Institution: University of Nottingham

Unit of Assessment: UoA4 - Psychology, Psychiatry and Neuroscience

Title of case study: Increasing Public Engagement and Involvement with Psychological Research Through the Creation of 'Summer Scientist' Events

1. Summary of the impact

Summer Scientist Week (www.summerscientist.org) is an innovative public engagement event held at the University of Nottingham that increases public understanding of the psychology of child development. Families with children aged from 4 to 11 years experience the research process first-hand by participating in ongoing studies. Research findings and their impact are disseminated through posters at the event and follow-up newsletters. Summer Scientist Week (SSW) has increased public understanding of psychology research within the community and has increased interest in psychology and child development topics in the media and has increased attendance at other science and research-based events.

2. Underpinning research

The research that underpins this impact comprises a range of psychological research conducted between 2005 to 2013 across both the Division of Psychiatry and the School of Psychology at Nottingham, forming the platform for engaging members of the public in science. This research encompasses 6 key research themes: social cognition, mathematical cognition, spatial cognition, perceptuo-motor development, attention and executive function, and hearing. The underpinning research was carried out by researchers in the School of Psychology (Drs. Lucy Cragg, Camilla Gilmore, Antonia Hamilton, Roger Newport, Danielle Ropar, Alastair Smith) and Division of Psychiatry (Drs. Madeleine Groom and Elizabeth Liddle). All are research active members of staff appointed between 2003 and 2007 and all remain at Nottingham with the exception of Gilmore who left in 2010 and Hamilton who left in late 2013. Examples of the key research themes and underpinning research are outlined below.

Social cognition: Dr Antonia Hamilton, Dr Roger Newport and Dr Danielle Ropar
This research programme investigates imitation; specifically who and what individuals choose to copy. So far, the findings suggest that imitation is influenced by the social situation, social standing and social cues such as eye gaze[1]. This topic is particularly suited to public engagement.

Mathematical cognition: Dr Camilla Gilmore
This research investigates how children's basic sense of quantity is related to the formal maths skills that they learn at school. It has been found that children can connect both number words and number symbols to their sense of quantity from the start of school[2].

Spatial cognition: Dr Alastair Smith
Dr Smith studies how children and adults deal with large-scale tasks such as learning a new environment. Studies have examined children and adults' ability to learn to search effectively for a hidden object and remember useful landmarks to help navigate routes[3].

Perceptuo-motor development: Dr Danielle Ropar, Dr Alastair Smith
This research programme uses children's drawings to study skills such as fine motor control, mental imagery, perceptual analysis, planning and memory. Children's knowledge about the object they are drawing appears to be the biggest influence on how well they can copy an image[4].

Attention and executive functions: Dr Lucy Cragg, Dr Madeleine Groom, Dr Elizabeth Liddle, Professor Chris Hollis
This research addresses how children develop the skills to ignore distractions and suppress impulsive actions as well as adapt their behaviour to changes in the environment. There is a dramatic increase in the ability to overcome distraction between 4 and 11 years, and children of different ages experience, and deal with, distraction in different ways[5,6].

One of the key features of SSW is that the data collected at the event feed back into underpinning

research. SSW research has produced high quality publications[7] in four of the five research themes outlined above. This research is disseminated to parents at the event and also underpins future research at the event, sustaining the cycle of research, engagement and education.

3. References to the research

1. Wang Y, Newport R, & Hamilton AF de C. (2011). Eye contact enhances mimicry of intransitive hand movements. *Biology Letters*, 7, 7-10. DOI:10.1098/rsbl.2010.0279. IF: 3.348; Citations: 16

2. Gilmore CK, McCarthy SE & Spelke E (2007). Symbolic arithmetic knowledge without instruction. *Nature*, 447, 589-591. DOI: 10.1038/nature05850. IF: 38.597; Citations 71

3. Smith AD, Hood BM. and Gilchrist ID. (2010). Probabilistic cuing in large-scale environmental search. *Journal of Experimental Psychology: Learning Memory and Cognition*, 36(3), 605-618. DOI: 10.1037/a0018280. IF: 2.918; Citations 10. Also available on request.

4. Sheppard E, Ropar D, & Mitchell P. (2005). The impact of meaning and dimensionality on the accuracy of children's copying. *British Journal of Developmental Psychology*, 23(3), 365-381. DOI: 10.1348/026151005X27605. IF: 1.33; Citations 4

5. Cragg L. & Nation K. (2009). Shifting development in mid-childhood: The influence of between-task interference. *Developmental Psychology*. 45(5), 1465-1479. DOI: 10.1037/a0015360. IF: 2.976; Citations 9. Also available on request.

6. Liddle EB, Scerif G, Hollis CP, Batty MJ, Groom MJ, Liotti M. And Liddle PF. (2009). Looking before you leap: a theory of motivated control of action. *Cognition*. 112(1), 141-58. DOI: 10.1016/j.cognition.2009.03.006. IF: 3.523; Citations 14

7. Marsh, L., Pearson, A., Ropar, D., & Hamilton, A. (2013) Children with autism do not overimitate. *Current Biology, 23* (7), R266-R268. DOI: 10.1016/j.cub.2013.02.036. IF: 4.949; Citations: 0

Selected Funding

Antonia Hamilton (RA2974 - £78,756)
Should I mimic you? : Social control of mimicry (ESRC, 2011-2012, PI: A. Hamilton)

Camilla Gilmore (Postdoctoral fellowship £208,778)
The roots of arithmetic: Linking numerical cognition with mathematics education (British Academy, 2008 – 2014, PI: C. Gilmore)

Antonia Hamilton (RA2946 - £275,500)
Action and interaction in the social brain (ESRC, 2007-2011, PI: A. Hamilton)

Camilla Gilmore (£71,843.81)
Uncovering the sources of arithmetic (ESRC, 2009 – 2010, PI: C. Gilmore)

Chris Hollis (£513,196)
Interaction of inhibitory control and reward mechanisms in attention deficit hyperactivity disorder (ADHD).) (MIDAS: Wellcome Trust, 2005-2009, PI: C. Hollis).

Alastair Smith (A1H106 - £5000) Improving the outreach capacities of Summer Scientist Week (HEIF HERMES, PI: A. Smith)

4. Details of the impact

Summer Scientist Week is a research and public engagement event for families with children aged between 4 and 11 years and has been running annually since 2007. Summer Scientist Week was developed in order to create a cycle of involvement, engagement and education in psychological

research within the local community. The two key aims of Summer Scientist Week are:

i) to stimulate interest and excitement in how the mind and brain work
ii) to support informal learning about the research process and research outcomes in the fields of psychology and cognitive neuroscience.

Families visit the University of Nottingham for a three-hour session during which time they take part in a range of fun activities with a psychology theme. Each session brings together up to 50 children in a single location with a mixture of hands on psychology games and experiments. Researchers and postgraduate students run a range of studies informed by the previous underpinning research described above, which showcase the research questions and methods involved. Parents experience the research process first-hand by watching their child take part in the studies and by talking directly with the researchers. They are also informed about findings from the underpinning research, in addition to current studies, through posters displayed at the event, student helpers, a newsletter sent out to all families in December each year and a booklet summarising the research undertaken by the group. This allows parents and children to link the findings to the research they experienced, gaining a deeper understanding of the outcomes as well as how it links to the process of carrying out psychological research. As this is an annual event the participants are able to learn about continuing developments within the field. It is particularly interesting for parents to see that some of the research they learn about at the event has arisen from data collected at previous SSW meetings and has led to scientific publications. In 2012/13, five journal articles were published using SSW data in journals including Development Psychology and Current Biology[7] (available upon request).

Since 2007 over 1,000 children aged between 4 and 11 years from the Nottinghamshire and Derbyshire area have attended the event with their parents. The event attracts people from a range of backgrounds (Deprivation Index range from 0% to 100%, mean = 64.7%). The majority of attendees are of white ethnic origin (81.5%). Over a quarter of participants have attended more than once (26.3%). The event is sustainable and has a lasting legacy, as evidenced by the steady increase in registrations each year (from 120 in 2007 to 550 in 2012)[a]. See Facebook page for updated registration details[b].

Parent evaluation data from 2012[c] showed that 99% of parents rated their experience at the event positively (68% very positive, 31% positive; 2011[d]: 67% very positive, 33% positive; 2010[e]: 73% very positive, 27% positive) and 100% of children enjoyed taking part. Moreover, 99% of parents and 100% of children would come to Summer Scientist Week again, and 100% of parents would recommend it to a friend (2011: 100%; 2010: 100%). In addition, demonstrating increased engagement with research developments, 68% agreed that they had become more interested in psychology/child development news items and programs in the media and 40% agreed that they have attended more University or science-based events in the local area due to their involvement with Summer Scientist Week. Together this demonstrates that Summer Scientist Week has led to increased engagement with science and research by the families who take part.

Summer Scientist Week has increased public understanding of research, as evidenced by the fact that in 2012, for example, 92% of parents stated that the event itself had improved their understanding of psychology research at the University of Nottingham (2011: 80%; 2010: 84%). For the newsletter, 93% of parents agreed that it had increased their understanding of psychology research[c,f]. At Summer Scientist Week 2012 parents also indicated how much individual posters had increased their understanding of the research topic covered, on a scale of 1 to 5 from 'not at all' to 'a lot'. From a total of 149 responses to 17 posters, the average rating was 4.5, indicating that their understanding had been increased[c,g].

Qualitative feedback received from parents and children, such as the comments below, illustrate their increased understanding of psychological research and engagement with science and research. [source: 2012 evaluation forms, available on request]

"I have enjoyed bringing my child; not only for his experience but also for the knowledge I have

gained from attending the event, looking at the website, and reading the newsletter."

"Fantastic! Both my boys loved it and had a great time. The research 'games' are pitched really well so that they enjoy playing them and had lots of fun. I've found the whole morning really informative too. We'll definitely come next year!"

"Tom aged 7: 'Today was super. I learned a lot about science and words I didn't know. I liked collecting the token. It was awesome! I'm glad we came.'

5. Sources to corroborate the impact

a. Registration numbers
b. www.facebook.com/summerscientistweek
c. Parent evaluation forms 2012 (Note: Contact details for individual parents who have filled in evaluation forms can be provided if necessary)
d. Parent evaluation forms 2011 (as above)
e. Parent evaluation forms 2010 (as above)
f. Summer Scientist Week Newsletter
g. Posters for parents and children to demonstrate shift in understanding of research topic