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Animal Behaviour

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Born in 1979 in Bangalore, India
Studied Animal Behaviour at the Indian Institute of Science, Bangalore and
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PROJECT

1. A Natural History of Attention

Ad 1. Our senses constantly receive an overload of information. We would be unable to process this information if we could not attend selectively to objects of interest. We are, however, not the only animals with sensory inputs that require selective processing. Several other animals must focus on targets of interest and ignore distractors to avoid predators, forage and find mates. What are the diverse attention-like processes in animals and what characteristics do they share? During my time in Berlin, I will research this question and develop a common framework to investigate attention across different animal models - from insects to primates. I will look for definitive attentional processes from human neuroscience and psychology that can be found in other animals. I will look for evidence of these characteristic processes in ecological and behavioural findings in different animals. This would provide a broader evolutionary picture of the distribution of individual attentional processes across the animal kingdom. I will then develop and design an experimental research program to test for attentional processes in non-human animals. My focus will be to design a range of ecologically relevant experiments that are comparable to human psychological experiments.

2. Understanding Science Through Comics and Animation

Ad 2. I will also explore the intersection between the creative arts and the sciences. My previous efforts at bringing the two together have thrown into sharp relief questions of how best to combine them effectively. For a successful collaboration, art has to actively engage with science without using it as mere inspiration. Equally, the collaboration has to succeed on artistic terms without being purely a science primer. This is a difficult balance. I will explore this process by documenting my research on attention with comics and animation. I anticipate that this creative experiment will result in a synergy that will benefit both the research project and the art.

Recommended Reading

Nityananda, V., G. Tarawneh, J. Nicolas, R. Rosner, S. Crichton, and J. Read (2016). "Insect stereopsis demonstrated using a 3D insect cinema." *Scientific Reports* 6: 1-9.

Nityananda, V. and L. Chittka (2015). "Modality-specific attention in foraging bumblebees." *Royal Society Open Science* 2: 150324. doi: 10.1098/rsos.150324

Nityananda, V. and M. Bee (2011). "Finding your mate at a cocktail party: frequency separation promotes auditory stream segregation of concurrent voices in multi-species frog choruses." *PLoS One* 6: e21191.

Can animals attend?

Can science become art?

Yes, this will be two talks for the price of one. Or rather one talk and one rambling discussion.

The first talk - the first part of my talk - will focus on attention. Everyday life is a struggle to cope with an overload of sensory information and focus on relevant details. Our capacity for attention is vital in helping us perform daily tasks. Other animals face a similar challenge - think of bees searching for rewarding flowers in a meadow or a hawk choosing between different prey. They would also be well served by attention-like processes that help them focus on sensory information that would help them find food, mates or avoid predators. We know far less of these processes in non-primates. Given the differences in brain structures and sensory processing in different animals, do they have unique sensory and attention-like solutions? Or could vastly different brains nonetheless show similar processes underlying selective attention?

To answer these questions requires a definition of attention that psychologists, neuroscientists and ethologists can agree on. There is no shortage of definitions of attention in psychology. Which one do we choose for our research program? I argue that it is instead better to identify definitive functional characteristics of attention and look for these in animals. I will focus on these characteristics and discuss how behaviour with similar characteristics has been demonstrated in animals, with examples from insect vision. I will ask if this is sufficient to demonstrate attention and point towards further processes that define attention, which we can investigate in animals. At the end of this section, I will outline a possible framework using which we could look at the evolution of attention by looking for these processes in different animals.

The second, shorter part of my talk will discuss my ongoing attempts at communicating science through art. In doing so I'm often faced with a problem- how do I create something of interest to both scientists and artists? A didactic science primer is often perhaps of little artistic interest. On the other hand, artworks inspired from science often might not engage with the science itself and have nothing to say about it. I will discuss how I've tried to combine science and art with comics (which may or may not have artistic merit) about scientific papers. This will hopefully open out a broader discussion on the variety of means by which we can bring the two together.

PUBLICATIONS FROM THE FELLOWS' LIBRARY

Nityananda, Vivek (Cambridge, 2017)

Stereopsis in animals : evolution, function and mechanisms

Vivek Nityananda and Jenny C.A. Read
<https://kxp.k1oplus.de/DB=9.663/PPNSET?PPN=1040830501>

Nityananda, Vivek (London, 2016)

Attention-like processes in insects

<https://kxp.k1oplus.de/DB=9.663/PPNSET?PPN=1042101361>

Nityananda, Vivek (2016)

Insect stereopsis demonstrated using a 3D insect cinema

<https://kxp.k1oplus.de/DB=9.663/PPNSET?PPN=864385528>