

**A PSYCHOLOGY OF ENVIRONMENTALLY SUSTAINABLE
BEHAVIOUR**

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CHAPTER ONE

INTRODUCTION AND OVERVIEW OF THE THESIS

"We cannot solve the problems that we have created with the same thinking that created them"

Albert Einstein

Increasingly, humankind is realising that our activities have had, and continue to have, a devastating effect on the ecological health of the planet that we occupy. We are now aware of a host of environmental problems that must be solved to ensure that future generations of humans (and other species) are able to survive on Earth. Global warming due to the greenhouse effect produced by the release of CO₂ into the atmosphere, the depletion of the Earth's protective ozone layer, loss of biodiversity through destruction of tropical rainforests, unsustainable food production practices, acid rain, and toxic pollution of air and drinking water are but a few of the major ecological disasters that currently face humanity (Oskamp, 2000). Although the analysis of these problems has typically been the domain of physicists, chemists, meteorologists, biologists, agronomists and ecologists (among others), it has been argued that solutions to these problems must also consider the one common feature that they all share - that they are all ultimately produced and maintained by the *behaviour of people* (Howard, 2000).

A discipline such as psychology is ideally placed to develop solutions to our environmental crises. There is no doubt in my mind that psychology *is* well placed to address the ecological problems facing humanity. One issue, though, revolves around the best way of organising knowledge from psychology's various sub-disciplines in such a way as to allow the various theoretical perspectives to be integrated successfully. At the present, the 'psychology of environmental sustainability' does not necessarily represent a discipline in its own right, or even a sub-discipline within psychology in its own right¹. Rather, this field tends to occupy the position of a 'research interest' of a number of psychologists who would regard themselves as 'social psychologists', 'behavioural psychologists', 'community psychologists' and so on. While some researchers in the field have begun to take on titles such as 'Environmental Psychologist', this title can often suffer from a lack of clear definition due to its attachment to the much broader field of "Environmental Psychology" which was originally conceptualised as the study of the impact of the environment on human beings, rather than the study of how to modify the impact of human beings on the natural environment². A similar problem can often emerge when applying the label of "Ecological Psychology" to this field. For example, monographs dealing with the psychological study of promoting environmentally sustainable behaviour which have used the term "Ecological Psychology" in their title have sometimes been criticised for not being concerned with 'Ecological' *theories* such as James Gibson's (1979) theories of 'affordances'

¹ Although recent publications such as Schmuck and Schultz's (2002) *Psychology of Sustainable Development* do represent an encouraging movement in this direction.

² Environmental psychology has, in recent times, broadened to also be concerned with the later phenomenon.

or Roger Barker's (1968) studies of 'behavioural settings' (Winter, personal communication).

One potential danger inherent in the location of the study of environmental issues within a number of different sub-disciplines of psychology is a tendency for these slightly different theoretical approaches to be thought of as in *competition* with one another. When competition for theoretical supremacy becomes the *main* objective of research, it can result in less attention being paid to the applied problems involved. A further outcome of such competition is a reduction in the degree to which researchers adopting different theoretical positions are able to communicate with one another and develop an understanding of the commonalities and differences and relative strengths and weaknesses of the various positions. This thesis is an attempt to investigate the psychology of environmentally sustainable behaviour in such a way as to achieve a 'bipartisan' form of integration that contributes to our understanding of the ways in which we can reduce the negative impact of our behaviour on our planet.

Overview of the Thesis

The thesis is presented in three sections. The first consists of the opening two chapters, which review the current literature in the area of environmentally sustainable behaviour (ESB) and develop the social-ecological framework that guides the remainder of the thesis. Chapter 2 outlines the main theoretical models that have been adopted by psychologists interested in preserving the natural

environment and considers some of the strengths and limitations of each. A social-ecological framework is also developed in this chapter to provide a meta-theory that allows for the integration of the strengths of each approach while helping to understand their various limitations. This chapter has been published (Kurz, 2002), and is produced here in its published state. Chapter 3 examines the literature concerning the ways in which psychological theory has been used to promote more environmentally sustainable behaviours and discusses existing conceptualisations of intervention programs in terms of the social-ecological framework outlined in chapter 2.

The second section reports the empirical studies conducted for this thesis. Chapter 4 reports a pilot study of an intervention program that applied a social-ecological framework to the promotion of water and energy conservation and waste recycling in a group of residential households in the local community. Chapter 5 reports a larger field experiment focused exclusively on water and energy conservation. This study is currently under review for publication (Kurz, Donaghue & Walker, under review), and is produced here in the state of the manuscript under review.

The main study supported the utility of the intervention strategy that was employed, but there was evidence of a discrepancy in the influence of the program on the different consumption behaviours being targeted. To examine this discrepancy, a third study was conducted in which some participants from Study 2 were interviewed. These interviews were analysed from the perspective of social

representations theory (Moscovici, 1984) and discursive psychology (Edwards and Potter, 1992; Potter & Wetherell, 1987).

Finally, chapter 7 provides an integration of the findings from the empirical studies and considers the implications of these findings for psychological theories of ESB, for public policy in this area, and for the usefulness to society of psychology (and in particular, social psychology) as a discipline.

CHAPTER 2

THE PSYCHOLOGY OF ENVIRONMENTALLY SUSTAINABLE BEHAVIOUR: FITTING TOGETHER PIECES OF THE PUZZLE³

This chapter considers the main features of four general psychological approaches to the analysis of environmentally sustainable behavior (rational-economic, social dilemmas, attitude-behavior models, and applied behavioral analysis), focusing on problems inherent in applying each approach to this issue. It also details the utility of a holistic Social-Ecological Framework for analyzing environmentally sustainable behavior. This approach draws on concepts from ecological psychology such as Gibson's (1979) notion of 'affordances'. It is shown how such an approach can account for and understand the limitations of traditional psychological approaches to environmentally sustainable behavior, and helps to provide a general guiding framework for the formulation of environmental policy decisions and intervention programs.

The psychology of environmentally sustainable behaviour

There has been an increased awareness of the environmental impact of human activity throughout many of the world's societies over the past three decades. As a response to this shift toward a more environmentally-minded society, researchers have begun to investigate the ways in which human societies might reduce their negative environmental impact.

³ Published as: Kurz, T. (2002). The psychology of environmentally sustainable behavior: Fitting together pieces of the puzzle. *Analysis of Social Issues and Public Policy*, 2, 257-278.

The search for solutions to environmental problems resulting from human activity, such as global warming, has been approached from a variety of perspectives. The natural sciences have offered potential *technological* solutions to such problems through the development of appliances and production processes that place less strain on the natural environment and are able to operate using less of the earth's natural resources. Attempts have also been made to address the ways in which resources are used through changes to legislation, and by influencing the pricing system, for example, through taxation.

As environmental degradation can be seen as the result of human behaviors that damage our natural environment, there has also been a move toward the re-conceptualization of environmental problems in terms of psychological, social and behavioral factors. Social scientists have begun to draw attention to the necessity of 'human' variables in any potential solution to environmental problems (Oskamp, 2000; Oskamp & Shultz, 1998; Stern, 1992). Early social psychological research relating to environmental issues often focused on individuals' *attitudes* towards these issues (e.g., Dunlap & Van Liere, 1978). Following the OPEC oil embargo of the 1970s, the focus of much social psychological research shifted to the study of specific *behaviors* considered relevant to the sustainable use of natural resources, particularly energy (e.g., Becker & Seligman, 1981; Gonzales, Aronson, & Constanzo, 1988; Seligman, 1986). As well as domestic energy use, studies of environmentally sustainable behavior over the past two decades have also examined behaviors such as recycling (e.g., Burn, 1991; Oskamp, 1995), promoting

environmentally friendly modes of transport (e.g., Tanner, 1999; Verplanken, Aarts, Knippenberg, & Moonen, 1998) and, more rarely, water conservation (e.g., Aitkin, McMahon, Wearing & Finlayson, 1994; Syme & Seligman, 1987).

Given the interest that psychology has taken in issues surrounding environmentally sustainable behavior, one might be led to question what it is that psychology has been able to tell us about the issue? The argument that will be presented here is that psychology has provided a number of approaches *to* or ways of thinking *about* environmental problems. Sometimes these approaches intersect and complement each other, while at other times these approaches are in opposition. I will begin by outlining the main features of four general approaches that psychology has taken to the analysis of environmentally sustainable behavior (ESB), before moving on to a discussion of some of the problems inherent in applying each approach to the promotion of ESBs. I then wish to detail a holistic framework (referred to as social-ecological) that I believe to be useful when analyzing ESBs. This approach draws on concepts from ecological psychology such as Gibson's (1979) notion of 'affordances'. It will be shown how such an approach can account for and understand the limitations of more traditional psychological approaches to ESBs and to develop interventions that build on the *strengths* of these approaches.

Psychological Approaches to ESB

There have been several different psychological approaches to the study of ESBs. It is often difficult to draw clear distinctions between approaches, given their

tendency to represent a mosaic of various theoretical positions, as opposed to clearly demarcated 'camps'. As a result, attempts to delineate psychological theories of ESB are open to the particular interpretation of the author and what it is that they are attempting to achieve or 'do' with these categories. Bearing this in mind, the following discussion does invoke demarcations along theoretical lines by 'dividing up' the field into rational-economic models, social dilemmas models, attitude models and behavioral models. However, this is done with the aim of demonstrating the inter-relatedness of these approaches as well as their differences.

Rational- Economic Models of ESB

The fundamental principle underlying rational-economic models of ESB is that people's propensity to engage in such behavior is primarily determined by whether or not it is in their financial interests to do so. This model assumes that individuals will engage in a process of cost-benefit analysis when deciding upon appropriate action, the results of which will guide their subsequent behavior (Archer, Pettigrew, Costanzo, Iritani, Walker & White, 1987). The intervention strategies that flow from such an approach are obvious. To *change* behaviors using this model, one needs to alter the pricing structure of both resources and devices that can aid conservation of resources in a way that renders the act of conserving resources more economically beneficial to individuals than not conserving.

Within a strict rational-economic framework, these changes in economic parameters ought to be sufficient to bring about the desired behavioral change (e.g., energy

conservation). Historical experience, however, has demonstrated that such changes alone often fail to result in the expected behavioral responses from individual consumers. For example, during the 1980s in the United States the Residential Conservation Service enacted a program whereby utility companies provided free home 'energy audits' to customers and made available low interest loans to cover the costs of performing the prescribed retrofits. Contrary to rational-economic explanations, it was found that despite the potentially large savings on energy bills that could be achieved, very few households requested the free energy audits and of those who did, few acted on the recommendations given (Hirst, Bery & Soderstrom, 1981). Gonzales, et al. (1988) have suggested that the deficiency in a strictly rational-economic model stems from the fact that individuals will often require a 'Persuasive Communication' in order for them to respond to changes in economic parameters. That is, not only does one need to make conservation a more economically viable act, one must also *persuade* individuals that these economic benefits exist and that they warrant changes in behavior. In a field study, Gonzales et al, applied principles of persuasive communication gleaned from social psychological research (such as vividness, personalization of information, inducing a commitment and framing in terms of loss rather than gain) in an attempt to train the energy auditors to be more effective in their attempt to persuade residents of the savings that they could enjoy as a result of retrofitting their houses. The results of the study indicated that auditors who participated in the program *were* subsequently more successful in persuading residents to perform retrofits, in comparison to a group who were not trained in the techniques of persuasive communication. The

expected changes in energy consumption resulting from retrofits, however, were not forthcoming. This result will be discussed in detail later, in relation to shortcomings of the rational-economic model.

Social Dilemmas Models of ESB

The social dilemmas approach to ESB has similarities to the rational-economic model in the sense that it is concerned with the analysis of the *process* that individuals engage in when making decisions regarding their consumption of resources. It departs from the aforementioned model, however, by taking into account that the situation in which such decisions are made has specific characteristics that need to be considered. The term ‘Social Dilemma’ is used to describe a situation in which private interests are at odds with collective interests (Liebrand, Messick & Wilke, 1992). When a group of individuals has access to a scarce common resource, the nature of the inter-dependence of this group of individuals can be thought of as a *dilemma* because they have the option of behaving for either their own individual gain (i.e., consume at will), or for the good of the collective (i.e., monitor consumption so as to not threaten the integrity of the resource and hence the collective good in the long term). This dilemma can be seen as *social* because the long-term status of the common resource will always be determined by the collective decisions of all the members of the group, with these individual decisions always being located in the context of others’ decisions and perceptions and expectancies of others’ decisions (Foddy, Smithson, Schneider & Hogg, 1999). In a sense, then, a social dilemmas approach deals with two

conflicting sets of rationality that individuals must weigh up when making decisions in a situation that represents a social dilemma. It has been suggested that many environmental problems are caused by the tendency of individuals to make choices leading to personal gain that are to the detriment of the collective who rely on the shared resource. This situation has been referred to by Hardin (1968) as the “Tragedy of the Commons”. It has been suggested that behaviors such as energy and water conservation can be thought to represent real world ‘commons dilemmas’ (Samuelson, 1990; Thompson & Stoutemyer, 1991; Van Vugt, 2001).

Research in the social dilemmas field has primarily revolved around the development of experimental models or ‘games’ that are thought to represent various forms of dilemmas that exist in the real social world. For example the experimental ‘commons dilemma’ paradigm will typically involve a group of individuals (e.g., six) in a laboratory being set the task of managing a shared, self-regenerating resource pool of ‘points’, money, or some other unit which acts as an analog to a real life resource. The participants will, over a series of trials, make decisions individually as to how much they wish to ‘harvest’ from the pool. Obviously, large initial harvests bring large short-term profits; however, successful long-term maintenance of the pool (and hence, largest overall harvest returns) requires responsible harvest decisions by all members of the group. (Hine & Gifford, 1996).

From an applied perspective, experimental social dilemmas research purports to offer a means by which researchers can investigate the ways in which such factors as characteristics of individuals, features of the group, communication between group members, group size, perceptions of trust, and feedback regarding status of the resource pool (to name but a few) may influence the way in which people behave when facing a commons dilemma. As such, it has been argued that results from the social dilemmas laboratory present a set of knowledge that has the potential to be applied to the real life problem of attempting to promote ESB in communities throughout the world (Komorita & Parks, 1994).

Attitude Models of Environmental Behavior

Perhaps the most common approach to the study of ESB relies on general attitude-behavior models. In fact, Kaiser, Wolfing and Fuhrer (1999) have suggested that almost two thirds of all environmental psychological publications include the notion of environmental attitude in one form or another. While the attitude-behavior models that have been applied to ESB vary in their make-up⁴, for the purposes of this discussion these approaches will be discussed in terms of their common assumption that an individual's ESB will be directed (to some extent) by their attitudes to either the natural environment in general or the specific ESB itself. Under such a model, the key issues in attempting to promote ESB become the extent to which pro-environmental attitudes influence ESBs, how to change

⁴ Models have ranged from simple attitude-behavior models to more multi-factorial models such as Ajzen & Fishbein's Theory of Reasoned Action (1980) and its developed version, The Theory of Planned Behavior (Ajzen, 1989)

people's attitudes towards environmental issues, and the conditions under which an individual's ESBs are guided by their attitudes. The attitude-behavior model can be seen as having some theoretical similarities to the social dilemmas approach; for example both consider the influence of features of the individual, as well as features of the conditions in which individuals are operating.⁵ One could argue that the main difference between the two is one of focus. A social dilemmas approach has the inter-relatedness of individuals in a social context as its primary focus, and the group as the unit of analysis. An attitude-behavior model, on the other hand, has the individual as the primary focus and unit of analysis. In a social dilemma the context may also be influenced by characteristics of the individuals involved; in an attitude behavior model it is the individual who may be influenced by their social context. As will be discussed in more detail later, this distinction often makes a large difference when it comes to applying theory to real life environmental problems.

Behavioral Models of ESB

The final theoretical approach that will be discussed is the behavioral approach. This approach represents the application of Behavioral Analysis, which stems from the Skinnerian tradition of behavior modification and is based on learning theory (Dwyer, Leeming, Cobern, Porter & Jackson, 1993). Within this behaviorist tradition, the focus of analysis is on the direct antecedents and consequences of behavior. The contribution of a behavioral approach in the applied intervention context lies in the identification of ways in which ESB can be modified by

⁵ Certainly, more recent, multi-factorial attitude-behavior models *have* included variables such as social and subjective norms (e.g., Ajzen, 1989)

providing antecedents (such as information leaflets, prompts or modeling) and by re-structuring consequences (such as through feedback or monetary and social reinforcement) (Cook & Berrenberg, 1981). A strictly behaviorist model of ESB is certainly in conflict with an attitude-behavior model, as a behavioral approach marginalizes the influence of cognitive concepts such as attitudes. The behavioral approach does share something with a rational-economic model, in that both often involve the use of monetary reinforcers to promote behavior. It departs from the rational-economic approach, however, by postulating that behavior is determined by many factors besides the simple economic contingencies that relate to the behavior. Similarly, the behavioral approach shares some commonalities with a social dilemmas analysis in that some of the variables that are studied in commons dilemma experiments (such as punishment, and feedback on the status of the resource pool) represent the same types of consequences that are studied in behavioral interventions. Further evidence for a relatedness of the two approaches comes from Platt (1973), who has offered a behavioral analysis of the commons dilemma (or 'social trap' as he refers to it). Platt argues that, in behavioral terms, the 'tragedy' of a commons dilemma lies in the schedules of reinforcement inherent in such a scenario. He points out that, *ceteris paribus*, the delay in obtained reinforcement when acting in self interest will always be far shorter than the delay in reinforcement when acting in the collective interest, and thus attempts to solve commons dilemmas should focus on finding ways to disrupt these schedules of reinforcement. The primary difference between a behavioral approach to ESB and a social dilemmas approach once again lies in the focus of the analysis. A behavioral

approach focuses on the behavior of an individual and its direct antecedents and consequences, as opposed to a social dilemmas approach, which, as mentioned previously, focuses on the group that share a resource and the inter-relatedness among group members.

Some Problems With Each of These Approaches

Each of the above approaches can be seen to have certain problems and limitations. In this section, I set out some commonalities in the limitations of each model. Some of these are theoretical in nature; with others arising from the application of theory into practice

Problems with the Rational-Economic model

A criticism of the rational-economic model of ESB is that people do not necessarily function in rational, economic ways. For example, Feldmen (1987) points out that the objects that make up our environment and the behaviors that we perform each day are attributed psychological and social, as well as economic value.⁶ Hence, to attempt to predict or modify behavior on the basis of a purely monetary cost-benefit analysis is likely to be futile. Feldmen also highlights the fact that people do not tend to be motivated by an expectation of *projected* savings, which is the very nature of economic ‘benefits’ inherent in conservation of resources (particularly those achieved through the purchase of more efficient technology).

A further issue here is that 'price' can mean different things to different people. That is, the same sets of economic contingencies can be interpretable in different ways by different individuals. For example, Harman, Stocker, Walker and Stirling (1991) conducted a study investigating the factors influencing purchases of solar water heaters in Western Australia. Of those respondents who already *had* a solar heater installed on their roof, many claimed that saving money was a major reason for having made this investment. Somewhat paradoxically, for those who did *not* have a solar heater, many cited the heater's *cost* as the main reason for *not* investing in a solar heater. Thus, it would seem that 'cost' should be better conceptualized in psychological analyzes of ESB as being a concept that can influence behavior through the individual's 'representations' of cost as opposed to being a concrete independent variable that can be measured in dollars. In line with such an argument are the unusual results of the energy audit study of Gonzales et al. (1988) mentioned earlier. The surprising result was that even for homes in which residents *were* persuaded to perform retrofits that were designed to produce substantial decreases in energy use, no substantial decreases in energy use were recorded! Thus it would appear, once again, that the relationship between 'cost' and behavior is more complex than a simple monetary analysis would suggest. An explanation that has been put forward for this failure to achieve reductions in consumption is that a 'rebound effect' occurred whereby individuals respond to the installation of more efficient technology by relaxing their everyday conservation behaviors. This

⁶ It should be noted that whilst, in economic theory, the term 'utility' *is* conceptualized as including such non-monetary variables it is questionable whether this is often recognized by psychologists utilizing rational-economic models in the context of ESB.

comes about because energy bills often represent a fixed, baseline cost that has already been factored into a household's budget (Gonzales).

The problems of the economic model discussed so far have tended to relate to shortcomings in the usefulness of trying to sell 'potential savings' as a motivation for individuals to conserve resources by making investments in more efficient technology. Another issue to consider is the potential to directly influence everyday consumption behavior through the price structuring of the resources themselves. The question to be asked here is, can we achieve conservation by simply pricing over-consumption behavior 'out of the market'? One such proposal has been to achieve energy efficiency by the imposition of a 'carbon tax'. That is, to place an additional cost on the price of energy produced from burning fossil fuels. Although demand for energy is relatively price elastic in the short term, some economists have questioned the effectiveness of carbon taxes as a long-term solution to greenhouse gas abatement. For example, Neuburger (1992) showed that the reductions in demand resulting from the sharp increases in energy prices in the US in 1973 and 1979 were the result of an income effect of price as opposed to a substitution effect. That is, the reduction in spending on energy was the result of macroeconomic recession resulting from the oil embargo itself as opposed to a change in patterns of consumer spending. Put another way, consumers had less money to spend on *everything*, rather than them buying things *instead* of energy. Neuburger argued that the use of general taxes such as a carbon tax is not likely to be effective in reducing energy consumption without widespread collateral damage

to the economy. Of course, it becomes an issue of priority and morality as to whether economic recession is of greater concern than global warming.

The effectiveness of price increases is also inhibited by the psychological and social relationship the consumer has with the activities that the consumption of a particular resource facilitates. For example, if the personal freedom and convenience that is offered by using a single occupant motor vehicle as a means of transport is central to an individual's self identity and fulfils certain social functions for that individual then they are likely to respond to price increases in petrol⁷ by forgoing expenditure on other items in order to maintain this mode of transport. Similarly, Seligman (1986) found that one of the best predictors of household energy conservation was the extent to which residents regarded thermal comfort as being central to their conceptualizations of health and well-being. Psychological variables such as these would seem to be important influences on the price elasticity of demand for resources such as energy.

In summary then, the main shortcoming of a rational-economic approach to ESBs (even one that involves the inclusion of concepts of persuasive communication) is that it fails to appreciate the psychological and social *meaning* of 'price' or 'cost', and the meaning of and relationship with the goods and services that individuals spend their money on.

⁷ Note: The Australian term 'petrol' is synonymous with the North American term "Gas", used to describe what we use to fill up our car's fuel tanks.

Problems with a social dilemmas approach

In considering the limitations of a social dilemmas approach, I focus specifically on the applicability of findings from the laboratory to 'real life' environmental dilemmas. The reason for this focus is that social dilemmas researchers do often claim such applicability (e.g., Foddy et al., 1999; Komorita & Parks, 1994; Liebrand, Messick & Wilke, 1992). I argue that some features of experimental commons dilemmas pose large questions about their usefulness in modeling real world dilemmas such as energy and water conservation.

Firstly, let us consider the unit which social dilemmas experiments use as an analog to a real-world resource. Since the majority of commons experiments in the lab involve either the harvesting of 'points' that are later exchangeable for sums of money, or in some cases have no worth at all once the experiment has finished, it becomes important to think about whether or not this 'resource' is conceptually suitable for what it is intended to model.

One problem that seems inherent in commons games, whereby individuals are 'dipping into' a common pool of money, is the payoff structure involved. In such a game, an individual is involved in the process of 'using' money; supposedly in the same fashion that one 'uses' water or electricity. One weakness of this situation is that, in a sense, the participants are getting to 'use' the money 'for free'. This is true in so much as the money used in such experiments is analogous to the resource in the real world. Obviously subjects who harvest irresponsibly *will* pay a financial 'cost' in

the form of there being less of the resource (which happens to money in this case) left over. However, the point here is that participants are *not* being required to engage in a decision making process whereby they are weighing up personal satisfaction/comfort, the welfare of the resource *and* personal financial interest.⁸

This is very different to real life commons dilemmas such as water and energy use whereby one has to *pay* money in order to harvest from the common pool and the amount one pays is proportional to the amount one harvests. Thus, the social dilemma approach suffers from the opposite problem to the rational economic approach in that it fails to consider personal economic cost-benefit processes. Obviously, this is a shortcoming that is difficult to overcome due to the fact that money represents a universally desired commodity that the researcher in the lab can reliably use to generate a desire for the common resource in their subjects. One way to attempt to overcome this problem, however, may be to create a situation in which participants are given a set amount of ‘currency’ of some sort at the beginning of the experiment that they can then use to ‘buy’ amounts of the common resource pool on each trial. Obviously the challenge then becomes to find a resource other than money to comprise the common pool and for which the participants have a desire. This represents a difficult challenge, but is surely not one that is insurmountable, given a little ingenuity.

⁸ It should be noted, however, that real life commons dilemmas do exist whereby users of resources are not required to pay per use, or where payments are minimal. (e.g., water use by agribusiness in California).

A second problem with the social dilemmas approach is that it generally contains an inherent assumption that, with prolonged non-cooperative management of the commons, all individual users will eventually be faced with the prospect of suffering the detrimental effects of its depletion. From an applied perspective, there are two problems with this assumption. Firstly, the consumption behavior of individuals in many western societies such as the US or Australia is rarely influenced by the threat of resource depletion, even in times of drought and energy shortages. The main reason such events *are* rare is that the relevant authorities and governments that manage such resources are primarily motivated by a desire to *avoid* a situation where a resource is depleted to such an extent that individual consumers suffer. For example, in the case of water, new dams will often be built to guard against potential water shortages. A prime example in the case of energy is the back down by US president George Bush on his pre-election promise to begin regulating carbon dioxide emissions from power plants. His response to such actions being:

“At a time when California has already experienced energy shortages, and other western states are worried about price and availability of energy this summer, we must be very careful not to take actions that could harm consumers” (cited in The West Australian Newspapers, March 15, 2001)

This form of “Consumer Protection” environmental management masks consumers from the *real* consequences of their consumption, hence allowing consumers to continue consuming at their current levels without experiencing shortage. The ‘price’ of this blissful ignorance is paid by the environment itself, which continues to be abused at unsustainable levels. In the case of greenhouse gases, carbon dioxide emissions continue to rise and the effects of global warming follow. In the

case of water, vast areas of land are lost to dams or underground water supplies are tapped faster than they can replenish, with the accompanying ecological effects. So in many real life environmental dilemmas, it can be seen that the real damage that is done by over consuming is often not in the form of a resource 'running out', but rather the collateral environmental damage that occurs as a result of maintaining supply at such a level that demand can always be met. As a result of this, it would seem unlikely that the behavior of individual consumers of these 'real life commons' would be influenced by the kinds of 'interdependence algebra' that are studied in experimental commons dilemmas. That is, if a resource pool from which you are harvesting has never run out in your lifetime, and you have never considered the possibility that it *might* run out sometime in your lifetime, then you are unlikely to consider moderating your use to avoid such a situation. You are also unlikely to consider how you expect other users of the resource to behave. Why would you? Although the production and consumption of energy may, in reality, represent a global commons dilemma, it does not represent a commons dilemma for individual consumers unless the environmental damage associated with consumption is factored into the regulation of its supply. Therefore, it could be argued that experimental commons dilemmas research may tell us little about the behavior of individual consumers of resources such as energy and water. It may, however, be useful in analyzing behavior at a higher level whereby one uses the nation state as the unit of analysis, such as is the case in international protocols for greenhouse gas abatement. One problem that still exists with using a commons dilemma model to analyze international-level dilemmas is that those who are

involved in the current decision making process often still do not face the prospect of suffering the ill-effects of over consumption. Unlike an experimental commons dilemma, whereby those who make decisions must deal with the consequence of those decisions, the impact of decisions related to global warming are more likely to affect future generations as opposed to those who are currently making these decisions. It would seem that this characteristic of the situation is significantly important to warrant its inclusion in attempts to model such decisions. Perhaps a traditional experimental commons dilemma should involve the management of a pool of 'resources' of some kind whereby subjects are informed that the amount of units of resource that remain once they have finished harvesting will represent the amount left over for the next group of subjects?

The main issue that is being taken with the social dilemmas approach is in terms of the usefulness of its experimental paradigms in being able to model 'real world' dilemmas in a way that is likely to produce results that will lead to successful application of intervention strategies in the real world. This is not to say that the theoretical tools of social dilemmas research have *no* utility in analyzing real world situations (for example, see Ostrom, 1993). It would seem, however, that more attention could be paid to developing experimental paradigms that *specifically* model particular real world environmental dilemmas. It has been pointed out that it is debatable whether self-interest *will* ever be eventually compromised as a result of the consumption of many natural resources. As a result, it appears questionable how many people are ever really weighing up personal benefit versus the collective good

when they engage in everyday behaviors such as driving to work, taking a long, hot shower or air conditioning their home. Most people may not even perceive everyday objects around their home or their transport choices as having an important environmental impact.

Problems with Attitude Models of ESB

The prediction of behavior from attitudes is an issue that has been the subject of much debate and contradictory findings in the field of social psychology in general (e.g., Wicker, 1969), as well as in the more specific area of ESB. A thorough review of the attitude-behavior literature is far beyond the scope of this paper. For the purposes of this discussion, it will be argued that if there is one overarching statement that can be made about the relationship between environmental attitudes and ESB, it is one of contradictory findings. Whilst some studies have found environmental attitudes to predict behaviors (e.g., Leung & Rice, 2002; Vogel, 1996), others have found them to have little predictive power (e.g., Archer et al., 1987; Scott & Willits, 1994).⁹

A major problem with the use of environmental attitudes as a predictor of behavior is that factors beyond the individual's personal control can often interfere with the performance of attitude-consistent behavior (Hines, Hungerford & Tomera, 1986/87). For example, the facilities available for recycling have been found to affect the influence of environmental attitudes on recycling behavior (Vining &

⁹ It should also be noted that a large amount of the literature in this area also relies on *self-reported* measures of ESB.

Ebreo, 1992). The general response to such findings has been the creation of more complex attitude-behavior models that include, as well as attitudes, variables such as “subjective norms” and “influences on behavior beyond people’s control” as predictive variables (Ajzen, 1989). For example, in a recent review, Kaiser et al. (1999) suggest that Ajzen’s Theory of Planned Behavior represents a unifying framework for environmental attitude research and demonstrate how it can be used to ‘allow the disentangling of psychological and non-psychological influences on individual behavior’ (p.14). Although including ‘non-attitudinal’ variables in attitude-behavior models makes such models more complete, it is debatable whether these frameworks (such as the Theory of Planned Behavior) are the most useful heuristic devices to apply to the analysis of environmental behavior. Their usefulness can be questioned because of their continued goal *being* the ‘disentanglement’ of cognitive, attitudinal determinants of behavior from other variables putatively separable from the individual and their psychological processing. Attitude-behavior models still concentrate on what an individual thinks about an environmental issue or associated behavior, and merely *recognize* the influence of other factors so as to be able to increase the apparent reliability of predictive models. The approach suggested by Kaiser et al. of ‘disentangling’ the way that individuals *think* about environmental behavior from the other situational and physical variables which may influence behavior during such an interaction, reflects what Altman and Rogoff (1987) have described as an *Interactional World View*. This worldview treats psychological functioning as a joint and interactional product of situational and personal factors. The theoretical corollary of this

becomes a desire to separate these factors so as to study their effect on the phenomenon in question, both in isolation and in interaction with one other. Alternatively, environmental behavior can be seen to involve a system containing both individual persons and a host of environmentally relevant 'objects' such as cars, washing machines and rubbish bins (Hormuth, 1999). This conceptualisation of ESB reflects what Altman and Rogoff describe as a *Transactional* worldview in which the unit of psychological analysis becomes 'holistic entities such as events involving persons, psychological processes, and environments' (p. 24). Rather than separable elements, this approach deals with a '*confluence* of inseparable factors that depend on one another for their very definition and meaning' (p.24). It is also recognised in a transactional approach that the definitions and meanings of aspects of these holistic entities are ever changing, as opposed to being static.

Perhaps the reason researchers have found it difficult to predict behavior from attitudes stems from an assumption that the psychological or attitudinal component of their models must always be thought of as being inherently static and separable from the other aspects of the system. That is, there is an underlying assumption that, despite many other factors being involved, one can always expect to find an attitudinal predictor of behavior that can be thought of as an identifiable 'thing' that one can 'have', and which is essentially static. This kind of assumption can perhaps be thought of as representing the very backbone of traditional, mainstream social psychology, but this does not necessarily mean that it is the most useful way of approaching the study of ESB.

Problems with Behavioral Approaches to ESB

Applied behavioral analysis has identified many intervention techniques that have been able to demonstrate notable beneficial effects on ESB during the short-run duration of the intervention. Unfortunately, however, a characteristic of behavioral interventions has also been that effects on behavior often subside with the removal of the intervention, particularly when interventions use consequence strategies (Dwyer et al. 1990). This makes intuitive sense, given that if an intervention relies solely on providing a set of positive consequences for ESB and/or negative consequences for environmentally damaging behavior, then it is likely that the subsequent removal of these consequences at the completion of the intervention will result in a return to the sets of behavior that were being elicited by the original sets of pre-intervention consequences. By totally de-cognitising the individual, the behavioral approach tends to, by its nature, problematise the concept of bringing about long-lasting changes in behavior. By removing psychological meaning from antecedents and consequences of behavior, the behavioral approach may ignore particularly important influences on behavior. For example, antecedent interventions such as prompts may play completely different roles in influencing the interaction between an individual and the environmentally relevant objects that they use, depending on their contextual meaning for the individual. So a prompt that is imposed upon an individual in a public space such as a university locker room (e.g., Aronson & O'Leary, 1983) should perhaps be considered differently to

a prompt that an individual personally agrees to install in the bathroom of their own home.

A Unifying Framework for Conceptualizing ESB

I will now present a framework that I believe may be useful in trying to understand and change ESB. This approach, which I will call the Social-ecological approach, can be seen as an amalgamation of Hormuth's (1999) Eco-psychological approach to ESB and Baron and Misovich's (1993) social ecological framework of attitude and behavioral change. The central tenet of this approach is that attempts to understand and change ESB have to take into account the psychological relationship between individuals and their physical and social environments. ESB can be seen as the result of the way that we interact with 'things' around us in our everyday lives (Hormuth). Examples of environmentally relevant 'things' include such objects as washing machines, rubbish, air-conditioners, cars or perhaps, more specifically, a gas pump. In such an approach, the important unit of analysis becomes the interaction (in both a physical and psychological sense) between the individual and the relevant 'thing' with which they engage to cause an environmental impact.

So how might we conceptualize the way that people interact with their environments? After all, it is one thing to attribute importance to this interactional process, but such a general approach does not necessarily leave us much to hold onto in a conceptual sense. I wish to argue that the social-ecological approach of

Baron and Misovich (1993) can be a useful framework for understanding these interactions. Baron and Misovich propose three key principles that can be seen to be involved in our interactions with our physical and social environments. The first of these is Gibson's (1979) notion of 'affordances'. Affordances can be seen as the potential utility (either positive or negative) that an 'object' in the environment is perceived by an individual to be capable of offering. That is, "what can I *do* with this object?" or "what does this object allow me to do...what does it afford?". For example, a washing machine may afford efficient cleaning of clothes, but it may also afford consumption of scarce water resources or the consumption of large amounts of electricity. It should be noted that affordances do not represent real, objective things that you can pick up or touch. They are subjective *perceptions* experienced by observers. For example, you cannot *touch* or visually *see* the affordances of 'energy consumption' when you turn on a light, but you may *perceive* it, or not, as the case may be.

The second key principle is that of 'attunements'. This concept arises from the fact that there are almost always multiple affordances that individuals can perceive in 'objects' or 'things' in their environments. As a result, individuals can be differently 'attuned' to various types of affordances. With an automobile, for example, one can be potentially attuned to its affording transportation. However, one could also be attuned to the automobile's affording the consumption of monetary income or affording the pollution of the earth's atmosphere and production of greenhouse gases.

The third key principle is the concept of ‘effectivities’. These refer to the skills and knowledge that an individual has that allow them to *utilize* an object’s affordances, once it has been perceived. For example, once an individual has perceived a pushbike as affording more environmentally friendly travel than their car, they will then need to be equipped with certain knowledge (such as information about bike paths between their home and work) and skills (being fit enough to ride to work) before acting to utilize these affordances. In relation to water and energy conservation in the home, once an individual has perceived an appliance such as a shower as affording high consumption of resources, they will need to know how they can go about reducing this before they can act (installing water saver shower heads for example, or more specifically, where they can buy them from). Expanding our effectivities can also, in turn, allow for the attunement to new affordances. For example, having learnt how to save water with the washing machine, we are more likely to then be attuned to the water consumption affordances of the dishwasher.

Hormuth (1999) points out that when we are engaged in using (or for that matter, *buying*) most of the ‘things’ around us that are environmentally relevant (e.g., cars, showers etc.) we do not usually perceive them in terms of their environmental impact. Rather, we tend to perceive them in terms of their primary, instrumental functions such as transportation or personal hygiene. Therefore it would seem that one of the main hurdles to be overcome in an attempt to invoke changes in both

everyday behaviors and consumer decision making that lead to more positive environmental outcomes is the sets of affordances that tend to dominate such person-environment interactions. It would seem necessary to try to attune people to the environmental impact affordances of environmentally relevant ‘things’ whilst they are using them in their everyday lives and to equip them with the skills and knowledge that they need to utilize these affordances.

Both Baron and Misovich (1993) and Hormuth (1999) also point to the importance of considering the *social* environment in which environmental behavior is taking place. The social-ecological approach does not regard a true consideration of the social environment as being analogous to the notion of ‘situational factors’ included in models such as Ajzen’s (1989) Theory of Planned Behavior. In line with Altman and Rogoff’s (1987) ‘Transactional World View’, it can be argued that ESB should be seen as being ‘socially embedded’ rather than simply being influenced by situational factors. As such, the social environment will both influence, and be influenced *by*, the affordances that individuals are attuned to and the effectivities that they are equipped with. So, for example, in the case of water conservation in arid climates, the extent to which a particular individual is likely to perceive the environmental affordances of water use behaviors such as lawn watering will be affected by the extent to which *others* in their social environment are attuned to these affordances. This influence can operate in two inter-related ways, one being conversationally and the other being observationally. That is, the individual may become aware of the environmental affordances of lawn watering as a result of

conversations with others and by exposure to public discourse. Awareness may also be heightened by individuals *observing others* behaving in a way that demonstrates an attunement to these affordances, such as allowing their front lawns to brown off, or applying soil wetting agents and mulch. Obviously, the social environment will also, in this way, influence the extent to which individuals are equipped with the effectivities required to utilise an affordance. Once again, this influence will occur through the dual processes of conversation and observation.

Due to the socially *embedded* nature of ESB, it is also important to recognise that the affordances that individuals are attuned to and the effectivities that they possess influence the social environment itself. For example, by becoming attuned to the environmental affordances of lawn watering and being equipped with the relevant effectivities required to modify their lawn watering behavior to accommodate these, an individual becomes able to *modify* their social environment, once again, through conversation and observation. The individual is able to attune others to these affordances through their conversations with other members of their collectivity as well as by enacting public behaviors that show an appreciation of these affordances. An important issue to be raised at this point concerns the distinction between public and private ESBs. Seligman and Finegan (1990) point to a distinction between ESBs that occur in a public setting (i.e., somehow observable by others) and those that occur in a private setting (i.e., not observable by others). They suggest that, as a result, different types of processes are likely to influence behavior in each setting. The current conceptualisation of the socially embedded nature of ESB extends

Seligman and Finegan's argument by suggesting that the social environment can still influence private ESBs, by way of *conversational* processes. It also suggests that public behaviors may be influenced to a *greater extent* by the social environment as a result of the interrelated effects of conversational and observational processes.

A Brief Social-Ecological Analysis of Existing Approaches to ESB

I now wish to briefly re-evaluate each of the approaches outlined previously by considering how they might be interpreted through a social ecological framework. Take, for example, the rational-economic model of ESB. If one is interested in using economic incentives and punishments to promote ESB, then one must first consider economic cost as a set of affordances that people may or may not perceive, or be attuned to, when using an object. Therefore, the behavioral effects upon consumers of changes in the price of a resource, or the price of high-efficiency appliances will depend to a large extent on whether or not they perceive the economic affordances of their mode of transport or personal hygiene or leisure habits when making relevant behavioral actions or decisions. In light of this, it would be advisable that those wishing to conduct rational-economic behavioral change interventions conduct an assessment of the degree to which financial affordances *are* likely to be perceived in relation to the particular behavior that is being targeted. After all, there is no point in offering financial rebates on public transport if people are more attuned to the social status that their private vehicle

affords them amongst their fellow employees, or the social ridicule that catching public transport may afford!

It is also important to consider social-ecological processes when evaluating social dilemmas paradigms. If one is interested in modeling real life dilemmas, then one needs to consider attunement processes that operate in the two settings. A major problem with laboratory dilemmas paradigms is that participants are ‘auto-attuned’ to certain sets of affordances when they enter the experiment. That is, participants are explicitly attuned to the ‘collective consequence’ affordances of their individual behavior. This can be contrasted with individuals who are going about consuming resources in their everyday lives who are not necessarily attuned to these affordances. From an applied intervention perspective, it would seem that experimental social dilemmas settings provide us with a model of the psychological ‘state’ that we would *like* individuals in real life settings to be able to achieve and maintain, rather than an avenue for assessing the effect of various independent variables on individual consumption of resources such as water and energy. Laboratory dilemmas paradigms may, however, be useful in modeling real-world situations in which people *are* likely to be attuned to the collective consequences that their behavior affords. For example, scenarios in which stakeholders are involved in policy decisions regarding issues such as water rights or fishery areas.

When applying attitude-behavior models to ESB, one needs to consider how an attitude may affect the individual at the point of interaction between the individual

and the ES objects in their environment. It *could* be postulated that attitudes influence our behavior by *guiding* our attunements, that is, our attitudes influence what uses we perceive in objects. I would tend to not support this idea however, as, if this were the case, a high attitude-behavior relationship would be observed more consistently. I would suggest a process more akin to that depicted in Figure 1. When an individual encounters, or is using, an ES object they perceive a set of affordances which are affected by former knowledge relating to the existence of different affordances for the object, and features of the immediate physical and social context which may attune the individual to certain affordances of the object. Having perceived various affordances, the individual must then decide whether they wish to maintain or modify their behavior as a result of the consequences that this behavior has been perceived to afford. It is at this stage (represented by the third box in figure 1) that attitudes would appear to become relevant. Having made this decision, the individual will then make the behavioral response that they have deemed appropriate.

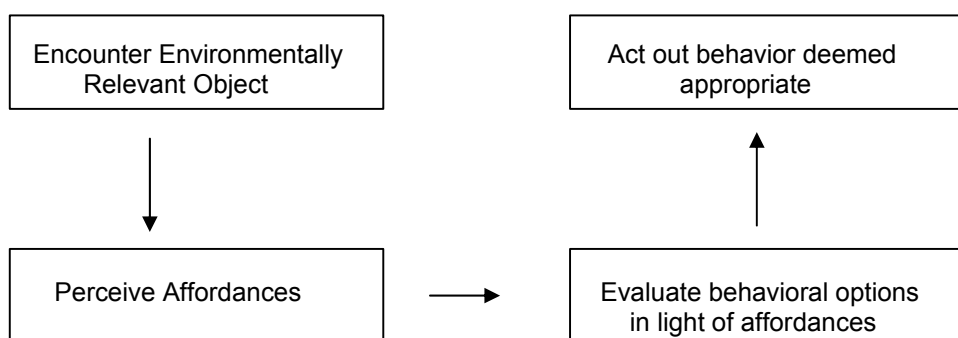


Figure 1. A model of the role of attitudes in a social-ecological framework of ESB

The stage in the model depicted by the second box in figure 1 could be thought to represent a similar concept to the notion of ‘attitude accessibility’, or the ease with which an attitude can be recalled from memory (Fazio & Williams, 1986), which has been adopted by those working from a social cognition perspective. The difference, however, lies in what is meant by ‘attitude accessibility’. The social cognition account of attitude accessibility considers the time taken to retrieve an attitude from memory as being a primary determinant of its ability to influence behavior. What the current model considers as important is whether or not an individual perceives a given situation as being in any way relevant to their attitude which will, in turn, influence whether or not an individual will even retrieve their attitude from memory *at all*.

So, from an applied intervention perspective, there is little doubt that what people ‘think about’ various environmental issues and behaviors *is* likely to influence their behavior. After all, people are unlikely to be influenced by *any* intervention strategies if they hold a fundamental belief that environmentalism is a ‘load of garbage’! However, the point being made here is that pro-environmental attitudes should be thought of as *necessary* but not *sufficient* in bringing about changes in peoples ESBs.

From a social-ecological perspective, the ‘antecedents’ of behavior referred to in a behavioral model of ESB can be thought of as providing guidance to the attunement process. So antecedents such as prompts or modeling will help influence the degree

to which individuals perceive environmental-impact affordances. The ‘consequences’ of behavior referred to in a behavioral approach can be thought of *as* affordances themselves. By providing feedback on consumption or monetary reinforcement for conservation, one is creating the potential for an individual to perceive their ESB as affording positive or negative feedback or economic benefit. When one considers behavioral interventions in *this* way, it would appear more logical to consider the behavioral change process as coming about as a result of individuals being faced with new sets of affordances (consequence strategies) and being guided to perceive sets of affordances that they may not have formally perceived (antecedent strategies). So if one wishes to bring about lasting changes in behavior, it becomes imperative that the sets of affordances that individuals are either provided with or trained to be attuned to have the potential to be perceived by the individuals long into the future. So, for example, there is little point in introducing a monetary reward during a one month period for individuals who engage in an ESB, as the economic benefit affordances which may produce changes in behavior will fail to be perceived once the intervention has concluded and will therefore fail to maintain subsequent ESB. Furthermore, even if a monetary incentive can be maintained, (for example, higher petrol prices), the perception of conservation affording economic benefits may not necessarily be maintained for a long period of time. An individual can simply incorporate the higher price into a slightly revised budget, and the economic affordances of consumption will quickly disappear. It is for this reason that I would argue that the only sets of affordances that have the potential to bring about true, long lasting change are those that relate

to the ‘real problem’ itself, these being environmental affordances. The challenge therefore becomes constructing interventions that cause individuals to become attuned to the environmental impact affordances of their behavior in such a way that these changes in attunement are maintained relatively permanently.¹⁰ This would appear to be where the importance of the social environment comes into play. If one can manage to create changes in the social environment of an individual which guide them to perceive environmental affordances and encourage individuals to perceive ESB as affording social benefits then, in a sense, it would be akin to an army of confederates permanently implementing a behavioral intervention strategy in a community.

A Way Forward?

Upon reading the preceding discussion, the reader could be excused for suggesting that I have raised more questions than I have produced answers. In a sense, this would be a fair comment. My aim, however, has been to examine the way that psychologists study the area of ESB and the influence that this has on our attempts to understand and, ultimately, influence it. What I hope to have demonstrated is that the rational-economic, social dilemmas, attitudinal and behavioral approaches to ESB can all be seen to suffer certain limitations. These limitations arise, primarily, out of what appears to be a need to explain behavior *in a particular way*, as opposed to simply trying to *explain behavior*. The social ecological framework that I have presented is not intended to represent yet another *way* of explaining behavior. Rather, it intends to

¹⁰ Obviously pro-environmental attitudes are also a ‘prerequisite’ if such an approach is to be successful

provide a conceptual framework that is broad enough to allow for the potential amalgamation of all existing psychological knowledge of ESB into a general way of thinking which can help guide attempts to influence ESB. It provides some concepts that can be used when attempting to formulate intervention strategies. The first of these is that in order to bring out changes in ESBs, one needs to consider the interaction between the individual and the relevant objects as the unit of analysis. One also needs to consider that individuals can be attuned to various different 'affordances' of objects; with the primary, instrumental affordances being more likely to be perceived than other affordances such as those relating to environmental impact. It is also important to consider whether individuals are equipped with the knowledge and skills (i.e., 'effectivities') that they require to be able to utilize objects in such a way as to reduce their environmental impact. Finally, to achieve long-lasting changes in attunements, it would appear necessary to create a suitable social environment that allows both the talk and the behavior of others to help attune individuals to the environmental affordances of the objects in their environment. Such a social environment should also allow for the conversational and observational transmission of the relevant skills and knowledge required to utilise these affordances. As for the specific way that one should go about achieving these goals, I would argue that it is futile to attempt to prescribe a 'cooking-recipe-style' intervention strategy that claims to be applicable in every social setting and to every form of ESB. The way in which the concepts I have suggested are eventually operationalized in a particular applied context should, in my view, be left to the discretion of the individual who has the

most knowledge of the financial, social and cultural constraints of the area in which they are operating and the behavior that they are attempting to influence.

CHAPTER 3

INTERVENTION PROGRAMS TO PROMOTE ENVIRONMENTALLY SUSTAINABLE BEHAVIOURS

Over the past 25 years there have been numerous studies published which outline behavioural change programs designed to foster more pro-environmental behaviours. Rather than reviewing this literature exhaustively, this chapter presents a review of the ways in which environmental behaviour change interventions have been *conceptualized* within major reviews of the existing literature. The various reviews and frameworks offered by a number of authors are detailed and then considered in terms of the social-ecological framework outlined in the previous chapter. A social-ecological conceptualisation of the literature is offered which aims to integrate the existing perspectives within a more holistic framework. This framework is not proposed as a superior *alternative* to the existing frameworks, but rather as an integration and reconciliation of the conceptual differences that exist within the current conceptualisations.

Conceptual Frameworks for Behaviour Change Interventions

An Attitude-Behaviour Model.

An early attempt to impose a theoretical structure upon the environmental behaviour change research is a review conducted by Cook and Berrenburg (1981). Their analysis takes an attitude and behaviour change approach and proposes a conceptual framework for conservation research that reflects what they regard as the interrelationship between attitudes and behaviour. They group approaches to

encouraging conservation of resources into seven categories which each emphasise different variables and different principles of attitude change, behaviour modification and behaviour maintenance.

Promoting pro-conservation attitudes. The first group of approaches outlined by Cook and Berrenburg involve promoting pro-conservation attitudes. This is achieved primarily through the use of persuasive communication techniques such as fear appeals and the relation of conservation to the achievement of valued goals such as family security, national welfare, and the preservation of resources for future generations (e.g. Wascoe, Beatty & Cook, unpublished, cited in Cook & Berrenburg, 1981).

Evoking attitude consistent behaviours. The second category of approaches aim to elicit behavioural responses from individuals who already hold pro-conservation attitudes. Three main methods are outlined for eliciting these behavioural responses; signaling that a particular behaviour is conservation-related through the use of reminders at the point of action (e.g., Delprata, 1977; Winnett, 1978), increasing the salience of pro-conservation attitudes in the behavioural setting, and coupling conservation actions to pro-conservation attitudes.

Incentives and disincentives. These approaches utilise material incentives such as financial rewards (e.g., Winnett, 1978) or the provision of convenience or comfort incentives (e.g., Rose & Hinds, 1976). A similar, fourth category uses social rather

than material incentives to promote conservation. These include techniques such as providing social recognition and approval (e.g., Seaver & Patterson, 1976), seeking a public commitment to conserve (e.g., Pallak & Cummings, 1976) and involving individuals in group conservation decisions (e.g., McClelland & Cook, 1980).

Providing Models. The fifth group of intervention strategies draws upon aspects of Social Learning Theory (Bandura, 1969) and involves the use of prominent members of society as models for demonstrating ways of behaving that are environmentally friendly. Cook and Berrenberg cite the wearing of a sweater by President Carter during his televised speech on energy policy as an example of such a technique. Subsequent to Cook and Berrenberg's (1981) review, other authors have applied modeling to environmental behaviours such as shower times in locker rooms (Aronson & O'Leary, 1983) and curbside recycling (Burn, 1991).

Facilitating conservation intentions. Cook and Berrenberg's sixth group of intervention strategies involve facilitating the implementation of conservation intentions. This includes providing knowledge of appropriate conservation practices to ensure that the individual has the ability and competence to act, making conservation alternatives more available (e.g. Pratsch, 1975) and minimizing the anticipated negative consequences of conservation actions (e.g., Seligman, Darley & Becker, 1978).

Providing Feedback. The final group of intervention strategies involves providing information on the effectiveness of conservation efforts by employing feedback procedures which provide individuals with feedback on their environmentally relevant behaviours (e.g. Seligman et al., 1979) as well as feedback via self monitoring, in which residents monitor their own levels of consumption of resources (e.g., Winnett, Neale & Grier, 1979).

Antecedent-Consequence Models.

Ester and Winnett (1982) and Dwyer et al. (1993) have provided a simpler taxonomy of approaches to changing environmental behaviours by grouping strategies into either antecedent or consequence strategies. Antecedent strategies are described as those involving interventions that occur *prior* to the target behaviour being performed (Ester & Winnett). These include obtaining a commitment to conserve, providing verbal information and demonstrations of the target behaviour being performed by others, written communications, assigning individual goals and altering aspects of the physical environment to facilitate the performance of the target behaviour (Dwyer).

Consequence strategies, on the other hand, are described as those involving interventions that occur *subsequent* to the target behaviour being performed. Such techniques include the provision of feedback on levels of consumption, rewarding either individuals or groups for their conservation efforts, and penalizing individuals or groups for high levels of consumption (Dwyer et al., 1993).

Classification of the behaviour rather than the intervention technique

Seligman and Finegan (1990) offer a different way of conceptualising the environmental behaviour change research, which focuses less on the techniques being used to change behaviour and more on the nature of the particular behaviours being changed. They suggest a model of water and energy conservation that includes two factors - the magnitude of the sacrifices involved in performing the target behaviour, and the degree to which the target behaviour occurs in the public or private domain.

Seligman and Finegan suggest that behaviours involving difficult sacrifices are, unsurprisingly, likely to be more difficult to change than those involving smaller sacrifices. If one assumes that using a resource is often rewarding for the user, then behaviours that involve greater rewards will be harder to get people to give up than those involving relatively smaller rewards. Behaviours falling into the 'difficult-to-give-up' category include the driving of automobiles, winter heating in cold climates, summer household cooling in warmer climates, and water use inside the home. Behaviours that are considered to involve less difficult sacrifices include outdoor water use, summer cooling in cool climates and winter heating in more temperate climates.

The public/private dimension of consumption behaviours concerns the degree to which particular behaviours are observable to others or are believed to be open to the scrutiny of others, and thus, are amenable to the effects of social influences.

Seligman and Finnegan suggest that car driving and out-door water use can be

thought of as relatively *public* behaviours as they are both observable to others. On the other hand, household heating and cooling and water use inside the home can be seen as relatively *private* behaviours as they do not occur within the public domain, and are not naturally observable to others (except those also living in the particular household).

In light of their two-factor model, Seligman and Finegan (1990) propose that when attempting to change behaviour, one needs to consider where the particular behaviour fits on the easy/difficult and private/public dimensions. They suggest that relatively difficult-to-give-up consumption behaviours are likely to be less amenable to change via on-going, curtailment activities (i.e., asking people to do without or do with less), and are more likely to be influenced by once-off investments which increase the efficiency of resource use (such as more fuel efficient cars, or the installation of water efficient appliances). On the other hand, they suggest that more easy-to-give-up behaviours are likely to be more amenable to change via ongoing curtailment activities (as well as once-off investments in efficiency measures) due to their more discretionary nature.

As private behaviours are not open to the surveillance of others it is suggested that changes in these behaviours will only be likely when the user of the resource accepts the reasons for making the change, that is, when there is internalization (Kelman, 1974). Alternatively, when behaviours are public, behaviour change may be possible

without necessarily achieving the same levels of internalization due to the pressures of social influence and the opportunity for social comparison.

Identifying barriers to behavioural change in a particular context

A third way of conceptualising the environmental behaviour change literature is provided by McKenzie-Mohr (2000; McKenzie-Mohr & Smith, 1999) who has detailed a Community-Based Social Marketing (CBSM) approach to promoting sustainable behaviour. In this approach it is suggested that attempts to change behaviours should begin by identifying the *barriers* to behavioural change that exist in the particular context in which the intervention program is to be implemented. Such barriers can exist on both an individual level and on a more systemic level, which is external to individuals. Individual barriers can include a lack of knowledge, non-supportive environmental attitudes and an absence of motivation for behavioural change. Examples of external, systemic barriers are such factors as the degree to which public policy initiatives make performing sustainable behaviours convenient (e.g., curbside versus depot recycling) and affordable (e.g., cheap and reliable public transport; subsidies for efficient appliances). Having identified the barriers to behavioural change that exist, McKenzie-Mohr suggests that one should then choose a behaviour change ‘tool’ which is appropriate to overcome it. The tools outlined in the CBSM approach include obtaining a commitment, prompts, promoting norms, communication, providing incentives and removing external barriers.

The conceptual reviews in review

Regardless of the conceptual approach taken, the reviews essentially agree on the behaviour change options that are available. There are, however, two ways in which the reviews differ in terms of their conceptualizations of the literature. The first of these is the extent to which the authors consider the importance of the nature of the specific behaviour that one is attempting to change. Both McKenzie-Mohr (McKenzie-Mohr & Smith, 1999; 2000) and Seligman and Finegan (1990) highlight that important psychological differences may exist between different types of environmentally relevant behaviours and that a behavioural change technique that is successful for one type of behaviour may not necessarily be useful for influencing a different type of behaviour. Cook and Berrenburg (1981), Ester and Winnett (1982) and Dwyer et al. (1993), on the other hand, tend to assume that the various environmentally relevant behaviours are interchangeable or equivalent. These authors divide the literature in terms of the behaviour change techniques employed rather than the different types of behaviour that these techniques have been applied to.

The second way in which the reviews tend to differ is the extent to which they focus on the significance of whether an intervention occurs prior or subsequent to the performance of the behaviour being targeted. As one would expect, the behaviorist frameworks offered by Dwyer et al. (1993) and Ester and Winnett (1982) contain a strong focus on this variable by dividing the literature into 'antecedents' and 'consequence' strategies. The remaining reviews, however, do not emphasise this temporal variable to the same extent.

A social-ecological analysis of these models

A social-ecological account (chapter 2) of ESB intervention research provides a framework that considers both the behaviour that is being targeted and the behavioural tools being employed to bring about change. In addition, it does not view strategies as necessarily being antecedent to the behaviour or consequent to the behaviour, but rather as part of a continually on-going 'system' of behaviour within a community. For example, the provision of feedback on consumption behaviours can be seen as both antecedent and consequent to behavioural change in that it can provide the consumer with evidence of a need to change behaviour, as well as providing evidence that a behavioural change has been successful in bringing about a more sustainable outcome. Ideally, intervention tools should work by being embedded within a behavioural system such that they provide both antecedents and consequences for behaviours.

As outlined in chapter one, the social-ecological approach conceptualizes ESB as the result of the way in which individuals interact with environmentally relevant objects in their physical environments, as well as the nature of the social environment in which these interactions are embedded. Conceptualising intervention strategies within a social-ecological framework therefore involves the consideration of five important aspects of the behaviour change process. I will now discuss each of these considerations.

Attuning community members to environmental impact affordances

As discussed in Chapter 1, it is important to design intervention strategies that attune individuals to the environmental impact affordances of various activities, at the point of interaction between the individual and the environmentally relevant objects and appliances. This could be achieved through the use of visual or verbal prompts that are strategically applied so as to influence behaviour as it is being performed. For example, in a project conducted by the Durham Region in Ontario, Canada (reported in McKenzie-Mohr, 2000), residents were reminded to water their lawn on either odd or even days and not to water their lawns if it had recently rained, by way of a prompt that was hung over the outside faucet that they used to turn on their watering system.

Some material incentives and penalties may also be applied to perform this task of attuning individuals to environmental impact affordances. For example, if a grocery store is to introduce a 5 cent charge for each plastic bag that they give out to shoppers, then one could argue that it is the interruption of a shopper's usual routine (i.e., fill cart with groceries, have groceries packed in plastic bags at checkout, pay for groceries, and leave with plastic bags full of groceries) that signals a potential need for a change in behaviour, rather than the change in economic contingencies. The small charge for bags can be best viewed as a way of potentially attuning people to the fact that plastic bags are a commodity with a direct environmental impact, rather than a way of encouraging people to conserve through a price increase. It would therefore be necessary to ensure that such an intervention program would signal these affordances to shoppers at the same time as it interrupts their shopping routine - for

example, by training checkout workers to advise shoppers of the 5-cent charge (rather than it simply being automatically added to the total price) and to give a one-sentence explanation of the environmental reasons for the bag charge.

Providing community members with the appropriate effectivities

It is also important that intervention strategies provide individuals with the skills and knowledge (or effectivities) that are required to behave sustainably, once the appropriate affordances have been perceived. This will inevitably involve some form of communication. Ideally, this communication would also occur during the process of the individual engaging with the behavioural situation in question. For instance, to return to the plastic grocery bag example, having advised shoppers of the 5c charge and the reasons for it, check-out staff could then inform shoppers of the alternative, re-useable, non-plastic bags that the grocery store is selling, or encourage shoppers to bring back their plastic bags next time they shop.

There is evidence that it is also helpful to make the information as individualized as possible when communicating effectivities information. For example, an intervention program conducted in a local council area of Perth, Western Australia to decrease car use was able to produce a 10 percent reduction in car driver trips and a 21 percent increase in public transport trips by utilizing an individualized marketing strategy (Brog & John, 2001). This strategy involved contacting members of the community to ascertain their current transport modes and whether or not they would be interested in finding out more about alternative modes to the car. Individuals who were already using alternatives were given 'rewards' to encourage them to utilize these methods

further. Individuals who were interested in *changing to* alternative forms were provided with more information regarding the specific options that they were interested in (such as public transport routes and schedules, bike paths etc), in relation to the particular trips that each individual made on a regular basis.

Attuning community members to suitable non-environmental affordances

A social ecological approach would suggest that, in some instances, it may be useful to attune community members to sets of affordances that relate to non-environmental aspects of the behaviour one is trying to promote, such as potential monetary savings. It may also be useful to attempt to create *new* sets of potential affordances by changing the pricing of resources or introducing fines for overuse of resources. However, these methods need to be approached with caution for a number of reasons. When attempting to attune individuals to pre-existing economic affordances (such as potential savings on household power bills) one needs to consider whether saving a few dollars, simply for money's sake, is actually likely to be a goal that many individuals in western societies are likely to be motivated towards. This issue is particularly salient within the more affluent sections of the community (who are generally the largest consumers of resources). In a capitalist culture that espouses an ethos of "the more you earn, the more you are entitled to consume", simply appealing to an ethic of 'thrift' is unlikely to be successful in promoting more sustainable use of natural resources.

When using price to promote behavioural change it need to be noted that small price increases have the potential to simply be incorporated into a revised budget, if individuals are not given any other reason to conserve. For example, despite the fact that petrol prices in Australia have been steadily increasing over the past five years (from around 75c a litre to around \$1 a litre) there has been no major change in residents' reliance on single occupancy vehicles for transportation in a city such as Perth, Western Australia¹¹. Secondly, the imposition of a very *large* price increase has the potential to cause political backlash and public outrage, particularly in the absence of a focus on a compelling environmental reason for the change.

A third option that focuses on non-environmental affordances is the imposition of restrictions on the amount of resources that are allowed to be used, and fining of those who exceed these limits. These initiatives (such as the recent introduction of garden watering restrictions in multiple Australian cities) have the advantage of not only attuning individuals to potential financial consequences of over using resources (i.e., fines), but, perhaps more importantly, also helping to attune individuals to the 'sharedness' affordances of resources (i.e., the degree to which the resources are shared by all members of a community). By imposing a community-wide set of restrictions, individual users of resources are likely to become more attuned to the fact that their individual use of resources is relevant for reasons *other* than their own individual utility bills. They are more likely to perceive their resource use as also having social responsibility affordances. This point is demonstrated further in chapter

¹¹ Indeed, the only change in behaviour appears to have been an increase in whinging-about-petrol-prices behaviour!

6 through the analysis of Perth residents' discourse surrounding water and energy resources.

Utilizing the influence of the social environment

It is important when developing intervention programs to attempt to maximize the potential beneficial influence of the social environment in which the target behaviour is taking place. As discussed in Chapter 2, the social environment can influence ESB through both observational and conversational processes. Therefore, an intervention should attempt to maximize the degree to which others are likely to observe individuals performing the behaviour and the degree to which individuals are likely to observe others performing the behaviour. It should also encourage individuals to communicate to others about the behaviour and increase the likelihood of individuals being communicated *to* by others regarding the behaviour. Essentially, the use of the social environment involves intervention strategies that promote behavioural change through the influence of social pressures and social models. In some cases, as was discussed earlier in relation to Seligman and Finegan's (1990) review, this may involve taking advantage of the fact that a particular behaviour is naturally open to public scrutiny. For example, curbside recycling lends itself to the operation of these processes due to the fact that people can naturally observe others engaging in the behaviour. Similarly, cycling to work can be observed by one's fellow work colleagues and is also likely to promote conversation about cycling as an alternative within the workplace. Water consumption in the garden (particularly the front garden) is another example of a socially visible behaviour. Other behaviours, however, are not

naturally open to public scrutiny. Energy and water use in the home, for instance, is generally a private behaviour that is only open to the scrutiny of others residing in the household. A social-ecological approach would suggest that with these private behaviours it is useful to devise intervention strategies that aim to make the behaviour more socially visible in some way, or at least promote the perception that the behaviour is taking place in a social, rather than an individual, context.

The use of the social environment to help promote environmentally sustainable behaviours (particularly ‘private behaviours’) has not been greatly utilised in intervention research. Some examples where it has been used include a study by Pallak, Cook, and Sullivan (1980) who induced a form of public commitment in participants in a program designed to reduce natural gas consumption during winter. Participants who were informed that the results of the study (including participants’ names) would be printed in a local newspaper were found to conserve more natural gas than those who were assured of anonymity. Another example can be found in a study by Siero, Bakker, Dekker and Van Den Burg (1996), who used feedback to influence the energy consumption behaviour of two units of a metallurgical company. One of the units only received feedback on their own unit’s energy consumption, whereas the second unit also received feedback that compared their consumption to that of the first unit. Employees in the comparative feedback condition were found to save more energy than those who only received feedback on their own unit’s consumption, with these differences still being evident 6 months after the intervention.

The use of social norms to influence ESB has tended to occur when the behaviours being targeted *are* publicly visible, such as a block-leader approach to promoting recycling in which residents were asked to encourage their neighbours to recycle (e.g., Hopper & Neilsen, 1991), or a program in which motorists were asked to affix a sticker to their car which espoused the virtues of not leaving their engine idling when parked (see McKenzie-Mohr, 2002). One survey study conducted in the Netherlands (Midden & Ritsema, 1983) suggests that consumers themselves do not feel that more private behaviours such as energy consumption behaviour are influenced by normative factors due to the lack of public monitoring and external sanctioning involved. Although there were numerous calls during the 1980s within the social psychological literature of energy conservation for an increased focus on social networks and ‘social diffusion’ strategies to promote ESBs through the communication processes of pre-existing social networks (e.g., Archer, et al., 1987; Darley & Beniger, 1981; Costanzo, Archer, Aronson & Pettigrew, 1986; Aronson & Gonzales, 1990), the decade that followed did not really produce any intervention studies which utilised these processes (with the possible exception of the application of ‘block-leader’ approaches to recycling). There may be two reasons for this, the first being an *overall* reduction in the number of intervention studies being conducted (or at least published) on ESB since the early eighties (see Dwyer et al., 1993). The second is a potential lack of clear direction as to how exactly one might apply theories such as social diffusion in the field to attempt to influence a community’s

ESB¹². Interestingly, some social dilemmas work done in the laboratory by Mosler (1993) has demonstrated the ability of ‘community members’ who are sharing a simulated common pool resource to exert mutual influence on each other’s behaviour through verbal public commitment to responsible harvesting of the resource. Hopefully research of this kind may be drawn upon in the future to devise applied interventions that utilize such processes to promote environmentally responsible behaviour in the field.

Decreasing the likelihood of inhibiting affordances being perceived

This final point refers to the need to be aware of the affordances that individuals may perceive which will inhibit their performance of ESB. For example, public transport may be perceived as affording inconvenience, due to unreliability or longer traveling time, or may be perceived by some as not affording the same levels of social status and prestige that driving an expensive car to work may afford. Likewise, the installation of energy and water efficient appliances in the home may be perceived as affording unwanted economic sacrifice. As McKenzie-Mohr (2000) points out, the negative affordances (or, as he terms them, perceived barriers) will be different for different types of behaviours, and for the same behaviours in different contexts.

There are two ways in which one can tackle these types of negative affordances. The first is to *alter* the physical or economic environment to remove the particular affordance (for example, providing more reliable and frequent public transport,

¹² It may be worth noting that the common conceptualisation of ESB as an *individual*, rather than a *community*, phenomenon may also represent a part of the problem.

introducing government subsidies on efficient appliances). The second is to attempt to reframe the particular sets of current contingencies for community members so as to alter their perception of the affordances (e.g., “time spent riding a bike to work is less time needed at the gym”, or pointing out monetary *savings* achievable over time produced by installing efficient appliances). Obviously, an ideal strategy would attempt to use both techniques. After all, it may be futile to double the number of buses running if nobody knows about it or to try to convince low income earners to invest in expensive solar water heaters so that they can “make back their money in 5 years time”!

Designing strategies

When designing intervention strategies to promote ESB it is important that the strategy incorporates as many of the above five principles as possible. Obviously, not all principles will necessarily be applicable to every type of ESB or in every specific community context; however strategies that incorporate multiple principles are likely to be the most effective. The study mentioned earlier on reducing engine idling (McKenzie-Mohr, 2002) is a prime example of this. In an attempt to encourage motorists to turn off their engines while stationary, the researchers approached motorists who were sitting in their vehicles and provided them with an information card which detailed how they could reduce environmental impact by not idling their engines (i.e., provided effectivities). Motorists were also given a static-cling sticker for their windscreen that contained the words “For our Air - I turn my engine off when parked” and an accompanying graphic. The use of this sticker helped to attune

motorists to the environmental impact of engine idling while they were engaging in this behaviour. It also helped to utilize the influence of the social environment by providing motorists with the opportunity to publicly display the behaviour¹³ which had the potential to not only increase the behavioural compliance of the sticker-bearing drivers (through cognitive dissonance and social identity processes) but also to influence the behaviour of *other* non-sticker bearing drivers through modeling and social norms.

Conclusion

This chapter has provided a discussion of the attempts that have been made by previous authors to impose conceptual frameworks upon the ESB intervention literature. It has been argued that while there is essentially a commonality in the ‘tools’ of behavioural change that various authors discuss, differences can be identified in terms of the ways in which these tools are conceptually organised. I have discussed the ways in which the intervention literature may be conceptually organised within a social-ecological framework (Kurz, 2002) and the ways in which this framework may be practically applied to the construction of future intervention strategies. Five principles have been outlined which should be considered when designing intervention strategies for ESB from a social-ecological perspective. These principles represent a guiding framework for choosing from the existing array of behaviour change tools for ESBs and also for the potential development of new and innovative behavioral technologies in this field.

¹³ As the act of turning off one’s engine when parked, in the absence of the sticker, may not be seen by others as a specifically ‘environmentally friendly’ act *per se*.

CHAPTER 4

APPLYING A SOCIAL-ECOLOGICAL APPROACH TO PROMOTING WATER AND ENERGY CONSERVATION: A PILOT STUDY

This chapter reports a pilot study that was conducted, with the support of the City of Melville (CoM) (a local council in Perth, Western Australia), between September 2000 and February 2001. The aim of the pilot study was to trial the application of an environmental intervention program that was developed following the social-ecological approach outlined in the previous chapters. Residential water and energy conservation and curbside recycling were chosen as the three behaviors to be targeted by the intervention. Residential water conservation has been an important issue in Perth for many years, due to the relatively arid, Mediterranean climate of the area. Residential energy conservation was also targeted due to the CoM's participation in the Cities for Climate Protection (CCP) initiative (<http://www.iclei.org/co2/>). This initiative is a collaborative project, involving local government authorities from all around the globe, which aims to address global warming by reducing greenhouse gas emissions at a local level. Curbside recycling was targeted due to the fact that it is an area that falls under local government responsibility.

Seligman and Finegan (1990) have noted a shortcoming in the ESB literature in terms of studies that investigate the effect of intervention strategies on different types of environmental behaviours within the same context. For example, they point to a lack of studies that have compared the effect of different types of interventions on both energy and water consumption behaviours within the same study and suggest that the

literature currently conceptualises different ESBs (such as energy and water consumption) as essentially synonymous. The current program of research offered an opportunity to help fill this gap in the literature.

The pilot study aimed to reduce water and energy consumption and increase rates of recycling of waste amongst residents in three ways. Firstly it aimed to provide residents with the necessary effectivities required to perform these behaviours in their home by providing them with information regarding these behaviours. Secondly, it aimed to attune residents to the environmental-impact affordances of various appliances and objects around their homes by providing residents with ‘attunement labels’ to be placed in strategic places around the home. Thirdly, it attempted to socially embed the otherwise relatively private behaviours of water and energy conservation in a more social context by providing feedback on residents’ levels of consumption that enabled them to engage in social comparisons with other households’ consumption. As a pilot study, this project was designed to assess the viability of conducting the intervention on a larger scale and to identify potential practical obstacles and issues before embarking on the larger main study.

Method

Participants

The study involved 22 households from the suburb of Bicton, located within the City of Melville in Perth, Western Australia. Half of these households were assigned to an experimental group who received the intervention, and half to a control group. All

participants took part in the study voluntarily. All suitable households¹⁴ within the suburb of Bicton were sent an initial information letter. This letter explained the nature of the study and also included a consent form that those interested in participating could fill out, as well a short questionnaire containing questions relating to the make-up of the household in terms of its size, numbers of residents and the types of appliances used. Residents were made aware that the researcher would be visiting the area in the coming weeks to collect consent forms and answer any questions from those who wished to participate. Approximately 300 letters were posted to the experimental group a further 300 to the control group pool. Upon returning to the area during the following week, the researcher was able to speak with 35 residents from the experimental sample, 11 of whom agreed to participate. The researcher visited 26 residences in the control sample to equal this sample size of 11 for the control group. For details of the characteristics of households in the two groups, refer to Table 1.

Table 1. Details of Households in the experimental and control groups

	Experimental	Control
Average no. of residents (SD)	3.18 (1.47)	3.55 (1.09)
% of rental households	27.3 %	9.1 %
Average no. of bedrooms (SD)	3.45 (1.29)	3.18 (0.87)

¹⁴ An attempt was made to create a reasonably homogeneous sample in terms of house size and house type. As a result, extremely large homes and strata blocks were avoided.

Design

The pilot study involved a simple two-group comparison (control vs. experimental). The experimental group received all of the interventions that were anticipated to eventually be included in the main study, and the control group received no contact after giving consent for the experimenter to periodically monitor their water and electricity meters and observe their levels of recycling.

Materials

Effectivities information packs. These information packs, which were delivered to households in the experimental group, were compiled using information from various sources including material from Energy Efficiency Victoria, The Perth Water Corporation and City of Melville recycling material. They included a brief statement of the environmental impact of energy and water use and waste disposal. (A full copy of this material is contained in appendix A)

Attunement label packs. These packs each contained a series of attunement labels for participants to install in their homes. Each pack was tailored to the particular appliances used in each home. Labels were provided for the shower/s, the washing machine, the clothes drier, dishwasher, toilet/s, front door knob, garden hose or reticulation system and the rubbish bin inside the house. Labels for the shower were also fitted with a small waterproof digital clock to enable residents to monitor more easily the amount of time spent under the shower.

The labels contained very basic information regarding the environmental impact associated with using particular appliances and behaviours that could be performed to reduce this impact. (See example in Figure 2; a full set of labels used in the pilot study is presented in Appendix C).

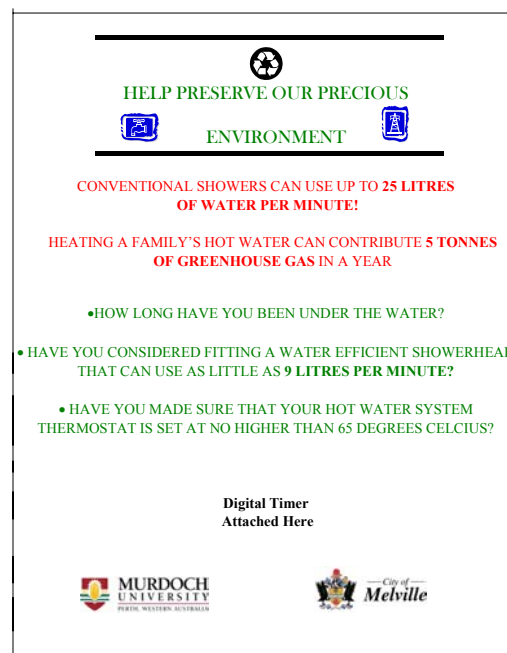


Figure 2. An example of an attunement label used in the shower

Feedback Sheets. Residents in the experimental group were presented with information on their percentage change in consumption for both energy and water consumption for the fortnightly period in question, as well as how their change in consumption compared to the other households in the experimental condition. The fact that individual households were not necessarily directly comparable to the other households in the pilot (e.g., by virtue of their size, number of occupants etc) was an

unavoidable problem that could not be addressed given the small number of households in the pilot study.

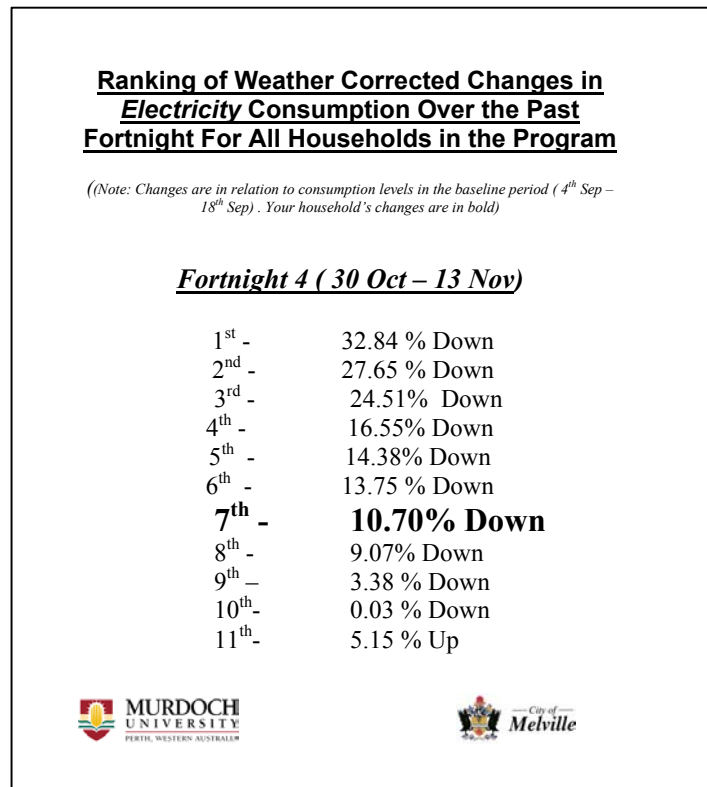


Figure 3. An example of league table used for comparative feedback.

The feedback sheets included numerical information regarding the change in consumption for the household, as well as a graphical display of their change in comparison to their consumption in each fortnight in the study. The sheets also contained a ‘league table’ that placed them in comparison to their ‘peers’ in terms of their changes in consumption (see figure 3).

Attitude Scales. General environmental attitudes were measured, using the New Environmental Paradigm (Dunlap & Van Liere, 1978), in order to determine the general level of environmental concern among the sample of residents. Additional items relating to attitudes toward water and energy conservation and recycling were also included, as well as items dealing with the individual's behaviour in these areas (a full version of the questionnaire can be found in Appendix B).

Procedure

As outlined earlier, 22 households were recruited to participate in the study, 11 for the experimental group and 11 for the control group. Water, energy and recycling data were initially recorded for a baseline period of 2 weeks (4th September- 18th September) that began approximately 1 week after obtaining consent from participants. Energy and water consumption data was collected by taking readings from the participant households' meters. Recycling data was recorded by the experimenter visiting the area early in the morning of each fortnightly curbside recycling collection day and estimating the percentage-fullness of the recycling bin and the regular rubbish bin to the nearest 10 percent.¹⁵

At the conclusion of the baseline period (18th September), half of the participants in each group received the attitude questionnaire in the mail. This procedure was designed to enable the identification of potential cognitive dissonance effects on behaviour that may have arisen as a result of expressing pro-conservation attitudes in

¹⁵ The City of Melville has a "two-bin" system of waste disposal in place, whereby each household is provided with 2 'Wheelie-bins'. One of these is for recyclable materials, whilst the other is provided for all other rubbish.

the questionnaire. Participants were asked to complete the questionnaire and place it in their electricity meter box for collection by the experimenter.

At the end of the baseline period, participants in the experimental condition were delivered their intervention packs that included both the effectivity information pack as well as their sets of attunement labels. Detailed instructions were included that outlined clearly how each label was to be installed (see Appendix A).

Recordings of the dependent variables were taken once a fortnight for six weeks (i.e., 3 readings) following the delivery of the intervention packs. For the following six weeks, households in the experimental condition were also sent fortnightly consumption feedback sheets (three in total). Follow-up recordings of water and energy consumption were then taken once a month for the following two months (see figure 4 for a time-line of the study).

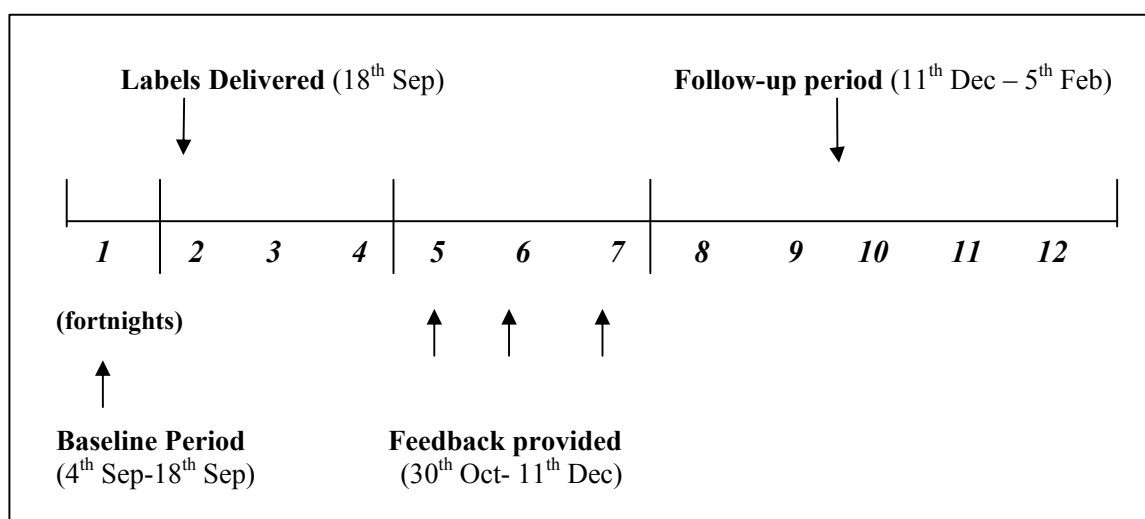


Figure 4. A time-line of the pilot study

Participants in the experimental group were also sent a follow-up questionnaire on the 17th of April which asked them to report on such things as whether they received all of the material they were sent, whether labels were installed around the home, their subjective experience of the labels and their impression of the effect that participating in the program had had on various behaviours, as well as its effect on the degree to which participants had discussed environmental issues with others.

Results

Consumption data

Water and energy consumption data for each time period were converted into a weekly consumption figure by dividing the total consumption for each period by the number of weeks that the period ran for. Mean weekly energy consumption figures were calculated for each household by converting both the kilowatt-hours of electricity and cubic metres of natural gas used into mega joules and summing these two figures. Due to inability to access meters, two households in the control group were not included in the energy consumption data and one household in the experimental group was excluded from the water consumption data. The weekly water and energy consumption data were analysed using a 9 x 2 (time x condition) mixed model ANOVA. Time was used as a repeated measures variable and condition (intervention or control) was used as a between-subject variable

Water Consumption. The interaction between group and time for water consumption failed to reach significance ($F(8, 160) = 1.2, p = .30$). The effect of group, over time, on water consumption is presented graphically in Figure 5.

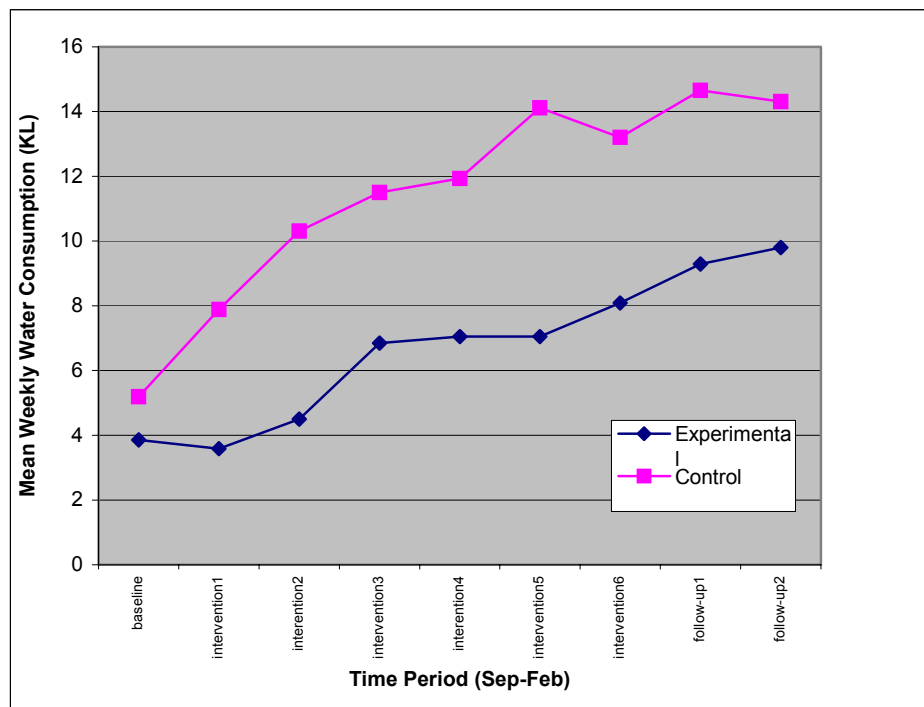


Figure 5. Mean weekly consumption of water for the experimental and control groups¹⁶

Due to the small sample sizes used in this pilot study and its exploratory nature, differences were tested between the two groups at each time period, despite the failure of the omnibus ANOVA to reach significance. These tests are summarized in Table 2.

¹⁶ Note: This data is *not* cumulative. The increasing consumption observed is due to the increasing temperatures and decreasing rainfall in Perth between September and February.

Table 2. Results of independent samples t-tests comparing the experimental and control group's mean weekly water consumption during each recording period.

<i>Time period</i>	<i>Date</i>	<i>Mean Difference (Kl)</i>	<i>t</i>	<i>Significance (2 tailed)</i>
Baseline	4-18 Sep	2.64	1.22	.24
Intervention1	18 Sep-2 Oct	8.56	2.84	.03
Intervention3	2-16 Oct	11.62	3.76	.01
Intervention4	16-30 Oct	9.27	2.47	.02
Intervention5	30 Oct-13 Nov	8.97	2.94	.00
Intervention6	13 – 27 Nov	14.15	2.93	.03
Intervention7	27 Nov-11Dec	10.19	2.59	>.01
Follow-up1	11 Dec-15 Jan	10.71	2.34	.03
Follow-up2	15 Jan–12 Feb	9.07	1.88	.08

As can be seen by the results of independent samples t-tests presented in Table 2, the two groups did not differ significantly in their water consumption during the two-week baseline period prior to the intervention. Following the intervention, however, one can see that the control group's mean consumption was significantly higher than the experimental group's consumption for the following 6 fortnights as well as during the first month of the follow-up period. The fortnightly average over the second month of the follow up period revealed that the two groups' water consumption figures during this month converged to a point that fell marginally short of significance¹⁷.

¹⁷ It is worth noting however, that if a 1-tailed test is employed (which may be justifiable in this case) then follow-up 2 is also significant.

Energy Consumption. No significant interaction was obtained for the interaction between group and time for mean energy consumption ($F(8, 144) = 1.51, p = .16$). The patterns of energy consumption of the two groups over the period of the intervention is presented in figure 6.

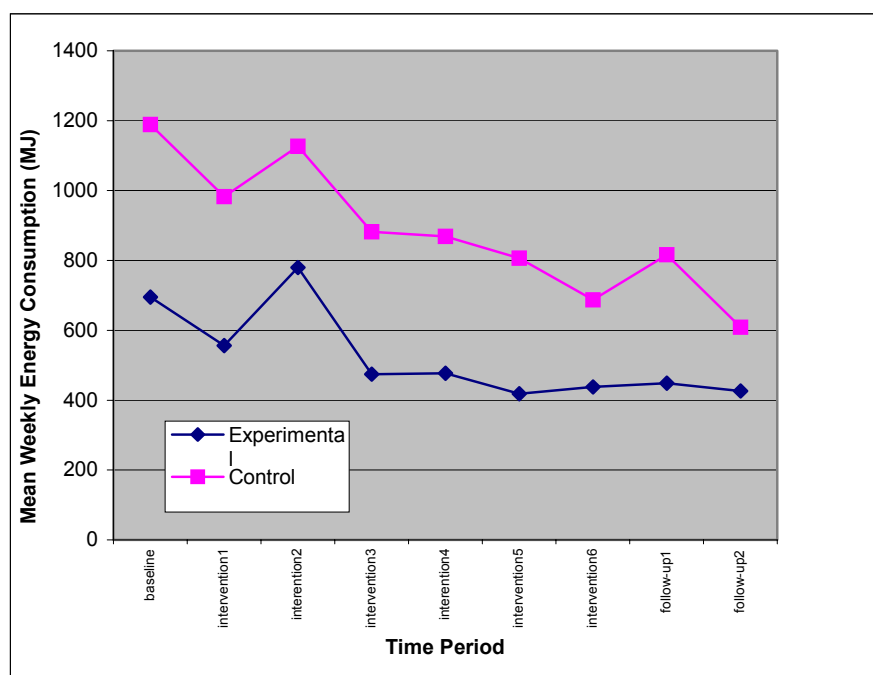


Figure 6. The patterns of mean energy consumption for each group

The details of comparisons performed between the experimental and control groups' energy consumption for each data-recording period are presented in Table 3.

Table 3. Results of independent samples t-tests comparing the experimental and control group's mean weekly energy consumption for each recording period

<i>Time period</i>	<i>Date</i>	<i>Mean Difference</i>	<i>t</i>	<i>Significance (2 tailed)</i>
Baseline	4-18 Sep	988.6	2.28	.038
Intervention1	18 Sep-2 Oct	852.9	2.82	.013
Intervention3	2-16 Oct	1194.3	3.42	.004
Intervention4	16-30 Oct	815.5	3.18	.006
Intervention5	30 Oct-13 Nov	783.01	3.03	.008
Intervention6	13 – 27 Nov	777.4	3.56	.003
Intervention7	27 Nov-11Dec	498.8	2.10	.054
Follow-up1	11 Dec-15 Jan	735.9	3.13	.007
Follow-up2	15 Jan–12 Feb	364.6	1.33	.203

As can be seen in table 3, there was a significant difference between the experimental and control groups during the baseline period prior to the intervention, with the control group having a significantly higher mean energy use than the experimental group. This significant difference was maintained over the following five fortnights. Differences in mean energy use for the two groups fell short of significance in the seventh fortnight. A significant difference was observed in the first follow-up month, with the second follow-up month showing no significant difference.

Recycling Data

The fortnightly percentage of household waste being recycled by each household was calculated by expressing the approximate volume of material being set out in the

household's recycling bin, as a percentage of the *total* volume of rubbish being set out for collection by that household on that rubbish collection morning. Recycling data from one household in each of the two groups was omitted because of missing data points due to households not placing *either* of their bins out for emptying. Therefore the following analyses refer to two groups of 10 households.

A 8 x 2 mixed model ANOVA¹⁸ was performed on the recycling percentage data, with time period used as a repeated measures variable and group (experimental or control) used as a between-subject variable. This ANOVA revealed no significant interaction between time and group ($F(7, 126) = .83, p = .86$). The mean percentage being recycled by the experimental and control groups during the two baseline measurements and the following six fortnights is presented in figure 7.

¹⁸ The recycling ANOVA was an 8 x 2 (as opposed to the 9 x 2 for the energy and water data) due to there being no follow-up conditions for recycling as well as 2 baseline data points.

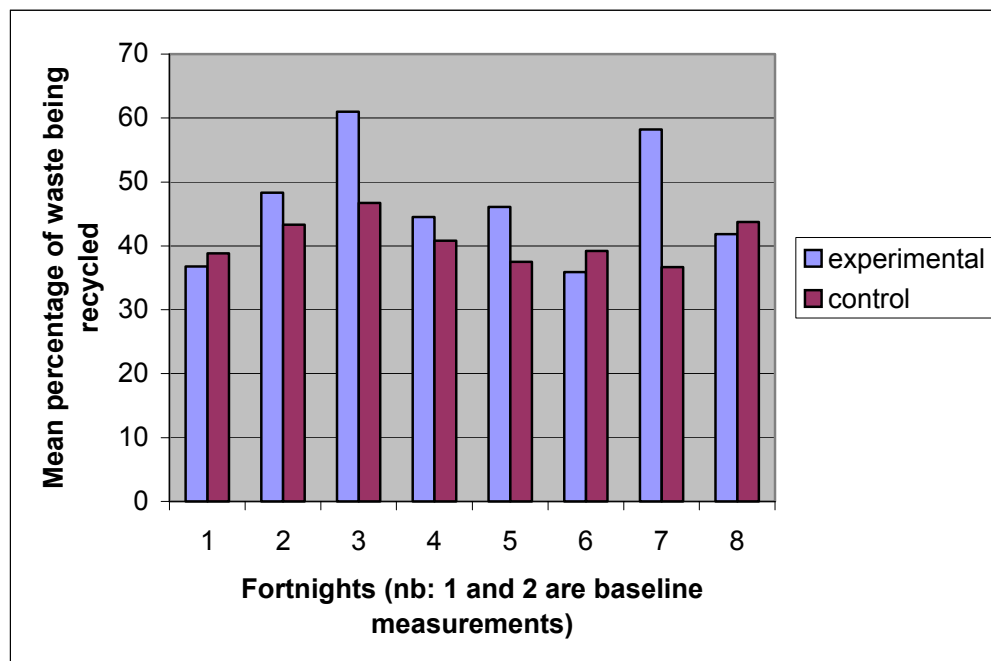


Figure 7. Mean percentage of household waste being set out for recycling in the two groups

As can be seen in figure 7, the only particularly notable features of the recycling data were the increased rates of recycling in the experimental group during the first week of the intervention period (fortnight 3) and also during fortnight 7. The increase in recycling percentage for the experimental group between fortnights 2 and 3 was not found to be significant ($t(9) = -1.33, p = .116$). The difference in recycling percentages between the experimental and control groups in fortnight 3 was also found to be non-significant ($t(18) = 1.46, p = .16$). The increase in recycling percentage for the experimental group between fortnight 6 and fortnight 7 did not quite reach significance ($t(9) = 1.9, p = .09$), as was the difference in recycling percentage for the experimental and control groups in fortnight 7 ($t(18) = 2.5, p = .02$).

Attitude scales

Of the five households in each group who were sent the pre-intervention questionnaire, four completed questionnaires were returned from each group. Respondents' scores on Dunlap and Van Liere's (1978) New Environmental Paradigm questionnaire were skewed towards the pro-environmental end of the scale, with scores ranging from 3 to 5 (on a scale of 1 to 5) with a mean of 3.92 ($SD = .61$). Due to the fact that only 8 participants completed the questionnaire, it is difficult to correlate the scores with baseline consumption figures especially given the multitude of other factors affecting these consumption figures. There appeared to be no significant correlation between the environmental attitude questionnaire scores and baseline levels of water and energy use or recycling.

Participants' specific attitudes towards the importance of water and energy conservation and recycling showed almost unanimous acceptance of the idea that we, as a society, should be trying to limit our consumption and wastage of resources. All participants either agreed or strongly agreed with conserving water and natural gas and also recycling. Only one participant indicated they were 'unsure' as to whether they thought that our society needed to reduce its usage of electricity, with the other 7 respondents all either agreeing or strongly agreeing.

In the case of water consumption at least, there was a *greater* variation in the extent to which participants felt that they themselves *engaged* in these behaviours. Responses to the item that read: "My household generally tries to limit its water

consumption” varied from disagree (2) to strongly agree (5) with a mean of 3.5 ($SD = 1.07$). On the other hand, participants were much more likely to believe that their household was making an attempt to limit their electricity and natural gas ($M = 3.9$, $SD = .83$) consumption, and also that they were making an effort to recycle ($M = 4.63$, $SD = .52$). There were no significant differences between the experimental and control groups in terms of their mean scores on any of the questionnaire variables.

Follow-up questionnaires

Seven of the 11 households in the experimental group returned their follow-up questionnaires. All of these seven households reported having received both their information/attunement packs as well as the feedback on their changes in use. Five households reported having installed all of the labels around their home, with the other two households having installed some of the labels. Four households reported having tended to notice the labels ‘on and off’ throughout the time they were in use, with the remaining three households claiming to have noticed them throughout the entire period and to be noticing them still at the time of completing the questionnaire. The labels were reported as still being installed in four of the households. Two households reported keeping them in use for about two months and the remaining household was still using the garden-watering label, despite having taken down the other labels.

The respondents’ perceptions of the effect that participating in the program had on various environmentally relevant behaviours are presented in Table 4. It appears that

the behaviours that were mostly commonly perceived as being affected were the following of a watering schedule in the garden, an increased utilization of the half flush button on the toilet, reducing time spent under the shower and the purchasing of products whose packaging was recyclable. The only behaviour that was universally reported to be unaffected in those who returned the questionnaire was the purchase of low-flow showerheads.

Table 4. Respondents' perceptions of whether they thought their household's participation in the program affected the following behaviours

Behavior	Yes	No	Not applicable
Reducing shower time	5	2	-
The purchase of low-flow shower heads	0	7	-
Using the half flush more often	6	1	-
Running the washing machine or dishwasher less often	4	3	-
Carefully setting the water level in the washing machine	4	3	-
Following a water schedule in the garden	6	1	-
Avoiding leaving lights and appliances on unnecessarily	4	3	-
Separating recyclables from other waste	4	3	-
Purchasing items whose packaging was recyclable	5	2	-
Using the air-conditioning less often	3	2	2
Using alternative forms of transport other than the car	3	4	-
Your recycling, water and energy use behaviour at work	2	3	2

The participants who responded to the questionnaire did appear to have discussed environmental issues with significant others as a result of participating in the program. All seven respondents indicated that participation had lead to an increased discussion of environmental issues between members of their households. However this discussion of environmental issues seemed to have also extended beyond the home for some participants, with four indicating having discussed it with friends, three with relatives, two with their work colleagues and one with their neighbours.

One respondent even reported having given a presentation to her local Ladies Club about the need to economize the use of resources in the home. Given that there were apparently 35 to 45 members in attendance, it is ironic but yet also encouraging that this message would have potentially reached more individuals than the pilot program itself did!

Discussion

Overall, the pilot intervention appeared to succeed in changing the experimental group's water consumption, but not energy use or recycling. I now wish to consider each of these three claims in more detail. Certainly when one compares the patterns of water consumption for the experimental and control groups throughout the period in which measurements were taken it seems clear that the program did influence the water-use behaviour of those in the experimental group. One other possible explanation for the significant difference that became evident after the implementation of the intervention could be that there was some form of systematic difference between the two groups of households prior to the intervention that only showed up as a difference in consumption during the warmer months of the year- for example, if households in the experimental group had gardens that required less watering or the residents in these households just happened to already be more conscious of water use in the garden. Theoretically, a confound such as this could produce a pattern of results showing no significant difference between the two groups in early September, with significant differences emerging as the weather became warmer and drier. This seems unlikely though, because the difference in consumption levels between the two groups was evident *immediately* upon implementation of the

intervention. It would seem unlikely that a significant difference between the groups would suddenly emerge as a result of a naturally occurring difference in levels of garden watering between the first two weeks of September and the second two weeks of September. Admittedly, there was some variation in temperature and rainfall across these two periods. The mean maximum temperature during the baseline period was 23 degrees Celsius compared to 24 degrees during the first intervention period. It would seem that this temperature variation of a single degree does not, however, represent anything that is likely to have influenced daily water consumption behaviours. Differences in rainfall were slightly more substantial with six days of rainfall being recorded in the baseline period (mean rainfall for the fortnight = 2.3 ml) compared to only three days in the first intervention period (mean rainfall = 0.3 ml). However, given the relatively mild temperatures, as well as the presence of *some* rain fall, during both these periods it is debatable as to whether garden watering was likely to be particularly prolific during either period. It is also unlikely that two groups of residents would be likely to respond in such a dramatically different way (i.e., to the tune of 6,000 liters a week!) to such relatively subtle variations in temperature and rainfall.

Another possibility is that the similarity in the levels of water consumption for the two groups during the baseline period may have simply been a chance event, and that the significant differences that were evident during the following months merely represented a naturally occurring difference that just happened to not show up during the two week baseline period. Although there is no evidence that this occurred, it is a

possibility that could be more easily ruled out in the main study by the inclusion of a longer baseline period. By taking baseline readings over two or even three fortnights one could be much more confident that a true baseline had been established.

One aspect of the water consumption data that does invite some pessimism is the fact that the relative reductions in consumption for the experimental group that appear to have been brought about by the intervention did appear to be dwindling during the final month in which follow-up data was collected, with the differences in consumption returning to a non-significant level. However if one looks at the mean difference it is revealed that the difference between the mean consumption levels of the two groups for this period was not substantially lower than for the preceding follow-up month or the last fortnight of the intervention period. Hence, it would seem that the failure of this difference to reach significance was primarily a result of an increase in within-group variation rather than a decrease in overall between-group differences. Given the small number of households in the study, it is difficult to make any meaningful statements regarding the shape of distributions of consumption data for each group across the various periods. A larger sample in future studies should allow for a more fine-grained analysis of changes in consumption data.

The graphical representation presented in figure 6 appears to paint a very grim picture of the effect that the intervention had on energy consumption. At first glance one could be forgiven for concluding that the intervention caused the experimental group to use progressively *more* energy relative to their control counterparts. However,

there are a number of other variables that need to be considered when comparing the energy consumption of the two groups. Firstly, the control group had a significantly greater baseline level of consumption than the experimental group. As a result, the only opportunity to demonstrate a change in the relative consumption levels in a statistical sense was to show a convergence in the two group's consumption to a point of *non-significance*, which represents the opposite of the effect that was hoped for. So, as a result of these unfortunate, pre-existing differences, the present study did not have a chance to demonstrate the desired effect. However, it still seems necessary to consider why there appears to be a reduction in the energy consumption of the *control* group relative to the experimental group. One possible reason for this unexpected pattern of results is the different forms of heating used in various households. Of the 10 households whose data was included in the comparison of energy consumption, 3 used a form of energy other than electricity or natural gas to heat their home. By comparison, none of the experimental households included in this comparison used an alternative form of energy. In light of this, it would appear logical that this second group would reduce their consumption by a larger amount as the weather became progressively warmer. The sudden rise in energy consumption for the control group during the period from 11 Dec-15 Jan (period 8 on figure 6.) was probably also due to appliance differences in the two groups. Specifically, all but 2 of the 9 control households used in energy comparisons utilized air conditioners in their homes in comparison to only 2 of the 11 experimental households. Since some of the hottest days of the summer fell during this period¹⁹, this may explain this sudden upturn in energy use in the control group during this monthly period.

¹⁹ With 10 days during this period experiencing maximum temperatures above 35 degrees C (or 95

The results of the recycling data do not show any substantial evidence of behavioural change as a result of the intervention. There did appear to be an initial increase in levels of recycling in the experimental group during the first fortnight of the intervention period, however this effect seemed to be very short lived. Also, the technique used to collect the recycling data was unreliable. As rubbish deposits were only observed during the fortnights in which recycling bins were set out, it was impossible to know how much general waste households were setting out during the alternate weeks when recycling was not collected. Missing data points also became a problem with the recycling data as a result of some households not setting out *any* bins on some fortnightly collection days. The difficulty comes in deciding how to interpret this. It may mean that the households had decided not to put out their bins because they were not full enough, or conversely it may mean that they had not yet put out their bin by 6.30am and may, in fact, have done so *after* the experimenter left the area, or, alternatively, they may have simply gone away on holiday. Another problem stems from the measurement technique itself. As only a rough, 'human eyeball algorithm' method of measurement could be implemented, this leaves the reliability and validity of the data open to criticism. A visual 'percentage fullness' estimate of rubbish bins can be influenced by anything from the extent to which the residents have crushed their rubbish to the shape of the objects that make up the rubbish. As such, this cannot be claimed to be an objective or accurate behavioural measure. The fact that the experimenter was also not blind to the condition of the

degrees F)!

participants when making these estimates also represents a potential problem. Participation rates (i.e. number of households using their recycling bins to any degree) could be a potentially more meaningful measure for future studies to adopt. However, in order to demonstrate change in participation rates, there would need to be a large enough percentage of the participants who were *not initially* participating, which may be difficult as recycling (at least to *some* degree) has become somewhat of a social norm.

The results of the follow up questionnaires were quite encouraging, with most of the targeted behaviours being reported by at least some of the participants to have been affected. It is important to remember, however, that one cannot speculate on whether the responses of the 7 households who did return the follow-up questionnaire would be likely to represent the experience of those who did *not* return the questionnaire. It is also important to approach self-reported behaviour with a degree of skepticism due to many past findings regarding its potential inaccuracy (Geller, 1981; Hamilton, 1985).

In line with the consumption data, it appeared that the behaviours that were most universally affected were those that involved conserving water. A couple of reasons could be postulated for this. Firstly, it is possible that the intervention's water conservation message may have had an interactional effect whereby it re-enforced the 'Water Wise' message already provided by the Perth Water Corporation in the mass media. In social-ecological terms, the program may have also attuned residents to the

‘water wise’ media campaign, which then in turn further attuned them to their own behaviour in a spiral-like effect. Given that no comparable media campaign is currently in place in Perth to promote energy conservation or recycling, this could represent one reason for the current intervention’s greater success in the water domain relative to the other two areas. Another possible reason may be that it is easier for individuals to become attuned to ‘water-use’ affordances than ‘energy-use’ affordances due to the fact that one can *see* the water that one is using. Energy, on the other hand, can often not be ‘seen’. Also, the consumption of water will usually involve a behavioural action on the behalf of a resident (e.g., having a shower, loading up a washing machine), whereas a large percentage of the energy used in a home happens without the residents even being aware of it (e.g., refrigeration, appliances such as computers being left on).

It was interesting to see that a number of respondents reported having begun to purchase more items whose packaging was recyclable as a result of the intervention, given that source reduction was not specifically targeted in the intervention. The fact that more respondents reported change in their shopping behaviours than reported changes in their recyclables separation behaviours is probably due to the fact that many of the participants in the experimental group already felt that they were separating the majority of their recyclable items to begin with. This does suggest, however, that shopping habits could represent a potential target for future interventions involving areas where curbside recycling participation rates are already quite high.

In conclusion, the results of this pilot study provided enough encouragement to pursue a similar intervention program with a much larger sample of participants. Due to the practical issues outlined above, the main study focussed only on water and energy consumption, and did not collect recycling data. In the main study, the three components of the intervention were separated (information, labels and feedback) and a longer baseline period was utilized. It also involved the provision of socially comparative feedback to participants using consumption levels of 'similar households'.

CHAPTER 5

UTILIZING A SOCIAL-ECOLOGICAL FRAMEWORK TO PROMOTE WATER AND ENERGY CONSERVATION: A LARGER FIELD EXPERIMENT.²⁰

This chapter details the main field experiment, which was conducted from October 2001 to April 2002. This experiment followed a similar methodology to that used in the pilot study reported in chapter 4, with three significant changes. The first of these was the inclusion of a larger sample of participants than was employed in the pilot. The second was an exclusive focus on water and energy conservation behaviours, with the recycling component being removed. The third change was the use of a full experimental design that allowed for the isolation of all three intervention variables and for comparisons of components in terms of their effect on consumption behaviours, as well as any potential interactional effects of the three components.

Psychology and environmentally sustainable behaviour

Many different psychological approaches have been taken to this issue such as rational-economic approaches, social dilemmas approaches, attitudinal approaches and behaviorist approaches (see Kurz, 2002 for a review). In the current study we aimed to reduce household water and energy consumption using a holistic, social-ecological approach that represents a broad framework, combining both environmental and social psychological principles.

²⁰ Under review as: Kurz, T., Donaghue, N., & Walker, I. (under review) Utilizing a social-ecological framework to promote water and energy conservation: A field experiment. *Journal of Applied Social Psychology*.

A Social-Ecological Framework for promoting environmentally sustainable behavior (ESB)

The Social-Ecological Framework for promoting ESB (Kurz, 2002) can be seen as an amalgamation of Hormuth's (1999) Eco-psychological approach to ESB and Baron and Misovich's (1993) social-ecological framework of attitude and behavioral change. The central tenet of this approach is that attempts to understand and change ESB must take into account the psychological relationship between individuals and their physical and social environments. ESB can be conceptualized in terms of the way that we interact with 'things' around us in our everyday lives (Hormuth). Examples of environmentally relevant 'things' include objects such as automobiles, trashcans, lawn sprinklers and home heating systems. In this approach, the unit of analysis becomes the interactional event (in both a physical and psychological sense) involving the individual and the relevant 'thing' with which they engage to cause an environmental impact. When attempting to understand the way in which we interact with our physical and social environments, Baron and Misovich suggest that it is necessary to consider three key principles. The first key principle is Gibson's (1979) notion of 'affordances' which can be defined as the potential utility (either positive or negative) that an 'object' in the environment is perceived by an individual to be capable of offering. Therefore, when encountering an aspect of their environment, an individual will perceive objects in terms of what they can *do* with the object or what the object will *allow* them to do, what it *affords*. For example, an automobile may be perceived to afford

efficient transport, but it may also be perceived as affording the production of greenhouse gases.

The second key principle is the concept of ‘attunements’. As there are almost always multiple affordances that an individual can perceive in ‘objects’ or ‘things’ in their environments, individuals can be differently ‘attuned’ to various types of affordances. For example, in the case of a household shower, an individual could be potentially attuned to perceiving it as providing cleanliness, hygiene and thermal comfort. However, one could also be attuned to the shower affording the consumption of potentially scarce water resources, the production of greenhouse gases or the consumption of household income in the form of utility bills.

The third key principle is the concept of ‘effectivities’, that refers to the skills and knowledge that an individual may or may not possess that allow them to *utilize* an object’s affordance, once it has been perceived. For example, once an individual has come to perceive a public transport system as affording more environmentally friendly travel than their car, they will still need to be equipped with certain knowledge (such as information about public transport options between their home and work) and skills (such as being able to co-ordinate these various transport options successfully) before acting to utilize these affordances.

Often, when we are engaged in using or purchasing most of the ‘things’ around us that are environmentally relevant we do not perceive them in terms of their

environmental impact (Hormuth, 1999). Rather, we tend to perceive them in terms of their primary, instrumental functions such as transportation or personal hygiene. One of the goals of attempts to foster sustainable behavior should be to try to attune people to the environmental-impact affordances of environmentally relevant ‘things’ while they are using them in their everyday lives, and to equip them with the skills and knowledge that they need to utilize these affordances.

It is also important to consider the *social* environment in which environmental behavior takes place. In a social-ecological approach, it is argued that ESB should be seen as being ‘socially embedded’ rather than simply being influenced by situational factors (Kurz, 2002). As such, the social environment will both influence, and be influenced *by*, the affordances that individuals are attuned to and the effectivities that they are equipped with. This influence can operate in two inter-related ways, one being conversationally and the other being observationally. That is, the individual may become aware of the environmental affordances of various activities as a result of conversations with others and by exposure to public discourse. Awareness may also be heightened by individuals observing others behaving in a way that demonstrates an attunement to these affordances.

Intervention strategies that have been used to promote ESB

An array of psychological ‘tools’ has been identified as being at the disposal of those wishing to conduct interventions designed to promote ESB. These tools include concepts such as inducing commitment, prompting behavior, development of

community norms, communication of information, provision of incentives or feedback, and removing structural barriers (McKenzie-Mohr & Smith, 1999). Commitment has typically been induced through community involvement, goal setting or by delivering an intervention in such a way as to involve personal contact. For example, Burn and Burn's (1986) 'block-leader' approach to the promotion of participation in curb-side recycling involved community volunteers eliciting commitments to participate from other residents on their block. Attempts to prompt environmentally friendly behaviors have involved the use of labels and signs as well as postal or verbal reminders (e.g., Luyben, 1984). Community norms have been developed through the processes of social diffusion and social modeling (e.g. Cialdini, Reno & Kallgren, 1990). Communication strategies have typically included education programs to increase knowledge as well as various specific techniques such as appealing to fear, framing information in particular ways and presenting information that is vivid (e.g., Gonzales, Aronson & Costanzo, 1988; Hungerford & Volk, 1990). Interventions utilizing an incentives approach have often relied on financial incentives to promote ESBs (e.g., McClelland & Cook, 1980). Feedback, in contrast, relies on more intrinsic motivations to change behaviours. This technique has most typically been used to promote behaviours such as energy or water conservation and typically involves providing feedback to households or businesses on their individual levels of consumption (e.g., Hayes & Cone, 1981). Feedback comparing own and others' levels consumption has also been utilized (Siero, Bakker, Dekker & van den Burg, 1996). Programs designed to remove structural barriers to ESB have usually focused on making the desired behavior more convenient for

individuals to perform, such as through improving the facilities available for recycling (Jacobs, Bailey & Crews, 1984).

Fitting these tools together within a Social-Ecological Framework

It is possible to conceptually locate these intervention tools within the social ecological framework of ESB outlined earlier. Firstly, the use of prompts can be seen as an attempt to attune people to the environmental impact affordances of objects in their environments. However, it should be noted that the context in which prompts are used is likely to make a large difference to their effectiveness. For example, Aronson and O'Leary (1983) have argued against the utility of prompts due to their failure to achieve changes in showering behavior using a sign erected by an external authority in a university locker room. The social environment in which the prompt was embedded in the Aronson and O'Leary study can be contrasted with that of another study reported by McKenzie-Mohr (2000) in which prompts were used to promote conservative lawn watering. In this case, individuals erected prompts voluntarily in their own homes. When used in this context, the prompts were found to be successful in changing water use behaviours.

Secondly, intervention strategies can lead to the creation of *new* affordances to which individuals can be potentially attuned. The provision of incentives can lead to individuals perceiving ESBs as affording rewards such as monetary saving or more social rewards such as public recognition. Similarly, removing structural barriers to ESB can lead to individuals perceiving ESBs as also affording a convenient use of the

relevant object. For example, improvements in the public transport system can lead people to perceive buses and trains as affording convenient transport rather than hours of waiting in the cold.

Thirdly, interventions can attempt to equip individuals with the necessary skills and knowledge that they require to utilize these new sets of environmentally related affordances through the effective communication of this information using the techniques outlined in the previous section.

Finally, the process of behavioral change can be embedded within the social environment through the use of techniques such as social diffusion, social modeling, the development of community norms and the use of socially comparative feedback.

Aim of the present study

The aim of the present study was to apply a social-ecological framework to conduct an intervention, in conjunction with a local council (The City of Melville), which addressed an environmental issue of significance to the local community of Perth²¹, Western Australia. Residential water and energy conservation were chosen as the behaviors to be targeted by the intervention. Residential water conservation has been an important issue in Perth for many years, due to the relatively dry, Mediterranean climate of the area. The importance of conserving water has become particularly prominent in the past twelve months due to unexpectedly low levels of rainfall, a situation that has led to the imposition of restrictions on sprinkler use. Residential

energy conservation was also targeted due to the local council's participation in the Cities for Climate Protection (CCP) initiative. This initiative is a collaborative project, involving local government authorities from around the world, which aims to address global warming by reducing greenhouse gas emissions at a local level.

The present study aimed to reduce water and energy consumption among residents by providing the necessary effectivities required for water and energy conservation in the home, attuning residents to the environmental-impact affordances of various appliances and objects around their homes, and by attempting to socially embed these otherwise relatively private behaviours through socially comparative feedback. The study aimed to evaluate the effect of each these variables within an experimental design and utilised direct behavioral data (i.e., consumption figures) rather than self-report data as the dependent variable (see Hamilton (1985) and Geller (1981) for discussions of the advantages of direct behavioral data over self-report data in this field of research).

Method

Design

The study involved a 2 x 2 x 2 design incorporating the 3 factors of Effectivities Information (present or absent), Attunement Labels (present or absent) and Socially Comparative Feedback (present or absent).

²¹ A city of approximately 1.2 million people

Participants

A sample of 166 households within the City of Melville (Perth, Western Australia) participated in the study. The sample was taken across 4 adjoining suburbs that were judged to be similar in socio-economic status. All participants took part in the study voluntarily. Participants were recruited by way of an initial information letter, detailing the nature of their study, and a follow-up visit to their home by the experimenter during the subsequent 2 weeks. Households who used underground bores (wells) to water their gardens, or whose water, electricity or natural gas meters were not easily accessible were excluded from the study. The response rate of eligible residents approached was 35.4 %.

Assignment to conditions was pseudo random. Target households who were sent the initial information letter *were* randomly assigned to their *potential* conditions. However, the final assignment was not strictly random due to the response rates being less than 100 percent. Demographic information such as age, gender and household income was not recorded due to ethical considerations relating to residents' reluctance to disclose such information for reasons of personal security.

Materials

Information Leaflets. These color leaflets included information for residents detailing the importance of conserving energy and water in their homes. They also included information relating to the energy and water usage of various appliances in the

home²². Leaflets for those residents in the no-labels condition also contained information on ways to reduce water and electricity usage by the various appliances (see Appendices D and F).

Attunement Labels. A series of attunement labels was provided to participants in the labels condition to install around their home and garden. Each pack was tailored to the particular appliances used in each household. Labels were provided for the shower/s, the washing machine, clothes drier, dishwasher, toilet/s, refrigerator and garden taps or reticulation system. Labels for the shower were also fitted with a small waterproof digital clock to enable residents to monitor easily the amount of time spent under the shower (see Figure 8 for an example; a full set of labels can be found in Appendix E).

The labels contained very basic information regarding the environmental impact of using particular appliances and behaviors that could be performed to reduce this impact (see example in Figure 9).

²² Appliances targeted were refrigerators, air-conditioners, showers, washing machines, clothes driers, dishwashers, toilets, and outdoor taps/reticulation systems.



Figure 8. An attunement label in action.

Feedback Sheets. Households in the socially comparative feedback condition received feedback sheets by post. These sheets provided residents with graphical feedback on their levels of water and energy consumption and how these levels compared to other households participating in the study that contained the same number of residents (see example in Appendix G).

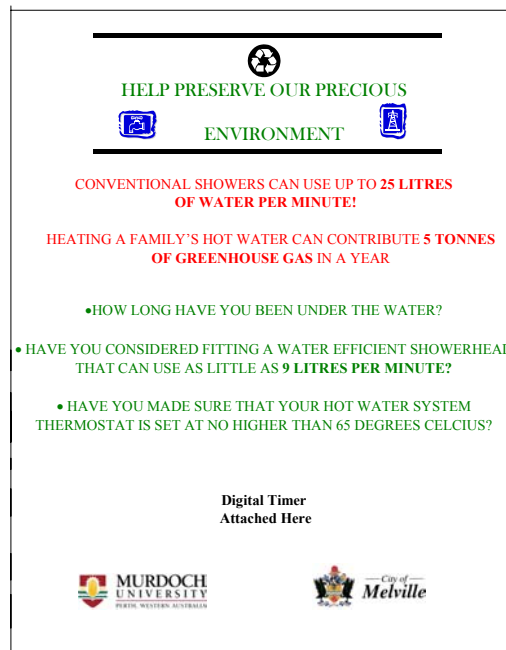


Figure 9. An example of an attunement label used in the shower

Attitude Scales. General attitudes toward the environment were measured using Dunlap, Van Liere, Mertig and Jones' (2000) revised version of the New Environmental Paradigm²³. The scale consisted of 15 items, answered on a 5-point Likert scale, with high scores reflecting a more pro-environmental orientation. Specific attitudes towards water and energy conservation were each assessed by a single item also using a 5-point Likert scale (the full scale can be found in Appendix H).

²³ This revised version differs only marginally from the original version. It claims to tap a wider range of facets of an ecological worldview. It also offers a balanced set of pro- and anti-NEP items and avoids outmoded terminology.

Procedure

Following the recruitment phase, an initial reading was taken of participant households' water, electricity and natural gas meters (24th October), and again at the completion of a five-week base-line period (21st November). The attitudes questionnaire was mailed out to all participants half way through this baseline period and mailed back by participants in the reply-paid envelope supplied. The response rate for this questionnaire was 56% and was relatively evenly distributed across each condition.

At the completion of the baseline period, households in the attunement-labels-present condition were delivered a pack that contained their labels and included instructions on how to use them. Participants in the information-leaflet-present condition were delivered their information leaflets.

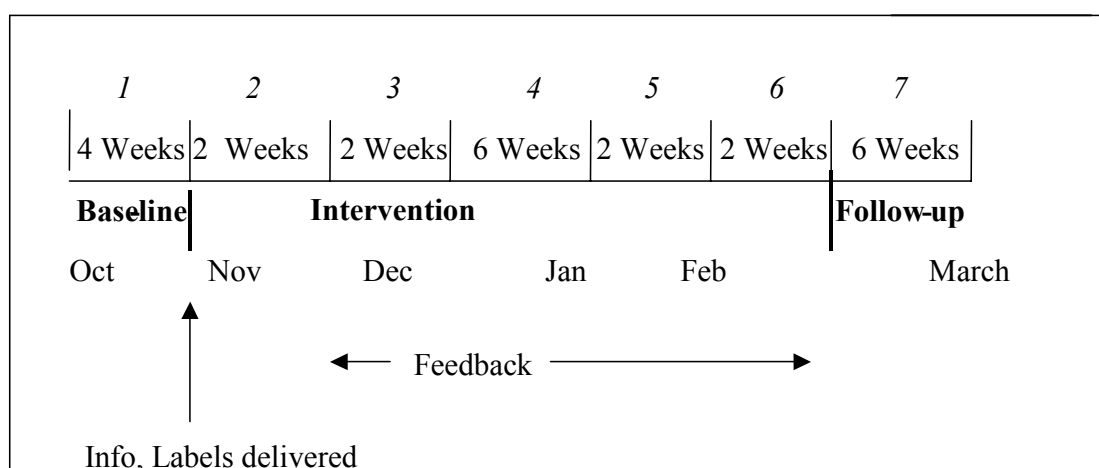


Figure 10. Time-line of the main study

Regular meter readings were then taken over the intervention period, which lasted for 14 weeks. These readings were conducted fortnightly, with the exception of the six-week period between the 19th of December and the 6th of February²⁴ (see figure 10). During the intervention period, households in the socially comparative feedback condition were mailed out fortnightly comparative feedback on their water and energy consumption.

Follow up readings of meters were taken 6 weeks after the completion of the intervention period. Participants were then sent a letter thanking them for their participation as well as a follow-up questionnaire, which included manipulation checks and gave them the opportunity to comment on their perceptions of whether the program had changed their behavior.

Dependent Measures

Each household's water consumption figures for each data-recording period were calculated by subtracting the meter reading at the beginning of the period (expressed in kilolitres) from that taken at the end of the period. Calculating each household's energy consumption for each period involved a similar procedure, however, due to the fact that different households were utilizing different sources of energy (i.e. electricity only, or a mixture of electricity and natural gas), it was necessary to convert the kilowatt hours of electricity and cubic metres of natural gas into the common unit of kilojoules in order to make households comparable.

²⁴ A longer measurement period was adopted over this period to dampen down the increased variability created by the Christmas/New Year summer vacation period that is held at this time in Australia.

Results

Manipulation Checks

A manipulation check examined the responses of participants in the intervention conditions who returned the follow-up questionnaire (the response rate for this questionnaire was 54 %). In the information condition, 85.4% of households reported having received and read their information leaflets, with 12.5% stating that they were 'not sure'. On average, it was reported that 71.3% ($SD = 30.5$) of household members over 12 years in age had read the information leaflets. Of those households who had been provided with the attunement label packs, 67.6% reported having installed the labels around their home. Of those who did *not* install their labels, the most common reason cited was that they felt that the labels were 'preaching to the converted' (with 62.6% citing this reason). Other reasons given included the labels being 'aesthetically displeasing' (25%), 'hard to attach' (6.3%) or that the household had decided to discuss the issues instead (6.3%).

When asked the length of time that the labels had remained installed in their home, 45.8% of respondents who had installed the labels stated that the labels were still installed at the time of filling out the follow-up questionnaire. For those that had taken the labels down, 25% said they had kept them up for 1-2 months, 8.3% had used them for 1-4 weeks, 4.2% less than a week and 16.7% said that duration of installation had varied between different labels.

For households in the socially comparative feedback condition, the mean percentage of household members over 12 years of age that were reported to have read the feedback provided was 83.0 % ($SD = 24.0$).

Attitude Questionnaires

Participants' general environmental attitudes were found to be relatively normally distributed with a mean that fell marginally towards the pro-environmentalism side of the mid-point (3) on the NEP scale ($M = 3.62$, $SD = 0.44$). Participants' attitudes toward water conservation ($M = 4.40$, $SD = .79$) were significantly more positive than their attitudes towards the importance of energy conservation ($M = 4.10$, $SD = .67$); ($t(92) = 2.84$, $p = .005$).

Energy and Water Consumption

Energy and water consumption data were analyzed using 7 x 2 x 2 x 2 (time x information x labels x feedback) mixed model ANOVAs. Time was a repeated measures variable and the remaining variables were between-subject variables.

Water Consumption Data. As expected, a main effect of time on mean water consumption was found, reflecting seasonal variation in water use ($F(3.6, 500.7) = 5.80$, $p < .01$)^{*}. A significant main effect of labels ($F(1, 140) = 5.51$, $p = .02$) was found for water consumption, but this main effect was qualified by a significant interaction between labels and time ($F(3.6, 500.7) = 3.47$, $p = .01$). The effect of

^{*} Degrees of freedom for the mixed model ANOVAs were adjusted using the Huynh-Feldt epsilon due to violations of the assumption of sphericity.

labels over time on water consumption is presented graphically in Figure 11. The details of two-way comparisons performed between the labels and no-labels groups' water consumption for each data-recording period are presented in Table 5. As can be seen, there was no significant difference between the two groups at baseline. By the second intervention period, however, the no-labels condition was consuming significantly more water than the labels condition, with this difference being maintained through to the completion of the follow-up period.

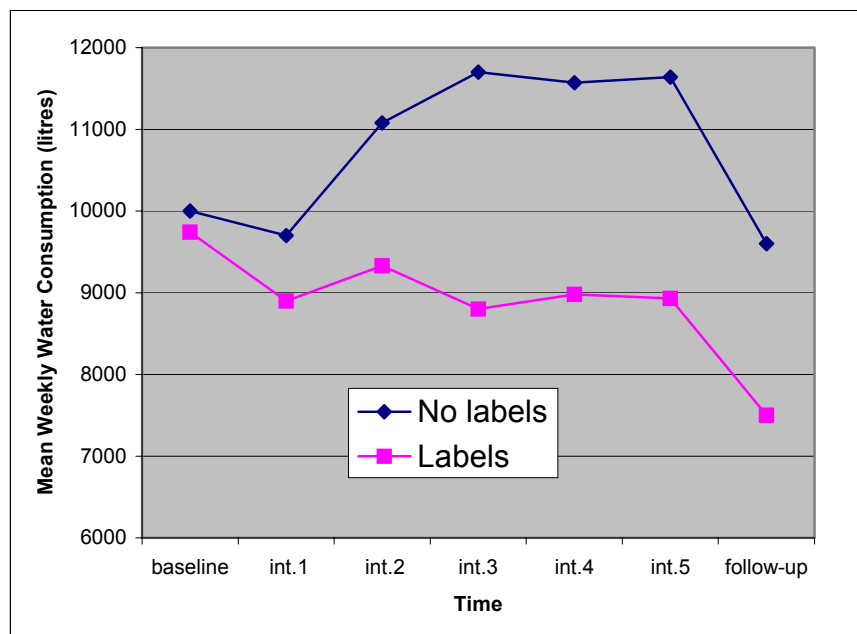


Figure 11. Effect of labels on weekly water consumption

No significant interactions between information and time for water consumption were found ($F(6, 840) = .67, p = .67$). No significant time x socially comparative feedback interaction was found for water consumption ($F(6, 840) = .47, p = .83$).

Table 5. Two-way comparisons performed between the labels and no-labels groups' weekly water consumption (in litres) for each data-recording period

	Condition	Mean (SD)	t	df	Significance (2 tailed)
Baseline	No Labels	10000 (4840)	.245	146	.81
	Labels	9740 (7750)			
Intervention1	No Labels	9720 (4720)	.810	146	.42
	Labels	8900 (7640)			
Intervention2	No Labels	11080 (4950)	1.98	146	.05
	Labels	9330 (5800)			
Intervention3	No Labels	11700 (5660)	3.18	146	.002
	Labels	8800 (5250)			
Intervention4	No Labels	11580 (5310)	2.79	146	.006
	Labels	8980 (5410)			
Intervention5	No Labels	11640 (5410)	2.94	146	.004
	Labels	8930 (5730)			
Follow-up	No Labels	9620 (3900)	3.01	146	.003
	Labels	7520 (4540)			

Energy Consumption Data. No significant main effects were obtained for the energy consumption data other than the expected main effect of time produced by seasonal variation in energy use ($F(4.92, 718.44) = 9.48, p < .01$). In contrast to the water consumption data, a significant time x labels interaction was *not* found for energy consumption. ($F(5.1, 749) = .38, p = .85$). There was also no significant information x

time interaction for energy consumption ($F(6, 876) = 1.09, p = .36$) or socially comparative feedback x time interaction ($F(6, 876) = 1.7, p = .11$).

There were no significant interactions between the three variables (information, labels and feedback) for either water or energy consumption. There was also no significant correlation between resident's attitudes towards conservation of the particular resource and their baseline levels of consumption for either water, $r(98) = .02, p = .49$, or energy, $r(86) = -.08, p = .84$. Scores on the NEP were also not significantly correlated with baseline energy consumption, $r(98) = -.02, p = .83$, or baseline water consumption, $r(94) = .04, p = .72$.

Comparisons of initially high, low and average consumers.

A separate Time x Feedback x Baseline consumption level ANOVA was conducted to investigate whether the failure to find an effect of feedback may have been the result of a differential effect of feedback on households who were initially high, low or average in their baseline levels of consumption. Households were grouped separately for energy and water consumption into one of three groups (above average, average and below average) based on a comparison between their baseline levels of consumption and the average baseline level of consumption among all other households in the study with the same number of residents. These analyses revealed no significant Time x Feedback x Baseline consumption level interaction for either water consumption, $F(8.66, 536.86) = .60, p = .79$, or energy consumption, $F(10.64, 692) = .98, p = .46$.

Residents' perceptions of their behavioral changes

Table 6 details the results of the section of the follow-up questionnaires that asked participants to self-report on the extent to which they felt that their participation in the program had brought about changes in specific types of water and energy consumption behaviors. This data represents percentages across all intervention conditions.

Table 6. Percentage of respondents who indicated that the program had caused behavioral change in the following areas

Using less water in the garden	85.7 %
Not leaving lights on	68.8%
Reducing shower time	62.3 %
Not leaving the refrigerator door open	55.8 %
Using the half flush on the toilet more often	55.8 %
Using the electric clothes drier less	54.1 %
Carefully setting water level in washing machine	53.2 %
Limiting the use of air conditioners	52.9 %
Running the dishwasher/washing machine less often	49.4 %
Checking refrigerator door seals	32.5 %
Energy and water behaviour at work*	21.9 %
Adjusting the thermostat on their hot water system	16.9 %
Using the car less*	16.9 %
Purchasing low flow shower heads	15.6 %
Installing insulation	3.9 %
Switching to natural power*	3.8 %

*These particular behaviours were not directly targeted by the intervention

As can be seen in table 6, many households who participated in the program believed that their involvement had brought about behavioral changes in a variety of areas.

The most commonly reported areas of change appeared to be those relating to water conservation, namely, reducing water use in the garden and reducing showering time.

Although a large proportion of households reported an increased vigilance in turning

of lights, it should be remembered that lighting only accounts for approximately 5% of a typical household's power use.

The behavioral self-report data was also analysed to compare the responses of those who received each form of intervention with those who did not receive that particular form of intervention. Two interesting results emerged from this analysis. Firstly, participants who received labels (including the shower label with timer) were more likely to report having reduced their shower times than those who did not receive labels (with 75% reporting having reduced as compared to 51.2%). Secondly, participants who received the information leaflets (which discussed *reasons* to save water and energy as well as ways to do this) were more likely to have reported performing the "once-off" behaviours of adjusting the thermostat on their hot water system (13.6% as compared to 2.4%) or purchasing low-flow showerheads (12.3% as compared to 2.4%).

Many participants also reported that their participation in the program had caused them to spend more time discussing environmental issues with others. Of the households who returned the follow-up questionnaire, 65% reported having increased their discussion of such issues with other members of their household, 49% increased discussion with friends and 40% increased discussion with their relatives. A smaller number of respondents also reported having increased discussion of environmental issues with neighbors (19.5%) and work colleagues (16%).

Discussion

The purpose of the present study was to examine the effect of the three intervention variables of information, attunement labels and socially comparative feedback on residential water and energy consumption. The results suggest that, for this intervention program at least, the use of attunement labels reduced water consumption. This impact could not be attributed simply to the information being provided on these labels, as no significant effects were obtained for those who were presented with this same information in an information leaflet form. It would seem that the placement of the information in the form of a label at the point of interaction between the residents and the environmentally relevant objects in question *did* cause changes in the amount of water being consumed, relative to those who were not provided with this intervention. At its peak during the third intervention period, the effect of labels on water consumption represented a *23% reduction* and, over the course of the 5-month intervention/follow-up period, the residents in the labels condition saved over *1 million liters* of water²⁵. The effect of labels on water consumption was surprisingly large, when one considers that the imposition of lawn watering restrictions by the Western Australian Government over the period in which the study was conducted reportedly reduced Perth's *overall* water consumption by 25%. This would suggest that, if anything, the effect size obtained in the current study would be an *underestimate* of the potential effect size that would be expected in a non-restricted setting. This was, in fact, the case for a small pilot study conducted

²⁵ Assuming that their rate of consumption relative to the non-labels condition would have remained as it was during baseline, had they not been delivered the intervention.

during the summer of 2000/2001²⁶ (prior to water restrictions) in which a 30% reduction in water consumption was obtained.

Interestingly, despite the positive effect of labels on water conservation, the same effect was not found for energy conservation. This discrepancy can be attributed to two potential causes. The first of these concerns differences in the social environment in which the use of the two resources is embedded. With the recent drought and resulting garden watering restrictions in Perth over the summer in which the study was conducted, there has been an increase in the discussion of water conservation issues in political debate, the mass media, and everyday public discourse. The Western Australian Water Corporation has been engaged in a large advertising campaign aimed at promoting water conservation, which has covered most forms of media including television, newspapers and billboards. This may account for the participants expressing more strongly held attitudes in favour of water conservation than energy conservation in the attitude questionnaire administered in the current study. The effect of specific prompting of behaviors at the point of interaction by the labels in this study appears to have been greater for water use than energy. This may have been a result of the behavior being embedded within a social environment which also facilitated attunement to water-use affordances to a greater degree than energy use affordances.

The second potential cause of the discrepancy between the labels' influence on water and energy conservation relates to the difference in the 'perceptual nature' of the two

²⁶ Reported in Chapter 4.

resources. Put simply, one can ‘see’ water as it runs out of the tap, but one cannot ‘see’ energy. It may be easier for people to become attuned to the water-consumption affordances of appliances in their homes than energy-consumption affordances as a result of this difference in the perceptual nature of the two resources. This suggestion is also supported by the fact that the most commonly reported energy-saving behavior being performed by residents was the switching off of lights. Lighting could be thought of as the most visible form of energy use for residents and has historically also been clearly linked to energy consumption. As a result of the possible psychological ‘invisibility’ of many forms of energy consumption, it may be necessary to develop ways of making energy consumption somehow more ‘visible’ to consumers of the resource.

Another interesting result of the study was the failure to find an effect of socially comparative feedback on either energy or water consumption. A social-ecological framework would have predicted a significant time x feedback x labels interaction, with the influence of attuning individuals to the water/energy affordances of objects in their homes being accentuated by embedding these private behavior within some form of social structure. The failure to find any effect of the socially comparative feedback can be explained in a number of ways. It may have been the case that the comparisons were often not strong enough to elicit a reaction from residents. For example, residents who were consuming at an average level were receiving feedback that was informing them of exactly that. Some other residents were being informed

that they were consuming *less* than average²⁷. Socially comparative feedback may only be effective when used to target specific households who have been pre-determined to be consuming at levels far above the average. There was no evidence found in the current study that this was the case, however such comparisons were limited slightly by cell size. A previous study by Aitken, McMahon, Wearing & Finlayson (1994) did find feedback to be more effective in reducing consumption among high consumers of water.

Although the socially comparative feedback was used as an attempt to ‘socially embed’ the otherwise relatively private behaviours of water²⁸ and energy consumption, the way in which feedback was received was still fairly private. The effect of this variable may have been more pronounced if, for example, all participants had received feedback that included a ranking of all the households in terms of their energy and water use and included names and addresses. For ethical reasons, studies utilizing such approaches have been very rare. Pallak, Cook, and Sullivan (1980) did, however, find that participants who signed a commitment to conserve energy in their homes and were *told* that the results of the study (including their names) would be publicized were more likely to conserve energy than those who were not told that the results would be publicized.²⁹

²⁷ This can be contrasted to other studies (e.g., Aitken et al. 1994) in which households have been provided with comparative feedback against data that were adjusted to be falsely low.

²⁸ Obviously, water consumption outside the home (i.e., front garden) is a more public behaviour.

²⁹ No results or names *were actually* made public at the completion of the study.

As well as being relatively non-public in nature, the method used to socially embed behaviour in the present study may also have been too contrived in that the comparisons drawn did not relate to any pre-existing social structures or groups, but rather ones created by the experimenter. It may be useful in the future to consider utilizing pre-existing social structures and groups in the local community, such as schools, to make the comparisons more socially meaningful. For example, the same methods used in the present study could be employed in a schools context whereby students could be educated about the need to conserve energy and water in class, be given a labels pack to install around their home and could be involved in the reading of their households' meters as a homework exercise. In this context, the possibilities for socially comparative feedback are endless and could range from individual household comparisons within a class to group comparisons such as a competition between classes or 'factions' within a school or even an interschool competition within a local council. Embedding ESB within a social structure in this way may prove far more fruitful than simply providing feedback comparing households with 'similar others'.

The results of this study have three important implications for those working in the area of promoting ESB. Firstly, the results support the argument that has been made by other authors (e.g., Geller, 1992) that simply providing people with information alone is not enough to change their resource consuming behaviors. Our findings also suggest that it is useful to target the point of interaction between individual resource consumers and the aspects of their physical environment that are relevant to the

conservation of the resource. Future research in this field should explore further the ways in which people interact with the environmentally relevant aspects of their physical environments and also the ways in which this is influenced by the social environment in which the behavior is embedded.

CHAPTER 6

THE WAYS THAT PEOPLE TALK ABOUT NATURAL RESOURCES

Given the differential effects of the intervention on water and energy consumption in the main study, it is important to explore the nature of these two resources in more depth. Although the consumption data from the field experiment suggest there may be different processes affecting the consumption of these two resources, the data are unable to illuminate why this may have been the case. It is necessary to investigate the more subtle, qualitative, aspects of the ways in which the use of these resources are constructed and represented by residents. This task is the aim of the current chapter.

Qualitative alternatives: The study of social representations and discourse

Investigating the ways in which the use of resources are constructed and represented by the users of those resources leads to a consideration of the theories of social representations (Moscovici, 1988) and discursive psychology (Edwards & Potter, 1992; Potter & Wetherell, 1987). Both these social psychological approaches offer theories and methods through which one is able to investigate a social phenomenon in ways that do not necessarily rely on the collection of quantitative data and instead allow for a more detailed analysis of qualitative aspects of the phenomenon.

The Theory of Social Representations

Social representations theory can be thought of as a constructionist theory that sees people as *constructing* their social worlds rather than simply perceiving or misperceiving a concrete, objective reality. A social representation can be seen as the device that is used to achieve this construction. It allows the potentially unfamiliar to become interpretable and amenable to evaluation (Potter, 1996). Moscovici regards social representations as the ideas, thoughts, images and knowledge that are shared by a collectivity. They are created and socially communicated to form a stock of common knowledge, or common sense theories about the social world, through which members of a society are able to construct social reality (Augoustinos & Walker, 1995). This stock of ideas is thought to not only be found in the minds of individuals but also out there 'in the world', existing with a social life of its own and representing the fundamental nature of social reality (Moscovici, 1988, 1984).

Social representations are not reducible to individual-level processes, because they are generated in communication and provide a fundamental component of our ability to communicate effectively with other members of our collectivity. While engaging in the everyday business of talking, arguing, debating and gossiping, people are constantly constructing pictures or representations of the social world, which then become socially shared communicational 'tools' which make this everyday business easier (Moscovici, 1985). In this way, the media, in particular, can be seen to play a large role in sustaining, producing and circulating social representations (Potter, 1996).

Discursive Psychology

Discursive psychology describes a number of social psychological approaches that are predominantly concerned with analysing the socially constitutive nature of language (LeCouter & Augoustinos, 2001). It is unlike most mainstream social psychology in that it does not attempt to explore the nature of mental structures, or 'contents of peoples heads'. It does not attempt to map the cognitive world or study internal representations. It is concerned instead with the analysis of discourse (Augoustinos & Walker, 1995). Discourse, in this instance, is to be regarded as an active process whereby individuals use their talk or writing to achieve certain social tasks. As such, discursive psychology studies the dynamic process of social interaction.

Potter (1996) outlines three basic elements of discursive psychology. Firstly, like social representations theory, discursive psychology can be seen as a social constructionist approach. It differs, however, in terms of the kind of constructionism that is involved. Social representations theory involves the way in which people make sense of the world around them through the use of simplified representations.

Discursive psychology, on the other hand, is concerned with "the ways in which people construct versions of the world in their practical interactions and the ways in which these versions are established as solid, real and independent of the speaker" (Potter, 1996, p. 151). Secondly, discursive psychology is concerned with action rather than cognition. Unlike more cognitivist approaches, it does not attempt to analyse discourse in terms of the potential underlying representations, attitudes or

beliefs of the speaker. Rather, it regards this discourse as a social action in its own right and seeks to investigate the ways in which these actions are being performed through studying the discourse. Thirdly, discursive psychology highlights the central role of *conflict* in the social world. The study of rhetoric can be seen to highlight the ways in which people's constructions and accounts of events and actions in the social world are usually designed to provide an opposition to competing constructions and accounts and represent part of ongoing arguments and debates (Billig, 1987).

The application of social representations and discursive approaches to environmental issues

Social Representations of environmental issues

As yet, the theory of social representations has rarely been used in the psychological study of environmental issues. Of the few studies that *have* applied social representations in this domain, not all are available in English. However, two instances in which social representations have been applied are the studies of Castro and Lima (2001) and Joffe (1996). Castro and Lima conducted a quantitative study employing a traditional questionnaire approach to assess the potential linkages between social representations of scientific knowledge and social representations of the natural environment. They identified what they believed to be two belief systems linking these representations. The first of these was termed "Prudence" and involved ideas such as the Earth having space and resource limitations, humans being subject to natural limits, and the abuse of the environment by humans upsetting nature's delicate balance, as well as science as a human enterprise being relative, dependent

on context, and unable to provide definitive proof. The second belief system was termed “Confidence” and incorporated notions such as human capabilities putting them in a position to overcome present limitations, humans being meant to rule over nature, power and wealth as goals worth pursuing and science as being capable of providing explanations independent of scientists’ own values.

Joffe (1996) offers an interesting discussion of people’s social representations of large-scale crises drawing on psychodynamic principles to extend the social representational accounts of these types of phenomenon. Analysis of interviews relating to HIV/AIDS are presented which demonstrate the ways in which representations of this large-scale crisis link the crisis to ‘the other’, thereby removing the sense of threat away from the individual. Joffe suggests that these forms of representations may possibly also be found for representations of other large-scale crises such as economic, political and environmental crises.

The study of environmental discourse

Examples of the analysis of discourses surrounding environmental issues in the literature are more common than their social representational counterparts. Much of this literature, however, is not necessarily located within the confines of discursive psychology *per se*. Studies of environmental discourses can be found in a range of related disciplines such as sociology, developmental psychology, linguistics, educational research and human geography. I will firstly review this range of cross-disciplinary approaches to the study of discourses relating to the natural environment, before examining in more detail Harré, Brockmeier and Mühlhäusler’s (1999)

comprehensive study of environmental discourse which the body of work in this area which most closely approaches a discursive psychology perspective.

Analysis of environmental discourse in media texts. One way in which environmental discourse has been studied is through the analysis of media texts dealing with environmental issues such as newspapers, television and magazines. For example, Coupland and Coupland (1997) traced the formation of discourses surrounding ozone depletion and melanoma risk in a sample of UK print media. These analyses suggest a competing-discourses formulation of this particular environmental (and consequent health) issue whereby discourses relating to environmental damage and subsequent skin cancer risk compete with another set of discourses relating to hedonistic summer leisure and aesthetic body culture. Specifically, the 'ozone-melanoma' discourse was often attenuated and reformulated in relation to a 'sun-is-fun' discourse. Similar competing-discourse formulations have also been identified in relation to other specific environmental issues such as regional land development (Carbaugh, 2001; Oravec, 1984).

In a more longitudinal study of media discourse, Gamson and Modigliani (1989) traced the ways in which different 'interpretive packages' on nuclear power evolved in television news coverage, news magazines, editorial cartoons and syndicated opinion columns between 1945 and 1988. Interpretive packages are defined by the authors as the metaphors, catchphrases, visual images, moral appeals, and other symbolic devices that characterise the discourse. They suggest that on most policy

issues there are competing packages available within a particular culture. This cultural system is thought to

...have a logic and dynamic of its own. Packages ebb and flow in prominence and are constantly revised and updated to accommodate new events. (p. 2)

In this sense I would argue that these interpretive packages referred to in the sociological literature can be thought of as very much akin to Moscovici's (1988) concept of social representations.

Gamson and Modigliani's analysis traces the changes in the interpretive packages provided by the media regarding nuclear power, as well as the competition between different interpretive packages within each historical period. For example, the 'unlimited destruction' package prominent following Hiroshima was found to be in competition with a 'progress' package which produced nuclear power as the potential solution to the world's growing energy needs. Gamson and Modigliani cite an excellent example of this dualistic discourse from an editorial in the *New York Times* a day after Hiroshima: "We face the prospect either of destruction on a scale which dwarfs anything thus far reported, or of a golden era of social change which would satisfy the most romantic utopian" (p.12). The authors trace the developing dominance of the 'progress' package during the 50s and 60s through to the development of a second pro-nuclear package of 'energy independence' that emerged as a result of the 'energy crisis' of the 1970s. They also discuss the anti-nuclear competitors, such as the "Soft paths" package that emerged from the growing environmentalist movement in the 1970s, which had as its catch phrase "Split wood,

not atoms". More recent anti-nuclear packages are also discussed, such as the "not-cost-effective" package and the "runaway" package that focuses on the potential irreversibility of environmental disaster that could be brought about as a result of nuclear mishap.

Another study involving the analysis of interpretive packages is that of Ungar (1998), who examined the content and structure of the interpretive packages utilised in texts designed by potential environmental-agenda-setters to frame environmentally friendly, individual lifestyle changes. Ungar argues that the most commonly employed interpretive package within these texts was one of 'Small Steps'. This small steps package, which was found in almost all of the texts analysed, including those texts directly aimed at bringing about behavioural changes, was found to be one in which no real onus is put on individuals to change their behaviours to any large extent. Rather, small steps presents individuals with a wide array of convenient, environmentally friendly behaviours from which they are able to choose which are suitable to adopt in relation to their lifestyle. In what can be seen as a consumerist model, 'consumers' of environmentalism are presented with a smorgasbord of behavioural alternatives, many of which represent minimalist responses and fail to address the *major* significant causes of environmental damage. Inherent in this package is the affording of individuals with the right to indulge themselves by making trade-offs, as demonstrated in the following quote from Heloise's (1990) book, "Hints for a Healthy Planet" (cited in Unger, 1998):

We have to be realistic. Most of us are so accustomed to modern conveniences that we can't give them up entirely; we can, however, use them

more wisely and with an environmental consciousness...Stop using disposable products, and if there is a certain disposable, such as diapers or paper towels, that you just can't give up, try to be more conserving in other ways (p.4)

A second interpretive package, which was found primarily in national newspapers, popular magazines, and prime-time television shows, was the "Eco-Freak" package. This package concentrates on the large differences between those who are truly committed to the environment and those who just don't care by presenting highly stereotyped images of the environmentally concerned which depict them as wacky curiosities or faddists that 'ordinary' people would never wish to emulate. Ungar presents an example from a front-page newspaper article from the Globe and Mail which depicts one particular activist who is attempting to live an environmentally friendly existence. The article describes how the individual does not heat his apartment, which remains at a "chilly" 11 degrees C in winter, doesn't use clothes driers or cars, takes fewer baths and eats organic foods and no meat. The author then contrasts such "zealots" with ordinary persons who like to construct themselves as environmentalists by using their own mugs at work or leaving wrappers in stores.

A third interpretive package emerged from the analysis that can be seen to counter the packages mentioned above. This package, which Ungar (1998) terms the "Eco-Phonies" package, was only found in academic sources and specialty environmentalist magazines and presents direct arguments against the minimalist discourse of small steps. Ungar refers to the example of the compilation "50 Difficult Things You Can do to Save the Earth" which surfaced as a back-lash to small steps publications such as "50 Simple Things You Can do to Save the Planet". The former

begins: “1. Dismantle your car. 2. Become a total vegetarian. 3. Grow your own vegetables. 4. Have your power lines disconnected. 5. Don’t have children.”

A final study involving the analysis of environmental discourse in media texts was an earlier study by Ungar (1992), which involved an analysis of the content and prevalence of media texts relating to global warming in the 1980s. Ungar documents the rise of global warming as a ‘social problem’ as a result of what has been termed the “Greenhouse Summer” of 1988³⁰. It is suggested that, as a result of the dramatic ‘real-world’ events of 1988, the issue of global warming was elevated from a matter of scientific debate to that of a “social scare”. Global warming was shown to take on a ‘celebrity’ status as a social problem, a status that diminished as the dramatic weather events of 1988 subsided. Ungar suggests that environmental claims are most likely to attract the attention of the media and the public, and accelerate demands in the political arena, when they coincide with dramatic, observable, real-world events.

Analysis of environmental discourse in interview settings

To date, few studies have used interviews to analyse environmental discourse. Studies that have been performed have tended to utilise semi-structured ‘scenario’ methods in which interviewees are asked to resolve certain environmental dilemmas presented as a series of hypothetical vignettes. For example, Horwitz (2000) conducted a qualitative analysis of the ways in which a group of student environmental activists resolved a number of hypothetical environmental dilemmas,

³⁰ This particular summer represented, at the time, the hottest summer ever recorded in the United States and came at the end of a decade that had already contained the next four hottest summers ever (1987, 1983, 1981 and 1980).

the hypothetical conditions under which they might change their minds and their justifications for each of their stances. Peter Kahn and colleagues have also employed a similar 'scenario' method to that used by Horwitz to investigate the origins and development of environmental reasoning and morality among children. This program of cross-cultural, developmental research involved scenario interviews with children of different age groups in three different communities; an inner-city African American community in Houston, Texas (Kahn & Friedman, 1995), a community in the Brazilian Amazon (Howe, Kahn & Friedman, 1996) and a community in Lisbon, Portugal (Kahn & Lourenco, 2002). Scenario-type methods have also been used in the science education field - for example, Kruger and Summers (2000) utilised qualitative scenario interviews to assess primary school students' understanding of 'energy waste' and to re-assess this understanding following science education classes.

It appears that the psychological literature is relatively devoid of studies of environmental discourse that employ unstructured, in-depth interviews. One example, from the human geography literature, is a study by Burgess, Limb and Harrison (1988) that employed an unstructured, in-depth approach using small groups of participants to qualitatively analyse environmental values in relation to the importance that open spaces play in people's lives. However, there is little in the way of studies that take a discursive psychology approach (such as those developed by Potter & Wetherell (1987) and Edwards and Potter (1992)) to the analysis of the ways

in which environmental issues are constructed in talk within the interview or focus group setting.

Discursive Psychology and Environmental Discourse

The work that most closely approaches an attempt to apply discursive psychology to the examination of environmentalist discourse is the interdisciplinary monograph of Harré, Brockmeier and Mühlhäusler (1999). They coin the term “Greenspeak” as a catch-all term for the ways in which issues of the environment are presented in spoken, written, or pictorial form. Harré et al. provide a detailed study of the linguistic, philosophical, psychological, and cultural-historical aspects of environmentalist discourse. The linguistic foundations of ‘green awareness’ language are explored and, in particular, the authors highlight the relative ‘lexical poverty’ of languages such as English in terms of their ability to communicate efficiently about environmental issues. For example, the authors point out many concepts for which there is currently no word in English, such as a word for the needless transshipping of commodities to places where they are freely available (e.g., English cheddar cheese to Australia and vice versa). Harré et al. also discuss the rhetorical uses of science in environmentalist discourse. They demonstrate how many of these texts often work to position the speaker as speaking with ‘the voice of science’, even when there is no scientific evidence to support claims, and consider the potential implications of this ‘scientistic’ use of scientific discourse in the political, public policy and activist arenas. Also considered is the power of metaphor in environmentalist discourse and the extent to which the discourse is inescapably linked to temporal dimensions. Harré et al.’s examination of Greenspeak represents a comprehensive discussion of the

nature of environmentalist discourse. It is primarily focused, however, on the discourse of those who are most visible within the environmentalist and anti-environmentalist movements, such as environmental policy makers, engineers, biologists, and green lobby groups, as opposed to the 'average citizen' (Penman, 2001)³¹. A further point of interest is the ways in which environmental issues are constructed and managed by these 'average citizens', particularly in an urban context. It is this issue that is addressed in the present study.

The current study

The current study aims to draw upon both discursive and social representations approaches to conduct a qualitative analysis of the ways in which residents construct and represent the issues surrounding the use and conservation of the resources of water and energy in their homes. The combination of discursive and social representations approaches in social psychological enquiry is certainly not unprecedented. For example, Augoustinos (2001) has combined social representation theory with a discursive approach in her demonstration of the historically-constituted nature of social categories in Australian political discourse. The current study will take a similar approach by combining these two approaches to the analysis of the discourse of a sample of households who participated in the intervention study outlined in chapter 4, with view to unpacking the ways in which the resources of water and energy are constructed in talk.

³¹ Penman (2001) also points to a lack of consideration of *rural* discourses relating to environmental degradation

Method

Participants

The interviewees were members of 9 households that had previously participated in the main field study. In 6 of the 9 interviews conducted, only one member of the household was present. For the other 3 interviews two members of the household were present. The participating households were recruited by responding to an item on the follow-up questionnaire mailed out to all households (other than those in the control group) at the completion of the main field study which asked whether they may be interested in being involved in an informal follow-up interview.

Procedure

Interviews were conducted by the researcher in the participants' homes and were audio-recorded. Interviews lasted for approximately 30 to 45 minutes and were loosely structured around a series of questions. Participants were asked how important they regarded the issues of water and energy conservation to be. In some instances, depending on the dynamic of the particular interview, they were also asked more specific questions such as their reactions to the water shortage in Perth the previous summer or their opinions on greenhouse gas issues such as the signing (or lack thereof) of the Kyoto Protocol. Another topic brought up in most interviews was the results that had been obtained in the field study in which they had participated. Participants were asked what their thoughts were on the results, based on their experience in the program and as users of resources in general. They were also asked what they believed to be the best way of encouraging people to change their resource-

consuming behaviours. The interviews were transcribed to allow them to be amenable to analysis. Full transcripts of all interviews can be found in Appendix I.

Analysis and Discussion

The interview transcripts were analysed by firstly coding all transcripts for relevant instances of talk and then conducting a discursive analysis of these instances. A detailed discussion of the epistemological bases of discourse analysis is beyond the scope of this chapter. For a detailed discussion of these issues I refer the reader to Potter and Wetherell (1987), in particular chapter 8: *How to analyse discourse*. The results of the analysis will now be presented in terms of the major themes of: The ways that participants represented and constructed the use of resources; the ways in which participants positioned themselves and others in relation to the use and conservation of resources; discourses surrounding the management of natural resources; and representations of 'truth' in the domain of environmental issues and the construction of social categories around these truth claims.

Constructions and Representations of Resources

Water as a 'precious commodity'. The most common way in which residents constructed water as a resource was in relation to its status as a 'precious commodity' that needs to be carefully managed and conserved in order to protect it for the future.

For example:

D: Well, water, there has been that much said about water over the last 20-30 years. It's a very precious commodity. We haven't got unlimited quantities of

it, well we have, but most of it is up north, and, well, we have just got to conserve it. As our population grows, more people, more users of water, so it's inevitable that one day we are going to reach the stage that we are going to have too many people for too little water, in the metro area.

Inherent in the above extract is a construction of water as something that should be seen as limited. It is produced as being a finite entity that runs the risk of possible depletion if not conserved or managed correctly. The suggestion that one day there may be "too many people for too little water" also highlights a construction of water as an essentially *shared* resource.

Participants also made reference to the environmental conditions in Western Australia to support their constructions of water as a precious and finite resource in this context.

W: Western Australia is a dry state, we don't have many good rivers that run through it. And those waters underground, they won't last forever either. So we need to be very careful with the amount of water we use.

In this way, participants presented accounts of water resources that appeared to be grounded in a representation of the area in which they live as being 'dry'. Often, these representations of 'dryness' were linked to concrete observations of real-world events such as empty dams or falling rainfall figures.

K: Ah yes, the water issue. Cause my mum grew up in Jarrahdale which is near the Serpentine Dam..umm...she has always grown up with the knowledge that the dam water does run out and stuff so she is always saying: "The dams are low so we have to conserve for the future".

And this:

V: Just knowing that the dams are so critically low is enough. Knowing that the rainfall is dropping, on average, every year....

Some residents' representations of the water resources in Perth appeared to suggest that this issue had almost reached the 'social scare' proportions discussed earlier in relation to Unger's (1992) analysis of reactions to the 'Greenhouse Summer' of 1988. For example, one participant appeared to feel personally threatened to the extent of indicating that she worried about the water situation because:

H: ...if you don't have water you can't drink anything and your body needs water. I mean, what else are we going to drink? Soft drink all day, ich! I'd be devastated without water. I drink so much water, that's all I drink. So if we didn't have water it's like, och! I'd be devastated, yeah.

Concern for the future of water resources, exemplified in its most extreme form above, was a common theme among participants. Residents were also worried about what restrictions further low rainfall could bring about if everybody did not make an effort to conserve now.

H: *Very*, very important to save water....very important...oh yes. I mean, look at our water restrictions now. And if we don't conserve our water then next year we won't be able to have our sprinklers on at all. I mean we've been lucky that we've had this little bit of rain, but we still need a lot more rain

Competing Discourses of Water Consumption and Conservation. Despite the essentially pro-conservation discourse outlined above, which focused on conserving 'precious' water resources for the future, there was also evidence of a competing discourse that was concerned with the aesthetic beauty of suburbs. In a similar vein to the competing 'ozone-melanoma' and 'sun is fun' discourses identified by Coupland and Coupland (1997) in UK print media, there appeared to be evidence in the current

data of competition between discourses of ‘protecting our water future’ and maintaining ‘our beautiful suburbs’.

D: Applecross is a very nice place to live, and I’m lucky that I live there. But, if I didn’t water my street lawn, and let it die, it would stick out like a sore toe. And that would be, I guess my neighbours would look at me and say “well what a crummy old neighbour *he* is!” So I am under pressure, to maintain a good lawn. So, you know, if you drive down the street and everybody has got reasonable lawns and one's got a dead patch, its like pointing the finger of scorn isn’t it?

It is evident in this extract that, whether or not other residents *would* “point the finger of scorn”, reference to this social pressure to maintain one’s front garden exists as a linguistic device which is available to residents to justify and legitimise their levels of water consumption used for lawn watering. In the ‘beautiful suburbs’ discourse, the individual resident is constructed as being powerless to resist the social pressures exerted by society to maintain a presentable green lawn. For example, consider the following extract from a resident who had just moved into a newly built house that did not yet have a landscaped front garden:

W: It’s a problem though. Did you see my big verge when we came in, now what would I do with that? If I left it looking like nature it would look like an Aboriginals' camp wouldn’t it? You know, I am nearly forced to put a lawn in aren’t I? Which is probably the worst thing you could ever do with it. So that’s a problem you see.

In this case, the individual is constructed as finding themselves with ‘a problem’. This ‘problem’ is constructed as a choice between two perceived forms of social pressure, namely, a pressure to maintain a lawn which doesn’t resemble what the resident describes as an “Aboriginal Camp” and a pressure to avoid putting in a lawn which would be ‘the worst thing you could ever do’ from a water conservation

perspective. This extract is also interesting on another level beyond the competing 'our water future' and 'beautiful suburbs' discourses. It is interesting to consider the representations of 'nature' and culture inherent in the extract. In this case, "nature", or 'Australian nature' at least, is seemingly being ascribed a negative status, and one which the participant appears to be linking to various negative stereotypes of Indigenous Australians which have been found to be prevalent in Australian society (e.g. Marjoribanks & Jordan, 1986; Pedersen, Griffiths, Contos, Bishop & Walker, 2000). It is also important to consider that the construction of the existence of a front verge which is 'left like nature' and looks 'like an Aboriginal Camp' logically suggests the existence of an alternative form of verge landscaping which would *not* be 'left like nature' and would *not* 'look like an Aboriginal Camp'. Given the predominant style of gardening in the suburbs of Perth, it would be reasonable to suggest that this alternative style of garden would most probably be one involving typically English features such as rolling green lawns and rose-bushes. It is interesting to consider how neatly this construction of nature and culture maps onto arguments that have been put forward by authors such as Flannery (1995). In his text, *The Future Eaters: An Ecological History of the Australasian Lands and People*, Flannery (1995) highlights the total rejection of the natural Australian landscape by white Australian colonisers since their arrival in 1788. This attempt to transform the Australian landscape into 'another England' is contrasted with the land use practices of the Australian Aborigines who are argued to have, over many thousands of years, developed to be much more in harmony with the ecology of the Australian environment.

Energy as 'replaceable'. The ways in which energy resources were constructed by participants differed from those of water resources. While energy was constructed as an important issue, concern focused much more on the type of energy being used rather than the amount being used. Unlike water, which was represented as a finite, precious resource, energy was seen as something that we will always be capable of producing, with the method of production being the main point for debate.

D: Well I guess it's probably not as much of a problem as water, at this point in time. But, ah, it's also important, particularly the sort of energy you use. We don't want to go back to coal fired power stations, although I think there is talk of building another one, which I think would be stupid. We've gotta worry about the greenhouse gas, so it's more important *how* we manufacture energy rather than worrying about how much we use. Perhaps one day, I know a lot of people don't like the idea, but one day we may have to depend on nuclear energy, whether we like it or not. Nice to live in a perfect world Tim, but we can't always do it can we?

T: So what would be your preference then...you said you're against coal fired power stations, you said that in the long term nuclear may be the only answer, what would you see as the best direction to take in the short term, for Western Australia?

D: In the short term I think gas power. We seem to have a lot of [natural] gas, why don't we use that for our power stations? In the long term, I don't know how long our gas is going to last. In the long term, maybe it will have to be nuclear. But certainly we have got to get away from coal powered, it's crazy!

In this extract the production of energy at current rates is constructed as something to be taken as given. There is no focus on the amount of greenhouse gases produced *per* unit of energy used, which is argued to be something we don't have to 'worry about'. Instead, the blame for the environmental consequences of energy production is placed on the use of 'coal fired power stations', which are seen as responsible for polluting our environment. The construction of the energy issue in these terms is reminiscent of

Joffe's (1996) observations outlined earlier of the ways in which representations of large scale crises often link the crises to 'the other'. 'The other' in this case is being represented by those in charge of making decisions (who are seen as often 'stupid' or 'crazy') regarding the methods of energy production being chosen. Reserves of coal and natural gas *are* being represented here as finite; however, this is not being presented as a reason to cut back on how much energy each of us uses as there is seemingly always going to be an alternative form of energy available.

Another interesting feature of the above extract is the way in which nuclear energy is presented as the inevitable solution to the energy issue. Despite the acknowledgment that 'a lot of people don't like the idea', nuclear energy is constructed as something that we should all learn to accept as a reality of life. This point is emphasized by the way in which the participant constructs anyone who disagrees with this position as being somewhat of an unrealistic idealist in pursuit of an unobtainable 'perfect world'.

A focus on by-products of energy production rather than quantity of energy being produced can also be seen in the following extract:

W: Well, energy...because I realise how it is manufactured, I realise that there is a by-product, you know, smoke, and pollution and so on, I'm aware of that. I had a house in Victoria once that was right near some big power stations and it would be smoking away just filling up the air with this smoke and you'd think, where is that going to go?

And when I'm on holidays and I come back to the city and I see this great haze... if you go on top of the hills here and see the haze over Perth, and that's a worry isn't it, and that's from too many cars or whatever.

The first section of this extract presents a similar image to that of the previous extract in terms of the representations of the 'smoky power station'. Interestingly though, once again, the participant appears to construct the power station itself as almost being responsible for this pollution, rather than the individuals whose energy demands it is supplying. The participant recounts questioning where the smoke is 'going to go', rather than questioning where it might be 'coming from'. This can be contrasted, however, with the second section of the extract in which haze produced by pollution from cars *is* attributed to there being 'too many' of those cars. The representation of pollution from motor vehicles here appears to be more connected to the individual consumer than that of pollution resulting from the use of energy supplied by the utility companies, although the speaker still manages to blame 'the cars' for the pollution rather than the drivers of those cars.

D: I think because water's...water's, you know, I think we're told or educated to think that water is more important. Umm, energy you can generate. If we wanted more energy we've only got to build another power plant. If we want more water, it doesn't matter how many more dams we build, unless it falls out of the sky or we get it from underground we can't get it. So I really don't think...I'm more concerned about water than I am about energy. I don't see energy really as a problem. And if we reach the stage of having nuclear power stations which are safe and viable we can use all the energy in the world. What difference is it going to make? But water is a different kettle of fish. We've only got limited water, we've got unlimited sources of energy. So I don't really worry too much about energy. I think water is our problem.

In this extract, energy is constructed as having an important property not ascribable to water in that it is able to be 'generated'. The generation of energy is presented as being far more under the control of human beings than the collection of water. We have the power to make decisions about energy and with the use of nuclear energy

have the potential to have ‘all the energy in the world’. This property of energy is contrasted against water, which is ascribed the almost biblical property of ‘falling out of the sky’.

The common theme that ran through participants' talk regarding the energy issue was the construction of the environmental impact of energy as being attributable to its production, rather than its use. Responsibility was attributed to the supply of energy, rather than those whose demands that supply was meeting. The *way* in which energy is produced was constructed as something that a society could make choices about, whereas *the amount* of energy we use was constructed as something that had to simply be taken for granted. Unlike water, which was constructed as a precious resource that we must endeavor not to waste, energy was constructed as something that is simply ‘used’ rather than ‘wasted’.

K: Maybe it had more effect on water because people can do smaller washes in washing machines and take shorter showers and things. But when it comes to electricity, people aren't prepared to cut back on things they like, like the TV, the radio, the hair-drier, appliances in the kitchen which make things easier. These are things that people rely on for everyday life.

This construction of energy as something that is ‘used’, rather than ‘wasted’, works to move responsibility further away from the individual. After all, one could not possibly expect people to give up things that they ‘rely on for everyday life’, such as hair driers. Seemingly, however, the use of showers and washing machines is constructed as somehow being more discretionary.

A: Energy...I don't think people waste it. We don't overuse energy in this place. We don't sort of...we use the fluorescent tubes, we sit in the lounge and just leave the light on in the kitchen. We've got a couple of electric radiators, but we never use them. We've got a [natural] gas heater...that's only gone on for the first time last night....first time we've used the gas, because its been a lot milder so there should have been some reduction in energy because of the weather I would think. Showers...we have a short sharp warm shower.

T: Do you use an air conditioner at all in summer?

A: Yeah, we've got an air conditioner...an evaporative air conditioner...we use that in the summer. Ah, yeah, if we had to we would cut it down. Its not being wasted.....air conditioning is probably the luxury item...there is nothing else in the house. We haven't got any 'machines'...well, we've got a washing machine of course...and a refrigerator...but ah...we haven't got any other machines around the place that are power users.

Again, natural gas heaters in a Mediterranean climate and air-conditioners for cooling are constructed as life-sustaining essentials that 'use' rather than 'waste' energy. It is interesting to note though that, despite this status, air conditioners are also being constructed here as something that the participant *could* cut down on, if they "had to".

One form of energy use in the home that *was* often constructed as 'wasteful' was that used to light rooms which were not being used.

A: ...we have always tried to conserve power as much as we can. We have never wasted it, put it that way. We don't leave all the lights in the house on. That gets up my snout a bit.

H: ...it was drummed into me when I was little: "don't leave the lights on! It's a waste of electricity, it's a waste of electricity"...and I've always had the same thing. If a light doesn't need to be on, don't leave it on. If you've finished in the room, turn it off. Yeah.

K: As for energy, saving energy...I don't know, we try to turn our lights off when we go out of a room, and just small things like that.

V: I certainly think people would become more conscious of turning off lights, if the electricity went up markedly, they wouldn't leave the lights on all the time.

In all of the examples given above, it can be seen how lighting is being presented as a form of energy 'wastage'. This focus on lighting is interesting, given that, on average, lighting only accounts for approximately 5 percent of a households' energy use. One explanation for this focus on lighting may relate to the perceptual vividness of lighting in comparison to other forms of energy use. The degree to which various forms of resource use are 'visible' or 'tangible' to the consumer was an issue raised by many participants and exemplified in the following extracts:

L: People don't seem to be though...*aware* of energy...do they? Maybe cause it's such a...um....hidden thing or something, you know?

W: It's not tangible is it?

And:

H: Umm...I s'pose because water you can actually see it. It's there and you think, "aww what a waste", cause you can see it. If you've got a bucket of water and you threw it away, it's like, it's a waste...it's gone. Whereas electricity, you can't see it, you can't necessarily feel it. I mean, you can feel heat, but, you can't feel light...you can see it, but you know...I don't know...maybe...you know what I mean?

This analysis of the perceptual nature of resources on behalf of my participants would lend support to the speculations offered in the previous chapter regarding the potential reasons for the labels being able to attune residents to water consumption affordances of appliances than to energy consumption affordances.

The positioning of self and 'the other' in relation to the use of resources

An interesting feature of participants' discourses relating to the self and the other in regard to resource use is the way in which these discourses can be seen to work to position the speaker *outside* the issue. Participants utilised a number of linguistic devices to prevent constructing themselves as 'wasters' of resources. On the other hand, there were numerous examples of reference to the careless 'other' to whom the responsibility for the environmental impacts associated with the over-consumption of resources was attributed.

K: As for energy...saving energy...I don't know, we try to turn our lights off when we go out of a room, and just small things like that...but I know a lot of people that wouldn't bother.

In the extract above, we can see how it is possible for the participant to construct themselves as 'conservers' by comparing themselves to 'the others' who are constructed as 'wasters'. Despite the admission of the rather minimalist approach being taken to energy conservation in their household, K is able to prevent herself from being categorised as a 'waster' by making reference to those who do not even bother to engage in simple acts, such as turning off lights.

Participants were even able to construct themselves as conservers in the face of contradictory evidence, as exemplified in the following extract:

R: Yes, I...we, do conserve water, actually we don't use a lot...although, the bill we get every year suggests we do use a lot. But...we...the big trees we've got, they allow us to save water to an extent because all the bushes that are under the trees don't require any water, *very* little, they are in the shade most of the time. We don't use sprinklers. I mean, we don't use set sprinklers, as a lot of people do these days. Most of our watering is hand watering, it's only a few of the small things like, for instance, I'm growing that passion fruit that

you can see there...ok...well...we will hand water that. The grevillea gets a bit. That's all part of living because the grevillea brings the birds, and we like the birds. I don't know that we could cut down a lot on our water usage...umm...so bearing in mind that you've got washing machines, and in this climate you have showers pretty often...umm...and washing up of course, they are pretty fixed. I don't think we could reduce ours very much. But we are conscious *of* it. And...as I say....we put the water out from the washing machine. And that seems to be legally approved now, approved by the health department, the council, and promoted by the water authority. I think we've got to.

The positioning of the speaker as a conserver of water in the above extract is achieved through the deployment of three different linguistic devices. Firstly, the speaker employs the technique outlined previously of making reference to the comparative 'other', who is constructed as a 'waster'. After all, R does not use sprinklers like "a lot of people do these days". Secondly, the speaker makes use of the 'use, rather than waste' device outlined earlier in the context of participants' general representations of *energy* as a resource. In this case, the participant uses this device to justify their own water use in terms of it being 'all part of living'. Attracting bird-life to the garden, use of washing machines and frequent showering in a hot climate are constructed as 'fixed' necessities of life. The third device used is the reference to the resource-saving activities that the speaker *does* engage in. Just as K, in the previous extract, utilised this device by referring to them turning off their lights, R employs this technique by referring to the recycling of water from the washing machine on the garden. By highlighting one small, but vivid, act of conservation the speaker is able to construct themselves as a conserver rather than a waster of resources, despite providing hard evidence to the contrary in the form of their high water bills.

Some additional methods of accounting for evidence of oneself as a waster of resources can be found in the following extract in which a participant discusses their reaction to the graphical feedback sent to them during the field study comparing their water use to other, similar sized, households.

S: I was rather interested to get the feedback, but I noticed that we were always running at about 13 or 14 Kilolitres, but when you are comparing to a supposed 'similar household' and they were down around the 8 or 9 and I thought...“how the hell are they doing it?” Umm, we have a pool, but I haven't even topped it up cause I've got a pool blanket on it. And I was wondering what they were doing and were they...was it valid...were they really identical or did they have a smaller garden or, you know, we've got a native garden which would...supposedly. I thought it was interesting that our latest water bill has shown a reduction of 36% over last year, which was significant I thought, and which was 27% less than the year before.

... I think that I'm, I mean, we are here committed to sort of...the “Greenie” approach I suppose. Umm...and ah...our son certainly...he started at Murdoch as an environmental scientist...a course in environmental science. So yeah, we are committed. But how I get the 13 thousand down to 8 or whatever it was I have no idea. And...ah...I guess it was so far, the gap was so wide, I don't think I even tried. Umm, I just couldn't see how I could get it down.

In the first section of the extract the participant attempts, firstly, to manage the negative social comparison by questioning the validity of the comparison and the categories being utilised in the comparison (“was it valid...were they really identical”). A second device is then employed which manages this negative comparison by simply changing the comparison from a social comparison to an individual comparison involving the household's own present and past consumption levels of consumption. In other words, the participant is arguing that even though they may be consuming above the average in comparison to other similar households, this can be overlooked by focusing on the fact that they are *well* down on *their own* levels of consumption in the past.

The second section of the extract contains the use of a slightly different technique to manage negative social comparison. This involves the participant defending their position as a conserver rather than a waster of resources by highlighting their membership of a different social category, that of a 'greenie'. By reference to the participant's son's studying an environmental science course at university, the speaker, and their household, is positioned as being 'committed to the Greenie approach'. This category membership, and the commitment to ecological ideals that are being ascribed to it, then allow the speaker to justify their lack of behavioural response to the negative social comparison. As the participant states, "we are committed. But how I get the 13 thousand down to 8 or whatever it was I have no idea".

It was also evident in the discourse that the positioning of oneself as a conserver rather than a waster of resources did not necessarily require the comparison of self and other in talk. Participants also positioned themselves as conservers simply by making reference to the 'wasteful other'. The creation of this category in talk and the positioning of various others within the confines of this category, works to position the speaker *outside* the confines of this category.

W: It's interesting the way some suburbs were different than others on water use... that's a good point of study...you know. Wembley was the best or something. You'd think that Dalkeith would be the worst...you know...because they spread it all over the place.

In this example the speaker constructs the residents of Dalkeith (a highly affluent Perth suburb) as wasters of water by referring to what is presented as the common knowledge (as signified by the term 'you know') that residents of this suburb 'spread' their water 'all over the place'. Inherent in inclusion of Dalkeith residents in the category of 'wasters' is the exclusion of the speaker from this category.

H: I can't understand why people waste so much water....you know like people brush their teeth with the tap running....can't stand that, don't do it at all.

In this extract this participant takes the creation of the categories of conservers and wasters of resources one step further by beginning to identify features of the category of wasters. Brushing one's teeth with the tap running is presented here as an example of a behavioural category membership designator. That is, people who engage in this practice are to be thought of as wasters. Having achieved this, the speaker is easily able to position themselves outside this category by demonstrating that they do not fit this description, as they "can't stand that" and "don't do it at all".

In light of these analyses of participants' talk relating to the self and other in relation to resource use (particularly that of water resources), one could suggest that this discourse represents a naturally occurring example of the actor-observer effect (Jones & Nisbett, 1972) - participants attributing their own actions situationally and others actions dispositionally. Participants' own use of resources is constructed as being attributable to the 'necessities of life', whereas it is 'the other' who is constructed as the needless waster of resources. This linking of large-scale crises to 'the other' is also reminiscent of Joffe's (1996) conceptualisation of the linking of social representations of HIV/AIDS to 'the other' as a form of ego-defense or threat

aversion. The current analyses appear to support Joffe's predictions that this process may also be evident in the context of environmental crises.

Managing the use of resources: discourses of justice and equity

The recent imposition of water restrictions in Perth provided an opportunity to investigate the ways in which issues surrounding justice and equity were constructed in talk about natural resources. On the 8th of September 2001, 8 months before the current interviews were conducted, the Western Australian government imposed mandatory restrictions on the number of days per week that sprinklers and reticulation systems were allowed to be used to water gardens. Residents in each household were given two specific days per week on which they were allowed to water either before 9am or after 6pm. The restrictions did not, however, apply to those residents who used underground bores (wells) to water their gardens. These residents were not restricted at all in the number of days per week they could water, however they were still asked not to water between 9am and 6pm. None of the participants interviewed was a bore owner, due to this being a criterion of participation in the main field study.

One feature of the discourse surrounding water restrictions was a framing of the issue in what could be seen as traditional 'social dilemma' terms. The status of water as a 'shared resource' outlined earlier was further exemplified in participants' talk regarding water restrictions, which constructed bore owners as the 'free riders' or 'bad apples' in Perth's water dilemma.

D: Well, you've got an anomalous situation now where...I don't have a bore...I used to have one, before we shifted to this house...you've got people today where if you've got a bore you can put water on your garden 7 days a week. If you haven't got a bore you can put it on 2 days a week. I guess people who haven't got a bore look at people who have and say, "Why are you using all that water, why can you use all that water and I can't"?

T: Do you think that bores should be metered, or restricted in terms of days per week?

D: I think so...I think so...I used to have a bore and when I had the bore I might not have said that, I might not have agreed with that but... I was going to put a bore down here, I got a man out to do it and he said it wasn't worth my while to do it. But if you forget about your own little personal choices...you know...common sense dictates that you should ration your water. You shouldn't just let people use it willy nilly. You know, I think it's a problem too with trying to educate people in water conservation. If you haven't got a bore, and everybody else in the street has and they are all splashing water around, why should you worry yourself? You know, you'd have to have an exceptionally strong conscience or a desire to do the right thing. Because you're one of...let's assume that around here most people have got bores...now, why should I really worry...I do worry...but why *should* I worry if...when all the neighbours are splashing water around, what difference is my little bit going to make. I think that's the attitude of people. If people see water being wasted, if they see it being wasted...like the place around here is not occupied and the sprinkler comes on regularly and you think "god, what a waste of water that is". Until we reach the stage when everyone is treated equally I don't think people will really take it too seriously.

The bore owner is constructed in the above extract as a 'free rider' who is allowed to consume at will despite others being forced to conserve. However, the speaker also complicates this construction by introducing the notion of the weak-willed consumer of water, who can be contrasted with those who have an 'exceptionally strong conscience or a desire to do the right thing'. Bore owners are not *necessarily* being placed in the former category, for, as the speaker states, *he* used to be a bore owner himself and he "does worry" about conserving water. The 'open slather' bore watering policy *itself* is what is being constructed as the problem due to its effect on

those who do *not* have an ‘exceptionally strong conscience or a desire to do the right thing’.

A similar discourse can be identified in the following extract:

RR:well...I suppose I’m one eyed because I don’t have a bore...but my son has one...umm...no...I’ve always felt that bores should be metered. There would be a bit of an outcry...but...umm...if it’s water, it’s water and if it’s going to affect the overall water supply by the water commission...if it’s going to upset them and make them bore deeper or whatever...well then, there must be some kind of restriction on people who use bores, even though they sunk the bores themselves.

It is interesting to note that RR and D both engage in a form of ‘stake inoculation’ (Edwards & Potter, 1993) in which they are able to manage the potential claim that their position regarding bores may be influenced by their status as a non-bore owner. In the case of D, this is achieved by making an explicit reference to the potentiality of this influence, “I used to have a bore and when I had the bore I might not have said that”, and then suggesting that, despite this, “if you forget about your own little personal choices...you know...common sense dictates that you should ration your water”. In this way, the speaker’s argument against unrestricted bore use is constructed as not being the result of personal stake but rather one of common sense. RR engages in a similar process of stake inoculation by demonstrating that while he *himself* does not own a bore, his *son* does. As such, the potential claim of RR’s argument against unrestricted bore use being a result of not owning a bore himself is diffused due to the potential disadvantage that bore restrictions would bring to RR’s son.

The importance of justice and equity characterized a great deal of the discourse relating to restrictions of water use. Although residents did indicate qualms regarding the fairness of differential restrictions for bore owners and non-bore owners, participants generally accepted water restrictions, provided that the restrictions *would* affect all members of society equally.

A: I just go along with the water restrictions and if it gets to the stage where you're not allowed to water your lawns well so be it, I'll just let the lawns die and I'll put a few more shrubs in out the front. You know, it's not just going to happen to me, it's going to happen to everybody...so you know your place isn't going to stand out like a beacon, everybody's will be the same if that happened. So, I accept it. Like years ago when we had power restrictions, people didn't like them but if they had any brains they would accept them.

Water restrictions are constructed as something that everybody simply has to grin and bear. In fact, A strengthens their argument to the extent of suggesting that to be opposed to water restrictions would be akin to not having 'any brains'. A similar discourse can also be observed in the following extract:

D: And if they changed that [the current water restrictions] and said: "you can only put it on once a week, for quarter of an hour", I'd do that. My lawns and gardens would suffer but if everybody else was suffering...if that was the norm...well, alright...I'd cop it, that's it.

Once again, water restrictions are constructed here as a part of life, something that we should just 'cop', particularly if members of society are forced to suffer equally.

"Greenies", "the Greens" and "Extreme Environmentalists" and the ascription of "Truth"

Another theme that emerged in participants' discourses of environmental issues was a concern with establishing what represented the 'truth' in regards to these issues.

Participants appeared sceptical at times of various sources of information regarding the environment. For example, if we take the following extract from an interview involving a husband (W) and wife (L):

L: What I find a problem though, with the environment, is extreme environmentalists! Now every article I would be reading about it, and they will be saying drastic this...and the ozone....disaster, disaster it's terrible. And then I read an article by a scientific thing who says it is exaggerated. Now, it puts me off when I feel that they are making statements that maybe are not true, so therefore I don't take as much notice. I have a problem with that. I just want to know what the truth is. Mmm.

W: Happens with the trees doesn't it...you hear conflicting stories....old growth, plantations...are they a problem....there is two different arguments. You don't know who is telling the truth, do you?

In this extract, L uses the category label of 'extreme environmentalists' to describe those individuals that she regards as perhaps *not* being in possession of the 'truth' in regards to environmental issues. In contrast, articles written by what she describes as 'a scientific thing' *are* seemingly constructed as being in possession of the truth. The extract presents an interesting demonstration of the problematic use of 'voices of science' in environmentalist texts outlined by Harré et al. (1999). Harré et al. have suggested that the use of what they call the 'scientistic' use of scientific language by environmental activists to make claims which may not be directly supportable through scientific evidence has the potential to undermine the progress of the environmentalist movement. The above extract certainly supports this suggestion, however, there is a need for further research into the ways in which categories such as 'extreme environmentalists' and 'scientific things' are constructed, distinguished from one another, and utilised in talk.

Some further examples of the construction and use of these types of categories can also be identified in the discourses of the current participants. For example:

A: You know...the average person doesn't have the ability to see how much coal is left in the ground, or how much [natural] gas is left. It's not a visual situation like water is. So I don't think people are anywhere near as concerned about energy as they are about water, except for the greens...who want to conserve it.

This extract introduces the use of another, different, category label - "the greens".

This category is seemingly being constructed by A as being more knowledgeable of 'the truth' than, for example, L's 'extreme environmentalists' category. 'The greens' here are constructed not so much in terms of holding a position which goes against scientific evidence, but rather as simply having a greater level of *concern* for the conservation of resources (in this case, energy) than "the average person".

In each of the extracts above, the speaker positions self outside the categories of 'extreme environmentalists' and 'the greens'. The following extract, however, provides an example in which the speaker positions self *within* a pro-environmental category.

S: I don't think enough of us are environmentalists. You know...sort of in a 'green' sense. When you drive along Leach Highway³² and see the rubbish that is collected along the road there and sort of demonstrates to me that a lot of people aren't that concerned about such issues.

S constructs the category of "environmentalists, in a 'green' sense", as containing individuals who would be concerned about rubbish being thrown along the sides of highways. The speaker is positioned within this category by virtue of the fact that

³² A major motorway in the city of Perth.

they *are* obviously ‘concerned about such issues’, for if they weren’t concerned then they would not have raised the issue *as* an environmental issue. It is interesting to note, however, that while membership of the category of ‘environmentalists’ is constructed as pertaining to a commitment to not *littering* the motorway, it is *not* constructed as associated with one’s choice to *drive a motor vehicle* on that motorway!

Conclusions

This analysis of participants’ discourses surrounding the consumption and conservation of water and energy highlights some important qualitative differences in the ways in which these two resources may be represented and constructed in talk. In the current context, water was constructed as being a finite, precious and shared resource that must not be ‘wasted’. In contrast, energy resources were seen as essentially replaceable. Discourses surrounding energy focused less on the amount of these resources being consumed and more on the particular choices being made by policy makers regarding the *methods* of energy generation being adopted. Energy was also often constructed as something that is ‘used’ for ‘the essentials of life’, rather than something that is ‘wasted’.

Also evident in participants’ discourse was a tendency to construct the self as a ‘conserver’ of resources whilst constructing ‘the other’ as a ‘waster’ of resources. This construction was even found to be manageable by participants in the face of

contradictory evidence³³. This finding may have implications in terms of explaining the lack of significant effects produced by socially comparative feedback in the main field study as it provides an account of how negative social comparisons can be managed, discursively, to remove the need to respond to such comparisons by changing one's behaviours.

Participants' discourse relating to the imposition of water restrictions in Perth during the preceding summer were found to reflect closely the traditional 'social dilemmas' discourse in terms of their construction of bore owners (who were allowed to consume at will) as being akin to what this literature would describe as a 'free rider' or 'bad apple'. The centrality of equity and fairness in discourses surrounding restrictions of resource consumption should be taken as evidence for the importance of considering such issues when formulating regulatory government policy in this area.

The ways in which participants represented and interpreted environmental 'truth' claims was found to support Harré et al.'s (1999) concerns regarding the potentially counter-productive effects of the 'scientific' use of scientific language by environmental activists. It is also suggested that the discursive psychological literature could benefit from more examinations of the ways in which various social categories, such as "the greens", "environmentalists" and "extreme environmentalists", are constructed and positioned in terms of their relative status as holders of 'truth'.

³³ Evidence that was also always raised *by* the participants themselves, in talk.

The qualitative analysis detailed in this chapter offers some insights into the ways in which discourses and representations of natural resources may operate within the society in which the two field studies outlined in chapters 4 and 5 were conducted. It provides an example of the strengths of qualitative methodologies in terms of their ability to provide a more detailed, in-depth account of the ways in which psychological processes operate and are utilised by members of society as evidenced in their talk regarding a particular issue. It has been shown how the qualitative analysis of interviews with residents was able to explore further some of the concepts that the earlier, quantitative research had highlighted as potentially important, such as potential differences in the psychological properties of water and energy resources. Through applying discursive psychology and social representations, it became possible to explore this issue in more depth, and also uncovered some further potentially important aspects of discourses of natural resources, which may stimulate further research in the area. In the final chapter of the thesis, it will be shown how these qualitative results can be integrated with those arising from the quantitative field experiments to expand our understanding of environmentally sustainable behaviour.

CHAPTER 7

CONCLUSION

Overview of the Chapter

The research presented in this thesis aimed to investigate the psychological aspects surrounding the issue of promoting environmentally sustainable behaviours (ESBs) within communities. The term ‘psychological’ has been defined in its broadest sense to include the wide range of different theoretical perspectives that have previously been utilised to investigate this issue. A particular aim of the thesis has been an attempt to suggest ways in which a psychology of ESB may be developed that is not necessarily wedded to any *particular* existing theoretical perspective within the discipline. Rather, I have aimed to develop an approach that is able to draw upon the strengths of a variety of these perspectives whilst maintaining a position that remains critical enough to be aware of the relative limitations of each perspective, particularly in terms of their potential application to the applied issue at hand. The second chapter of the thesis represents an attempt to develop an over-arching framework that is able to achieve this goal. The third chapter then sets this framework against existing conceptualisations of the ESB intervention literature. I have then presented two quantitative field experiments (a pilot study in chapter 4 and a larger main study in chapter 5) that aimed to apply concepts developed in the preceding chapters to the issue of water and energy conservation in residential households within the local community. Finally, chapter 6 detailed the analysis of qualitative data collected from in-depth interviews with a sub-sample of residents who participated in the main study

and explores in more depth some of the ways in which the issues surrounding the consumption of resources are constructed in talk. In this final chapter I will provide an integration of the findings that have emerged from the research presented in the thesis as a whole, and a discussion of the limitations of the research. I also wish to consider the implications of this research for psychological theories of ESB as well as for public policy in this area. Finally, I will consider some methodological and meta-theoretical issues regarding applied social psychology and psychology in general, that I believe emerge from the current program of research.

Summary of findings

The results of the field studies reported in chapters 4 and 5 suggest that the attunement labels were effective in helping to reduce water consumption by attuning residents to the environmental affordances of the relevant appliances around their homes. This effect was also not attributable to the influence of information alone. The same effect of labels, however, was not observed for energy consumption. The results of the main field experiment also demonstrated that the provision of socially comparative feedback in the current context did not appear to influence residents' water or energy consumption. The qualitative study was able to uncover some important qualitative differences in the way in which participants constructed and represented water and energy resources in their discourse. Water was constructed as a finite, precious and shared resource that must not be 'wasted', in contrast to energy which was seen as essentially replaceable and something that is 'used' for 'the essentials of life', rather than something that is 'wasted'. Participants' discourse also

tended to construct the self as a 'conservator' of resources whilst constructing 'the other' as a 'waster' of resources, even in the face of contradictory evidence. Discourses relating to the imposition of water restrictions in Perth were found to be reminiscent of traditional 'social dilemmas' discourse in terms of their construction of bore owners as 'free riders'. Also, participants' representations and interpretations of environmental 'truth' claims was found to support Harré et al.'s (1999) concerns regarding the potentially counter-productive effects of the 'scientific' use of scientific language by environmental activists through its promotion of discourses of skepticism.

Integrating the quantitative and qualitative findings

The differences in participants' discourses relating to water, as opposed to energy, resources uncovered in the qualitative study may represent some clue as to the reasons for differential effects of the intervention in the field experiments on water and energy consumption. These differing discourses suggest that the social environment in which consumption behaviours were embedded may have influenced water and energy consumption to a different extent, or in a different way. Residents appear more willing to construct water as a resource which one has a personal responsibility not to 'waste', whereas the consumption of energy is constructed more as an individual right. As such, the likelihood of energy consumption behaviour being promoted in the social environment through conversational processes would appear to be potentially limited.

The ways in which participants in the quantitative study demonstrated an ability to manage unfavourable social comparisons in relation to their consumption behaviour may also shed light on the failure of the socially comparative feedback to influence consumption levels in the main field experiment. Chapter 5 outlined a number of ways in which residents were observed to discursively construct themselves as not being 'wasters' or resources, even when provided with comparative feedback or water bills that suggested the opposite. Given the ease with which this task was performed by participants in the interviews, one may suggest that participants in the main study may have also engaged in a process of simply 'explaining away' any negative social comparisons.

Limitations of the research

The field experiments

One limitation of the field experiments was the fact that the sample of households used was not strictly random. Given that participation in the program was voluntary, the pool of participants was more likely to be comprised of individuals who were more concerned with environmental issues, or at least those who were generally more willing to volunteer to participate in research. Although this means that the sample was selective, this does not *necessarily* represent a weakness in the studies, from a practical point of view. Even if one were to regard the sample used in the fieldwork as more pro-environmental in its orientation than some other sections of the community, this does not make the research any less meaningful. This would only make the research less meaningful if there were an existing literature demonstrating

that it is very *easy* to change individuals' behaviours to be more environmentally friendly, provided that they hold pro-environmental attitudes. As has been mentioned in the early chapters of the thesis, this is *not* the case. Therefore, an examination of the ways in which ESBs can be promoted within a sample of people who are interested and willing enough to be involved in such a program is still very useful in a practical sense. This does, however, provide a limitation in terms of how generalisable the findings may be to the community as a whole, particularly those who may *not* hold pro-environmental attitudes.³⁴

Another limitation of the field experiments was the limited amount of demographic data that was collected from participants. Household income, for example, was not recorded due to concerns regarding resident's willingness to give out such information whilst being recruited door-to-door. Indeed, some residents who were approached to participate in the study declined due to 'security concerns'. In addition, given that each 'participant' in the field studies represented a household, rather than an individual, it did not make conceptual sense to record individual demographic variables from the particular household member who agreed (on behalf of the household) to participate in the study. While this issue does not represent a confound with the experimental effect, it does provide a possible limitation of the generalisability of the results.

³⁴ Such as the next-door neighbour of a member of my department who has often been overheard muttering "Take that David Suzuki!" as he intentionally places recyclable material in his regular rubbish bin!

The utility of the attitude questionnaires may also be drawn into question as they potentially only represent the responses of one member of the household. If one considers that some households may contain individuals with quite different environmental attitudes then it becomes conceptually difficult to draw conclusions regarding such questions as whether attitudes affected behaviour in this instance.

A further limitation was that the general consumption figures recorded for energy and water use were unable to isolate the particular behaviours that may or may not have changed as a result of the intervention. That is, whilst they provided evidence that overall water consumption was reduced, they were unable to provide information regarding whether this might have been due to less water being used in the garden, less flushing of the toilet and so on. State-of-the-art technology is now available that allows for monitoring of water consumption that is able to isolate things as specific as which room in the house water is being used. Ideally the current research would have employed this technology; however this was not possible due to financial and practical constraints. A second potential limitation of the consumption data is the degree of 'noise' caused by natural variation in individual households' consumption as a result of such factors as residents going away on holidays and having guests to stay in their homes. While random assignment to conditions does ensure that such factors do not represent confounds, they may have increased the difficulty of demonstrating significant differences between the various intervention groups due to greater levels of *within*-group variation.

Another point worth mentioning in regard to the main field experiment is that there was some conceptual and operational overlap between the labels and information conditions. This is due to the fact that the information and labels variables are not totally independent of one another as, in a sense, the labels also provide similar information to that provided in the information leaflet. Therefore, technically, the experiment did not contain a group of participants who received attunement labels but did not receive *any* information. Given the way that the attunement labels were conceptualised in the current research, however, it would not have made a great deal of sense to create such a condition. The labels *were* intended to convey information. The distinction between this information and the information conveyed in the information leaflets was that it was presented at the point of interaction between the individual and the environmentally relevant object involved. Therefore, it appeared to make more sense to utilise these labels, rather than creating labels that contained no information and only acted as primes to the information provided in information leaflets. Also, given that providing information leaflets is a relatively simple and cheap form of intervention, there seemed to be little practical benefit in a design which was able to demonstrate whether labels provided *without* information were any less effective than those provided *with* information.

A final limitation of the field experiments was that the attempts to utilise the influence of the social environment did not draw on the pre-existing social networks of the participants. The provision of socially comparative feedback did potentially allow participants to locate their own consumption behaviour within the context of

others consumption levels. However, it may have been more effective to design the intervention such that it utilised categories of comparison that held pre-existing social meaning for the participants and allowed for naturally occurring social diffusion of a 'conservation ethic' through interpersonal interaction (such as the schools model outlined in the discussion section of chapter 5). As Lewin (1959) has suggested:

"It is easier to change individuals formed into a group than to change any of them separately. As long as group values are unchanged the individual will resist changes...if the group standard itself is changed, the resistance which is due to the relation between the individual and the group is eliminated" (p. 228)

The Qualitative study

The main limitation of the qualitative study presented in chapter 6 is the highly selective nature of the sample. The participants, in a sense, represented a selective sample of a selective sample in that they were comprised of residents who had initially agreed to participate in the main study and had then also indicated a willingness to participate in the in-depth interviews. As such, these individuals are not necessarily representative of the wider community. They are, however, a group that may represent the most receptive audience for appeals for the conservation of resources within the community. Therefore, the analysis of the ways in which resource issues are constructed in talk by this group *is* of great interest as they may represent the 'first point of contact' with the community when attempting to promote ESBs through public policy campaigns. That is, they may represent naturally occurring versions of Burn's (1991) 'block leaders' from which ideas surrounding ESBs may socially diffuse through the community. It would certainly be useful, however, for future studies of environmental discourses surrounding resources to

utilise a variety of samples, so as to map the discourses of sections of the community who may not be as initially receptive and may represent those whom the 'block-leaders' may find themselves attempting to influence.

Theoretical implications for psychological theories of ESB

The current program of research highlights the need to consider the entire system in which ESB behaviour takes place. This system includes the physical, the psychological and the social. For example, while changing the physical environment to attune people to environmental-impact affordances did have an effect on consumption, this effect appeared to be mediated by the more highly pro-conservation attitudes that participants in the main study held toward water resources than they did for energy resources. Behaviour also appeared to be influenced by the social environment in which the behaviour took place as evidenced by the correspondence between the differential effects on water and energy in the main study and accompanying differences in the social representations of these resources and the ways in which issues surrounding their consumption were managed in talk. Regarding this final point, there appears to be a need to consider the representations of resources that permeate through a society and the linguistic devices that members of a society have at their disposal as crucial influences on ESB. For example, MaKenzie-Mohr has espoused the merits of identifying both individual and external 'barriers' to ESB (see chapter 3). As outlined in chapter 3, individual barriers include such variables as a lack of knowledge, non-supportive environmental attitudes and an absence of motivation for behavioural change. External, systemic barriers on the

other hand include such factors as the degree to which public policy initiatives make performing sustainable behaviours convenient and affordable. It would seem that researchers interested in promoting ESB should *also* be interested in the ways in which social representations of environmental issues and the linguistic devices that members of a society have at their disposal help to create barriers and incentives for ESBs. They should also be concerned with the ways in which the existence of linguistic resources which can legitimate and justify failure to perform ESBs can also provide a barrier to ESBs being performed. One could argue that such processes allow for the creation of a form of ‘barrier’ to the performance of ESB that can still occur in the absence of *all* of the individual and systematic barriers outlined by McKenzie-Mohr. For example, the existence of such linguistic devices as “energy is essentially replaceable” and “energy is used for the necessities of life, it is not wasted” provide a form of barrier to the promotion of energy conservation behaviours. This barrier is not an individual psychological one *per se*, it is not something that an individual *has*, like an attitude. It is also not an external, physical or structural barrier like inconvenient infrastructure or cost. Rather, it represents a linguistic device that members of a society are able to *use*, while interacting with other members of that society, to legitimate and justify their existing patterns of behaviour. The same can also be said of the social justice aspects of environmental discourse that were also evident in resident’s discourses in chapter 6. While members of a society are able to justify their lack of behavioural response to environmental problems by making reference to an inequality between expectations regarding their own sacrifice and expectations of others’ sacrifice then this also represents a barrier

to encouraging these individuals to engage in ESBs. Likewise, the ability of residents to position the ‘other’ as being responsible for the ‘wasting’ of resources, while positioning the self as merely a ‘user’ of resources can similarly be seen as a barrier.

Implications for environmental policy

I will consider the implications for environmental policy that arise from the current program of research by returning to the five social-ecological principles for designing ESB interventions that I proposed in chapter 3 and considering them in light of the results obtained in both the field and quantitative studies.

The results of the main study support the suggestion that attuning community members to environmental impact affordances of relevant objects would help them to use these objects more sustainably, at least for water resources. It is difficult, however, to draw conclusions regarding the provision of effectivity information given that (as outlined earlier in this chapter) this variable was not completely separable from the attunement label variable.

The current intervention study was also not able to investigate the effect of attuning community members to suitable non-environmental affordances that may promote ESB. It was practically impossible in the current research context to change such factors as the pricing of water and energy resources, and financially impossible to offer financial incentives to residents to encourage conservation. Had a much larger sample size of households been available, the study *could*, however, have compared

the effect of attuning residents to *economic* affordances of energy and water consuming appliances around their home with that of attuning them to environmental-impact affordances. This may represent a potential angle for future research.

It appears that attempts to utilize the influence of the social environment to promote ESB may require a more truly 'social' approach than the socially comparative feedback that was used in the current study. Indeed, it may prove futile to attempt to create contrived 'social influence' processes and may be more fruitful to attempt to take advantage of more naturally occurring social influence process such as the observeability of certain behaviors, such as recycling. Alternatively, it may be useful to concentrate on ways of influencing the 'real' social environment so as to make it more conducive to promoting ESB. For example, as discussed in chapter 5, the Western Australian government has managed over the past 12 months to alter the social environment in which water consumption behaviour takes place in the city of Perth. Through a combination of mass media advertising and the imposition of watering restrictions, the Water Corporation has been able to create a social environment in which water resources have become a frequent topic of conversation amongst the public. Residents have even begun to report neighbours who are violating restrictions to the Water Corporation via a special hotline! Of course, as was discussed in chapter 6, the current rise in importance of water resources as an issue in Perth society could be argued to represent what Ungar (1992) has described as a 'social scare', akin to the Greenhouse Summer of 1988. Therefore, whether or not the

social environment that has been created in Perth in the past 12 months would be achievable or maintainable once the water issue inevitably loses its current ‘celebrity status’ (Ungar) is a further issue of interest.

The final principle outlined in chapter 3 concerned decreasing the likelihood of inhibitory affordances being perceived. The current research was not able to change the presence of inhibitory affordances for obvious practical and financial reasons. The current research also did not necessarily try to reframe these negative affordances in more positive ways. For example, the intervention did not directly focus on helping residents come to terms with the potential for their garden to suffer from less watering, or with coping with having shorter showers. However, in light of the findings in the qualitative study (regarding the ways in which people utilise various linguistic devices in their talk to locate ESB outside the realm of their own individual responsibility) it may be useful to think of ‘inhibitory affordances’ as not only being things that people can ‘perceive’ in their environment, but also as things that people can refer to legitimate their behaviours. This reference to inhibitory affordances in talk can be viewed as performing a social action. This notion has some important implications for the development of environmental public policy in terms of the ways in which economic and structural influences on ESB are analysed and investigated. As alluded to in chapter 2 (when discussing limitations of rational-economic models of ESB) a danger exists whereby policy makers may treat the pricing of resources and new efficient technologies as the ‘independent variable’ when attempting to influence ESB. The logic to this is understandable if one conceptualises ‘barriers’ in a

traditional way. After all, if economic cost represents a barrier then it makes sense to simply remove that barrier. However, as was discussed in relation to the Harman et al. (1991) study of barriers to renewable energy in Western Australia in chapter 2, ‘price’ and ‘cost’ should not necessarily be thought of only as variables that can be represented in dollars and cents. Rather, they should be thought of as *representations* that exist in the community concerning the expenses associated with engaging in certain ESBs (such as the purchase of more efficient technology). As was demonstrated in the analysis of the interviews in chapter 6, it may matter less in some instances whether an activity *is* expensive *per se*, but more whether members of a community are able to legitimise and account for not performing the particular behaviour by employing a linguistic device such as “I would do it, but it is just too expensive”.³⁵ After all, at the same time that cost is often being employed as a reason for *not* purchasing more efficient technology it is often failing to be recognised as a reason to engage in other ESBs, such as catching public transport to work for a couple of dollars instead of paying up to tens of dollars per day to park in the city.

The same argument may also be made for structural/convenience affordances. For example, it would not matter *how* frequent and reliable a city’s public transport system is as long as members of the community still have a “Buses are just too slow and unreliable” linguistic device at their disposal. The implication for public policy is that intervention strategies to promote ESB need to consider these linguistic devices *as* barriers which exist in the society in which the behaviours take place (or do not

³⁵ This point obviously holds more weight the higher *up* the socio-economic ladder the people involved reside.

take place, as the case may be). Therefore, those working in the field need to develop strategies that attempt to create a social environment in which such linguistic devices are *not* at the disposal of individuals. This may be one area in which mass media advertising (if used strategically) may be of great utility. Well-designed advertisements that are informed by extensive qualitative research into linguistic devices that exist in a community to create 'barriers' to ESB may be ideal to perform this task.

Epistemological Relativism for Applied Social Psychology

This research can be seen as an example of the advantages of utilising a variety of methods and theoretical orientations within the one research context. In a field such as social psychology there seems to be a perpetual succession of arguments regarding theoretical perspectives and the various methodological preferences that are associated with each perspective. Social cognition researchers advocate an individualistic orientation and the use of highly experimental and lab-based methodologies, self-categorisation and social identity theorists adhere to a focus on inter-group perspectives, whereas those coming from a social representations or discursive angle argue (often vehemently) for the merits of more post-modernist, qualitative methods. One notable aspect of these arguments is the extent to which combatants in such debates often seem fixed on a goal of constructing the final 'knock-down' point that will demonstrate, once and for all, the superiority of their particular theoretical and methodological perspective over all others. Such a goal draws attention away from the far more important concerns which researchers in

social psychology, and the social sciences in general, should be concerned with, such as attempting to make societies more enjoyable places for all members of that society to live in. This has never been more apparent than in the area of promoting environmentally sustainability, a point perhaps best made by Winter (2000):

Although the 100-year history of psychology is saturated with vigorous debates about the relative merits of various theoretical perspectives, the enormity of our environmental problems requires a diversity of approaches. Whether psychologists begin by focusing on feelings (from a depth perspective), behaviours (from a behavioural perspective), norms and attitudes (from a social perspective), or perceptions and thoughts (from a cognitive perspective) is less important than that *we begin and begin soon*. The future of psychology (and of most everything else that we care about) may well depend on it. (p. 521, emphasis in original)

In the program of research outlined in this thesis, it is evident how different theoretical perspectives and methodologies can be used in conjunction with one another to pursue a goal of producing knowledge that is useful for helping to understand and, ultimately, solve real-life social issues. It is also evident that the qualitative and quantitative methods employed can be seen to have *complemented* each other in a way that has made the end result preferable to that which may have been achieved by only using one or the other. Each approach obviously has its own weaknesses; however aspects of the research question that one method may have struggled to address were often found to be more amenable to analysis using the other. It has also been demonstrated how the results of field experiments conducted with quantitative methods were able to ‘feed into’ an interview study using qualitative methods. That is, the field experiment may have shown that it was easier to produce conservation behaviours for water use than it was for energy, however

they were not able to suggest why this may have been the case. The qualitative study allowed for a deeper analysis of the ways in which residents may construct water and energy resources and the potential differences in these constructions. The results of this study have then, in turn, highlighted important directions that future quantitative studies may wish to explore in a way which would allow more generalization than small-sample interview studies and would thus be more attractive to those working in public policy.

With the increasing recognition of a need for inter-*disciplinary* approaches to investigate environmental problems (e.g., Stern, 2000) it would seem important that psychologists are at least able to work across the *sub-disciplinary* boundaries that exist within psychology when approaching this issue, and *certainly* should endeavour to work across the various “competing” theoretical perspectives *within* the sub-discipline of *social* psychology. To my mind, a central requirement of such a commitment is the ability to take a relativist approach to both theory and methodology.

Concluding Remarks

For myself, the ultimate goal of a social psychologist should be to conduct research that helps us understand how to make the world a better place. In the case of research into environmental sustainability, this goal can be extended to include helping us to understand how to ensure that the world remains a place that humans can *inhabit*. How to achieve this goal is, at present, something of a puzzle. This thesis has

attempted to add but one, small piece to our understanding of this problem. However, it is my hope that over the coming decades more researchers in social psychology, and psychology in general, will take an interest in environmental issues. I would hope that, together with colleagues in the other social sciences and those from the natural sciences, solutions to the world's environmental problems may be developed before it is too late.

REFERENCES

- Aitkin, C., McMahon, T., Wearing, A., & Finlayson, B. (1994). Residential water use: Predicting and reducing consumption. *Journal of Applied Social Psychology, 24*, 136-158.
- Ajzen, I. (1989). Attitude structure and behavior. In A. Pratkanis, S. Breckler & A.G. Greenwald (Eds.), *Attitude structure and function* (pp. 241-74). Hillsdale, NJ: Erlbaum.
- Ajzen, I., & Fishbein, M. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice Hall.
- Altman, I., & Rogoff, B. (1987). World views in psychology: Trait, interactional, organismic and transactional perspectives. In D. Stokols & I. Altman (Eds.), *Handbook of environmental psychology* (vol. 1, pp. 7-40). Toronto: John Wiley & Sons.
- Archer, D., Pettigrew, T., Costanzo, M., Iritani, B., Walker, I., & White, L. (1987). Energy conservation and public policy: The mediation of individual behavior. In W. Kempton & M. Neiman (Eds.), *Energy efficiency: Perspectives on individual behavior* (pp. 69-92). Washington: American Council for an Energy Efficient Economy.
- Aronson, E., & Gonzales, M. H. (1990). Alternative social influence processes applied to energy conservation. In J. Edwards, R.S. Tindale, L. Heath & E. J. Posavol (Eds.), *Social Influence: Processes and prevention* (pp. 301-325). New York: Plenum.

- Aronson, E., & O'Leary, M. (1983). The relative effectiveness of models and prompts on energy conservation: A field experiment in a shower room. *Journal of Environmental Systems*, 12, 219-224.
- Augoustinos, M. (2001). Social categorization: Towards theoretical integration. In K. Deaux & G. Philogene (Eds.) *Representations of the social: Bridging theoretical traditions* (pp. 201-216). Oxford: Blackwell Publishers..
- Augoustinos, M., & Walker, I. (1995). *Social cognition: An integrated introduction*. London: Sage.
- Bandura, A. (1969). *Principles of behavior modification*. New York: Holt, Rinehart & Winston.
- Barker, J. (1968). *Ecological psychology: Concepts and methods for studying the environment of human behavior*. Stanford: Stanford University Press.
- Baron, R., & Misovich, S. (1993). An integration of Gibsonian and Vygotskian perspectives on changing attitudes in group contexts. *British Journal of Social Psychology*, 32, 53-70.
- Becker, L., & Seligman, C. (1981). Welcome to the energy crisis. *Journal of Social Issues*, 37 (2), 1-8.
- Billig, M. (1987). *Arguing and Thinking: A rhetorical approach to social psychology*. Cambridge: Cambridge University Press.
- Brog, W., & John, G. (2001). *Individualized marketing: The Perth success story*. Paper presented at the Conference on Marketing Public Transport: Challenges, opportunities and success stories, Auckland, New Zealand, 3rd August, 2001. (available in text at www.dpi.wa.gov.au/travelsmart/techpub.html)

- Burgess, M., Limb, M., & Harrison, C. (1988). Exploring environmental values through the medium of small groups: 1. Theory and practice. *Environment and Planning A*, 20, 309-326.
- Burn, S. (1991). Social psychology and the stimulation of recycling behaviors: The block leader approach. *Journal of Applied Social Psychology*, 21, 611-629.
- Carbaugh, D. (2001). 'The mountain' and 'the project': Dueling depictions of a natural environment. . In A. Fill & P. Mühlhäusler (Eds.), *The ecolinguistics reader : Language, ecology and environment*. (pp. 124-141). London: Continuum.
- Castro, P., & Lima, M. (2001). Old and new ideas about the environment and science: an exploratory study. *Environment and Behavior*, 33, 400-423.
- Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology*, 58, 1015-1026.
- Cook, S., & Berrenburg, J. (1981). Approaches to encouraging conservation behavior: A review and conceptual framework. *Journal of Social Issues*, 37, 73-107.
- Costanzo, M., Archer, D., Aronson, E., & Pettigrew, T. (1986). Energy conservation: The difficult path from information to action. *American Psychologist*, 41, 521-528.
- Coupland, N., & Coupland, J. (1997). Bodies, beaches and burntimes: Environmentalism and its discursive competitors. *Discourse and Society*, 8, 7-25.

- Darley, J. M., & Beniger, J. R. (1981). Diffusion of energy-conserving innovations. *Journal of Social Issues, 37*, 150-171.
- Delprata, D. (1977). Prompting electrical energy conservation in commercial users. *Environment and Behavior, 9*, 433-440.
- Dunlap, R., & van Liere, K. (1978). The New Environmental Paradigm: A proposed measuring instrument and preliminary results. *Journal of Environmental Education, 9*, 10-19.
- Dunlap, R., Van Liere, K., Mertig, A., & Jones, R. (2000). Measuring endorsement of the New Ecological Paradigm: A revised NEP scale. *Journal of Social Issues, 56*, 425-442.
- Dwyer, W., Leeming, F., Cobern, M., Porter, B., & Jackson, J. (1993). Critical review of behavioral interventions to preserve the environment: Research since 1980. *Environment and Behavior, 25*, 275-321.
- Edwards, D., & Potter, J. (1992). *Discursive Psychology*. London: Sage.
- Edwards, D., & Potter, J. (1993). Language and causation: A discursive action model of description and attribution. *Psychological Review, 100*, 23-41.
- Ester, P., & Winnett, R. (1982). Toward more effective antecedent strategies for environmental programs. *Journal of Environmental Systems, 11*, 201-221.
- Fazio, R., & Williams, C. (1986). Attitude accessibility as a moderator of the attitude-perception and attitude-behavior relations: An investigation of the 1984 presidential election. *Journal of Personality and Social Psychology, 14*, 398-408.

- Feldmen, S. (1987). Why is it so hard to sell 'savings' as a reason for energy conservation? In W. Kempton & M. Neiman (Eds.), *Energy efficiency: Perspectives on individual behavior*. (pp. 27-40). Washington: American Council for an Energy Efficient Economy.
- Flannery, T. (1995) *The future eaters : An ecological history of the Australasian lands and people*. Melbourne: Reed Books.
- Foddy, M., Smithson, M., Schneider, S., & Hogg, M (Eds.). (1999). *Resolving social dilemmas: Dynamic, structural, and inter-group aspects*. Philadelphia: Psychology Press.
- Gamson, W., & Modigliani, A. (1989). Media discourse and public opinion on nuclear power: A constructionist approach. *American Journal of Sociology*, 95, 1-37.
- Geller, S. (1981). Evaluating energy conservation programs: Is verbal report enough? *Journal of Consumer Research*, 8, 331-335.
- Geller, S. (1992). It takes more than information to save energy. *American Psychologist*, 47, 814-815.
- Gibson, J. (1979). *The ecological approach to visual perception*. Boston: Houghton Mifflin.
- Gonzales, M., Aronson, E., & Costanzo, M. (1988). Using social cognition and persuasion to promote energy conservation: A quasi-experiment. *Journal of Applied Social Psychology*, 18, 1049-1066.
- Hamilton, L. (1985). Self-reported and actual savings in a water conservation campaign. *Environment and Behavior*, 17, 315-326.

- Hardin, G. (1968). The tragedy of the commons. *Science*, *162*, 1243-1248.
- Harman, F., Stocker, L., Walker, I., & Stirling, M. (1991). *Barriers to the use of renewable energy in Western Australia*. Perth: Murdoch University.
- Harré, R., Brockmeier, J., & Mühlhäusler, P. (1999). *Greenspeak: A study of environmental discourse*. Thousand Oaks, CA, US: Sage Publications, Inc.
- Hayes, S., & Cone, J. (1981). Reduction of residential consumption of electricity through simple monthly feedback. *Journal of Applied Behavioral Analysis*, *14*, 81-88.
- Hine, D., & Gifford, R. (1996). Attributions about self and others in commons dilemmas. *European Journal of Social Psychology*, *26*, 429-445.
- Hines, J., Hungerford, H., & Tomera, A. (1986/87) Analysis and synthesis of research on responsible environmental behavior: A meta-analysis. *Journal of Environmental Education*, *18*, 1-8.
- Hirst, E., Berry, L., & Soderstrom, J. (1981). Review of utility home energy audit programs. *Energy*, *6*, 621-630.
- Hopper, J. R., & Nielsen, J. M. (1991). Recycling as altruistic behavior: Normative and behavioral strategies to expand participation in a community recycling program. *Environment and Behavior*, *23*, 195-220.
- Hormuth, S. (1999). Social meaning and social context of environmentally-relevant behavior: Shopping, wrapping and disposing. *Journal of Environmental Psychology*, *19*, 277-286.
- Horwitz, W. (2000). Environmental dilemmas: The resolutions of student activists. *Ethics and Behaviour*, *10*, 281-308.

- Howard, G. (2000). Adapting human lifestyles for the 21st Century. *American Psychologist*, 55, 509-515.
- Howe, D., Kahn, P. & Friedman, B. (1996). Along the Rio Negro: Brazilian children's environmental views and values. *Developmental Psychology*, 32, 979-987.
- Hungerford, H., & Volk, T. (1990). Changing learner behavior through environmental education. *Journal of Environmental Education*, 21, 8-21.
- Jacobs, H., Bailey, J., & Crews, J. (1984). Development and analysis of a community-based resource recovery program. *Journal of Applied Behavior Analysis*, 17, 127-145.
- Joffe, H. (1996). The shock of the new: A psycho-dynamic extension of social representational theory. *Journal for the Theory of Social Behaviour*, 26, 195-219.
- Kahn, P., & Friedman, B. (1995). On nature and environmental education: Black parents speak from the inner city. *Environmental Education Research*, 4, 25-39.
- Kahn, P., & Lourenco, O. (2002). Water, air, fire and earth: A developmental study in Portugal of environmental moral reasoning. *Environment and Behavior*, 34, 405-430.
- Kaiser, F., Wolfing, S., & Fuhrer, U. (1999). Environmental attitude and ecological behavior. *Journal of Environmental Psychology*, 19, 1-19.
- Kelman, H. (1974). Further thoughts on the processes of compliance, identification, and internalization. In J.T. Tedeschi (Ed.), *Perspectives on social power* (pp. 125-171). Chicago: Aldine.

- Komorita, S., & Parks, C. (1994). *Social dilemmas*. Dubuque: Wm. C. Brown Communications, Inc.
- Kruger, C., & Summers, M. (2000). Developing primary school children's understanding of energy waste. *Research in Science and Technology Education, 18*, 5-21.
- Kurz, T. (2002). The psychology of environmentally sustainable behavior: Fitting together pieces of the puzzle. *Analysis of Social Issues and Public Policy, 2*, 257-278.
- LeCouter, A., & Augoustinos, M. (2001). The language of prejudice and racism. In M. Augoustinos & K. Reynolds (Eds.), *Understanding prejudice, racism, and social conflict*. (pp. 215-230). London: Sage.
- Lewin, K. (1959). *Field Theory in Social Science*. New York: Harper and Brothers.
- Leung, C., & Rice, J. (2002). Comparison of Chinese-Australian and Anglo-Australian environmental attitudes and behavior. *Social Behavior and Personality, 30*, 251-262.
- Liebrand, W., Messick, D., & Wilke, H. (1992). *Social dilemmas: Theoretical issues and research findings*. Oxford: Pergamon Press Ltd.
- Luyben, P. D. (1984). Drop and tilt: A comparison of two procedures to increase the use of venetian blinds to conserve energy. *Journal of Community Psychology, 12*, 149-154.
- Marjoribanks, K., & Jordan, D. (1986). Stereotyping among Aboriginal and Anglo-Australians. *Journal of Cross Cultural Psychology, 17*, 17-28.

- McClelland, L., & Cook, S. W. (1980). Promoting energy conservation in master-metered apartments through group financial incentives. *Journal of Applied Social Psychology, 10*, 20-31.
- McKenzie-Mohr, D. (2000). Promoting sustainable behavior: An introduction to community-based marketing. *Journal of Social Issues, 56*, 543-554.
- McKenzie-Mohr, D. (2002). The next revolution: Sustainability. In P. Schmuck & W. Schultz (Eds.). *Psychology of sustainable development* (pp. 19-36). Norwell: Kluwer Academic.
- McKenzie-Mohr, D., & Smith, W. (1999). *Fostering sustainable behaviour: an introduction to community-based social marketing*. Gabriola Island: New Society Publishers.
- Midden, C. J., & Ritsema, B. S. (1983). The meaning of normative processes for energy conservation. *Journal of Economic Psychology, 4*, 37-55.
- Moscovici, S. (1984). The phenomenon of social representations. In R. Farr & S. Moscovici (Eds.), *Social representations*.(pp. 3-69). Cambridge: Cambridge University Press.
- Moscovici, S. (1985). Comment on Potter and Litton. *British Journal of Social Psychology, 24*, 91-92.
- Moscovici, S. (1988). Notes towards a description of social representations. *European Journal of Social Psychology, 18*, 211-250.
- Mosler, H. (1993). Self-dissemination of environmentally-responsible behavior: The influence of trust in a commons game. *Journal of Environmental Psychology, 13*, 111-123.

- Neuburger, H. (1992). Energy use in an era of rapidly changing oil price - how OPEC did not save the world from the greenhouse effect. *Environment and Planning A*, 24, 1039-1050.
- Oravec, C. (1984). Conservationism vs. Preservationism: The public interest in the Hetch-Hetchy controversy. *Quarterly Journal of Speech*, 70, 245-258.
- Oskamp, S. (1995). Applying social psychology to avoid ecological disaster. *Journal of Social Issues*, 51, 217-238.
- Oskamp, S. (2000). A sustainable future for humanity? How can psychology help? *American Psychologist*, 55, 496-508.
- Oskamp, S., & Shultz, P. (1998) *Applied social psychology*. Upper Saddle River: Prentice Hall.
- Ostrom, E. (1993). Analyzing the performance of alternative institutional arrangements for sustaining rural infrastructure in developing countries. *Journal of Public Administration Research and Theory*, 3, 11-45.
- Pallak, M., & Cummings, W. (1976). Commitment and voluntary energy conservation. *Personality and Social Psychology Bulletin*, 2, 27-31.
- Pallak, M., Cook, S., & Sullivan, J. (1980). Commitment and energy conservation. In L. Bickman (Ed.), *Applied social psychology annual (vol.1, pp. 235-253)*. Beverly Hills: Sage.
- Pedersen, A., Griffiths, B., Contos, N., Bishop, B., & Walker, I. (2000). Attitudes toward Aboriginal Australians in city and country settings. *Australian Psychologist*, 35, 109-117.

- Penman, R. (2001). Environmental Matters and Communication Challenges. In A. Fill & P. Mühlhäusler (Eds.), *The ecolinguistics reader : Language, ecology and environment*. (pp. 143-153). London: Continuum.
- Platt, J. (1973). Social traps. *American Psychologist*, 28, 641-651.
- Potter, J. (1996). Attitudes, social representations and discursive psychology. In M. Wetherell (Ed.), *Identities, groups and social issues* (pp.119-174). London: Sage Publications.
- Potter, J., & Wetherell, M. (1987). *Discourse and social psychology: Beyond attitudes and behaviour*. London: Sage.
- Pratsch, L. (1975). *Carpool and buspool matching guide*. (4th Edition). Washington D.C.: U.S. Department of Transportation.
- Rose, H., & Hinds, D. (1976). South Dixie Highway contraflow bus and car-pool lane demonstration project. *Transportation Research Record*, 606, 18-22.
- Samuelson, C. (1990). Energy conservation: A social dilemma approach. *Social Behavior*, 5, 207-230.
- Scott, D., & Willits, F. (1994). Environmental attitudes and behavior: A Pennsylvania survey. *Environment and Behavior*, 26, 239-260.
- Seaver, W., & Patterson, A. (1976). Decreasing fuel-oil consumption through feedback and social commendation. *Journal of Applied Behaviour Analysis*, 9, 147-152.
- Seligman, C. (1986). Energy consumption, attitudes, and behavior. In M. Saks & L. Saxe (Eds.), *Advances in applied social psychology* (pp. 153-180). Hillsdale: Erlbaum.

- Seligman, C., Darley, J., & Becker, L. (1978) Behavioral approaches to residential energy conservation. *Energy and Buildings, 1*, 325-337.
- Seligman, C., & Finegan, J. (1990). A two-factor model of energy and water conservation. In R. S. Tindale, L. Heath, & E. Posavc (Eds.), *Social influence processes and prevention* (pp. 279-299). New York: Plenum Press.
- Seligman, C., Kriss, M., Darley, J., Fazio, R., Becker, L., & Pryst, J. (1979). Predicting summer energy consumption from homeowners attitudes. *Journal of Applied Social Psychology, 9*, 70-90.
- Siero, F., Bakker, A., Dekker, G., & Van Den Burg, M. (1996). Changing organizational energy consumption behaviour through comparative feedback. *Journal of Environmental Psychology, 16*, 235-246.
- Stern, P. (1992). Psychological dimensions of global environmental change. *Annual Review of Psychology, 43*, 269-302
- Stern, P. (2000). Psychology and the science of human-environment interactions. *American Psychologist, 55*, 523-530.
- Syme, G., & Seligman, C. (1987). The planning and evaluation of public information campaigns to encourage water conservation. In *Proceedings of the national workshop on urban demand management* (pp. 608-658). Canberra: Australian Water Resources Council.
- Tanner, C. (1999). Constraints on environmental behavior. *Journal of Environmental Psychology, 19*, 145-157.

- Thompson, S., & Stoutemyer, K. (1991). Water use as a commons dilemma: The effects of education that focuses on long-term consequences and individual action. *Environment and Behavior, 23*, 314-333.
- Ungar, S. (1992). The rise and (relative) decline of global warming as a social problem. *The Sociological Quarterly, 33*, 483-501.
- Ungar, S. (1998). Recycling and the dampening of concern: Comparing the roles of large and small actors in shaping the environmental discourse. *Canadian Review of Sociology and Anthropology, 35*, 253-76.
- Van Vugt, M. (2001). Community identification moderating the impact of financial incentives in a natural social dilemma: Water conservation. *Personality and Social Psychology Bulletin, 27*, 1440-1449.
- Verplanken, B., Aarts, H., Knippenberg, A., & Moonen, A. (1998). Habit versus planned behavior: A field experiment. *British Journal of Social Psychology, 37*, 111-128.
- Vining, J., & Ebreo, A. (1992). Predicting recycling behavior from global and specific environmental attitudes and changes in recycling opportunities. *Journal of Applied Social Psychology, 22*, 1580-1607.
- Vogel, S. (1996). Farmers' environmental attitudes and behavior: A case study for Austria. *Environment and Behavior, 25*, 591-613.
- Wicker, A. (1969). Attitudes versus actions: The relationship of verbal and overt behavioral responses to attitude objects. *Journal of Social Issues, 25*, 41-78.
- Winnett, R. (1978). Prompting turning-out lights in unoccupied rooms. *Journal of Environmental Systems, 98*, 247-251.

Winnett, R., Neale, M., & Grier, H. (1979). The effects of self-monitoring and feedback on residential electricity consumption: Winter. *Journal of Applied Behavioral Analysis, 9*, 315-322.

Winter, D. (2000). Some big ideas for some big problems. *American Psychologist, 55*, 516-522.