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Adversity of the Anticommons

The Effect of Uncertainty and Accountability on Decision Making in an Anticommons Dilemma

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In collaboration with Dexter van der Steen, Shadee Steen and Dion Morgan Halfhide.

Abstract

This paper examines for the first time how environmental (un)certainty and justification of decisions to group members influences decision making in an anticommons dilemma. The tragedy of the anticommons is a phenomenon that arises when individuals have the right to exclude other individuals from a limited common resource. This can result in no one having an opportunity to benefit from the common resource and the common resource becoming underused and wasted. Varying the degree of uncertainty and accountability, a social decision-making task on the computer was conducted with 136 participants. The participants indicated their willingness to accept (WTA) price of a lottery ticket with three different degrees of uncertainty about the offer of the buyer of the lottery tickets (certainty, low uncertainty or high uncertainty). Furthermore, there were two accountability conditions where participants either did or did not justify their decisions to their group members. As predicted by previous research, uncertainty had a negative effect on decision making. Participants indicated a higher WTA price and thus behaved less cooperative as uncertainty increased. Unexpectedly, accountability had no significant effect on decision making. Participants indicated a similar WTA price whether they had to justify their decisions to group members or not.

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Introduction

Around 143,000 people are infected with chronic hepatitis C in the UK alone (Public Health England, 2019). This infection can ultimately cause patients to develop cirrhosis of the liver or liver cancer. Needless to say, it is urgent that people with this infection get treatment as soon as possible. Luckily, a new drug called Harvoni has entered the market which cures chronic hepatitis C infection. However, due to the high costs of Harvoni, the National Health Service (NHS) decided to treat only 10,000 people a year in the UK and thus leaving thousands of people untreated, treating only the worst cases. These high costs can be attributed to the patent system obstructing the process of developing and distributing new drugs. Patents give patent holders a momentary monopoly on the production of the drug. As a consequence, patent holders can ask nearly every price for use of their patent, even if this price is far too high.

The lack of treatment for chronic hepatitis C infection is just one example. This phenomenon of underutilization extends not only to the rest of the medical world (e.g., cancer research and Alzheimer medicine), but also to the business, social and political world and even our everyday lives. Heller (1998) was a pioneer on this subject and the first to give this phenomenon a name: the tragedy of the anticommons. According to Heller (1998), the tragedy of the anticommons is the mirror image of the tragedy of the commons. It is therefore useful to first take a look at this preceding adverse phenomenon of overutilization, as Hardin (1968) recommends, before further diving into the tragedy of the anticommons. Hardin (1968) described the tragedy of the commons somewhat melancholic: "Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a

commons brings ruin to all." (p. 1244). Moreover, he describes the tragedy of the commons as a faulty system wherein every individual with free access to a common resource and without rights to exclude other individuals from the resource is looking to maximize their best interest by drawing from the resource. If the number of individuals drawing from the resource grows too big for the resource to accommodate, depletion of the common resource is imminent. Even if this has detrimental ramifications for everyone drawing from the resource, including themselves.

The following example depicts the complex phenomenon of the tragedy of the commons to provide a better understanding of it. Picture a big green forest, rich with flora and fauna. In this forest there are many deer, which hunters, who live in and around the forest, kill during hunting season. However, there are too many hunters in relation to the population of deer. Slowly but surely, less and less deer are spotted in the forest while the hunters keep hunting the few deer that are still left. It is only a matter of time before there will not be a single deer left in the forest. The most beneficial situation would be for the hunters to limit the number of deer they kill to give the deer a chance to increase their population. Instead, the population became depleted because the hunters valued their personal gain over the gain of the collective, in other words the tragedy of the commons.

As the example has shown, this tragedy of overuse occurs when too many individuals exhaust a shared resource to the point of depletion. They choose for their own personal gain, even if the collective of users would benefit from less use. Moreover, the tragedy of the commons is an important theory for understanding many local and wide-spread ecological problems and many researchers have examined this tragedy in light of a broad range of sciences, including psychology, political, economic, and biological sciences

(Van Vugt, 2009). Following Hardin's article, many researchers started to look for a solution regarding this tragedy (Hardin, 1968; Heller, 2013; Zhou, 2016). One solution, as they found, is to privatize the shared resource; to endow individuals drawing from the common resource the rights to exclude other individuals drawing from the same resource.

Although the tragedy of the commons could be solved with this solution, there are two sides to the same coin. This kind of fragmentation by privatization can elicit another tragedy, as previously mentioned; the tragedy of the anticommons. Where the tragedy of the commons is characterized by overuse, the tragedy of the anticommons is characterized by underuse. In addition, Heller (1998) defines the tragedy of the anticommons as the phenomenon that arises when too many individuals have the right to exclude other individuals from a limited common resource. He further argues that if those individuals invoke their rights, a tragedy arises. With many individuals being excluded, no one has a chance to benefit from the common resource and the common resource becomes underused and wasted, he concludes.

Underutilization thus occurs when there are too many uncoordinated owners of a limited resource who can exercise their rights by excluding other people from using or creating said resource (Heller, 2013). In the case of the high costs of Harvoni, which explains the lack of treatment for chronic hepatitis C infection, the patent holders are the uncoordinated owners of the resource; the medicine. By asking a high price, they exclude other people from the use of this medicine, because it prevents the NHS from being able to distribute the medicine to the people who need it. As a consequence, the resource is underused; also known as a tragedy of anticommons.

This tragedy is prevalent in many different applications, including for example biomedical research, the environment, cyberspace, hydropower development and bargaining behaviour (Heller & Eisenberg, 1998; Kosnik, 2012; Hunter, 2003; Kosnik, 2010; Parente & Winn, 2012). Therefore, it is important to research which factors influence or attenuate the underuse as consequence of the tragedy of the anticommons. The commons is a more established phenomenon and more research has been conducted regarding this subject, whereas anticommons is less visible and less researched. Nevertheless, some factors have been examined in relation to the anticommons. For instance, Parisi, Schulz, and Depoorter (2004) attempted to make a general model of anticommons fragmentation in property. They found that negotiating with sellers simultaneously magnifies the effect of the anticommons tragedy and negotiating sequentially attenuates the effect. Parente and Winn (2012) researched the effect of low, high and uncertain budget signals and strict and partial input complementary on the tragedy of the anticommons in bargaining behavior. They argued that a low budget signal and partial complementary were the most optimal conditions under which the effect of the tragedy weakened. Yet, there is much to be discovered concerning the tragedy of the anticommons. The present research aims to contribute to existing research on this subject, particularly looking at two factors that might influence the tragedy of the anticommons; Environmental (un)certainty and accountability for decisions. These factors were researched by conducting an experiment involving a social decisions task on the computer.

Social dilemmas such as the anticommons dilemma are situations in which a conflict arises between pursuing one's personal interests, referred to as defection, or

pursuing the interests of the group, referred to as cooperation. Research on decision

making in social dilemmas demonstrated that individuals make their decisions following

division rules (De Kwaadsteniet, Van Dijk, Wit, De Cremer, & De Rooij, 2007). An

example of a division rule is the equal division rule. The equal division of an inheritance

among the next of kin, which is generally seen as the fairest way to divide the goods,

portrays this rule for instance. Furthermore, this rule is a decision heuristic used in

situations where multiple individuals are ought to share a (common) resource and do this

by equally disseminating the resource to all parties involved (Allison, McQueen, &

Schaerfl, 1992; Allison & Messick, 1990; Messick, 1993). In other words, it is often used

to make decisions in social dilemmas where a resource has to be divided among equally

interested negotiators as it allows individuals to make clear and easy decisions on account

of three characteristics (De Kwaadsteniet, Van Dijk, Wit, De Cremer, & De Rooij, 2007;

Messick, 1993). Firstly, it requires little effort and little cognitive capacity. Secondly, its

efficiency as the rule generates clear and fair decisions for the division of the resource.

Thirdly, the justification to the other negotiators is trouble-free because the decision

follows the fairness principle.

Although, the equal division rule is frequently used in social dilemmas, there are

conditions under which the rule is violated. Allison and Messick (1990) state that the rule

will be violated when there is a reduction in conspicuous situational and task cues of

equality or when competition cues are offered. Allison, McQueen, and Schaerfl (1990)

name another violation; when an individual deems it (too) difficult or impossible to

partition resources, there is a great risk of the resource being overconsumed or exploited.

Not being able to partition a resource seems to lead to environmental uncertainty which

has the volitional or nonvolitional violation of the equal division rule as a consequence. Gustafsson, Biel, and Gärling (1999) propose that uncertainty around the different possible outcomes of a resource dilemma might be the most important single factor influencing defection and cooperation.

Real-life negotiation situations are surrounded by uncertainty. Uncertainty about what the other negotiators will offer; uncertainty about if the other negotiators will accept your offer; uncertainty about the size of the resource you are negotiating about. Most research regarding social dilemmas focuses on solving societal and environmental problems, therefore it is important to enhance ecological validity by taking environmental or resource uncertainty into account (Gustafsson, Biel, & Gärling, 1999).

Environmental uncertainty makes it hard for individuals to exercise the equal division rule, because environmental uncertainty means a reduction in conspicuous situational cues of equality or might trigger competitional cues. In addition, environmental uncertainty makes it difficult for an individual to partition the resource; increasing the risk of exploitation and overuse. This, in turn, might have detrimental consequential effects on cooperation among the group members, who will not try to divide the goods equally but rather start to pursue their own personal gain. The detrimental effect of environmental uncertainty on cooperation in social dilemmas is also established in other research, where participants claim an increasing part of the resource to the point of overharvesting (Budescu, Rapoport, & Suleiman, 1990; Gustafsson, Biel, & Gärling, 1999).

So far, there has been no research regarding the influence of uncertainty on decision making in an anticommons dilemma, making the effect of uncertainty on decision making in an anticommons dilemma a relevant and fruitful avenue for research.

Another possibly influential factor in an anticommons dilemma is accountability for decisions. Accountability for actions can be defined as actions having identifiable consequences for others (Tetlock, 1992). Research has shown that being accountable for your decisions in social dilemmas influences the behavior and goals of the individual making the decision. This suggests that social approval or social disapproval in these social dilemmas plays an influential role in collective actions (Lerner & Tetlock, 1999; De Cremer & Bakker, 2003).

Evidence has shown that when individuals were made accountable for their decision making in a social dilemma, individuals contributed more than when they were not made accountable for their decision making (De Cremer, Snyder, & DeWitte, 2001; De Cremer & Bakker, 2003). A possible explanation for this is that being accountable for your decisions leads to a vulnerability to social pressure and critique, which may result in a negative self-image. As people constantly seek for approval and respect from other individuals, a negative self-image is not desired. As a result, people are motivated to improve approval from others in order to protect their self-image. They achieve this by acting in line with the normative correct thing to do; cooperate (Kerr, 1995; De Cremer, Snyder, & DeWitte, 2001; De Cremer & Bakker, 2003; Milinski, Semmann, & Krambeck, 2002).

A study by De Kwaadsteniet, Van Dijk, Wit, De Cremer, and De Rooij (2007) found evidence for this line of reasoning, implying that accountability will induce people to

comply more to the norms in the group. In addition, De Kwaadsteniet et al. (2007)

demonstrated that being accountable in a social dilemma reduced egotism, promoting

cooperation, which implies an increase in the adherence to the group norm (equality).

This supports the justification characteristic, specified by Messick (1993) as one of the

three characteristics of the equal division rule that were mentioned earlier, and research

regarding the usage of the equal division rule in social dilemmas (Van Dijk & Wilke,

1995). Furthermore, De Kwaadsteniet et. al. (2007) found that groups were more efficient

when group members were expected having to justify their decisions in three

environmental uncertainty conditions. This can be traced back to the efficiency

characteristic, another characteristic of the equal division rule described by Messick

(1993). Additionally, when there was environmental certainty and accountability as

opposed to environmental uncertainty and accountability, there was a reduction in the

variance of harvests, which suggests a convergence to an equal share of the harvest.

Conversely, when participants were made accountable and there was environmental

uncertainty, the expected overharvesting effect, as a consequence of environmental

uncertainty, disappears. More specifically, accountability may provide a solution to

detrimental effects of environmental uncertainty. There has currently been no research

into the influence of environmental uncertainty and accountability in an anticommons

dilemma.

For this reason, the aim of this research is to focus on two factors which may influence

the decision making in an anticommons dilemma. Firstly, to what extent environmental

uncertainty influences decision making and determining WTA in an anticommons

dilemma and if environmental uncertainty indeed has a detrimental effect in an

anticommons dilemma. Secondly, to what extent does being made accountable or having no accountability to fellow group members influence decision making. Moreover, determining WTA in an anticommons dilemma to see if accountability indeed provides a solution to the detrimental effects of environmental uncertainty.

The following two hypotheses were formulated based on the previously introduced literature:

H1: People are expected to behave less cooperative under uncertainty, as is based on the research of Allison and Messick (1990); Allison, McQueen, and Schaerfl (1990); De Kwaadsteniet, Van Dijk, Wit, De Cremer, and De Rooij (2007); Budescu, Rapoport, Suleiman (1990); and Gustafsson, Biel, and Gärling (1999). Therefore, it is expected that in the high uncertainty condition participants indicate a higher WTA than the participants in the low uncertainty condition and than participants in the certainty condition. Additionally, it is expected that participants indicate a higher WTA in the low uncertainty condition than participants in the certainty condition.

H2: Based on research by De Cremer, Snyder, & Dewitte (2001); De Cremer & Bakker (2003); and Gächter & Fehr (1999) the expectation is that when participants expect to have to justify their choices to fellow group members they behave more cooperative. Therefore, it is expected that participants in the no accountability condition indicate a higher WTA than participants in the accountability condition.

Method

Participants and design

Based on an a priori power analysis using the program G*Power[1] (Faul, Erdfelder, Lang & Buchner, 2007) forty-four participants were required. One hundred and thirty-six individuals (101 women, M age = 21.58 years, SD = 5.97) participated voluntarily in the present study. A 2 (Accountability: Yes vs. No) x 3 (Uncertainty: High vs. Medium vs. No) mixed design was used. For their participation, participants received a monetary compensation (€2) and had a chance to win €20 in a lottery or earn additional money by selling their lottery tickets.

Procedure. When participants arrived at the laboratory to take part in the experiment, they were seated in seats with desks separated by panels, so they could not look at the screens of the participants next to them. Each desk contained a personal computer that was used to present the instructions and register the data. Participants were divided into three-person groups, which were randomly assigned to one of the two accountability conditions by a computer automated procedure. Before receiving further instructions about the social decision-making task, participants had to fill in an informed consent (see Appendix).

The instructions informed participants about the joint task consisting of three rounds they had to perform together with two fellow group members whose identities were unknown. These group members were the Sellers. In each round these three group members could sell one of three lottery tickets they had in their possession to a Buyer and

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[1] Based on a medium effect size (f = 0.25), α = .05, 2 groups and 3 measurements. G*Power Total sample size = 44.

they had to indicate their WTA price for the lottery ticket in every round. In each round

the groups were assigned to one of three conditions of uncertainty about the offer of the

Buyer (certainty, low uncertainty or high uncertainty) in a random order. Across all

conditions, the instructions participants received about the task were the same.

Participants were presented with the following text:

"Thank you for participating in this experiment! For participation in this experiment, you

will receive a participation fee of €2 or 1 credit. In addition to the basic fee for

participating in the experiment, you will participate in a group task in which you can earn

extra money. In the group task you can earn hundreds of valuable points. Each point you

earn in the group task is worth 1 eurocent and will be exchanged for real money at the

end of the experimental session. This group task consists of three Sellers and one Buyer.

You are one of the three Sellers, just like two other research participants who are also

present in the lab right now. The experimenter will play the role of the Buyer. The role of

the task are as follows: As a Seller, you have three lottery tickets in your possession. The

same goes for the other two Sellers, who also have three lottery tickets in their

possession. These lottery tickets are valuable, as each lottery ticket can yield a prize of

2000 points (= €20). The chance that a specific lottery ticket will yield a prize is 1 out of

36. The lottery will be carried out at the end of the experimental session, after which you

hear whether you have won a prize or not. So, the more lottery tickets you have, the

higher the chance of winning a prize of €20. Of course, there is also a considerable

chance that your lottery tickets do not yield any prize at all, and that you will end up with

zero euros in the lottery (a chance of 35 out of 36 for each ticket). Therefore, you can also

sell your tickets to the Buyer (= the experimenter). Of course, if you sell your tickets you

cannot participate in the lottery.

In the group task, you have the possibility to sell your lottery tickets to the Buyer. The

group task consists of three rounds. In each of these rounds you can sell one lottery ticket

to the Buyer. Whether you will sell your tickets to the Buyer depends not only on your

own asking price but also on the asking prices of two other Sellers and the price the

Buyer is willing to pay for the lottery tickets. Namely, if the price the Buyer is willing to

pay for all three tickets together is equal to or higher than the sum of all prices the three

Sellers ask for the lottery tickets, the Buyer will buy the tickets for the asking prices.

However, if the Sellers together ask more than the price the Buyer is willing to pay for

the three tickets together, no deal is made, and all Sellers will keep their lottery tickets.

To summarize: The group task consists of three rounds. In each of these rounds, you can

sell one of your three lottery tickets to the Buyer. In round 1 you can sell your first lottery

ticket, in round 2 you can sell your second lottery ticket, and in round 3 you can sell your

third lottery ticket."

The participants were subsequently presented with four questions to check

whether they understood the rules of the task they were about to perform. Questions

included were 'How many Sellers are involved in the group task?' (1 Seller, 2 Sellers, 3

Sellers, or 4 Sellers), 'How many rounds does the group task consist of?' (1 round, 2

rounds, 3 rounds, or 4 rounds), 'What happens when the Sellers together ask for more

points than the Buyer wants to pay?' (The Buyer will then buy all three lottery tickets, the

Buyer will then NOT buy any lottery tickets or I have not been informed about what will

happen then), and 'What happens if the Buyer offers more points than the Sellers together request for their lottery tickets?' (The Buyer will then buy all three lottery tickets; the Buyer will then NOT buy any lottery tickets, or I have not been informed about what will happen then).

After this short quiz, the next screen depended on which condition (accountability or non-accountability) the participant was randomly assigned to. In the accountability condition, participants were presented with the following text preceding each of the three rounds:

"Before you start with this round, it is important to know that after the rounds are finished you will have to explain your decisions to the rest of your group. Specifically, in a group chat session you will have to explain to the other Sellers which prices you asked for your lottery tickets in all three rounds of the task, and why. To start with this round, please click the next button below."

The participants were presented with this text preceding each of the three rounds. In the non-accountability condition participants were not presented with this screen and started the three rounds right away.

In every round the participants were randomly assigned to one of the three (un)certainty conditions (certainty, low uncertainty and high uncertainty). In the certainty condition the participants were informed that the Buyer offered 200 points for the lottery tickets of all three Sellers together. After the participants in the certainty condition received the Buyer's offer, the participants had to indicate how many points they requested for their lottery ticket. In the low uncertainty condition, the participants were informed that the Buyer offered 150 to 250 points for the lottery tickets of all three

Sellers together and that the exact number of points offered by the Buyer would be randomly determined by a computer. After they were informed about the Buyer's offer range, the participants had to indicate how many points they requested for their lottery ticket. In the high uncertainty condition, the participants were informed that the Buyer offered 100 to 300 points for the lottery tickets of all three Sellers together and that the exact number of points offered by the Buyer would be randomly determined by a computer. After they were informed about the Buyer's offer range, the participants had to indicate how many points they requested for their lottery ticket.

To measure whether uncertainty of the Buyer's offer was manipulated effectively participants were asked after every round to what extent they experienced uncertainty about the offer of the Buyer measured on a 7-point scale (1 = to a small extent, 7 = to a large extent).

After the three rounds, participants in the accountability condition had to explain their asking price in each of the rounds to the other two participants in their three-person group. For each round they were reminded of the number of points the Buyer offered them and how many points they had requested themselves for the lottery ticket. They subsequently had to explain why they asked for this number of points in a chat window on the screen. They had to chat with their fellow groupmates for at least 60 seconds before they could proceed to the next page.

To measure whether accountability was manipulated effectively, participants from both the accountability and non-accountability conditions had to fill in a questionnaire about the group task. In this questionnaire, three questions were used to measure to what extent participants felt like they had to justify their decisions. Questions included were

'To what extent did you feel that you had to justify your decisions to the other Sellers?',

'To what extent did you feel accountable for your decisions in the group task?', and 'To

what extent did you feel you had to explain your decisions to the other Sellers?'. These

questions were all answered on a 7 point scale (1 = to a small extent, 7 = to a large

extent).

Afterwards, the participants received the results of the lottery to see whether they

won prizes with the lottery tickets that were still in their possession. The participants then

had to answer two questions concerning their demographics. Questions included were

'What is your age (in years)?' and 'What is your gender?'.

The survey concluded with a debriefing where participants were informed about

the goal of the research and which variables were manipulated. The debriefing included

contact information which the participants could use to ask questions or raise concerns

about the study.

Analyses

A two-way mixed ANOVA (factors: ("Certainty condition": *certainty* vs. *low*

uncertainty vs. *high uncertainty*) x ("Accountability condition": *accountability* vs. *no*

accountability)) was performed to examine the relationship between (un)certainty, (no)

accountability and the WTA price.

For the certainty manipulation check a repeated measures ANOVA was

performed (factor: ("Manipulation check scores": *certainty* vs. *low uncertainty* vs. *high*

uncertainty) for the question "*To what extent did you experience uncertainty about the*

offer of the Buyer?".

For the accountability manipulation check an independent samples t-test was

performed (factors: ("Accountability condition": *accountability* vs. *no accountability*) x

("Mean manipulation check scores") for the questions *"To what extent did you feel that*

you had to justify your decisions to the other Sellers?", "To what extent did you feel

accountable for your decisions in the group task?", and *"To what extent did you feel you*

had to explain your decisions to the other Sellers?".

Results

Participants

A total of 136 participants completed the experiment. Of these 136 participants,

55 participants started in the no accountability condition and 81 participants started in the

accountability condition. Seven entries (case 63, 68, 94, 105, 114, 120, 166) were

considered outliers based on these data points deviating more than three standard

deviations from the group mean. All these seven cases were in the certainty condition. To

try to meet the assumption of no significant outliers, a square root transformation was

performed on all three (un)certainty conditions. The transformed variables contained no

outliers, indicating that the transformation led to the data points distributing closer around

the group mean. All analyses were run with both the original variables and the

transformed variables and this showed that the outliers did not affect the data in a

significant way. Therefore, it was decided to leave the outliers untransformed and

included in the data for the final analyses.

Manipulation checks

To check if (un)certainty was effectively manipulated, participants answered one

manipulation check questions after each of the three rounds for the certainty condition:

"To what extent did you experience uncertainty about the offer of the Buyer?". To test if

(un)certainty was indeed effectively manipulated a repeated measures ANOVA was performed. The Greenhouse-Geisser estimate of the departure from sphericity was $\varepsilon = 0.79$. Therefore, a Greenhouse-Geisser correction was applied. Manipulation check scores for the certainty, low uncertainty and high uncertainty groups differed significantly, $F(1.58, 212.58) = 76.57$, $p < .001$. Participants in the certainty condition ($M = 2.42$, $SD = 1.90$) had lower manipulation scores than participants in the low uncertainty ($M = 3.93$, $SD = 1.60$) and high uncertainty condition ($M = 4.51$, $SD = 1.62$). Contrasts revealed that participants in the certainty condition had a significantly lower score for the manipulation checks than participants in the low uncertainty condition, $F(1, 135) = 67.068$, $p < .001$, and participants in the low uncertainty condition had a significantly lower score for the manipulation checks than participants in the high uncertainty condition, $F(1, 135) = 22.453$, $p < .001$. This result indicates that the manipulation of (un)certainty was successful (Fig. 1).

To check if accountability was effectively manipulated, participants answered three manipulation checks for the accountability condition: *"To what extent did you feel that you had to justify your decisions to the other Sellers?", "To what extent did you feel accountable for your decisions in the group task?",* and *"To what extent did you feel you had to explain your decisions to the other Sellers?"*. These three items showed acceptable internal consistency ($\alpha = .78$). To test if accountability was indeed effectively manipulated an independent samples t-test was performed on the mean scores of the three manipulation check questions. Manipulation check scores were significantly higher in the accountability group ($M = 4.32$, $SD = 1.42$) than in the no accountability group ($M = $

3.67, $SD = 1.49$), t (134) = -2.542, $p = .012$. This result indicates that the manipulation of

accountability was succesful (Fig. 2).

Figure 1

Mean scores of experienced uncertainty in the certainty, low uncertainty and high
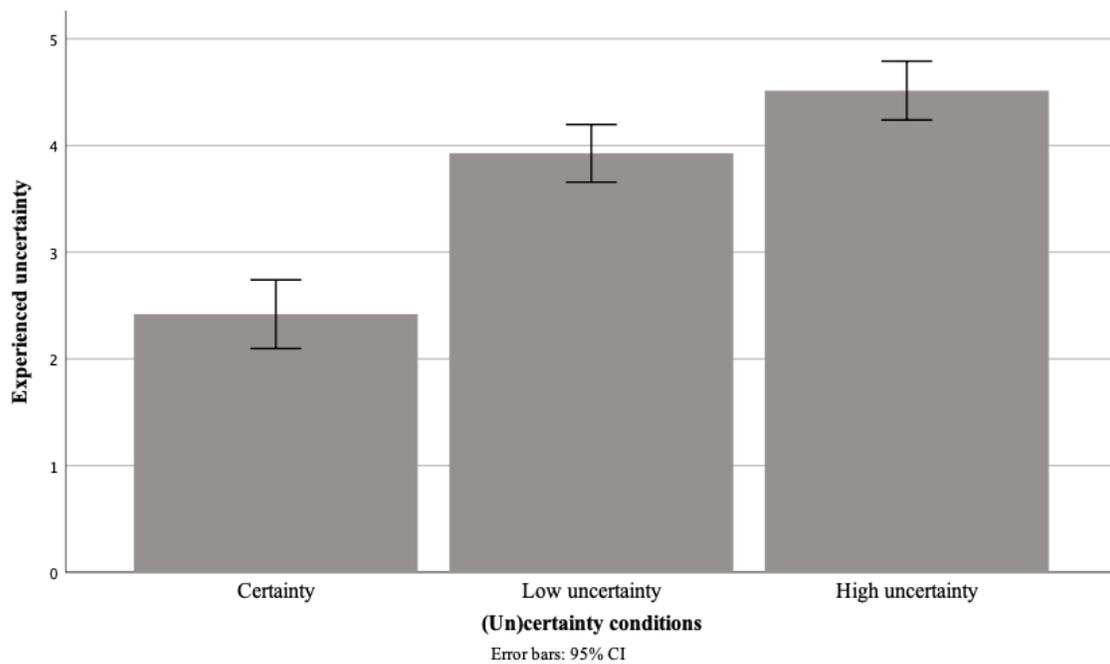
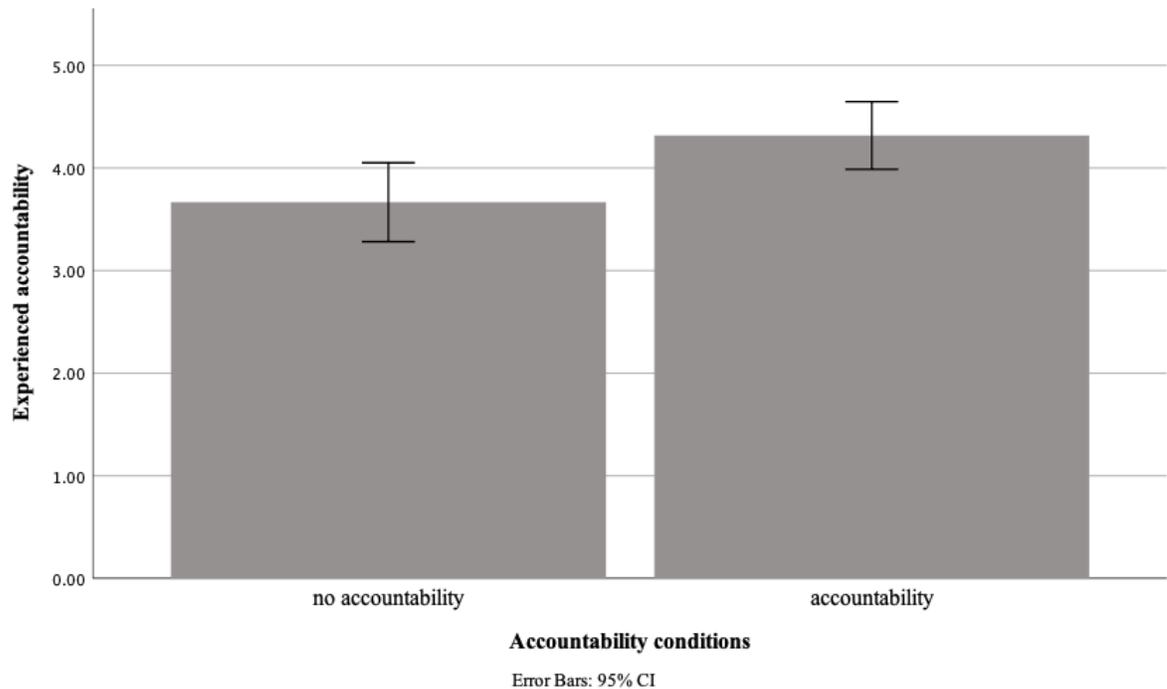*uncertainty conditions with 95% CI error bars*

Error bars: 95% CI

Figure 2

Mean scores of experienced accountability in the no accountability and accountability

condition with 95% CI error bars

Error Bars: 95% CI

WTA

To test the hypotheses the WTA scores were analyzed with a two-way mixed

ANOVA with (un)certainty (three levels: certainty, low uncertainty and high uncertainty)

as the within-subjects variable and (no) accountability as the between-subjects variable.

There was a significant main effect for (un)certainty, $F(2, 268) = 13.813$, $p < .001$, partial

$\eta^2 = .093$. Participants in the certainty condition ($M = 93.29$, $SD = 51.72$) scored lower on

WTA than participants in the low uncertainty ($M = 111.05$, $SD = 67.23$) and high

uncertainty condition ($M = 116.86$, $SD = 73.63$). Contrasts revealed that participants in

the certainty condition had a significantly lower score on WTA than participants in the

high uncertainty condition, F(1, 134) = 25.321, $p < .001$, partial η^2 = .159, but

participants in the low uncertainty condition did not have a significantly lower score on

WTA than participants in the high uncertainty condition, F(1, 134) = .903, p = .344,

partial η^2 = .007 (Fig. 3). These results were partially in line with hypothesis 1.
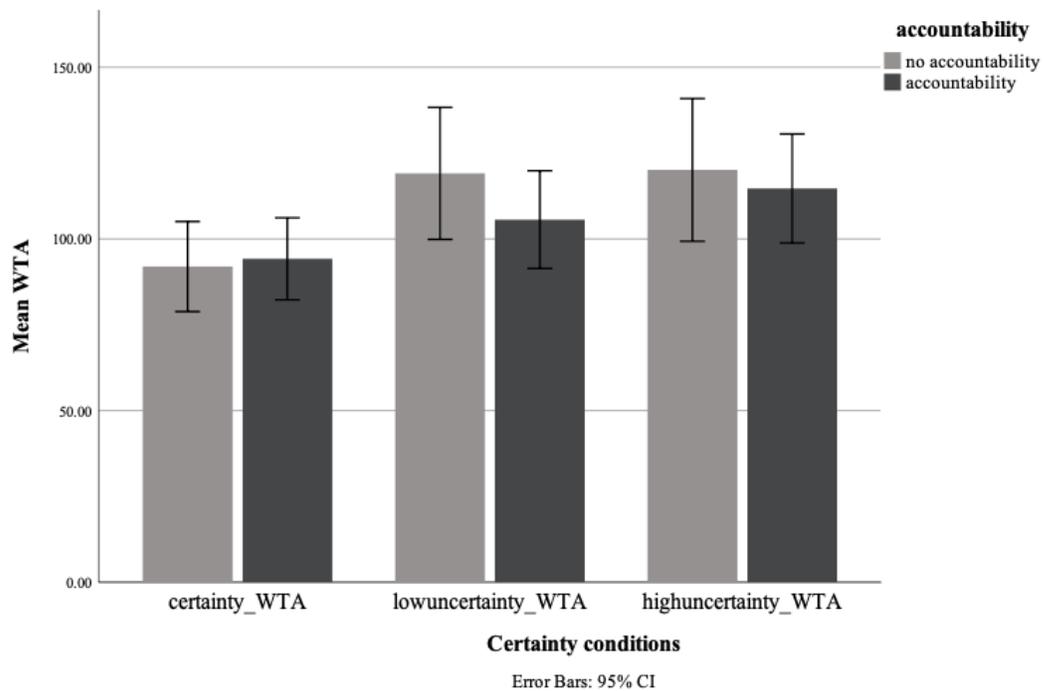
Accountability

There was no significant main effect for accountability, F(1, 134) = .317, p =

.575, partial η^2 = .002. Participants in the accountability condition (M = 104.83, SD =

63.38) and no accountability condition (M = 110.37, SD = 65.50) scored similar on WTA

(Fig. 3). This result is inconsistent with hypothesis 2.

Interaction effect

There was no statistically significant two-way interaction effect between the

certainty and accountability conditions, F(2, 268) = 1.299, p = .274, partial η^2 = .010

(Fig. 3).

Figure 3

Mean WTA scores for the certainty, low uncertainty and high uncertainty conditions for the accountability (dark grey) and no accountability (light grey) conditions

Error Bars: 95% CI

Discussion

In the present study accountability and (un)certainty were manipulated in an anticommons dilemma. As expected, people behaved less cooperative under uncertainty, as shown by their mean WTA's. Participants in the high uncertainty conditions indicated a higher willingness to accept than participants in the low uncertainty and certainty conditions. Additionally, participants in the low uncertainty condition indicated a higher willingness to accept than participants in the certainty condition. The difference in WTA scores was significant between the high uncertainty and certainty condition, but the difference was not significant between the high uncertainty and low uncertainty

condition. Inconsistent with Hypothesis 2, participants did not behave more cooperatively when they had to justify their choices to their fellow group members. The participants indicated a similar willingness to accept in both the accountability and no accountability conditions.

(Un)certainty

It might be insightful to relate findings from the present study to findings from earlier research on the effect of environmental uncertainty in social dilemmas. Gustafsson, Biel and Gärling (1999) conducted two resource-dilemma experiments where participants had to request an amount from a resource with varying degrees of environmental uncertainty regarding the resource size. They found an increase in requests from participants when uncertainty about the resource increased. An explanation they offered is an individual outcome-desirability bias, where people overestimate the probability of the outcome being in their desired outcome. Research found that this bias is only observed if participants are not fully informed about the probabilities of the outcome. Optimistic predictions of desired outcomes increased when uncertainty about the outcome increased. Participants in the present study may have felt uncertain about the outcome as environmental uncertainty increased. This might have led them to make an optimistic prediction of the desired outcome and thus led them to believe that their group members would behave more cooperatively. This might have resulted in them behaving non-cooperatively and increase their WTA price. An alternative explanation Gustafsson, Biel and Gärling (1999) offered is the egoism bias. This bias occurs when a resource size is uncertain. Due to the uncertainty, people may be less compelled to comply to the equal division rule. Therefore, participants with egoistic motives may request a higher WTA

price than their estimate of their equal share as environmental uncertainty increased. De

Kwaadsteniet et. al. (2007) states that environmental uncertainty induced participants to

overestimate the resource size and harvest from the resource and resource size estimates

are strongly interrelated. Participants in the present study might have overestimated the

resource size more as environmental uncertainty increased. This might have prompt them

to indicate a higher WTA price when environmental uncertainty increased. Although,

based on results from De Kwaadsteniet et. al. (2007) resource size estimates might

decrease when participants are held accountable for their decisions, which might result in

participants indicating a lower WTA price. This effect was not observed in the present

study.

Another possible explanation for participants increasing their part of the resource as

environmental uncertainty increases is offered by Budescu, Rapoport, Suleiman (1990).

In the present study, we see a slight increase in variability as uncertainty increases.

Budescu, Rapoport, Suleiman (1990) offered an explanation for the increase in variability

of requests from the resource as environmental uncertainty increased. They proposed that

the increase in variability of requests is a result of an increase in diversity about the

amount fellow group members requested from the source. The results of the present study

may be explained by participants expecting their group members to be risk-averse and

thus expect them to decrease their request of the resource. Because of the expected

behaviour of their group members, participants will increase their own request.

Alternatively, participants might also request a smaller part of the resource if they believe

their fellow group members will, because they do not want to violate the norm within the

group. Budescu, Rapoport and Suleiman (1990) suggest this occurs when participants

believe their fellow group members will behave the same as they do and will adhere to

the equal share norm.

An alternative explanation for participants increasing their part of the resource in the

anticommons dilemma could be found in the research by Allison, McQueen and Schaerfl

(1990). Their study suggests that difficulty in applying the equal division rule leads to a

violation of the equal division rule and thus a greater risk of the resource being

overconsumed or exploited. In the study by Allison, McQueen and Schaerfl (1990)

difficulty applying the equal division rule was due to an unpartitioned resource, in the

present study difficulty applying the equal division rule was due to environmental

uncertainty. The difficulty applying the equal division rule might thus lead to a violation

of the equal division rule and this might explain the increase in the WTA scores in

conditions with higher uncertainty.

Accountability

The present study showed that participants in the accountability and no

accountability conditions indicated a similar willingness to accept. Additionally, there

was no interaction between (un)certainty and accountability.

The unexpected finding that participants had a similar WTA in the accountability and no

accountability conditions may be explained by the finding by Gächter and Fehr (1999).

They found that social approval had a large positive effect on cooperation, but only if

participants formed (weak) social ties. Were these (weak) social ties absent, social

approval only had a small positive effect on cooperation. In the present study, most of the

participants had never seen each other before participating and were placed in separate

cubicles almost immediately after arriving. This may mean that they formed no social

ties, thus explaining the similar WTA in the accountability and no accountability

condition if their motivation for cooperation was social approval. However, in De

Kwaadsteniet et. al. (2007) participants were also placed in separate cubicles almost

immediately after arrival, and their findings suggested that accountability induced

cooperation. An explanation for the incongruence in the findings from De Kwaadsteniet

et. al. (2007) and the present study might be that in the present study the participants

communicated through chat messages, whereas in the study by De Kwaadsteniet et. al.

(2007) participants were instructed that they would have to justify their decisions, but

after the experiment they learned that they did not have to do this. The participants never

had to justify themselves to fellow group members. This difference in the accountability

condition might explain the difference in results. In addition, the fact that the participants

in the present study communicated through chat messages might also be an explanation

for the similarity in WTA in the accountability and no accountability conditions. They

did not interact face to face, thus possibly preventing the participants from forming

(weak) social ties. Another possible explanation was mentioned by De Cremer and

Bakker (2003). They stated participants in social dilemmas that were accountable for

their decisions only sustain or positively influence cooperation if they believe that others

will behave cooperatively as well. The participants in the present study might not have

had that believe and might have behaved less cooperatively themselves as a consequence.

Limitations and weaknesses

One possible methodological limitation of the present study could be the lack of

prior research of the influence of environmental uncertainty on decision making in an

anticommons dilemma. Little research can be found concerning this topic. Although this

makes the present research a relevant addition to existing research, it limits the scope of

understanding of the problem researched in this experiment and can hinder the credibility

of the experiment. The lack of prior research stresses the importance of research on this

topic. More future research should be directed on the effect of environmental uncertainty

in an anticommons dilemma.

Furthermore, it could have been useful to research the motives of the decisions made by

the participants. In the present study, we interpreted the indication of a lower willingness

to accept as cooperative behaviour, because it increases the probability that the lottery

tickets sell to the Buyer. Indicating a higher willingness to accept is seen as non-

cooperative, because it increases the probability of the lottery tickets not selling to the

Buyer and thus the underusage of the resource. But looking at the discussion participants

held in the accountability condition, some participants did not want to sell their lottery

tickets. They felt their chance of winning the lottery would be more profitable than

selling their tickets, so they indicated a higher willingness to accept. In their eyes,

indicating a high willingness to accept and not selling might be seen as cooperative

behaviour, as they might think keeping the lottery tickets and having a chance of winning

the lottery is beneficial for every participant. More insight as to what motivated the

decision to indicate a specific willingness to accept can provide understanding about what

participants interpreted as cooperative or non-cooperative behaviour, and if this

corresponds with the interpretation of the researcher. It might also give more information

about the possibility of an egoism bias when indicating a willingness to accept if

participants indicate they were motivated by their self-interest.

Future research and implications

A recommendation for future research might be determining if participants are risk-seeking or risk-averse and how this influences decision-making in an anticommons dilemma. Risk is a theme that repeatedly comes back in the discussion participants have with group members in the accountability condition, in comments such as "I played it safe", "the risk is too big" and "I tried to be a bit more on the safe side this time". Risk-seeking people might be motivated to keep their lottery tickets in order to win the lottery and thus behave less cooperatively, whereas risk-averse people might be motivated to indicate a low price in order to sell their lottery tickets and thus behave more cooperatively. De Kwaadsteniet et. al (2007) state risk preference as a relevant factor. They argue that higher harvests are risky in a common resource dilemma, as it increases the probability the source becomes depleted. In an anticommons dilemma higher harvests are risky, as it increases the probability a resource cannot be used. Hence, the influence of risk preference might be a fruitful avenue for future research.

It might also be interesting to investigate how trust influences price-indication in an anticommons dilemma. De Cremer, Snyder and DeWitte (2001) researched trust in group members as a factor in social dilemmas. They found that when participants had high trust in the contributions group members would make, they contributed more to the common welfare than participants who had low trust. This was established in a public goods dilemma. It might be interesting to investigate if these results can be replicated in an anticommons dilemma and how accountability relates to the relationship between trust and cooperation, as De Cremer, Snyder and DeWitte (2001) found that accountability serves as a moderator. In addition to looking at how trust and risk individually influence

price-indication in an anticommons dilemma it might also be interesting to look at the relationship between trust and risk and if their relationship might alter their individual influence on price-indication in an anticommons dilemma.

The results of the present study are a relevant addition to existing knowledge by showing that as uncertainty about the resource size increases in an anticommons dilemma, cooperation decreases. The detrimental effects of environmental uncertainty on cooperation in social dilemmas have been established in other research (Budescu, Rapoport & Suleiman, 1990; Gustafsson, Biel & Gärling, 1999). However, it hasn't been established in the form of an anticommons dilemma and is therefore an extension of knowledge on the subject. Because of the non-hypothetical nature of the experiment, the results are better generalizable, although still derived from an experiment. Information from the results could be used in real life situations similar to an anticommons dilemma and implicates that parties involved in this situation could try to minimize the environmental uncertainty in order to promote cooperative behaviour. Additionally, the results from the present study imply that while there is a small difference in indicating prices between people that are accountable for their decisions and people who are not, being held accountable for decision making might not be a significant factor in an anticommons situation.

Conclusion

The present study aimed to determine the effect of accountability and different degrees of uncertainty on decision making behaviour in an anticommons dilemma. Partially in line with our expectations, the present research showed that under high uncertainty, people behaved less cooperatively than people experiencing certainty. Additionally, the present study adds to existing research by showing that, unexpectedly, having to justify one's decision-making behaviour did not have a significant effect on decisions in an anticommons dilemma. The results suggest that while making people accountable might not contribute significantly, parties involved in an anticommons dilemma could profit from reducing uncertainty as much as possible to facilitate cooperative behaviour. The present research is therefore meaningful for people striving to counteract underuse in an anticommons dilemma due to non-cooperative behaviour.

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Appendix

Informed consent

Informed consent

Dear participant,

You are about to participate in a study on social decision making. Please read the below information carefully before deciding whether to take part in this experiment.

Participation in this study will last 15 to 20 minutes an involves participating in group task with two other participants. Taking part will be compensated by a €2 payment or 1 credit, plus the amount you will earn in the group task (i.e., on average about €1,50 to €2,50 per person). Additionally, you can participate in a lottery in which you can earn a bonus of €20.

Please note that participation in this study is voluntary and that you have the right to withdraw at any time.

Anonymity

Be open and honest when answering the questions; there are no right or wrong answers. Your responses are strictly confidential and will be used for research purposes only. No personally identifiable information will be recorded and you will never be personally identifiable from the study data you provide or the publications that result from it.

Risks

There are no significant risks involved in this study beyond those you would encounter in everyday life.

Contact information

If you have any questions or concerns about the study, please contact the principal investigator, Dr. Erik W. de Kwaadsteniet from Leiden University (The Netherlands), at kwaadsteniet@fsw.leidenuniv.nl or +31 71 5274109

Please click on the next button below when you agree with the above information. If you agree, then the study will start on the subsequent page.

Next