

Are babies the key to the next generation of artificial intelligence?

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Babies can help unlock the next generation of artificial intelligence (AI), according to Trinity neuroscientists and colleagues who have just published new guiding principles for improving AI.

The research, published today in the journal *Nature Machine Intelligence*, examines the [neuroscience](#) and psychology of infant learning and distills three principles to guide the next generation of AI, which will help overcome the most pressing limitations of [machine learning](#).

Dr. Lorian Zaadnoordijk, Marie Skłodowska-Curie Research Fellow at Trinity College explained: "Artificial intelligence (AI) has made tremendous progress in the last decade, giving us smart speakers, autopilots in cars, ever-smarter apps, and enhanced medical diagnosis. These exciting developments in AI have been achieved thanks to machine learning which uses enormous datasets to train artificial neural network models.

"However, progress is stalling in many areas because the datasets that machines learn from must be painstakingly curated by humans. But we know that learning can be done much more efficiently, because infants don't learn this way. They learn by experiencing the world around them, sometimes by even seeing something just once."

In their article "Lessons from infant learning for unsupervised machine learning," Dr. Lorian Zaadnoordijk and Professor Rhodri Cusack, from the Trinity College Institute of Neuroscience (TCIN), and Dr. Tarek R. Besold from TU Eindhoven, the Netherlands, argue that better ways to learn from unstructured data are needed. For the first time, they make concrete proposals about what particular insights from infant learning can be fruitfully applied in machine learning and how exactly to apply these learnings.

Machines, they say, will need in-built preferences to shape their learning from the beginning. They will need to learn from richer datasets that capture how the world is looking, sounding, smelling, tasting and feeling. And, like infants, they will need to have a developmental trajectory, where experiences and networks change as they "grow up."

Dr. Tarek R. Besold, researcher, Philosophy & Ethics group at TU Eindhoven, said: "As AI researchers, we often draw metaphorical parallels between our systems and the mental development of human babies and children. It is high time to take these analogies more seriously and look at the rich knowledge of infant development from psychology and neuroscience, which may help us overcome the most pressing limitations of machine learning."

Professor Rhodri Cusack, the Thomas Mitchell Professor of Cognitive Neuroscience, director of Trinity College Institute of Neuroscience, added: "Artificial neural networks were in parts inspired by the brain. Similar to infants, they rely on learning, but current implementations are very different from human (and animal) learning. Through [interdisciplinary research](#), babies can help unlock the next generation of AI."

More information: Lorijn Zaadnoordijk et al, Lessons from infant learning for unsupervised machine learning, *Nature Machine Intelligence* (2022). [DOI: 10.1038/s42256-022-00488-2](https://doi.org/10.1038/s42256-022-00488-2)

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