

Program for Sunday, 20 March, 2016

Tomorrow's World:

Ethics of Emerging Technologies for the Science of Learning

Moderator/Host: Roger Bingham, Salk Institute & UC, San Diego,
Director, The Science Network.

*Venue: The Auditorium, Advanced Engineering Building (AEB building No. 49, rm. 200)
Staff House Road, The University of Queensland, St. Lucia Campus, Queensland, 4072*

8.45 am – 9.00 am Tea/Coffee on arrival

9.00 am – 10.30 am **Session I: Next Gen: Developing Minds**

Prof. Jay N. Giedd, M.D. University of California, San Diego (25 +5 Q)

The Teen Brain: Insights from Neuroimaging

The adolescent brain has been forged by evolution to have different features than those of a child or an adult, but it is not broken or defective. Phenomenal ability to adapt to environmental demands (i.e. plasticity), dynamic changes in the brain's reward circuitry, and dramatic alterations in how the different components of the brain interact with each other make adolescence a time of great opportunity but also a time of vulnerability. Prominent amongst the vulnerabilities are the factors that make adolescence the most common time for emergence of many psychiatric conditions including anxiety and mood disorders, eating disorders, psychosis, and substance abuse. Neurobiological maturation in the highly adaptive teen brain drives behavioral changes of increased risk taking, heightened sensation seeking, and a move away from parent to peer affiliation. These behavioral changes are not inherently bad but may contribute to an increased likelihood for difficulties during adolescence. Neuroimaging investigations are beginning to map trajectories of brain development in health and illness, discern the influences, for good or ill, on these trajectories, and explore how the biological changes interact with the behavioral changes and social context to affect behavior and well being.

10 minute moderated discussion (10)

Prof. Nancy Law, University of Hong Kong (20 + 5 Q)

Digital Citizenship: a Developmental Perspective

Citizenship refers to the process, right and intellectual capacities of the members of a society to participate fully according to the prevailing standards and to share in that society's social and cultural heritage. Technological advancement influences society along two distinct and interconnected dimensions. Firstly, technology connects the human mind across time and space. It democratizes the dissemination of information and empowers individuals, allowing almost anyone, children included, to spread their voices/ideas across the globe. Secondly, technology augments human performance through tools that extend our physical and/or cognitive capacities. This, coupled with easy access to information, materials and artefacts, also has an empowering effect that liberates human creativity and entrepreneurship. These advances also create new challenges. People are now prone to being over-connected because of ever-present technology-mediated connectivity, which creates stress and noise that exert an impact on our cognitive, social, and emotional functioning. The end result could

be information overload, a loss of focus, over-indulgence in the cyber world and, ironically, social isolation. This presentation explores the research challenges in understanding digital citizenship as intellectual capacities from a human development perspective.

Dr. Deborah Forster, University of California, San Diego (5 + 5 Q)
Social robots in early childhood - towards experiential, active, self-paced learning.

Dr. Leanne Chukoskie, University of California, San Diego (5 + 5 Q)
Gaming the system: using video games to remediate cognitive skills
10.30 am – 11.00 am Morning Tea

11.00 am – 12.30 pm **Session II: Next Gen: Brain Hacks**

Prof. Mayank Mehta, University of California, Los Angeles (25+5 Q)
How neurons respond to virtual reality

A part of the brain, called the hippocampus, is crucial for many forms of learning and memory and for learning spatial maps. This part of the brain is quite plastic, even in adults and is implicated in a range of neurological disorders including ADHD, Alzheimer's disease, Epilepsy and PTSD. To understand hippocampal function, especially in mediating spatial navigation, we have developed a noninvasive, immersive and multisensory virtual reality system where precisely controlled stimuli determine the surrounding virtual space, and nonspecific stimuli are spatially uninformative. We simultaneously measured rats' behavioral performance and the activities of thousands of neurons from the hippocampal circuit while rats performed complex tasks in virtual reality. We also developed computational techniques to decipher the emergent neural dynamics. This integrative, experiment-theory approach provided many surprising results. Surprisingly, we found profound changes in the way neurons respond to virtual reality – a large portion of the hippocampus shut down in virtual reality and the spatio-temporal pattern of activity of the active neurons was significantly altered, which I will describe.

10 minute moderated discussion (10)

Prof. Janet Wiles, University of Queensland (5+5 Q)
From rat to iRat

Prof. Andrea Chiba, University of California, San Diego (5+5 Q)
Social Brains and Social Robots: Helpful Rats!

Prof. Andre van Schaik, Western Sydney University (5+5 Q)
The Braincubator: extending the viability of brain slices

Prof. Garrison Cottrell, University of California, San Diego (5 +5 Q)
The Dawn of Autonomous Robots: Ethical Considerations

10 minute wrap-up (10)

12.30 am – 1.30 pm Lunch in the Foyer on Level 2 of AEB

1.30 pm – 3.00 pm **Session III: Next Gen: Cultures Communicating**

Prof. Nicole Vincent, Georgia State University (20 +5 Q)

What Goes, When Anything goes? Brains, Norms, and Neuro-Interventions

In what ways would you have reason to change yourself if you could change yourself in any way including those aspects of yourself that ground your reasons? Put another way, if technology removed all barriers – if science and technology became so advanced and sophisticated that people could change themselves in whatever ways they chose – in what ways would they have reason to choose to change themselves?

Children are sometimes asked, "What do you want to be when you grow up?" But if feasibility were no constraint because scientific and technological progress created a limitless menu of options, what reasons would anyone have to answer this question in any given way but not in some other way? If risks of medical harm or concerns about effectiveness were no longer an issue, might reasons still remain in favor of or against changing ourselves in various ways? Or, if all limitations were removed, would anything go?

Furthermore, how would we even know what reasons we had to answer this question one way or another? How could we even reason about what reasons we might or might not have to transform ourselves in a range of different ways, when the transformations that we choose to undergo might alter us so profoundly that ex ante we may lack an ability to appreciate how we will evaluate the results ex post and the reasons we will have that support those evaluations?

This talk will sketch out a framework for answering such questions, and this framework's utility – and indeed the utility of reflecting on such broad questions – will be related to two current debates about the regulation of neuro-interventions for biomedical human enhancement.

Prof. Edward Spence, Charles Sturt University (20 +5 Q)

Wisdom and Wellbeing as a Measure of the Normative Impact of Technology on Society

In this presentation I will explore the conceptual relationship between wisdom and well-being and its normative importance for a contemporary society increasingly defined by multiple activities associated with technology generally and ICTs specifically. To that end, I will present a theoretical model based on the conceptual association of wisdom and well-being for the purpose of demonstrating how that model is useful for normatively evaluating technological activities in contemporary society in relation to their impact on well-being.

Prof. Brendan Weekes, University of Hong Kong (5+ 5 Q)

Bilingual Brains are Bigger

Dr. Clint Bracknell, University of Sydney (5+5 Q)

Avoiding Cultural Grey-Out in the Information Age

Dr. Dana Bradford, CSIRO, University of Queensland (5+5 Q)
Putting the Mob in Mobile: Digital Health for Indigenous Australians

Prof. Jonathon Tapson, Western Sydney University (5+5 Q)
Cell-life – lessons learned from a not-for-profit technology startup

3.00 pm – 3.30 pm Afternoon Tea

3.30 pm – 5.00 pm **Session IV: Next Gen: Smart Tech**

Dr. Hannah Maslen, Oxford University (20 + 5 Q)

Brain stimulation for treatment and enhancement in children: trade-offs, open futures, and ethical limits to parental proxy decision-making

There have been calls for “extreme caution” in the use of non-invasive brain stimulation (NIBS) to treat neurological disorders in children, due to gaps in scientific knowledge. In this talk I address the ethical implications of applying this technology to children. I argue that compensatory trade-offs associated with NIBS present a challenge to its use in children, insofar as these trade-offs have the effect of limiting the child’s future options. The distinction between treatment and enhancement tracks morally relevant considerations here. As the intervention moves away from being a treatment toward being an enhancement—and thus toward a more uncertain weighing of the benefits, risks, and costs—considerations of the child’s best interests (as judged by the parents) diminish, and the need to protect the child’s (future) autonomy looms larger.

I compare NIBS for enhancement with ‘traditional’ intensive attempts to improve a child’s cognition, arguing that, whilst such intensive cognitive training will not be without trade-offs of a sort, these are less problematic from the point of view of the child’s open future, at least objectively.

I conclude by suggesting that NIBS for enhancement involving trade-offs should be delayed, if possible, until the child reaches a state of maturity and can make an informed, personal decision. NIBS for treatment, by contrast, may be permissible insofar as it can be shown to be at least as safe and effective as currently approved treatments, which are themselves justified on a best interests standard.

10 minute moderated discussion (10)

Dr. Jackie Liddle, University of Queensland (5+5 Q)
Using smartphones to measure health outcomes and quality of life: What do we need to consider?

Prof. Helen Chenery, Bond University (5+5 Q)
Communication and Dementia: The ethical implications of assistive technologies.

Final Discussion: Next Gen: What Next? (30)

Program for Monday, 21 March, 2016

8.00 am – 9.00 am Breakfast for Workshop Participants

Breakfast Venue: Lakeside Cafe outside foyer area Level 2 of Advanced Engineering Building entry via Jocks Road (off Staff House Road), The University of Queensland, St. Lucia Campus.

Workshop Venue: Note Room Change from Sunday:

Advanced Engineering Building (Building No. 49; Room 313A)

8.45 am – 9.00 am Tea/coffee served in the hallway of AEB Room 313A

9.00 am – 10.30 am **Session I: Ambassadors of Technology**

Panel I: Bots for Tots (30 minutes – including questions)

Janet Wiles, Deborah Forster, Kristyn Hensby, Jonathon Taufatofua, Scott Heath, Nicole Vincent

Panel II: Tech from Tykes to Teens (30 minutes – including questions)

Nancy Law, Brendan Weekes, Leanne Chukoskie, Marie Boden, Jay Giedd, Hannah Maslen

Moderated group discussion (30 minutes)

10.30 am – 11.00 am Morning Tea served in the hallway of AEB 313A

11.00 am – 12.30 pm **Session II: Social Medium**

Breakout Groups on Emergent Topics from Discussion (30 minute breakout)

Group A: Led By Hannah Maslen and Mayank Mehta, Reporter Eric Leonardis

Group B: Led By Edward Spence and Jay Giedd, Reporter Kristyn Hensby

Group C: Led By Nancy Law and Nicole Vincent, Reporter Marie Boden

Group D: Led by Brendan Weekes and Helen Chenery, Reporter Jackie Liddle

Group Reports (20 Minutes)

Moderated Group Discussion (40 Minutes)

12.30 am – 1.30 pm Lunch at Lakeside Cafe

Venue: Lakeside Cafe outside foyer area Level 2 of Advanced Engineering Building entry via Jocks Road (off Staff House Road).

1.30 pm – 3.00 pm **Session III: Worlds Colliding**

Panel I: Coordinating with Culture (30 minutes including questions)

Nikodem Rybak, Clint Bracknell, Dana Bradford, Arafah Karimi, Jonathon Tapson, Edward Spence.

Panel II: Bots with Brains? (30 minutes including questions)

Gary Cottrell, Janet Wiles, Andre van Schaik, Jonathon Tapson, Andrea Chiba, Nicole Vincent

Moderated group discussion (30 minutes)

3.00 pm – 3.30 pm Afternoon Tea served in the hallway of Room 313A

3.30 pm – 5.00 pm **Session IV: Next Gen: Next Gen**

Large Panel: Graduate Students and Post-Doctoral Fellows (40 minutes)

Future Codes Moderated Group Discussion (40 Minutes)

Closing Remarks (Janet Wiles and Andrea Chiba)