



Emotion elicitation in socially intelligent services: the intelligent typing tutor study case

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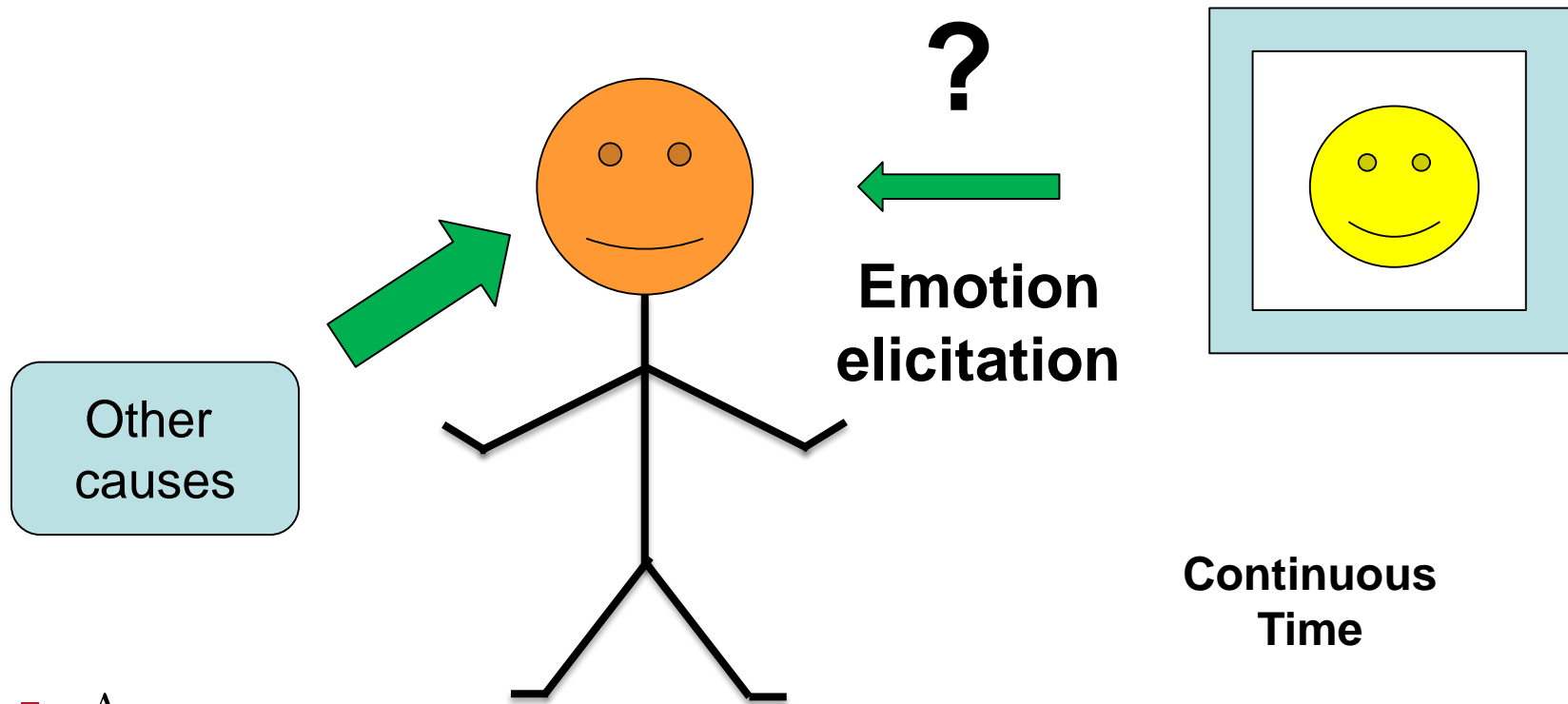
...: Faculty of Electrical Engineering ...
...: User-adapted Communication and Ambient Intelligence Lab ...



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Research question

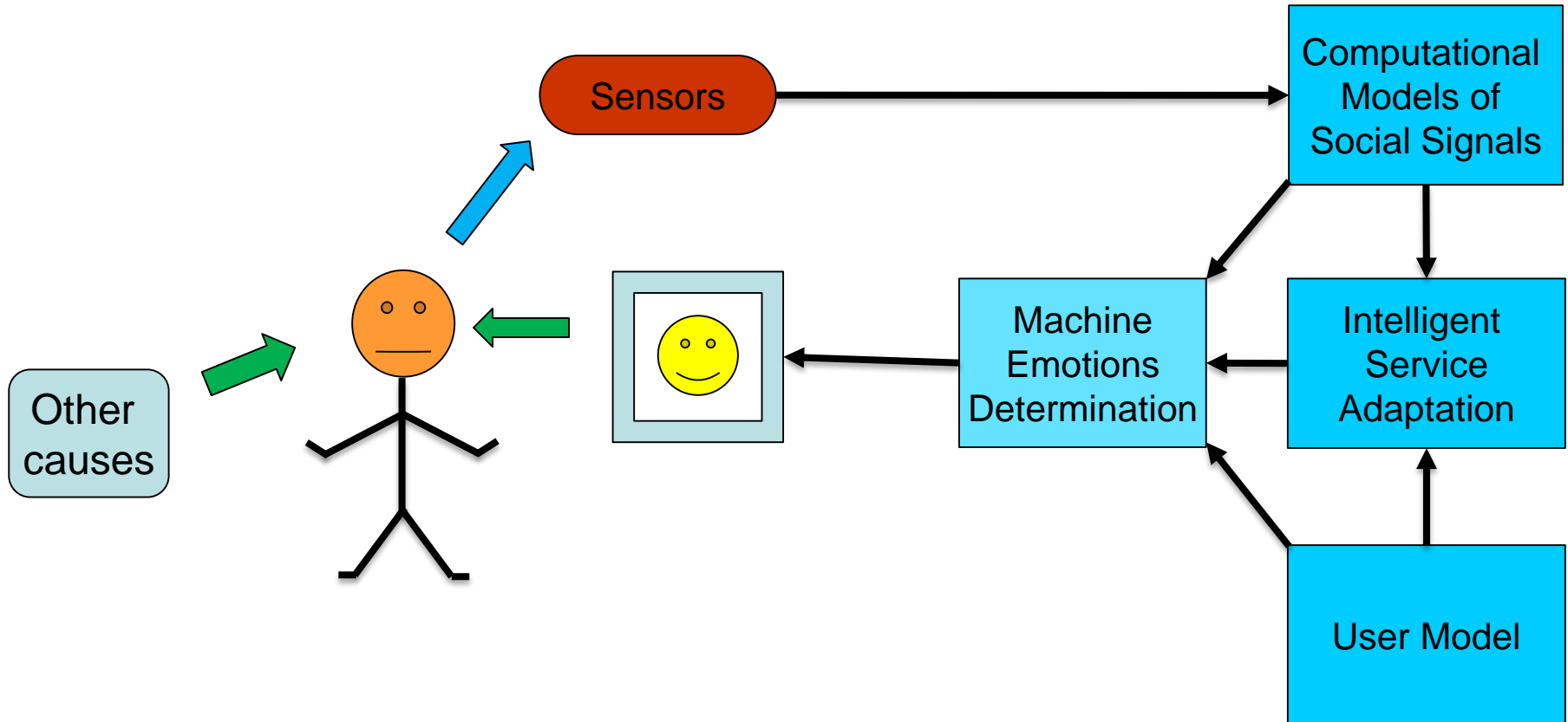
- Is emotion elicitation using emoticon-like graphics feasible?
- How effective is it: **from UI against other sources?**



- Answers:
 - Yes
 - Effective to some extent

Scope: socially intelligent applications

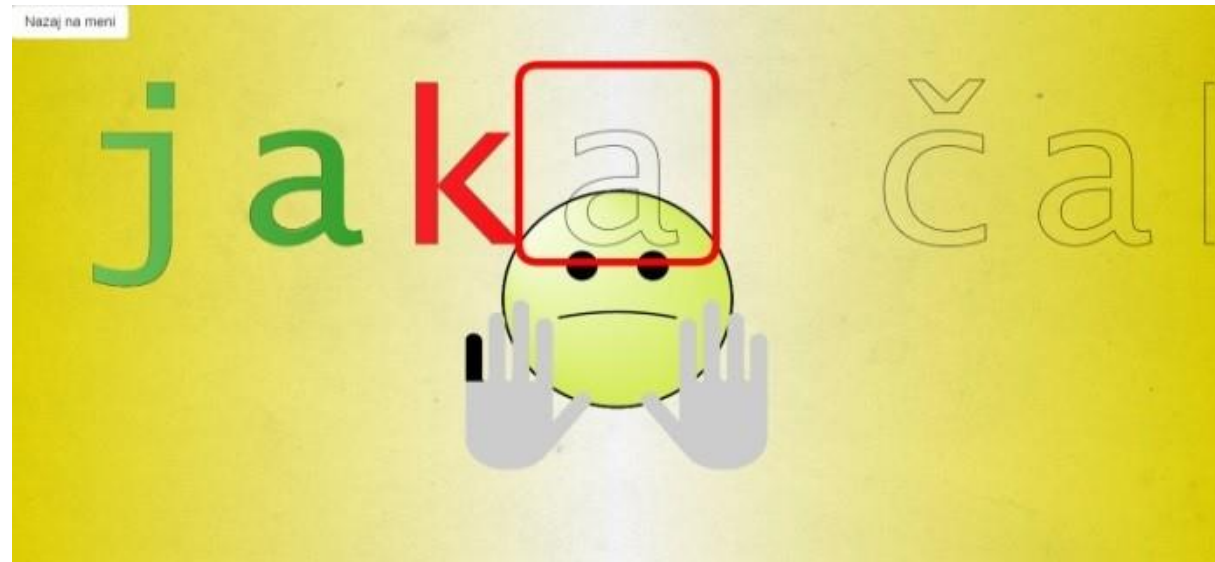
- What are socially intelligent applications?



- Emotion elicitation closes the loop!

Service/application: Touch typing tutor

- Test application: Touch typing tutor
- Touch typing tutor is **socially intelligent**: to improve learner's sessions (more effective, less tedious)
 - Continuous human-machine communication
 - Capable to express emotions
 - Computational model of emotions is based on the Positive reinforcement assumption and learner's attention estimation
 - Event driven model



Emotion elicitation model

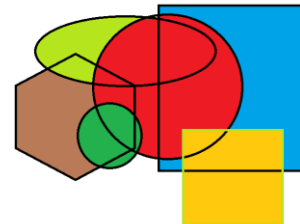
- Emotion model: VAD, we model only V and A
- The model:
 - Linear model, independent for valence and arousal
 - No memory model

$$\Phi_{uV} = \beta_{1V}\Phi_m + \beta_{0V} + \epsilon_V, \quad \Phi_{uA} = \beta_{1A}\Phi_m + \beta_{0A} + \epsilon_A$$

- Effectiveness of elicitation: part of the explained variance R^2
- When it occurs: $H_0 = [R^2 = 0]$ is rejected.
- Why so simple model?
 - Linear versus non-linear: statistical power of fitting over nonlinearity
 - No memory model: to grasp the main effect

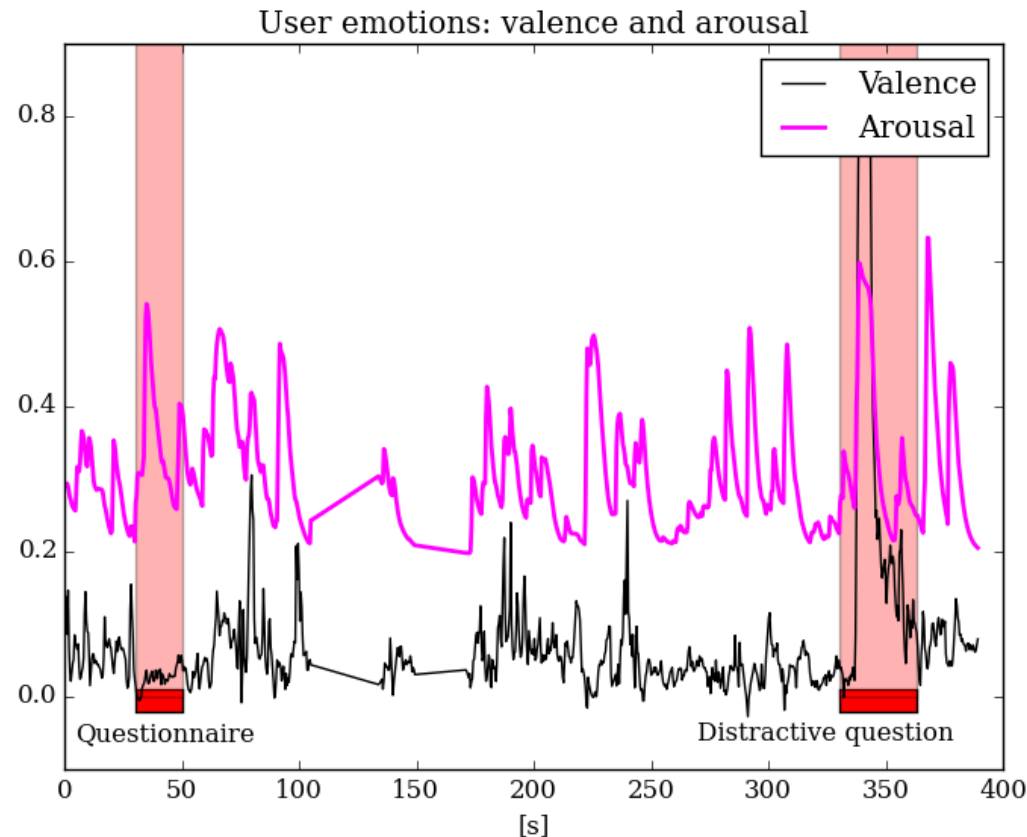
Experiment: touch typing lessons

- 32 female learners, students
- Average session duration is 17 minutes.
- Case study: only 5 users were analyzed on the 5 min. session subinterval
- Timeline:
 - Typing session
 - Sound distraction
 - Typing session (cont.)
 - Cognitive distraction
 - Typing session (cont.)
 - Self-report questionnaires



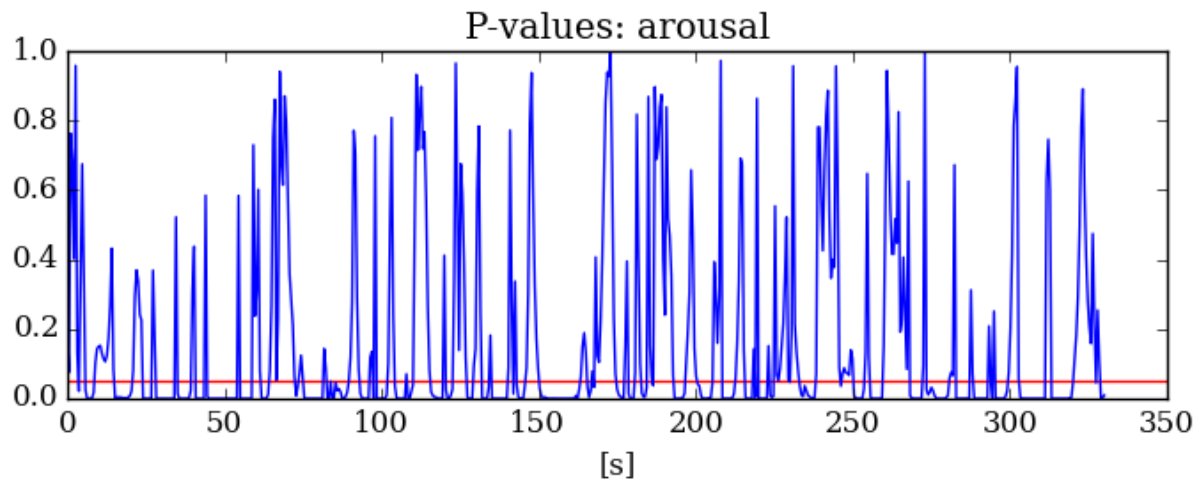
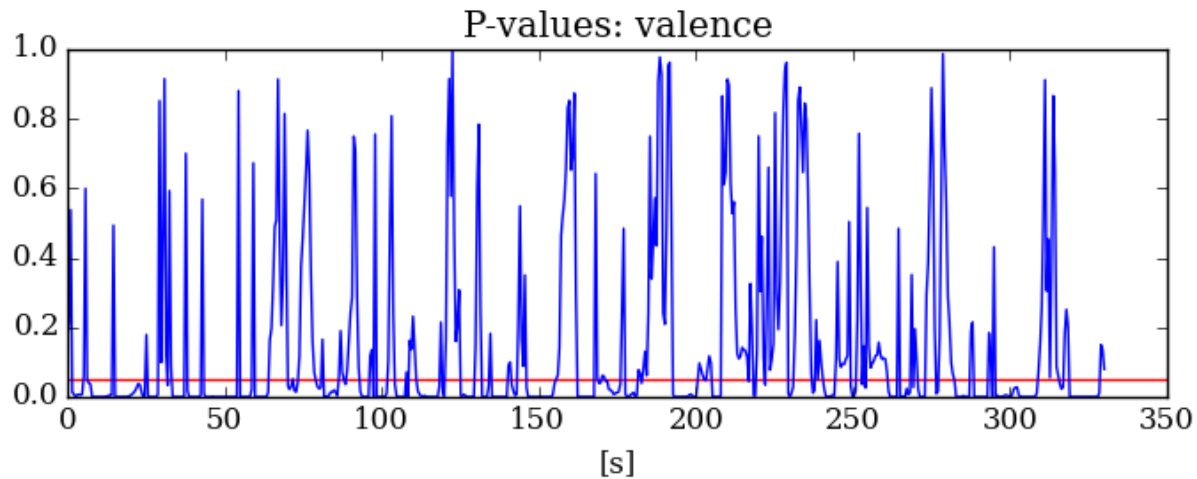
Results: time plots of valence and arousal

- Valence and arousal through time for the selected learner
- Between-learner comparison is difficult as each session is event driven and the individual session timelines are not comparable



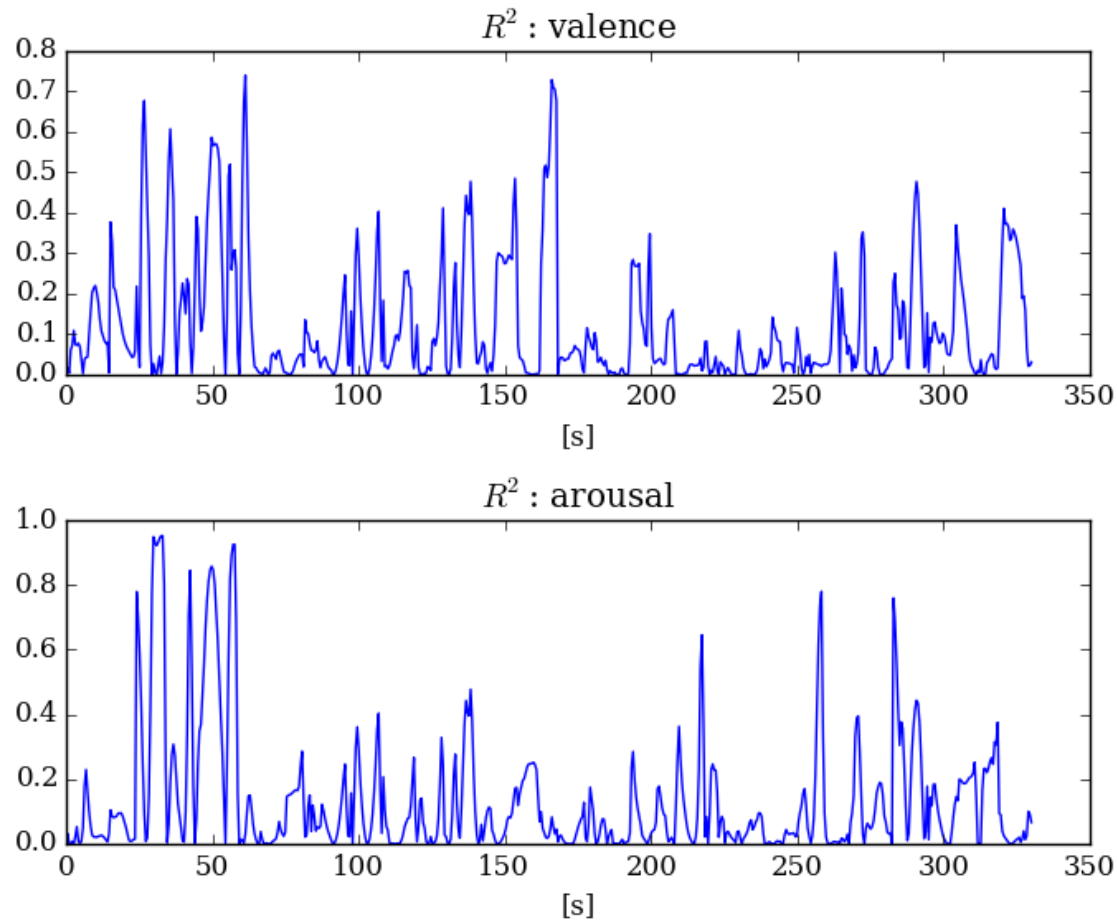
Results: when is the elicitation on?

- P-values and risk level



Results: the efficiency of emotion elicitation (1)

- Part of the explained variance





Results: the efficiency of emotion elicitation (2)

- A percentage q of times when the elicitation was on

User id	Arousal		Arousal	
	q %	Red. q %	q %	Red. q %
1	47.7	45.3	43.2	41.1
2	68.3	65	72.2	68.6
3	60	57	61.3	58.2
4	51.6	49.1	60.6	57.6
5	62.3	59.4	61.9	58.8

Results: the efficiency of emotion elicitation (3)

- An average part of the explained variance R^2
- Due to the human emotion measurement noise, reported values are lower bounds

User Id	Arousal		Arousal	
	All int.	Sig. int.	All int.	Sig. int.
1	18.3	32.5	19.7	36.3
2	19.4	33.8	27.4	39.2
3	24.5	39.3	31.4	44.9
4	19.8	33.3	23.9	39.9
5	21.7	35.4	26.8	40.2



Discussion

- Emotion elicitation, using emoticon-like graphic elements integrated into a GUI, can be effective to some extent
- Human emotion measurement noise: it seems high
- Emotion “expressionability” is an important factor: socially intelligent services will have to take it into account
- The dynamics of emoticon-like inductor was not taken into account



Future work and take away notes

- Future work
 - Elicitation model using memory: regression on time series
 - Emotion elicitation convolution kernel: to model the process of elicitation → elicitation delay, the impact rate of change
 - Elicitation dynamics: how the elicitation goes on and off
 - Investigate emotion elicitation together with other modalities used in computer mediated communication
 - Investigate elicitation and personality

 - Public test set: physiological measurement, context, distractors, emotion elicitation, user responses

- Take away notes
 - Elicitation is effective to some extent
 - The elicitation goes on and off