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Using Marketing Concepts to Facilitate Upstream Public Engagement with Science

A thesis presented in partial fulfilment of the requirements for the degree of

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Abstract

This thesis investigates whether marketing theories and methodologies can be used to facilitate upstream public engagement with contentious scientific issues. Upstream engagement requires the early involvement of citizens in decisions about new science or technology from the conceptualisation stage onwards; before ingrained attitudes, social representations or frames in the media bias responses. Contemporary approaches to science communication lack consensus on the most appropriate approach to engage the public with new science and technology.

The research addresses upstream communication in the context of climate engineering. Scientists and the International Panel for Climate Change are considering climate engineering as a potential solution to global warming, given that the present methods of mitigation and adaptation have so far failed to sufficiently reduce global temperatures to a level of 1.5 degrees above pre-industrial levels. The communication of potential solutions to global warming is a vital part of a critical global issue that will impact the planet's eco-systems, biodiversity and future generations. Marketing may be able to provide methodologies and techniques for evaluating and measuring public perceptions of climate engineering.

As well as contributing to upstream science communication and public engagement, the research contributes to marketing theory in two ways. First, it extends the application of brand image research founded on the Associative Network Theory of Memory (ANTM) to science concepts, demonstrating the robustness of the theory. Second, it extends the information dual-processing theory to investigate the effects of intuitive and deliberative thinking on concept evaluations, and whether these views change with greater deliberation.

In the qualitative phase, thirty exploratory semi-structured depth interviews, using two methods of attribute elicitation, provided 12 common attributes associated with climate engineering. The findings identified an overall negative public reaction to the four climate engineering technologies tested. The independent qualitative findings also revealed a strikingly clear result – Carbon Dioxide Removal technologies are perceived more positively than Solar Radiation Management technologies.

The subsequent quantitative on-line surveys tested public perceptions of six climate engineering techniques in Australia ($n=1,006$) and New Zealand ($n=1,022$). The results of the on-line surveys supported the qualitative findings that associations with climate

engineering techniques are predominately negative, and allowed further diagnostic insights into the sources of these evaluations for each of the individual techniques tested. The analysis established the data are robust and stable across the two countries and the methodologies are validated by the strikingly similar aggregate findings across the qualitative and quantitative stages.

For the comparison of intuitive and deliberative thinking on memory associations with climate engineering the effects are measured by comparing within sample groups split by the length of time taken to complete the online survey. In Australia, the findings show that greater deliberative thinking is associated with more negative evaluations, indicating that intuitive and deliberative thinking do give different results in *magnitude*, if not in *direction* for these data. In New Zealand, greater deliberative thinking is not associated with more negative evaluations suggesting that the effect of deliberative thinking on the evaluation of climate engineering concepts is moderated by the country of study, or by the prior beliefs of the country's population.

A final stage of research used five focus groups in New Zealand to investigate whether deliberative arguments and interactions help participants make sense of unfamiliar, multi-faceted or contentious issues, and whether different perspectives are influenced by age, gender or the ethnicity of participants. Overall, most participants were sceptical of climate engineering, although some between-group differences were apparent. Knowledge of climate engineering varied between groups, with younger participants unaware of climate engineering, and reluctant to consider research on the technologies. Conversely, in the retiree group all but one participant had heard of climate engineering and the most of the participants were receptive to the idea of proceeding with research on climate engineering technologies. This further demonstrates that the effects of deliberation may be context specific.

The results confirm the practicality of extending concept testing and measurement of memory associations to upstream engagement for controversial scientific methods, showing convergent validity across countries and methods. The results demonstrate that mixed mode research using marketing techniques yields a range of insights that are not otherwise available in upstream public engagement. Finally, the research finds that more deliberative responses may affect the magnitude of concept evaluations, but the effect is contextual. This highlights the need for further research to provide better understanding of the effect of deliberation on evaluations.

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I pass on to you an Irish blessing from my cultural heritage.

*May love and laughter light your days,
And warm your heart and home,
May good and faithful friends be yours,
Wherever you may roam,
May peace and plenty bless your world,
With joy that long endures,
May all of life's passing seasons,
Bring the best to you and yours.*

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Journal Article

Wright, M. J., Teagle, D. A. H., & **Feetham, P. M.** (2014). A quantitative evaluation of the public response to climate engineering. *Nature Climate Change*, 4(2), 106-110.

Conference Papers in Proceedings

Feetham, P., Wright, M., Comrie, M., Teagle, D. (2012, December 1). Public reaction to climate geoengineering: An exploratory study. In R. Lee (Ed.), 2012 ANZMAC Annual Conference—*sharing the cup of knowledge* Adelaide, South Australia.

Feetham, P., Wright, M., Teagle, D. Comrie M. (2015, November 30). Qualitative evaluations of new scientific concepts: Accurate, fast, easy and inexpensive. In A. Sinha., J. Cadeaux. J., T Bucic (Eds.), 2015 ANZMAC Annual Conference-*Innovation and growth strategies in marketing* Sydney, Australia.

Funded Panel Participant Climate Engineering Conference-Berlin 2014

Panel Presentation

Feetham, P., Wright, M., Teagle, D. (2014, August 20). Qualitative in-depth interviews uncover public responses to climate engineering. *Climate Engineering Conference 2014: Critical Global Discussions*. Potsdam : Institute for Advanced Sustainability Studies (IASS) Berlin, Germany. DOI: <http://doi.org/10.2312/iass.2015.008>

Seminar Presentations

Invited speaker at the Biochar Workshop – The final answer 4 -5th July, 2013 at Massey University, Palmerston North.

Feetham, P., Wright, M., Teagle, D. Comrie, M. (2013, July 5). Public perceptions of Biochar in a climate engineering context. *Biochar Workshop – The final answer*. Massey University: Palmerston North

Feetham, P. M. (2013, March 20). Public Reaction to Climate Engineering. *CJM Seminar Series*. Massey University, Palmerston North.

Feetham, P. M. (2015, March 18). Do Citizens' Evaluations of Climate Engineering vary with Deliberation? *CJM Seminar Series*. Retrieved from <http://connect.massey.ac.nz/cjm-pn-seminar/>

