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progress."

In an experiment called the Aibo Playground Project, Oudeyer and Kaplan placed the robotic pups in a child's activity-pen and left them to investigate. They found that the robots learned progressively, initially just moving their limbs in an uncoordinated manner, before tentatively exploring their surroundings and biting nearby soft toys.

After several hours, however, the bots started kicking their toys and even trying to interact with conventional Aibo dogs. A [short video](#) (Windows Media Video 7.8MB), available from the researchers' web site, shows an Aibo pup that has learnt to play with its toys and bark at another robot nearby.

Oudeyer says every subject followed a similar learning pattern, but there was also variation among Aibos, a pattern also seen in learning animals. He believes the research could eventually help robot designers create machines that are much more flexible and adaptive in unpredictable circumstances. But he also says the project could shed light on how human intelligence benefits from curiosity and experimentation. "We hope, by building these robots, we might shed some light on the development of human children," he says.

### Biological learning

Other robotics experts agree that it may be necessary to learn from biological organisms in order to make robots smarter and more adaptive.

"Playful curiosity is absolutely fundamental to learning in many animals," says Steve Grand, founder of UK robotics research company Cyberlife Research. "Curiosity created the cat, and the human, so why not the robot?"

Olaf Sporns, an expert in artificial neural systems at Indiana University, US, adds that: "Robots that are driven by curiosity may be able to develop on their own, without programming or supervision."

And Max Lungarella, an expert in adaptive robots at the University Of Tokyo, Japan, says that an in-built inquisitiveness could eventually hold the key to robots that independently explore the world around them. "Curiosity might provide the necessary drive to act and interact with the environment," he told **New Scientist**. "I like it very much."

However, Lungarella also cautions that the nature of curiosity in biological entities, including humans, remains extremely complex and poorly understood: "I am not sure if it's possible to map curiosity onto an algorithm. However complex the algorithm might be."

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