Introduction to Affective Computing

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Inspired by Prof. Rosalind Picard's Affective Computing class
https://ocw.mit.edu/courses/media-arts-and-sciences/mas-630-affective-computing-fall-2015/

What is Affective Computing?

Affective Computing is the study and development of systems and devices that can recognize, interpret, process, and simulate human affect/emotion.

Motivation – why emotions and computers?

Emotion is fundamental to human experience, influencing cognition, perception, and everyday tasks such as learning, communication, and even rational decision-making. However, while computers cannot detect, respond to, or simulate affect, they remain crippled in the ways that they can respond intelligently and efficiently to humans.

Motivation

"The question is not whether intelligent machines can have any emotions, but whether machines can be intelligent without any emotions."

— Marvin Minsky (1927–2016) (Co-founder of AI Lab at MIT, Turing Award winner (most prestigious award in Computer Science)).

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Which one is more intelligent?

Even a puppy can tell when you are angry with it.

(Nicholas Negroponte, *Being Digital*)

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Computer will keep showing you the same data, whether you look like this, or like this

As a human, how would you respond to this?

Courtesy of Sybren Stuvel on Flickr

https://www.flickr.com/photos/sybrenstuvel/2468506922

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With this?

Human clippy

Imagine you are at work and a character barges into the room and when you're busy, doesn't apologize, doesn't ask, doesn't notice that you are annoyed.

He offers you useless advice.

You express annoyance.

He ignores it.

This goes on.

Finally you tell him 'go away'

He winks and does a little dance before exiting.

- from Rosalind Picard, Affective Computing class

Intelligent expression by computers requires first recognizing affective context (and also considering goals & predicting outcome)

Human-Human Interaction

Suppose that a person starts to give you help at a bad time. You try ignoring, then frowning at,

then

maybe glaring at him or her...

The smart person infers you don't like this, ceases the interruption, notes the context, and learns from the feedback.

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But the computer wouldn’t frustrate people if it was only more intelligent?”

Consider:

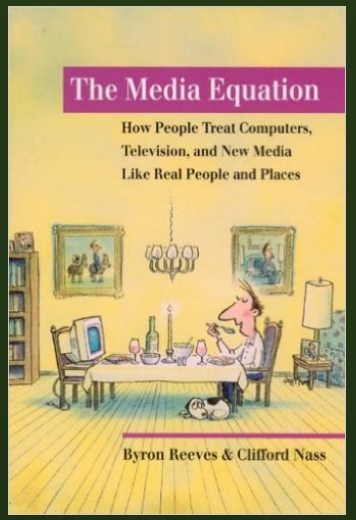
“But the person wouldn’t frustrate people if he/she was only more intelligent?”

Fact: The most intelligent people are still

frustrating (at least sometimes).

People and computers can’t always prevent frustration. Thus, they should be prepared to handle it intelligently.

The Media Equation



Reeves and Nass, 1996

Media = Real life

Individuals interactions with computers, televisions, and new media are *fundamentally social and natural.*

Everyone expects media to obey a wide range of social and natural rules – all these rules come from the world of human-to-human interaction. Expects these rules to pass into human-to-computer interaction.

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Media = Real Life

But Professor, I know my computer does not have emotions.

I can distinguish between life on the screen and the real thing.

"*It doesn't matter, people respond socially and naturally to media even though they believe it is not reasonable to do so, and even though they don't think that these responses characterize themselves*." Reeves and Nass, 1996 (p7)

Media = Real Life

Not anthropomorphism – people rationally know but people often live life mindlessly.

People are polite to computers

People respond to interpersonal distance similarly (e.g. faces close up versus further away on the screen)

People believe flattery given from computers –regardless of sincerity

Class Exercise: Devise a Scenario Using the Media Equation

Break into groups of two and construct a human-computer interaction and then construct its "equivalent" human-human interaction using the media equation that clearly involves affect.

Write the interaction scenario in two ways: Once using the word "person" and the second time replacing it with the word "computer" so that the parallels are clear.

Humorous examples very much appreciated!

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Skills of emotional intelligence

Expressing emotions	->	**Simulating emotion**
Recognizing emotions	->	**Detecting emotion**
Handling another's emotions	->	**Adapting/Responding to emotion**
Regulating emotions	} If "have emotion"	
Utilizing emotions		

(Salovey and Mayer 90, Goleman 95)

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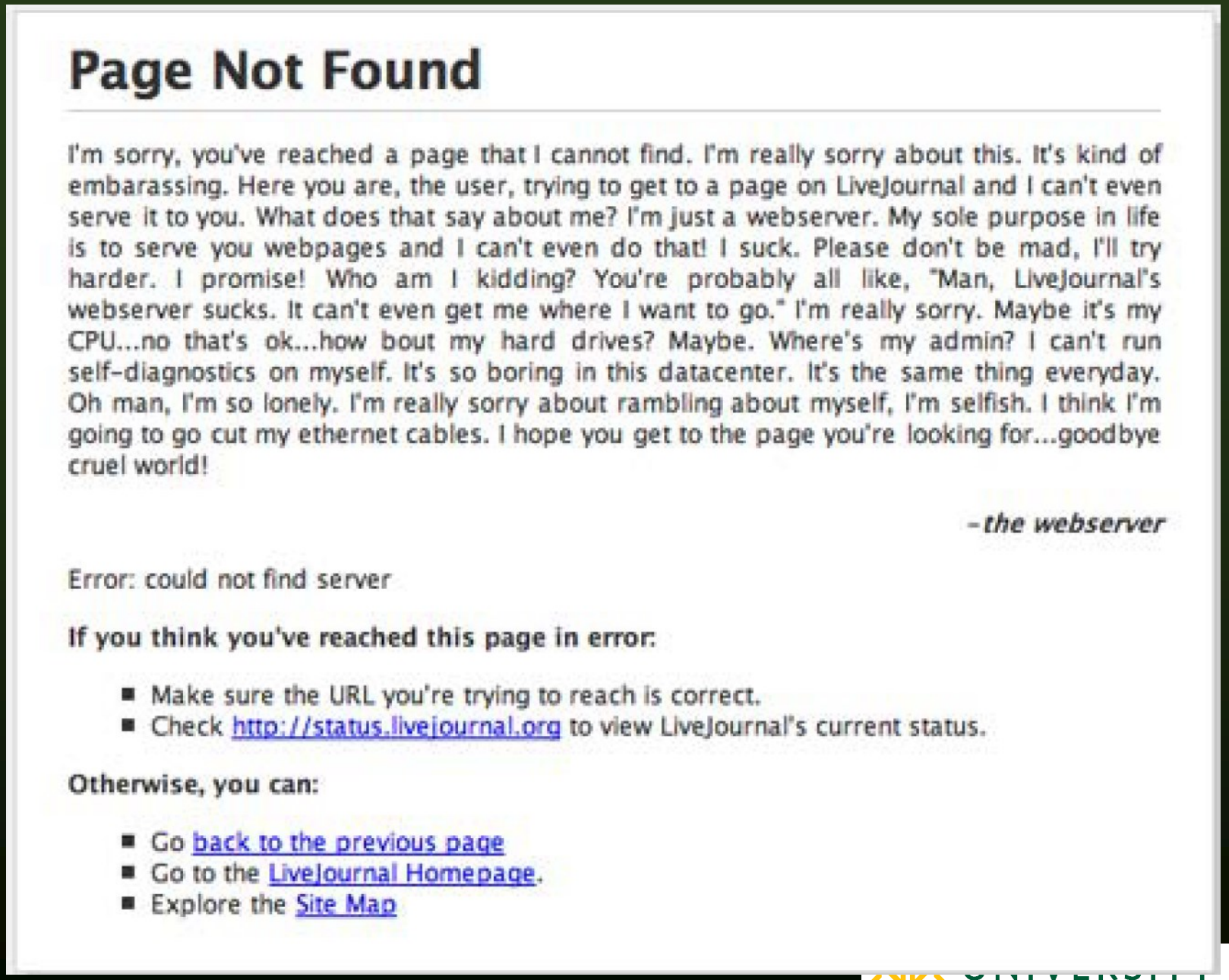
Example – Simulating Affect



Page Not Found

I'm sorry, you've reached a page that I cannot find. I'm really sorry about this. It's kind of embarassing. Here you are, the user, trying to get to a page on LiveJournal and I can't even serve it to you. What does that say about me? I'm just a webserver. My sole purpose in life is to serve you webpages and I can't even do that! I suck. Please don't be mad, I'll try harder. I promise! Who am I kidding? You're probably all like, "Man, LiveJournal's webserver sucks. It can't even get me where I want to go." I'm really sorry. Maybe it's my CPU...no that's ok...how bout my hard drives? Maybe. Where's my admin? I can't run self-diagnostics on myself. It's so boring in this datacenter. It's the same thing everyday. Oh man, I'm so lonely. I'm really sorry about rambling about myself, I'm selfish. I think I'm going to go cut my ethernet cables. I hope you get to the page you're looking for...goodbye cruel world!

-the webserver

Error: could not find server

If you think you've reached this page in error:

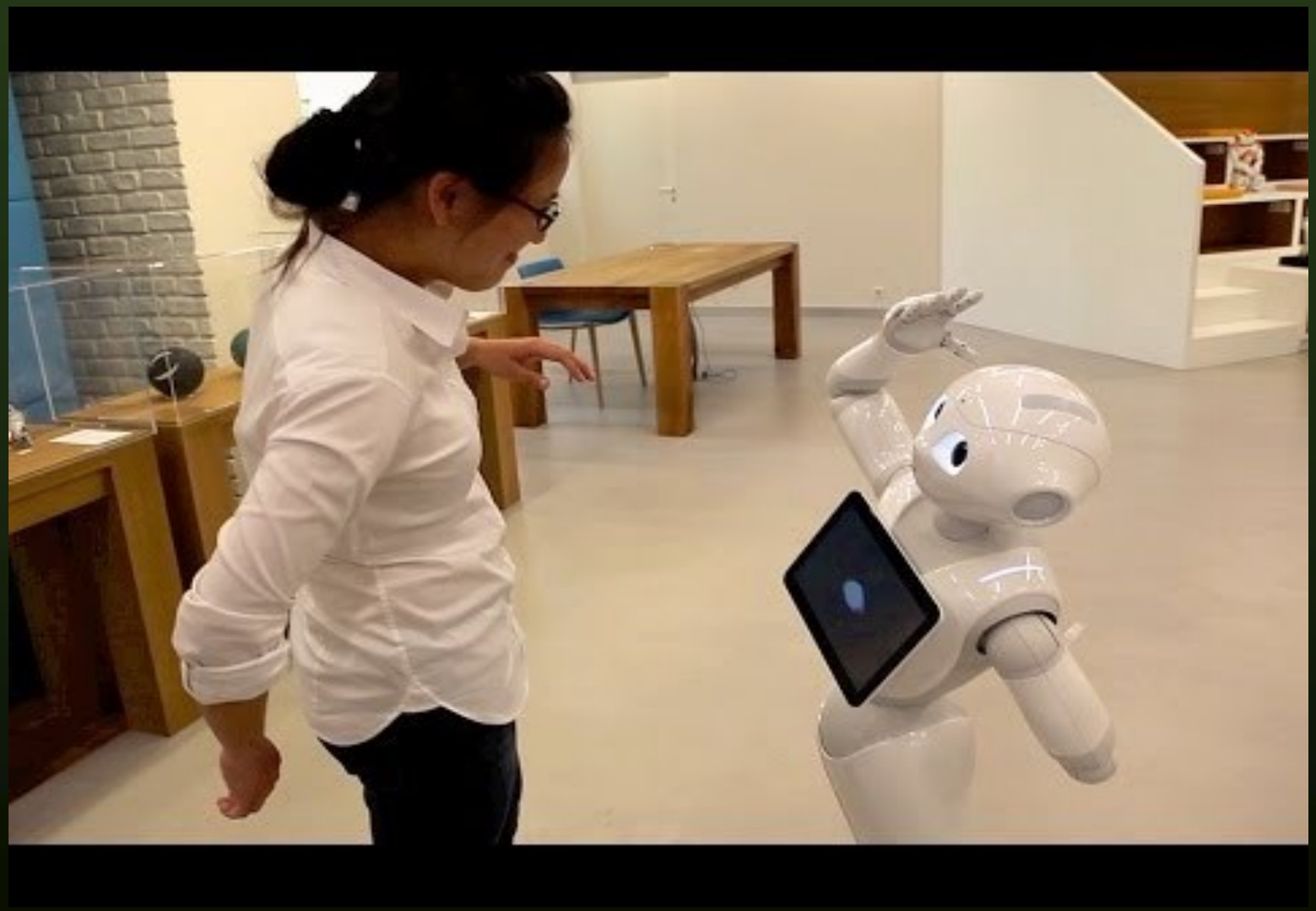
- Make sure the URL you're trying to reach is correct.
- Check http://status.livejournal.org to view LiveJournal's current status.

Otherwise, you can:

- Go back to the previous page
- Go to the LiveJournal Homepage.
- Explore the Site Map

Emotional Intelligence (Ben Bloomberg) 404 Tumblr.com

Video of Robots simulating affect



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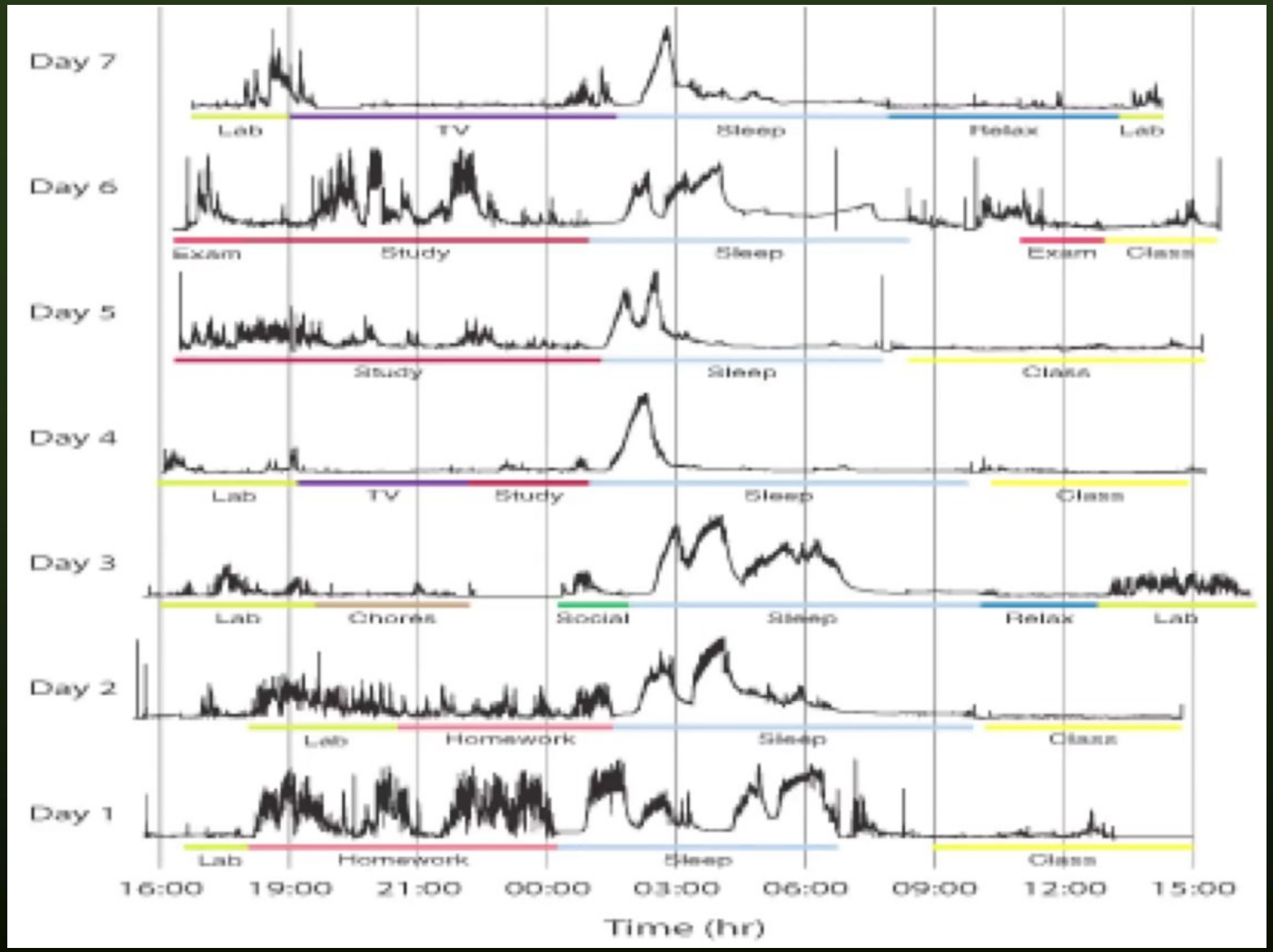
Detecting Affect

Electrodermal activity (EDA) often increased by:

- Significant thoughts
- Exciting events
- Exercise/breathing deeply
- Motion artifacts
- Humidity/moisture increase
- Lying
- Pain



As shown in TED Talk by Rosalind Picard
https://www.youtube.com/watch?v=ujxriwApPP4

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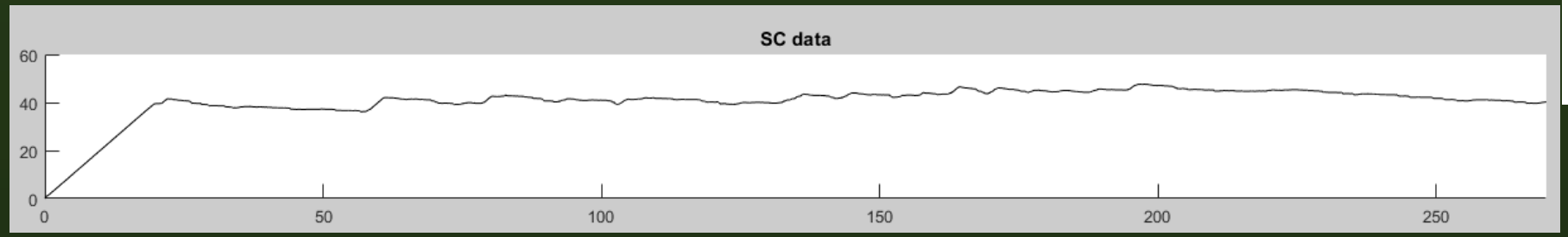
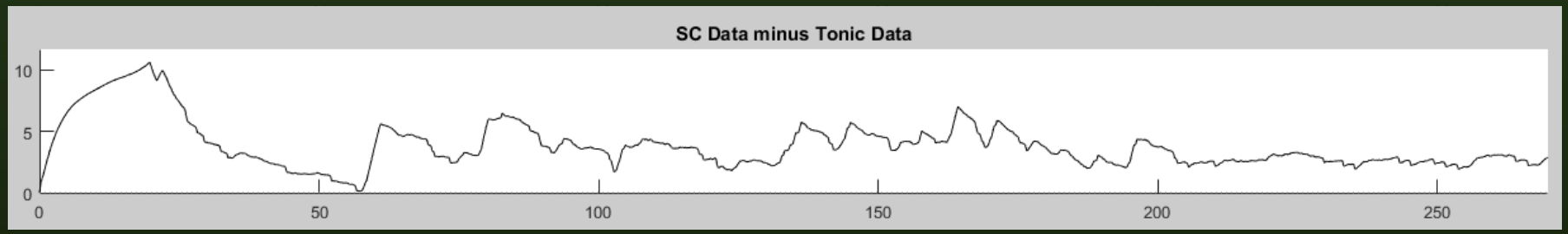
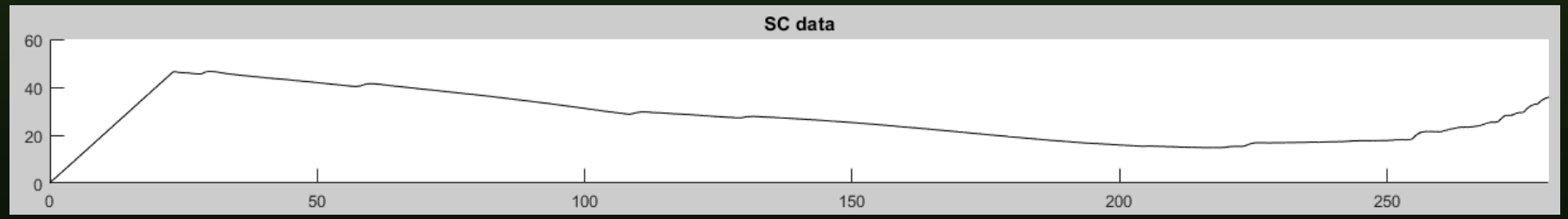
Detecting Affect

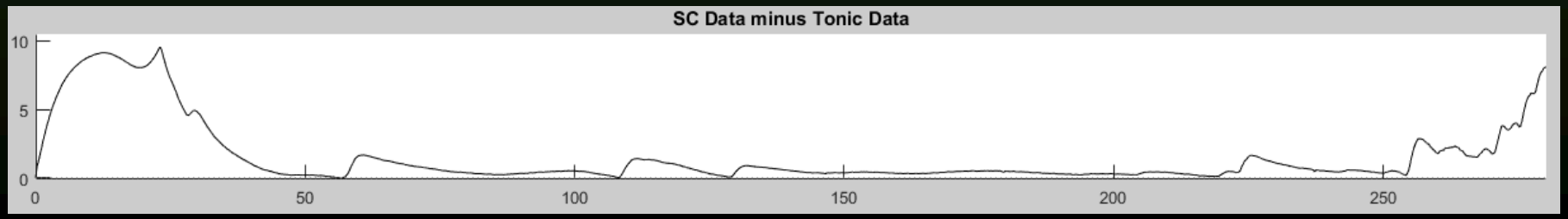
Horror Movie





Calm Movie





Empatica E4 Wristband

Results from Yi Yang and Bingkun Yang's work in Human-Computer Interaction Lab.

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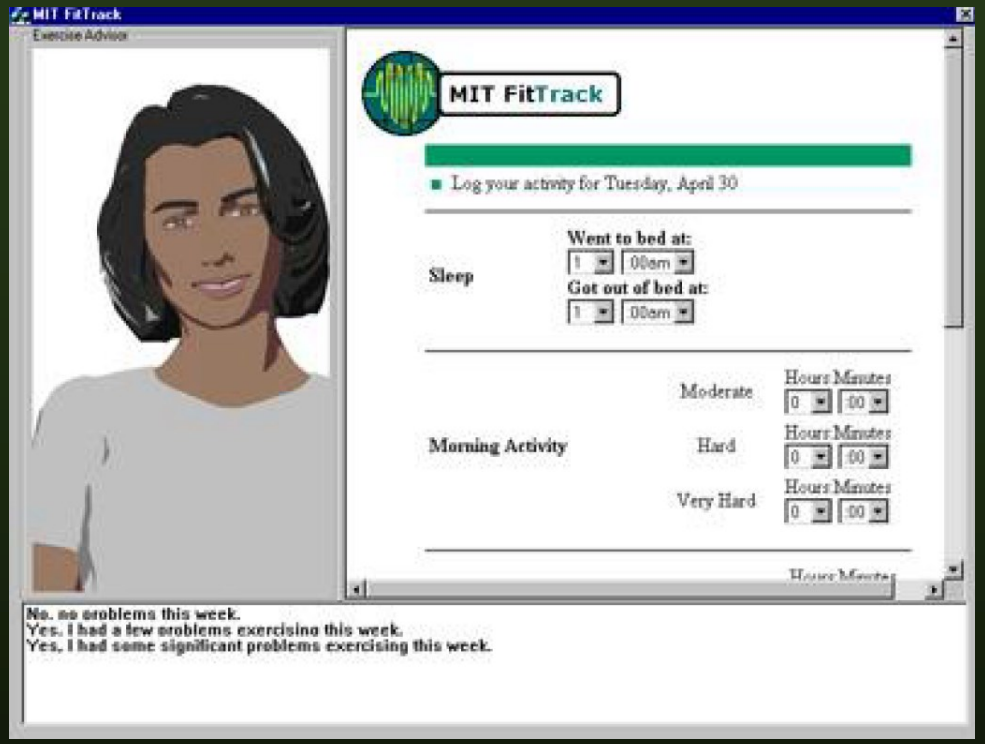
Responding to Affect

Relational agent vs Non-relational agent

Users interacted with agent for a month, both agents had same scripts, but relational agent had other skills such as empathy.

Relational agent responded to affect, used small talk, adjusted language over time, adjusted social distance.



Bickmore, Timothy W., and Rosalind W. Picard. "Establishing and Maintaining Long-Term Human-Computer Relationships." Acm Transactions on Computer Human Interaction 12, no. 2 (2005): 293-327.

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Responding to Affect

Intelligent Machines

Amazon Working on Making Alexa Recognize Your Emotions

With Google and Apple preparing voice devices for the home, Amazon is teaching Alexa to listen for emotions.

by Will Knight June 13, 2016

It can be incredibly frustrating when a virtual assistant repeatedly misunderstands what you're saying. Soon, though, some of them might at least be able to hear the irritation in your voice, and offer an apology.

Amazon is working on significant updates to Alexa, the virtual helper that lives inside the company's voice-controlled home appliance, called Amazon Echo. These will include better language skills and perhaps the ability to recognize the emotional tenor of your voice.

https://www.technologyreview.com/s/601654/amazon-working-on-making-alexa-recognize-your-emotions/

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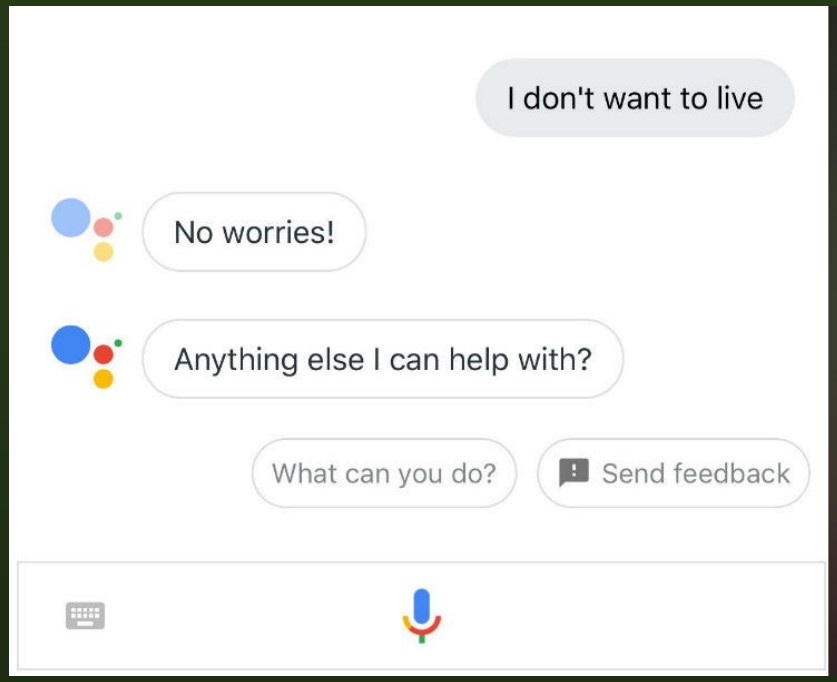
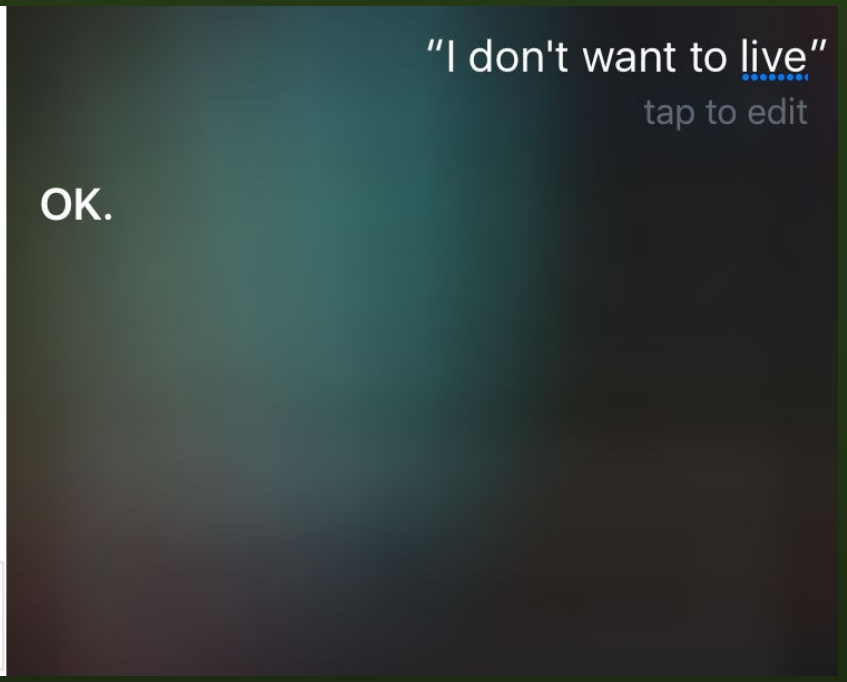
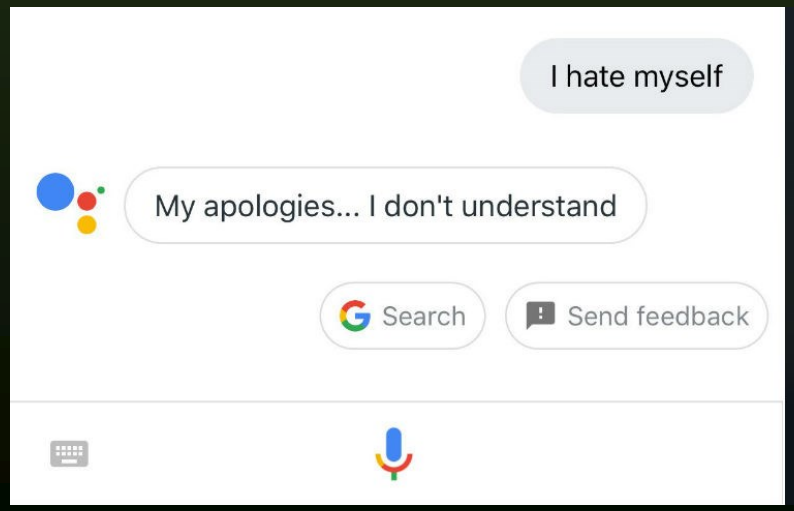
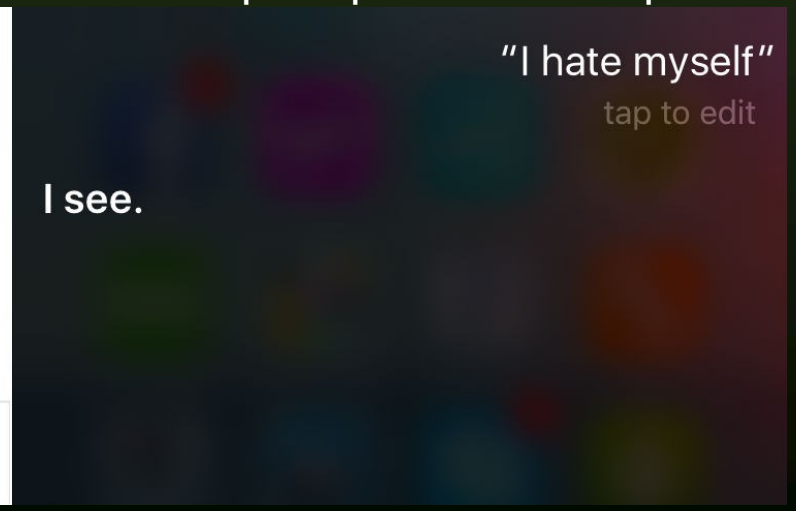




On the left, an image Maneesh Juneja shared on Twitter; right, Siri's response to the same input. The Google Assistant now directs users to a hotline when prompted with this phrase.





http://www.slate.com/blogs/future_tense/2017/10/26/google_assistant_and_other_virtual_assistants_don_t_always_help_in_a_mental.html

https://sml.stanford.edu/ml/2016/05/mi

Demo time

http://www.affectiva.com/

Facial expression recognition software