CREATIVE PARTNERSHIPS

Collaborative art and science research
The Australian Network for Art & Technology (ANAT):

- Established 25 years ago
- Adelaide-based, national remit
- Enables collaboration at the nexus of art, science and technology
ART/SCIENCE RESIDENCIES

Collaboration between the arts and sciences can create new knowledge, ideas and processes beneficial to both fields.

ANAT, with the financial support of partners including the Australia Council for the Arts and Arts Victoria, has supported close to 30 residencies over the past decade.
Madeleine Flynn and Tim Humphrey + Garvan Institute for Medical Research
Music for the Bionic Ear
George Khut and The Children’s Hospital, Westmead
Interactive Art in Health and Rehabilitation

Dr Angie Morrow, Kids Rehab
The Children's Hospital at Westmead

Dr George Poonkhin Khut
Artist and Interaction-Designer

Transformation
Inspiration
Motivation...
Angie Morrow MB BAO BCh MRCPI FRACP PhD

• Staff Specialist – Head of Brain Injury Service, Kids Rehab

• Over 15 years experience in paediatrics: rehabilitation, palliative care, general paediatrics.

• PhD thesis “Measuring quality of life in children with chronic conditions” - University of Sydney, March 2010.

• Research: Patient reported outcomes, qualitative research, clinical trials

• Commitment to innovative creative projects – applying rigorous methodology to establish evidence-based outcomes
Dr George Poonkhin Khut DCA, BFA

- Practicing visual artist since 1994, BFA University of Tasmania
- Making body-focused interactive art since 2002
- Winner, 2012 National New Media Art Award ($75,000)
  Queensland Art Gallery, Gallery of Modern Art
- Doctoral Exegesis “Development and Evaluation of Participant Centred
  Biofeedback Artworks”, University of Western Sydney, 2007.
- Interactive art as a way to facilitate active exploration,
  discovery and reflection – how we are, qualities of interaction
Biofeedback

Subjects are trained to alter or control physiological processes they are not usually aware of.

Bio-signal monitoring provides external feedback and validation in response to changes in the physiological parameter being measured e.g. heart rate.

Limited evidence in the medical literature for the efficacy of biofeedback in our setting.
Biofeedback Art...

Using the principals of biofeedback but with a much closer attention to the aesthetic aspects of the biofeedback signal -

how the‘feedback’ signal looks and sounds - the qualities of attention and interaction evoked by the moving images and sounds to create an experience that is both aesthetically expressive and informative.

http://georgekhut.com/cardiomorphologies/
Biofeedback-controlled interactive art as 'transforming mirror' reflecting back new experiences of self and body-mind connection; Participants share stories and representations that explore themes such as embodiment, selfhood, health, emotions - as people, not 'patients'.
• Many children with chronic conditions undergo repeated painful procedures.

• The recurrent nature of these procedures can result in a build-up of anticipatory anxiety, causing...

• Significant distress to the children, exacerbating the perceived intensity of the painful stimulus...

• Further complicating certain procedures - in cases of extreme vasoconstriction
BrightHearts

• Distraction therapy i.e. ‘Play Therapy’ is effective but play-therapists (child-life therapists) are not always available.
Hypothesis: That biofeedback assisted relaxation training in the form of an interactive-art ‘app’ can help reduce the pain and anxiety experienced by children undergoing painful procedures.
BrightHearts
Research collaboration:

• Design phase, 2011-2012
• Pilot, 2013
• Randomized Controlled Trial, 2014
Funding

• $30K medical grant from James N. Kirby Foundation, to adapt and evaluate George’s biofeedback controlled artworks for acute pain management.

• $24K Research Residency grant from Australian Network for Art and Technology (ANAT) to support George’s research at the hospital and development of prototype iPad app.

• 6 months part time artist’s residency, plus ongoing research on-site.
Design Phase, 2011-2012

Qualitative study conducted at The Children’s Hospital at Westmead (CHW), Sydney, Australia

• Iterative process to inform the design of BrightHearts Sydney

• Staff expert panels
  • Semi-structured group interviews (19 participants)
  • Opportunity to provide feedback on prototypes

• Interactive “pop-up” exhibitions at CHW
  • 20 children aged 7-18 years
  • Invited to interact with the prototype
  • Feedback via semi-structured interview and drawing

• Thematic analysis
  • Analysis of audio recordings to identify factors influencing design
Staff Expert Discussion Panels

- Pain team, Dental, Rehab, Renal and Oncology
- 28 participants (24 female),
- 11 medical, 8 allied health
Factors identified for consideration in design process by expert panels

- Strengths and weaknesses of current clinical practice
  - Distraction techniques, CBT, analgesia, availability of staff/equip

- Spectrum of children’s coping styles and strategies
  - Variable, individual, familiarity and self determination

- Identify roles/styles of interaction of persons involved: child, parent, clinician
  - Parental aspect, clinician skill, child life therapist

- Special considerations related to patient populations and specific procedures:
  - Disability, clinical space, positioning of body and screen
Prototype 1 (8 children)

- Desktop Computer game/interactive artwork
  Geometric shapes, bright colours, developed from “Cardiomorphologies”

- Children found it easy to influence the images, and enjoyed the novelty of the interaction

- Engaged well but difficult to ascertain whether this would translate well to the clinical situation
Testing prototypes in waiting room exhibitions
Pulse Sensor: Nonin Finger Clip (8000SS) silicon pulse sensor
Prototype 2 (12 children)

• Design updated to function as iPad/iPhone app

• Images programmed to reward only decreases in heart rate

• Changes to language around presenting the “game” and illustrations

• Addition of ‘musical’ feedback – “makes the notes lower”

• Feedback from children re alternative displays e.g more figurative imagery.
FAST/NOT RELAXED

RELADED/SLOW

Kiernan

GETS BIGGER

Kiernan

GETS SMALLER
relaxed

excited
FAST/NOT RELAXED

RELAXED/SLOW

Kieran: Gets bigger

Kieran: Gets smaller
Design Phase

Outcomes so far...


• Paper Presentation, World Congress of Pain Clinicians, Granada, Spain, 2012

• Prototype iPad app wins Queensland Art Gallery, 2012 National New Media Art Award ($75,000)

• ANAT and Children’s Hospital at Westmead, National Winners, AbaF Art and Health Foundation Award
Prototype iPad App

iPad visuals and sound controlled by software on laptop

The shapes expand and contract with changes in heart rate.

When heart rate trend is decreasing, this causes musical notes to play, and ripple patterns to emerge.

The circles can be manipulated by relaxing to lower heart rate, and by slow breathing.

URL for video: https://vimeo.com/54079384
Pilot study, 2013-2014

Qualitative study conducted at The Children’s Hospital at Westmead (CHW), Sydney, Australia

• To establish feasibility of using BrightHearts in the clinical setting

• 30 children in 3 different settings

• Outcome measures

  • Pain, fear, anxiety, child/parent/health professional satisfaction (faces scales and STAI-C/STAI-AD)
What’s next...

• Collaboration with HPV Vaccination Trial with high school students in WA and SA, 2014 (500 participants)
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• Application of creative biofeedback technologies in other settings e.g. anxiety, selective motor control, limb deficiency clinic
Kids love interactive art...
“It’s like having magic powers!”

• Interactive art in rehab – supporting imagination not replacing imagination...

• The human aspect is still important – meaningful interactions require skilful facilitation – it’s not about pacifying kids with ‘distraction’

• More open-ended interactions can be tailored to individual children’s creative interests and abilities...

but this requires much more complex technical solutions that take time, expertise, and costs money.
Examples of interactive art projects made with “open Frameworks” opensource (free to use and modify) interactive visual effects software that could be adapted for use with children in rehab clinics!
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... i.e. facial expression training and recognition for brain injury and autism

Karolina Sobecka
All the Universe is Full of the Lives of Perfect Creatures
Video URL https://vimeo.com/35262930
Kids love interactive art...
“It’s like having magic powers!”

• Facilitate active learning, imagination and reflection

• Biofeedback training can provide experiences that demonstrate they can control aspects of their experience

• Multimedia interactions can help motivate children’s engagement with otherwise tedious rehab tasks

• But we need solid, evidence-based research outcomes to argue for ongoing support and development work...
What’s needed on the Creative side

• Fee’s for highly skilled, interdisciplinary teams – artists, electronics engineers, computer graphics developers

• Administrative support – negotiating hospital protocols, and requirements facilitate creative collaborations across depts. and disciplines

• Capacity to maintain services, facilities and upgrades
  Staff (or skilled volunteers) to operate interactive exhibitions, and multimedia-enhanced rehab tools.

• Electronic and Computer Hardware – more affordable than ever, but we need clarification around requirements for TGA certification
What’s needed on Medical side...

Leadership and vision
• Medical Research Supervision for Masters & PhD students
• Commitment to innovative, interdisciplinary research

Capacity building
• Funding for Scholarships: Post Doctoral, PhD or Masters research students (Medicine)
• Research Governance

Clinical and academic links...
• Medical, Interaction-Design and Industrial Design

Effective collaboration
• With staff across clinics (recruiting research participants)
Challenges

• **TGA certification**: medical vs educational/recreational devices
  – How to evaluate appropriate categories for rating safety of equipment for multimedia rehab?

• **IP – art vs medicine**
  – different attitudes and economic models around innovation, marketing patents and sharing ideas: *opensource vs patent applications*

• **Health vs Medical evaluation frameworks**
  - Different criteria i.e. NMRC Grants vs Australia Council for the Arts

• **Research governance – capacity and responsiveness:**
  – slow turn around time for medical research vs ‘just do it’ approaches of artists, hackers, opensource developers
2013 Creative Partnerships Australia Awards

NOW OPEN

Creative Partnerships Arts and Health Award

For arts and health projects or programs, involving healthcare organisations and arts and cultural organisations or individual artists, that improve the health and wellbeing of individuals, groups or a community.

*Developed in collaboration with the Arts & Health Foundation.*

For more information on all our Award categories visit:

[www.creativepartnershipsaustralia.org.au](http://www.creativepartnershipsaustralia.org.au)