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RESEARCH DIRECTIONS

Sense in the finger tips

Dr Ingvars Birznieks from the School of Health and Science and Professor Vaughan Macefield, School of Medicine, University of Western Sydney, together with Dr Stephen Redmond of the Graduate School of Biomedical Engineering, University of New South Wales, will be investigating the mechanisms underlying the tactile sensing of friction in the fingertips. This research is being supported by an Australian Research Council Discovery Projects award.

'For humans and other primates the use of hands is central to life and survival,' says Dr Birznieks. 'The hand provides crucial sensory information that enables us to interact with objects and to perform sophisticated actions which are unique in the living world. The dexterity of the human hand still remains unmatched by the most advanced artificial devices, mainly because it is not understood how the relevant sensory information is extracted and utilised. Our ability to handle brittle objects gently without slipping or being crushed by excessive force relies on sophisticated tactile sense in the fingertips. In this study we will record and analyse signals which human nerves are sending from fingertip receptors to the brain centres controlling hand actions.'

Using the unique technique of microneurography which is able to measure the neural activity of the muscle and skin, the researchers will investigate the mechanisms underlying tactile sensing of friction by recording signals from single human tactile receptors. This study will record and analyse the signals which human nerves are sending from the fingertips to the brain centres. By modelling this data the study will uncover some of the fundamental sensory mechanisms underlying human capabilities to manipulate objects and use tools.

Findings from this research will provide significant advances in our understanding of how tactile information is encoded and signalled to the brain but will also open new opportunities reaching beyond the specifics of the proposed study. It will enhance the future development of next generation sensory-controlled prosthetic and robotic manipulators.

Project Title: The encoding of friction by tactile mechanoreceptors – the key to fingertip force control during dexterous object manipulation by humans
Funding has been set at: $290,000
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