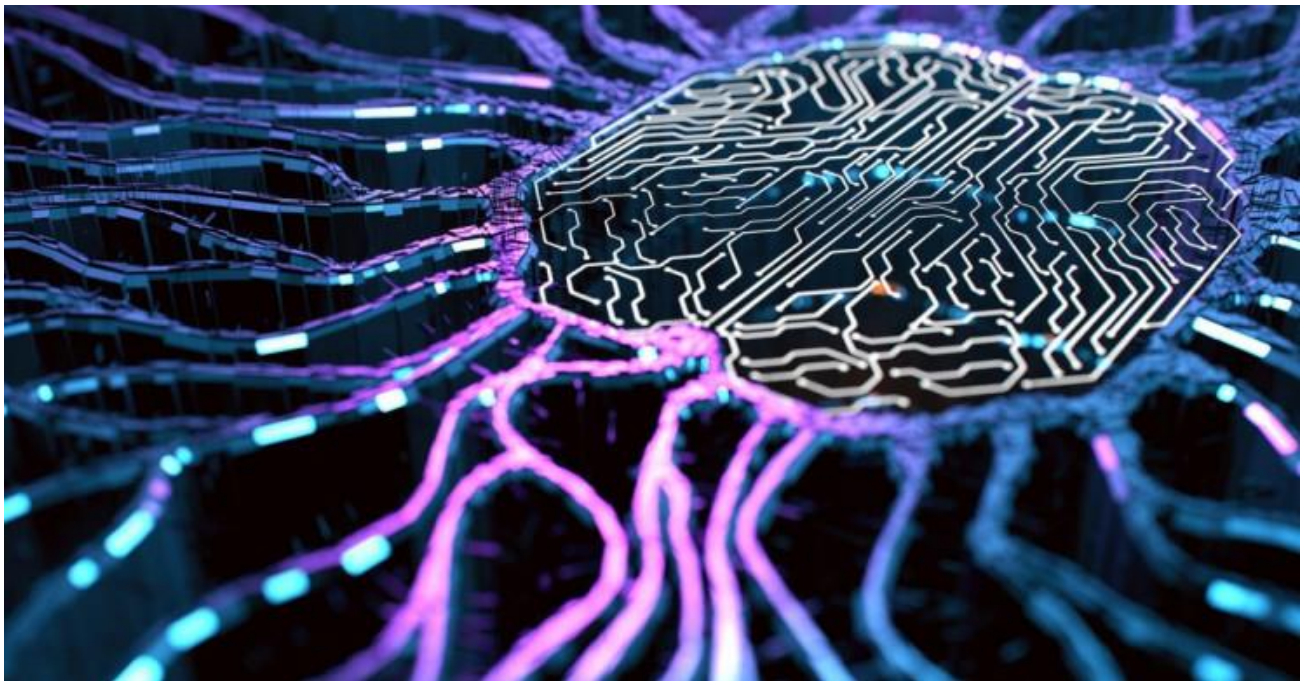# Neuroscience and Artificial Intelligence Are More Linked Than You'd Expect

Linking dopamine and temporal difference learning, DeepMind AI shared their interesting discovery in a blog post.

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Artificial Intelligence (AI) is more linked to dopamine-reinforced learning than you may think. That's a mouthful, so for now just think of Pavlov's dog study.

DeepMind AI published a blog post on their discovery that the human brain and AI learning methods are closely linked when it comes to learning through reward.

Their findings were also published in the journal *Nature* on Wednesday.

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Motivational learning

It's been a well-known fact for a while now that we humans, and many animals, learn through reward. We are motivated by external and internal factors to learn more.

If you think about it, many of your day-to-day tasks and behaviors are led by how the end result will make you feel. Whether it'll be a negative or a positive outcome.

How organisms learn from experience to properly anticipate and predict rewards has been one of many researchers' focus for over a century. In fact, it dates all the way back to Ivan Pavlov.

Pavlov's psychological work is known for its experiments on dogs, gaining his most well-known work the name of "Pavlov's dog."

In his experiment, dogs were trained to expect food after a buzzer went off. Soon enough the dogs would start to salivate as the buzzer went off, knowing they could expect to be fed shortly after. A clear sign that they understood they would be fed when they heard the buzzer.

More recently, scientists have been working on studying the inner workings of our brains and how they expect these types of rewards. In an even more modern touch, computer scientists are now looking at how machine learning is also able to recreate this type of behavioral learning.

It turns out that artificial systems can also learn to predict what an outcome will be, much like Pavlov's dogs.

The future can be considered as a probability redistribution, in red are the negative ones, and in green are the positive rewards, *Source: DeepMind AI*

DeepMind AI worked closely with an experimental lab at Harvard University. The teams first had to study our brain neural networks and how they reacted to distributional reinforcement learning and our levels of dopamine.

Then they were able to focus on the implications these led to for AI. The conclusion was that AI research is on the right track as its algorithm is already focused on our human brains.

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