Finding a path: Navigating my PhD with Sensory Substitution
My Brief Talk

• Bit of a story of my PhD
• Bit of finding my own niche
• Bit of research
• Bit of fun – I brought toys!
My Interview onwards

• Accepted placement on project proposal
  – “Spatial perception in associator / projector synaesthetes” based on M.Sc. fMRI project.
  – Some individuals ‘hallucinate’ colours onto letters, colours could be ‘on the page’ or in the ‘mind’s eye’

• “Fantastic! Great! …”
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• “…Also we’re about to start doing that elsewhere, so erm, do something else.”
  – Ok is there anything else I can find on my interests?
    • Spatial perception / colour / cross-sensory?
Finding a subject

• After giving a talk on my M.Sc. Project at a conference, ended up seeing a talk by Dr Proulx on Sensory Substitution.

  – Device that turns vision into sound for blind people to ‘see’ in greyscale and navigate.
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  – Device that turns vision into sound for blind people to ‘see’ in greyscale and navigate.

  …this could potentially tick all the boxes
PhD Goals

• Develop knowledge in new areas
• Understand the publication process
• Carry out new lines of research
• Learn new skills and get creative
• Understand post-doc funding more
Develop my knowledge

• I have an interest in sound-colour associations and synaesthesia, so…
• …what Sound-Colour devices exist?
Develop my knowledge

• I have an interest in sound-colour associations and synaesthesia, so…
• …what Sound-Colour devices exist?
• I found that most devices exist in isolation.
  – 14 Devices, all with different conversions and experiments done with them.
  – Maybe a review paper would work?
Publication process

• 16k words cut down into 10k
• About 3 major revisions
• Submitted, reviewed, rejected (8 months)
• Reviewed a lot of other papers in the meantime…
• Submitted elsewhere, reviewed
Publication process

• After another 6 months...
New lines of research

• Ok so background taken care of.
• What sound-colour associations can I find?
New lines of research

• Ok so background taken care of.
• What sound-colour associations can I find?
• Could these associations inform new devices?
Experiment (1)

• Pick colour that ‘goes best’
  – Found vowel-colour links to red/green
  – Found sinewave links to yellow/blue
  – Found harmonics links to colour saturation
Learning new skills

• Wanted to make a device that utilised these sound-colour mappings.

• Took a few weeks to take an online C# coding course so I could do this.
The Creole

Visual Image

Visual sensor

Translate Visual to Audio

Headphones

Ear

Mental Image

SSD
Experiment (2)

- Colour memory task
- either ‘normal’ sound-colour mappings (/i/ = green) or ‘reverse’ (/i/ = red)
  - Found colour memory advantage when sound-colour pairings were the ‘normal’ way.
• Currently continuing with sound-colour experiments…

• What about spatial perception?
Spatial Perception
Typical SSDs

• The vOICe
  – Hear one column at a time
Typical SSDs

• The vOICe
  – Hear one column at a time

Time / Panning (1 second)
Typical SSDs

- The vOICe
  - Hear one column at a time
Typical SSDs

• The vOICe
  – Hear one column at a time

High Pitch

Low Pitch

Time / Panning (1 second)

Loud

Quiet
Typical SSDs

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• The vOICe
  – Hear one column at a time (repeats every second)
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  – Hear one column at a time (repeats every second)
Now that you are all experts

Your turn

Close your eyes and visualise!
My Blind Cat ‘Monty’
My Blind Cat ‘Monty’

High Contrast Best Friend ‘Indie’
My Blind Cat ‘Monty’

High Contrast Best Friend ‘Indie’
Typical Tasks

Object Tasks

Navigation Tasks
Solving multiple problems

- vOICe does well with minimal simple shapes but badly with complex images
- Blind users don’t want ears ‘used up.’
  - Silence needs to be meaningful and ‘default.’
- Not every object is relevant
  - Near more relevant than far usually
- Goals: Object identification and Navigation
Stumbling on ideas

• Researched distance-sound SSDs from engineering departments.
• Found this:
  This image looks like the simple vOICe images
Making my own

- Got a Kinect depth camera (infra-red)
- Spent some more time on an online coding course in C#
- Spent a few weeks making it over Xmas
‘Vocal Range’ for vOICe

Depth image
User controls ‘max range’
1 to 3 metres

0 to 0.8m = silent

0.8 to ‘max range’ = loud, gradually reducing in volume.
New tool

• What is it suitable for?
  – Distance perception up to 3 metres
  – Shape perception
  – Navigation
  – Navigation of digital worlds
  – Future integration with phones
• While this distance-sound research and my device are not a part of my PhD…

• It created some new work that formed the basis of a post-doc funding application.
So final year and...

- New background knowledge
- Understand publication more
- New coding skills
- Understand post-doc applications more
- Got to be creative and find work for me to explore.