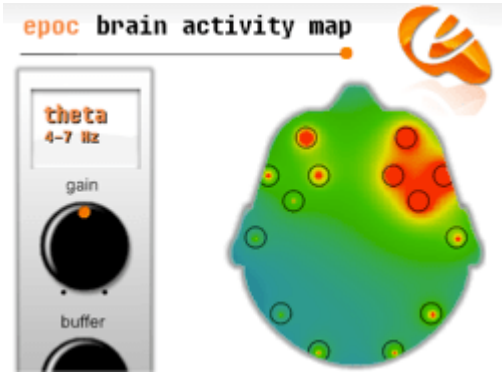
The brain in the city

Description

How does the space you are in affect the way you feel? Weâ??ve just published an article in the British Journal of Sports Medicine (Online First edition) outlining our results from a study using head-mounted EEG (electroencephalography) technology worn by people walking about outdoors in Edinburgh. We think this is a first. Such studies usually take place in a laboratory, with human subjects sitting in front of a computer monitor and looking at pictures of city streets and landscapes. In our study we took the EEG technology out into the field.

The research was undertaken by Panos Mavros, Jenny Roe, Peter Aspinall, and me, Richard Coyne . As researchers in architecture, environmental psychology, health studies and urban design we are interested in the relationship between the environment and emotions. We conducted a study using mobile EEG as a method to record and analyze the emotional experience of people walking in 3 types of urban environment including parkland.

Using Emotiv EPOC, a low-cost mobile EEG recorder, participants took part in a 25 minute walk through three different areas of Edinburgh. The areas were a shopping street, a path through green space and a street in a busy commercial area. The equipment provided continuous recordings from 5 channels.



The manufacturers of the EEG recorder identify these channel outputs as â??short-term excitement,â?• â??frustration,â?• â??engagement,â?• â??arousalâ?• and â??meditation level.â?• In fact, the readings

are derived from the faint frequency signals picked up from the human brain, known as alpha, beta, delta and theta waves. These are the major pulse frequencies at which brain activity takes place, and seem to be reliable indicators of the emotional state of the person from whom readings are taken.

Our analysis of the data show evidence of lower frustration, engagement and arousal, and higher meditation when moving into the green space zone, and higher engagement when moving out of it.

Our study provides evidence in support of other perceptual and preference studies based on questionnaires, observations and the use of other sensor data.

We found systematic differences in EEG recordings between the three urban areas in line with theories about how certain behaviours, environments and technologies can assist recovery from short-term or long-term periods of stress or illness â?? restoration theory.

Our study has implications for promoting urban green space to enhance mood, important in encouraging people to walk more or engage in other forms of physical or reflective activity. More green plazas, parkland, trees, access to the countryside, and urban design and architecture that incorporates more of the atmosphere of outdoor open space are all good for our health and wellbeing.

Our study also intersects with the current fascination with GPS (global positioning systems) mapping techniques providing new avenues for experimentation. The recordings from the portable EEG were tagged with location data, and later turned into maps showing the relative levels of readings at different points along the journeys.

Read more at http://bjsm.bmj.com/content/early/2013/03/05/bjsports-2012-091877.full, and blog posts: Are you aware of your brain and Soft fascination.

Bibliography

- Al-Chalabi, A., M.R. Turner, and R.S. Delamont, *The Brain: A Beginnerâ??s Guide*. 2008, Oxford: Oneworld.
- Aspinall, Peter, Panagiotis Mavros, Richard Coyne, and Jenny Roe. 2013. The urban brain: analysing outdoor physical activity with mobile EEG. *British Journal of Sports Medicine*, (doi:10.1136/bjsports-2012-091877). http://bjsm.bmj.com/content/early/2013/03/05/bjsports-2012-

091877.full
- Greenfield, S., *The Private Life of the Brain*. 2000, London: Penguin.
- Hartig, T., et al., *Tracking restoration in natural and urban field settings.* Journal of Environmental Psychology, 2003. 23: p. 109-123.
- Mavros, P., R. Coyne, J. Roe and P. Aspinall, â??Engaging the brain: Implications of mobile EEG for spatial representationâ??, in H. Achten, J. Pavlicek, J. Hulin and D. Matejdan (eds), *Digital Physicality Proceedings of the 30th eCAADe Conference*, Czech Technical University in Prague: Molab, 2012, 657-665.
- Ramachandran, V.S., *The Tell-Tail Brain: Unlocking the Mysteries of Human Nature*. 2011, London: William Heinemann.
- Roe, J. and P. Aspinall, *The restorative benefits of walking in urban and rural settings in adults with good and poor mental health.* Health and Place, 2011. **17**: p. 103â??113.
- Ward Thompson, C., J. Roe, P. Aspinall, R. Mitchell, A. Clow and D. Miller, â??More green space is linked to less stress in deprived communities: Evidence from salivary cortisol patternsâ??, *Landscape and Urban Planning*, 105: 3, 2012, 221-229.

Notes

- The team: Panos Mavros, Jenny Roe, Peter Aspinall, Richard Coyne.
- The project is funded by a Collaborative School grant from the School of Built Environment, Heriot-Watt University and the Edinburgh School of Architecture and Landscape Architecture, University of Edinburgh.
- The analytic technique we used is known as â??high dimensional correlated component logistic regression analysis.â?•
- The results seem to be comparable to the findings of other studies using skin galvanometry.
- For neuroscience research by colleagues in Music see IMHSD.
- Also see Posh boys and mirror neurons, Exaggeration, Arboreal architecture gets wrong end of the stick, Neuroscience eclipses AI, Are you aware of your brain, and Soft fascination.
- 14 March 2013: See writeup in Runnerâ??s World http://www.runnersworld.com/sports-psychology/how-our-brains-experience-public-green-spaces
- See further writeup in NY Times http://well.blogs.nytimes.com/2013/03/27/easing-brain-fatigue-with-a-walk-in-the-park/ (added 27 March 2013) http://www.quantumactivist.com/easing-brain-fatigue-walk-park/ (added 28 March 2013) http://www.huffingtonpost.com/2013/03/29/green-space-meditation-brain-walk-park_n_2964199.html (added 30 March 2013) http://www.scotsman.com/edinburgh-evening-news/latest-news/green-spaces-help-fight-brain-fatigue-1-2865765 (added 31 March 2013) http://anniemurphypaul.com/2013/04/what-goes-on-in-the-urban-brain/ http://blog.womenshealthmag.com/scoop/restore-your-brain/ (added 12 April) http://www.salon.com/2013/09/21/parks_make_us_smarter_science_proves_it/ (added 22 Sep 2013)
- Some more, added 17 April 2013: Daily Telegraph, Saturday 27th April (no web link); The Glasgow Herald, 30th April (no web link); The Sydney Morning Herald http://www.smh.com.au/world/its-official-keeping-calm-is-a-walk-in-the-park-20130403-2h6z1.html

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1. Culture

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1. brain
2. EEG
3. landscape

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