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

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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 **L**earner encounters 2 kinds of difficulties (Kline, 2015), either

  ▶ to **have access** to the **C**ontent, or

  ▶ to **focus her attention** to **C**

▶ And when a **T**eacher 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?)

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 exageration: **T**'s larger body's bounding volume

Teaching: Higher Levels (not detailed there)

▸ Teaching by **evaluative feedback** (**L** accesses **C** but lacks information on her performance) or by **direct explanations** (**L** lacks both attention and access to **C**, 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 **L**s

‣ Use this framework (likely extended to variables like position, noise level) to investigate **notions in educational psychology** (**L**s time on task, or steering group, **T** immediacy, etc.)(Cortina et al., 2015; Dessus et al., 2016)

Thanks for your attention!

Any questions?

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