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Community acceptance of recycled water - can we inoculate the public against scare campaigns?

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Community Acceptance of Recycled Water: Can We Inoculate the Public Against Scare Campaigns?

Abstract

Without improved water resource management, it is predicted that water shortages will affect two-thirds of humanity by 2025. One solution that has traditionally faced fierce public resistance is recycled waste water. This study investigates the extent to which public communication strategies can influence community acceptance of recycled water, using the framework of Inoculation Theory. A four-phase experimental design was conducted. Participants completed an initial questionnaire and were then randomly assigned to a control group, a manipulation check group or a treatment group. A final follow-up survey measured changes in the dependent variable: stated likelihood of using recycled water for different uses. Results indicate that communication strategies based on Inoculation Theory are limited in their effectiveness for this product category. Findings do, however, identify a clear recency effect indicating that continuous public communications is key to ensuring that community scare campaigns do not prevent implementation of water augmentation projects. This study differs from previous applications of Inoculation Theory because of the challenges associated with marketing a monopoly commodity which is a necessity to support life. This empirical study uses fictional marketing stimuli to test the theory in a context which is growing in global importance.

Keywords:

Community acceptance, recycled water, Inoculation Theory, public communications

Introduction

Water is a unique public good which has no direct substitute. Humans and the environment rely on water to support life. Yet in many situations water is treated as a commodity (often a monopoly commodity), exploited to meet human demand. Such human exploitation of water has seen per capita demand increase in many countries. At the same time, pollution of water sources has been increasing. As a consequence, the United Nations Educational Scientific and Cultural Organization declared ‘a looming water crisis’ [<http://portal.unesco.org>], a decision supported by others including Seckler et al. (1999, p. 29) who state ‘water scarcity has become the single greatest threat to food security, human health and the natural ecosystem’ [p. 29]. Cities around the world are facing significant challenges to meeting both the need and demand for water (Postel, 1992).

This crisis of water management has driven jurisdictions around the world to initiate community and industry demand management programs. In many situations the need arises to explore the feasibility of augmenting existing supplies (for example, surface water dams and ground water) through the production of alternative sources of water such as recycled waste water and desalinated sea water. However such augmentation can have significant costs both financially, socially, and to the environment (Hurlimann, 2007a).

Augmentation of water supplies with recycled water can occur for a range of purposes. For example, low quality recycled water can be used to irrigate public parks and gardens, reducing total demand on drinking (potable) water supplies. This has been the dominant approach to water recycling in Australia to date (Australian Academy of Technological Sciences and Engineering, 2004). In some areas of the world, recycled water has been treated to a high quality for drinking purposes. For example, the city of Windhoek in Namibia had a rapidly growing population, but the area had a very low annual rainfall and did not have sufficient supplies of water. In 1969 this shortfall was remedied when the city built a waste water (sewage) recycling scheme to supply residents with drinking water (du Pisani, 2006). Indirect potable reuse of recycled water has also occurred in Singapore, Europe, and the USA (Law, 2003).

In contrast to Windhoek, however, a number of planned indirect potable reuse projects around the world have failed. While evidence surrounding the failure of many such projects is largely anecdotal, a commonly identified contributing factor is negative consumer attitudes (Hurlimann and McKay, 2004; Christen, 2005). For example, in Australia, a planned potable reuse scheme for the city of Toowoomba failed after community members voted against it in a referendum (Hurlimann and Dolnicar, 2010). This was also the case for other potable reuse projects, including those planned for San Diego, USA (Christen, 2005) and Maroochy, Australia (Stenekes, Schaefer and Ashbolt, 2001). Failure of a project to gain consumer acceptance often results in significant loss of public time and resources. As recognized by Dishman et al. (1989, p. 158) ultimately, “the issue of public acceptance could kill the [water augmentation project] proposal” (p. 158).

As will be discussed in the Literature Review section of this paper, much research has investigated public acceptance of alternative water sources, however there has been very little research which informs governments about communications strategies and the prevention of public opposition campaigns (often labeled 'scare' campaigns) having their intended impact. Such strategies are important because in a number of failed water projects consumer group campaigns against the project successfully subjugated official government marketing efforts (see Hurlimann and Dolnicar, 2010 for the case of Toowoomba, and Stenekes *et al.*, 2001 for the case of Maroochy).

The aim of this paper is to investigate the effectiveness of public communications in building resistance amongst the population towards recycled water scare campaigns. We investigate whether Inoculation Theory, which has proven effective in a range of public campaigns (Pfau and Burgoon, 1988; Wood, 2007; Compton and Pfau, 2008) can be used effectively in the context of recycled waste water.

Literature Review

Influences on 'Willingness to Use'

The drinking of recycled water has traditionally been met with resistance. From as early as Bruvold and Ward's (1970) founding study, drinking has been consistently one of the least popular uses of recycled water. This has been supported by many subsequent studies (Bruvold and Ward, 1972; Baumann and Kasperson, 1974; Sims and Baumann, 1974; Stone and Kahle, 1974; Olson *et al.*, 1979; Bruvold, Olson and Rigby, 1981; Milliken and Lohman, 1985; Bruvold, 1988; Sydney Water, 1999; Hurlimann and McKay, 2003; Marks, 2004; Po *et al.*, 2005; Marks, Martin and Zadoroznyj, 2006; Hurlimann, 2007b) which have demonstrated the public's lack of willingness to drink recycled water.

When considering the causes for such opposition to recycled water, a number of factors have been suggested. One of the earliest suggestions was the examination of demographic characteristics as predictors of recycled water acceptance. Factors include education level (Sims and Baumann, 1974; Olson *et al.*, 1979), age (Hanke and Athanasiou, 1970; Hurlimann and McKay, 2003), gender (Baumann and Kasperson, 1974; Tsagarakis *et al.*, 2007), and a combination of factors (Sims and Baumann, 1974; Bruvold, Olson and Rigby, 1981; Sydney Water, 1999). However, when viewed in synthesis, conclusions about demographic predictors of recycled water acceptance are often unclear and contradictory, leading Marks (Marks, 2004, p. 10) to suggest that "...apart from gender, there are no demographic and social influences that predict acceptance of potable reuse" (p. 10).

Health concerns have also been hypothesised in the past to influence willingness to use recycled water (Olson *et al.*, 1979; Dishman, Sherrard and Rebhun, 1989; Sydney Water, 1999; Baggett, Jeffrey and Jefferson, 2006; Marks, Martin and Zadoroznyj, 2006), specifically, concerns with water quality (Higgins *et al.*, 2002; Po *et al.*, 2005; Baggett, Jeffrey and Jefferson, 2006). In addition, climate (Bruvold and Ward, 1970; Baumann

and Kasperson, 1974), past experience (Sims and Baumann, 1974; Olson *et al.*, 1979; Dishman, Sherrard and Rebhun, 1989), economic and environmental costs (Baggett, Jeffrey and Jefferson, 2006; Hartley, 2006), trust (Olson *et al.*, 1979; Sydney Water, 1999; Hurlimann and McKay, 2004; Marks, 2004; Po *et al.*, 2005; Hurlimann, 2007b) and the provision of information (Po *et al.*, 2005; Stenekes *et al.*, 2006) have all at one time been associated with recycled water acceptability.

In response to these factors it can be argued that communications efforts represent a potential means for increasing acceptance of recycled water; effective marketing may serve to provide information to the public and increase consumer trust in the water authority. The next section reviews previous marketing communications interventions employed to increase public willingness to use recycled water.

Studies Investigating Intervention Effectiveness

Despite the potentially vital role of public communications, there has been very limited research into the effectiveness of actual communications interventions in a recycled water context. As demonstrated, researchers have extensive knowledge about the factors influencing public acceptance, but limited knowledge about strategies to overcome negative influences.

One strategy with demonstrated success at increasing willingness to use is labeling. The graphical symbols used to denote recycled water were the focus of an experiment by Tsagarakis *et al.* (2007). In this study, the traditional purple-colored tap symbol currently used to represent recycled water was compared with a new set of symbols that had been empirically derived in a previous study (Mellon and Tsagarakis, 2006). Through face-to-face interviews (n=807) conducted in Greece, two groups of respondents were asked questions relating to their intentions to use recycled water for different purposes. One group was presented with the currently used symbol; the other was presented with the newly designed alternatives. Significantly, a substantially higher willingness to use recycled water was associated with the experimental group exposed to the alternative symbols. This study demonstrates that even seemingly insignificant elements of a water recycling system can play a part in shaping acceptance. However, it is important to consider the role of culture on the interpretation of symbols (Kaufman, 2004), therefore the applicability of these results in other cultural contexts is unknown.

Recycled Water Overview

It has been clearly shown in the background literature that public opposition to recycled water remains a barrier to its adoption. This public opposition can be explained by a plethora of reasons suggested by the reviewed literature. Despite this, however, very limited research has been conducted into practical strategies for overcoming such opposition. Studies examining intervention effectiveness usually focus on one particular technique (such as symbols) and results are therefore difficult to apply in terms of a holistic strategy. The present study aims to address this knowledge gap by examining the

effectiveness of alternative communication strategies in changing public perceptions of recycled water. In particular, the present study introduces Inoculation Theory to the area of recycled water research for the first time. Inoculation Theory is particularly relevant for preparing audiences for anticipated counterarguments, such as those presented to the Toowoomba community by the group 'Citizens Against Drinking Sewage,' who were campaigning against the indirect potable reuse scheme proposal.

Theoretical Foundation: Inoculation Theory

Inoculation Theory is often referred to as 'the grandparent theory of resistance to attitude change' (Eagly and Chaiken, 1993) and has been influential within the field of communications research since its inception. The theory was first proposed by McGuire (McGuire, 1961) and centers around the use of refutational messages, which mention and refute arguments known to be counter to the marketer's position. McGuire hypothesizes that refutational messages lead to greater resistance to attitudinal change than supportive messages which simply state arguments in favor of the marketer's position, without referring to possible counterarguments. He tests this hypothesis in an experiment (n=168) involving cultural truisms - universally accepted beliefs that individuals would not have been previously called upon to defend (for example, receiving medical check-ups and cleaning teeth after meals). Findings indicate that refutational approaches are generally superior to supportive approaches in bolstering resistance to attitudinal change.

McGuire [1961] also proposes two variations of refutational messages, relating to the order in which messages are viewed. The first type of refutation, named 'inoculation', occurs when refutation of counterarguments are presented prior to attack. In contrast, 'restoration' involves refutation which occurs after exposure to attack messages. No clear differences attributable to order sequence were found by McGuire; hence the inoculation approach was not shown to be significantly superior to restoration. Interestingly however, almost every subsequent study of Inoculation Theory has assumed the superiority of the inoculation approach. The present study re-tests for possible order sequence effects in the unique context of recycled water acceptance.

A study which extends the work of McGuire (McGuire, 1961) was undertaken by Bither et al. (1971). Their paper is widely recognized as the first to apply Inoculation Theory to the field of marketing communications. Using the theories of McGuire (McGuire, 1961) as a base, Bither et al. (1971) hypothesize that consumers exposed to an inoculation message will demonstrate more resistance to attitudinal attack than those who are not inoculated. The communication issue tested in this case is that 'there should be little or no censorship of movies' (Bither, Dolich and Nell, 1971, p. 57). The authors also examine the effects of source credibility on inoculation effect. Using a longitudinal experiment, the difference in attitudes between a pre- and post-treatment measurement is examined. Attitudes are measured on a 20-point scale, arguably too detailed for this purpose and leading to possible respondent confusion and inconsistency. The results of Bither et al. (1971) indicate that inoculation messages are significant in producing increased belief

levels. However, because inoculation is not compared to the alternative restoration approach, this study does not provide evidence for the superiority of inoculation.

Following these two founding studies, a number of attempts have been made to enrich Inoculation Theory. Possibly the most notable of these was Pfau et al.'s (1997) attempt to determine the cognitive processes associated with effective refutation. In particular, the authors reveal the influence of two key concepts: threat and counterarguing. The concept of threat was adapted directly from McGuire's (McGuire, 1961) initial hypothesis and refers to the 'vulnerability of attitudes to potential challenges' (Pfau *et al.*, 1997, p. 188). That is, refutational messages alert audiences that a particular viewpoint will be subject to future attack. The second core element to inoculation was found to be counterarguing. This refers to the process whereby audiences consider arguments counter to their own position and plan responses to those arguments. Both threat and counterarguing are tested as moderating variables in Pfau et al.'s (1997) experiment (n=790) and shown to be significant predictors of attitudinal resistance.

A number of recent studies also serve to increase the level of understanding of how inoculation works. Some recent advances have dealt with practical issues relating to message design. Studies have shown that the inoculation effect is consistent across appeal types: cognitive versus affective (Pfau *et al.*, 2001); communication mediums such as video versus print, [Pfau *et al.*, 2000]; and initial respondent attitudes, either supportive, neutral or opposed [Wood (2007)]. In addition, inoculation effects are proven to last up to 44 days when reinforcement messages are used (Pfau *et al.*, 2006). Overall, these results suggest that Inoculation Theory is a viable option for addressing the present research problem. The consistency of inoculation effects suggests that results in the present study should not differ because of the choice of appeal type, communication medium, and so on.

The premise at the core of McGuire's [1961] original research was that inoculation was a phenomenon particularly important to the defense of truisms, or unquestioned beliefs. It follows, therefore, that most of the earliest applications of the theory remained true to this specification. For example, in studies prior to the 1980's inoculation was applied to topics such as attitudes toward a recommended textbook (Burgoon *et al.*, 1976). Additionally, authors would go to great lengths to establish their chosen application as truisms prior to experimentation (Cronen and LaFleur, 1977). Despite this, even early studies of Inoculation Theory show attempts to widen the scope of application. Such studies focus on issues such as product advertising (Sawyer, 1973), new brand introductions (Etgar and Goodwin, 1982), product trial experiences (Kamins and Assael, 1987; Kamins and Marks, 1987), comparative advertising (Pfau, 1992), advocacy campaigns (Burgoon, Pfau and Brik, 1995) and even political campaigns (Pfau and Burgoon, 1988; Meirick, 2002). As can be seen, these applications represent a gradual deviation from truisms into more controversial topics.

One of the most important areas of application for Inoculation Theory has been in health promotion. Successful applications have occurred in the contexts of anti-smoking interventions (Pfau, van Bockern and Kang, 1992b; Pfau and van Bockern, 1994) and

teenage alcohol use (Duryea, 1983). In more recent times, Inoculation Theory has been applied in even more controversial areas, such as agricultural biotechnology (Wood, 2007), animal experimentation (Nabi, 2003), online parody videos (Lim and Ki, 2007), student plagiarism (Compton and Pfau, 2008) and the legalization of handguns and marijuana (Pfau *et al.*, 1997; Pfau *et al.*, 2001; Pfau *et al.*, 2003).

As demonstrated by these examples, Inoculation Theory has been applied to a variety of contexts. However, no previous studies have sought to test Inoculation Theory in the context of a public good. Water is one such public good; a monopoly commodity which is necessary to support life. Individuals are likely to be wary of any scheme that alters the source of such an essential resource. Contexts involving public goods, therefore, may be subject to a greater degree of perceived risk.

Trends evident in previous literature indicate that Inoculation Theory could potentially be applied to the context of a public good such as water. Possibly the most important recent study suggesting this was the aforementioned research by Wood (2007). The context of this study is agricultural biotechnology, selected due to the wide range of initial attitudes that it generates amongst respondents. Wood (2007) uses a student sample (n=558) to test the impact of inoculation and attack messages on the levels of threat, counterarguing and final attitudes. Results indicate that inoculation messages improve the attitude ratings of respondents, regardless of their initial attitudes. Based on the promising results of this study, the present research seeks to further extend Inoculation Theory in a number of ways.

To begin with, the use of a nationally-representative sample in this study will enable a more accurate determination of inoculation effectiveness. In addition, some key distinguishing characteristics of the recycled water context add challenge to the inoculation task. In particular, the perceived benefits of recycled water adoption may appear distant and abstract to the individual. Benefits such as improved water availability for future generations may not be worth the perceived health risks in the short-term. This means that individuals may be more likely to favor their current health at the expense of long-term water security, a problem which by its nature has been described by Wiener (1993, p. 244) as a 'social dilemma' (p. 244). This argument is supported by Vlek and Keren (1992, p. 251) who state '...we may presume that there are strong temptations for people to maximize their own short-term and local benefits at the neglect of collective, long-term and global risks' [p. 251].

Essentially this means that marketing recycled water is particularly challenging because it involves diffusing perceived risks in the short-term, while emphasizing long-term benefits. This requires an emphasis on the collective rather than the individual, the long-term rather than the immediate, and the global rather than the local (Vlek and Keren, 1992). By contrast, messages attacking recycled water have the advantage of immediacy – their arguments concern the short-term, the individual, and the local. It is this context that represents a unique application of Inoculation Theory and a contribution to the field.

Methodology

Experimental Design

In order to address the hypotheses of this study, a four-phase experimental design was conducted, as shown in Table 1. Each phase occurred one week apart. To begin with, respondents were required to complete an initial survey which gathered base levels of the dependent variables of the study. Respondents were randomly assigned to either the control group (which did not view any communications materials), one of two manipulation check groups (to determine the influence of each intervention stimuli), or one of two treatment groups (to test the influence of inoculation and restoration respectively). After exposure to stimuli, a follow-up survey was used to determine changes in the dependent variable over time.

[Insert Table 1 here.]

All phases of the experiment were conducted using a national online internet panel. Phases 2 and 3, which required respondents to view communications messages, also included a brief comprehension exercise to ensure that respondents understood the main point of each advertisement.

Stimuli

The stimuli used in this experiment took the form of a fictional flyer and a fictional newspaper article, either supporting or opposing recycled drinking water. Prior to use in the experiment, four alternative communication materials were designed and compared in a pre-testing phase. Pre-testing made use of a convenience sample (n=20) to compare the effects of each alternative stimulus. Respondents were required to complete a selection of questionnaire items regarding recycled water prior to viewing one of the communication pieces. After the stimulus had been shown to the respondent, the same questionnaire items were re-administered. The respondents' quantitative changes over time were used to compare alternative stimuli. In addition, qualitative comments made by the respondents were used to guide the selection of final stimuli. The purpose of this pre-testing phase was to ensure that stimuli chosen would have the desired effect on respondent attitudes and behavioral intentions.

[Insert Figure 1 here]

The final stimuli used in the experiment consisted of a newspaper article (Figure 1) and a flyer (Figure 2). The newspaper article was designed to support recycled water, citing a fictional scientist claiming that recycled water is safer than tap water. The flyer, on the

other hand, was designed to be in opposition to recycled water. It was written from the perspective of a community-based action group, Citizens Against Drinking Sewage. The advertisement was designed to replicate real tactics used by protest groups such as fear appeals and emotive language. Each stimulus was approximately equal in length. These two stimuli were chosen because they elicited the greatest positive and negative changes in attitudes and intentions among pre-test respondents.

[Insert Figure 2 here]

Research Instrument

The dependent variables for the study were:

- a) Stated likelihood of using recycled water for 12 household uses (see Appendix 1) measured using a visual analogue scale converted to 100 points and summated across all items to derive a single dependent variable
- b) Stated likelihood of drinking recycled water measured using a Juster scale (Juster, 1966)
- c) Stated likelihood of drinking recycled water measured using a visual analogue scale converted to 100 points

Additional information collected from respondents included previous experience with recycled water and water restrictions, their assessment of the gravity of the water scarcity problem in Australia, sources of information they use to get information about recycled water, their altruism (Clark, Kotchen and Moore, 2003), environmental concern (Berenguer, Corraliza and Martín, 2005), environment-related attitudes (Dunlap *et al.*, 2000), pro-environmental behavior, disgust (Haidt, McCauley and Rozin, 1994; Olatunji *et al.*, 2007), knowledge about recycled water (Dolnicar and Schafer, 2009) and their basic socio-demographic information.

Participants

The experimental design of this study made use of a sample of 978 respondents. This sample consists of approximately 200 respondents per treatment group (for detailed sample sizes see Table 1). To be included in the final sample, respondents needed to participate in all four phases of the experiment. Respondents were recruited through an online internet panel and were representative of the Australian population. Each respondent completed all phases online, including the viewing of advertisements.

Analysis

Paired sample t-tests are computed for each of the experimental conditions to assess whether a significant difference exists between the first and the second measurement.

Since we have one-sided hypotheses about all differences (for example, exposing respondents to a negative piece of information about recycled water will lead to a decreased acceptance of recycled water), one-tailed p-values are provided for all test results.

Results

Manipulation Check

It was hypothesized that there would be no difference between measurement 1 and measurement 2 in the control group, that acceptance would drop for the manipulation check 1 group, and that acceptance would increase for the manipulation check 2 conditions. Separate results for the three dependent variables are provided in Table 2.

[Insert Table 2 here.]

As can be seen in Table 2, all hypotheses are supported. In all cases no significant changes occurred in the stated likelihood of using recycled water for the control group, which was not exposed to any information between measurements. When presented with negative information about recycled water (attack), the stated likelihood of using recycled water dropped significantly for all three dependent variables. When presented with positive information (defense), the likelihood of use increased significantly for all three dependent variables investigated. It can therefore be concluded that both the artificially created attack and defense messages achieved what they were designed to achieve and are therefore suitable for use in the main two experimental conditions in which Inoculation Theory will be tested.

Treatment Effects

It is hypothesized, as the theory postulates, that treatment 2 would lead to increased acceptance levels because inoculation has occurred. No inoculation occurred in the treatment 1 condition so it is therefore expected that the level of stated likelihood of use would remain unchanged because the two pieces of information would counteract one another. Table 3 contains the results for the same three dependent variables used for the manipulation check.

[Insert Table 3 about here.]

With respect to the hypothesis that the level of stated likelihood would remain unchanged if the attack message is presented first (treatment 1), results differ for the three dependent variables used. For the full set of 12 household uses, as well as for the likelihood to drink, the differences between the first and second measurement are not significant, thus supporting the hypothesis of no change. However, for the likelihood to drink question

offering respondents a visual analogue scale, the difference was significant: the attack message followed by the defense message led to an increase in stated likelihood to use, pointing to a recency effect as opposed to an inoculation effect. The hypothesis that inoculation can protect the population from scare campaign messages is not supported: for all three dependent variables the differences between measurements one and two are insignificant for the inoculation condition (treatment 2).

Upon closer inspection of the numbers it can be seen that there is a slight tendency for Inoculation Theory to hold if the dependent variable includes a range of 12 household uses, in which case the stated likelihood of use increases from 68 to 70 on a 100 point scale. In those cases where respondents were asked to make their assessment for drinking recycled water only, the stated likelihood actually drops, indicating that the best predictor of the difference between measurements is the last piece of information respondents were exposed to; in short, the recency effect may be stronger than the inoculation effect in this particular context.

Discussion

There are a number of important conclusions that arise from our research. First, our manipulation checks established that the recycled water scare campaigns have a significant and negative impact on respondents' stated likelihood to use recycled water for drinking, and also for the other 12 listed uses of recycled water. Conversely, the defense stimulus – the factual newspaper article about recycled water which supported its use – had a significant and positive impact on respondents' stated likelihood to use recycled water. This indicates that presenting information in support or opposition of recycled water has a significant impact on respondents' stated likelihood to use recycled water, and thus members of the public are influenced by information presented to them.

Second, our study tested Inoculation Theory in a new product category – a monopoly commodity. The theory was specifically tested in the context of water, and the augmentation of drinking water supplies with recycled wastewater. The product chosen for research has additional distinctive characteristics. Water is a product which is necessary to support life, it is a public good, and the introduction of an alternative source will impact all members of the community who are connected to these centralized supply systems, as they have limited options available to them to opt out of the product. Our study found that Inoculation Theory does not hold in this product category. We believe that explanation lies in the fact that water is such a fundamental necessity for people that any change relating to its supply leads to a very high level of perceived risk and thus caution. Any negative information will therefore be taken very seriously, whether it is presented before or after the message defending water from alternative sources.

This study has a number of implications for communications strategies relating to recycled water. First, the results indicate that people are influenced by communications material that is presented to them. Second, the results suggest that if authorities wish to promote public acceptance of recycled water, a communications strategy based on an

inoculation approach would have limited, if any, effect. Third, our results suggest that there may be a recency effect with regard to the effect of information on consumer attitudes. For four of the six treatments researched, consumer attitudes changed in the direction of the most recent information campaign respondents were exposed to. This indicates to marketers of augmentation projects that they should continually communicate and promote the benefits of these schemes to the community or else risk the public being exposed to opposing campaigns, and thus attitudinal change in that direction. As such, sustained and frequent community information campaigns are necessary. This may have significant marketing budget implications for authorities introducing such plans, and should be actively considered in planning for the introduction of water augmentation schemes.

To be considered with these findings is that, due to the experimental design of this research, the “threat” of recycled water being introduced into household supplies is hypothetical in nature. It raises the question of the extent to which the experimental conditions here would actually be reflected in a similar real world situation, as it is possible that responses to an abstract threat are more rational and considered than in a real life situation where an immediate threat of a similar nature would be mixed with an emotional response also. This question could be answered through future research which performs a similar test in a community facing the real prospect of introducing recycled wastewater, as was the case in Towoomba. However, these cases do not arise frequently and are even less likely in Australia in the near future because of the current over-supply of natural rainwater which has caused the overflowing of dams in many parts of the country.

Additional future research is suggested with other products in this category to verify that Inoculation Theory has limited applicability in this context. Suitable products to test in future include: unlabelled genetically-modified foods, and the use of unlabelled nano-technology in products which are consumed or used by humans (e.g. sunscreens).

References

- Australian Academy of Technological Sciences and Engineering. 2004. *Water Recycling in Australia*. Australian Academy of Technological Sciences and Engineering: Melbourne, VIC.
- Baggett S, Jeffrey P, Jefferson B. 2006. Risk Perception in Participatory Planning for Water Reuse. *Desalination*, 149-58.
- Baumann D, Kasperson R. 1974. Public Acceptance of Renovated Waste Water: Myth and Reality. *American Geophysical Association*, 667-73.
- Berenguer J, Corraliza JA, Martín R. 2005. Rural-Urban Differences in Environmental Concern, Attitudes, and Actions. *European Journal of Psychological Assessment* **21**, 128-38.
- Bither S, Dolich I, Nell E. 1971. The Application of Attitude Immunisation Techniques in Marketing. *Journal of Marketing Research* **8**, 56-61.
- Bruvold W. 1988. Public Opinion on Water Reuse Options. *Water Pollution Control Federation* **60**, 45-49.
- Bruvold W, Ward P. 1970. Public attitudes toward uses of reclaimed wastewater. *Water and Sewage Works* **April**, 120-22.
- Bruvold W, Ward P. 1972. Using Reclaimed Wastewater - Public Opinion. *Journal of the Water Pollution Control Federation* **44**, 1690-96.
- Bruvold WH, Olson BH, Rigby M. 1981. Public Policy for the Use of Reclaimed Water. *Environmental Management* **5**, 95-107.
- Burgoon M, *et al.* 1976. Propensity of Persuasive Attack and Intensity of Pretreatment Messages as Predictors of Resistance to Persuasion. *The Journal of Psychology* **92**, 123-29.

Burgoon M, Pfau M, Brik T. 1995. An Inoculation Theory Explanation for the Effects of Corporate Issue/Advocacy Advertising Campaigns. *Communication Research* **22**, 485-505.

Christen K. 2005. Water Reuse: Getting Past the 'Yuck Factor'. *Water Environment and Technology* **17**, 11-15.

Clark CF, Kotchen MJ, Moore MR. 2003. Internal and External Influences on Pro-environmental Behavior: Participation in a Green Electricity Program. *Journal of Environmental Psychology* **23**.

Compton J, Pfau M. 2008. Inoculating Against Pro-Plagiarism Justifications: Rational and Affective Strategies. *Journal of Applied Communication Research* **36**, 98.

Cronen V, LaFleur G. 1977. Inoculation Against Persuasive Attacks - Test of Alternative Explanations. *Journal of Social Psychology* **102**, 255-65.

Dishman M, Sherrard J, Rebhun M. 1989. Gaining Public Support for Direct Potable Water Reuse. *Journal of Professional Issues in Engineering* **115**, 154-61.

Dolnicar S, Schafer AI. 2009. Desalinated Versus Recycled Water: Public Perceptions and Profiles of the Acceptors. *Journal of Environmental Management* **90**, 888-900.

du Pisani PL. 2006. Direct Reclamation of Potable Water at Windhoek's Goreangab Reclamation Plant. *Desalination* **188**, 79-88.

Dunlap RE, *et al.* 2000. Measuring Endorsement of the New Ecological Paradigm: A Revised NEP Scale. *Journal of Social Issues* **56**, 425-42.

Duryea E. 1983. Utilizing Tenets of Inoculation Theory to Develop and Evaluate a Preventive Alcohol Education Intervention. *Journal of School Health* **53**, 250-56.

Eagly A, Chaiken S. 1993. *The Psychology of Attitudes*. Harcourt Brace Jovanovich College Publishers: Fort Worth.

Etgar M, Goodwin S. 1982. One-Sided Versus Two-Sided Comparative Message Appeals for New Brand Introductions. *Journal of Consumer Research* **8**, 460-65.

Haidt J, McCauley C, Rozin P. 1994. Individual Differences in Sensitivity to Disgust: A Scale Sampling Seven Domains of Disgust Elicitors. *Personality and Individual Differences* **16**, 701-13.

Hanke SH, Athanasiou R. 1970, Social Psychological Factors Related to the Adoption of Reused Wastewater as a Potable Water Supply, in Western Resources Conference. Boulder, Colorado.

Hartley T. 2006. Public Perception and Participation in Water Reuse. *Desalination*, 115-26.

Higgins J, *et al.* 2002. Survey of Users and Providers of Recycled Water: Quality Concerns and Directions for Applied Research. *Water Research* **36**, 5045-56.

Hurlimann A. 2007a. Time for a Water Re-Vision. *Australasian Journal of Environmental Management* **14**, 11-18.

Hurlimann A. 2007b. Is Recycled Water Use Risky? An Urban Australian Community's Perspective. *Environmentalist* **27**, 83-94.

Hurlimann A, Dolnicar S. 2010. When public opposition defeats alternative water projects - the case of Toowoomba Australia. *Water Research* **44**, 287-97.

Hurlimann A, McKay J. 2003, Community Attitudes to an Innovative Dual Water Supply System at Mawson Lakes South Australia, in OzWater Conference 2003. Perth, Western Australia.

Hurlimann A, McKay J. 2004. Attitudes to Reclaimed Water for Domestic Use: part 2. *Water, Journal of the Australian Water Association* **31**, 40-45.

Juster FT. 1966. *Consumer Buying Intentions and Purchase Probability: An Experiment in Survey Design*. National Bureau of Economic Research, Columbia University Press: New York.

Kamins M, Assael H. 1987. 2-Sided Versus One-Sided Appeals - A Cognitive Perspective on Argumentation, Source Derogation, and the Effect of Disconfirming Trial on Belief Change. *Journal of Marketing Research* **24**, 29-39.

Kamins MA, Marks LJ. 1987. Advertising Puffery: The Impact of Using Two-Sided Claims on Product Attitude and Purchase Intention. *Journal of Advertising* **16**, 6-15.

Kaufman J. 2004. Endogenous explanation in the sociology of culture. *Annual Review of Sociology* **30**, 335-57.

Law IB. 2003. Advanced Reuse - From Windhoek to Singapore and Beyond. *Water, Journal of the Australian Water Association* **30**, 44-50.

Lim JS, Ki E-J. 2007. Resistance to Ethically Suspicious Parody Video on YouTube: A Test of Inoculation Theory. *Journalism and Mass Communication Quarterly* **84**, 713-28.

Marks J. 2004, Back to the Future: Reviewing the Findings on Acceptance of Reclaimed Water, in Water Recycling Australia 2nd National Conference. Brisbane.

Marks J, Martin B, Zadoroznyj M. 2006. Acceptance of Water Recycling in Australia: National Baseline Data. *Water* **33**, 151-57.

McGuire W. 1961. The effectiveness of supportive and refutational defenses in Immunizing and Restoring Beliefs Against Persuasion. *Sociometry* **24**, 184-97.

Meirick P. 2002. Cognitive Responses to Negative and Comparative Political Advertising. *Journal of Advertising* **31**, 49-62.

Mellon R, Tsagarakis K. 2006. Assessment of Implicit Meaning in the Design of Graphic Symbols for the Control of Recycled Water Use. *Environment and Behavior* **38**, 689-706.

Milliken J, Lohman L. 1985. Analysis of Baseline Survey: Public Attitudes About Denver Water and Wastewater Reuse. *Journal of American Waterworks Association* **77**, 72.

Nabi R. 2003. "Feeling" Resistance: Exploring the Role of Emotionally Evocative Visuals in Inducing Inoculation. *Media Psychology* **5**, 199-223.

Olatunji BO, *et al.* 2007. The Disgust Scale: Item Analysis, Factor Structure, and Suggestions for Refinement. *Psychological Assessment* **19**, 281-97.

Olson BH, *et al.* 1979, Educational and Social Factors Affecting Public Acceptance of Reclaimed Water, in Water Reuse Symposium. Denver, Colorado.

Pfau M. 1992. The Potential of Inoculation in Promoting Resistance to the Effectiveness of Comparative Advertising. *Communication Quarterly* **40**, 26-44.

Pfau M, Burgoon M. 1988. Inoculation in Political Campaign Communication. *Human Communication Research* **15**, 91-111.

Pfau M, *et al.* 2006. The Conundrum of the Timing of Counterarguing Effects in Resistance: Strategies to Boost the Persistence of Counterarguing Output. *Communication Quarterly* **54**, 143-56.

Pfau M, *et al.* 2003. Attitude Accessibility as an Alternative Explanation for How Inoculation Confers Resistance. *Communication Monographs* **70**, 1-14.

Pfau M, *et al.* 2001. The role and impact of affect in the process of resistance to persuasion. *Human Communication Research* **27**, 216-53.

Pfau M, *et al.* 1997. Enriching the inoculation construct: The role of critical components in the process of resistance. *Human Communication Research* **24**, 187-216.

Pfau M, van Bockern S. 1994. The Persistence of Inoculation in Conferring Resistance to Smoking Initiation Among Adolescents - the 2nd Year. *Human Communication Research* **20**, 413-30.

Pfau M, van Bockern S, Kang J. 1992b. Use of Inoculation to Promote Resistance to Smoking Initiation Among Adolescents. *Communication Monographs* **59**, 213-30.

Po M, *et al.* 2005, Predicting Community Behaviour in Relation to Wastewater Reuse: What drives decisions to accept or reject? Perth: CSIRO Land and Water.

Postel S. 1992, Last Oasis: Facing Water Scarcity. New York: Worldwatch Institute.

Sawyer A. 1973. The Effects of Repetition of Refutational and Supportive Advertising Appeals. *Journal of Marketing Research* **10**, 23-33.

Seckler D, Barker R, Amarasinghe U. 1999. Water Scarcity in the Twenty-first Century. *Water Resources Development* **15**, 29-42.

Sims J, Baumann D. 1974. Renovated Waste Water: The Question of Public Acceptance. *Water Resources Research* **10**, 659-65.

Stenekes N, *et al.* 2006. Risk and Governance in Water Recycling. *Science, Technology and Human Values* **31**, 107-34.

Stenekes N, Schaefer AI, Ashbolt N. 2001, *Community Involvement in Water Recycling - Issues and Needs* in Recent Advances in Water Recycling Technologies Workshop, A. I. Schaefer and T. D. Waite and P. Sherman, Eds. Brisbane: Centre for Water and Waste Technology, Civil and Environmental Engineering The University of New South Wales, Queensland Government Environmental Protection Authority.

Stone R, Kahle R. 1974, Wastewater Reclamation: Socioeconomics, Technology and Public Acceptance, U.S. Department of the Interior Office of Water Resources (Ed.). Washington, D.C.

Sydney Water. 1999, Community Views on Recycled Water: Sydney Water: Customer Research Unit.

Tsagarakis K, *et al.* 2007. Identification of Recycled Water with an Empirically Derived Symbol Increases Its Probability of Use. *Environmental Science and Technology* **41**, 6901-08.

Vlek C, Keren G. 1992. Behavioural decision theory and environmental risk management: Assessment and resolution of four 'survival' dilemmas. *Acta Psychologica* **80**, 249-78.

Wiener JL. 1993. What Makes People Sacrifice Their Freedom for the Good of Their Community. *Journal of Public Policy and Marketing* **12**, 244-51.

Wood MLM. 2007. Rethinking the Inoculation Analogy: Effects on Subjects With Differing Pre-existing Attitudes. *Human Communication Research* **33**, 357-78.

Tables

Table 1: Experimental Design

Experimental group		Phase 1	Phase 2	Phase 3	Phase 4
Control (n= 194)	R	M ₁			M ₂
Manipulation Check 1 (n=196)	R	M ₁		Attack	M ₂
Manipulation Check 2 (n=196)	R	M ₁		Defense	M ₂
Treatment 1 (n=199)	R	M ₁	Attack	Defense	M ₂
Treatment 2 (n=193)	R	M ₁	Defense	Attack	M ₂
Legend:	R: <i>Randomization</i> M ₁ : <i>Measurement 1 (Initial Survey)</i> M ₂ : <i>Measurement 2 (Follow-up Survey)</i>				

Table 2: Manipulation Check Test Results (paired t-tests, one-tailed p values provided)

	<i>p</i> -value	Phase 1	Phase 2	Phase 3	Phase 4
Likelihood to use for 12 household uses (100 points)					
Control	.325	72			71
Manipulation Check 1	.028	68		Attack	65
Manipulation Check 2	.017	72		Defense	74
Likelihood to drink (11 points)					
Control	.106	5.1			4.9
Manipulation Check 1	.007	5.3		Attack	4.8
Manipulation Check 2	.032	4.9		Defense	5.3
Likelihood to drink (100 points)					
Control	.085	60			57
Manipulation Check 1	.004	58		Attack	52
Manipulation Check 2	.000	56		Defense	62

Table 3: Treatment Effect Test Results (paired t-tests, one-tailed p values provided)

	<i>p</i> -value	Phase 1	Phase 2	Phase 3	Phase 4
Likelihood to use for 12 household uses (100 points)					
Treatment 1	.145	70	Attack	Defense	72
Treatment 2	.226	68	Defense	Attack	70
Likelihood to drink (11 points)					
Treatment 1	.413	4.9	Attack	Defense	4.8
Treatment 2	.140	5.1	Defense	Attack	4.9
Likelihood to drink (100 points)					
Treatment 1	.029	53	Attack	Defense	57
Treatment 2	.128	57	Defense	Attack	54

Appendices

Appendix 1 - Household Water Uses

1. Watering the garden (flowers, trees, shrubs)
2. Washing clothes, doing laundry
3. Cooking
4. Showering / taking a bath
5. Brushing teeth
6. Bathing the baby
7. Filling up the fish pond or aquarium
8. Toilet flushing
9. Cleaning the house, windows, driveways
10. Watering of garden (vegetables, herbs)
11. Washing the car
12. Refilling / topping up swimming pool