

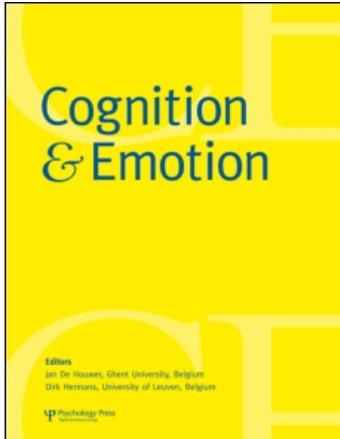
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### Joint presentation reduces the effect of emotion on evaluation of public actions

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# Joint presentation reduces the effect of emotion on evaluation of public actions

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In four experiments conducted on the world wide web, subjects evaluated the priority of policies presented separately or presented jointly in pairs, and/or reported their emotional responses to the problem that each policy addressed. Strength of emotional responses was more strongly related to priority when policies were presented separately than when they were presented jointly. We found evidence for one mechanism that could produce these results: joint presentation increases the evaluability of the policies, thus increasing the influence of cognitive evaluations of importance on priority judgements, and reducing the relative influence of emotional responses. We also found evidence that importance can affect emotional responses. We found no evidence for other mechanisms in which the emotions evoked by one item spread to the other item in joint presentation. The role of evaluability points to the applied value of evaluating policies in the context of alternatives.

**Keywords:** Evaluability; Emotion; Importance; Public policy; Judgement.

## INTRODUCTION

Interest in the different roles of emotions in decision making has grown in the last several years (e.g., Loewenstein & Lerner, 2002). Attention has been focused on the distinction between two kinds of mental processes involved in decision making: an immediate, automatic, intuitive process, and a more analytical and deliberative process (Chaiken & Trope, 1999; Kahneman & Frederick, 2002). Here our interest is in the contrast between emotional and cognitive processes; we make no assumption that emotional

processes are more immediate or automatic. The two processes often yield divergent outcomes. It is thus important to understand what the role of each process may be, and when the behavioural choice is affected more by one of these processes than by the other.

The growing interest in the affective system seems to be matched by a growing appreciation of its importance to human survival. Negative affect triggers action designed to avoid a potentially dangerous situation, while positive affect may promote acts that would help maintain favourable circumstances. In the study of risk preference, the

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“affect heuristic” (Slovic, Finucane, Peters, & MacGregor, 2002) has been proposed as main heuristic that guides people’s behaviour. This proposal has its roots in earlier research on “affect-as-information theory” (Schwarz & Clore, 1983, 2003; see also Forgas, 1994; Pham, 2004, for reviews), a theory that views the person’s affective response to an option as a key aspect of the information concerning this option, brought to bear when making a choice.

Although the affective system may direct attention to potentially high priority events, its role is not entirely beneficial. In their discussion of the “risk as feelings” hypothesis, Loewenstein, Weber, Hsee, and Welch (2001) argued that the direct emotional influence on the decision process (including feelings such as worry, fear, dread and anxiety) often results in behavioural responses that depart from what the individual would view as the best course of action. In particular, stimuli that evoke more immediate emotional response may take precedence over less emotion-arousing stimuli, even if the latter have more important consequences. The arousal of emotions may be affected by factors that don’t always correlate with importance. For example, vividness exerts great influence on emotions, although it does not necessarily reflect the severity of the problem. Attention to emotions has been proposed as an explanation for a large variety of behaviours that depart from principles of rationality, such as people’s willingness to pay for insurance against a specific cause more than they are willing to pay for insurance against a more general, inclusive category of causes (Johnson, Hershey, Meszaros, & Kunreuther, 1993), the general failure to save and invest appropriately for retirement (Weber, 2004), and some distortions in the use of probability (Hsee & Rottenstreich, 2004).

On the other hand, inattention to emotional or affective attributes may sometimes lead to worse decisions. Hsee and his co-workers (Hsee & Zhang, 2004; Hsee, Zhang, Yu, & Xi, 2003) have noted that emotional attributes may be underweighed when the task involves prediction of the decision-maker’s future emotional responses, as in many consumer purchases. Our concern here is

with public policy, where choices affect others and prediction of the emotional responses of those affected would seem to depend largely on the objective consequences (deaths, illnesses, and so on). Although prediction of emotional responses may not be the only situation where emotional attributes are under used, we assume that they are rarely if ever under used in citizens’ judgements about public policy.

### Separate vs. joint evaluation

We are particularly concerned here with the effect of separate versus joint evaluation of different public actions. Earlier studies have compared separate and joint presentation of two conflicting options, one representing a temptation (the “want” option) and the other representing a more proper choice (the “should” option). People tend to prefer the “should” option in joint evaluation but the “want” option in separate evaluation (Bazerman, Tenbrunsel, & Wade-Benzoni, 1998). Presumably the “want” option is more “emotionally desirable”. Thus, for example, Irwin, Slovic, Lichtenstein, and McClelland (1993) found that willingness to pay for an increment in the quality of a consumer good was higher than willingness to pay for an environmental good, but subjects selected the environmental good when they were asked to choose. In a similar vein, Kahneman and Ritov (1994) found that people were willing to pay more for saving dolphins than for preventing skin cancer in farm workers, when the two causes were presented separately, but the preference reversed when they were judged simultaneously. Possibly, the dolphins aroused more intense emotional response than the farm workers, when each was considered on its own, but other considerations came into play when the two were considered simultaneously: these could include cognitive evaluations, or the emotional responses themselves could reverse.

The preference reversals detailed above, as well as a number of other examples, could be explained by assuming that emotions play a relatively greater role in separate than in comparative evaluations. For example, as we shall explain, emotions may

bleed into each other, like colours, when two items are presented together, or, paired presentation could make cognitive (non-emotional) evaluation easier and more salient by allowing comparison of the items. We can think of most evaluative judgements as influenced by a cognitive component and an emotional component. Both of these components can affect separate as well as simultaneous judgements. However, their relative effect may depend on the mode of evaluation, with joint presentation reducing the relative role of emotion. This hypothesis is of interest in part for practical reasons: when emotional influences on judgement are problematic, then one way to reduce them is to present judgements in a comparative context. (And the reverse when emotional responses are under weighed.)

None of these earlier studies tested this hypothesis directly. Our main test was to assess the emotional response to each of two public actions in a pair, and a more cognitive (we assumed) importance judgement of each action. We then assessed the relative priority of the two actions both jointly and separately. The main prediction was that the relative priority of the two actions would be more influenced by relative importance and/or less influenced by relative emotional response when the items were presented jointly, compared to separate presentation. By collecting emotion ratings in both separate and joint presentation, we could also begin to test several alternative explanations of the main result.

The emotions we examined were responses to particular stimuli. They were judgements about the emotion-inducing property of the stimulus, which may be judged as anger-inducing even if it does not induce anger at the time. When we are presented with two stimuli, we can simultaneously judge them as prone to induce different degrees of the same emotion.

### **Possible mechanisms: spill-over, evaluability and capture**

Our experiments addressed three possible mechanisms at work in joint/separate preference reversals: emotional spill-over, evaluability and

capture. Spill-over concerns the emotional component. Joint presentation could blur the distinction between the emotions evoked by the two items. That is, emotion could spill over from one item to the other, thus reducing any effects of emotion differences between them on preference or judgements of priority.

Evaluability concerns the cognitive component. Joint presentation could make it easier to evaluate the attributes of proposals. More generally, it could make the cognitive component (which we call importance) more salient, by calling attention to differences between options. Putting this another way, joint presentations could blur the emotional differences between items but make their cognitive differences more distinctive.

Finally, in combination with evaluability, the emotional responses to the items could be “captured” by cognitive evaluation, thus providing an additional pathway for cognitive effects to influence responses.

Evaluability has been proposed (by Hsee, 1996) as an explanation of the reversals described above. This process does not entail any change in emotional reaction due to context. Rather, as Hsee has found, cognitive evaluations are easier in a comparative context. They are easier because each item provides a reference point for evaluation of the other. In the absence of such a point of comparison, we tend to ask ourselves, “Compared to what?” This requires at least an additional step, and the reference point is likely to be different for different items presented separately. Hsee’s analysis implies that, because comparative evaluations are easier, they are made more quickly and with greater confidence, so they would play a greater role in judgements about the priority of two policy options. The “importance” of a project or policy is inherently comparative. Many projects are valuable, but the need to evaluate them arises largely because of resource limitations. Thus, it is helpful to see any given programme in the context of some other programme, with which it competes for resources.

Hsee (1996) demonstrated an evaluability effect in joint versus separate presentation. He

was concerned mostly with quantitative properties of options, such as the “total harmonic distortion” or “cost” of an audio speaker. He found that people pay more attention to easily evaluated properties such as cost in separate presentation. Joint presentation makes it possible to evaluate the more obscure properties. Our experiments did not involve quantitative properties, but, otherwise, the basic idea that evaluation is easier with joint presentation was preserved.

We tested a new prediction of the evaluability hypothesis, namely, that cognitive evaluations would play a larger role in priority judgements, relative to emotion, in joint presentation than in separate presentation. In Experiment 1, we simply showed that the emotion effect is smaller in joint presentation than in separate presentation. In Experiment 2, however, we used priority judgements in the other condition (joint or separate) as a proxy for importance judgement, and we asked whether the importance judgement, thus measured, was more predictive of priority judgements in joint than in separate presentation.

Although evaluability does not assume an emotional change, such a change may still occur. Hence, preference reversals may also be due to the effect of a comparative context (such as another item) on emotions, rather than being due to the easier cognitive evaluation of the relative importance of the two problems (in which case the reversal of preference will not signify a decrease in the weight of emotions). We tested the possibility that emotions spill over from one item to another, reducing the difference between them, when they are presented jointly. In such emotional spill over, the emotion evoked by one item would affect judgements about the other item, including emotion judgements, or perhaps even actual emotional responses. If one item evokes anger (or is seen as anger evoking), a person may be inclined to attribute anger to the second item too (or judge it as being anger evoking). Such cross-item contamination would reduce the difference between the two items in their emotional responses and in ratings of these responses. That is the main prediction of spill over.

The idea of spill over is related to various other effects in the emotion literature, such as the role of affect as information and the misattribution of mood states (Forgas, 1994; Pham, 2004; Schwarz & Clore, 1983, 2003). Most of this literature involves the induction of a mood or overall emotional state in the subject. We do not expect that such a global effect would result from presentation of a single item about a hypothetical policy. We might expect, however, that the item would evoke emotional associations (Forgas, 1994), which would affect judgements made about an adjacent item, especially judgements about the emotion evoked by the latter item. Possibly related effects are found in the literature on semantic priming through emotional associations (Fazio, 2001). However, this literature generally does not involve explicit judgements about both items.

In “capture”, emotion responses are captured by cognitive evaluations. This process concerns the effect of joint versus separate presentation on emotional responses rather than on preference and thus does not by itself explain preference reversals. (The emotional responses may still influence judgements, but they would mediate the cognitive effects.) The effect of cognitive appraisals on emotions is of course well known from other literature (e.g., Smith & Ellsworth, 1985).

For example, if you are presented with a more important but less emotional problem (say skin cancer in farm workers) together with a less important but more emotional problem (say dolphins threatened by pollution), your specific emotional response to the dolphins is less intense than when the problem is considered on its own, because you have evaluated it cognitively as being less important in view of your belief that dolphins are less important than people. Similarly, your specific emotional response to the skin cancer risk may intensify when the problem is compared to a non-human problem. A reversal of preference may thus stem at least in part from a modification in specific emotional reactions. The emotional reactions would mediate the effects of the comparisons.

## Overview of experiments

Our experiments addressed the existence of reversals in priority and emotions, and compared the role of emotions in separate and joint evaluations. Experiments 1 and 2 compared joint and separate presentation and asked for judgements of priority or importance and judgements of emotional responses. Experiment 3 also examined the relation between emotion and protected values, values that subjects think of as absolute (such as categorical opposition to reproductive cloning), protected from trade-offs with other values (such as a wife's desire to preserve the genes of her dying husband; see Baron & Leshner, 2000; Baron & Ritov, 2009; Baron & Spranca, 1997; Ritov & Baron, 1999). Effects on protected values are of interest because of their pronounced effects on policy judgements (e.g., Dehghani et al., 2009).

The emotion judgements allowed us to assess the possible roles of emotional spill over, capture, and cognitive evaluation. We postpone the results relevant to these questions until after we present the first four experiments, because the relevant analyses are much the same. Experiment 4 asked about capture with cases involving human versus natural problems, which were previously found to cause joint/separate preference reversals (Kahneman & Ritov, 1994; Ritov & Kahneman, 1997). We asked about emotion only, so that the emotion response was not contaminated by any other response.

## EXPERIMENT 1

As we argued earlier, we can think of a priority judgement as influenced by a cognitive (importance) component and an emotional component. Insofar as the emotional component is imperfectly correlated with the cognitive component, and relatively more influential in separate presentation than in joint presentation, we should find that some pairs of items are ordered one way in joint presentation and the opposite way in single presentation. If the emotional component is stronger in favour of item E than for item C

and the cognitive component stronger for C, then we would expect to find that E is given higher priority in separate presentation and C is given higher priority in joint presentation. The opposite kind of reversal (E higher priority in joint, C in separate) should not happen very often.

The predicted reversals would be rare, however, for two reasons. First, we would expect that the emotional and cognitive components are positively correlated (if not perfectly correlated) across items, so, for most pairs, they would not conflict. Second, even when the two components conflict, one might dominate the other in both separate and joint presentation.

Experiment 1 looked for preference reversals of the predicted sort, in which one item leads to stronger emotion and the other is evaluated as more important. We tried to select pairs in which the conflict would be present (but of course we may have been capitalising on error in doing this). The main hypothesis was that cognitive evaluations of importance would play a greater role, relative to emotion, in joint presentation. We also ask (later in this article) whether joint evaluation changes the emotional reaction to each of the problems, as predicted by the spill over and capture hypotheses.

The experiment had two parts, each with separate evaluation (12 items) and joint evaluation (6 items). In the joint evaluation in Part 1, human health problems were paired with environmental problems, as in Kahneman and Ritov (1994), using the same items that they used. In the joint evaluation in Part 2, the joint items were selected so that the emotions were judged to be stronger for one member of the pair. We expected some reversals away from the order defined by emotional strength.

## Method

The study was done on the world wide web. After an introductory web page, the subject saw two blocks of 18 pages each. Each block contained 6 pairs of items presented jointly and the same 12 items presented singly. The joint items in the first block were not part of the main design.

Rather, the separate items in the first block were used to construct new joint items for the second block, such that the two items in each pair differed as much as possible in their emotionality (as assessed from the separate presentation in the first block). The main question concerned the second block. The hypothesis was that the less emotional item in each pair would have a higher priority, relative to the other member of the pair, in joint presentation than in separate presentation, because emotionality would play a smaller role in joint presentation.

The study was completed by 132 subjects: their ages ranged from 14 to 75 (median 37), and 27% were male. Aside from this imbalance in sex, subjects were typical of the US population in income and education (as assessed in other studies with the same population), although some were not US residents. Subjects were paid for each study. To be paid, they had to provide full identification associated with a single e-mail address. Most subjects found our studies by searching for ways to earn money on the web.

Each trial consisted of a web page. The experiment was controlled by a JavaScript program that checked responses and record times (without informing the subjects that times were recorded). The items, based on the "headline" study of Kahneman and Ritov (1994), are shown in the appendix.

The introduction began, "It sometimes happens that budget constraints force a choice between two desirable projects. One has to be given up, at least for now, so that the other can go forward". Then it briefly described the 36 pages to come.

The 36 trials consisted of two blocks of 18, with the order of the 18 trials in each block chosen randomly for each subject. Each block of 18 consisted of 6 joint items (pairs) and 12 single items, the same items used in the pairs.

The joint items in Part 1 were the 6 pairs listed in the appendix, each consisting of a human and a nature item as in Kahneman and Ritov (1994). (We do not discuss the human/nature contrast itself in this article.) The Part 2 pairs were selected on the basis of the separate emotional

reaction in Part 1, so that emotion should favour one of the items, as we describe in more detail below. The subjects saw no break between the two parts.

Each separate item asked about emotion and priority. An example of a separate item is:

Item 1 out of 36:

Headline: SHARP DROP IN VISIBILITY RECORDED IN SEVERAL NATIONAL PARKS

Intervention: Support special fund to improve air quality in parks

1. What priority would you assign? (Click one)

Does not deserve attention

Significant but not important

Less important than most other problems

Moderately important

Important

Very important

One of the most important

Which of the following feelings do you have when you think about this? (Click yes or no for each.)

2. Disgust at the existence of this problem

3. Fear, anxiety, or worry over nothing being done about this

4. Anger at those who want to do nothing about this

5. Sadness if nothing is done

6. Guilt that I have done nothing about this kind of problem

7. Eagerness to do something about this problem

The joint items asked about relative priority and emotion for each member of the pair. An example of a joint item is:

Item 1 out of 36:

Headline A: A THIRD OF THE MASONRY BUILDINGS IN OLDER SECTIONS OF CITIES ARE INADEQUATELY REINFORCED FOR EARTHQUAKE SAFETY

Intervention A: Set up a programme that offers incentives for building owners to strengthen unsafe buildings

Headline B: HABITAT FOR THE SPOTTED OWL IS SEVERELY REDUCED BY

## TIMBER HARVESTING OF OLD GROWTH GROVES

Intervention B: Increase the protected area of old growth timberland in the Pacific northwest to include 10% of all untouched groves to include all untouched groves

1. What priority would you assign to the interventions? (Click one)

A should get absolute priority.

A should get priority, but B should get some resources if possible.

A and B should get equal priority.

B should get priority, but A should get some resources if possible.

B should get absolute priority.

Consider Headline A: A THIRD OF THE MASONRY BUILDINGS IN OLDER SECTIONS OF CITIES ARE INADEQUATELY REINFORCED FOR EARTHQUAKE SAFETY

Intervention A: Set up a programme that offers incentives for building owners to strengthen unsafe buildings

Which of the following feelings do you have when you think about this? (Click yes or no for each.)

2. Disgust at the existence of this problem
  3. Fear, anxiety, or worry over nothing being done about this
  4. Anger at those who want to do nothing about this
  5. Sadness if nothing is done
  6. Guilt that I have done nothing about this kind of problem
  7. Eagerness to do something about this problem
- [Then the same questions were asked about Headline B.]

At the end of the first block of 18 trials (Part 1), the JavaScript program formed pairs of items for joint presentation in Part 2, based on the subject's responses in Part 1. The idea was to make the two items in a pair as different as possible in the strength of their emotional responses. We would then look for cases in which the less emotional item was preferred in the joint presentation.

To pair up the items, the program first computed an emotion score for each item: the sum of

the scores to the emotion questions (coded 1 for yes, 0 for no). It then used this score to rank the items from most emotional to least emotional. To break ties, it used the scores on the priority question (more important getting a higher score), when this was possible. In order to achieve maximal mean difference between the emotions rating of the two members of each pair, the program divided the list of problems into two equal subsets, the top ranking ones and the lower ranking ones. The top problem in the former set was paired with the top one in the latter, the second highest in the top set was paired with the second highest in the lower set, and so on. The higher item was always presented second. If preference corresponds to the emotion ratings, this method of pairing should lead to preference for the higher ranked item in all cases. (And breaking ties with the priority ratings strengthens this prediction.) On the other hand, if emotion is less important in joint evaluation, we should expect some reversals in Part 2, in which the lower-ranked item is preferred in joint evaluation but not in separate evaluation.

Part 2 also presented the 12 single items again, as a control condition. The critical comparison is thus between joint presentation and separate presentation of the items in each pair in Part 2. And, again, the order of all 18 items was randomised for each subject. Subjects could take as much time as they wanted on each question, but times were recorded.

## Results

Here we present the main result concerning preference reversals, specific to Experiment 1. After describing Experiments 2–3, we present the results concerning emotion that are common to all three experiments.

*Preference reversals.* The first hypothesis of interest is that, in Part 2, the joint presentation would lead subjects to give higher priority to the lower ranked item, the one with a weaker emotion response, more often in joint presentation than in the second separate presentation of the same items. Recall that the rankings were derived largely

from the emotion responses to the separate presentation items in Part 1. We would expect to find that the rankings were generally consistent with these responses, but we hypothesised that the number of reversals would be greater in the joint presentation than for the corresponding problems in the separate presentation. Note that the separate presentation trials in Part 2 were intermixed randomly with the joint presentation items (because the 18 items in each part were randomised).

In Part 2, in the joint presentation, subjects gave higher priority to the higher ranked (more emotion arousing) item in 54% of the pairs, with 12% going the other way. For each pair, we looked at the responses to the corresponding items presented separately. The higher ranked item was given higher priority in 78% of these corresponding pairs, with 3% going the other way. The priority difference between the two items was thus smaller in joint presentation, as hypothesised. The size of the hypothesised interaction effect is thus  $(0.78 - 0.03) - (0.54 - 0.12)$  or 0.33, where the most extreme possible shift would be  $(0.78 - 0.03) - (0 - 1.00)$  or 1.75, if all pairs reversed in joint presentation.

We counted a hypothesised preference reversal if the higher-ranked (more emotion arousing) item in a pair was given higher priority than the lower-ranked item in separate presentation and lower priority in joint presentation. In the opposite case, the higher ranked item got higher priority in joint presentation and lower priority in separate presentation. Hypothesised reversals made up 6.6% of the cases, and the opposite reversals made up 0.3%, a significant difference,  $t(131) = 6.59$ ,  $p = .0000$ , tested across subjects.<sup>1,2</sup> In sum, the results support the hypothesis that emotion differences, as assessed in separate presentation, have more effect in separate evaluation

than in joint evaluation. Another way to describe the result is that emotion in Part 1, in separate presentation, is more predictive of priority in separate presentation in Part 2 than of priority in joint presentation in Part 2.

As we explained earlier, the number of possible reversals is necessarily small in part because of the correlation between emotion and cognition. The mean within-subject correlation, in the second part, between priority and emotion in separate presentation was .66, with 73% perfect agreement between the emotion order and the priority order of each pair—and because, even when cognition and emotion pulled in opposite directions, the emotion response would dictate the priority in joint presentation some of the time.

## EXPERIMENT 2

We have suggested that joint presentation reduces the influence of emotion at least in part because the priority of options is easier to evaluate when they are next to other options. Thus, in rating the options, subjects will attend relatively less to emotion and relatively more to what they think of the policy itself. This is the assumption of the evaluability mechanisms.

Experiment 2 sought more direct evidence of evaluability. We used the 12 cases from Experiment 1, but the pairs were this time only within category (nature or human). We compared all possible combinations of these cases with the same cases presented singly. We asked about priority of each issue in joint presentation as well as separate presentation (unlike Experiments 1 and 3, where we asked about relative priority in joint presentation), and we also asked about emotional reactions to each issue. We compared priority in separate presentation and emotion in joint presentation as

<sup>1</sup> This result was significant when the categories in each pair were human/nature, nature/human, or the same. Thus, it did not apparently result from the effect of contrasting different types of problems, which led to the reversals of the sort described by Ritov and Kahneman.

<sup>2</sup> The result is unlikely to be due to an order effect resulting from the most important member being presented second. When the two items in a pair were rated equally important in separate presentation in Part 2, the second item was given slightly higher priority in joint presentation; a mean of .08, where 1 is a step on the response scale. This was not significant of course.

predictors of priority in joint presentation, and we compared priority in joint presentation and emotion in separate presentation as predictors of priority in separate presentation, by computing within-subject correlations. (We did not do this in Experiment 1 because of the human/nature difference in Part 1 and the intentional lack of variation in emotion differences in Part 2.) In other words, we predicted priority in each condition (separate vs. joint) from priority in the other condition and emotion in the same condition.

An evaluability effect would imply that priority in joint presentation (Priority-joint) is more affected by priority in separate presentation (Priority-separate) than the reverse. Both priority measures are affected by an underlying variable of “importance” and an underlying emotional response, but the evaluability hypothesis holds that importance has more effect in joint presentation than separate presentation. Thus, the regression weight of Priority-separate when predicting Priority-joint (from Priority-separate and Emotion-joint) will be higher than the weight of Priority-joint when predicting Priority-separate (from Priority-joint and Emotion-separate). The corresponding effects of Emotion-joint and Emotion-separate—which we assume to be affected by the same underlying variables—will be the same or even reversed (if the variance of priority judgements is unchanged despite the greater effect of importance in joint presentation), leading to an interaction between the coefficients for Priority and Emotion as a function of the direction of prediction.

## Method

Ninety-two subjects completed the study. (Five others were eliminated because they gave the same response to one or more questions in every case. Also, 14 subjects had missing data on 25% of the problems because of a programming error that was corrected after one of them pointed it out; we used their remaining data anyway, and they did not differ from other subjects in the main results.)

The items were all the items from Experiment 1, but we used only the 30 same-category pairs for the joint presentation condition, with the order of items within each pair randomised within the session. Thus, we presented the 30 pairs and 12 single issues for a total of 42 trials, in a random order chosen for each subject. In the joint condition, the two cases were presented together and the subject was told that a choice between the interventions was required. Then they were presented again, on the same page, for additional questions about emotions and priorities. The first question followed each headline:

Rate the strength of your emotional reaction when you think about this problem. Consider your feelings of disgust, fear, anxiety, worry, and anger, and also any feelings of guilt for having done too little about it.

NO EMOTIONS AT ALL ↔ ↔ ↔ ↔ ↔ ↔ ↔  
↔ ↔ EXTREMELY STRONG EMOTIONS

The second question followed each intervention:

What priority would you assign to this intervention? (Click one)

Does not deserve attention.

Significant but not important

Less important than most other problems

Moderately important

Important

Very important

One of the most important.

## Results

The main analyses were within-subject correlations and regressions involving four variables, Emotion-separate, Emotion-joint, Priority-separate, and Priority-joint. The names correspond to the questions, and separate versus joint to whether the presentation was separate or joint. For convenient analysis, we put each subject’s data into a form based on the 30 joint trials. Thus, the joint trials, for each subject, had 60 numbers representing the emotion judgements, two for each of the 30 pairs, and 60 numbers representing the priority judgements. Then we created 30 artificial pairs from the

12 separate trials, so that each of the artificial pairs had the same two items as the corresponding pair of the joint items. From these artificial pairs, we derived 60 numbers for the emotion judgements and 60 for the priority judgements. Of course, this procedure meant that each of the 12 judgements for the separate items was repeated five times. This repetition would exaggerate the results of any significance test of a within-subject regression. But we did no such significance tests. Instead, we simply computed the regression for each subject, then tested coefficients across subjects.

The primary hypothesis concerning the evaluability mechanism concerns the determinants of priority judgements. Importance, the cognitive component, should have a greater effect in joint presentation than it has in separate presentation, because of the evaluability effect. The effect of emotion should be no greater in joint presentation than in separate presentation. (The effect of emotion might be less in joint presentation if there is a spill-over effect. We discuss this possibility later.) Putting these two predictions together, we can say that the relative influence of importance, compared to emotion, should be greater in joint presentation than in separate presentation. To test this hypothesis, we regressed, within each subject, Priority-joint on Emotion-joint and Priority-separate, and we regressed Priority-separate on Emotion-separate and Priority-joint. Thus, we used the priority measure from the other trial type (joint vs. separate) as a measure of importance, and we used emotion from the same trial type.

Table 1 shows the results. As hypothesised, priority (from the other condition) plays a relatively larger role in predicting priority judgements in the joint judgements. The difference for the importance measures (.39 vs. .35) was significant,  $t(91) = 2.21$ ,  $p = .0293$ , two tailed. This

result supports an evaluability mechanism, since this mechanism implies that importance is easier to evaluate in joint presentation and should therefore have a greater influence on the judgement. The difference for the emotion coefficients (.52 vs. .57) was not significant,  $t(89) = 1.46$ ,  $p = .1479$ . But the interaction, the relative effect of emotion and importance for joint versus separate (measured for each subject and tested across subjects) was significant,  $t(89) = 2.07$ ,  $p = .0409$ .

As another test of the main hypothesis of joint/separate reversals, we looked for reversals in which the priority ordering of two problems, A and B, differed in joint and separate presentation, as in Experiment 1. Reversals favouring A in separate presentation (or B in joint presentation) should occur when the emotional response to A is greater than that to B. We measured emotion by summing the emotion measures in separate and joint presentation for each item. Although 47 subjects had no reversals (and only 9% of the cases for the remaining 45 subjects showed reversals), the within-subject correlations between reversals and emotion were in the predicted direction for the remaining 45 subjects, mean  $r = .05$ ,  $t(44) = 2.18$ ,  $p = .0348$ . The mean emotion difference between the two items in a pair was 0.66 on the 7-point scale when reversal occurred (estimated on the basis of within-subject regression of emotion difference on reversals).

### EXPERIMENT 3

Most people have some values that they think of as absolute, not to be traded off for anything else. These are an extreme form of priority judgements, as they give absolute priority to one sort of outcome. They include values for the natural environment, human or animal life, human rights,

**Table 1.** *Unstandardized regression weights for Experiment 2*

<i>Dependent variable</i>	<i>Emotion measure</i>	$\beta$	<i>Importance measure</i>	$\beta$
Priority-joint	Emotion-joint	.52	Priority-separate	.39
Priority-separate	Emotion-separate	.57	Priority-joint	.35

sacred objects, and works of art and other human creations. Baron and Spranca (1997) called these protected values (PVs) and proposed a theory of the nature of these values. They proposed that the values arise from deontological rules, rules concerning actions rather than consequences. By this account, what is absolute is the prohibition against acts that would destroy species of animals or violate human rights. PVs concern actions but not omissions (Baron & Leshner, 2000; Baron & Ritov, 2009; Ritov & Baron, 1999). Failure to prevent an outcome such as the disappearance of a species may be bad, but the prohibition against such omissions is not absolute. If it were, people who held such values would be obliged to spend their lives looking for ways to promote them.

Protected values are associated with emotions (Baron, 2003; Dehghani et al., 2009). If emotions influence PVs and joint presentation reduces the relative effect of emotions, then joint presentation should also affect the expression of PVs. We tested this with a modified form of Experiment 1, using all pairs of a smaller set of cases. More generally, the tendency to see values as absolute may be seen as a rating of extreme priority, so that the rating may be influenced by anything that influences priority. If cognitive evaluation is easier in joint presentation, and if cognitive evaluation causes people to see values as less absolute, we would get the same prediction.

## Method

To avoid an excessive number of pages, we removed the myeloma, CO<sub>2</sub> oil burning, and coral reefs cases from the cases used in Experiment 1. We used all 36 (non-identical) pairs of the remaining 9 cases for the joint pages, and we presented the 9 cases for the single pages, for a total of 45 pages. Order of the two items in joint presentation was randomised for each subject.

The priority questions for joint and separate presentation were the same as those used in Experiment 1.

We again used a 1-item emotion questions for both separate and joint presentation, "Rate the strength of your emotional reaction when you

think about this problem. Consider your feelings of disgust, fear, anxiety, worry, and anger, and also any feelings of guilt for having done too little about it". Subjects responded on a 7-point scale ranging from "No emotions at all" to "Extremely strong emotions". This item followed each headline in the joint pages.

We also added a PV question to both single and joint presentation, following each emotion question:

Which of the following best expresses your view about the problem?

The problem must be addressed no matter how much it costs.

The problem should be addressed, but only if its cost is reasonable.

Nothing needs to be done, even if its cost is very low.

The first answer was counted as a PV.

The 105 subjects, recruited as in Experiment 1, ranged in age from 19 to 68 (median 41), and they were 37% male.

## Results

We replicated (within the constraints of the present design) the main findings of the first two experiments concerning the relative role of emotion in joint and separate presentation. For the emotion measure for each case, we added together the responses for the separate and joint presentations of that case. The hypothesis is thus, for a pair of cases *A* and *B*, a greater *B*–*A* emotion difference will correlate with preference reversals in which *B* is lower in priority than *A* in the separate condition and *A* is lower in the joint condition. We computed this correlation within each subject, using a measure of preference reversals with the sign indicating the direction of the priority reversal. The mean of these correlations (between emotion difference and preference reversal, within each subject) was 0.12 (*SD* = 0.18),  $t(100) = 5.69$ ,  $p < .00005$ .

The mean proportion of PVs was 0.370 for the separate items and 0.356 for the joint items (*SD* = 0.27 for both); the difference, although very small,

was almost significant across subjects,  $t(104) = 1.78, p = .0780$ .

For PVs, we counted a preference reversal for two cases, A and B, if case A showed a PV in separate presentation, B did not, and the same difference did not occur in joint presentation. (In joint presentation, this could mean that A and B both showed PVs, neither did, or B did. We counted “both” and “neither” here because joint presentation was implicitly comparative.) Of pairs of (non-identical) cases presented separately, 0.36 had PVs in one item but not the other. Only 0.09 of the items showed preference reversals as just defined, and 0.39 of the subjects had none of them.

Our prediction is that such reversals will occur when the overall emotion measure (combining joint and separate) is higher for the case that has the PV in single presentation than for the other case in the pair. We correlated this emotion difference with the direction of the reversal (whether the PV was in one case or the other), within each subject. The mean correlation was .09,  $t(59) = 2.69, p = .0092$ , across subjects. Although this result is small in magnitude, relevant cases are necessarily rare. Perhaps a better index of the magnitude of the effect is a comparison of the within-pair emotion differences corresponding to reversals in one direction with emotion differences corresponding to reversals in the other direction. The mean difference of emotion differences was 0.67 (out of a maximum possible difference of 12), corresponding to  $t(348) = 2.27$  (effect size, .12).

In sum, the main result was that joint presentation also led to preference reversals for PVs. We suggest that this is because PVs are influenced by emotion as well as by a cognitive component, and the emotional component is less effective with joint presentation, and/or the cognitive component is more salient. (Results from Baron &

Ritov, 2009, showing little effect of emotion on PVs, are consistent with the latter possibility.)

## EMOTION RESPONSES IN EXPERIMENTS 1–3

Here we discuss the results concerning spill over and capture from the first three experiments.

### Spill over

In all three experiments, emotional responses to the two items in a pair were closer than the responses to the two items presented separately, as predicted by spill over. However, this difference could result from a simple tendency to give similar responses to similar items on the same page, a general property of judgements. Experiment 2 provided a more direct test. Specifically, an effect in judgement (rather than spill over) would apply to priority judgements as well as to emotion. To test this prediction we computed for each subject the standard deviation of the joint-presentation differences for emotion and for priority, and the standard deviation of the same differences inferred from separate presentation. The standard deviations were higher for Emotion-separate (mean 1.40, in the units of the 7-point response scale) than Emotion-joint (1.32) and likewise higher for Priority-separate (1.41) than Priority-joint (1.36). Although the first difference was significant and the second was not, importantly the difference of differences was not significant,  $t(91) = 0.90, p = .3730$ . A similar analysis of Experiment 4 yielded an interaction in the opposite direction. In sum, we find no evidence for a spill-over effect. Evidently the closeness of the ratings in joint presentation is not specific to emotion.<sup>3</sup>

Additional evidence for the lack of a spill-over effect is found in Experiment 2, where the

<sup>3</sup> We found little evidence for increases or decreases in emotion resulting from joint presentation itself. In Experiment 1, “yes” responses to emotion questions were 52% in separate and 54% in joint in Part 1; 55% in separate and 56% in joint in Part 2. (*SDs* of subject means ranged from 22% to 24%.) In Experiment 2, the mean emotion responses were 4.5 on the 7-point scale for both single and joint judgements. In Experiment 3, the mean emotion score (out of 6, with the lowest response counted as zero) was 3.52 for the separate items and 3.59 for the joint items, a small but significant difference,  $t(104) = 2.58, p = .0114$ .

effect of emotion on priority judgements (the unstandardised regression coefficient) was not significantly reduced in joint presentation, compared to separate presentation.

### Capture

The capture mechanism implies that priority judgements affect emotion. It implies an effect of joint versus separate presentation on emotion, caused indirectly by their effect on cognitive evaluation.

Consistent with this hypothesis, priority and emotion judgements were highly correlated in all four experiments. For example, in Experiment 1 Part 1, emotion in the single items correlated .57 with importance (mean of within-subject correlations,  $SD = 0.24$ ). (All emotions played a role in these correlations. Correlations with importance in single items in Part 1 were (across all subjects and items): disgust .374; fear .533; anger .467; sad .416; guilt .312; eager .445.) But such correlations could arise from effects of emotion on priority or common influences on both.

The difference between joint and separate presentation could be seen as an experimental manipulation that affects mainly, or entirely, cognitive evaluation. We have found no good evidence that it affects emotions independently. If we provisionally assume that the joint–separate effect is purely cognitive, we can use this manipulation to ask whether changes in cognitive evaluation affect emotions. Specifically, we can ask whether the effects of joint versus separate presentation on priority are paralleled by effects on emotion. When the priority difference between the first and second members of a pair changes in one direction, does the analogous emotion difference change in the same direction?

Table 2 shows across-subject correlations among three measures. One is the mean emotion difference between a pair of items. This is not a change measure. The emotion difference is the mean of the difference in separate presentation and the difference in joint presentation.

The second measure is the change in the priority difference. In Experiments 1 and 3, we

standardised the two priority measures within each subject because they were on different scales. The results we have reported imply that this change in priority difference will be positively correlated with the emotion difference measure as we move from joint to separate. As shown in the top row of Table 2, we found this correlation in Experiments 1–3. This result is consistent with our claim that priority judgements in joint presentation are less influenced by emotion, arguably because they are *more* influenced by cognition.

A third measure is the change in the emotion difference. If a change in priority affects emotions, then this difference should correlate with the priority change measure. This is the main prediction of the capture hypothesis. As shown in the second row of Table 2, we found this correlation in all three experiments. (For completeness, we include the correlations of the emotion difference with the emotion change measure. These are not significant.)

However, this result does not support the capture hypothesis as strongly as it might, since this effect might result from a tendency to give consistent responses. Experiment 4 avoids this problem by not asking for priority responses at all.

## EXPERIMENT 4

The present experiment asked about emotional capture by looking at the effect of joint versus separate presentation on emotions ratings alone, without any questions about priority or importance. It used the human/nature difference found by Kahneman and Ritov (1994) to manipulate cognitive evaluations; indeed, because this effect is based on category membership, we assume that it is the result of effect of cognitive judgement on emotion, rather than the reverse. We hypothesise that emotions will show the effect found for priority judgements: risks to humans will seem more serious and evoke more emotional reactions, relative to risks to nature, when they are presented jointly than when both types of risks are presented singly. We do not ask here whether emotions affect priority

**Table 2.** *Emotion differences and changes in emotion and priority differences, Experiments 1–3*

<i>Experiment</i>	<i>1</i>	<i>2</i>	<i>3</i>
Mean emotion difference and change in priority difference	$r = .10$ $t(119) = 2.84$ $p = .0053$	$r = .05$ $t(89) = 1.70$ $p = .0919$	$r = .13$ $t(99) = 6.69$ $p = .0000$
Change in emotion difference and change in priority difference	$r = .18$ $t(117) = 4.69$ $p = .0000$	$r = .38$ $t(89) = 11.10$ $p = .0000$	$r = .27$ $t(98) = 10.43$ $p = .0000$
Mean emotion difference and change in emotion difference	$r = .06$ $t(125) = 1.36$ <i>ns</i>	$r = .03$ $t(91) = -0.85$ <i>ns</i>	$r = .01$ $t(99) = 0.32$ <i>ns</i>

judgements; we ask only whether they are affected (captured) by factors that affect these judgements.

The present experiment used a between-subject design, which is usually less sensitive to small differences, but we tested many subjects and carried out all statistical tests across stimuli.

## Method

The emotional reactions were elicited in the questionnaire, by asking subjects to indicate which of the following feelings they experienced when thinking of the headline problem: (1) anger at people who do not do anything about the problem; (2) sorrow that such a problem exists; (3) self-blame for not doing anything about it; (4) anxiety and fear about the consequences of the problem; (5) disgust at the thought of such a problem existing; or (6) an urge to take some action to resolve the problem. The responses were given by circling either “yes” or “no” next to each feeling.

Eight problems were employed in this experiment, four of which were environmental and the other four were human:

### *Environmental problems*

The coral reefs in Eilat are badly damaged as a result of sea farming.

The construction of marinas along the Mediterranean shores causes the sand to gradually disappear.

The population of tigers in the Negev desert is threatened with extinction.

Large areas of natural forest in the Carmel are cleared due to avoidable fires.

### *Human problems*

The foreign workers live in poor conditions, and have no social insurance.

Many of the workers recently fired in the textile industry cannot afford to celebrate the holidays.

Released convicts return to crime, in the absence of rehabilitation programmes.

The children in “Hatzrot Yosef” do not have a playground.

In the separate evaluation condition each questionnaire presented a single problem (either environmental or human), and elicited the emotional responses. In the joint evaluation condition two problems were presented at the top of the page. These were followed by emotional responses to the first problem, and then the emotional responses to the second problem (all on a single page). All possible pairs of problems were used, and the order of the problems was reversed in half of the questionnaires. Altogether there were 8 separate evaluation and 56 joint evaluation versions.<sup>4</sup>

A total of 745 students at the Hebrew University were randomly assigned to one of the versions, so that 128 saw the joint presentation of items from different categories (human or environmental), 361

<sup>4</sup> The joint-evaluation versions with the two items from the same category—human or environmental—were done a few months after the others, but in the same way and to subjects drawn from the same population.

**Table 3.** Mean proportion of yes answers (out of 6) in each cell

	<i>Environmental</i>	<i>Human</i>
Presented singly	0.510	0.530
Paired with same category	0.506	0.557
Paired with other category	0.466	0.592

saw the joint presentation of problems from the same category, 128 saw only a single environmental problem, and 127 saw only a single human problem. The upshot was that 32 subjects did each of the single problems, about 15 subjects did each combination of the within-category jointly presented problems, and 8 subjects did each combination of the between-category problems.

## Results

We used the item as the unit of data analysis. For the joint presentation, we collapsed across order (first or second item in the pair) after determining that order had no significant effect.

The proportion of “yes” answers (out of 6 emotions) served as the primary measure of the emotional response to each problem. Table 3 shows the mean response as a function of category and type of presentation.

Although human problems aroused more emotion on the average than environmental problems, this difference increased when the two problems types were presented together, as shown in the last row of Table 3 compared to the single presentation,  $t(6) = 3.17, p = .0192$ , comparing the 4 human and 4 environmental cases, or to the same problems presented jointly with other problems from the same category,  $t(6) = 2.43, p = .0511$ .

This experiment provides evidence for the capture of emotions by cognitive judgements, since the effect of joint presentation must be cognitively mediated.

## DISCUSSION

The main result (Experiments 1 and 2) is that priority judgements are affected by two different factors, which we call importance and emotion, as measured by emotion judgements. Importance is assumed to affect priority judgements primarily, although priority judgements are also affected by emotions. The relative influence of importance, compared to emotion, on priority judgements is greater in joint presentation than in separate presentation. Thus, Experiments 1 and 2 (and 3, for PVs) show preference reversals in which the more emotional item has higher priority in separate presentation but the other item has higher priority in joint presentation. Experiment 2 uses the priority rating of the same item in the other condition (joint vs. separate) as a proxy for importance, finding that this judgement has more effect on priority judgements in joint than in separate presentation.<sup>5</sup>

Experiment 3 found reversals in expressions of protected values (PVs), which may be seen as extreme priority judgements. Again, this result can be explained in terms of joint presentation leading to increased attention to cognitive factors, thus reducing the role of emotional factors. This result adds to the findings of Baron and Leshner (2000), which showed that PVs are somewhat malleable. It also calls attention to one of the practical effects of emotion in judgements about public policy.

The small magnitude of the effects we found can be understood as a consequences of the fact that emotion and importance (or priority, or PVs) varied spontaneously. The correlation between emotion and importance was high. Experiment 2 provided the clearest example of this correlation because it asked about importance and emotion in both single and joint presentation. The median within-subject correlations of interest were: Importance-joint and Emotion-separate .71, Emotion-joint and Importance-separate .70,

<sup>5</sup> In an additional experiment, we found that reversals also occur in a ranking task, in which subjects ranked several proposals. The ranking task, like joint presentation, reduced the effect of emotion, so that items with strong emotional responses tended to be ranked lower than their separate-presentation priority ratings would imply.

Importance-joint and Importance-separate .79, and Emotion-joint and Emotion-separate .72. The last two correlations serve as a kind of test-retest reliability measure for importance and emotion. The product of the last two correlations (.57) estimates the theoretical upper limit of the product of the first two correlations, which is not much lower (.49). There is thus little scope for the separation of emotion effects and importance effects. Despite this lack of scope, we found such effects.

We suggested two mechanisms that might explain the main effects: increased evaluability in joint presentation and emotional spill over. We found no evidence for spill over. Although emotion ratings of a pair of items were a little closer in joint presentation than in separate presentation, this convergence was no greater than that for priority ratings. The convergence thus appears to be a general property of judgement, not specific to emotion.

A spill-over effect might exist if our stimuli were real rather than hypothetical. Subjects in our experiments may have been making a kind of predictive judgement of true emotion. Recognising the hypothetical nature of our stimuli, they may have judged what they *would* feel if the situation were real, rather than what they were actually feeling.

We attempted to elicit more real emotions in a follow-up experiment using 16 news headlines about bad events and brief excerpts from Google News on the day of the study (9 October 2005, shortly after a major earthquake in Pakistan, a mudslide in Guatemala, and with hurricane Katrina still in the news). Each of 83 subjects saw all 16 stories separately, and 16 pairs of them, intermixed and randomly chosen (each story appearing once on the top and once on the bottom of the pair). We replicated the main finding of preference reversals: the mean within-subject correlation between the direction of reversals and the signed difference in emotion ratings between the two items in a pair (averaged over joint and separate) was 0.13,  $t(67) = 6.18$ ,  $p < .00005$ , 16 subjects provided no relevant data. Just as in Experiment 2, the emotion ratings converged in

joint presentation (1.41 in separate to 1.37 in joint on a 5-point response scale), but this convergence was not significantly greater than that for the priority ratings (1.42 to 1.39 on a similar 5-point scale),  $t(82) = 0.6$  for the difference of differences. Once again, we found no evidence for spill over.

Despite the limitation that results from the use of hypothetical cases, we have no reason to expect that the effect of evaluability would be reduced by variables that do not also effect real emotions in joint or separate presentation. Moreover, some evidence suggests that people do experience real emotions when reading hypothetical cases (Greene, Sommerville, Nystrom, Darley, & Cohen, 2001; Greene, Nystrom, Engell, Darley, & Cohen, 2004).

We also asked whether cognitive judgements “capture” emotions. Experiments 1–3 provided evidence consistent with a capture mechanism: condition effects (joint vs. separate) on the within-pair difference in emotion were correlated with condition effects on within-pair differences in priority. Experiment 4 provided better evidence: emotion responses were affected by the categories of the items presented jointly. Human items aroused relatively more emotion than natural items in joint presentation, presumably because of the contrast of the categories. This contrast is not inherently emotional, so we take this result to indicate that emotions are affected by cognitive judgements. (Baron, 1992, also found that manipulations of moral judgements also affected anticipated emotions.)

To the extent to which emotional effects are undesirable when they conflict with cognitive evaluations, joint presentation has an advantage in discussions of public policy, and perhaps elsewhere. It would lead to a less biased evaluation of policies. Although this advantage is small when emotion and importance are as highly correlated as they are in our cases, we can imagine situations in which the correlation is broken, e.g., by explicit attempts to arouse emotion (Kuran & Sunstein, 1999). Joint or comparative presentation is also more realistic. As we said, the need for evaluation arises from competition for limited resources. When some new risk materialises, such as a new

form of flu or a new type of terrorist attack, governments and citizens tend to want to “do something”, usually to increase the resources available for protection against the risk at hand. Although such responses may be appropriate, they may in some cases be excessive. Some perspective may be gained by putting the new, more emotion-arousing, risk in the context of other risks that have been neglected and that are, in the judgment of experts, just as dangerous.

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## APPENDIX

## Items used in Experiment 1

Each involved a title, a headline, and a description of an intended action. The double lines separate pairs, each pair consisting of a human item and a nature item.

Lead paint poisoning: MANY INNER CITY HOMES HAVE LEAD-BASED WALL PAINT. LEAD POISONING AFFECTS THE CENTRAL NERVOUS SYSTEM	Set up program to replace lead-based paint in low-income neighborhoods replace lead-based paint and provide free blood tests for lead poisoning in low-income neighborhoods
Elephants: ELEPHANTS IN ASIA AND AFRICA ARE THREATENED WITH EXTINCTION BECAUSE OF HUNTING BY IVORY POACHERS	Join international efforts to provide protection for elephants and to control ivory trade
Skin cancer in farmers: SKIN CANCER FROM SUN EXPOSURE IS SUSPECTED AMONG FARM WORKERS	Support medical checkups for threatened groups
Australian mammals: SEVERAL AUSTRALIAN MAMMAL SPECIES NEARLY WIPED OUT BY HUNTERS	Contribute to worldwide fund to provide safe breeding areas for these species
Increase in myeloma: A RISE IN THE INCIDENCE OF MULTIPLE MYELOMA (A TYPE OF MARROW CANCER) AMONG THE ELDERLY (75 AND OVER)	Increase research on multiple myeloma
Coral reefs: CORAL REEFS IN FLORIDA IMPERILED BY OIL SPILLS AND RIVER POLLUTION	Create marine sanctuaries and divert tanker traffic
Earthquake safety: A THIRD OF THE MASONRY BUILDINGS IN OLDER SECTIONS OF CITIES ARE INADEQUATELY REINFORCED FOR EARTHQUAKE SAFETY	Set up a program that offers incentives for building owners to strengthen unsafe buildings
Spotted owl: HABITAT FOR THE SPOTTED OWL IS SEVERELY REDUCED BY TIMBER HARVESTING OF OLD GROWTH GROVES	Increase the protected area of old growth timberland in the Pacific northwest to include 10% of all untouched groves to include all untouched groves
Toxic spills: INCREASING INCIDENCE OF ACCIDENTS INVOLVING SPILLS OF TOXIC CHEMICALS	Institute special training programs for emergency personnel
Visibility: SHARP DROP IN VISIBILITY RECORDED IN SEVERAL NATIONAL PARKS	Support special fund to improve air quality in parks
CO <sub>2</sub> -oil burning: CARBON DIOXIDE EMITTED IN THE PROCESS OF OIL BURNING IS SUSPECTED TO BE ONE OF THE MAJOR CAUSES OF GLOBAL WARMING	Increase research on solar energy technology
Dolphins: DOLPHINS IN THE MEDITERRANEAN SEA ARE THREATENED BY POLLUTION	Contribute to international fund to save the Mediterranean Dolphin