

Robots can help us better understand how infants learn

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Credit: Radboud University

Robots are a hot item and Radboud University is right on trend by using them to replicate babies' brain and behaviour. Johan Kwisthout, coordinator of the Master's programme in Artificial Intelligence,

explains how this works and what else we can expect from robots.

According to Kwisthout, previous research into the learning behaviour of [babies](#) focused primarily on 'when'. "For example, when do children learn to pay attention to an adult or estimate probabilities. There was less research into the underlying mechanisms (how and why). It's tricky, because there is a limit to what you can do with pure baby research. It can be difficult to study exactly what you're interested in, largely because you can't give instructions to babies."

As coordinator of the Master's programme in Artificial Intelligence, Kwisthout is particularly interested in how babies' brains process information and how they integrate new information into the knowledge they already have. The advent of smart, technologically advanced robots is now providing unique opportunities for this type of research. "In human brains, you can't just switch things on and off or change variables. But you can with robots. We can programme them with the parameters and mechanisms we are interested in, and then see what happens and how this compares with our expectations. Robots bridge the gap between our theories about learning and what we can actually measure."

One of the main challenges in baby research is that unlike real babies, robots do not grow or develop. This makes it difficult to understand how the development of the brain and the body affects cognitive aspects. "In the first few months of their lives, babies are much less able to distinguish between things they see than older children. This offers opportunities and limitations. As they can't actually see much, it is easier for them to structure new information and use it to build up a model of their world."

Kwisthout wants to discover how information processing changes as their sight improves and how this affects infants' perception of their

world. "We are considering the possibility of simulating growth in robots. We could achieve this by fitting them with physical characteristics and changing certain parts of the robot during the course of the research."

Robotics is the theme of the Dutch library campaign Nederland Leest, for example, and there was a lecture on [humanoid robots](#) during the InScience Film Festival (8-12 November). The question on everyone's lips is: how can we give robots emotions and social skills, and why would we want to?

Kwisthout: "At present, people are much better at recognising and processing emotions and body language. Robots have a limited ability to recognise faces, but are unable to do anything with the information. This is where the opportunities lie, because being able to recognise and convey emotions would be good for mutual communication and the effectiveness of robots." Furthermore, first impressions and facial expressions are essential for creating trust. "This is what researchers are currently focusing on."

Discussions about robots tend to concentrate on social issues and ethics. "People are concerned that robots will take over and steal their jobs. Certain work will definitely become automated, but this will create more demand for creative and highly qualified workers. The challenge for society is to respond to this development by ensuring that less skilled workers are trained in a way that will keep them in the workforce."

Another sensitive subject is the question of who is responsible if something goes wrong. "Take [autonomous robots](#). Automatic weapons (so-called killer robots) that can decide whether to classify someone or something as hostile without referring back are already being designed. People are not needed when they make this decision. So the question (both moral and legal) is: who is responsible for the victims? The robot,

the manufacturer, the programmer or the one who bought the [robot](#)?"

The same sort of questions apply to self-driving cars. "Imagine you're in a self-driving car and you find yourself in a dangerous traffic situation with two possible outcomes: you either drive into a tree, or you swerve to avoid the tree but hit a child. Which decision would a car make? Could it decide that a child's life is more important than the safety of the people in the car? Ethical options like this must be laid down in advance, and the enormity of the consequences means that we need to think long and hard."

Robots can also hold up a mirror to us. "How do we learn, how do we develop and how do certain aspects of our brain affect our behaviour? Robots can help us understand the subconscious mechanisms that steer our behaviour and answer that one big question: how unique are we really?"

Provided by Radboud University

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