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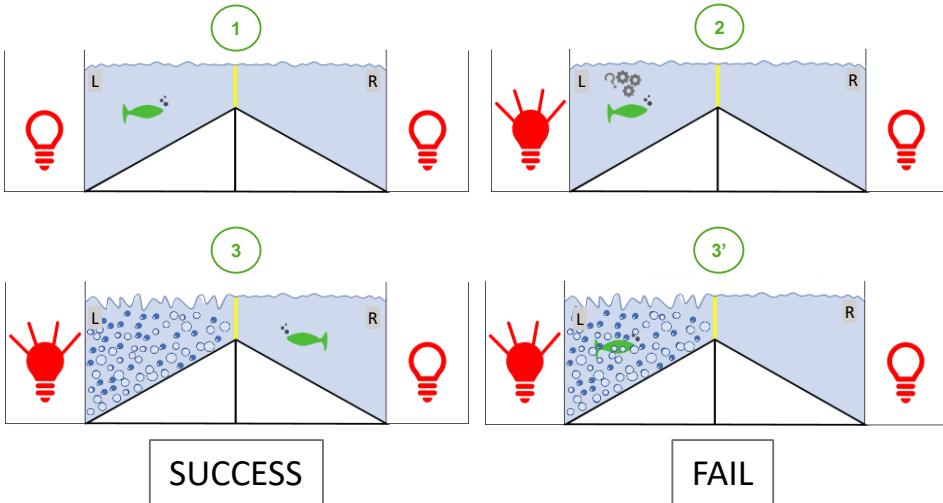
Active avoidance paradigm

Assessing learning and cognition in model organisms has shown its ecological relevance. The shuttle-box test is based on the aptitude of an organism to process new signals from the environment and its ability to recall an appropriate behavior. The test is made of segregated controlled areas where the environment can be modified at different level.

A

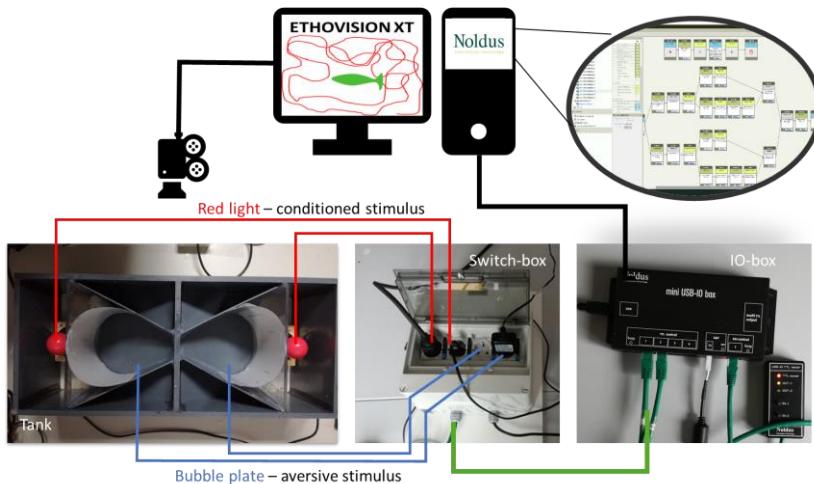
- 1) The fish swims freely in L or R.
- 2) Redlight suddenly turns on, the fish analyzes the new environment.
- 3) Within 15sec the fish has moved to the opposite side of the red light = success, no adverse stimulus.
- 3') The fish has stayed in the red lighted side = failure, the fish undergoes intense bubbles.

Adapted from Valenzano *et al.* 2006



B

Making the setup fully automated is key for a perfect reproducible design



The camera records the fish. Ethovision XT tracks fish behavior and the software sends the appropriate signal to the IO-box which commands the switchbox connected to the tank set-up.

Noldus
Information Technology

C

Performance index (PI)

$$PI = \frac{1}{10} \sum_{i=x}^{x+9} P(i)$$

Learning criterion:

All PI < 80%	At least one PI ≥ 80%
Non-learner	learner

Conclusion & Perspectives

Implementation of the switchbox combined with the IO-box allows for fully automated, computer controlled behavioral analyses, thus removing observer biases and rendering the test perfectly reproducible. The simple concept of the switchbox lends itself to a huge panel of different tests involved in complex studies such as personality traits or learning behaviours.

Piront and Schmidt 1988 ; Pradel *et al.* 1999

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- Piront, M. L., & Schmidt, R. (1988). Inhibition of long-term memory formation by anti-ependymal antisera after active shock-avoidance learning in goldfish. *Brain Research*, 442(1), 53–62.
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- Valenzano, D. R., Terzibasi, E., Genade, T., Cattaneo, A., Domenici, L., & Cellerino, A. (2006). Resveratrol prolongs lifespan and retards the onset of age-related markers in a short-lived vertebrate. *Current Biology*, 16(3), 296–300.