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Press release

Neuroscientist wins DPZ Sponsorship Award

Pooja Viswanathan is awarded for her findings on numerical cognition in primates

Göttingen, November 13, 2018. When we look at a bowl of apples, we have a feeling for how many fruits we see without counting them beforehand. This sense of number allows even small children and animals to intuitively estimate numbers. In her doctoral thesis at the University of Tübingen, neuroscientist Pooja Viswanathan investigated how this process is implemented at the level of nerve cells in the brain. In her work with rhesus monkeys, she found that so-called number neurons in the cerebral cortex reacted selectively to different numbers even before the monkeys had been taught to differentiate between them. Therefore, primates possess an early developed sense of number, which does not have to be learned beforehand. Further investigations with trained monkeys also showed that the neural networks of the sense of number can be improved through learning and experience. For her findings, Pooja Viswanathan was awarded this year's Sponsorship Award of the German Primate Centre (DPZ) – Leibniz Institute for Primate Research. The prize is awarded annually by the Institute's Sponsorship Society to young scientists who conduct research with or on non-human primates. The award is endowed with a six-month scholarship to a research institute of one's own choice and an amount of 1000 euros donated by the company Euroimmun, Lübeck. The award ceremony will take place on Monday, November 19, 2018, at 5:15 p.m. in the lecture hall of the German Primate Center, Kellnerweg 4, in Göttingen, including a lecture in English by the prizewinner. Visitors are cordially invited to the event.

In her work, Pooja Viswanathan examined the activity of number neurons in two areas of the cerebral cortex: the frontal and parietal lobe. "Number neurons represent certain numbers such as three or four," explains Pooja Viswanathan. "A neuron whose preferred number is three is most active when there are three apples in a bowl. But the same neuron would also react if instead there were three nuts in the bowl, three eggs in a carton, or three people in a room."

In order to find out whether primate brains have a sense of number, Viswanathan examined the activity of number neurons in the brain of rhesus monkeys that were not trained to differentiate numbers and compared them with those of trained monkeys. The neurons of untrained monkeys, just as those of trained monkeys, reacted to a certain number of dots presented to the monkeys. Thus, she could show for the first time that primates have an early developed sense of number. "The number neurons in the monkeys' brains' were not a result of training, but were already present," explains Viswanathan. In a series of further investigations Pooja Viswanathan could prove that the sense of number is not rigid or independent of

experience. She trained the same monkeys and showed that the frontal lobe contained more and better tuned number neurons after training, which reacted highly selectively to different numbers. “We cannot say with certainty whether number neurons are already present at birth or are a result of the world we experience. However, learning to differentiate numbers improves the neurons' selectivity,” Viswanathan summarizes her results.

Pooja Viswanathan (31) studied Life Sciences at Osmania University in Hyderabad, India, from 2004 to 2007. After obtaining her Bachelor's degree in Genetics, Microbiology and Chemistry, she worked for three years at the National Brain Research Centre in Manesar, India. She then moved to Germany, where she completed her Master's degree in Neural and Behavioural Sciences at the University of Tübingen in 2012 and received her PhD at the Institute of Neurobiology in Tübingen in the group of Andreas Nieder. Pooja Viswanathan has been working as a postdoctoral fellow at the Laboratory of Neural Systems at the Rockefeller University in New York since June 2018. “The DPZ's Sponsorship Award supports my current research in the field of social memory,” says Viswanathan. “In the future, I want to investigate which processes in the brain enable us to remember individual faces.”

“Ms. Viswanathan has produced an excellent scientific paper, which shows an unusually broad spectrum of methods and contributes to a better understanding of the brain's processing in the field of the sense of number,” the Scientific Advisory Board of the DPZ explains its choice. The members of the external advisory board annually select the prize winners. The DPZ Sponsorship Award is one of the highest endowed prizes for young scientists in Germany. It is awarded by the DPZ Sponsorship Society, a non-profit association that supports research on and with primates and promotes young scientists.

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Printable pictures are available in our [Media library](#). The press release is available on our [website](#). We kindly request a specimen copy in case of publication.

More information about the DPZ Sponsorship Award can be found at: www.dpz.eu/foerderpreis.

The German Primate Center (DPZ) – Leibniz Institute for Primate Research conducts biological and biomedical research on and with primates in the fields of infection research, neuroscience and primate biology. The DPZ maintains four field stations in the tropics and is the reference and service center for all aspects of primate research. The DPZ is one of 93 research and infrastructure facilities of the Leibniz Association.