

Unplugged Programming, Games and Technology

Dr George Aranda

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DEAKIN
UNIVERSITY

“Computational thinking is the thought processes involved in formulating a problem and expressing its solution(s) in such a way that a computer - human or machine – can effectively carry out.” (Wing 2014)

- Wing Vs Bers
- Playpen Vs Playground

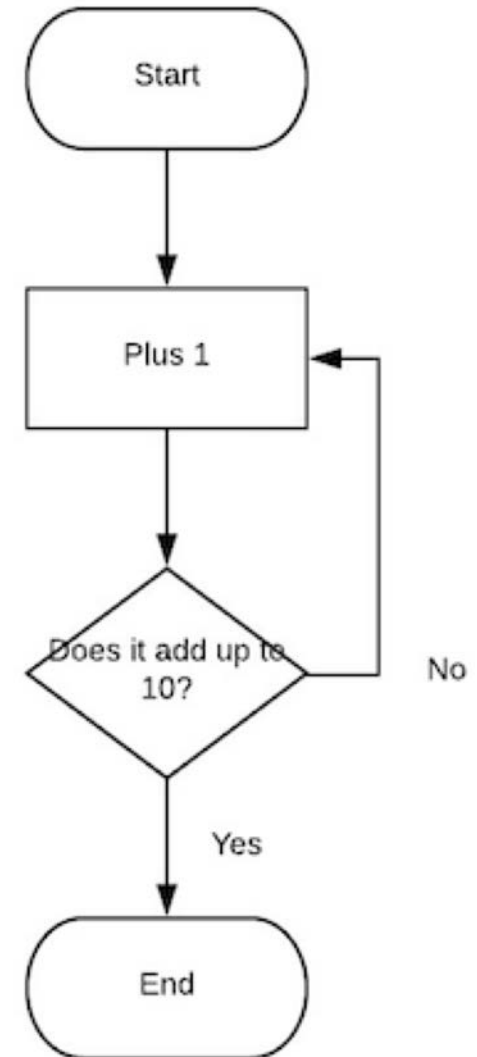


“We have found that many important concepts can be taught without using a computer—in fact, sometimes the computer is just a distraction from learning. Often computer science is taught using programming first, but not every student finds this motivating, and it can be a significant barrier to getting into the really interesting ideas in computer science.” (CSUnplugged, 2015)

Flowchart Programming



- Using a flowchart to visualise components of a computer program
- Complexity can be scaled
- Natural language can be used
- Collaborative





Start

Draw a board that looks like a giant hashtag

Get a partner

Each choose their knots or crosses

are you crosses?

wait until it is your turn

Put a X in one of the spaces

O's turn

Put a O in one of the spaces

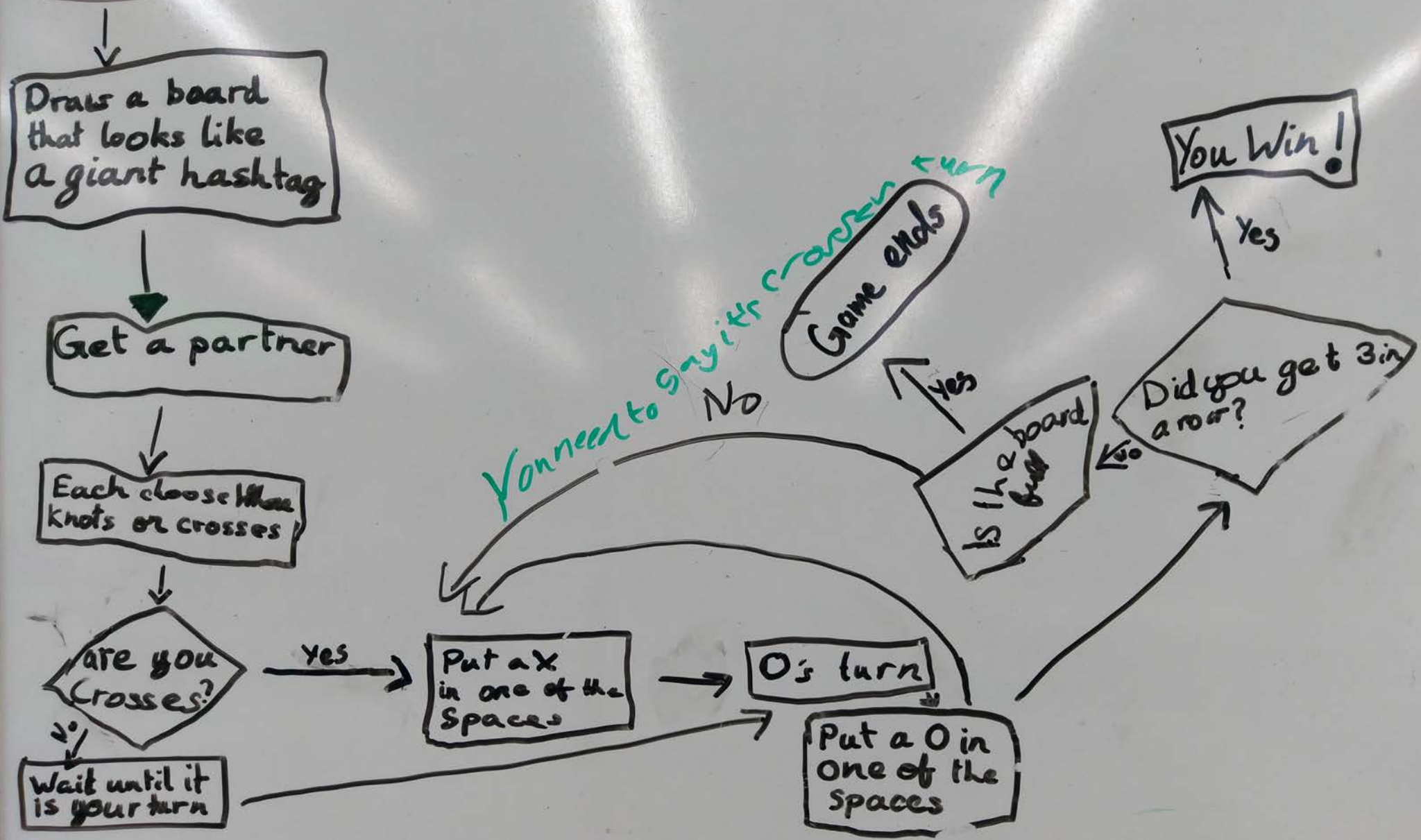
Game ends

You Win!

Did you get 3 in a row?

Is the board full?

You need to say it's ~~crosses~~ ^{crosses} turn



Start

Draw a board that looks like a giant hashtag

Visual Elements

Get a partner
Each choose their knots or crosses

Social Elements

Are you crosses?

Conditional

Wait until it is your turn

Put a X in one of the spaces

O's turn

Put a O in one of the spaces

Game Processes

You need to say it's ~~crosses~~ ^{crosses} turn

Loop

Conditional

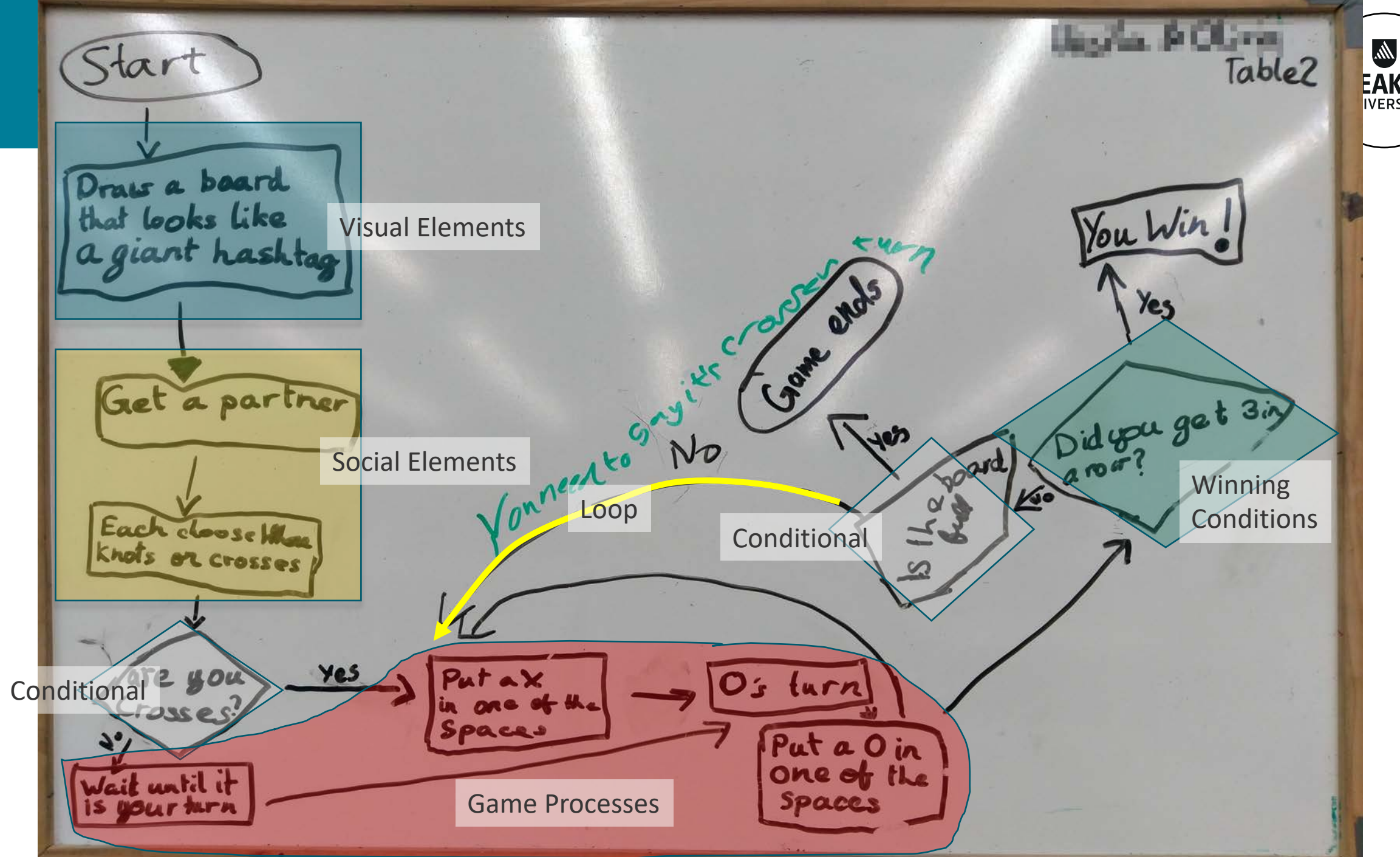
Is the board full?

Did you get 3 in a row?

Winning Conditions

Game ends

You Win!



Different Accounts of Distributed/Embodied Cognition

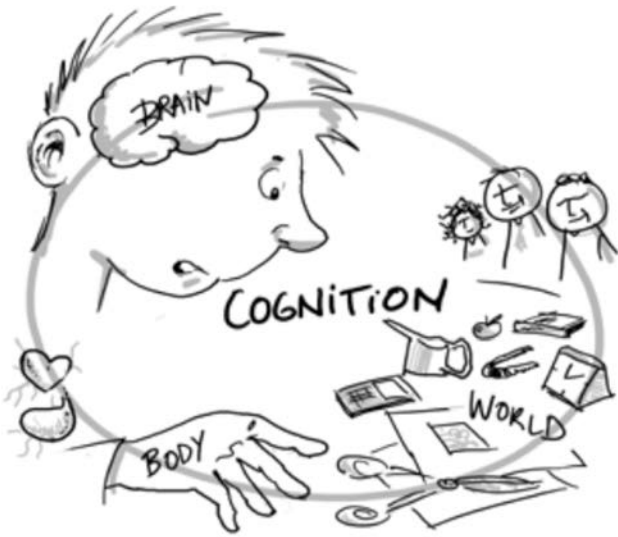


Figure 1: Sketch of the Embodied Cognition perspective. Cognition emerges from interactions between brain, body and the physical- and social environment © Jelle van Dijk



Figure 2. The Distributed Representation and Computation perspective (DRC). Details in text. © Jelle van Dijk

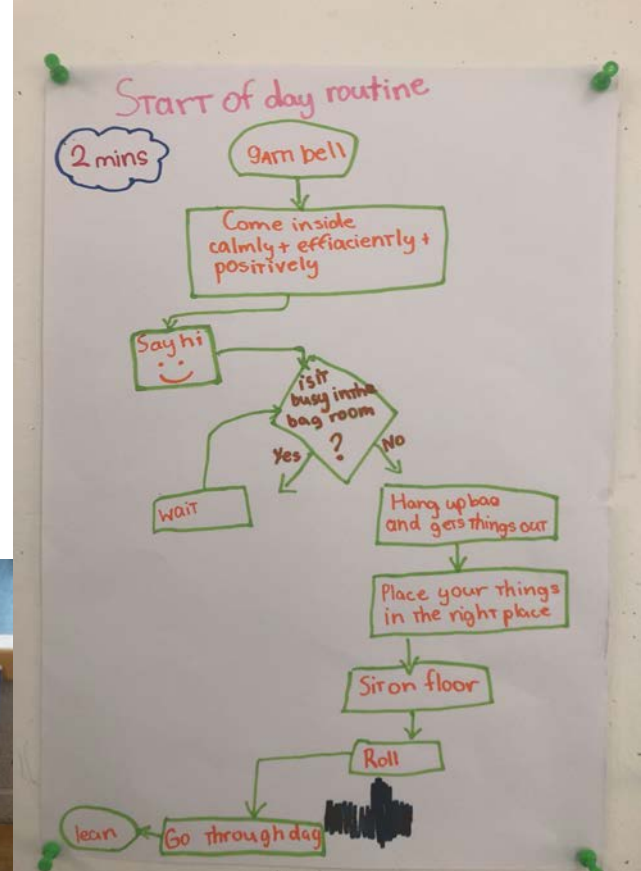


Figure 6. The Sensorimotor Coupling & Enactment perspective (SCE). Details in text. © Jelle van Dijk



Figure 4: The Socially Situated Practice perspective (SSP). Details in text. © Jelle van Dijk

Van Dijk, Hummels, & van der Lugt, 2014, p. 2)



Science Games Night



the Awkward Yeti™ Presents
Organ ATTACK!
The Family-Friendly Game of Organ Harvesting

Includes Ready Player 6 Expansion Pack!

<p>Affects AFFLICTION</p> <p>Hot Coffee! Tongue gets burned by a trusted friend.</p> <p>YARCH WHY!</p>	<p>Affects AFFLICTION</p> <p>Arrhythmia! Heart refuses to keep a consistent, steady beat.</p> <p>Check out the Fun-Point Tutor!</p> <p>IT'S 3 AM. SLEEP UP!</p>	<p>Affects AFFLICTION</p> <p>Thyroiditis! The immune system produces antibodies that attack the thyroid, causing inflammation.</p> <p>MUTINY!</p>
<p>BUREAUCRACY</p> <p>Chart Mizup!</p> <p>ALL PLAYERS MUST DISCARD THEIR ENTIRE HAND AND DRAW 5 NEW CARDS!</p> <p>RESHUFFLE THE ATTACK DECK.</p>	<p>RESISTANCE</p> <p>Immunity Boost!</p> <p>INSTANTLY BLOCK AN OPPONENT'S PLAY!</p>	<p>POISONED!</p> <p>Upon the unfortunate discovery of this card's existence in your hand, you must immediately remove one of your own organs.</p> <p>CAN NOT BE BLOCKED!</p>



Virtual, Mixed and Augmented Reality





Unplugged Programming – Dr Joe Ferguson

Embodied Gaming – A/Prof Juli Lynch, Krissy Hill

Robotics and EC – A/Prof Coral Campbell, Dr Joe Ferguson, Chris Spendelwinde

Games Night – Dr John Cripps-Clark, Dr Peta White, Dr Joe Ferguson, Dr Kathleen Hayes, Dr Leissa Kelly

Augmented Reality – Dr Seamus Delaney, Caitlyn Pryse

Aranda, G. & Ferguson, J. (2018). Unplugged Programming: The future of computational thinking?, *Pedagogika*, 68(3), 233-247.

Murcia, K., Campbell, C. & Aranda, G. (2018). Trends in Early Childhood Education Practice and Professional Learning with Digital Technologies, *Pedagogika*, 68(3), 249-264.

Tytler, R, Prain, V, Aranda, G, Ferguson, J, Gorur, R. (2019) Drawing to reason and learn in science. *J Res Sci Teach.*2019; 1– 23. <https://doi.org/10.1002/tea.21590>

Jelle van Dijk, Remko van der Lugt, and Caroline Hummels. 2014. Beyond distributed representation: embodied cognition design supporting socio-sensorimotor couplings. In Proceedings of the 8th International Conference on Tangible, Embedded and Embodied Interaction (TEI '14). ACM, New York, NY, USA, 181-188. DOI: <https://doi.org/10.1145/2540930.2540934>