ESRC End of Award Report

For awards ending on or after 1 November 2009

This End of Award Report should be completed and submitted using the **grant reference** as the email subject, to reportsofficer@esrc.ac.uk on or before the due date.

The final instalment of the grant will not be paid until an End of Award Report is completed in full and accepted by ESRC.

Grant holders whose End of Award Report is overdue or incomplete will not be eligible for further ESRC funding until the Report is accepted. We reserve the right to recover a sum of the expenditure incurred on the grant if the End of Award Report is overdue. (Please see the ESRC Research Funding Guide for details.)

Please refer to the Guidance notes when completing this End of Award Report.

Grant Reference	RES-062-23-2462		
Grant Title	The rank principle in social and cognitive comparison		
Grant Start Date	1 Oct. 2010	**Total Amount Expended:**	£401,291
Grant End Date	30 Sept. 2013		
Grant holding Institution	University of Warwick		
Grant Holder	Prof. Gordon D. A. Brown		
Grant Holder's Contact Details	**Address**		**Email**
	Dept. of Psychology University of Warwick COVENTRY CV4 7AL		g.d.a.brown@warwick.ac.uk
			Telephone
			024 765 24672
Co-Investigators (as per project application):		**Institution**	
Prof. Alex M. Wood		University of Manchester (now University of Stirling)	

1. Non-technical summary

Please provide below a project summary written in non-technical language. The summary may be used by us to publicise your work and should explain the aims and findings of the project. *[Max 250 words]*

How long is a fair prison sentence for a crime? What determines students' satisfaction with their educational experience at University? What makes people decide whether they are drinking too much alcohol?

   The project explored the idea that people's answers to questions such as these are highly *relative* in nature. For example, consider two students who both drink the same amount of alcohol each week. However one student believes that 80% of other students drink more than she does herself; the other student thinks that only 15% of students drink less than he does himself. We find that the second student is likely to be more concerned about her level of drinking than the first, even though in fact they both drink the same amount.

   The research developed and tested a simple mathematical model of everyday judgements such as these and tested the model in a number of real-world contexts. The model was used to help understand issues such as students' judgements about their satisfaction with their educational experience, perception of crime seriousness, judgements of personality, people's perception of the amount they exercise, the amounts of money people are willing to pay for particular products, and a number of others. In all cases it was found the judgements were influenced by the context of comparison in ways predicted by the model. An extended version of the model, dubbed Social Sampling Theory, was developed to account for social-level phenomena such as political polarisation.

2. Project overview

a) Objectives
Please state the aims and objectives of your project as outlined in your proposal to us. *[Max 200 words]*

1) To develop and test rank-based models of cognitive judgement, social comparison, and decision making

2) To extend the domain of applications of such models to a variety of real-world domains (e.g. judgements of legal, economic and political quantities)

3) To collect a body of experimental data applying context-based models and judgement and choice to a variety of socially important domains

4) To explore and test the relation between different classes of models of judgement (range-frequency theory, decision by sampling, and peak-end theory)

b) Project Changes

Please describe any changes made to the original aims and objectives, and confirm that these were agreed with us. Please also detail any changes to the grant holder's institutional affiliation, project staffing or funding. *[Max 200 words]*

No changes were made to the original aims and objectives, which have been met in full. Indeed, we are pleased to be able to report that we have exceeded our targets and been able to make progress substantially beyond the original aims and objectives.

There have been no changes to project staffing: Dr Silvio Aldrovandi has been employed as postdoctoral researcher on the grant throughout its entire period.

Alex Wood, the co-investigator on the grant, was based in the Division of Psychological Science at the University of Manchester at the time the grant was awarded. At the end of 2012 he moved to become Professor and Director, Behavioural Science Centre, Stirling Management School, University of Stirling. This move was entirely positive for the progress of the research; the investigators have continued to meet regularly in both Warwick and Stirling, and the move of Wood to the highly interdisciplinary environment at Stirling's Behavioural Science Centre enabled him to take the research in new directions.

c) Methodology

Please describe the methodology that you employed in the project. Please also note any ethical issues that arose during the course of the work, the effects of this and any action taken. *[Max 500 words]*

The research has involved four complementary methodologies.

First, we have conducted a large number of laboratory-based experiments to test the predictions of the contextual model of judgement that formed the theoretical backbone of the project. Many of these laboratory experiments have been quite labour-intensive, involving individual subject testing. For a number of the experiments involving economic behaviour (such as the effects of "anchors" on people's estimates of how much they are willing to pay for products) we have gone beyond what is normal within experimental psychology and made use of incentive compatible methodologies of the type developed within behavioural economics.

Second, we have tested the predictions of our model using a number of large-scale datasets. Specifically, we have tested hypotheses using the British Household Panel Survey (now Understanding Society), the German Socio-Economic Panel, the World Values database, and the US-based Behavioural Risk Factor Surveillance System (BRFSS).

Third, we have made extensive use of mathematical modelling techniques. These have been used both to calculate maximum likelihood fits of mathematical models of judgement to the experimental data we have collected, and to explore the predictions of various different models.

Fourth, and going beyond what we anticipated would be possible in the originally stated aims and objectives, we have used agent-based modelling techniques to explore the behaviour (especially polarisation) of social networks of individual agents, in which each agent is influenced by the observed behaviour of its network neighbours according to the rank-based principles of judgement that have formed the focus of the overall project.

No unusual ethical issues arose during the course of the research; institutional approval was obtained in the normal way as required, and we ensured that the conduct of all experiments conformed to the requirements of both the British Psychological Society and the American Psychological Association.

d) Project Findings

Please summarise the findings of the project, referring where appropriate to outputs recorded on the ESRC website. Any future research plans should also be identified. *[Max 500 words]*

We summarise progress under the originally stated objectives.

1) To develop and test rank-based models of cognitive judgement, social comparison, and decision making

We have developed a Bayesian extension of the rank-based models of judgement and choice that provided the theoretical underpinnings of the initial proposal. We have applied the extended model to the social comparison processes that may be involved in social contagion effects, as when obesity and levels of alcohol consumption can be seen to propagate through social networks.

2) To extend the application of such models to a variety of real-world domains, and 3) to collect a body of experimental data applying the models to a variety of socially important domains

We have applied the rank-based model to a variety of real-world domains. Space permits only a few examples to be listed.

Students' attitudes to indebtedness. We have shown that students' level of concern with the level of indebtedness they expect to have incurred by the time they graduate is given partly by their anticipated level of indebtedness (as expected) but also by how they believe that level of indebtedness ranks within the students' estimated distributions of amounts that other students will owe. This study is currently in press.

Perception of own alcohol consumption. A series of studies has applied our cognitive model of judgement to drinkers' perceptions of the riskiness of their own alcohol consumption. In two experiments, the rank of an individual's drinking in a context of other drinkers predicted their perceptions of their risk of developing alcohol-related disorders. The results have already been published.

Education. We have examined whether and how students' satisfaction with their educational experience depends on the context of comparison (such as inaccurate beliefs about the distribution of provision at other universities). We found strong effects of beliefs and comparison context. This paper is currently under revision.

Other areas. A number of studies applying the model to other domains (price perception, exercise levels, overweightness, self-perception of anxiety and depression, perception of crime seriousness) have been completed and are either published or in process.

4) To explore and test the relation between different classes of models of judgement

An apparent limitation of existing rank-based models of judgement is their inability to account for so-called range effects and anchoring effects in consumer price perception and

choice. We have developed an extended model that assumes that consumers infer price distributions from the (often impoverished) sample of prices that they view. We have conducted a series of experiments — using incentive-compatible designs — to test the predictions of the new model, and results are consistent with the new approach.

In a separate strand of theoretical development we have integrated our existing model of judgement with existing models of memory.

Future plans, beyond the publication of some of the remaining results from the grant, revolve around (a) extending the model of individual judgement to account for social-level phenomena, and (b) developing and testing, in collaboration with others, health-related interventions based on our theoretical model.

e) Contributions to wider ESRC initiatives (eg Research Programmes or Networks)

If your project was part of a wider ESRC initiative, please describe your contributions to the initiative's objectives and activities and note any effect on your project resulting from participation. *[Max. 200 words]*

N/A

3. Early and anticipated impacts

a) Summary of Impacts to date

Please summarise any impacts of the project to date, referring where appropriate to associated outputs recorded on the Research Outcomes System (ROS). This should include both scientific impacts (relevant to the academic community) and economic and societal impacts (relevant to broader society). The impact can be relevant to any organisation, community or individual. *[Max. 400 words]*

The primary impacts to date relate to two distinct areas.

First, on the empirical side we have shown that common principles of judgement and choice are relevant to a number of everyday choices and behaviours, such as people's perceptions of their personality, weight, alcohol consumption, and healthy food consumption, anxiety and depression, and exercise levels. In all these cases we have shown that individuals judgements of the relevant quantities are informed by the context of comparison and the individuals judgements about what is socially "normal".

Results are also relevant to economic phenomena; several of our experiments have shown that price perception and willingness to pay the products, "anchoring" effects on consumer price processing, and the relation between income and mental health all follow similar principles.

On the theoretical side, our development of a relative rank model and social sampling theory

considerably extend the generality and range of application of rank-based models of judgements as well as showing that they can be applied to social-level phenomena such as political polarization. Some of these papers are yet to appear in print, but have already been disseminated extensively at conferences and workshops.

Extensive dissemination has already been achieved, in terms both of publications in peer-reviewed journals and oral presentations at conferences, workshops, and seminars.

16 journal articles are already published or "in press", with several more at various stages of the submission process. Our strategy, as stated in the original application, was to publish in high-status general journals but also to target international journals in the areas most relevant to each section of the research. We have achieved this aim, with papers having appeared in, for example, *Alcohol and Alcoholism, Journal of Affective Disorders, Journal of Sport and Exercise Psychology, and Studies in Higher Education.*

We have made more than 30 presentations of the research results arising from the grant, mostly to primarily academic audiences but also including some presentations to specialist user groups (e.g. the Allianz Oxford Pensions Forum, 2012).

b) Anticipated/Potential Future Impacts

Please outline any anticipated or potential impacts (scientific or economic and societal) that you believe your project might have in future. *[Max. 200 words]*

It is hoped that much of the basic research will lead to future impact in the form of improved interventions in a number of areas of application, such as unhealthy food consumption, alcohol intake, measurements of student satisfaction, exercise levels, and so on.

Several of the key papers have been published in the relevant field-specific journals, and several more are at various stages of the publication process. We are keen to maintain momentum, and will do whatever we can to ensure that the impact is felt as widely as possible.

Future impact will be facilitated through Wood's involvement (as Director) in the Behavioural Science Centre at the University of Stirling. The Centre organises regular workshops focussed around issues of behavioural science and practice, and also hosts a highly influential blog. Impact will also be facilitated by Brown's involvement in the ESRC funded Network for Integrated Behavioural Science (NIBS) which is funding the universities of Nottingham, Warwick, and East Anglia for a period of four years with the explicit aim of bringing together theory, policy, and practice in the area of behavioural science.

You will be asked to complete an ESRC Impact Report 12 months after the end date of your award. The Impact Report will ask for details of any impacts that have arisen since the completion of the End of Award Report.

4. Declarations

Please ensure that sections A, B and C below are completed and signed by the appropriate individuals. The End of Award Report will not be accepted unless all sections are signed. Please note hard copies are **not** required; electronic signatures are accepted and should be used.

A: To be completed by Grant Holder

Please read the following statements. Tick **one** statement under ii) and iii), then sign with an electronic signature at the end of the section (this should be an image of your actual signature).

i) The Project

This Report is an accurate overview of the project, its findings and impacts. All co-investigators named in the proposal to ESRC or appointed subsequently have seen and approved the Report.	☒

ii) Submissions to the Research Outcomes System (ROS)

Output and impact information has been submitted to the Research Outcomes System. Details of any future outputs and impacts will be submitted as soon as they become available. **or**	☒
This grant has not yet produced any outputs or impacts. Details of any future outputs and impacts will be submitted to the Research Outcomes System as soon as they become available.	☐

iii) Submission of Data

Data arising from this grant have been offered for deposit with the UK Data Service. **or**	☒
Data that were anticipated in the grant proposal have not been produced and the UK Data Service has been notified. **or**	☐
No datasets were proposed or produced from this grant.	☐