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- Tuesday, September 29, 1998
Internal Models of Virtual Objects

7.0 The talk on 28 Sept 98 was by Gabriel Robles De La Torre and was entitled "Internal models of virtual objects"

7.1 De La Torre's premise was that to make skilled manipulations of an object, you need information that is not present in the stimulus. That is you need outside knowledge. The example he described at length was pushing or pulling a piston that was immersed in some viscous oil. But this point is true for any manipulation such as opening a door or operating a gear lever on a car.

7.2 To apply this knowledge usefully, he proposed, requires an internal model or representation of the system under consideration.

7.3 Since most systems can be modelled by the differential equations of systems dynamics, this could be taken to imply that the equations, or their equivalent, are internalized.

7.4 This principle applies to virtual objects (eg an interactive animation on a computer screen) in exactly the same way. The only difference would be the sort of feedback one obtained, or perhaps just the medium of the feedback, whilst learning the manipulation or task.

8.0 De La Torre did some experiments in which he trained people to push buttons to manipulate a computer animation that simulated a piston in oil. By looking at their improvement in performance he attempted to identify the strategy that they were using (or internalizing).

8.1 In common with the strategy that seems to be used for many physiological tasks, subjects seemed to adopt an energy-minimizing strategy.

8.2 Was this strategy achieved by learning the differential equations or by some kind of temporal calibration? To investigate this, having trained subjects on the single virtual piston, De La Torre cleverly changed the simulation into a double piston. The minimal errors subjects made were more compatible with having internalized the equations to describe the system (which were still valid) rather than calibrating time, which would have required a whole new calibration.

8.3 More detailed discussion on the role of feedback loops versus internalized equations was unfortunately cut short by time pressure..

Gabriel Robles De La Torre