Uncertainty in social dilemmas

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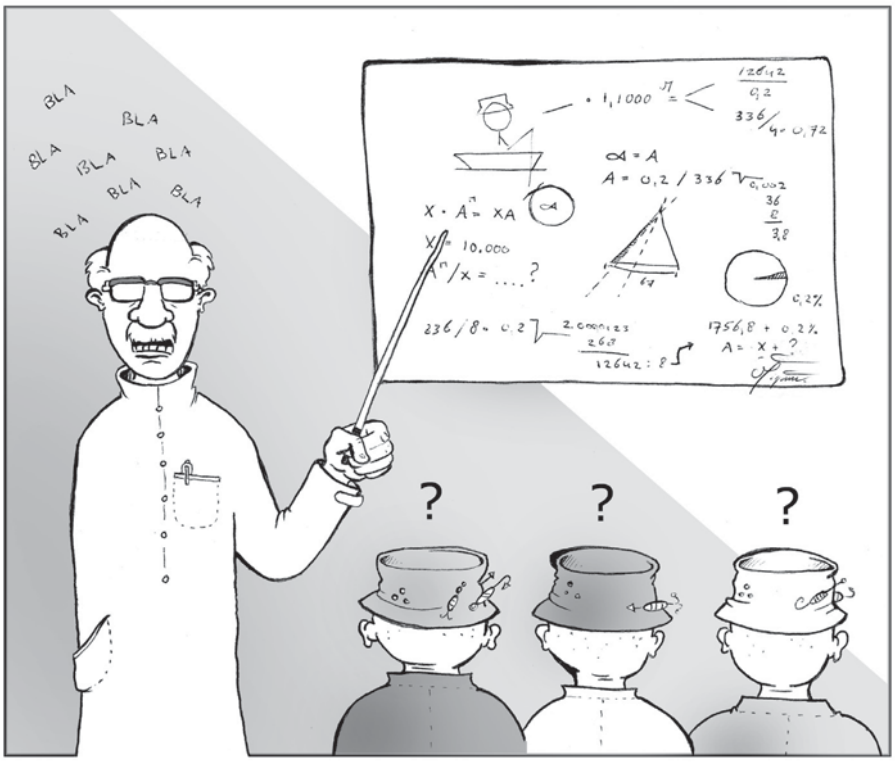

To summarize...

Chapter 6
General Discussion

The main objective of the present dissertation was to provide a more comprehensive perspective on environmental uncertainty in social dilemmas. I argued that environmental uncertainty hampers the application of the equal division rule. In accordance with this idea, the present dissertation showed that environmental uncertainty affects several interpersonal processes that are related to the application of this rule. More specifically, environmental uncertainty has consequences for three key aspects of interpersonal processes in social dilemmas, namely, for (a) how people tacitly coordinate their harvesting decisions, (b) how they justify their harvesting decisions to others, and (c) how they respond affectively to their fellow group members after overuse.

In this chapter, I will briefly summarize the most important findings of the experimental studies that were presented in the previous chapters. However, the main aim of this chapter is to put these findings in a broader perspective. For this purpose, I will elaborate on the general implications of these findings and I will give suggestions for future research.

Summary of the Main Findings

Chapter 2 and 3 investigated how environmental uncertainty affects tacit coordination. These chapters focused on the influences of the equal division rule and social value orientations under resource size uncertainty (Chapter 2) and under group size uncertainty (Chapter 3). The findings showed that under environmental certainty proselfs as well as prosocials tacitly coordinated their decisions by adhering to the equal division rule, whereas under environmental uncertainty (i.e., resource size uncertainty or group size uncertainty) proselfs harvested more from the common resource than prosocials.

In Chapter 4, two experimental studies were conducted to investigate how people justify their harvesting decisions under resource size (un)certainty. These studies showed that under certainty participants indicated that harvests adhering to the equal division rule were easiest to justify and they adhered to this rule when they had to justify their harvesting decisions to their fellow group members. By contrast, under uncertainty participants indicated that relatively low harvests were easiest to justify and they restricted their harvests when they had to justify their decisions to their fellow group members.

In Chapter 5, three experimental studies were conducted to investigate how people react affectively after overuse under resource size (un)certainty. These studies demonstrated that under certainty participants' affective and retributive reactions after overuse were more negative than under uncertainty. Furthermore, the findings showed that this can be explained by the fact that under certainty participants attribute overuse more to the harvesting behavior of their fellow group members than under uncertainty.

General Implications

A central theme of the present dissertation is that the equal division rule is an important division rule in social dilemmas. But why is this rule so important? According to Messick (1993), the equal division rule has three characteristics that make it highly useful and appealing. First, the rule is easy to implement and requires little cognitive effort. Second, the rule promotes group efficiency because it generates clear decisions which often lead to successful coordination. And third, decisions that conform to this rule can be easily justified because they are in accordance with a general norm of fairness. Because of these appealing characteristics it is not surprising that people often base their harvesting decisions on the equal division rule (e.g., Allison, McQueen, & Schaerfl, 1992; Allison & Messick, 1990; Rutte, Wilke, & Messick, 1987; Van Dijk & Wilke, 1993, 1995; Van Dijk, Wilke, Wilke, & Metman, 1999).

However, in the present dissertation I also argued that there are limits to the applicability of the equal division rule. In other words, the rule cannot always be so easily applied (for articles on the limits on applying the equal division rule, see Allison et al., 1992; Allison & Messick, 1990). After all, in order to calculate an equal share people need specific and accurate information about the task environment of the social dilemma. More specifically, in a common resource dilemma group members need to know exactly how large the common resource is and how many people have access to the common resource. In many real-life social dilemmas, such environmental characteristics are uncertain and therefore the application of the equal division rule is hampered. Based on this line of reasoning, I argued that under such environmental uncertainty the three useful characteristics of the equal division cannot be employed. The present dissertation focused on the various consequences of this notion.

Environmental Uncertainty and Tacit Coordination

The first theme this dissertation focused on was tacit coordination. What are the consequences of environmental uncertainty for efficient coordination? Can people still tacitly coordinate their harvesting decisions under environmental uncertainty? To answer these questions it was useful to first take a closer look at the concept of

tacit coordination. This concept was developed by the famous economist and Nobel prize winner Thomas Schelling (1960). Schelling argued that even in the absence of communication people can often efficiently coordinate their decisions. To illustrate this, he gave an example of two people who want to meet each other in New York City without having a prior understanding on where and when to meet. Where would one go and at what time? Schelling asked participants this question and found that the majority of the people answered that they would go to Central Station at 12.00 noon. If people would indeed act accordingly this would mean that tacit coordination would be highly efficient.

Van Dijk and colleagues (e.g., Van Dijk, De Cremer, & De Kwaadsteniet, in preparation; Van Dijk & Wilke, 1995, 1996; Van Dijk et al., 1999) applied this concept of tacit coordination to social dilemmas. They argued that in social dilemmas people can efficiently coordinate their choice behavior by anchoring their decisions on so-called coordination rules. To use these coordination rules people use specific cues from the task environment of the social dilemma (Van Dijk et al., 1999). When people use the same cues to base their decisions on, they can efficiently coordinate their choice behavior. According to Schelling, such a common understanding is crucial for tacit coordination. For tacit coordination to work, it is essential that people "read the same message in the common situation, to identify the one course of action" (Schelling, 1960, p. 54). In the present dissertation, I argued that it is exactly this common understanding that is missing under environmental uncertainty. Since under such uncertainty people cannot so easily apply the equal division rule – and they might even have different ideas about what constitutes an equal share (see Chapter 4) – there is no common understanding of how much to harvest. As a consequence, tacit coordination is hampered under environmental uncertainty.

Based on the above, I concluded that under environmental uncertainty people cannot (so easily) base their harvesting behavior on coordination rules such as the equal division rule. But what do people base their decisions on under such uncertainty? To answer this question, I connected Schelling's concept of tacit coordination to Snyder and Ickes' (1985) framework of weak vs. strong situations. Based on this framework, situations that provide salient cues for tacit coordination – such as social dilemmas with environmental certainty – can be defined as "strong" situations. By contrast, situations that do not provide such salient cues – such as social dilemmas with environmental uncertainty – can be defined as "weak" situations. In strong situations, people can tacitly coordinate their choice behavior by anchoring their decisions on these salient environmental cues. By contrast, in weak situations Snyder and Ickes argued that people base their decisions on relevant dispositional factors instead of cues from the environment. By applying this framework to the topic of environmental uncertainty, the present studies demonstrated that whereas under environmental certainty people

can tacitly coordinate their choice behavior by applying the equal division rule, under uncertainty they base their decisions on their own social value orientations, inducing proselfs to harvest more than prosocials. These findings clearly show that Snyder and Ickes' framework can be fruitfully used to explain and predict choice behavior in social dilemmas (cf. Roch & Samuelson, 1997; Van Lange, 1997) and perhaps also in other settings in which tacit coordination is hampered, such as pure coordination games with ambiguous focal points (see e.g., Mehta, Starmer, & Sugden, 1994). Moreover, these findings show that both tacit coordination and personality differences have their boundaries, and that the weak-strong framework helps to determine which one of these two factors has the strongest influence on people's choice behavior in social dilemmas.

Is Uncertainty Always Detrimental?

The bulk of earlier studies on environmental uncertainty in social dilemmas (e.g., Budescu et al., 1990, 1995; Gustafsson et al., 1999a, 1999b; Rapoport et al., 1992) suggest that environmental uncertainty is detrimental to the collective interest. More specifically, these studies repeatedly demonstrated that resource size uncertainty induces people to harvest excessively from the common resource. Based on these findings, social dilemma researchers drew the conclusion that environmental uncertainty leads to non-cooperation, which in turn jeopardizes the collective interest by increasing the chance of the common resource becoming depleted. Although this over-harvesting effect was replicated in the present dissertation (see Studies 2.1 and 4.2), the research in this dissertation also showed that environmental uncertainty does not always lead to non-cooperation. Based on this finding, I argued that environmental uncertainty does not only have detrimental effects, but that uncertainty might sometimes even be beneficial to the collective interest. In the following, I will elaborate on the detrimental and beneficial effects of environmental uncertainty.

Chapter 2 focused on how resource size uncertainty interacted with social value orientations. This topic was investigated by using the same experimental common resource dilemma as the one used by Budescu, Rapoport, Suleiman and colleagues (e.g., Budescu et al., 1990, 1995; Rapoport et al., 1992; Suleiman et al., 1996) and Gustafsson, Biel and Gärling (1999a, 1999b). Resource size uncertainty was manipulated in the same way as in these earlier studies, namely by varying the range of the size of the common resource. As expected, the over-harvesting effect that was found in these earlier studies was replicated, indicating that resource size uncertainty is indeed detrimental to the collective interest. However, what the present dissertation adds to these earlier studies is the finding that not all people over-harvest

under environmental uncertainty. More specifically, Chapter 2 showed that only proselfs increased their individual harvests under resource size uncertainty, whereas prosocials' harvests remained unaffected by such uncertainty. These findings indicate that the over-harvesting effect that was repeatedly found in earlier research was probably caused by proselfs' non-cooperative choice behavior. Based on these findings, it can be concluded that resource size uncertainty may only be detrimental to the collective interest when (at least some of) the people involved in the social dilemma have a proself orientation.

Chapter 3 focused on another type of environmental uncertainty than resource size uncertainty, namely, group size uncertainty. This type of uncertainty has – until now – only been investigated in one earlier experimental study (Au & Ngai, 2003). Au and Ngai manipulated group size uncertainty in a single-trial common resource dilemma. Interestingly, they found that group size uncertainty did *not* induce over-harvesting. More specifically, they found that group size uncertainty induced a decrease in the collective harvest, suggesting that not all types of environmental uncertainty are necessarily detrimental to the collective interest. However, it is important to note that Au and Ngai did not find an effect of group size uncertainty on participants' *individual* harvests. In Chapter 3, I conducted an experimental study in which participants' social value orientations were measured before they were faced with a social dilemma with group size (un)certainty. This study (Study 3.1) showed that under uncertainty participants mean *individual* harvests were lower than under certainty, indicating that group size uncertainty induces cooperation. Furthermore, this study demonstrated that prosocials responded more strongly to group size uncertainty than proselfs. Prosocials decreased their individual harvests under uncertainty, whereas proselfs' harvests remained unaffected by uncertainty. These findings suggest that not all different types of environmental uncertainty have the same detrimental effect on cooperation. Group size uncertainty even seems to be beneficial to the collective, especially when (most of) the group members have a prosocial orientation.

Chapter 4 focused on how people justify their harvesting decisions under resource size uncertainty. To do so, in Study 4.2, accountability was manipulated under varying levels of resource size uncertainty. This study showed that under uncertainty accountability induced participants to decrease their mean individual harvests. As a consequence, no over-harvesting effect was found in the uncertainty-accountability condition. This finding indicates that the detrimental effects of resource size uncertainty may disappear when group members are held accountable for their harvesting decisions. In other words, accountability may provide a solution for the detrimental effects of resource size uncertainty. The findings of Chapter 4 thus clearly show that resource size uncertainty does not necessarily lead to over-harvesting.

Although the above-mentioned findings suggest that environmental uncertainty

is not always detrimental to collective interests, it should be noted that this conclusion was based on analyses of participants' *mean* harvests. However, as already argued in Chapters 3 and 4, in order to investigate how environmental uncertainty affects tacit coordination it is important to not only focus on the mean harvest level – which is the way most social dilemma researchers analyze participants' choice behavior – but to also look at the variance in participants' harvests. In all of the studies in this dissertation – including the ones that showed that uncertainty does not lead to non-cooperation (i.e., Studies 3.1 and 4.2) – environmental uncertainty increased the variance of people's harvesting decisions. This finding is important because variability constitutes a potential threat to successful coordination, especially in small group settings. In small groups, the presence of only a few over-harvesters may be enough to harm the collective interest by increasing the chance that the common resource becomes depleted. Small harvests, on the other hand, may harm the collective interest by increasing the chance that the common resource is underused. As a consequence, high variability in individual harvests hardly ever leads to optimal or efficient use of the common resource. This idea was supported by the Monte Carlo analysis that was conducted in Chapter 4. Moreover, this reasoning is also fully in line with Schelling's notion that a common understanding is necessary for successful coordination (Schelling, 1960), and that environmental uncertainty undermines such a common understanding (De Kwaadsteniet et al., 2006). Furthermore, this analysis clearly demonstrates that, in order to assess the influence of environmental uncertainty on tacit coordination, it is important to not only look at the means but also at the variance of people's choice behavior.

In the previous paragraphs, the effects of environmental uncertainty on people's harvesting decisions were discussed. However, the last empirical chapter of this dissertation (i.e., Chapter 5) did not focus on people's harvesting decisions, but primarily focused on how environmental uncertainty influenced people's affective and retributive reactions after overuse. In short, the findings of this chapter demonstrated that under uncertainty people reacted much more mildly to such overuse than under certainty. More specifically, under uncertainty people became less "angry" at their fellow group members – even when these group members had harvested relatively large amounts – and they were less inclined to punish these fellow group members after such overuse than under certainty. These findings show that under environmental uncertainty people respond less negatively to negative outcomes such as overuse, which again suggests that environmental uncertainty does not always and exclusively have negative effects. However, it should be noted that the fact that under uncertainty people react less negatively to their fellow group members may in turn be detrimental to the collective interest. After all, not punishing fellow group members for overuse – and the non-cooperative choice behavior that may have caused it – might have negative consequences in the future.

Taken together, by applying a new perspective to study the effects of environmental uncertainty, the present dissertation clearly shows that the effects of environmental uncertainty are indeed more differentiated than suggested in earlier research. By focusing on individual differences (social value orientations), different types of uncertainty (resource size uncertainty and group size uncertainty), accountability, and affective and retributive reactions after overuse, I was able to show repeatedly that environmental uncertainty is not necessarily detrimental to collective interests.

Limitations and Suggestions for Future Research

Although the research presented in this dissertation has generated a number of new insights on the topic of environmental uncertainty in social dilemmas, there are still themes that are related to this topic that were not addressed. Therefore, I will now elaborate on the limitations of the present dissertation and I will give some suggestions for future research on environmental uncertainty in social dilemmas. First, I will discuss how the effects of environmental uncertainty – such as the effects observed in the present dissertation – can be investigated by focusing on other types of social dilemmas and other types of environmental uncertainty. Second, I will present some ideas about where the research on environmental uncertainty in social dilemmas might be heading in the future.

The present dissertation has primarily focused on the effects of environmental uncertainty in *common resource dilemmas*. Although it is very important that this type of social dilemma is studied and understood (see Ostrom, 1990; Ostrom, Gardner, & Walker, 1995), there is another type of social dilemma, namely the public good dilemma, which has received little attention in the present dissertation. Public good dilemmas are social dilemmas in which a group of people can contribute endowments to realize a public good. Several earlier studies have shown that people often behave quite differently in these different types of social dilemmas (e.g., Brewer & Kramer, 1986; Parks, 1994; Van Dijk & Wilke, 1995), and therefore it is important to investigate whether the findings that were obtained in the present dissertation also generalize to public good dilemmas. For instance, does the weak-strong framework (Snyder & Ickes, 1985) also apply to provision point uncertainty in step-level public good dilemmas? And what happens to tacit coordination under uncertainty in public good dilemmas?

There are a number of earlier studies on environmental uncertainty in public good dilemmas (e.g., Au, 2000; Gustafsson, Biel, & Gärling, 2000; Suleiman, Budescu, & Rapoport, 2001; Wit & Wilke, 1998). Interestingly, most of the effects observed in these studies were quite different from the effects obtained in studies on common resource dilemmas. For instance, none of the experimental studies on public good

dilemmas showed that environmental uncertainty induces non-cooperation. To give just one example, a study by Suleiman and colleagues (2001), in which provision point uncertainty was manipulated, showed that the effect of this type of environmental uncertainty on cooperation depended on the mean provision threshold level. In case of a high provision threshold (relatively hard to reach) provision point uncertainty induced a decrease in contributions, whereas in case of a low provision threshold (relatively easy to reach) participants became more cooperative under uncertainty. Although this is only one example, these findings clearly illustrate that environmental uncertainty seems to have quite different effects in public good dilemmas versus common resource dilemmas. Moreover, the findings on environmental uncertainty in public good dilemmas that were observed in these earlier studies do not provide a consistent picture, and it remains unclear how these effects differ from the ones found in studies on common resource dilemmas. Thus, more research is needed to address the issue of how environmental uncertainty affects choice behavior in different types of social dilemmas.

The present dissertation focused on two distinct types of environmental uncertainty, namely, resource size uncertainty and group size uncertainty. Although the weak-strong framework can be applied to both types of uncertainty, the present studies also showed that these two types of uncertainty have very different behavioral effects. Whereas resource size uncertainty led to higher harvests, group size uncertainty induced lower harvests. These contradictory findings suggest how fruitful it is to investigate different types of environmental uncertainty. However, until now only very few types of environmental uncertainty have been investigated. Experimental research has only focused on resource size uncertainty, group size uncertainty and provision point uncertainty. Further, Van Lange and colleagues (e.g., Brucks & Van Lange, 2007; Tazelaar, Van Lange, & Ouwerkerk, 2004; Van Lange, Ouwerkerk, & Tazelaar, 2002) have investigated the influence of *noise* in social dilemmas, which is a topic that is closely related to environmental uncertainty. Although these earlier studies have broadened our understanding of uncertainty in social dilemmas, Van Dijk et al. (2004) have suggested that there are many other types of environmental uncertainty that can also be investigated, such as uncertainty about the size of the public good, uncertainty about group members' access to the common resource, and asymmetric uncertainty about the size of the common resource (e.g., when some members know how large the common resource is, whereas others do not). The effects of these unexplored types of uncertainty may be quite different from the effects found in earlier studies. For instance, in case of uncertainty about the size of the public good, optimism may lead to overestimation of the size of the public good, which may in turn increase people's willingness to contribute (i.e., uncertainty may induce cooperation). This reasoning suggests that overestimation of an uncertain public good may stimulate cooperation, whereas the present dissertation as well as earlier research has shown

that overestimation of an uncertain common resource stimulates non-cooperation (see Chapter 2). Since these uninvestigated types of uncertainty often lead to such new and interesting predictions, they constitute interesting challenges for future research on environmental uncertainty in social dilemmas.

Earlier research on environmental uncertainty has mainly focused on how uncertainty influenced people's harvesting decisions and their estimates of the size of the uncertain common resource. In the present dissertation, however, I argued that groups are characterized by more than just harvests and estimates. Groups may be characterized by a broad spectrum of interpersonal processes. Therefore, the present dissertation focused on how environmental uncertainty influences interpersonal processes in social dilemmas. For instance, Chapter 5 focused on how such uncertainty influenced the way in which people responded to their fellow group members after overuse. Specifically, this chapter investigated people's negative affective reactions towards fellow group members. This chapter showed that such reactions are contingent upon the environmental characteristics of the social dilemma, i.e., under certainty these affective reactions were more negative than under uncertainty. In the social dilemma literature, research on emotions has been quite scarce. However, it is important to investigate the role of emotions in social dilemmas. After all, emotions can have a substantial impact on people's judgments and decisions (e.g., Loewenstein & Lerner, 2002). For instance, when people become angry at their fellow group members, they are more inclined to punish these group members for their non-cooperative behavior (Stouten et al., 2005, 2006). Moreover, the present dissertation showed that research on emotions can be fruitful, for it can broaden our understanding of social dilemmas. Therefore, it is important for social dilemma researchers to not only focus on the conventional dependent variables, such as people's individual harvests or contributions, but also on more unconventional topics, such as the role of emotions in social dilemmas.

The present dissertation aimed to generate more insights into the effects of environmental uncertainty on interpersonal processes in social dilemmas. Although for this purpose it was sufficient to study how uncertainty works in single-trial dilemmas, to investigate the dynamics of such interpersonal processes it may also be useful to investigate what happens *after* the first trial. After all, most groups do not cease to exist after one single encounter. Very few experimental studies have been done to investigate how environmental uncertainty affects choice behavior in multiple-trial settings (for exceptions, see Hine & Gifford, 1996; Roch & Samuelson, 1997). Roch and Samuelson (1997) showed that also in a replenishable resource dilemma an interaction of environmental uncertainty and social value orientations on harvests can be found (cf. De Kwaadsteniet et al., 2006), which implies that Snyder and Ickes' weak-strong framework can also be fruitfully applied to multiple-trial social dilemmas. However,

research should not only focus on how environmental uncertainty affects harvesting decisions in multiple-trial social dilemmas, but also on how repeated interactions between group members influence the interpersonal processes that were studied in the present dissertation.

In Chapter 5, a first attempt was made to study the dynamics of such processes by investigating people's affective and retributive reactions to their fellow group members *after* receiving feedback that the dilemma had resulted in overuse. By doing so, this chapter demonstrated that, *after* people have learned that the social dilemma has resulted in overuse, they respond more negatively to their fellow group members under resource size certainty than under resource size uncertainty. These findings imply that when overuse occurs under uncertainty people's responses to their fellow group members are relatively mild, which may in turn have positive consequences for the stability of the group. Moreover, this chapter clearly illustrates that people deal differently with the same negative collective outcome depending on whether or not the social dilemma is characterized by environmental uncertainty. An interesting next question would be whether these reactions extend to preferences for structural solutions in social dilemmas, such as the installment of sanctioning systems or the endorsement of leaders. Are people more willing to install a sanctioning system after overuse under certainty than under uncertainty? To obtain more insights into how people deal with environmental uncertainty in social dilemmas such questions should be addressed in future research.

It is my hope that future research will follow the lines set out in the present dissertation. As I argued in the previous paragraphs, there is still a lot of research to be done. First, future research could address the question as to whether earlier findings extent to other types of social dilemmas and other types of environmental uncertainty. Second, future research could focus more on the interpersonal effects of environmental uncertainty. In the present dissertation, I made a first attempt at addressing these issues. By doing so, I think this dissertation has indeed provided a more comprehensive view on the topic of environmental uncertainty in social dilemmas.