h2_o

Technology-Sense and People-Sensibility

Rosalind Picard

Hyungil Ahn

Hoda Eydgahi

Shaundra Daily

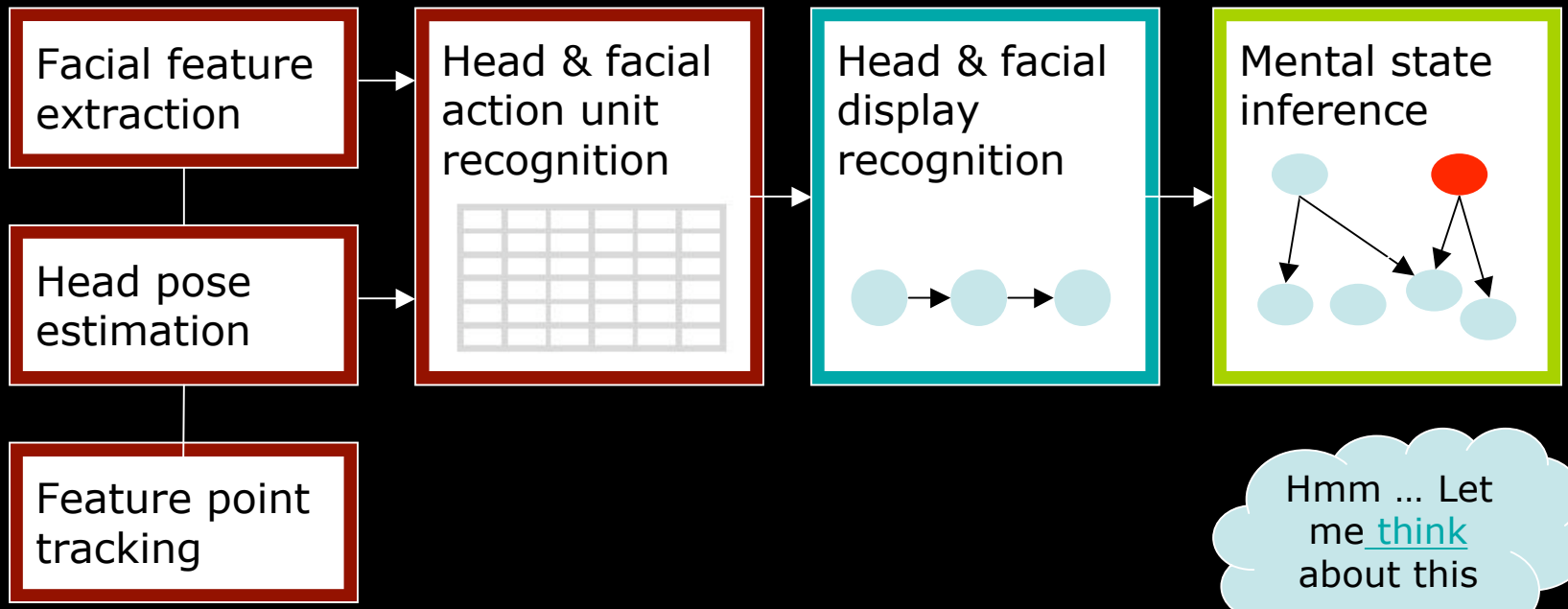
Rana el Kaliouby

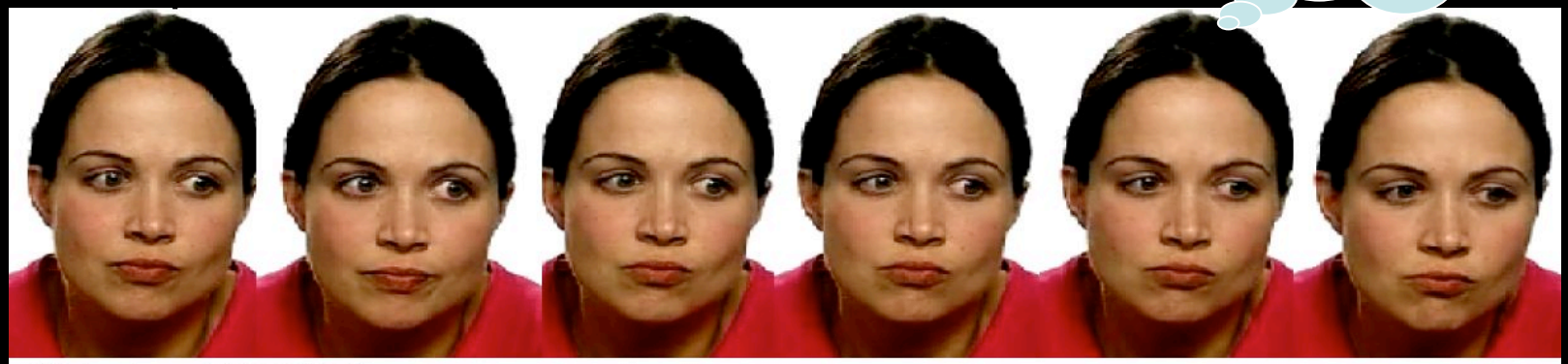
Seth Raphael

Alea Teeters

http://affect.media.mit.edu

Inferring Cognitive-Affective State from Facial+Head movements (el Kaliouby, 2005)



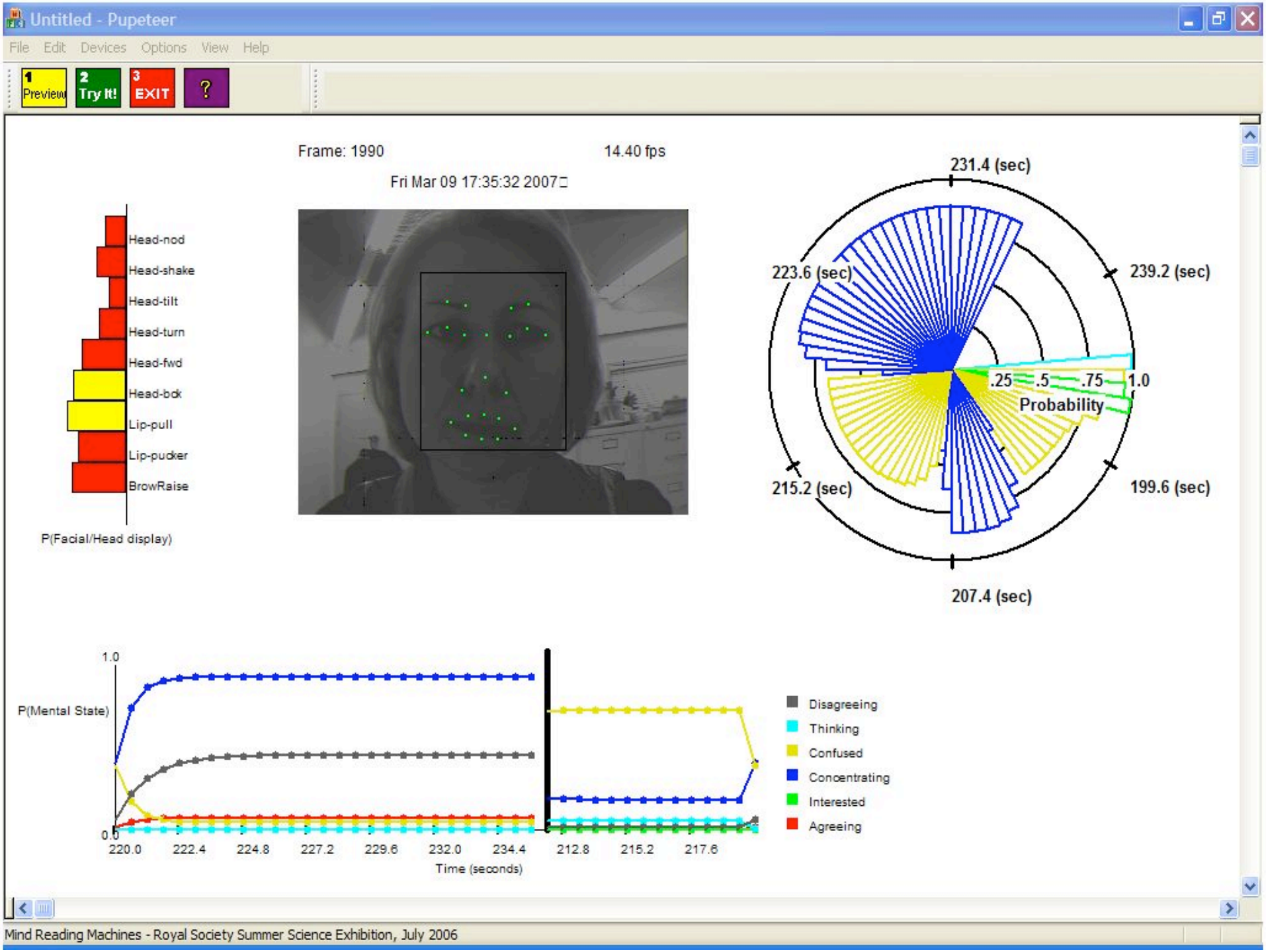


Video input (observed)

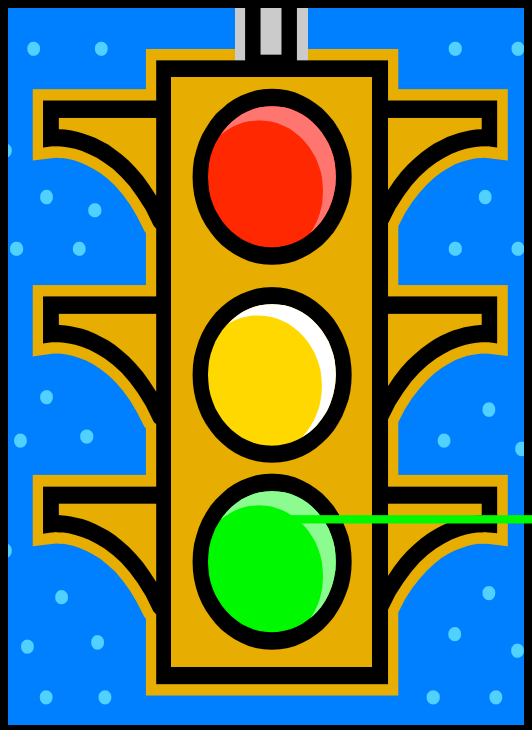
Other examples:

Agree

Disagree

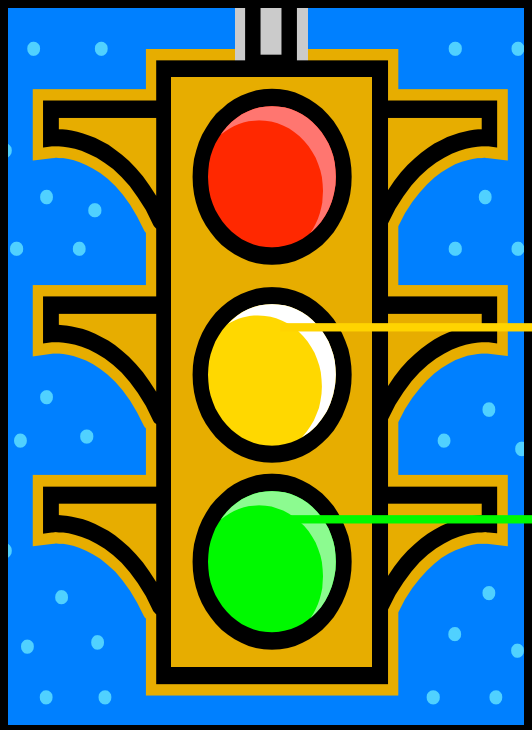

Untitled - Pupeteer
File Edit Devices Options View Help
1 Preview
2 Try It!
3 EXIT
?
Frame: 1990
14.40 fps
Fri Mar 09 17:35:32 2007
Head-nod
Head-shake
Head-tilt
Head-turn
Head-fwd
Head-bck
Lip-pull
Lip-pucker
BrowRaise
P(Facial/Head display)
231.4 (sec)
223.6 (sec)
239.2 (sec)
.25
.5
.75
1.0
Probability
215.2 (sec)
199.6 (sec)
207.4 (sec)
1.0
P(Mental State)
0.0
220.0
222.4
224.8
227.2
229.6
232.0
234.4
212.8
215.2
217.6
Time (seconds)
Disagreeing
Thinking
Confused
Concentrating
Interested
Agreeing
Mind Reading Machines - Royal Society Summer Science Exhibition, July 2006

LIVE EXPERIMENT:
Feedback 6 states -> 3 states



INTERESTED,
AGREEING, or
CONCENTRATING

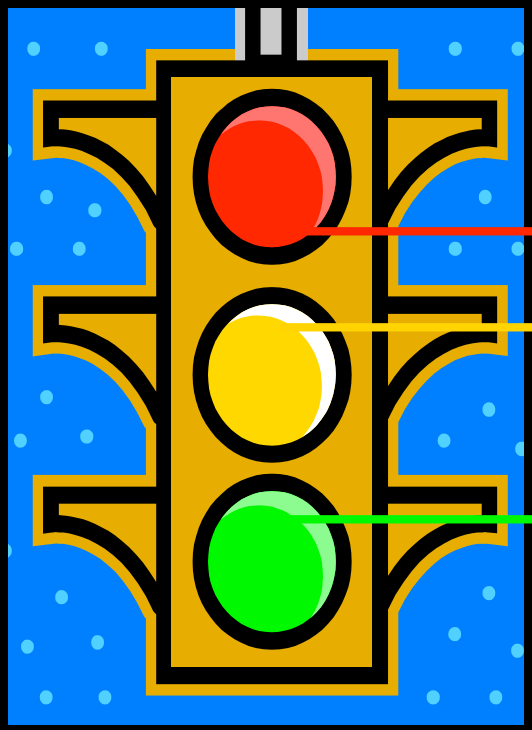
LIVE EXPERIMENT:
Feedback 6 states -> 3 states



CONFUSED

INTERESTED, **AGREEING**, or **CONCENTRATING**

LIVE EXPERIMENT:
Feedback 6 states -> 3 states



DISAGREEING or
“THINKING” (no longer attending)

CONFUSED

INTERESTED,
AGREEING, or
CONCENTRATING

WHY NOT JUST GIVE
Green/Yellow/Red buttons to push?

Because people forget to do this *while they're engaged.*

(e.g., T. Sheridan (1975), Proc of the IEEE, Vol 63, No. 3, pp. 463-475.)

Many people can use this kind of information…

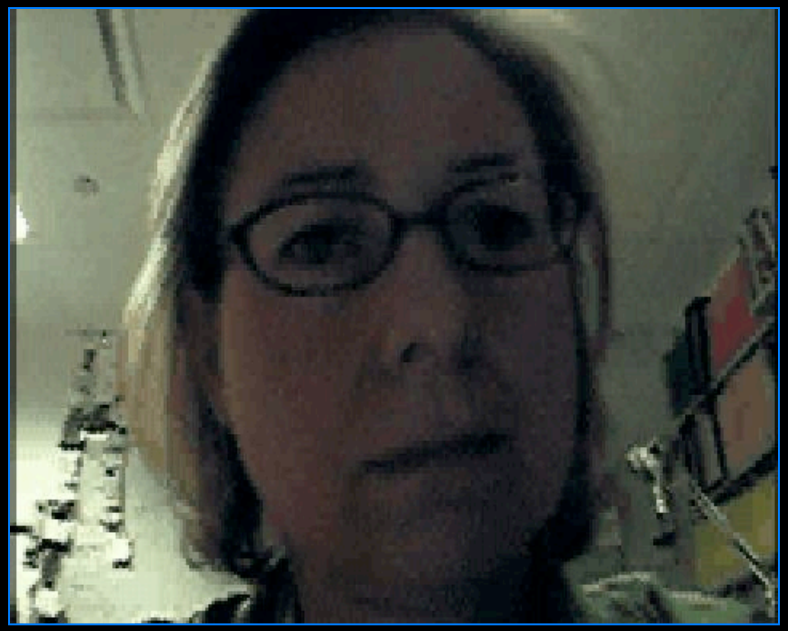
Many people can use this kind of information…

Many people can use this kind of information…

+ Designers of web pages,1000-Channel content providers, Advertisers, Telemetrics, Packaging, Distance Learning, Interfaces, …

This technology can help reduce rudeness…

Example: Let applications know when you're concentrating, then...



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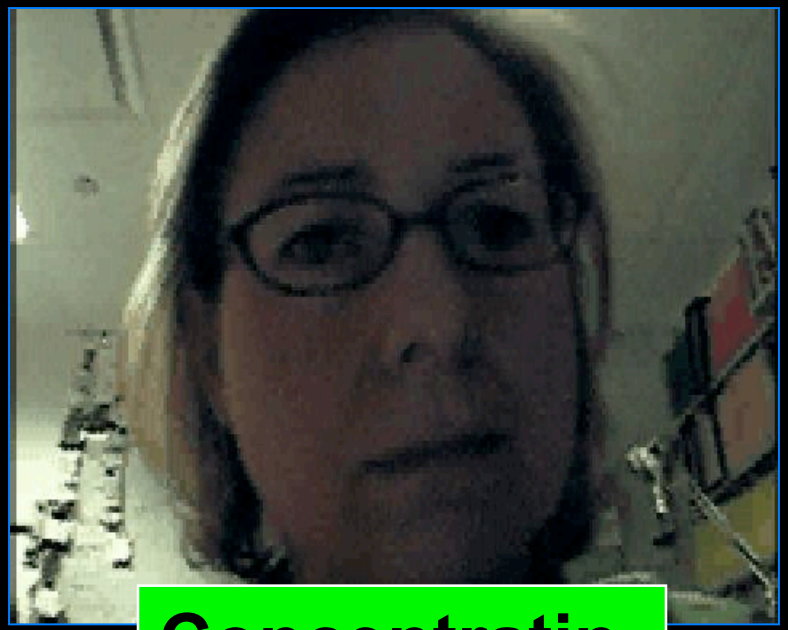

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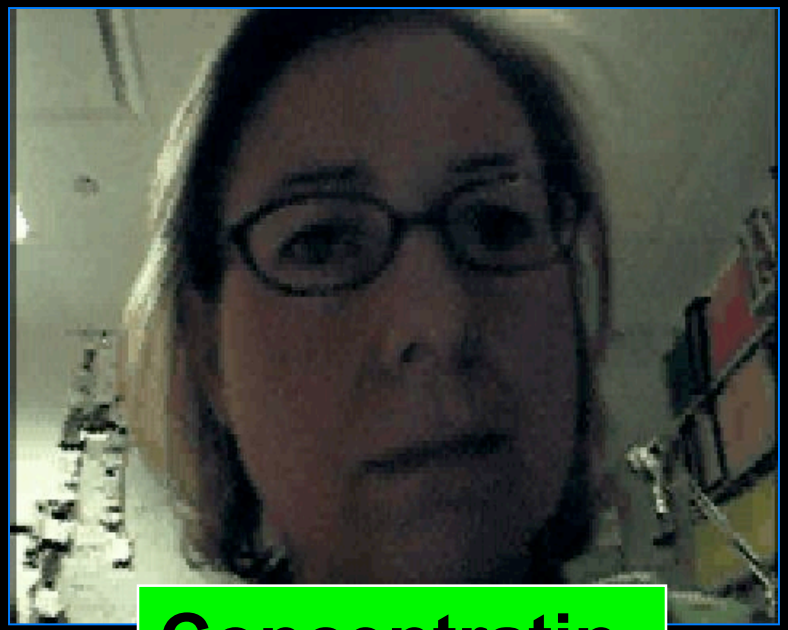

Concentratin

This technology can help reduce frustration…

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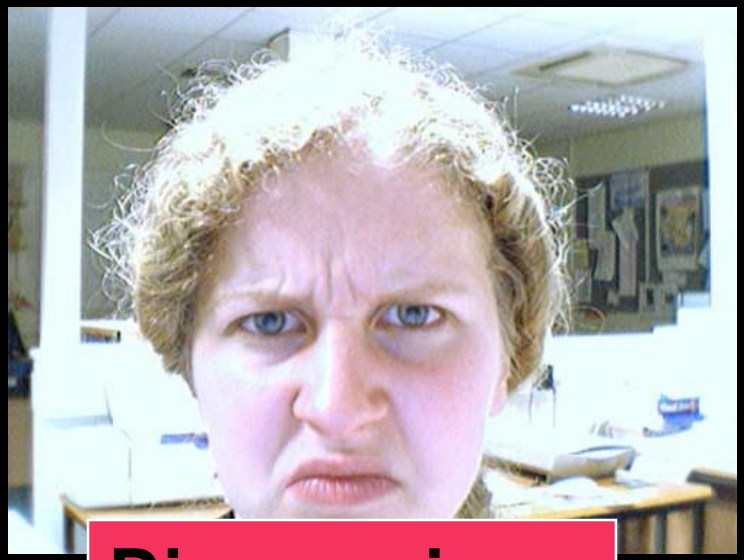
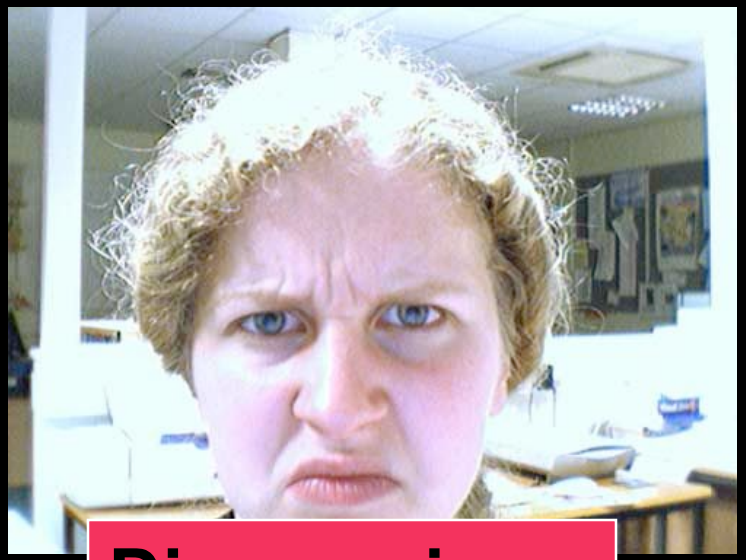


Disagreeing

This technology can help reduce frustration…



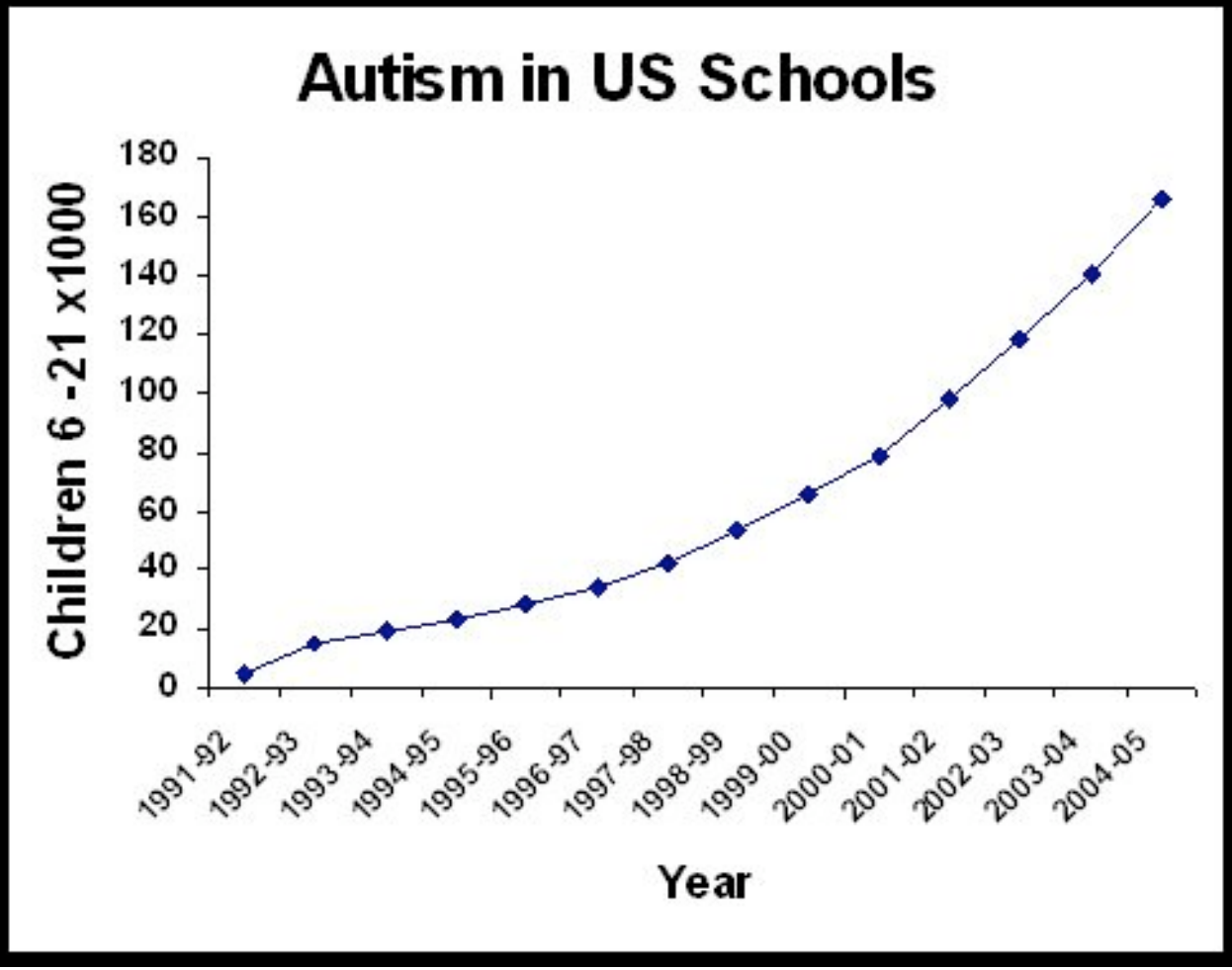
Disagreeing

Inhibit smiling (and more…)

We’re not just developing this new capability to make office experiences better…we’re using it to affect real people’s lives right now, for example, enabling people with autism to have new tools for communication

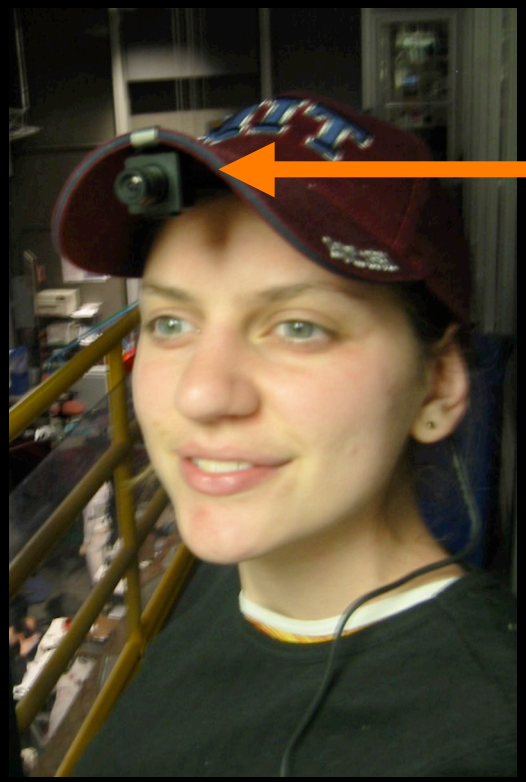
1 child in 150 is on the autism spectrum

Center for Disease Control and Prevention (2007)



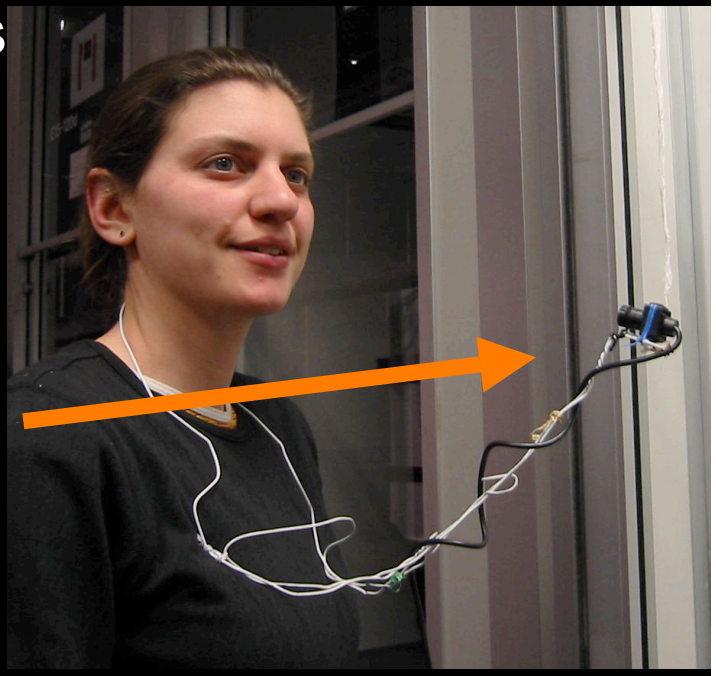
Autism makes it challenging to recognize and predict emotional expressions in face-to-face interaction

Hat-cam, Self-cam



1. Hat-Cam
(to capture other's expressions)

2. Self-Cam
(to communicate self expressions)



Dual-cam

For understanding and translating social-emotional cues in dialogues

YouTube "In My Language" 252,352 views

Sorry I'm late with the Blog Carnival. My home was invaded by interesting geeks.

by **ballastexistenz** @ 10:50. Filed under Uncategorized

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Anyway, the gloves were all too big for me, but they had one that was just electrodes that attached to a thing that transmits to a computer, which then shows it on a graph. Because there were so many people in the room, my arousal level was really high, it turned out (I wouldn't be surprised, being around lots of strangers stresses me out). But if I sat and rocked and didn't look at the people, it slowly went down. The moment one of them turned her head to look at me, though, it suddenly jumped up again. And this was *before* the point of eye contact, even, and certainly before I could *feel* more than a small difference in my stress levels.

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How hard is it to make real-time emotionally intelligent moves?

Chess: The first player can open with any of 20 actions and the second player can respond with 20 as well. After the first two moves, there are 400 branches to specify.

How hard is it to make real-time emotionally intelligent moves?

After three moves there are 5362 distinct chess positions, and there are 8902 chess games that end in exactly 3 moves.

The number of chess games that end in exactly n=4 moves is 197,742.

The number of chess games that end in exactly n=5 moves is 4,897,256.

The number of chess games that end in exactly n=6 moves is 120,921,506.

The number of chess games that end in exactly n=7 moves is 3,284,294,545,….

(K. Thompson, Sloane's A006494)

How hard is it to make real-time emotionally intelligent moves?

It has been estimated that the total number of possible moves in chess is on the order of 10^120 …A computer making a billion calculations a second, would need approximately 3x10^103 years to consider all of these moves.

(Dixit and Skeath, 1999:66)

LE 1. Single action units (AU) in the Facial Action Coding System

AU number	Descriptor	Muscular Basis
1.	Inner Brow Raiser	Frontalis, Pars Medialis
2.	Outer Brow Raiser	Frontalis, Pars Lateralis
4.	Brow Lowerer	Depressor Glabellae, Depressor Supercilli; Corrugator
5.	Upper Lid Raiser	Levator Palpebrae Superioris
6.	Cheek Raiser	Orbicularis Oculi, Pars Orbitalis
7.	Lid Tightener	Orbicularis Oculi, Pars Palebralis
9.	Nose Wrinkler	Levator Labii Superioris, Alaeque Nasi
10.	Upper Lip Raiser	Levator Labii Superioris, Caput Infraorbitalis
11.	Nasolabial Fold Deepener	Zygomatic Minor
12.	Lip Corner Puller	Zygomatic Major
13.	Cheek Puffer	Caninus
14.	Dimpler	Buccinator
15.	Lip Corner Depressor	Triangularis
16.	Lower Lip Depressor	Depressor Labii
17.	Chin Raiser	Mentalis
18.	Lip Puckerer	Incisivii Labii Superioris; Incisivii Labii Inferioris
20.	Lip Stretcher	Risorius
22.	LipFunneler	Orbicularis Oris
23.	Lip Tightener	Orbicularis Oris
24.	Lip Pressor	Orbicularis Oris
25.	Lips Part	Depressor Labii, or Relaxation of Mentalis or Orbicularis Oris
26.	Jaw Drop	Masetter; Temporal and Internal Pterygoid Relaxed
27.	Mouth Stretch	Pterygoids; Digastric
28.	Lip Suck	Orbicularis Oris

AU number	
19.	Tongue
21.	Neck Tightener
29.	Jaw Thrust
30.	Jaw Sideways
31.	Jaw Clencher
32.	Lip Bite
33.	Cheek Blow
34.	Cheek Puff
35.	Cheek Suck
36.	Tongue Bulge
37	Lip Wipe
38.	Nostril Dilator
39.	Nostril Compressor
41.	Lid Droop
42.	Slit
43.	Eyes Closed
44.	Squint
45.	Blink
46.	Wink

The Facial Action Coding System (or FACS; Ekman & Fries
comprehensive, anatomically based system for measuring al
discernible facial movement. FACS describes all visually d
facial activity on the basis of 44 unique action units (AUs)
categories of head and eye positions and movements. Eac
code, the designation of which is fairly arbitrary. Tables
coded in FACS, as well as the muscle groups involved i
figure of muscles see next page).
FACS coding procedures allow for coding of the *inten*
action on a 5-point intensity scale, for the *timing* of fa
coding of facial expressions in terms of *events*. An e
description of each facial expression, which may co
many AUs contracted as a single expression.

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After three moves th… …e

First move using face: 44 single actions + many more action combinations AND

Can vary moves with prosody, gesture, and more

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(Di

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Chess timing per move: minutes

Human interaction timing: milliseconds

Challenge:

Decode/code all the moves of social-emotional communication.

This is the problem faced daily by people on the autism spectrum: systemizing social-emotional interaction

…She said that she could understand "simple, strong, universal" emotions but was stumped by more complex emotions and the games people play. "Much of the time, " she said, "I feel like an anthropologist on Mars." .. "She has instead to "compute" others' intentions and states of mind, to try to make algorithmic, explicit, what for the rest of us is second nature." *-Interview with Temple Grandin, by Oliver Sacks*

Summary & Challenge

- Decode human social-emotional moves
- Team w/people (autistics) who “systemize”
- Extend human social-emotional communication

The End