

# The evolution of imitation



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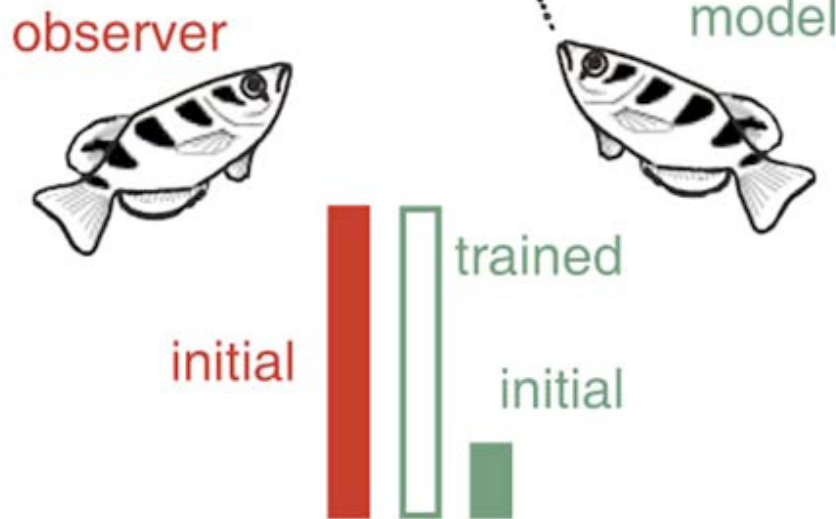


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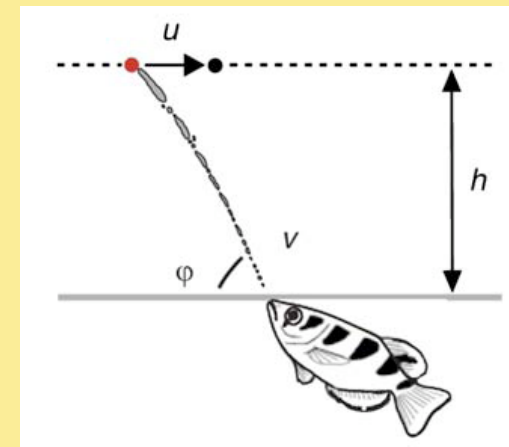
- What are the evolutionary origins of the potential to imitate?
- How is it possible to transform visual information into matching motor acts?
- Is intentional control of imitative performance uniquely human?



# 1. Observational Learning



In almost their first tests their performance approached that of the long-trained model and was far above the score that the model was able to reach when it had started its practice.



when releasing its shot with speed  $v$  its horizontal offset  $\sigma$  from the target and its shooting angle  $\varphi$  must be chosen conjoined to match the relation:

$$\sigma = \frac{\Delta v_x}{g} (\Delta v_y - \sqrt{\Delta v_y^2 - 2gh}),$$

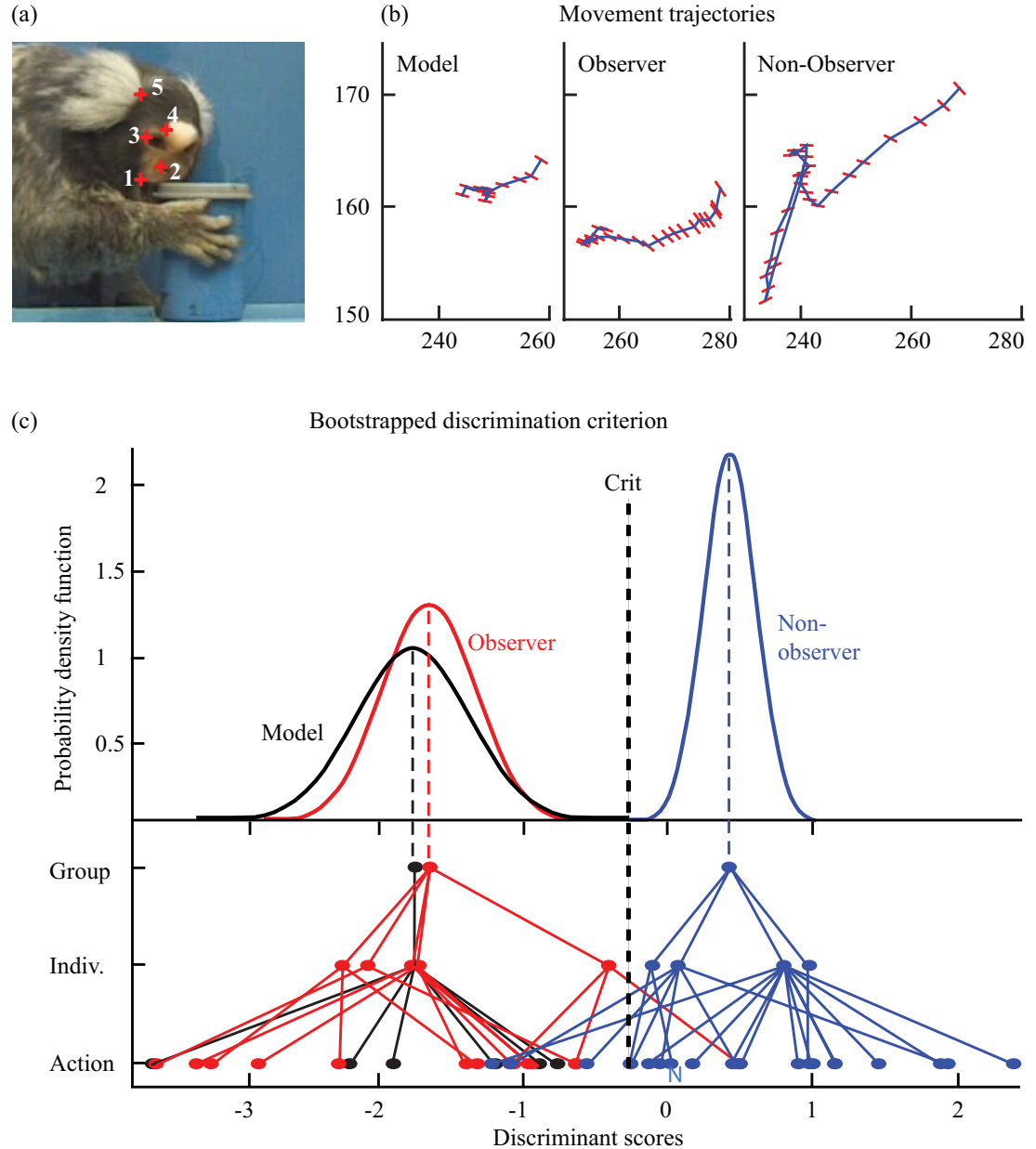
where

$$\begin{aligned} \Delta v_x &= v \cos \varphi - u \cos \alpha \\ \Delta v_y &= v \sin \varphi - u \sin \alpha \end{aligned}$$

are the differences in horizontal and vertical speed, respectively, between shot and target. The velocities and angles of shot and target are denoted as  $v$ ,  $\varphi$ , and  $u$ ,  $\alpha$ , target height is  $h$ , and  $g$  is the gravitational constant.

## 2. Movement imitation

How is it possible for actions as seen to be matched with actions as imitated (the 'correspondence' problem)?



Voelkl & Huber (PLoS ONE 2007)

### 3. Selective imitation in dogs

Imitation based on the **intentional stance?** Learners identify what **relevant** information to retain and **selectively imitate** when observing others' skills. Imitation is an **interpretative** (rational) process.

#### Children

Gergely, Bekkering & Kiraly  
(Nature 2002)

#### Dogs

Range, Viranyi & Huber  
(Current Biology 2007)

