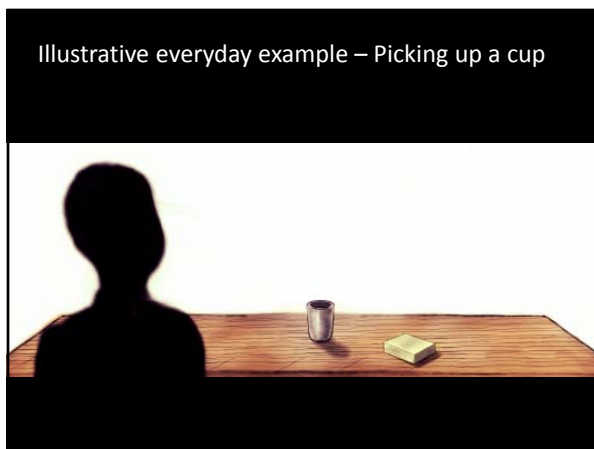
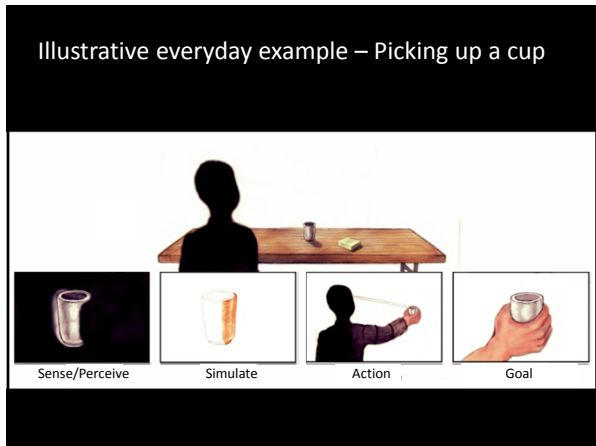
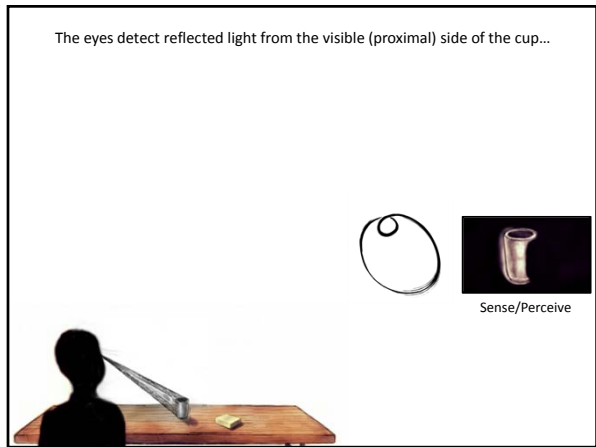


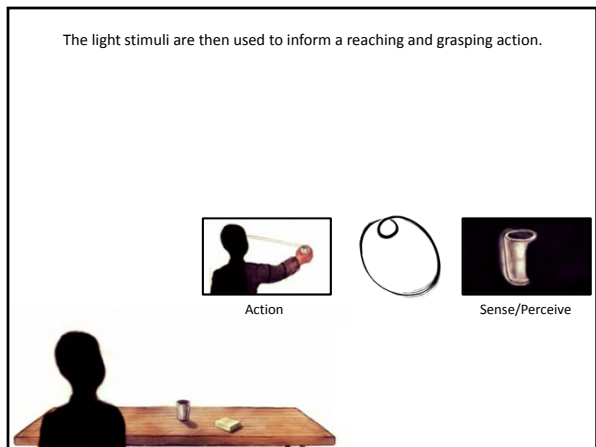
Perception and Action Cycle (PAC)

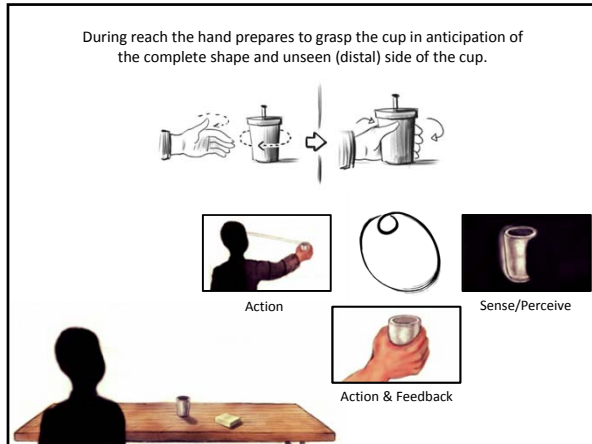
- The circular interaction between an organism and its environment during a sensory-guided sequence of behaviour towards a goal.
- Each action causes changes in the environment that are again picked up by the perceptual system, which is then informed by memory and decision-making and leads to further action.
- Each action causes new changes that are analyzed and lead to further action, and thus the cycle continues.

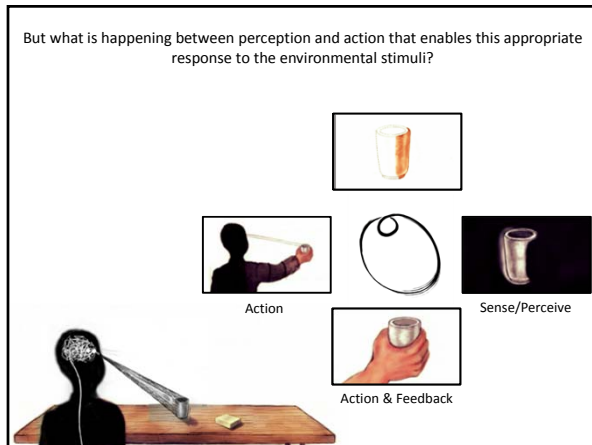


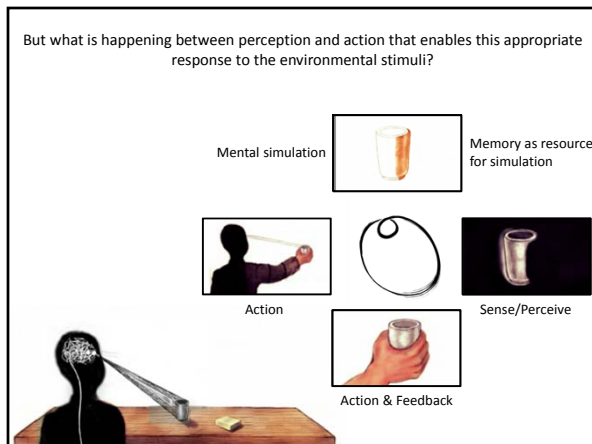


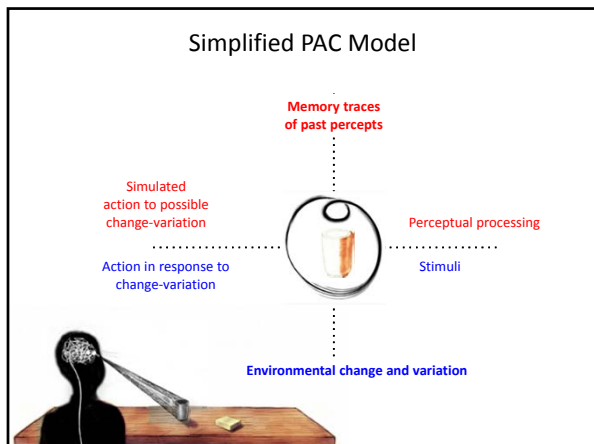


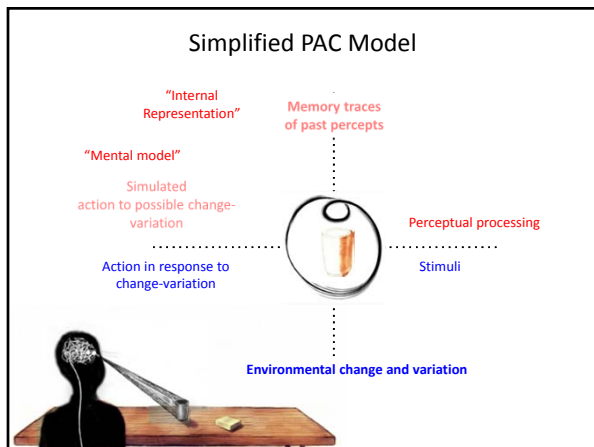


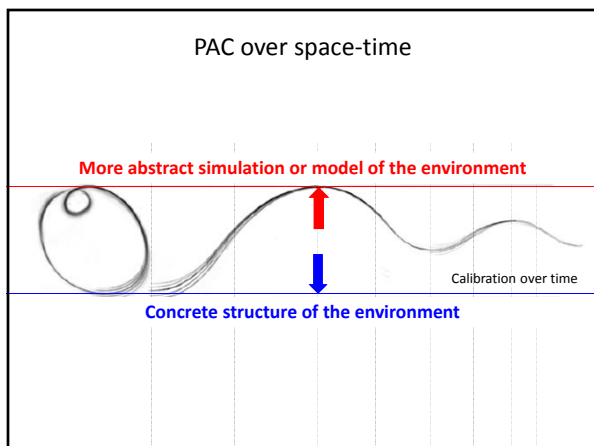


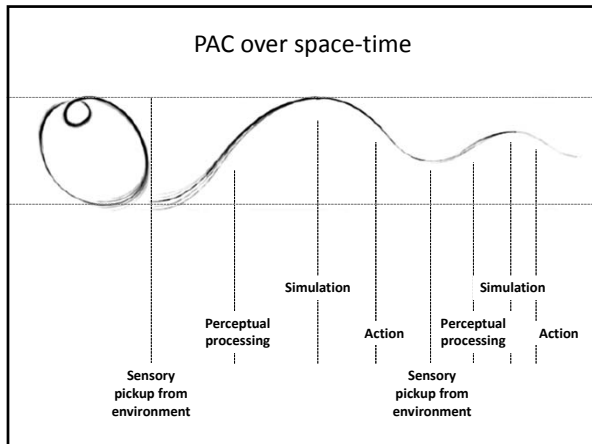


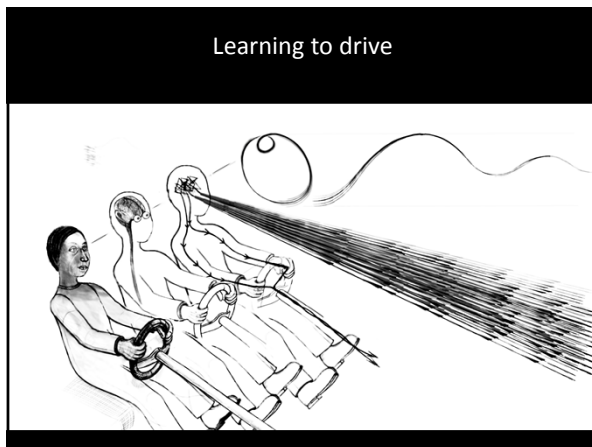


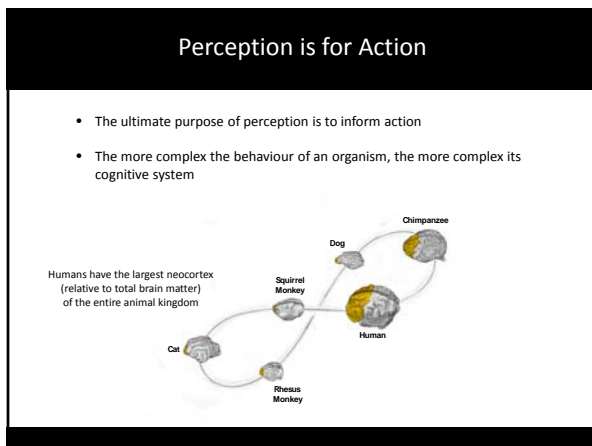










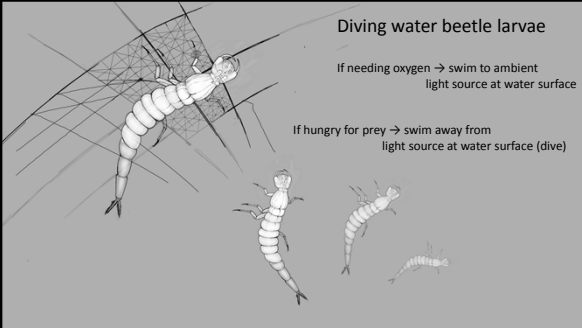


Simpler organisms have simpler PAC systems relating sensory input to behaviour

Diving water beetle larvae

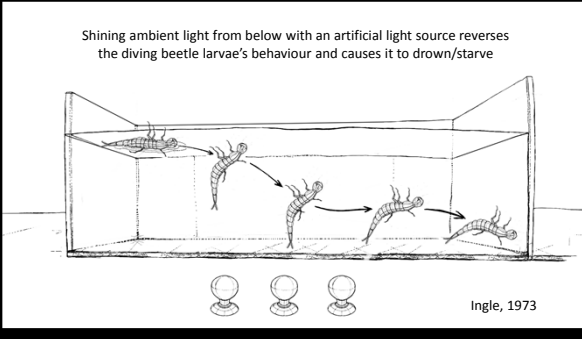
If needing oxygen → swim to ambient light source at water surface

If hungry for prey → swim away from light source at water surface (dive)



In simpler organisms there is a more direct link between perception and action

Shining ambient light from below with an artificial light source reverses the diving beetle larvae's behaviour and causes it to drown/starve



Ingle, 1973

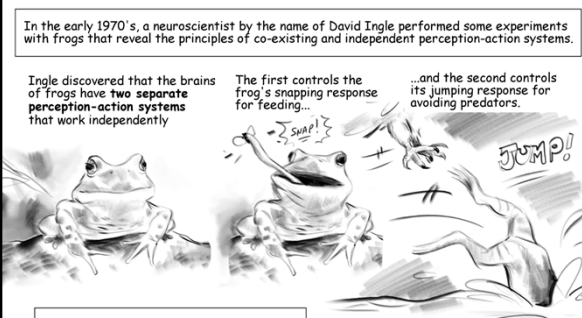
Multiple PAC systems can combine for adaptive behaviour

In the early 1970's, a neuroscientist by the name of David Ingle performed some experiments with frogs that reveal the principles of co-existing and independent perception-action systems.

Ingle discovered that the brains of frogs have **two separate perception-action systems** that work independently

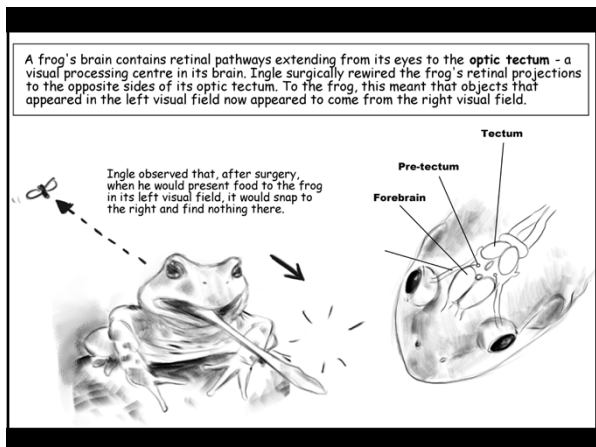
The first controls the frog's snapping response for feeding...

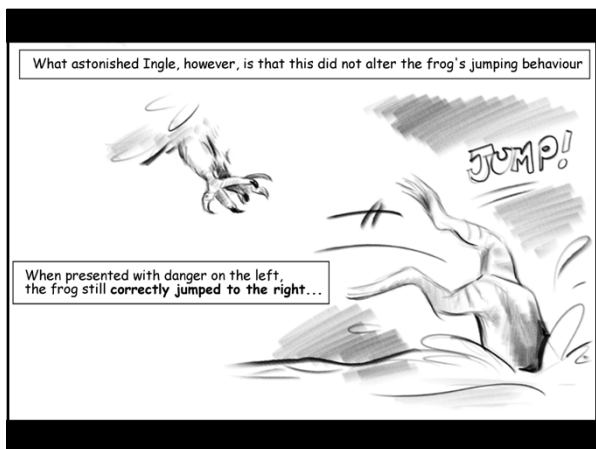
...and the second controls its jumping response for avoiding predators.



The direction of both of these behaviours (snapping and jumping) depends on the frog's visual input.





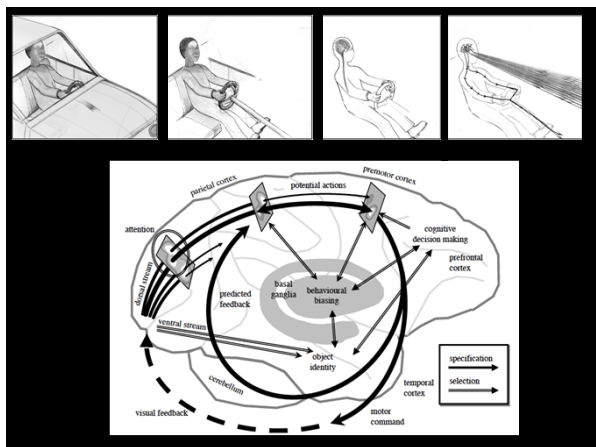


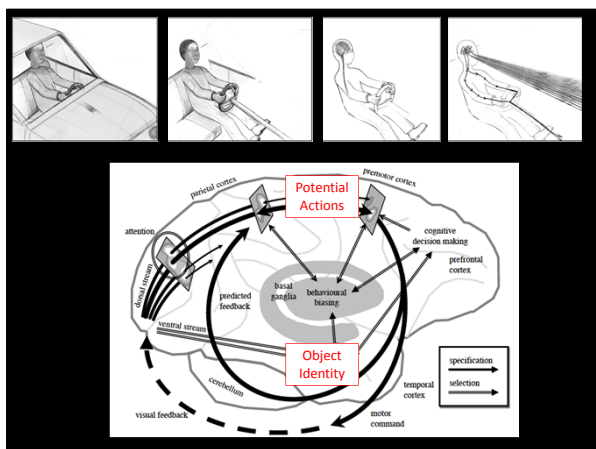
In this way, Ingle found two sets of retinal projections that lead to different parts of the frog's brain. He found that he could independently manipulate each of the frog's two behaviours.

Retinal projections to the optic tectum govern the frog's feeding behaviour in response to visual input, while separate retinal projections of the pre-tectum (which Ingle did not manipulate) govern jumping behaviour...

Ingle's discovery was very important because it demonstrated that two separate behavioural systems developed independently to solve two different problems...

Visual information, therefore, is not put into a central processor. Instead, the nervous system is modular—it is composed of independent perception-reaction systems.





Perception and Action systems in humans are linked and influence each other

Studies* show that people perceive their environment and events within it in terms of their ABILITY TO ACT

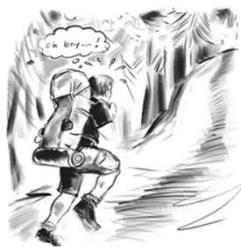
For instance, softball players who are hitting BETTER see the ball as BIGGER than it actually is ... **



** Witt, J.K. & Proffitt, D.R. (2005). See the ball, hit the ball: Apparent ball size is correlated with batting average. Psychological Science, 16, 937-938.

The objects of perception are Affordances

Another example of action-specific effects is that hills look STEEPER (and also farther away) when wearing a heavy backpack ... ***

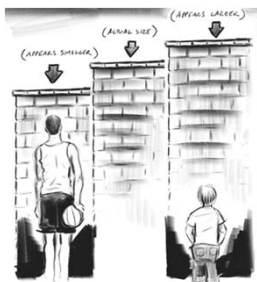


Perception is used to determine and exploit the affordances in the environment.

Affordances refer to the possibilities for action in the environment and are inherently defined in relation to the limitations of the organism.

*** Shalloo, M. & Proffitt, D.R. (1999). Visual-Motor recalibration in geographical slant perception. Journal of Experimental Psychology: Human Perception & Performance, 25, 1076-1096.

The objects of perception are Affordances

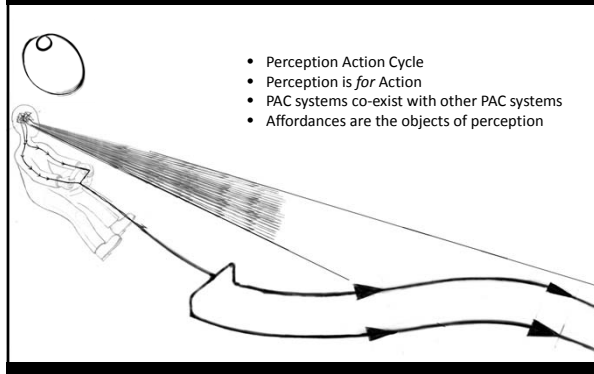


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* Witt, J.K. (2011). Action's effect on perception. Current Directions in Psychological Science

Conclusion Summary



The diagram shows a profile of a human head with a large eye and a hand reaching out. A wide cone of lines extends from the eye, representing the field of vision. A curved arrow with a double-headed arrowhead loops from the hand back towards the eye, indicating a feedback loop between action and perception.

- Perception Action Cycle
- Perception is *for* Action
- PAC systems co-exist with other PAC systems
- Affordances are the objects of perception
