computing*, 27 (12), 1743-1759, 2009

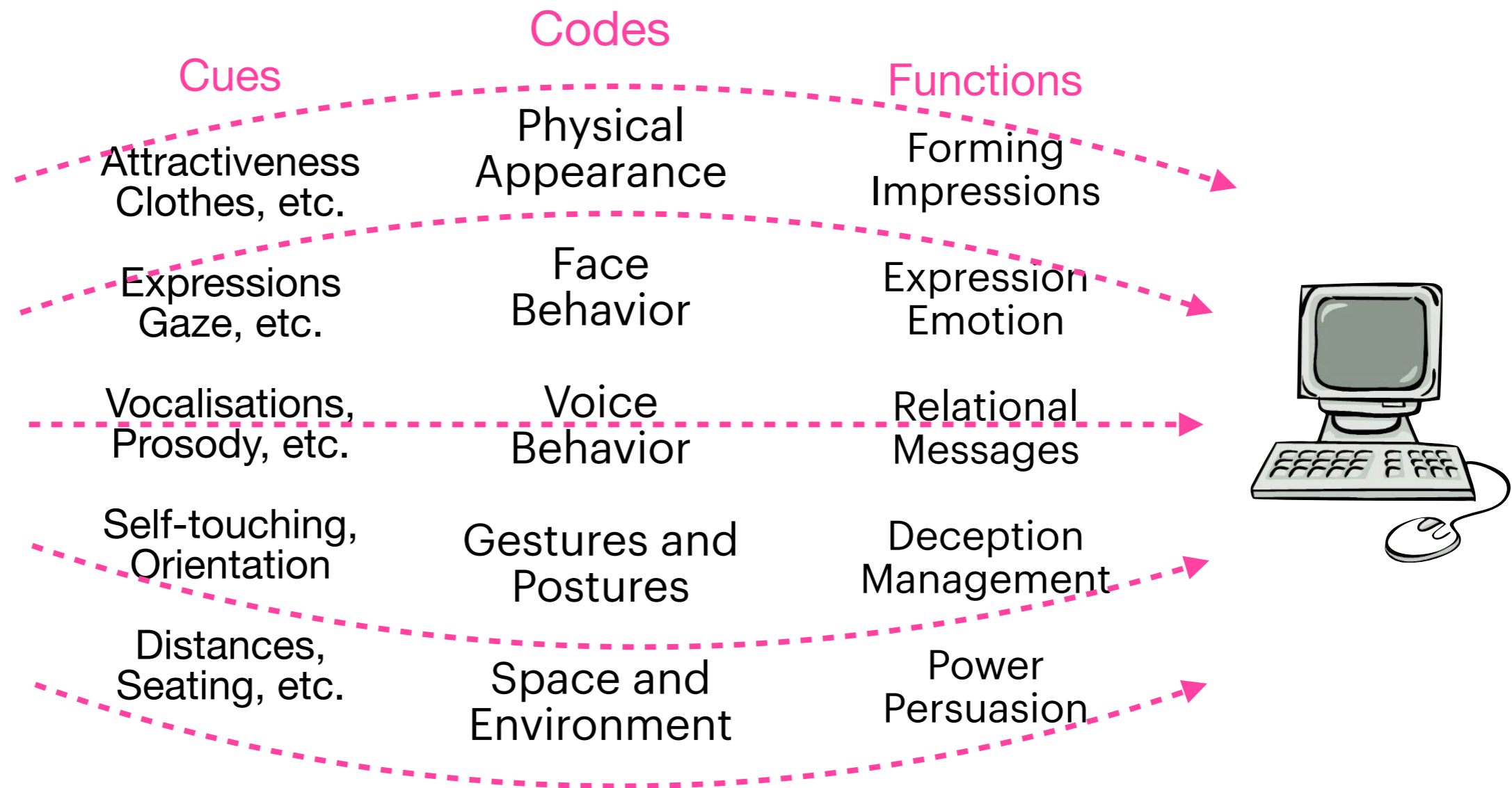
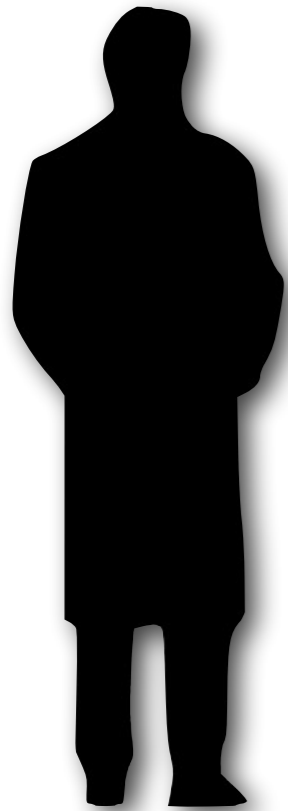


Richmond and McCroskey, "Nonverbal Behaviors in Interpersonal Relations", Allyn and Bacon, 1995



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of Glasgow





The Three Problems

- **Modelling**: to investigate and outline principles and laws underlying human-human and human-machine interactions;
- **Analysis**: to investigate and develop automatic approaches for detection and understanding of verbal and nonverbal behavioural cues;
- **Synthesis**: to investigate and develop automatic approaches for the automatic generation of verbal and nonverbal behavioural cues.

Why Social AI?

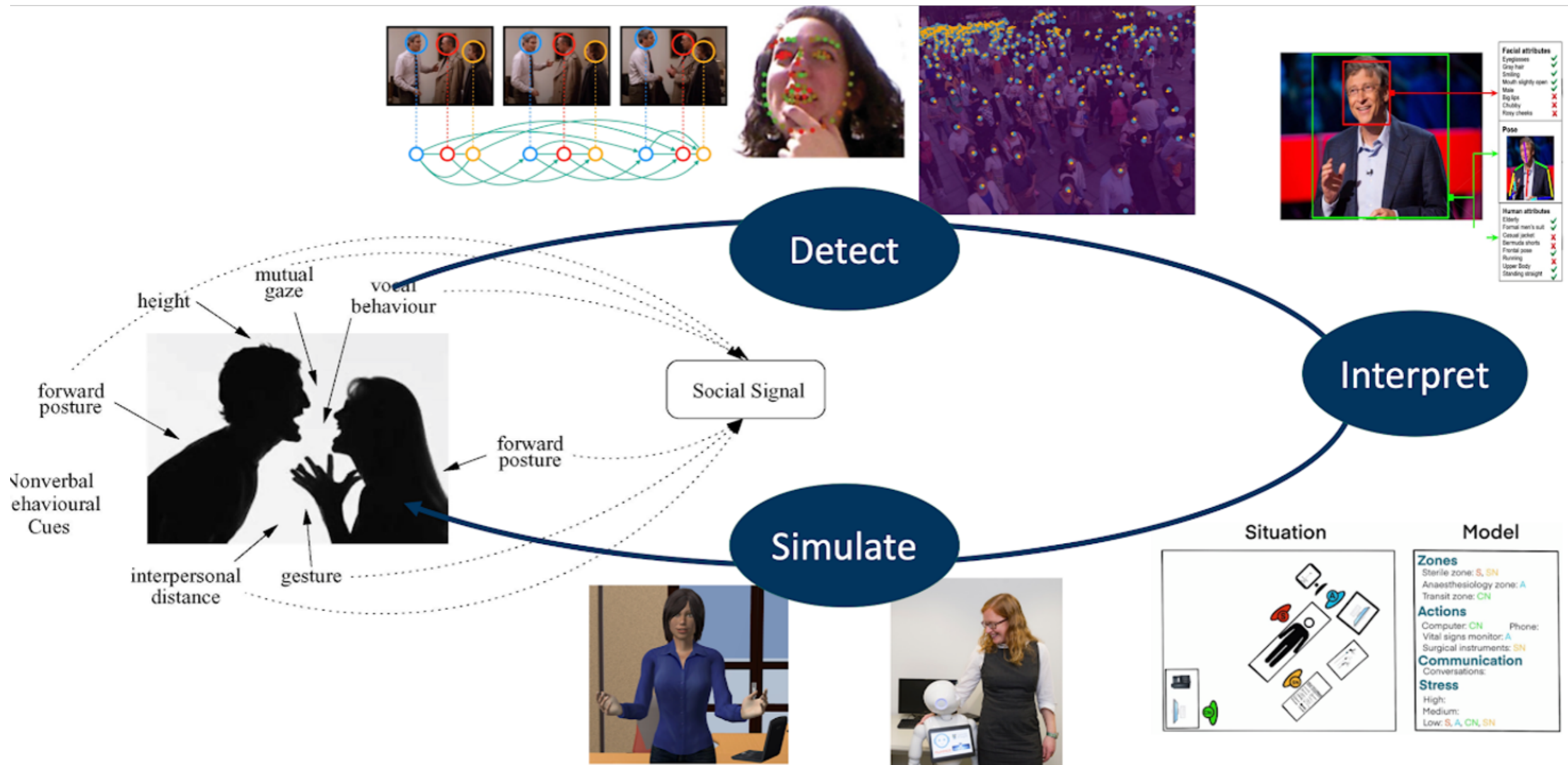
“If AI systems are indeed ever to walk among us, they’ll have to be able to understand that each of us has thoughts and feelings and expectations [and] they’ll have to adjust their behaviour accordingly.”

Why Social AI?

“tasks that are difficult to automate [...] will require [...] **social intelligence.**”

Why Social AI?

“[...] the [next] wave of computerisation will depend on overcoming the engineering bottlenecks related to creative and **social intelligence.**”



<http://socialaiglasgow.co.uk>

Welcome to the Social AI CDT

THE UKRI CENTRE FOR DOCTORAL TRAINING IN SOCIALLY
INTELLIGENT ARTIFICIAL AGENTS

The overarching goal of Social AI is to train the next generation of experts in Artificial Social Intelligence; the AI domain aimed at endowing artificial agents with social intelligence, the ability to deal appropriately with users' attitudes intentions, feelings, personality and expectations.

<http://socialcdt.org>

Main Specificities (I)

- **It is about machines as much as it is about people:** it is a technical discipline, but psychological knowledge is necessary to design an experiment;
- **Data collection is part of the experiment:** data are often an integral part of the approach, you need to collect data according to psychological knowledge to make an approach effective;
- **Insight is as important as performance:** whenever possible, developing insights about the psychological problem is as important as achieving good performance;

Main Specificities (II)

- **Subjectivity and ambiguity:** labels and ratings used as “groundtruth” are not objective because they result from interpretation and perception;
- **Cultural differences:** The same social and psychological phenomena leave different traces in different cultures, in turn, the same behavioural trace is perceived and interpreted differently in different cultures.

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Course Plan

- The course covers the three major areas of Social AI, namely **modelling**, **analysis** and **synthesis**;
- **Modelling**: **scientific observation of behaviour** (based on ethology) and **judgment studies**, one of the most common types of work in psychology;
- **Analysis**: an introduction to the main **scientific and technological questions** to be addressed in a Social AI analysis approach;
- **Synthesis**: an introduction to the use of cognition and psychology as an interface for human-agent interaction.

Course Plan

- Lecture 01: Introduction
- Lecture 02: Scientific Observation of Behaviour
- Lecture 03: Judgment Studies
- Lecture 04: Analysis of Conversations
- Lecture 05: Behaviour as a Window to the Mind
- Lecture 06: Behaviour as a Trace of Inner Life
- Lecture 07: Engaging with Cognition and Psychology
- Lecture 08: Engaging with Senses and Experience
- Lecture 09: Body Language Without the Body
- Lecture 10: Conclusions

Focus

- Aspects **less likely** to be covered in **standard technical education** (Computer Science, Engineering, Mathematics, Physics, etc.);
- **Interdisciplinary** loop between AI and human sciences (psychology, sociology, etc.);
- **Balance** between technological **performance** and **insight** (whenever possible, we should learn something about psychology and cognition);
- Approaches that involve both “**Art and Science**”, not everything can be addressed “more geometrico” and there are soft aspects.

Goals

- To provide **examples** of how technology and human sciences collaborate with mutual benefit;
- To **identify** the widest possible range of **scientific** and **technical questions** that need to be addressed in Social AI work;
- To outline **limitations and challenges** in the current state of the art and, in turn, possible **opportunities for future research**;
- To describe **practical challenges** in research involving human, possibly vulnerable participants;
- To attract **curiosity** and **interest** towards Social AI.

Thank You!