ILHAIRE
Incorporating Laughter into Human-Avatar Interactions: Research and Evaluation

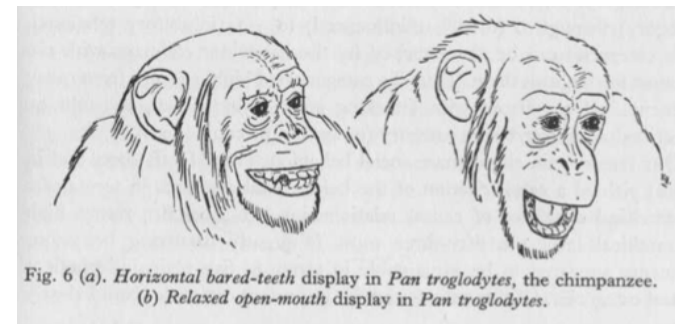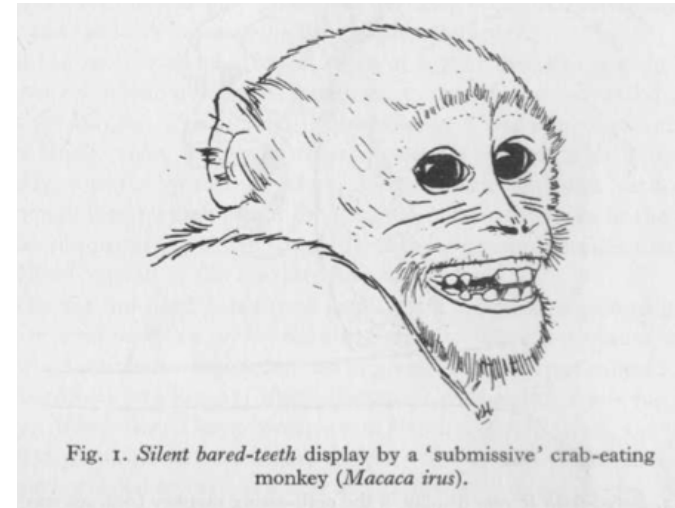UMONS – CNRS – UAU – UNIGE – UCL – QUB – UZH – SUPELEC – CANTOCHE

S. Dupont, G. McKeown, J. Urbain, T. Dutoit
& ILHAIRE Consortium

Laughter Everywhere

- Laughter is ubiquitous in human interaction

  - in our conversational interactions 2.5 times a minute

- Often ignored - not taken seriously

- Presents a problem in HCI

  - especially face to face avatar interactions

- Requirement to produce naturalistic and convincing laughter within the repertoire of social signals available to avatars

Darwin, Van Hooff, Glenn

- Darwin (1872)
  - Continuum – from smiles to laughter

- Van Hooff (1972)
  - Smiles from primate bared teeth display
  - Laughs from open mouthed play display
  - Evolved into a near continuum in humans

- Conversation Analysis (Glenn, 2003; Glenn & Holt, 2013)
  - Strong role for laughter in conversational interaction

Fig. 1. Silent bared-teeth display by a 'submissive' crab-eating monkey (*Macaca irus*).

Fig. 6 (a). Horizontal bared-teeth display in *Pan troglodytes*, the chimpanzee. (b) Relaxed open-mouth display in *Pan troglodytes*.

Lessons from Previous Experiments

- Evaluation of interactions with four avatar personalities
- 2 Negative, 1 Positive, 1 Neutral
- Negative interactions received best evaluations
- Positive and neutral were poorly received.
- They lacked appropriate laughing behaviours.

Laughter and Computers
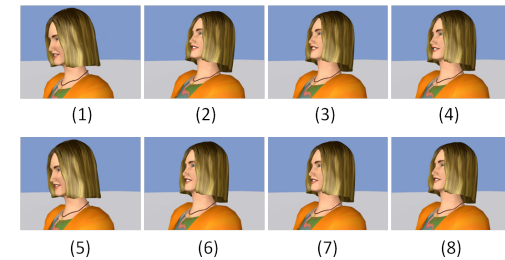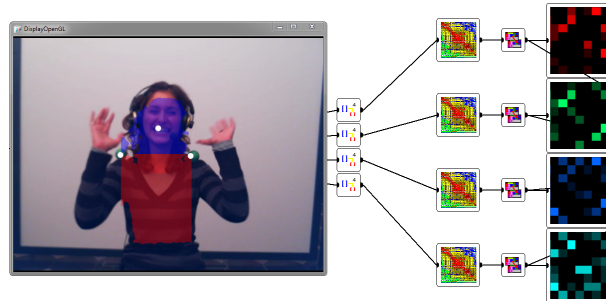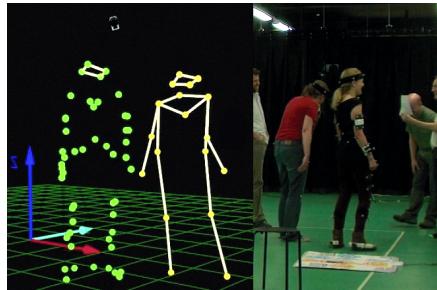
- ## Applications:
  - Media Production, Gaming, Storytelling, Teaching, Coaching, Companioning, …

- ## But much remains to be understood:
  - How laughter is perceived and conveyed and how psychological profile impacts,
  - How to recognize laughter and its subcategories,
  - How to synthesize natural sounding and looking laughter,
  - How to endow machine with the capability to laugh when appropriate, and using the correct type of laughter; or to fall into a contagion loop,
  - How humans feel in the presence of machines with interaction capabilities including laughter,
  - How to deal with gelotophobia (emotional disorder - extreme fear of being laughed at).
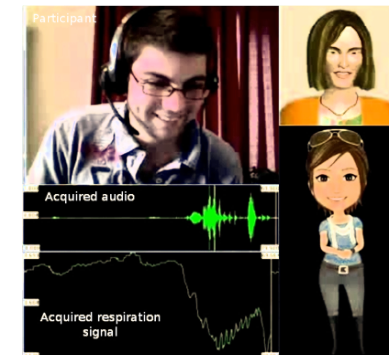
Different Perspectives on Laughter

(1) (2) (3) (4)

(5) (6) (7) (8)

Participant of an ILHAIRE Experiment

Laughter Pioneers and Famous Researchers

Duchenne Laugh (hilarious laugh)

Expected AUs (prototypical):
- AU12
- AU25, 26, 27
- AU6, AU7
- Laughter related vocalization
- Head and Shoulder Movements
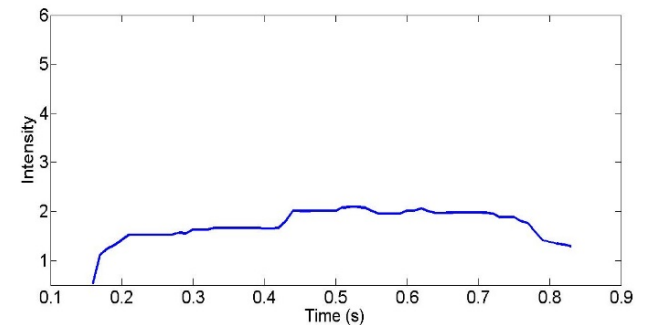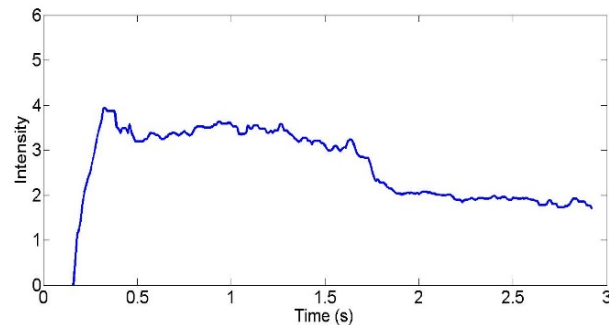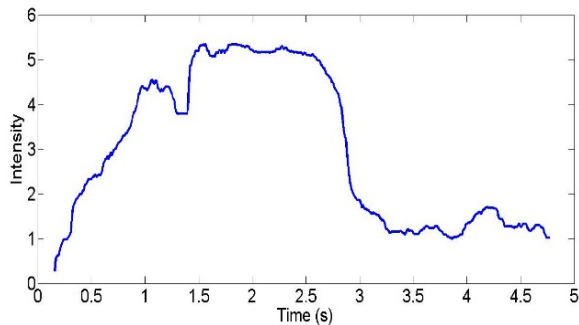- AU4 in intense hilarious laughter

"Greta" Laughing

Acquired audio

Acquired respiration signal

10 sec.

ILHAIRE
The science of laughter!

Laughter Synthesis

Laughter intensity curves
➔ Laughter «phonetic» transcriptions
➔ Laughter audiovisual synthesis

History of the Project

- < 2006 – significant achievements in speech technologies.
- 2006 – start of bold research on laughter acoustics at UMONS.
- 2004-2010 – European projects merging IT and a human sciences perspective:
  - 2004-2007 - HUMAINE – Human-Machine Interaction Network on Emotions
  - 2006-2010 - CALLAS - Conveying Affectiveness in Leading Edge Interactive Systems
- 2009 – eNTERFACE'09 workshop in Genova:
  - project on laugher in HCI
  - discussing the courageous idea of a EU project around laughter, quickly joined by other people.

Boat Trip at eNTERFACE ,
2009 July 20th, Genova
(T. Dutoit, S. Dupont, C. Pelachaud)

History of the Project

- **Deserving multidisciplinary perspective:**
    - self-evident with the merger with the psychological component, which gave the final focus of the project.

- **2010 May**
    - pre-proposal ready

- **2010 Dec**
    - full proposal ready

- **2011 Feb**
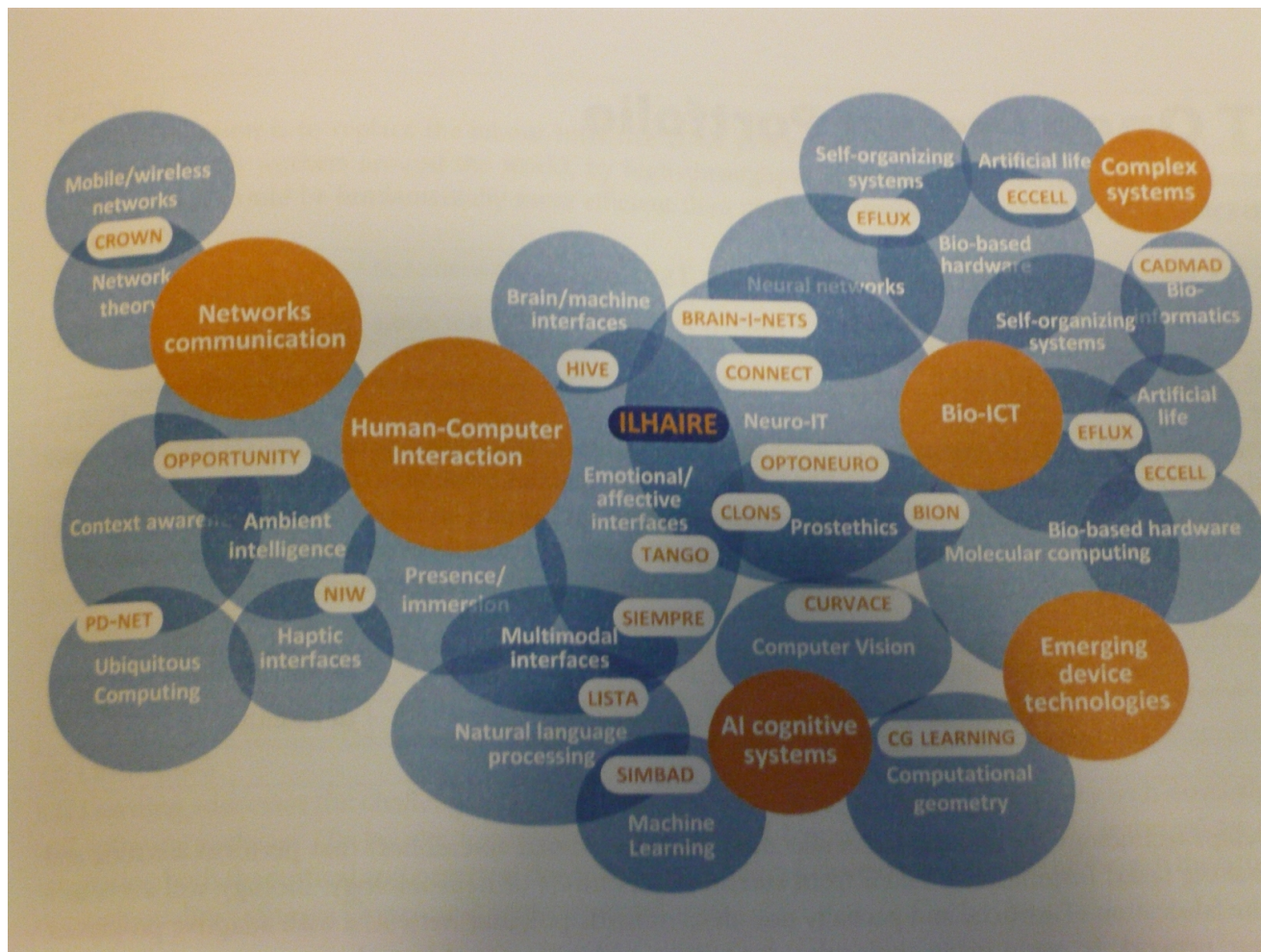   - ILHAIRE budget reserved by EC

Ilhaire Negociation Meeting, 2011 March 4th, Brussels (T. Dutoit, C. Pelachaud, S. Dupont, O. Pietquin)

"Congratulations! Rather unlikely that you will get another one of these FET projects pretty soon!"

Prabhat Agarwal , 2011 March 4th

ILHAIRE & the FET cloud

Part of the FET portfolio in 2011

Added Value

- ## Interdisciplinarity

  - Engineers attending **psychology aficionados** events,
  - Psychologists attending **techies** events,
  - IT supporting research in psychology,
  - Psychology providing a framework for IT (Human-Computer Affective Interfaces).
  - ➔ From signal and speech processing towards the current paradigm shift in HCI.

- ## More up-front than most other funding opportunities

  - Explore several facets of a theme without having to comit on adressing commercial exploitation quickly,
  - ➔ Strong basis for defining downstream project centered on application potential or on other identified challenges.

Added Value

- ## Interdisciplinarity
  - Engineers attending **psychology aficionados** events,
  - Psychologists attending **techies** events,
  - IT supporting research in psychology,
  - Psychology providing a framework for IT (Human-Computer Affective Interfaces).
  - ➔ From signal and speech processing towards the current paradigm shift in HCI.

- ## More up-front than most other funding opportunities
  - Explore several facets of a theme without having to comit on adressing commercial exploitation quickly,
  - ➔ Strong basis for defining downstream project centered on application potential or on other identified challenges.
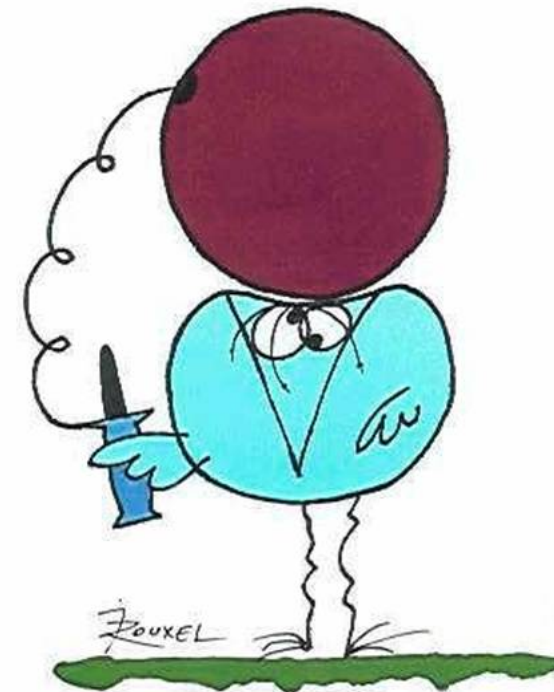
Some Humble Advices

Some Advices

- Don't do it! You will most likely to fail!The success rate on FET is around 6%!

Some Advices

- Don't do it! You will most likely to fail!The success rate on FET is around 6%!

Les devises Shadok

EN ESSAYANT CONTINUELLEMENT
ON FINIT PAR RÉUSSIR. DONC:
PLUS ÇA RATE, PLUS ON A
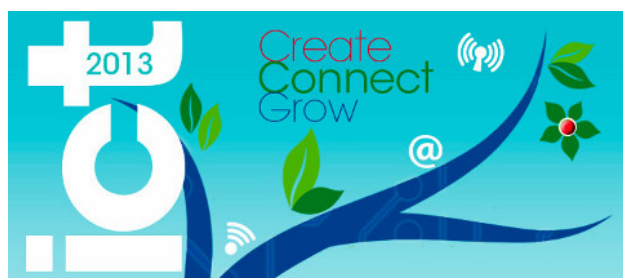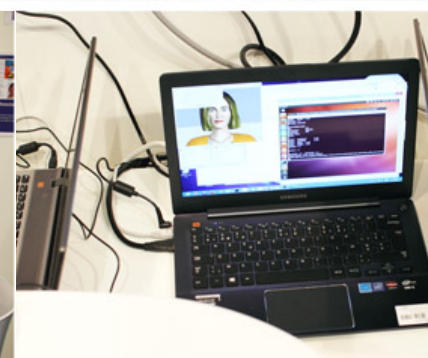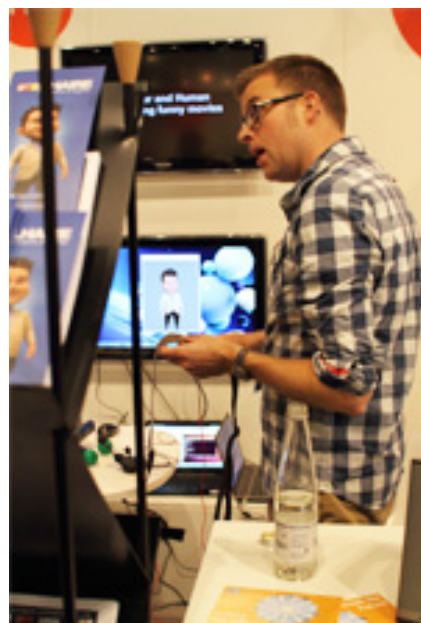DE CHANCES QUE ÇA MARCHE.

Some Advices

- Follow advices provided through EC POs, and information days such as this one. General presentations
  - Know main reasons why a proposal fails.
  - Understand the "philosophy" behind the call for proposal texts.
  - Check the basic rules and eligibility criteria.

- In H2020 FET, it's mostly the IDEA that matters
  - Simpler submission format, and administrative rules.
  - Think about wider implications of your research and how it can connect with other disciplines.
  - Be eager to learn from others.
  - Work collaboratively! Difficult to get to the proper focus and consortium composition alone.

Some Advices

- During project - Disseminate

Some Advices

Thank You!

- **UMONS**: Stéphane Dupont, Thierry Dutoit, Jérôme Urbain
- **CNRS**: Catherine Pelachaud, Gerard Chollet, Sathish Pammi, Bingqing Qu, Abhisheck Sharma, Yu Ding, Jing Huang
- **UAU**: Elisabeth André, Johannes Wagner, Florian Lingenfelser, Tobias Baur
- **UNIGE**: Antonio Camurri, Gualtiero Volpe, Maurizio Mancini, Giovanna Varni, Radoslaw Niewiadowski
- **UCL**: Nadia Berthouze, Harry Griffin, Hane Aung
- **QUB**: Roddy Cowie, Will Curran, Gary McKeown, Lesley Storey
- **UZH**: Willibald Ruch, Tracey Platt, Jennifer Hofmann
- **SUPELEC**: Olivier Pietquin, Matthieu Geist, Bilal Piot
- **CANTOCHE**: Benoît Morel, Laurent Ach, Émeline Bantegnie, Anh Tu Mai
- **EC**: Prabhat.AGARWAL, Paul Hearn, Dagmar Floeck, Christiane Wilzeck

http://www.ilhaire.eu/

ILHAIRE
The science of laughter