

humaine

WP 6: Emotion in Interaction

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Plenary meeting, 24-27 May 2005, Newcastle

Partners

- ◆ DFKI
- ◆ DIST - University of Genova
- ◆ EPFL
- ◆ France-Telecom
- ◆ ICCS
- ◆ Limsi CNRS
- ◆ OFAI
- ◆ T-systems
- ◆ Trinity College of Dublin
- ◆ University of Augsburg
- ◆ University of Geneva
- ◆ University of Hertfordshire
- ◆ University of Paris 8
- ◆ New member: University of Sheffield

WP6 Core research themes

- ◆ *Research theme: role of emotion in interaction.*
 - ➔ *Perception: perception from audio and visual information;*
 - Agent perception of the users / other agents / world.
 - Agent's interpretation of signals
 - Human perceptual attention
 - Social attention for speakers and listeners during social interaction
 - ➔ *Interaction: role of emotions in interaction;*
 - Balanced perception and generation
 - Model of speaker(s) and listener(s)
 - Create affective awareness
 - ➔ *Generation: design of expressive signs.*
 - Produce dynamic expressive visual and auditory behaviours
 - Achieve coordination of signs of emotion in multiple modalities
 - ➔ Define representation language to encode information and use it to drive animation of ECAs

Work done so far

◆ Deliverable 1:

- ➔ describe WP6 main domains

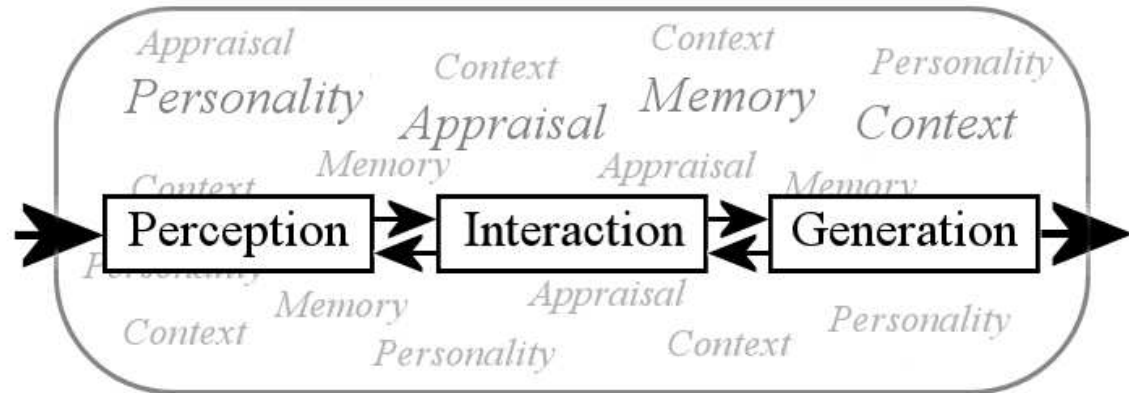
◆ Deliverable 2:

- ➔ extensive literature review in the domains of
 - perception: bio-signal interpretation, audiovisual speech perception, face perception, bodily expressivity perception
 - interaction: adapt to user's emotional state, artificial memory and attention, perceptual attention
 - generation: ECAs; nonverbal production, audio and visual speech synthesis, representation languages
- ➔ preliminary ideas about exemplars
- ➔ reshaping of WP6 themes on ECAs

Exemplar

- ◆ Deliverable 3: Definition of *Affective Interactive Embodied Conversational Agents* with several capabilities covering the 3 domains:

- ➔ perception
- ➔ interaction
- ➔ generation



- ◆ Capabilities required from an ECA corresponds to **steps** to move research forward

Current conception

- ◆ ECAs with more or less sophisticated presentation facilities. ECAs are to a certain extent able:
 - to compute what to say based on discourse plans
 - to generate synchronized behaviours
 - to talk with somehow emotional appropriate intonation
 - to show some emotional expressions (the so-called 'universal' facial expressions of emotions)
 - to perform gesture and body movements

What needs to be done

- ◆ Improve the naturalness of ECAs
 - ➔ multimodal integration of emotional behaviours
- ◆ Improve the believability of ECAs
 - ➔ consistency of an ECA's behaviour in terms of personality, cultural context and situation.
- ◆ Improve the interactivity of ECAs
 - ➔ take into account the particular *user* and the particular *context*

Agents' capabilities

- ◆ Cognitive influences on action
 - ➔ Emotion related attention shifts
 - ➔ Adapt politeness behaviours to the user's emotional state
- ◆ Creating Affective Awareness
 - ➔ Creating Affective Bonds
 - ➔ Imitation
 - ➔ Adaptation
 - ➔ User's engagement
- ◆ Backchanneling

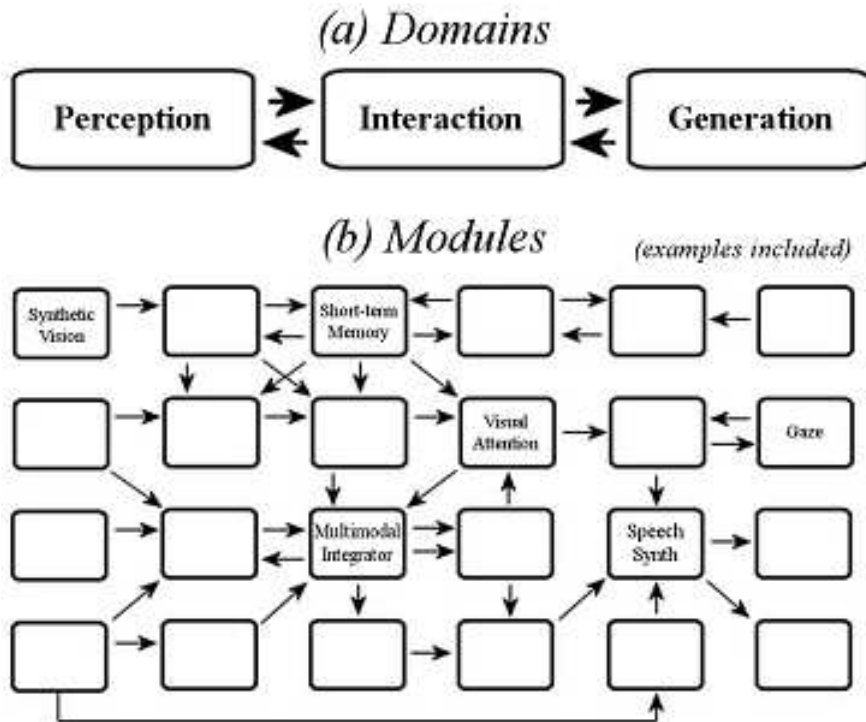
Agents' capabilities

- ◆ Coordination of signs in multiple modalities
 - ➔ From multimodal emotional corpora to models of coordination between modalities
 - ➔ Multimodal behaviour
 - ➔ Gesture repositories
- ◆ Expressivity
 - ➔ Behaviour expressivity
 - ➔ Speech expressivity
 - ➔ Context dependent emotional body gesture
 - ➔ Blend of emotions: acoustic and facial expressions (fuzzy logic, genetic algorithm)
 - ➔ Copy-synthesis of emotional speech and behavior

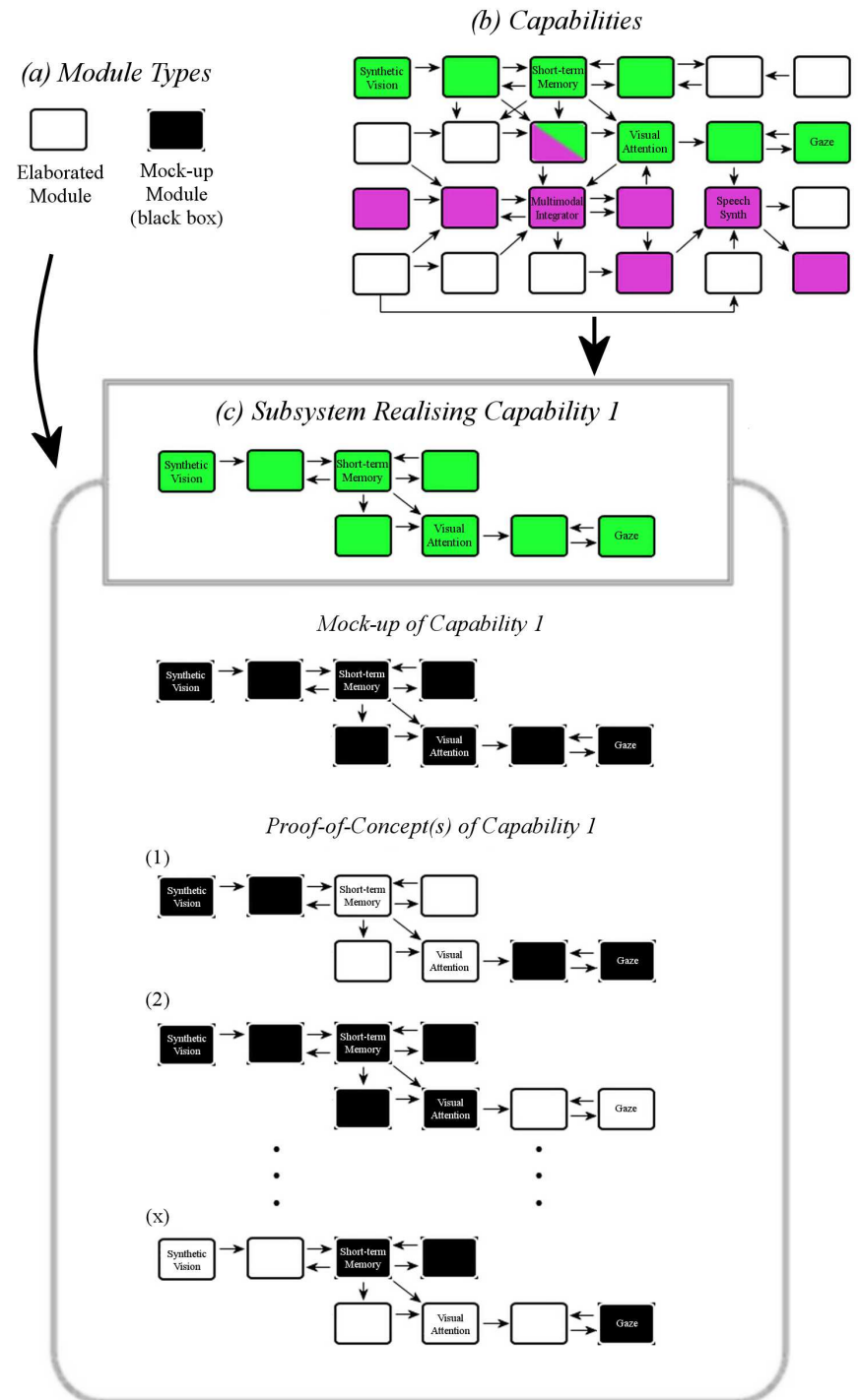
Methodology overview

- ◆ Theoretical Framework: Design of overall architecture for ECA system, that can perceive, interact and generate
- ◆ Mock-up development of a sub-system enabling a capability
- ◆ Proof-of-concept: instantiation of sub-systems of the theoretical framework

Methodology



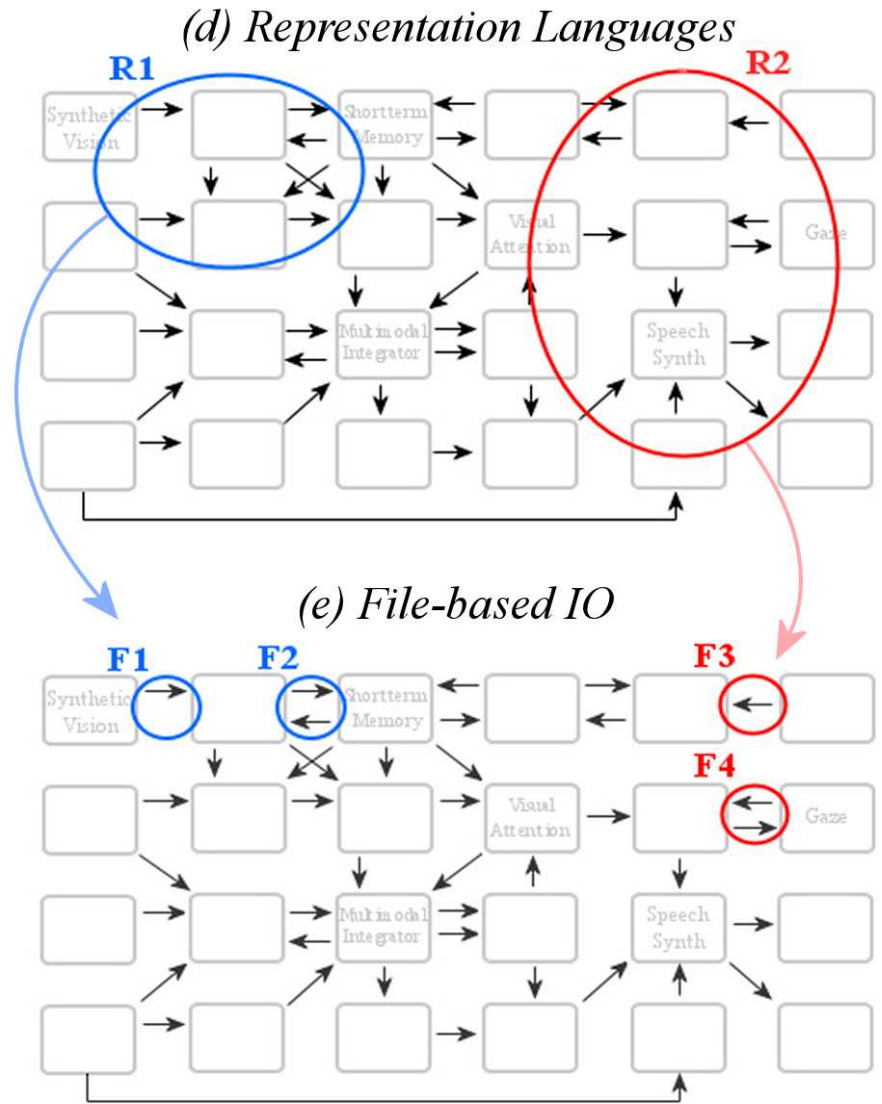
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Representation Language

- ◆ A key issue for mock-up implementation
- ◆ A means for encoding communicative information
- ◆ Use it to drive and control the animation of ECAs
- ◆ Function as interface to wrappers for various player technologies
- ◆ Interfaces to the annotation schemes
- ◆ A first meeting happened on March 9th
- ◆ A second meeting will be hold here

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One Year Achievement

◆ Perception domain:

- ➔ perception model: based on Theory of Mind research
 - attention model: measure of the perceived amount of attention that an other is paying, based on their eye, head, body and locomotion directions
 - level of interest: degree to which potential partners are perceived to intend to interact

One Year Achievement

◆ Interaction domain:

➔ affective bonds

- investigate user's engagement behaviors through empirical study
- evaluate emotional engagement of users using analysis of movement
- modulate synchronization/imitation rate in function of the affect link with the other agents

➔ interaction management:

- Companion project (U of Sheffield): notice emotional user responses, produce timely emotional responses
- Basic model: model of actions and expressions in a social context

One Year Achievement

◆ Generation domain:

→ audio:

- rule-based emotion simulation for speech synthesizer
- multicultural / multilingual comparison

→ visual

- communicative behavior qualifier: expressivity model for gesture and face
- perceptual tests to evaluate implementation of single and combined dimensions of expressivity to produce more believable overall impression of the agent
- modulation of gestures according to the emotional state induced by context-situation
- idle variations of gesture and posture
- synthesize intermediate expressions

One Year Achievement

- ◆ Representation language:
 - ➔ coding scheme for correlating politeness strategies with communicative behaviors
 - ➔ multilevel annotation of multimodal emotional behaviors
 - ➔ annotation scheme for attentive behaviors

TASKS

- ◆ Task 1: Representation Languages and Theoretical Framework
 - ➔ Deliverable: report describing the representation languages and the theoretical Framework of the overall architecture: due Month 23
- ◆ Task 2: Mock-up of each capability
 - ➔ Deliverable: report describing the mock-up of each capability: due Month 35
- ◆ Task 3: Proof-of-concept of each capability
 - ➔ Deliverable: report describing the proof of concept of each capability: due Month 46

Achievements

- ◆ Definition of common thematic areas through the elaboration of one exemplar
- ◆ Exchange of existing tools
- ◆ Collaboration among partners
- ◆ Active participation (more than 40 contributions sent to WP6 workshop; around 70 participants at WP6 workshop)

Difficulties

- ◆ Maintain coherence across subtasks
 - ➔ Strong need of dialog reinforcement between groups working on the different capabilities
 - ➔ Common research topics or common practicability questions across working groups
- ◆ Maintain coherence across workpackages

Working methodology

- ◆ Use the already available tools in the HUMAINE portal
- ◆ Several meetings are planned
- ◆ Exchange of personnel for short periods among partners