UNIVERSITY OF ABERDEEN

The Rowett Institute

RI Invited Speaker Form
Please complete as much as you can

Name & job title:	Eisuke Koya, Reader in Behavioural Neuroscience
Institution:	University of Sussex
Talk title:	Appetitive conditioning and cue reactivity: Recent insights into the role of excitability alterations on neuronal ensembles
Date:	7th of May 2019
Seminar Abstract: (provide URL if easier)	Both humans and animals need to respond appropriately to cues that predict the availability of food for nutrient procurement. For example, one may follow a sign leading to a fast food restaurant when driving while hungry or wild mice may follow sweet smells that lead them towards fragrant ripe berries. Such reactive actions to cues ('cue reactivity') depend on the brain's ability to store and retrieve learned associations about food and its predictive cues. Such 'food-cue' associations form during Pavlovian conditioning. Although the brain areas implicated in food-cue associations have been well-characterised, the specific neuronal populations that help encode these associations have not been fully elucidated yet. Animal research has allowed us to obtain better insight of the precise mechanisms behind how these associations are formed and established at the level individual neurons such as their activity patterns. They also allow the characterisation of how individual neurons undergo physiological changes such as changes in their electrical or 'excitability' properties, which are thought to be critical for information storage and retrieval. We and others have shown that cue-reward associations are encoded in specific patterns of activity from a population of sparsely distributed neurons, called 'neuronal ensembles' in brain areas implicated in reward, such as the nucleus accumbens. Here, I will first discuss how factors such as the strength of food-cue associations and the perceived value of food reward impact cue-evoked food-seeking and the underlying activity patterns and excitability properties of neuronal ensembles in the nucleus accumbens. I will also discuss how neurons in the prefrontal cortex are recruited to form a stable ensemble representation of food-cue associations and how excitability alterations play a crucial role in optimal appetitive conditioning.

Speaker Biography: (provide URL if easier)	Eisuke Koya received his BA in Molecular and Cellular Biology (w/ emphasis on Neurobiology) from UC Berkeley, and PhD from the 'Free University of Amsterdam (Vrije Universiteit Amsterdam)', where he conducted investigations on how motivationally relevant brain areas such as the prefrontal cortex and nucleus accumbens were activated by heroin and sucrose -associated cues in rats. He conducted his post-doctoral research at the National Institute on Drug Abuse (Baltimore, USA). He encountered his love for 'neuronal ensembles' or a minority of sparsely distributed neurons which encode various types of learned associations. During this he and his supervisor Dr. Bruce Hope developed the 'Daun02' inactivation method to selectively silence behaviourally activated neuronal ensembles. Using this approach, in 2009 he made the discovery that associations about cocaine and the cocaine administration context were encoded in only a few percent of nucleus accumbens neurons. More than 15 papers have been published using this approach, and neuronal ensembles storing memories about cocaine, alcohol, nicotine, heroin, food, and fear and have been revealed. Moreover, he revealed that these neurons had unique synaptic physiology, and that they were part of a unique circuit. He has been a group leader at the University of Sussex since 2012, and his lab examines how neuronal ensemble representations of food-cue associations are established and maintained in motivationally relevant brain areas such as the prefrontal cortex and nucleus accumbens.
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