STEAM in Education

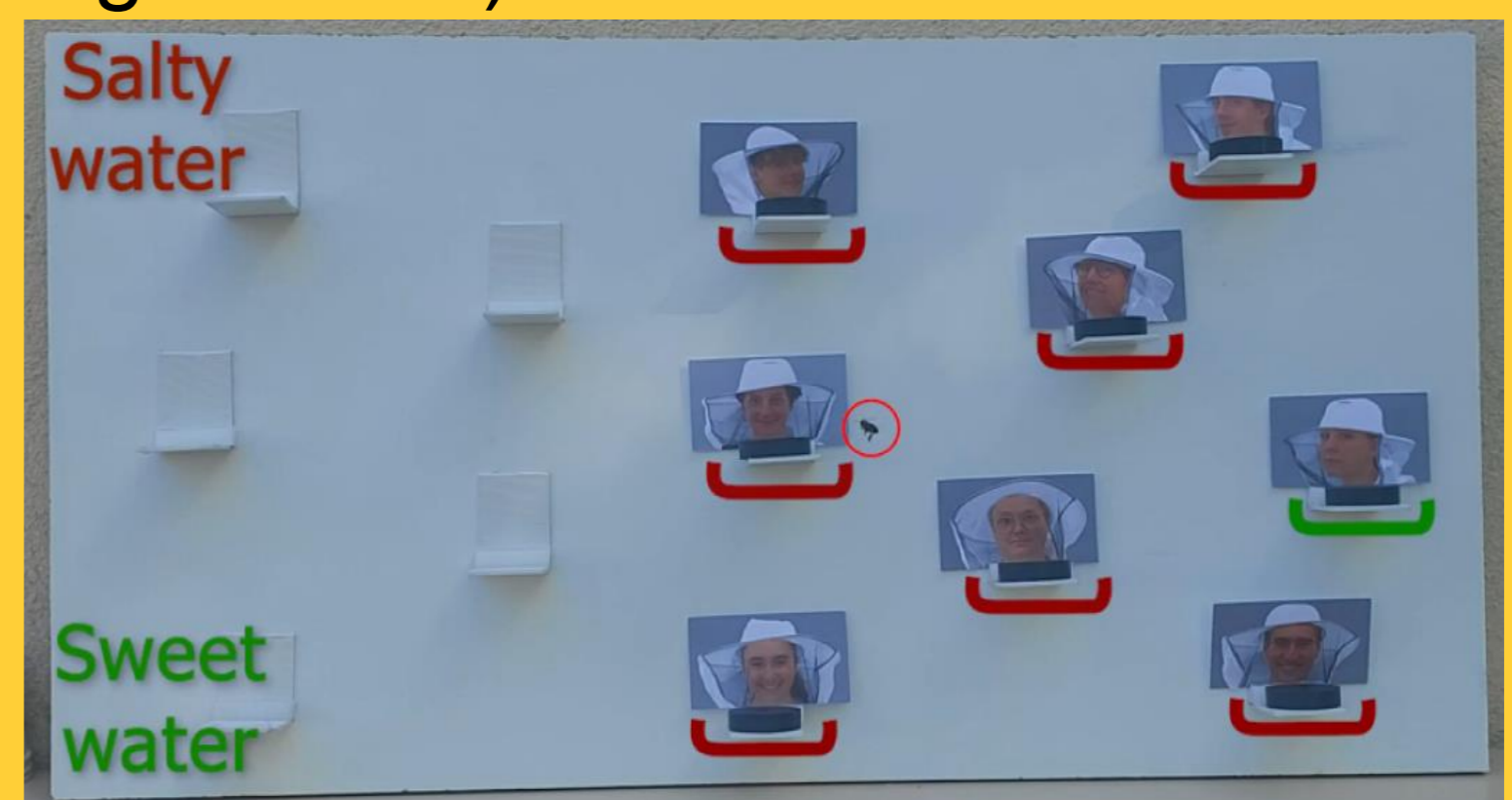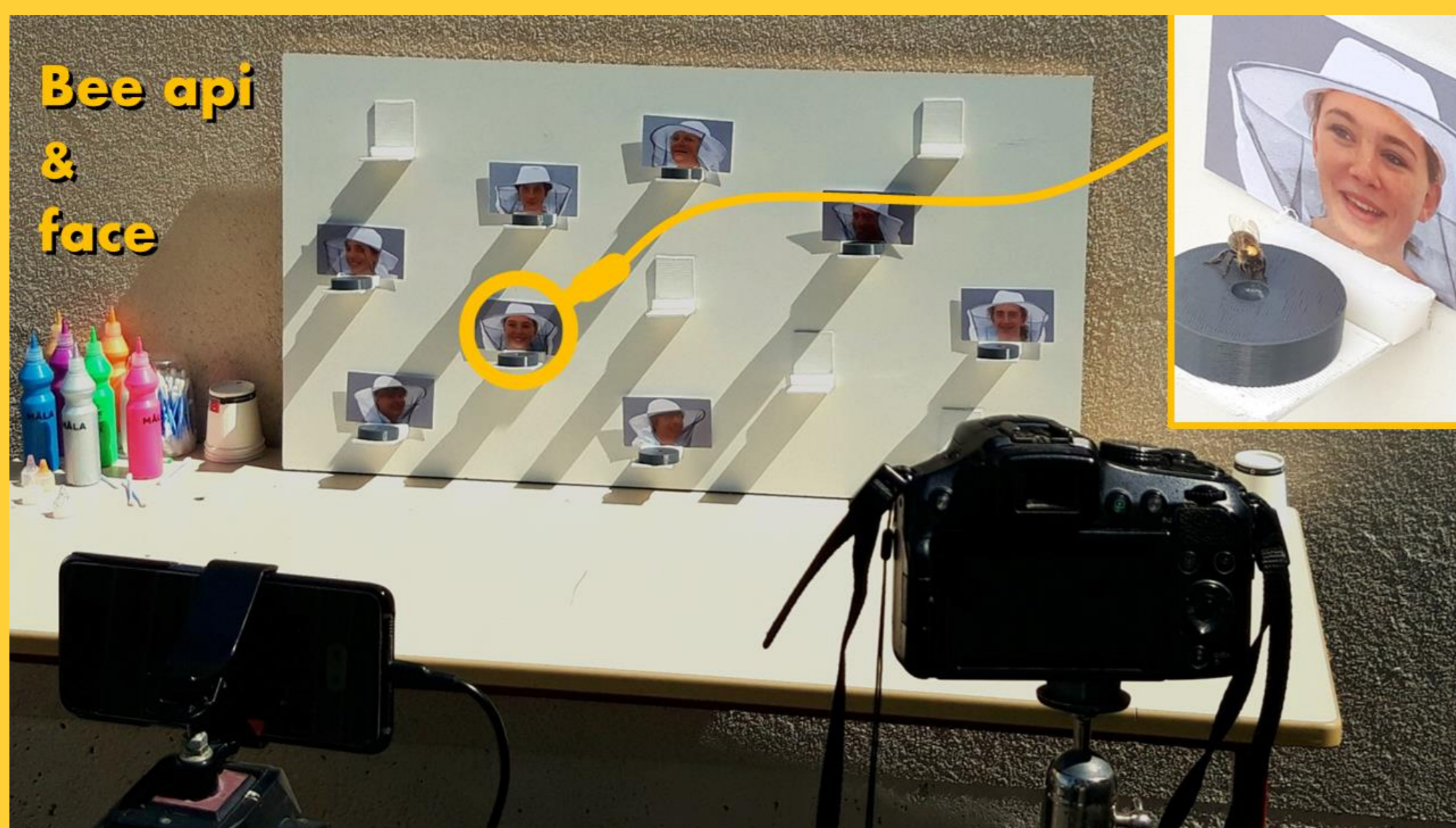**Scientific workshop| Highschool Alexis Monteil | Rodez | France**

Bee Api & Face
Do bees recognise their beekeeper by facial identification?

This unusual question not only provides an opportunity to develop a complete, innovative and evolving experimental approach with students, but also leads public to be aware of bees' intelligence and their vulnerability.

By exploiting the **floral constancy** and **insatiability of bees**, we take note the performance of foragers in recognising, from a large selection, a given beekeeper whose face photos are the only ones to be associated with a reward (reinforcement learning method).

- The reward drop (sugar water) and the punishment drop (salty water) are indistinguishable unless the bee tastes them.

- A lot of round-trips (table ⇔ hive) to empty it's crop.
- Changes among the faces from one round trip to the other (people, faces' positions on the panel, faces expression, angles of view).

The results: 3 phases in the bee's behaviour *(click to watch videos)*

➢ **The not understanding phase**
   (up to 10 round trips)
   = the bee only knows there is
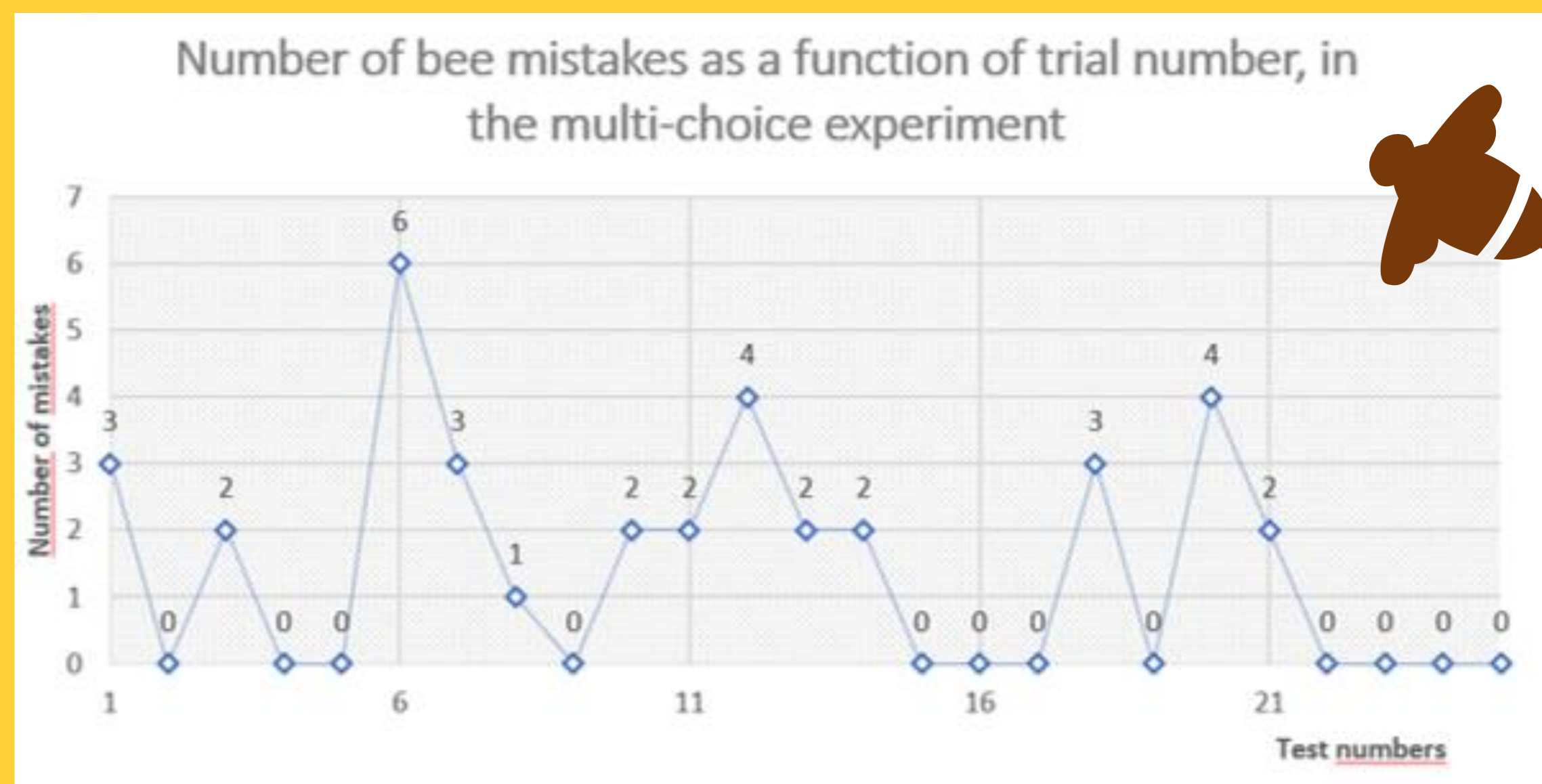   sugar water on the experiment table: 🎥

➢ **The semi-understanding phase**
   (**between 10 and 24 round trips**)
   = the bee tastes the solutions until
   it finds the sugar water: 🎥

➢ **The understanding phase**
   (after 24 round trips) = the bee associate
   the "target face" with sugar water: 🎥

Number of bee mistakes as a function of trial number, in the multi-choice experiment

Conclusion: From the bees' behaviour and performance we can conclude that, under the experimental conditions and after a large number of trials, the foragers are able to discriminate between beekeepers'faces.