

<b>Institution: University of Bristol</b>
Unit of Assessment: <b>17 – Geography, Environment Studies and Archaeology</b>
Title of case study: <b>Culture evolutionary analysis for business and government.</b>
<p><b>1. Summary of the impact</b> (indicative maximum 100 words)</p> <p>The research of Professor Bentley and colleagues has developed a novel and practical analysis that commercial and government organisations can use to extract social network ‘signatures’ and collective decision patterns from available data that were never intended to measure social influence or ‘decision fatigue’ directly (such as sales figures, trend popularity statistics or other ‘big data’). Since Bentley’s arrival to Bristol University in 2011, this research and impact have proceeded in parallel, as for example in multiple publications with Paul Ormerod, who is co-director of Volterra LLP, an influential consulting company whose direction was informed by this research with Ormerod. Other research was published in trade magazines (e.g., refs [f, g] below) shortly after academic publication (1-6), which led other organisations to follow in applying the methods of data analysis. For example, in 2011-12 Sony Electronics Europe (via Anomaly Communications, London) contracted this analysis of their sales data to distinguish market segments characterised by consumers looking toward ‘expert’ opinion, versus segments in which indiscriminate copying was more prevalent, which fundamentally steered the segment-specific marketing strategies.</p>
<p><b>2. Underpinning research</b> (indicative maximum 500 words)</p> <p>Situated within the larger study of culture evolution, a subfield of both archaeology and anthropology, Professor Bentley’s research has concerned the modelling and understanding of collective ‘herding’ behaviour in society, and testing these models against real-world phenomena. Bentley’s research since starting at the University of Bristol in Sept. 2011 (e.g., refs 1-6, section 3) integrates his ongoing research on the dynamics of ‘random copying’ and cultural drift, into a larger unified framework of discrete choice with social interaction (ref 1). The result at Bristol has been recent papers (1-4) that consolidate these new forms of quantitative evolutionary analysis in applications on real-world data on popular culture change. The analytical framework has now been discussed at length in <i>Behavioral and Brain Sciences</i> (ref 1) with thirty different academic responses. Simultaneously, Bentley et al. communicated this research to business audiences via a popular book (ref [a], section 5) and in prominent trade magazines like <i>European Business Review</i> (refs [b, f, g, h]). This led directly to Bentley’s speaking invitations for large business audiences (refs [g–i]).</p> <p>This research is increasingly relevant in the digital age, when big-data record collective decision-making in populations. As <i>New York Times</i> recently discussed (15 April 2013), big data agenda lacks a coherent framework of social theory. A specific challenge is that social influence is rarely measured by big data directly. Although big data directly record the where and when of everyday user activity, Bentley et al. research what big data reveal indirectly about <i>how</i> decisions are made, how collective behaviour evolves on different time scales, and how this varies across communities.</p> <p>The research of Bentley and colleagues is intended to provide a foundational analytical framework, summarised as an interpretive “map” of collective decision making that is diagnostically applicable to time-stratified decision data (refs 1,6). Grounded in a novel combination of discrete choice theory and the economics of social influence, the analytical framework enables the extraction, from big data, two elusive but important components of decisions: (1) the degree of social influence and (2) the ‘transparency’ of decision, or how well-informed a decision is. The analytical approach measures the effect of social influence and how well-informed the decisions are on the aggregate scale. The approach extracts statistical patterns from sales data that identify when ‘copying’ is taking place in a category (e.g. skewness of the distribution of sales data) as well as when the choices within categories are easy or hard to discriminate (noise patterns of data). Its value lies in extracting these ‘signatures’ from available data that were never intended to characterize social influence directly, such as trend popularity statistics (refs 1, 6).</p>

**3. References to the research** (indicative maximum of six references)

- [1] Bentley, R.A., M.J. O'Brien & W.A. Brock (2013). Mapping collective behavior in the big-data era. *Behavioral & Brain Sciences*. Preprint available from: [http://journals.cambridge.org/images/fileUpload/documents/O'Brien\\_BBS-D-11-00658\\_preprint.pdf](http://journals.cambridge.org/images/fileUpload/documents/O'Brien_BBS-D-11-00658_preprint.pdf)
- [2] Acerbi, A., V. Lamos, P. Garnett & R.A. Bentley (2013) The expression of emotions in 20<sup>th</sup> century books. *PLoS ONE* 8(3): e59030. DOI: 10.1371/journal.pone.0059030.
- [3] Bentley, R.A. & M.J. O'Brien (2013). Cultural evolutionary tipping points in the storage and transmission of information. *Frontiers in Psychology* 3: article 569. DOI: 10.3389/fpsyg.2012.0056.
- [4] Bentley, R.A., P. Garnett, M.J. O'Brien & W.A Brock (2012). Word diffusion and climate science. *PLoS ONE* 7(11): e47966. DOI: 10.1371/journal.pone.0047966.
- [5] Bentley, R.A. & P. Ormerod (2012). Accelerated innovation and increased spatial diversity in U.S. popular culture. *Advances in Complex Systems* 15: 1150011. DOI: 10.1142/S0219525911003232.
- [6] Bentley, R.A., M.J. O'Brien, and P. Ormerod (2011). Quality versus mere popularity: a conceptual map for understanding human behaviour. *Mind & Society* 10: 181-191. DOI: 10.1007/s11299-011-0087-4.

**4. Details of the impact** (indicative maximum 750 words)

Applied to the commercial world, the research recognizes highly important factors in social and economic activity, namely (a) the propensity to copy others and (b) how well informed the deciders are, in their ability to discriminate between available choices, such as products in a category. Without prior assumptions, the analysis extracts signatures of social influence and transparency of decision-making (1). This serves as an effective focusing 'lens' for marketing efforts. Marketing something that is very socially visible and easy to discriminate, for example, is quite different from marketing something that is socially invisible or not discriminable from similar alternatives.

By saving wasted marketing effort, the analysis has fundamentally steered real marketing strategies, often away from those mis-targeted at individual, 'rational' agents without social influence. Applying the analysis (section 2) to sales data, for instance, often indicates that people copy much more indiscriminately than often assumed, especially when subjected to social media influences. When this is the case, the best strategy is to generate critical mass for the product and then position it as a more considered decision or purchase. If, on the other hand, if the analysis of sales data reveals more well-directed social influence, then survey methods can be used to identify the characteristics of "Influential" individuals within the network as a focus of dissemination efforts.

**Volterra Consulting, LLP** Bentley's academic collaboration with Volterra co-Director Paul Ormerod (e.g. refs 5, 6, [f], sections 3, 5) has informed the actions of this prominent and influential economic consultancy in London. Although Bentley has not worked directly on Volterra's projects, his Bristol-based research with Ormerod contributes to Volterra's approach toward numerous clients. For example, Volterra's 2011 project revealing how social networks account for the rise in U.K. binge drinking ([www.volterra.co.uk/publication-archive](http://www.volterra.co.uk/publication-archive)) was influenced by collaboration of Bentley with Ormerod and B. Tarbush at Volterra on "Network effects on decisions among many similar choices" (later presented by Bentley at 'NetSci,' Northwestern University, June 2012).

**Sony Electronics Europe, 2012.** The framework of Bentley's research was the basis for a substantial change in Sony's marketing approach in Europe. The 2012 project, with Mark Earls, was done via Anomaly Communications, London, to which in 2009 Sony Europe contracted its £50 million advertising account. Bentley's social-copying models lay at the core of the analysis of the sales dynamics of a range of portable electronics across a number of different European geographies. Basically, the analysis revealed that certain segments of the electronic camera market was characterised by consumers looking toward 'expert' opinion, whereas in other segments, fairly indiscriminate copying characterised consumer choices. These segment region-specific patterns allowed Sony and Anomaly to customise their marketing strategies accordingly. Geoff Gray, Partner at Anomaly, confirms this [m], and Giles Morrison (now at Unilever U.K.) says:

*As a senior marketer working in a complex organisation, across categories and national*

*borders, I found the novel approach (from Alex Bentley and Mark Earls) very useful. Because it used our own sales data, it allowed us to focus conversations about what to do on the facts of consumer behaviour rather than opinion and assumption. Because it focussed on patterning in the data, it allowed us create consensus about similarities and differences in our categories very quickly and simply. As a result of this, we found it much easier to develop appropriate regional creative solutions and communications mixes ... the immediate benefits of this technique are organisational - they help us make better decisions, faster and together, something which is incredibly valuable. [n]*

**HERD consulting:** In work similar to the Sony example above, Bentley has partnered as consultant at HERD consulting with Mark Earls, who has held senior posts at Ogilvy & Mather. Earls and Bentley have done public presentations together at the Royal Society of Arts (Nov 2011), Ogilvy “Big Data Debate” (June 2013), the Market Research Society (2012) and The Royal Mail (Sept 2012). The feedback from these events (mostly online) testifies to how it has helped organisations strategise their communications strategies. Earls and Bentley are writing a new follow up to their 2011 MIT book (ref. [a]) and will continue to pursue high-profile public speaking engagements and consultancies with marketing divisions with which they have worked already, such as Royal Mail, Modernista!, Channel 4, Unilever, BrainJuicer, Ogilvy & Mather and others.

**Sanofi Pasteur Pharmaceuticals:** In 2012, Sanofi Pasteur MSD sponsored Professor Bentley to visit their headquarters in Lyon, France (March 2012) to spend a day discussing/presenting the relevance of his research to this pharmaceutical industry. Subsequently Bentley was sponsored by Sanofi Pasteur to present "An anthropologist's view on vaccination" to an international audience of hundreds of medical doctors at the European Society for Paediatric Infectious Diseases (ESPID, 9 May 2012). Bentley maintains his relationship with Sanofi Pasteur through Dr. Rosybel Drury, Senior Manager of Medical Affairs. Relatedly, Bentley and Professor Adam Finn (Bristol Clinical Medicine, who also works with Sanofi Pasteur) led a session public engagement concerning vaccination and behaviour at the 2012 “Engage” event in Bristol (coordinated by Sophie Duncan, National Coordinating Centre for Public Engagement).

## 5. Sources to corroborate the impact (indicative maximum of 10 references)

### **Book aimed at general/commercial audience**

- [a] **Bentley, R.A.**, M. Earls, & M.J. O'Brien (2011). *I'll Have What She's Having: Mapping Social Behavior*. MIT Press. “This book is a very sophisticated treatment of the most critical influence on consumer decision-making. Every marketing plan must include this thinking in order to have a chance of being successful.” -- Robert Barocci, President and CEO, The Advertising Research Foundation.

### **Invited articles for popular press, business and government publications**

- [b] Earls, M. & **R.A. Bentley** (2013). Big data, not magic data. *Admap* (Sept).  
 [c] **Bentley, R.A.** & M.J. O'Brien (2012). The buzzwords of the crowd. *NY Times*, 1 Dec 2012.  
 [d] Strong, C., P. Ormerod & **R.A. Bentley (2013)** Under the influence. *Research* (magazine of the Market Research Society), 23 Jan 2013.  
 [e] **Bentley, R.A.**, Mark Earls and Michael O'Brien (2012). Mapping human behavior for business. *European Business Review*, May-June 2012: 23-26.  
 [f] Earls, M. & **R.A. Bentley** (2011). Memorandum (w/ Mark Earls) for 2011 House of Lords' Science and Technology Committee on Behaviour Change, pp. 319-323.  
<http://www.parliament.uk/documents/lords-committees/science-technology/behaviorchange/BCwrittenevidenceHtoM.pdf>

### **Presentations for substantial (100+) business, medical and/or government audiences**

- [g] **Royal Society of Arts** (public videotaped talk with M. Earls, invited by RSA, 3 Nov 2011).  
 [h] **Google@SocialMediaWeek** (London 16 Feb 2012, sponsored by Google+)  
 [i] **European Society for Paediatric Infectious Diseases**, May 2012, (Thessaloniki, Bentley sponsored by Sanofi Pasteur MSD)  
 [j] **Big Data Debate** (6 June 2013 London, sponsored by Ogilvy Europe, The Digital Media Innovation Consultancy project, and EU FP7).

### **Presentations for business with prospect of active collaboration**

- [k] **Activate Networks** (24 Aug 2013), a Boston-based start-up company founded by N.

**Impact case study (REF3b)**

Christakis and others (Board of Directors includes U.S. Senator William Bradley).

- [l] **Sanofi Pasteur MSD** (March 2012), Lyon France, to present the research to the head office of this European pharmaceutical company.

***Individuals who have provided a factual statement or could be contacted***

[m] Partner, Anomaly.

[n] Creative Excellence Director, Unilever Global (former Brand Director, Consumer Marketing at Sony Europe).