

# Spatial and Temporal Biases in Assessments of Environmental Conditions in New Zealand

Taciano L. Milfont, *Victoria University of Wellington*

Wokje Abrahamse, *University of Otago*

Norma McCarthy, *Victoria University of Wellington*

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This article reports two studies conducted in New Zealand, replicating and expanding Gifford et al.'s (2009) recent research on spatial optimism ("things are better here than there") and temporal pessimism ("things will get worse") in the assessment of environmental conditions. The present research goes beyond the original study by using a national sample and by examining whether assessments of climate change differ from those for other environmental conditions (Study 1), and also by examining whether two individual difference variables, dispositional optimism and consideration of future consequences, are related to the biases (Study 2). Overall, the results of both studies indicate that comparative optimism and temporal pessimism exist in New Zealand, which suggests generalizability of these cognitive biases. Respondents tend to believe that "things are better in New Zealand than elsewhere" and that "things are better now than they will be in the future". The findings were similar for climate change assessments and were independent of individual differences in optimism and consideration of future consequences, which seems to suggest that they are relatively pervasive. Construal Level Theory is discussed as a theoretical framework to understand and integrate cognitive biases related to the assessment of environmental conditions.

In recent years, awareness about environmental problems such as climate change, loss of biodiversity and sea level rise has grown considerably. In the scientific community, it is now widely recognised that human behaviour has a substantial impact on these global environmental changes. Various trends are linked to human activity, such as the increase in carbon dioxide emissions, the extinction of certain animal species, and desertification of land areas (IPCC, 2007). For New Zealand, some of the likely impacts of climate change include higher temperatures, rising sea levels, more frequent extreme weather events, such as droughts and floods, and increased rainfall (Ministry for the Environment, 2010). Given that many of New Zealand's urban areas and infrastructure are located in coastal areas,

changing environmental conditions can have important ramifications for its inhabitants.

Despite the evidence pointing to the importance of human influences on global environmental changes, some uncertainty still exists as to the exact nature and extent of changes in environmental conditions. Situations characterised by a particular degree of uncertainty may be more readily susceptible to misperceptions, or cognitive biases. Cognitive biases tend to influence individuals' judgments and decision-making (Haselton et al., 2009), which interferes with individuals' ability to be impartial or objective. For instance, recognition bias occurs when people base their choice between two alternatives on their level of familiarity with these alternatives (e.g., which city is larger), and hindsight bias

occurs when people believe that an event (e.g., a patient's death) is more likely to happen when they assess the probability after the event than when they assess the probability beforehand (for more examples, see Haselton et al., 2009). It has been argued that unrealistic perceptions of environmental conditions may be a barrier for people to change their behaviour in a pro-environmental direction (Gifford et al., 2009; Hatfield & Job, 2001; Pahl, Harris, Todd, & Rutter, 1995). That is, if people believe environmental risks are more likely to happen elsewhere and to other people, they may be less willing to behave in an environmentally friendly way.

A recent cross-national study found that biases in people's perception of environmental conditions do exist, and that they exist for inhabitants of a number of countries (Gifford et al., 2009). The present paper builds on from this recent international study to further explore the nature of optimism biases in relation to environmental conditions by (i) examining whether these biases also exist in New Zealand (a country not included in the original study), (ii) including a specific climate change question to assess whether these biases are also relevant for this particular environmental problem, and (iii) including optimism and future orientation measures to assess whether individual difference variables affect these biases.

## Optimism biases

The concept of optimism concerns people's expectations for the future

(Carver, Scheier & Segerstrom, 2010). An optimism bias refers to the belief that, compared to other people, one is more likely to experience positive events and less likely to experience negative events (Harris, 1996). For instance, people generally believe that the chances of having a heart attack or being involved in a car accident are higher for other people than they are for themselves (Weinstein, 1980). Some studies have found that such optimism biases (also referred to as comparative optimism) may apply to environmental risk perception as well. To illustrate, Pahl, Harris, Todd, and Rutter (2005) found that people displayed comparative optimism for a range of environmental risks. Respondents in their study thought that risks like earthquakes, acid rain, and air pollution were more likely to happen to other people than to themselves. Similarly, a study by Hatfield and Job (2001) found that students believed that their own area was less likely to be affected by environmental problems than the local area of their "average" peers.

One specific type of optimism bias is referred to as a spatial bias. Spatial biases occur when people view geographical areas closer to themselves in a more favourable light than similar but more distant areas ("things are better here than there"). Several studies indicate that such spatial biases occur across different cultures (e.g., Dunlap, Gallup, & Gallup, 1993; Uzzell, 2000). In their study with respondents from 18 different countries, Gifford and colleagues (2009) found that assessments of environmental conditions generally decreased as spatial distance increased (my area, my country, globally). (However, it should be noted that this was not the case for respondents from India, Russia and Romania, highlighting that a spatial bias was not common to all countries included in that study.)

A similar study has shown that spatial bias is not only related to geographical distance but also to social distance (Fleury-Bahi, 2008). Social distance does not assume a geographical element, but refers to how different two people are from each other (e.g., in terms of culture, personality, social economic status, etc.). People view others closer to themselves (in-group) in a more

favourable light than others that are more distant (out-group; "we are better than they are"). Specifically, Fleury-Bahi (2008) examined risk perceptions for three types of environmental hazards, namely technological and chemical (e.g., air pollution), climate change, and loss of biodiversity on four different social distances: oneself, inhabitants of the town, inhabitants of the country, and humanity. The results indicate that technological and chemical hazards were associated with greater risk than climate change and loss of biodiversity. More importantly, risk perceptions were higher overall as social distance increased, that is, environmental risks were perceived highest for humanity.

Another form of optimism bias is referred to as a temporal bias, which occurs when people believe environmental risks are more likely to happen in the distant future than in the near future. In other words, present environmental conditions are viewed in a more favourable light than future environmental conditions ("things will get worse"). The aforementioned study by Gifford et al. (2009) indeed found such a temporal bias to exist for respondents from most countries. Respondents tended to rate future environmental conditions as more negative than current environmental conditions. These spatial and temporal biases have practical implications because the more people believe consequences of environmental problems are far away geographically and temporally, the less likely they would be willing to take action here and now (cf. Rabinovich, Morton, Postmes, & Verplanken, 2009).

It has been suggested that various factors may be associated with these biases. For instance, levels of controllability may be related to optimism bias (Fleury-Bahi, 1998; Harris, 1996). Supporting this view, the aforementioned study by Pahl and colleagues (2005) found that people did not display optimism bias when they were asked to make risk assessments in the case of a hypothetical accident. These results suggest that optimism bias may be more pronounced in the assessment of situations in which people experience or perceive higher levels of controllability over the situation.

To date, relatively few studies have

looked into other variables that may affect spatial and temporal optimism. In Study 2, we examine the role of individual difference variables that may account for differences in perceptions of environmental conditions. One relevant variable in relation to spatial and temporal biases is dispositional optimism. People differ in their level of optimism: optimists generally expect positive outcomes, while pessimists expect bad outcomes. A number of studies have found differences between optimists and pessimists in their perceptions of situations as well as their behaviour, such as engagement in actions to cope with health risks (Scheier, Carver, & Bridges, 2001). In terms of environmental risks, it may well be that when making judgements about the state of the environment, some people may have an optimistic view while some may have a pessimistic outlook from the outset. The current research examines whether individual differences in optimism can account for optimism biases.

A second variable included here is people's consideration of future consequences. Consideration of future consequences is an individual difference variable that distinguishes between people who consider the long-term impact of their behavioural choices and people who prefer to think more about the immediate consequences of their actions (Lindsay & Strathman, 1997). Consideration of future consequences may be a relevant variable to include in relation to optimism biases as it concerns differences in the extent to which individuals are influenced by immediate versus distant consequences of their behaviour (Strathman, Gleicher, Boninger, & Edwards, 1994). Consideration of future consequences has been found to influence a variety of behaviours, including health-related behaviours such as decisions to be tested for the HIV virus (Dorr, Krueckeberg, Strathman, & Wood, 1999) and environmentally friendly behaviours such as recycling (Lindsay & Strathman, 1997). Indeed, future time orientations have been shown to influence individuals' concerns about environmental issues (e.g., Corral-Verdugo, Fraijo-Sing & Pinheiro, 2006; Joireman, Van Lange & Van Vugt, 2004;

Milfont & Gouveia, 2006).

## The present two studies

The aim of the current paper is to replicate and expand on the study by Gifford et al. (2009) by examining whether optimism biases exist for New Zealand, a country not included in their study. Cross-cultural studies on environmental attitudes including New Zealand samples have found similarities across countries (e.g., Milfont & Duckitt, 2010; Milfont, Duckitt, & Wagner, 2010). Nevertheless, Gifford et al. (2009) showed cross-cultural variations in spatial bias, and argued that these differences could be a result of national identity. "Clean and green" and "100% pure" are examples of the way New Zealand markets itself to the international community, and the country is famous worldwide for this green image. The "clean and green" image is indeed ingrained in New Zealanders' view of the country, which may influence their assessment of environmental conditions. Thus, this paper reports two studies examining whether New Zealanders hold similar perceptions regarding the state of the environment compared with other countries.

In addition to this, the present research expands on the original study in three ways. First, Study 1 considered a national sample of New Zealanders while no national sample was included in the original study. Second, a specific question about climate change was included in Study 1 to examine whether it is evaluated differently than the other environmental conditions assessed in the original study. Although Gifford et al. (2009) included a question about greenhouse gases, having a specific climate change question will provide additional information about this pressing issue and the biases related to it. Considering how this topic has been covered in the media, the question arises whether participants assess the effects of climate change differently from the other environmental conditions. As a result of the media coverage it can be argued that 'climate change' is a more emotionally-charged label than 'greenhouse gases' and people may think differently about the terms (cf. Weber, 2006; Whitmarsh, 2009).

Research has also shown that people think about climate change in more global terms (e.g., Leiserowitz, 2007). Therefore, an investigation of whether or not spatial bias exists for climate change (an environmental impact with a possibly different geographical content) is worthwhile. One could expect that climate change assessments would be different from other environmental issues. However, if spatial and temporal biases are indeed as pervasive as previous findings tend to show, there should be no marked differences between climate change assessments and the assessment of other environmental conditions.

Finally, measures of optimism and consideration of future consequences were included in Study 2 to assess whether the biases are affected by these individual difference variables. Considering the important effects of individual differences in environmental assessments, one could expect that individual differences in optimism and consideration of future consequences could potentially influence spatial and temporal biases. However, if these biases are indeed pervasive, individual differences in optimism and consideration of future consequences would not be associated with spatial and temporal biases in the assessment of environmental conditions.

## Study 1

### Method

#### Participants

The sample for this study was derived from the final survey wave of a longitudinal study conducted by the first author. The aim of this broader project was to gather longitudinal information on several environmental issues from a national representative sample of New Zealanders. A total of 3,000 names were randomly selected from the 2007 New Zealand Electoral Roll held in hard copy at public libraries. The sample was split across 69 electorates and each sub-sample was proportional to the size of the electorate. Five addresses were invalid and 186 other surveys were returned undeliverable, resulting in a possible sample of 2,805 households. Participants were invited to fill out the survey and were contacted again six months and a year later. The samples

for the three waves were: Wave I (June 2008),  $N = 551$ ; Wave II (November 2008),  $N = 358$ , and Wave III (June 2009),  $N = 335$ . The present study used this final sample of 335 participants (226 females and 123 males; 6 did not report their sex). The age of participants ranged from 19 to 91 years of age ( $M = 53.49$ ,  $SD = 16.13$ ).

#### Instruments

The questionnaire included demographic questions to gather basic information about the participants, such as age and sex, plus the Environmental Futures Scale.

*Environmental Futures Scale.* This is a 20-item scale developed by Gifford et al. (2009) to measure spatial and temporal optimism. On a scale ranging from 1 (very bad) to 5 (very good), participants were asked to first rate the *current* conditions of 20 aspects of the environment: "the availability of fresh drinking water", "the state of rivers and lakes", "the degree of biodiversity", "the quality of air", "the state of urban parks and green space", "the state of forests and wilderness", "the environmental impact of vehicle traffic", "the effects of human population on the environment", "the effects of greenhouse gases", "the state of fisheries", "the aesthetic quality of the built environment", "the management of garbage", "the management of fibres or fumes from synthetic materials (e.g. asbestos, carpets and plastics)", "the management of radiation and nuclear waste", "the quality of soil for agricultural purposes", "the management of natural disasters", "visual pollution (e.g. billboards, ugly buildings, litter)", "the effect of pesticides and herbicides", "the management of acid rain", and "the management of noise". They were asked to rate the *current* conditions of these aspects of the environment for three spatial areas: 'My area', 'New Zealand' and 'globally'. Participants were then also asked to rate the *future* environmental conditions (in 25 years time) of the same 20 items on a scale ranging from -2 (much worse) to 2 (much better) for each of the three spatial levels. One item was added to this scale, asking participants to also rate the current and expected future "effects of climate change".

Table 1: Descriptive statistics for the EFS subscales and Optimism and Future Orientation scales.

Assessments of	Study 1 (N = 335)				Study 2 (N = 108)		
	N	Alpha ( $\alpha$ )	Mean	SD	Alpha ( $\alpha$ )	Mean	SD
Current environmental conditions							
At the local level	264	0.91	3.58	0.54	0.85	3.43	0.50
At the national level	273	0.91	3.46	0.53	0.81	2.78	0.44
At the global level	267	0.93	2.37	0.52	0.82	3.51	0.47
Expected future environmental change							
At the local level	268	0.91	-0.17	0.48	0.86	-0.26	0.46
At the national level	273	0.92	-0.20	0.53	0.86	-0.68	0.44
At the global level	273	0.95	-0.66	0.74	0.87	-0.58	0.59
Optimism	–	–	–	–	0.86	3.58	0.84
Future Orientation	–	–	–	–	0.81	3.42	0.52

Note. In Study 1 the sample size varied per variable due to missing values. Study 2 was an online study with no missing cases, hence the same sample size for all variables

### Procedure

The questionnaire package was posted with a consent form and covering letter which described the broader project and invited the named person or another member of the household of 16 years and over to participate in the study. Participation in the survey was voluntary. A freepost return envelope and an entry form for a draw to win \$100 worth of grocery vouchers were included to encourage participation.

### Results and Discussion

#### EFS internal consistency and descriptive statistics

Descriptive statistics and Cronbach's alphas for the six EFS subscales (i.e. three spatial areas combined with two temporal dimensions) are shown in Table 1. All subscales had high internal consistency, and the reliability of the full EFS was also high ( $\alpha = .97$ ,  $N = 241$ ). Means for local and national current environmental conditions were above the scale midpoint (3 = "acceptable") and the mean for global current environmental conditions was below the scale midpoint, and overall means tended to decline for increasingly distant spatial levels. Means for all expected future conditions were below the scale midpoint (0 = "no different") and ratings were increasingly pessimistic as spatial levels increased. These patterns of findings are similar to those observed by

Gifford and colleagues (2009).

#### Assessments of current environmental conditions

A one-way repeated-measures ANCOVA was performed to examine spatial optimism, with age and sex as covariates. Besides following the original study, the inclusion of age and sex as covariates is important because these variables have been shown to be associated with environmental engagement, with younger and female participants typically being more environmentally concerned than older and male participants (e.g., Fransson & Gärling, 1999; Van Liere & Dunlap, 1980). Partial eta-squared was used as an effect size index for the ANCOVA, where values of .01, .06, and .14 corresponded to small, medium, and large effects, respectively; and Cohen's  $d$  statistic (repeated measure) was used as an effect size when comparing means, where values of .20, .50, and higher than .80 corresponded to small, medium, and large effects, respectively (Cohen, 1988).

Results showed that assessment of current environmental conditions was significantly affected by spatial level,  $F(1.28, 308.56) = 40.92$ , Huynh-Feldt adjusted,  $p < .001$ ,  $\eta_p^2 = .15$ .<sup>1</sup> This indicates that participants evaluated the quality of proximal environmental conditions more positively than the environmental conditions of more

distant places. Planned contrasts were performed to compare the three spatial levels. Results indicate that assessments of local and national environmental conditions did not differ,  $F(1, 241) = 1.58$ ,  $p > .10$ ,  $d = .51$ . However, participants did assess current local and national environmental conditions significantly more positively than global environmental conditions,  $F(1, 241) = 42.19$ ,  $p < .001$ ,  $d = 2.98$  and  $F(1, 241) = 48.74$ ,  $p < .001$ ,  $d = 3.19$ , respectively. In line with Gifford et al.'s findings, the assessment of current environmental conditions declined for increasingly distant spatial levels.

#### Assessments of future change in environmental conditions

Following Gifford et al., one-sample  $t$ -tests were performed to determine whether assessments of environmental conditions changed from present to future. We examined whether the means of each of the three future change subscales differed significantly from zero, given that scores below zero indicate pessimism (much worse) and scores above zero indicate optimism (much better). The analyses reveal significant temporal pessimism at all spatial levels: local,  $t(267) = -5.90$ ,  $p <$

1. Mauchly's test indicated violation of the sphericity assumption, and the Greenhouse-Geisser correction (.63) was smaller than .75. However, considering that Gifford et al. reported values based on Huynh-Feldt correction and that the statistics were virtually identical for both corrections [i.e.,  $F(1.27, 305.14) = 40.92$ , Greenhouse-Geisser adjusted,  $p < .001$ ] we preferred to report the Huynh-Feldt adjusted values for all analyses.

.001,  $d = -.36$ , national,  $t(272) = -6.31$ ,  $p < .001$ ,  $d = -.38$ , and global,  $t(272) = -14.74$ ,  $p < .001$ ,  $d = -.89$ . This temporal pessimism indicates that participants assess environmental conditions to be better now than they will be in the future (in 25 years' time), and this assessment of future environmental change do not vary as a function of spatial level.

**Comparison between New Zealand and other countries**

New Zealand means were compared with the means obtained from the 18 countries in the original study. Table 2 presents the means and Figure 1 illustrates the trends. Regarding current assessments of environmental conditions, participants in this New Zealand sample scored among the highest on positive assessments of current local environmental conditions (just below Finland and Sweden), the second highest on positive assessments of current national conditions (just below Finland), and in the middle range on assessments of current global

conditions. Regarding expected future changes of environmental conditions, this New Zealand sample was one of the most optimistic about future local conditions (only behind Romania and Sweden), one of the most optimistic about future national conditions (behind Mexico, Romania and Sweden), and in a middle position about future global conditions.

Using the country-means provided in the original study, average means were created for each of the six EFS subscales. The average means for the six EFS subscales across the 18 countries were: current local conditions ( $M = 3.00$ ), current national conditions ( $M = 2.82$ ), current global conditions ( $M = 2.37$ ), future local conditions ( $M = -.29$ ), future national conditions ( $M = -.28$ ), and future global conditions ( $M = -.52$ ). One-sample t-tests were then performed to assess whether the means of this New Zealand sample differed significantly from the average scores from the other countries.

Participants' assessments of current local and national conditions were more positive than those from the cross-cultural average,  $t(263) = 17.39$ ,  $p < .001$ ,  $d = 1.07$  and  $t(272) = 20.13$ ,  $p < .001$ ,  $d = 1.22$ , respectively. Similarly, New Zealand participants were more optimistic about future local and national conditions than the cross-cultural average,  $t(267) = 4.00$ ,  $p < .001$ ,  $d = .24$  and  $t(272) = 2.43$ ,  $p < .05$ ,  $d = .15$ , respectively. However, this New Zealand sample was more pessimistic about future global conditions than the cross-cultural average ( $t(272) = -3.07$ ,  $p < .01$ ,  $d = .19$ ), and did not differ regarding current global conditions ( $t(266) = .00$ ,  $p > .10$ ,  $d = 0$ ).

**Is climate change perceived differently?**

To address the question of whether assessments of climate change are different from the assessments of the other environmental conditions, correlations were examined between the climate change item and a closely

Table 2. EFS subscale means for each country

Country	Mean Ratings					
	Local		National		Global	
	Current	Future	Current	Future	Current	Future
Australia	3.27	-.55	2.91	-.70	2.11	-1.00
Brazil	3.01	-.47	2.69	-.56	2.41	-.65
Canada	3.42	-.42	3.13	-.49	2.07	-.82
England	3.15	-.32	2.87	-.35	2.21	-.58
Finland	3.59	-.24	3.62	-.27	2.43	-.53
France	2.95	-.29	2.65	-.36	2.03	-.71
Germany	3.38	-.27	3.27	-.32	2.59	-.73
India	2.78	-.19	2.72	-.21	2.75	-.14
Italy	2.92	-.25	2.65	-.35	2.33	-.49
Japan	2.81	-.26	2.61	-.35	2.34	-.64
Mexico	2.55	-.50	2.26	.69	2.3	-.65
Netherlands	3.10	-.30	3.01	-.35	2.34	-.62
New Zealand (Study 1)	3.58	-.17	3.46	-.20	2.37	-.66
New Zealand (Study 2)	3.43	-.26	2.78	-.68	3.51	-.58
Portugal	2.82	-.18	2.68	-.23	2.5	-.28
Romania	2.66	.10	2.62	.12	2.96	.32
Russia	2.51	-.23	2.56	-.25	2.63	-.22
Spain	2.68	-.43	2.43	-.51	2.04	-.64
Sweden	3.58	-.12	3.45	-.15	2.38	-.34
United States	2.91	-.38	2.69	-.46	2.26	-.61

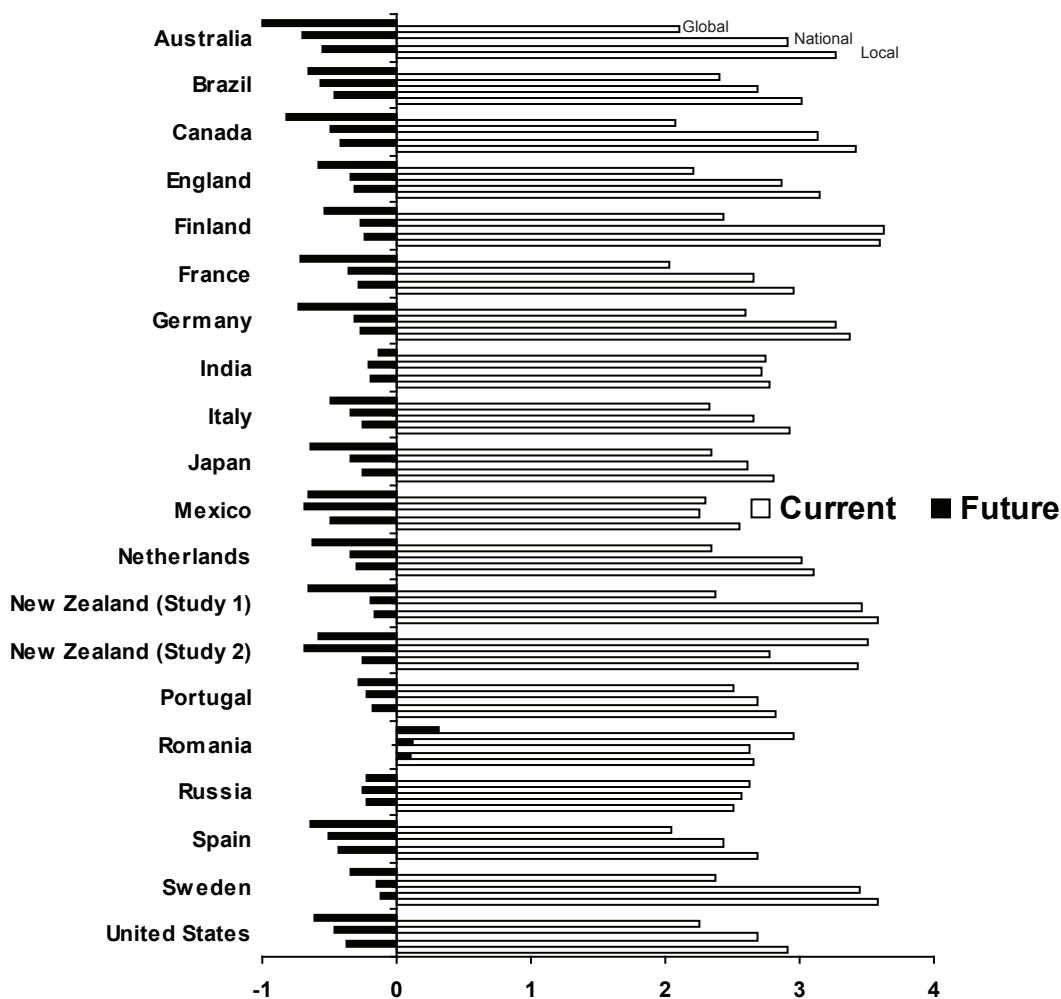
Note. Data were obtained from Gifford et al.'s (2009) study in Table 3.

Table 3. Correlations between assessment of the effects of climate change and other environmental conditions

Assessment of	Current effects of climate change			Expected future changes in the effects of climate change		
	Local (M = 3.30, SD = .86)	National (M = 3.19, SD = .86)	Global (M = 2.36, SD = .90)	Local (M = -.38, SD = .86)	National (M = -.39, SD = .92)	Global (M = -.74, SD = 1.08)
Current effects of greenhouse gases						
At the local level	.52***	.51***	.35***	.14**	.16**	.12*
At the national level	.46***	.53***	.43***	.13*	.16**	.12*
At the global level	.29***	.38***	.55***	.19**	.22***	.31***
Current effects of other 19 environmental conditions						
At the local level	.52***	.57***	.41***	.19**	.21**	.18**
At the national level	.54***	.58***	.42***	.19**	.21***	.18**
At the global level	.34***	.45***	.68***	.25***	.33***	.42***
Expected future change in the effects of greenhouse gases						
At the local level	.12*	.14**	.22***	.42***	.41***	.37***
At the national level	.10	.13*	.21***	.40***	.41***	.41***
At the global level	.01	.05	.20***	.37***	.40***	.51***
Expected future change in effects of other 19 environmental conditions						
At the local level	.01	.06	.33***	.45***	.52***	.68***
At the national level	.05	.08	.26***	.53***	.53***	.53***
At the global level	.01	.06	.33***	.45***	.52***	.68***

Figure 1.

Mean ratings of current environmental conditions and expected future change at the local, national, and global spatial levels for New Zealand and eighteen other countries



related item from the EFS (“the effects of greenhouse gases”), as well as with the scores of the other 19 environmental conditions (excluding the greenhouse gases item). The correlations are shown in Table 3, which also presents the descriptive statistics for the climate change item. As can be seen, assessments of current and future effects of climate change at the global level were significantly correlated to assessments of all other environmental conditions. In contrast, correlations between current assessments of climate change (both local and national) and expected future changes of the other environmental conditions were not significant. This seems to indicate that the way participants evaluate the current effect of climate change at the

local and national level differs from the assessment made at the global level.

To further examine the assessments of climate change, a one-way repeated-measures ANCOVA, with age and sex as covariates, was performed and indicated that assessments of current effects of climate change were significantly affected by the spatial level,  $F(1.45, 479.90) = 24.44$ , Huynh-Feldt adjusted,  $p < .001$ ,  $\eta_p^2 = .07$ . Contrasts indicated that participants assessed current local and national climate change conditions more positively than those at the global level,  $F(1, 330) = 5.65$ ,  $p < .05$ ,  $d = 1.50$  and  $F(1, 330) = 23.73$ ,  $p < .001$ ,  $d = 1.51$ , respectively. In contrast to the assessments of overall environmental conditions, assessments of the effects of climate change were significantly

different for the local and national levels,  $F(1, 330) = 30.23$ ,  $p < .001$ ,  $d = .37$ . This indicates that assessments of the effects of climate change are more negative as the spatial distance increases. One-sample t-tests examining temporal bias showed that participants expected the effects of climate change at the local, national and global levels to get worse in the future,  $t(337) = -8.12$ ,  $d = .44$ ,  $t(338) = -7.87$ ,  $d = -.43$  and  $t(333) = -12.54$ ,  $d = -.69$ , respectively,  $ps < .001$ . The same pessimistic assessment of environmental conditions was thus found for the future effects of climate change. Therefore, the results do not show a marked difference in assessments of climate change compared to the assessments of other environmental conditions.

## Study 2

Study 2 goes beyond Study 1 and the Gifford et al. (2009) original study in an important way. Spatial optimism and temporal pessimism may be a result of individual differences in optimism and temporal orientation. In this study, pessimism and future orientation measures were also considered in order to assess whether these individual difference variables would affect the biases.

## Method

### Participants and Procedure

An anonymous survey was administered over the Internet to 108 participants (71 females and 37 males). Participants were recruited via emails sent to personal networks of the third author and advertisements posted on the social network site Facebook. The online survey was created using SurveyMonkey technology and could be accessed through an Internet link. By following the link embedded within the emails and advertisements, participants were directed to a webpage where they could complete the survey. The sample of this study was thus based on a convenience sampling. The age of participants ranged from 18 to 62 years of age ( $M = 27.05$ ,  $SD = 10.00$ ). Participation in the survey was voluntary and no incentive was used for participation.

### Instruments

The questionnaire included demographic questions to gather basic information about the participants such as age and sex, and the original Environmental Futures Scale, plus the following measures.

*Consideration of Future Consequences (CFC) Scale:* This is a 12-item scale developed by Strathman et al. (1994) to measure individual differences in future orientation. Example of items are: "Often I engage in a particular behaviour in order to achieve outcomes that may not result for many years" and "I only act to satisfy immediate concerns, figuring the future will take care of itself" (reversed scored). Participants were asked to rate how characteristic or true each statement was to them on a scale ranging from 1 (very uncharacteristic) to 5 (very characteristic).

*Life Orientation Test-Revised:* This scale was developed by Scheier, Carver, and Bridges (1994) to measure individual differences in generalized optimism (see also Carver, Scheier & Segerstrom, 2010). The scale has 4 filler items and 6 construct items. Examples of construct items are: "In uncertain times, I usually expect the best" and "I hardly ever expect things to go my way" (reversed scored). Participants were asked to rate their level of agreement with each statement on a scale ranging from 1 (I disagree a lot) to 5 (I agree a lot).

## Results and Discussion

### EFS internal consistency and descriptive statistics

Descriptive statistics and Cronbach's alphas for the six EFS subscales as well as for the optimism and future orientation scales are shown in Table 1. All subscales had high internal consistency, and the reliability of the full EFS was also high ( $\alpha = .97$ ). As was also found in Study 1, means for all expected future conditions were below the scale midpoint (0 = "no different") and the expected future changes at the local and global level were increasingly pessimistic as spatial levels increased. In contrast to Study 1, the mean for national current environmental condition was below the scale midpoint (3 = "acceptable"), and the means for current environmental conditions did not follow the expected decline for increasingly distant spatial levels. The mean for the expected future conditions at the national level was also higher than for the other levels. These results seem to indicate that this sample assessed the current and future state of environmental conditions at the national level differently than the sample in Study 1 (see Figure 1). This is further discussed in the analyses below.

### Assessments of current and future change in environmental conditions

A one-way repeated-measures ANCOVA examining spatial optimism, with age, sex, optimism and future orientation entered as covariates, showed that assessment of current environmental conditions was significantly affected by spatial level,  $F(1.54, 146.37) =$

13.33, Huynh-Feldt adjusted,  $p < .001$ ,  $\eta_p^2 = .12$ . No significant interactions were found between spatial level and optimism and future orientation. This indicates that spatial optimism occurs even after controlling for individual differences in concern for future consequences and levels of optimism. Contrasts indicated that assessments of local and global environmental conditions were significantly more positive than those at the national level,  $F(1, 95) = 11.70$ ,  $p < .01$ ,  $d = 2.05$  and  $F(1, 95) = 18.22$ ,  $p < .01$ ,  $d = 2.14$ , respectively. The assessments of local and global environmental conditions did not statistically differ,  $F(1, 95) = 2.44$ ,  $p > .10$ ,  $d = .34$ . The results indicate a different pattern compared to Study 1, with a more negative view of national environmental conditions than for the other spatial levels. In line with Study 1, one-sample t-tests examining temporal bias showed that participants were pessimistic about the future, rating that local, national and global environmental conditions will get worse,  $t(107) = -5.72$ ,  $d = -.55$ ,  $-16.15$ ,  $d = -1.55$  and  $-10.18$ ,  $d = -0.98$ , respectively,  $ps < .001$ .

## General Discussion

This article discusses two studies aimed to replicate and expand on the cross-national research conducted by Gifford et al. (2009) on spatial optimism ("things are better here than there") and temporal pessimism ("things will get worse") in assessments of environmental conditions. The present study examined whether participants from New Zealand (a country not included in the original study) would hold similar biases regarding the state of the environment. This study also included a national sample and an extra item on climate change to examine whether assessments were different for this particular environmental condition (Study 1). Also, two individual difference variables that were deemed relevant in assessments of environmental conditions, namely optimism and consideration of future consequences, were included (Study 1). Overall, our results corroborate earlier findings showing that both comparative optimism and temporal pessimism are related to assessments of environmental conditions (e.g., Gifford et al., 2009;



Fleury-Bahi, 2008; Hatfield & Job, 2001).

The results support the existence of optimism biases in our New Zealand samples. In Study 1 and in line with the findings by Gifford et al. (2009), participants evaluated the quality of local and national environmental conditions more favourably than they rated global environmental conditions. There was no significant difference between participant ratings of environmental conditions for the local ('My area') and national ('New Zealand') area. In contrast, for Study 2 ratings of environmental conditions were more positive for the local and global level than they were for the national level. No significant differences emerged between assessments of environmental conditions at the local and global level. Evidence of temporal pessimism was found in both New Zealand samples. Participants rated environmental conditions to be better now than they will be in the future (in 25 years' time), and these ratings do not vary as a function of spatial level. The temporal pessimism bias found in this study could potentially be a result of general levels of knowledge of environmental degradation discussed by scientists and by the media, so that individuals are aware of environmental deterioration and that the forecast for the future is quite negative (Gifford et al., 2009).

#### *Comparison between New Zealand and other countries*

When comparing the New Zealand sample with the countries included in the cross-national comparison (Gifford et al. 2009), it appears that New Zealand participants were significantly more positive in their ratings of current local conditions, compared to the average scores of the other countries. This may be explained by the image New Zealanders have of their country as being 'clean and green', which suggests some contextual influence. Overall, this lay belief is supported by expert assessments of environmental quality of the country. For example, in the most recent Environmental Sustainability Index (Environmental Sustainability Index, 2010), New Zealand is ranked 15<sup>th</sup>, and it is ranked first in the Asia and Pacific region. This index ranks 163 countries on 25 performance

indicators, including access to drinking water and sanitation, forest cover and greenhouse gas emissions per capita. This agreement between lay people and expert assessments of environmental conditions supports the findings by Gifford et al. (2009).

Some variations in spatial optimism and temporal pessimism were observed in our studies. In Study 1, respondents were more optimistic about future local and national conditions, and more pessimistic about future global environmental conditions than the average of the other countries. In Study 2, in contrast, respondents' evaluations of future national conditions were more negative than the average of the other countries and much more negative than that of Study 1. The different sample compositions may account for these findings. Study 1 included a national sample, while the sample in Study 2 consisted principally of participants from Wellington (92 out of 108). Wellington has a relatively large amount of Green party voters (20.6%), more than in other large cities (Elections, 2008). This might have influenced the environmental assessments of the respondents. Also, the sampling technique used in Study 2 may have resulted in selection bias. Because the online survey was distributed through social networks, it may be that people with similar views on environmental issues may have completed the survey.

It is worth noting that variations in spatial optimism and temporal pessimism were also observed in the original study. Gifford et al. (2009) found that Russian and Romanian respondents assessed global conditions more positively than local conditions, and Indian respondents did not show the expected spatial optimism; temporal pessimism was also higher in Australia, Finland, Germany and Canada than in the other countries. Thus, although the link between environmental assessments and spatial and temporal biases appears pervasive, country- and sample-level variations are also evident.

#### *Climate change assessment and individual difference variables*

Study 1 investigated whether respondents had different assessments of the effects of climate change, as compared to the other environmental

conditions. The results indicate that, overall, assessments of climate change follow a similar trend. Participants evaluated the current effects of climate change at the global level significantly more negatively than they did at the national and the local level, highlighting the occurrence of spatial bias. In terms of temporal pessimism, the results for climate change also followed a similar trend, in that participants expect the effects of climate change to get worse in the future. Assessments of climate change were different on one spatial aspect, compared to the other environmental conditions. There was a significant difference in ratings of the local and national level of climate change effects. This seems to indicate that the effects of climate change were assessed to be worse at the national than at the local level; a difference that did not occur in the assessment of other environmental conditions at these two levels. Future studies should investigate this further as it could have potential implications for individuals' willingness to engage in mitigation actions at differing levels of spatial interventions.

Taken together, the findings indicate that spatial and temporal biases are relatively stable across different environmental conditions, even for those that have been extensively discussed in the media such as climate change. Results from Study 2 also indicate that there was no support for the hypothesis that individual difference variables affect these biases. The inclusion of general levels of optimism and consideration of future consequences as covariates was not associated with overall assessments of environmental conditions, suggesting pervasive biases in individuals' assessment of environmental conditions.

The observation that spatial optimism and temporal pessimism are near-universal cognitive biases in environmental assessments has important theoretical and practical implications (for a discussion of psychological universals, see Norenzayan & Heine, 2005). Theoretically, it highlights that cognitive bias is an important psychological construct in understanding people's assessment of environmental conditions, which is stable across cultures, across

specific environmental conditions and after controlling for related individual difference variables. Considering that the role of social sciences is still not fully acknowledged in actions aimed to tackle environmental issues (cf. Gifford, 2008, p. 273), consistent empirical findings showing a specific psychological phenomenon affecting the assessment of environmental conditions can support the role of psychology in helping to address environmental issues. Another practical implication of this theoretical finding is that this knowledge can assist with environmental campaigns and policy making. For example, policy makers should be aware of the biases and frame policy communication accordingly. Prompting people to consider local and present environmental issues might be more effective than focusing on national, global, and future scenarios.

#### *Explaining spatial and temporal biases*

Gifford et al. (2009) consider accuracy as a possible explanation for their findings regarding spatial optimism and temporal pessimism. They argue that the decreasing negative assessment of environmental conditions from proximate to more distal spatial levels and from current to future time could be accounted for in part by participant accuracy. That is, media coverage of environmental trends might make more salient the belief that national/global and future conditions are indeed worse than local and current conditions, and individual assessments of environmental conditions could reflect this. Although this accuracy explanation cannot be completely discarded with the empirical evidence gathered so far, it seems that spatial optimism and temporal pessimism are pervasive cognitive biases related to environmental assessments.

Another possible way of theoretically examining spatial and temporal biases can be offered by Construal Level Theory (Lieberman & Trope, 2008; Trope & Liberman, 2003). According to Construal Level Theory, an event is more psychologically distant when it takes place farther into the future (temporal distance), when it occurs in more remote locations (spatial distance), when it is less likely to occur (hypothetical distance), and when it

happens to people less like oneself (social distance). The basic premise of the theory is that events that are psychologically distant are viewed in more abstract and super-ordinate terms (high-level construals), while events psychologically closer are viewed in more concrete and detailed terms (low-level construals). The theory posits that similar mental construal processes underlie psychological distance dimensions, and that these construal processes guide the way people predict, evaluate, and plan psychologically near and distant situations (Lieberman & Trope, 2008; Trope, Liberman & Wakslak, 2007).

High-level mental representations are more abstract, simpler, coherent and more schematic than low-level representations. For example, by representing an object as “a writing device” (high-level construal) instead of representing the same object as a “pen” (low-level construal), concrete information and details about the object are omitted (e.g., the object is a pen not a pencil) while central features of the object are emphasised and retained (e.g., the object can be used to write a letter). Similarly, every action (e.g., write on a piece of paper) can be construed in a concrete level referring to how the action was performed (e.g., sign a petition) as well as in terms of an abstract level referring to why the action was performed (e.g., lobby for climate change policies).

Milfont (2010) has recently used this theory in trying to understand climate change and other environmental risks as psychologically distant situations. Environmental conditions are often uncertain (hypothetical distance), take place farther into the future (temporal distance), are perceived to be more likely to occur in distant geographical locations (spatial distance), and to people less like oneself (social distance). Environmental conditions are psychologically distant and thus assessed with a high level of construal. Given that environmental conditions are already similarly assessed in terms of more schematic and abstract level of mental representation, any specific assessment that highlights distance would increase this high-level representation and would lead to similar biases.

In line with Construal Level Theory, we contend that the biases in the assessment of environmental conditions can be explained by the underlying high-level mental representation they share. That is, the psychological mechanism associated with representing an object or situation (in this case, environmental conditions) in a high-level construal lead to similar assessments of the object or situation. For example, the assessment of environmental conditions that take place farther into the future, and are perceived to be more likely to occur in distant geographical locations and to people less like oneself, will be represented at a high-level of construal and as a result will be similarly assessed. Empirical findings seem to support this view, with similar biases in the assessment of environmental conditions shown for temporal distance (Gifford et al., 2009), spatial distance (Uzzell, 2000), and social distance (Fleury-Bahi, 2008). We argue that these biases are a reflection of the underlying high-level mental representation of environmental conditions. Using Construal Level Theory for integrating cognitive biases related to the assessment of environmental conditions seems a fertile endeavour for theoretical and empirical development in the area.

#### *Limitations and Conclusion*

A potential limitation of the study is the way in which the participants may have conceptualised the different spatial levels. In the case of the local level (‘My area’) it is not clear whether people would have been thinking about their specific suburb, or whether they would be considering their region or city. It may well be that those who were thinking about a smaller spatial area (such as their neighbourhood) may have had a different assessment of that spatial level than those who were thinking about their city or suburb. In terms of temporal level, we did not include a measure of the past, i.e., whether participants consider current environmental conditions to be worse than they were previously. Research indicates that people have a tendency to more accurately assess the risks of events occurring after these events have happened (i.e., hindsight bias; see Haselton et al., 2009). Including assessments of environmental conditions

in the past could help gain insight into the role of accuracy as an explanatory factor. Future work could include and refine the measure for environmental assessments to help address some of these issues.

Surveys about environmental topics may be self selective in that people with an interest in the issue are more likely to respond, introducing a self-selection bias. As a result, knowledge about environmental degradation may have been associated with participants' assessments of environmental conditions. In addition, an online survey was used in Study 2, which may have resulted in a different socio-demographic composition of the sample. These issues may partly explain some of the differences between the results of Study 1 and 2, as also discussed above. Therefore, some caution is warranted in generalising the results to the population of New Zealand. Nevertheless, the use of a national sample from the general population in Study 1 and similarity with previous findings support the validity of the results.

One direction for future studies is to examine the interaction between the two biases. An interaction between spatial optimism and temporal pessimism would imply an increase in the negative assessment of future environmental conditions as spatial distance increases ("things will be worse there than here"). Results reported by Gifford et al. showed a trend for this proposed interaction with assessments of future environmental conditions increasingly pessimistic as spatial levels expanded (see their Figure 1). Our findings also support this trend, with greater temporal pessimism for global than for national/local environmental conditions (Study 1) and greater temporal pessimism for global/national than for local environmental conditions (Study 2; see Figure 1 above). Future studies could directly examine this proposed interaction via experimental designs (e.g., Spence & Pidgeon, 2010).

Overall, the results of this study indicate that comparative optimism and temporal pessimism do exist in New Zealand, with some variations with respect to the cross-national study by Gifford et al. (2009). Participants in the New Zealand samples tend to believe that

"things are better in New Zealand than elsewhere" and that "things are better now than they will be in the future". These assessments are independent from individual differences in optimism and consideration of future consequences, which seems to suggest that they are relatively pervasive. Considering that these biases may be associated with an individual's willingness to act to protect environmental conditions, they warrant further examination in future research. We also believe that Construal Level Theory may be useful to understanding and integrating related cognitive biases in environmental assessments.

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**Corresponding Author:**

Taciano L. Milfont  
 Victoria University of Wellington  
 School of Psychology  
 PO Box 600  
 Wellington  
 Taciano.Milfont@vuw.ac.nz