A Framework for a Multimodal Analysis of Teaching Centered on Shared Attention and Knowledge Access
Philippe Dessus, Louise-Héléna Aubineau, Dominique Vaufreydaz, James L. Crowley

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A Framework for a Multimodal Analysis of Teaching Centered on Shared Attention and Knowledge Access


* Univ. Grenoble Alpes, LaRAC (EA 602), Grenoble

** Univ. Grenoble Alpes, Inria, CNRS, Grenoble INP, LIG, Grenoble
The Activity of Teaching: A Social Learning Strategy

- Everybody can try to learn anything alone, but some content is better learned socially (time, energy, opportunities, danger) (Kendal et al., 2018)

- Teaching, a.k.a. social learning with explicit instructions, is a form of social and cultural learning that relies on domain-general abilities
The Abilities Grounding Teaching

- Heyes (2018) argues that ability of teaching is built on top of social faculties like:
  - Selective social learning
  - Imitation
  - Mind reading
  - Language
In which Occasions does Teaching Occur, Actually?

‣ When a Learner encounters 2 kinds of difficulties (Kline, 2015), either
  ‣ to have access to the Content, or
  ‣ to focus her attention to C

‣ And when a Teacher can allocate some time to help L (even it’s costly)
Some Cues to Trigger Access or Attention

- **Communicative and attentional** cues are crucial in social learning, to make teaching easier
  - Visual or vocal priming: e.g., T pointing to C in presence of L
  - Joint attention to C (in some cases, parallel)
  - Action and speech contingencies
  - Adapted communication (“teacherese”)
Research Questions

‣ Which framework for accounting teaching processes?

‣ How to capture (part of) teaching processes by eye-tracking and signal processing tools?

‣ Which experiments using this framework to deploy in classrooms?
Components of the Teaching Process

- **Two steps**: Initial situation (without social help) and teaching situation (with social help)

- **Determination criteria**: how this teaching situation can be automatically determined?

- **Five levels of teaching**, of increasing complexity (from Kline, 2015)
Level 1 – Social Tolerance (Teacher as a model)

- **Initially**: L can perceive C but its access depends on T’s willingness
- **Teaching**: T tolerates that L observes her during standard activities, without modifying anything
- **Criteria**: L visually tracks T frequently; T doesn’t track L at all
Level 2 – Opportunity Provisioning (a.k.a. Playground Making)

- **Initially**: L would be able to perceive C, but its access is difficult

- **Teaching**: T devises specific activities so that L can learn (play, chores, etc.)

- **Criteria**: C is modified by T; T doesn’t track L; parallel attention towards C (is the task completed?)

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Level 3 – Teaching by Stimulus or Local Enhancement (actual teaching)

- **Initially**: L can access C but lacks attention to it
- **Teaching**: T points towards C, slows down her action and speech
- **Criteria**: Frequent reciprocal gazes between T and L, “teacherese”, action exaggeration: T’s larger body’s bounding volume
Teaching: Higher Levels (not detailed there)

› Teaching by **evaluative feedback** \( (L \text{ accesses } C \text{ but lacks information on her performance}) \) or by **direct explanations** \( (L \text{ lacks both attention and access to } C, \text{ and needs explicit information}) \)

› Involves **mind reading** more intensively, and **language**, so more difficult to be captured by eye tracking tools only
Understanding Classroom Situations

- Capture teaching levels in a “smart classroom” context: cameras, mobile eye-tracker for T, camera glasses for Ls.
- Use this framework (likely extended to variables like position, noise level) to investigate notions in educational psychology (Ls time on task, or steering group, T immediacy, etc.)(Cortina et al., 2015; Dessus et al., 2016)
Thanks for your attention!

Any questions?

@pdessus

References @ https://frama.link/eye-mov