Communicating the Greenhouse Effect to the Public: Evaluation of a Mass Media Campaign from a Social Dilemma Perspective

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The present study evaluates a mass media public information campaign regarding the greenhouse effect, designed by the Dutch Ministry of the Environment. During more than two months, the mass media (national television, national newspapers, billboards) were employed intensively to make the public aware of the nature and causes of the greenhouse effect, its consequences and possible ways of dealing with this environmental problem. As an evaluation of the campaign was deemed important, the research reported here was executed. In a Pre-Post Design survey ($N=704$), assessments were made of changes in knowledge, problem awareness, willingness to show ecologically sound behaviours and perceived necessity of additional superimposed policy measures. The results show that it is hard to change current cognitions and behaviour but, more importantly, the data suggest that knowledge and problem awareness may be less instrumental in promoting behavioural change than was assumed before the campaign. These results are reflected upon from a social dilemma perspective. This perspective stresses that it is unlikely that individuals are willing to forfeit some of their personal comfort in favour of long-term collective interests if not only the desired collective goal (the prevention of ecological disaster) but also the contributions made by other parties are surrounded by much uncertainty. The present campaign primarily focused on reducing citizens' uncertainty about the collective goal and ways of achieving it, while it left citizens in complete uncertainty about the contributions made by other parties. Additional analyses support the significance of citizens' expectations about contributions of other parties. These expectations were positively related to respondents' own contributions and negatively related to the perceived necessity of additional superimposed policy measures. The strategic implications for future campaigns are discussed.

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1. Introduction

Living conditions on earth are strongly influenced by the climate. In the past, slowly developing climate changes have had an influence on the evolution of human and animal life, vegetation and the geomorphology of the earth's surface. Since the last glacial period, about 10 000 years ago, a new and very rapidly occurring climatic change has been taking place. This time the change is caused by human activities. Simply stated, emissions from industrial and consumptive activities have an effect on solar radiation and warmth reflections from the earth. Researchers predict that, as a result, average temperatures on the earth will rise at a pace that cannot be met by the adaptation of ecosystems. Consequences may include the extinction of plant and animal species, desertification of land and a rise in the sea level. However, uncertainty remains as to the magnitude and onset of these negative effects.

This phenomenon is referred to as the greenhouse effect. It is considered to be one of the most serious large-scale environmental issues of our time and will be prevalent on research and policy agendas for the coming decade. Although the prevention of the greenhouse effect will require many technical and economic changes, the problem can to a large extent be considered behavioural. Behavioural choices that have positive consequences for the individual in the short term eventually have serious negative consequences for the collective when chosen by too many people. As such, the greenhouse effect has the characteristics of a social dilemma, a situation in which individual and collective welfare are at odds (Dawes, 1980). In order to mitigate the negative consequences of the greenhouse effect, behavioural changes are necessary in life styles, purchasing decisions and waste management.

One of the most used instruments to influence the public is the mass media information program. In several countries, governments are planning public information campaigns on the climatic problems of the greenhouse effect as tools to educate the public about the nature of the environmental problem, its causes and potential effects. Furthermore, these information programs are intended to gain acceptance of unpopular policy measures and to encourage the public to change its life style, leading to reductions in energy use and the decrease of toxic emissions and waste disposal. From a psychological perspective, the question arises whether these objectives can be realised by using this type of instrument. The present study aimed to evaluate just such a program that was designed and launched by the Dutch government. The information program is described in the next section. Next, goals, methods and results of the present research will be addressed. This article is concluded by a section in which the social dilemma framework is outlined. This framework offers an explanation of the difficulty in changing environmentally relevant behaviour, even when people are made aware of the negative collective consequences of their own acts. The framework also provides suggestions for the development of strategies for behaviour change.

1.1. THE INFORMATION PROGRAMME ON THE GREENHOUSE EFFECT

The information programme launched in the Netherlands had two main goals: to provide a clear description of the characteristics, causes and consequences of the greenhouse effect to the Dutch population and to enhance awareness of the problem and ways of solving it. The basic idea behind the programme was that enhanced knowledge and problem awareness would be instrumental in promoting voluntary behavioural change and in creating a more positive attitude towards policy measures to combat the problem.

The target group was defined as the entire population of the Netherlands, of age 18 years and older. The instruments used in the campaign were billboards, posters, television commercials, advertisements and a brochure that was freely available at post offices and libraries or that could be mailed home on request. Billboards, posters and television commercials were mainly designed to attract attention to the greenhouse effect and its potential impact on the earth by giving a symbolic, rather dramatic impression of the seriousness of the problem (by showing a person's head trapped and suffocating in a transparent, very humid looking plastic bag). Using information provided by the Dutch Ministry of the Environment, the advertisements and the brochure tried to explain the greenhouse effect and to link the climatic changes to daily human behaviours, for example automobile use and thermostat control in the home. The advertisements and the brochure contained factual information about the characteristics of the greenhouse effect (e.g. that it is different from the problem of the ozone layer, that it has to do with the regulation of the temperature on earth), its causes (e.g. the production of carbon dioxide, energy consumption) and consequences (e.g. a rise in sea level, desertification of fertile land). Besides this factual information, possible ways of solving the problem were described. The advertisement stressed energy saving as the key to a solution. The brochure advocated a range of voluntary behaviours, including energy saving at home and the separate disposal of small chemical waste and contained the most factual information. Also mentioned were certain policy measures such as banning CFCs and reducing the use of private automobiles.

The information programme lasted approximately two and a half months. At the end of 1990, between 11 October and 29 December, 36 commercials on the national television network were broadcast and 14 advertisements appeared in national newspapers and magazines. During this period, billboards and posters were visible in many public access areas, for example all town and city centres, halls of public buildings and railway stations.

1.2. GOALS OF THE PRESENT STUDY

The present study was designed to meet three goals, namely:

1. To assess the effects of the governmental mass-media campaign on knowledge about the greenhouse effect and awareness of the problem. The latter concept was subdivided into two separate issues: the perceived seriousness of the phenomenon and the emotional concern about it.
2. To assess the influence of knowledge, perceived seriousness and emotional concern on people's environmentally favourable behaviour and their acceptance of necessary policy measures.
3. To gain additional insight into factors affecting people's willingness to contribute to the solution of the greenhouse effect. We posed some additional questions to our respondents that may be relevant if one analyses the greenhouse effect from a social dilemma perspective.

2. Method

2.1. SAMPLE

A pre- and post-campaign survey was executed among a sample that was representative of the Dutch population with respect to age and sex. In the first survey, 965 respondents participated, of which 704 again took part in the post-campaign survey. No significant

differences were found in age and sex between the original sample and the subsample that participated twice.

2.2. QUESTIONNAIRE AND SCALE CONSTRUCTION

The majority of the questionnaire consisted of series of items that were identical in the pre- and post-campaign survey. The relevant concepts were measured in the following way (all items, in their original phrasing are given in Tables 1–4). Where appropriate, scales were constructed from empirically interrelated items from the same concept:

- *Knowledge*: 42 true–false items on the characteristics, causes and consequences of the greenhouse effect; 25 of these were correct statements, 17 reflected popular misunderstandings and were therefore incorrect statements. To explore the structure of knowledge, a principal component analysis (PCA) with varimax rotation was performed. This analysis yielded three dimensions (eigenvalues 7.0, 3.1, 2.1, 31.3% variance explained) containing 27 of the 42 items. The first dimension contained 13 items with loadings >0.40 , which were all correct statements on the greenhouse effect. The 13 single items were summed to form the first knowledge scale, called a *correct statements scale* (Cronbach alpha = 0.77).

The second dimension with 7 items, loadings >0.40 , contained false statements about the greenhouse effect. The series of items loading on the second dimension proved to be relatively difficult to answer correctly. These items were summed to form the second knowledge scale, called the *false-difficult statements scale* (Cronbach's alpha = 0.72).

The third dimension with 7 items, loadings >0.40 , contained false statements that were relatively easy to recognise. These items were again summed to form the third knowledge scale, called the *false-easy statements scale* (Cronbach's alpha = 0.51).

Table 1 contains items and percentages of correct answers of the pre-campaign data.

PCA on post-campaign data provided virtually the same solution.

- *Problem awareness*, subdivided into:
 - (i) emotional concern: 12 items describing emotions on 5-point rating scales were employed, indicating the degree to which these emotions were evoked by the greenhouse effect (1 = low, 5 = high);
 - (ii) perceived seriousness: six items describing the estimated seriousness on 5-point rating scales (1 = low, 5 = high);

Principal component analysis of these 18 items confirmed the difference between these concepts. A solution was provided of which the two most important dimensions (variance explained 44.4% and 9.4%, respectively) were clearly interpretable. The first of these two dimensions contains all 12 items regarding negative feelings evoked by the greenhouse effect (loadings >0.50), the second dimension contains all 6 items on perceived seriousness (loadings >0.50). PCA on data of the post-campaign survey provided the same structure and approximately the same factor loadings. The solution thus proved to be quite stable.

Scores on the 12 negative emotion items were summed and used as a scale for emotional concern (Cronbach alpha = 0.92), scores on the 6 items on perceived seriousness were summed and used as a scale for perceived seriousness (Cronbach alpha = 0.87). Table 2 contains items, averages and standard deviations of the 18 items (pre-campaign data).

TABLE 1. Knowledge of the greenhouse effect. Items and percentage of correct answers (pre-campaign data; $N=704$)

Statement	(%) Correct answers
(a) Correct statements scale	
The greenhouse effect has to do with:	
—the atmosphere	66
—warmth radiating from the earth	45
—the regulation of temperature on earth	56
—the climate	70
The greenhouse effect is caused by:	
—the production of carbon dioxide	70
—our everyday energy consumption	51
—the use of fossil fuels like coal	67
Because of the greenhouse effect	
—the earth becomes warmer	86
—floods become more likely	67
—more deserts will appear	59
—the water in seas and oceans will expand	50
—the sea level will rise	81
—the atmosphere increases to conserve the warmth of the earth	42
(b) False-difficult statements scale	
The greenhouse effect has to do with:	
—the ozone layer	20
—a protective layer around the earth	57
—increasing activity of the sun	58
The greenhouse effect is caused by:	
—the deposit of heavy metals by industries	26
Because of the greenhouse effect	
—holes fall in the ozone layer	55
—the atmosphere becomes thinner	46
—the atmosphere increases to conserve the warmth of the sun	39
(c) False-easy statements scale	
The greenhouse effect has to do with:	
—magnetic fields around the earth	89
—a too fast succession of high and low pressure zones	77
The greenhouse effect is caused by:	
—the building of ever more nuclear power plants	71
Because of the greenhouse effect	
—temperature on earth becomes lower	93
—the north- and southpole will get out of position a little	72
—summers in the Netherlands will become cooler	93
—the amount of pole ice will increase	92

- *Voluntary behaviours* that are relatively beneficial to the greenhouse effect compared to their most likely alternatives. Nine behavioural acts were rated on 5-point scales (1 = “not at all descriptive of my behaviour”, 5 = “very much descriptive of my behaviour” (see Table 3; average Pearson correlation between behavioural acts = 0.15).

TABLE 2. Emotional concern and perceived seriousness (1 = not at all, 5 = very much). Means and standard deviations (pre-campaign data, $N=704$)

	<i>M</i>	<i>SD</i>
(a) Emotional concern		
To me, the greenhouse effect evokes feelings of:		
—Uneasiness	2.7	1.1
—Worry	3.2	1.1
—Despair	2.1	1.0
—Threat	3.2	1.1
—Uncertainty	3.0	1.1
—Concern	3.3	1.0
—Sadness	2.3	1.1
—Dissatisfaction	2.8	1.1
—Anger	2.5	1.1
—Lack of control	3.1	1.2
—Tension	2.3	1.0
—Guilt	2.2	1.0
(b) Perceived seriousness		
The greenhouse effect:		
—is a very serious problem	4.0	1.1
—will arise at short notice	3.3	1.3
—can affect me personally	3.5	1.2
—is very threatening	3.9	1.1
—is a catastrophe	3.7	1.1
—is close by	3.7	1.2

- *The perceived necessity of policy measures*: with beneficial consequences for the greenhouse effect problem. Seven measures were proposed and rated on 7-point scales (1 = “necessity absent”, 7 = “absolutely necessary”; see Table 3; average Pearson correlation between policy measures = 0.19).
- Several items were added to the questionnaire of the post-campaign survey. These items were derived from the *social dilemma perspective* of the greenhouse effect problem. Some items assessed respondents’ self reported contributions to help prevent the greenhouse effect. Other items measured respondents’ judgments about what four other parties (other households, the industrial, agricultural and traffic sector) should contribute to help preventing the greenhouse effect and respondents’ expectations about the actual contributions by the other four parties.

3. Results

3.1. CAMPAIGN DIFFUSION RESULTS

Based on the level of information in the messages in each of the different media sources, a five-group split of the panel ($N=704$) was made between:

1. A group that had not noticed any of the campaign elements ($N=175$, 25%);
2. A group that had noticed TV-spots, posters and/or billboards ($N=229$, 32%);
3. A group that had only read the advertisements ($N=58$, 8%);

TABLE 3. Voluntary behavioural acts and perceived necessity of policy measures. Means and standard deviations (pre-campaign data, $N=704$)

	<i>M</i>	<i>SD</i>
(a) Voluntary behavioural acts (1 = not at all descriptive of my behaviour, 5 = very much descriptive of my behaviour)		
—using the heating sparsely	4.0	1.2
—taking the bicycle instead of my car as often as possible	3.6	1.6
—using public transportation instead of my car	2.6	1.6
—not buying environmentally harmful spray cans	4.3	1.2
—buying energy saving light bulbs	2.7	1.5
—separating small chemical waste	4.2	1.2
—bringing my old refrigerator to a special dismantling station	4.0	1.5
—keeping vegetable, fruit and garden waste separate from other waste	2.4	1.7
—turning the light off when leaving the room	4.2	1.1
(b) Perceived necessity of policy measures (1 = necessity absent, 7 = absolutely necessary)		
—banning CFCs	6.2	1.1
—raising the price of gasoline by 30%	3.5	1.6
—halve the livestock in the Netherlands	4.0	1.5
—subsidise initiatives for car pooling	4.1	1.6
—higher subsidies for energy saving measures	4.9	1.4
—ban deforestation	6.3	1.1
—lower maximum speed on all highways to 100 km/h	4.4	1.8

4. A group that had noticed TV-spots, posters, billboards, and had read the advertisements ($N=209$, 30%);
5. A group that, in addition to perceiving one or more of the elements described before, had fetched and read the information brochure ($N=33$, 5%).

3.2. CAMPAIGN EFFECTS

Analysis of covariance on data of the post-campaign survey were used to assess the effects of the campaign. Pre-campaign scores on the identical variables served as covariates, perception of campaign elements—the five group split described above—as factor. Contrasts were calculated as deviations from the grand mean. Interactions of pre-campaign scores and group membership were tested to see if an effect was attributable to a group that before the campaign already differed from the rest. Selective perception and retention of campaign elements may influence the reported perception of campaign elements: people who are already more interested in the greenhouse effect are more likely to report having seen and remembered elements of the campaign. This influence may be visible in their pre-campaign scores on the variables under study.

3.3. KNOWLEDGE OF THE GREENHOUSE EFFECT

Analysis of covariance of the three knowledge-scales showed a campaign-effect, but only on the correct-statements scale ($F_{(4,698)} = 3.0$, $P < 0.02$). Differences that did not exist

between the five groups before the campaign ($F_{(4,694)} = 0.9$, $P < 0.5$) became manifest as a function of the perception of campaign elements. Increase in knowledge occurred mostly in group 4, the group that had seen television commercials, billboards and that had read the advertisements ($P_{\text{contrast}} < 0.03$). However, misunderstandings as verbalised in the items of the second and third knowledge-scales (for example, the confusion between the greenhouse effect and the problem of the ozone layer) were not eliminated ($F_{(4,698)} = 1.1$, $P < 0.33$ for the false-difficult scale and $F_{(4,697)} = 1.0$, $P < 0.39$ for the false-easy scale).

3.4. EMOTIONAL CONCERN

No campaign effects were found for emotional concern ($F_{(4,697)} = 1.5$, $P < 0.19$). On average, the sample seemed to be slightly worried about the greenhouse effect (range of the scale = 12–60, $M = 32$, $SD = 9.3$).

3.5. PERCEIVED SERIOUSNESS

No effects were found for perceived seriousness of the problem ($F_{(4,694)} = 1.5$, $P < 0.21$). The already rather high ratings on this scale (range of the scale = 6–30, $M = 22.0$, $SD = 4.9$) were not affected by the campaign.

3.6. VOLUNTARY BEHAVIOUR

Of the nine advocated voluntary behaviours, only the separate disposal of small chemical waste was influenced by the campaign ($F_{(4,698)} = 4.4$, $P < 0.001$). Mainly group 4 was responsible for the effect ($P_{\text{contrast}} < 0.001$). However, there was an interaction effect between behaviour before the campaign and group membership ($F_{(4,694)} = 3.0$, $P < 0.02$). The respondents eventually to be in group 4 were already in advance of the others ($P_{\text{contrast}} < 0.01$). Thus, the campaign-effect was limited to a group that already showed more environmentally favourable behaviour before the campaign started.

3.7. PERCEIVED NECESSITY OF POLICY MEASURES

Seven policy measures were proposed. Only one, the acceptance of a substantial raise of the price of gasoline, showed a tendency of being enhanced by the campaign ($F_{(4,661)} = 2.0$, $P < 0.02$) (see Note 1). This effect was mainly due to a shift in scores by group 2 ($P < 0.001$), who had seen the television commercials, posters and/or billboards.

In summary, one can conclude that few effects were found. Knowledge about the greenhouse effect improved slightly. In addition, respondents reported only one type of voluntary behaviour more often after the campaign than before.

3.8. THE RELATIONSHIPS OF KNOWLEDGE, PERCEIVED SERIOUSNESS AND EMOTIONAL CONCERN ABOUT THE GREENHOUSE EFFECT WITH VOLUNTARY BEHAVIOURAL ACTS AND THE PERCEIVED NECESSITY OF POLICY MEASURES

Regression analyses were performed with knowledge, perceived seriousness and emotional concern as predictors for nine voluntary behavioural acts and the perceived necessity of seven suggested policy measures. The results of the analyses are summarised

TABLE 4. Regression analyses of knowledge on the greenhouse effect, perceived seriousness and emotional concern on voluntary behaviour and perceived necessity of policy measures (pre-campaign data, $N=704$)

	Knowledge (beta)	Perceived seriousness (beta)	Emotional concern (beta)	Multiple correlation
(a) Voluntary behavioural acts				
—using the heating sparsely	0.06	0.08*	0.07	0.16
—taking the bicycle instead of my car as often as possible	−0.05	0.09*	0.05	0.13
—using public transportation instead of car	0.04	0.05	0.11**	0.16
—not buying environmentally harmful spray cans	0.08**	0.13**	0.12**	0.25
—buying energy saving light bulbs	−0.01	0.02	0.05	0.06
—separating small chemical waste	0.01	0.19**	0.02	0.21
—bringing my old refrigerator to a special dismantling station	−0.05	0.08*	0.03	0.10
—keeping vegetable, fruit and garden waste separate from other waste	−0.05	0.07	−0.01	0.07
—turning the light off when leaving the room	0.04	0.03	0.06	0.09
(b) Perceived necessity of policy measures				
—banning CFC's	0.01	0.21**	0.02	0.22
—raising the price of gasoline by 30%	0.04	0.13**	0.11**	0.22
—halve the livestock in the Nether- lands	−0.04	0.13**	0.19**	0.28
—subsidise initiatives for car pooling	0.00	0.00	0.19**	0.19
—higher subsidies for energy saving measures	0.05	0.08*	0.19**	0.26
—ban deforestation	0.02	0.11**	0.14**	0.23
—lower maximum speed on all high- ways to 100 km/h	−0.02	−0.03	0.27**	0.25

* $P<0.05$, ** $P<0.01$.

in Table 4 (see Note 2). It appears that the relationships of these three concepts with behaviour and policy measures were not strong.

The predictive power of knowledge, perceived seriousness and emotional concern on *voluntary behaviour* was very weak. Only “not buying environmentally harmful spray cans” was mildly related to each of these three predictors.

In relation to *perceived necessity of policy measures*, knowledge of the greenhouse effect did not play a role at all, which is a noteworthy finding in view of the fact that this knowledge-scale was the only one influenced by the campaign. Perceived seriousness of the greenhouse effect had a significant contribution on five out of seven, emotional concern on six out of seven measures proposed. The variance explained by perceived seriousness and emotional concern ranged from 4–9%.

4. Discussion

In the present assessment of the impact of the campaign, campaign success was narrowly defined in terms of individual changes in the short term with respect to knowledge, problem awareness, willingness to show ecologically sound behaviours and attitudes towards policy measures. It has been argued (e.g. Wallack, 1981) that the current approach needs to be expanded to encompass several levels of possible campaign effects. However, to assess, for instance, the degree to which campaign elements are the subject of discussion among members of various kinds of social networks over the longer term is very difficult. Equally difficult would be an assessment of the impact on problem awareness at an institutional level. In this respect, the present evaluation study merely shows that hardly any individual short term effects were found.

On the other hand, the present research provides a tentative explanation of why the program did not affect behaviour. The results show that, with the exception of a slight increase of knowledge about the greenhouse effect, no campaign effects were found for problem awareness. More important, however, was that the additional regression analyses suggested that respondent's knowledge and problem awareness did not have a strong relationship with self-reported behaviour. One might conclude from these results that the present campaign was erroneously focused on enhancing the public's knowledge and problem awareness. However, from a theoretical perspective it can be argued that knowledge and problem awareness *are* important determinants of ecologically sound behaviour, if accompanied by trust that one's individual contributions are reciprocated by other parties. This hypothesis is derived from the social dilemma paradigm (Dawes, 1980). This conceptual framework allows us to better understand why people, although they are aware of the negative collective consequences of ecologically unsound behaviours, are very reluctant to change their own. These insights may also provide some suggestions for future campaigns.

With the greenhouse effect issue, individual and collective welfare are at odds: behavioural choices that have positive consequences for the individual in the short term eventually have serious negative consequences for the collectivity when chosen by too many people. In order to predict people's behaviour in such social dilemma like situations, Pruitt and Kimmel (1977) formulated their Goal-Expectation Theory. On the basis of an extensive literature review of relevant research, Pruitt and Kimmel predicted that people will sacrifice personal interests in favour of collective interests when they share the *goal* to promote the collective interest and, at the same time, have the *expectation* that other people will also contribute (see also Rutte and Wilke, 1992). A Goal-Expectation theoretical analysis of the social dilemma of the greenhouse effect highlights two psychological aspects of the issue. First, people's orientation toward shared collective goals is inhibited by "environmental uncertainty", and, second, people's expectations about the contributions made by other parties suffer from what is known as "social uncertainty" (cf. Messick *et al.*, 1988; Suleiman and Rapoport, 1989).

Environmental uncertainty. In the present campaign, as in the literature on social dilemmas (see Liebrand *et al.*, 1992; Messick and Brewer, 1993), it was assumed that individuals' willingness to contribute to the solution of social dilemmas is affected by their knowledge about the characteristics and seriousness of the collective problem. Being well informed on these issues provides them with a clear goal. However, the public's orientation towards a shared collective goal of preventing the greenhouse effect is inhibited by an uncertainty about the form the negative collective consequences of the greenhouse effect will take, and when they will become manifest. The negative

consequences for the earth are surrounded by considerable uncertainty, even among experts on the issue. In a temporal perspective, individuals are faced with certain immediate positive rewards of many ecologically unsound behaviours, while any negative collective consequences of such behaviours are delayed in time (e.g. Platt, 1973; Brechner, 1977). Because of the uncertainty of the nature and timing of these negative consequences, the present campaign had a difficult task of convincing people of the urgency to change their behaviour.

This sense of environmental uncertainty is clearly reflected in the responses to additional items in the campaign survey. When asked to indicate how (un)certain they were about the characteristics, causes and consequences of the greenhouse effect (the 27 items, listed in Table 1), 75% of the respondents indicated that they were very uncertain. More important, however, was the relationship between environmental uncertainty and respondents' self-reported behavioural acts (the nine items, listed in Table 3). Although all the correlations were in the predicted direction (i.e. the more environmental uncertainty, the less ecologically sound behaviour), they were not strong (correlations ranging between -0.10 and 0.00). This implies that the present campaign's focus on environmental uncertainty (by educating the public about the characteristics, causes and consequences of the greenhouse effect) as a means to elicit voluntary contributions, was built upon assumed relationships that proved to be very weak.

Social uncertainty. An individual may still be very concerned about the uncertain collective consequences of ecologically unsound behaviours but only be willing to sacrifice self-interests if other parties also do so. Unilateral contributions in order to prevent a collective disaster are futile unless a substantial number of other parties involved behave similarly. Information that other parties do cooperate enhances people's perception that their own cooperative acts can be effective. However, especially in world-wide social dilemmas, the perception of efficacy is attenuated (Kerr, 1989).

The decision to behave cooperatively often rests on trust that others will do likewise. Research in small group settings (see Messick and Brewer, 1983; Liebrand *et al.*, 1992) shows that interpersonal trust develops from interactions that reveal motives and intentions of the other group members. However, many real life dilemmas, like the greenhouse effect, involve large collectives that are extended in space and time, offering little or no opportunity for such direct interaction. With the greenhouse effect issue, individuals lack the knowledge about the contributions made by other parties. They are faced with a great deal of social uncertainty. Acting cooperatively requires a kind of depersonalised trust that operates in the absence of any interaction with other people involved. Depersonalised trust is, however, more likely to develop over dilemmas of relatively small homogeneous social groups, where individuals presume that they share common values, attitudes and goals, than over societal social dilemmas, with various parties having differential resources and differential interests (Wit *et al.*, 1992). With regard to the greenhouse dilemma, individuals need to not only trust in fellow citizens' cooperation but must also trust other parties involved, such as the industrial, agricultural and traffic sectors of society. The questionnaire data indicated a strong positive relationship ($R=0.77$, $N=704$, $P<0.01$) between respondents' self-reported behavioural contributions and the contributions that they expected from other Dutch households. However, when asked, 65% of the respondents were very uncertain whether other households were really contributing to prevent the greenhouse effect. Positive relationships were also found between respondents' self-reported behavioural contributions and the contributions that they expected from other parties, such as the agricultural sector ($R=0.29$, $P<0.01$), the traffic sector ($R=0.28$, $P<0.01$) and the

industrial sector ($R=0.08$, $P<0.05$). But additional data showed that there was even more doubt as to whether these parties really contributed to help preventing the greenhouse effect (70% of the respondents doubted the contributions by the agricultural sector, 81% doubted the contributions made by the traffic sector and 83% doubted the contributions made by the industrial sector). Under these circumstances people do not change their own behaviour but support the implementation of superimposed policy measures. The perceived necessity of such policy measures, as evidenced in the present data, corresponds to the predictions derived from the Structural Goal-Expectation Theory (Yamagishi, 1986, 1988), that built upon Pruitt and Kimmel's (1977) theory. People who, out of concern about the collective consequences of ecologically unsound behaviours, have the goal to achieve mutual cooperation, *but at the same time* doubt whether other parties contribute sufficiently to help preventing the collective problem, opt for structural solutions. Therefore, people delegate their own decisional freedom to an authority that rewards ecologically sound behaviours or punishes ecologically unsound behaviours. Additional data from our questionnaire supported this line of reasoning: the stronger respondents' feelings that their fellow citizens and other parties involved were contributing less than they ought to, the more they were in favour of the listed policy measures ($R=0.25$, $P<0.01$) (Note 3). Furthermore, given the public's pessimistic view on the cooperation that can be expected from other parties, the regression analyses (see Table 4) show that perceived seriousness of the greenhouse effect and emotional concern are more predictive of the perceived necessity of policy measures than of respondents' willingness to show ecologically sound behaviours themselves.

In summary, due to environmental and social uncertainty, people are faced with the question to what extent cooperative acts by *themselves* can have any impact on the prevention of the greenhouse effect, of which the proportions and timing are not even known. If it remains uncertain whether other parties contribute to help preventing the greenhouse effect, people will see their own efforts as wasted. It is unlikely that citizens will be willing to sacrifice some of their personal comfort if not only the collective goals to strive for (i.e. the prevention of ecological disaster) but also the contributions made by other parties are surrounded by so much uncertainty.

5. Implications

A social dilemma approach to environmental problems is not without precedent. Several psychologists have previously suggested the utility of viewing environmental problems as social dilemmas (e.g. Shippee, 1980; Brechner and Linder, 1981; Stern and Gardner, 1981; Messick and Brewer, 1983; Samuelson, 1990). Surprisingly, this approach has received little attention in recent years from applied psychologists working in this area. Most of the work done to encourage environmental conservation behaviour has typically been based on the educational/attitude model, with its basic assumption that knowledge and attitudes guide behaviour. From this viewpoint, to promote ecologically sound behaviour, one must promote knowledge, problem awareness and favourable attitudes in the general public. This has also been the kind of approach followed in the present campaign. The literature on persuasion and attitude change shows hardly any awareness of the dynamics of individual behaviour in situations with the characteristics of a social dilemma (see also Klandermans, 1992). In particular, social uncertainty appears to be a neglected issue. Although some models incorporate beliefs about other parties as a factor distinct from an individual's attitude towards the behaviour concerned (e.g.

social norms in the model developed by Fishbein and Ajzen, 1975), the relationship between beliefs about other parties and the perceived efficacy of one's own behaviour needs increased attention. If we assume that people are aware that the realisation of collective goals in social dilemma situations is dependent on the behaviour of other parties, we may expect them to take into account any available information about the contributions of other parties. A campaign that focuses primarily on environmental uncertainty about the seriousness of the problem by stressing that, until now, too little has been done to prevent the collective disaster, runs the risk of discouraging rather than encouraging contributions. We can hypothesise that, if people take a pessimistic view of the issue and doubt whether enough others will contribute, it is unlikely that they themselves will contribute. As such, expectations about the behaviour of others function as self-fulfilling prophecies. Campaigns that can convince people that their fellow citizens and other parties involved will contribute may be successful in motivating people to contribute themselves.

The present analysis implies that policy makers and campaign designers should not only focus on the public's environmental uncertainty (depicting the seriousness of the greenhouse effect and setting clear collective goals to prevent the problems) but also on social uncertainty. If we assume that perceived efficacy is particularly low in large-scale social dilemmas, it is worth asking how one might combat these feelings. From such a perspective, a campaign should focus on influencing peoples' expectations about the contributions by other parties. Convincing people that other parties also contribute to help preventing the greenhouse effect does not necessarily imply that one is misleading them. It should be possible to focus on the results of successful local and (inter)national initiatives to promote cooperation. Rather than trying to swim against the strong current of low efficacy in large-scale social dilemmas, the greenhouse dilemma can be reframed in terms of smaller issues, small enough for individuals to tackle with reasonable prospects of success. Local programs allow the public to work toward clearly defined common goals and to provide feedback about one another's contributions (cf. Weenig and Midden, 1991). In fact, numerous case studies of local programs to tackle large scale problems, such as energy conservation, have been documented in the literature (see Stern *et al.*, 1981 for a review), depicting a promising alternative to traditional mass media campaigns. For example, recently a new program to promote environmentally relevant behavioural change has been developed by a foundation called Global Action Plan for the Earth (Gershon and Gilman, 1992). A manual provided by the foundation contains practical advice to households to change behaviour in six domains (household waste management, use of gas, electricity and water, mobility and consumption). For each of these domains clear goals are set in group meetings of "EcoTeams", consisting of volunteers. These EcoTeams keep records of their performances in the six domains. A coordinating institution aggregates the achievements of all EcoTeams and provides feedback about the impact of the achieved behavioural changes on the environment on several levels (local, regional, national, global). The program is now in its fourth year, applied in fourteen countries and growing fast. From a social dilemma perspective, the potential of the program lies in the combination of clear goal setting and the reduction of social uncertainty within and among the participating EcoTeams. The real potential for significant contributions from such local community actions to the world-wide problem of the greenhouse effect has yet to be demonstrated empirically.

As far as we know, the present campaign was the first mass media campaign on the greenhouse effect. Considering the costs associated with such large-scale campaigns,

every improvement in effectiveness is valuable. The social dilemma approach outlined above may provide a framework for designing future attempts to help to prevent the greenhouse effect. A programme that aims at persuading individuals to act in the collective interest must not only stress the seriousness of the collective problem at hand but it must also convince the individual that enough other parties will contribute to help in realising desired collective goals, even if only at a local level. Hopefully, this approach will have heuristic value in stimulating further research into effective methods to cope with important environmental social dilemmas.

Notes

Note 1. The separate analysis of each of the behavioural and policy items means that chance capitalisation may influence the findings. The significance level for these analyses was therefore lowered from $P < 0.05$ to $P < 0.01$.

Note 2. Only the results regarding the first knowledge dimension of 13 correct statements on the greenhouse effect are presented in Table 4. The other two dimensions, or the combined effect of all three dimensions, did not improve the explanatory power of the analyses.

Note 3. For this analysis two new variables were created. The first variable is a subtraction of respondents' judgments about what the other parties *should* contribute to help preventing the greenhouse effect minus respondents' expectations about the *actual contributions* by other parties. The second variable is a summation of the perceived necessity of all seven policy measures, as an indication of people's general support for superimposed solutions.

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