How externalities awareness and Social Value Orientation (SVO) influence decision-making in an anticommons game.

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Master Thesis, specialization: Social & Organizational Psychology
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May 28, 2021
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Abstract

The present study explores the effect of externalities awareness and Social Value Orientation (SVO) in anticommons dilemmas. Making participants of an anticommons game aware of externalities was expected to increase cooperation, by decreasing their willingness-to-accept (WTA) values, i.e. the amount they would be willing to accept in order to allow other individuals to make use of the resource. The results of the computer-based anticommons game ($N = 167$) did not support this hypothesis. However, the results did show, as predicted, that the more prosocial participants were, the more easily they allowed access to the resource by setting lower willingness-to-accept (WTA) values. Additionally, the hypothesized interaction effect between externalities awareness and Social Value Orientation (SVO) was not confirmed. Proselfs' behavior did not change significantly more than prosocials', after they got aware of the externalities. Finally, the negative effects of uncertainty in cooperation are discussed.

Keywords: anticommons; commons; social dilemmas; externalities; awareness; social value orientation; willingness-to-accept; decision-making; uncertainty

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Table of Contents

1. Introduction

On many occasions, we are in situations where we have to decide between maximizing our selfish interests or trying to maximize the collective interests of our group or even society. Such situations are called social dilemmas (Komorita & Parks, 1995). At first thought, it would be more beneficial for us to maximize our personal interests. However, we should pay attention to the fact that, if all maximize their selfish interests then we will all be worse off than if we all had furthered the collective interests. According to Komorita & Parks (1994), social dilemmas constitute a conflict between individual and collective rationality.

A widely-studied type of social dilemma is the commons dilemma, which refers to a situation where multiple owners have free access to a resource. The resource may be depleted, if owners harvest more from it than it is able to reproduce (Dhont, Van Hiel & De Cremer, 2012). In real life there are many examples of commons dilemmas that resulted in a collective tragedy. An often-used example is overfishing, which constitutes the greatest threat for sea life. The catching of too many fish makes the breeding population too depleted to recover. As a result of widespread overfishing, nearly a third of the world's fisheries are now in danger of exhaustion. This means that not only fishermen will have no more fish to catch in the future, but most importantly the ecosystem is being irreparably destroyed day by day. This unfortunate situation is referred to as the "Tragedy of the Commons" (Hardin, 1968). Multiple owners driven only by their desire to maximize their individual profit, do not consider the costs of overusing and depleting the resource (Vanneste, Van Hiel, Parisi & Depoorter, 2006).

According to Komorita & Parks (1995), there are two types of solutions for resource dilemmas. Individual solutions include manipulations that aim to changing the behavior of individual group members. Structural solutions refer to methods for setting a limit on how much each person can harvest from the resource and for changing the incentives that define people's decision making (Messick, Wilke, Brewer, Kramer, Zemke, P.E & Lui, 1983). Hardin

(1968, 1998) suggested that another promising structural solution to the "Tragedy of the Commons" would be to remove resources from the public domain and privatize them, instead. An advantage of that change would be that when a resource is owned privately, people are depleting it more slowly than when this resource is shared as a public property (Cass & Edney, 1978; Martichuski & Bell, 1991).

On the other hand, privatization may include some threats too. When privatized, the resource might be underused because co-owners of the resource will exert their exclusion rights aiming to block other users from accessing the resource (Heller, 1998). In that case, the full value of the resource might not be realized and the resource could be underused. Imagine that in 2022 a new dangerous type of COVID arises and the pharmaceutical company "Lamda" is doing a very promising try to develop a new vaccine that creates lasting antibodies for both the old and the new type of the virus. Unfortunately, this try has been blocked by three other biotech companies. Specifically, the development of the vaccine will need the usage of the research findings that have been patented by the other pharmaceutical companies. If "Lamda" company wants to create the new vaccine, it would have to pay each company who owns a patent needed for the new vaccine. The difficulty lies in the fact that, each pharmaceutical company thinks of its patented research finding as the most crucial one and therefore demands a high fee for letting "Lamda" use its patent. If the demands by the competitive biotech firms exceed the vaccine's expected profits, "Lamda" company will abandon its developments because the firm will be incapable of paying such high amounts to each other company. Consequently, profits would be lost for all the companies included and most importantly patients would be left without a vaccine, that could otherwise protect them from ailing. The example above represents a typical real-life anticommons dilemma-situation, which constitutes another type of social dilemma.

Heller (1998) referred to the "Tragedy of the Anticommons" as a state where resources are inefficiently underused because too many owners can exclude each other from using them. While the "Tragedy of the Commons" represents the overuse of a depletable resource, the "Tragedy of the Anticommons" represents an over-fragmented property, where owners of individual units cannot agree on how to use the resource and finally the resource is led to its tragic underuse.

Anticommons dilemmas have a mixed-motive character, because self-interests tend to conflict with the collective ones. By excessively using your exclusion rights in an anticommons regime, negative effects for the group and usually also for the society are caused (Van Lange, Joireman, Parks & Van Dijk, 2013). From that point of view, one could say that the anticommons dilemma constitutes a reversed form of the "Tragedy of the Commons", as selfish behavior of blocking the use of the resource, instead of depleting it, causes negative effects for the collective. However, the actual behavior observed in the two dilemmas and the factors influencing it diverge significantly (Glöckner, Tontrup & Bechtold, 2015).

What are the psychological factors driving behavior in anticommons dilemmas? Individuals seem to be incentivized to set prices that are higher than the true value of the good they possess, aiming to gain more out of a possible trade in the future (Heller, 1998). Moreover, the "Endowment Effect" might also contribute in some cases to increased pricing. Individuals tend to ask for more money when they sell something compared to the amount, they want to pay, in order to buy the same good (Kahneman, Knetsch & Thaler, 1990). In that way, two important definitions are introduced that are often met in bargaining situations as well as in social dilemmas such as the anticommons dilemmas. "Willingness-to-accept value" (WTA) represents the amount that in a bargaining situation a seller is willing to accept in order to give up the good or part of property that he/she possesses. "Willingness-to-pay value" (WTP) stands for the amount that a buyer is willing to pay to get a good or a part of property. In the

anticommons dilemmas though individuals do not give up a good that they possess, but they allow access to the part of the resource they own, for someone else, who belongs in the group that owns the whole resource. Although, Economic Theory has suggested that WTP and WTA values are equivalent amounts (Willig, 1976), empirical evidence has shown that there is usually a large numerical gap between these two values (Kahneman, Knetsch & Thaler, 1990).

As observed by Vanneste, Sven, Van Hiel, Parisi & Depoorter (2006), those who have control of an anticommons property usually demand higher amounts for allowing access to the resource compared to the resource's value. This behavior has a close relationship with "Loss Aversion", the tendency of people to prefer avoiding losses to going for equivalent gains. For instance, a potential seller would have negative feelings for giving up his/her good and those feelings would heighten his/her WTA, which would represent the loss value of the good (Kahneman, Knetsch & Thaler, 1990). Similarly, in an anticommons dilemma an individual asks for a higher amount, in order to compensate for the loss of the good or of the property's part he/she owns. The paradox of that situation lies in the fact that in reality the owner will not lose his/her good, as he/she will still be able to access it conversely to a bargaining situation. The owner loses, however, the exclusive access to the part of property, as someone else begins to make use of it too and probably also gain profits from it.

This psychological bias is closely tied to the "psychological ownership" that individuals in an anticommons property might feel (Pierce et al., 2001). Specifically, individuals perceive that they own a good or a part of property and therefore they overvalue it. This has as an effect that they set higher prices for that compared to its real value and unintentionally they block others from using the same good or property (Heller & Eisenberg, 1998).

Another important dimension of overpricing in anticommons dilemmas is the interdependence of group members' outcomes. In an anticommons dilemma every person's decision determines the final outcome of the interaction. If an anticommons property is owned

by 5 persons, all the other 4 persons have to agree so that the fifth person can get access to the resource. If only one co-owner doesn't agree, the endeavor will be unsuccessful. Every co-owner in an anticommons dilemma has therefore "pivotal power" (Shapley & Shubik, 1954), because each one of them can demand high amounts as a term of cooperation and therefore can determine whether others will benefit from the resource or not. Normally, individuals apply their coercive power moderately because they are afraid of retaliation by others, if they behave more extremely. However, in anticommons dilemmas co-owners know that the worst scenario is that none of them gets access to the resource. That's why they are not afraid of retaliation and excessively apply their coercive power one to another (Van Lange, Joireman, Parks & Van Dijk, 2013).

Furthermore, it is very important to bear in mind that although privatization is considered to be a means of independence, it increases, as mentioned above, the interdependence between co-owners, in case that a property is shared (Mc Williams, 2011). This interdependence creates an environment where co-owners adopt territorial behaviors. In other words, they try to mark their parts of property and defend them by setting higher prices and block others from using them. This "anticipatory defending" (Messick et al., 1985) may get even harder in case they think that the other co-owners do not want to cooperate. In that case, individuals will adopt even more egocentric behaviors and, in their try to defend their parts of ownership, they will lead the property to underuse and harm the collective (Mc Carter, Kopelman, Turk & Ybarra, 2021).

As assumed from the above, owners of an anticommons resource usually lack incentives for cooperation. They prefer defending their part of property and not being able to access the resource to allowing access to their part and taking advantage of the full value of the resource. According to Strathman et al. (1994) and Joireman et al. (2012), if individuals consider the future consequences for their group, they will be more willing to cooperate with

each other, by asking for less compensation, and they will more easily allow access to the resource. These consequences are related to the long-term outcomes that their behavior will have for the collective and the way they will be influenced by those outcomes in the future.

Mundell (1968) referred to the term "externalities" as the external consequences which do not directly concern the decision maker but rather the collective i.e. the whole group that owns the resource. Cooperation will not occur if co-owners do not realize the consequences of the underuse of the resource for the whole group (Schulz, Parisi & Depoorter, 2002; Fennel, 2004). Dhont, Van Hiel & De Cremer (2012) suggested that when individuals realize the externalities, co-owners will choose to cooperate by allowing access to the resource and increasing the possibility that the full value of the resource can be used. In other words, information about the negative effect of noncooperation can improve the resource management efficiency (Stern, 1976; Rapoport, 1988; Foddy & Veronese, 1996). It also affects the way individuals perceive the dilemma, as they no longer have as a first goal to mark and defend their part of property but to avoid negative consequences and to increase their collective profit. Moreover, externalities awareness also influences the dimension of morality. When decision makers are aware of the fact that if they do not cooperate, negative consequences will harm themselves and others, they feel greater social responsibility and they get more convinced to cooperate (Dhont, Van Hiel & De Cremer, 2012).

The difficulty lies herein that collective consequences are more difficult to detect in an anticommons dilemma than in a commons dilemma. When individuals use a common resource, they are aware that if they harvest too much, they will deplete the resource and this will harm the collective. On the other hand, in the case of an anticommons dilemma the value of the resource is unclear, as it either has not been created yet or it has not been productive yet (Dhont, Van Hiel & De Cremer, 2012). That is why individuals face difficulties to think both of the collective benefits and of the consequences of noncooperation. These conditions make

decision-makers prone to psychological biases, overvaluation of individual parts of the property and to only pursuing their personal benefits (Kopelman, 2009). However, when externalities in an anticommons dilemma are unveiled, the hidden rationality principle moves from the individual to the group level (Liebrand et al., 1986). Building on these findings, it will be tested in the current study whether awareness of externalities reduces the compensation that participants ask in order to allow access to the anticommons resource.

The forenamed findings have led to the formulation of the first hypothesis:

H1: Co-owners who are made aware of the externalities will set lower WTA prices in comparison to those who are not made aware of the externalities.

Except for externalities awareness, previous research in social dilemmas has shown that one's personality also plays a considerable role in mixed motive behavior. This is basically due to the interpersonal differences in social values. Social Value Orientation (SVO) expresses stable preferences for the distribution of outcomes between ourselves and others (Messick & Mc Clintock, 1968). Social Value Orientation influences individuals' cognitions and consequently their choices in resource dilemmas (Roch & Samuelson, 1997; Roch et al., 2000). Moreover, it affects the expectations about others' behavior (Kelley & Stahelski, 1970) and the tendency to cooperate or not (Zeelenberg, Nelissen, Brengelmans & Schaik, 2008).

People with a Prosocial Value Orientation (prosocials) want to maximize joint outcomes, they find the collective interests of a greater importance than the individual ones and look for equality in outcomes. In resource and public good dilemmas, they tend to be cooperative, which can be translated into harvesting less and contributing more (Van Dijk, De Kwaadsteniet & De Cremer, 2009). Additionally, they usually have a strong sense of social responsibility which leads them to cooperation in social dilemmas (De Cremer & Van Lange, 2001).

On the other hand, people with a Proself Value Orientation (proselfs) mainly consist of two subcategories: competitors, who want to maximize the difference between their and others' outcomes and individualists, who just want to maximize their own outcomes. Proselfs are generally noncooperators and perceive cooperation as a sign of weakness while defection as a sign of strength (Liebrand, Jansen, Rijken & Suhre, 1986). According to Van Lange & Kuhlman (1994), proselfs perceive noncooperation as rational, whereas prosocials cooperation as rational. As suggested by the "Might versus Morality Hypothesis" this might be due to the fact that prosocials view social dilemmas through a morality dimension, where the desirable behavior seems to be cooperation, while proselfs view them through a power dimension, where they will be more powerful, if they do not cooperate (Liebrand, Jansen, Rijken & Suhre, 1986; Van Lange & Kuhlman, 1994).

The role of Social Value Orientation in anticommons dilemmas will be studied for the first time in the current study. Specifically, it will be observed whether prosocials cooperate more than proselfs when they own a part of an anticommons property. Based on that, the second hypothesis has been formulated:

H2: Co-owners who score higher on the Social Value Orientation scale will set lower WTA values compared to participants who score lower on the Social Value Orientation scale. This means that individuals who are more prosocial are expected to be more cooperative, by allowing access to the resource, compared to individuals who are more proself.

In their attempt to understand the context where cooperation can emerge, Pruitt & Kimmel (1977) formulated the "Goal-Expectation Theory", which suggests that cooperation generally depends on two factors. Firstly, decision makers have to understand that it is pointless to steadily pursue their individual interest and that they have to accept instead, that trying to promote the group benefits, by cooperating, will be more beneficial than behaving in a selfish manner. Secondly, it is very important for them to expect that their partners will also be willing

to cooperate. If this prerequisite is not fulfilled, individuals may be afraid of exploitation in case they cooperate (Pruitt & Kimmel, 1977). That is why they would prefer to not cooperate and to protect themselves, instead.

As mentioned above, Social Value Orientation influences individuals' expectations about others' behavior (Kelley & Stahelski, 1970). According to Bogaert, Boone & Declerck (2008), proselfs tend to view others in a more homogeneous way. Specifically, they usually assume that their partners also have an Individualistic or Competitive Value Orientation. This makes them believe that their partners will mostly behave out of self-interest and that they will possibly not cooperate. These expectations of proselfs prevent them even more from cooperating.

Conversely, prosocials tend to have a heterogeneous view of others, by believing both that some people may share same values as they do and that some people may have different social values. Either way, prosocials are more optimistic that their partners will cooperate (Smeesters et al. 2003), as they expect that at least some people will also be prosocial and will value cooperation as high as they do. Moreover, prosocials have inherent willingness to cooperate due to their Social Value Orientation (Bogaert, Boone & Declerck, 2008). They share a higher preference for mutually beneficial outcomes and they are more concerned for the collective. That is why they mark the try to enhance joint outcomes as a rational behavior. On the other hand, proselfs need external incentives which will show them that their personal interest aligns with the collective interest. As also suggested in the "Interactive Model of Social Value Orientation" by Bogaert, Boone & Declerck (2008), only if proselfs view cooperation as serving their own interest, is it possible for them to cooperate. This could be achieved for instance by heightening the identity of the group or by mentioning long-term benefits of cooperation (Bogaert, Boone & Declerck, 2008). In an anticommons dilemma this could be translated as follows: if proselfs were made aware of the externalities i.e. the negative

consequences that non-cooperation would have for their group, it would be possible that they would cooperate more than if they had not thought of the consequences. This would be due to the fact that they would figure out that cooperation would also increase their long-term individual profit, while non-cooperation would only increase their short-term profit.

Inspired by these findings it will be studied whether people who score higher or lower in the Social Value Orientation scale differ in the factors that influence them more in behaving cooperatively.

The third hypothesis has been formulated as follows:

H3: An interaction between externalities awareness and Social Value Orientation is predicted. Externalities awareness will influence proselfs more in setting lower WTA values compared to prosocials.

Empirical research has also been conducted for the role of uncertainty in social dilemmas. Uncertainty's influence on cooperation and overpricing is of a great interest. Specifically, social uncertainty arises when people do not have the possibility to communicate with each other in a social dilemma and therefore are not certain about which decision their partners will make (Messick, Allison & Samuelson, 1988; De Kwaadsteniet, Van Dijk & De Cremer, 2006). Especially in resource dilemmas, individuals are uncertain about how much their partners will harvest from the resource. In such cases, people lack cues about how they should coordinate with each other and this usually leads them to basing their decisions on their Social Value Orientation (Van Dijk, De Kwaadsteniet & De Cremer, 2009).

Anticommons dilemmas constitute environments where uncertainty is at high levels. This happens because it is difficult, when owing a part in an anticommons property, both to define which choices are losses and which are gains and how large the gains and the losses will be. For instance, if we go back to the anticommons example of the COVID vaccine we will see the following: if the companies grant permission for "Lamda" to use their patents in exchange

for money, they do not lose the ownership of the patent and they still have the right in the future to exclude other companies from using the same patent. However, they are uncertain about what profits "Lamda" will have from using their patents. This will lead them to act selfishly and try to maximize as much as they can the amount they ask as a compensation for their patents. Instead of setting a fairly proportionate price to the expected profits, they therefore try to win as much as possible from "Lamda's" future gains.

Consequently, uncertainty results in the reduction of cooperativeness (Budescu, Rapoport & Suleiman, 1990) and the justification of non-cooperative behavior (Van Dijk, Wit, Wilke & Budescu, 2004). Few studies that have investigated factors, which influence decision making in anticommons dilemmas, have shown that uncertainty amplifies strategic overpricing. According to Glöckner, Tontrup & Bechtold, (2015), people who felt uncertain in social dilemmas were more selfish and less cooperative, by stating high WTA values and aiming to maximize their individual gains. It is very unpleasant that anticommons dilemmas are situations with increased uncertainty; many transactions that are of a great importance for the society are lost, because of owners of anticommons resources behaving in a selfish manner and blocking the access to the resources (Heller, 2008). In the present study the role of uncertainty in an anticommons dilemma will be explored.

2. Method

i. Participants and Design

For the current experimental game 238 participants were recruited through the platform "Mechanical Turk" from Amazon. 167 participants finished the study (M_{age} = 38.11, SD_{age} = 9.89; 68.3% male). In groups of three, participants took part in the anticommons game, where they could win an average of 1$ per person, depending on the decisions they made during the task, additional to their participation fee, which was 2$. Out of the 167 participants who finished the study, 78 were randomly assigned to the control condition and 89 to the experimental condition. The study had a factorial design with two independent variables: 1. Externalities Awareness, a categorial variable with two levels (aware vs. not aware), which was manipulated; 2. Social Value Orientation (SVO), a continuous variable that was measured. The dependent variable of the study was Willingness-to-accept values (WTA), also a continuous variable that represented the amount of points that participants demanded in order to allow access to the resource.

ii. Procedure and Material

Before participants took part in the game, they had read an informed consent which included information about the duration of the task, the anonymity of the study and the necessary contact details with Leiden University. Moreover, participants were informed about the amount of money they would get, that they would do the task together with two more people and that they could withdraw at any time during the game.

After indicating that they agreed with the informed consent, participants were asked to fill in the SVO Slider Measure, which consisted of its 6 basic items (Murphy, Ackerman & Handgraaf, 2011). Individuals should make choices about how to allocate resources between themselves and another person. For each of the six questions they had to move a slider input

left and right until they reach their preferred joint amount. Due to the fact that Social Value Orientation is a continuous variable, its most suitable scale would be a continuous one. With the SVO Slider Measure the set of the participants' responses could be scored in order to give a single final score expressed in degrees. Prosocial Value Orientation corresponded to 22.45° - 57.15° and Proself Value Orientation to less than -12.04° - 22.45°. SVO Slider Measure was also chosen because of its reliability, predictive validity and high resolution.

After the measurement of Social Value Orientation, participants could read the detailed instructions of the anticommons game. They got informed that they would start with 50 points each and that they would be the co-owners of a resource together with 2 more players. The size of the resource was 150 points. Co-owners were not allowed to harvest the resource, unless they reached a deal with the other two players. In order to get access to the resource they had to make an offer to the other two co-owners, indicating their Willingness-to-pay (WTP) value, in other words how many points they would be maximally willing to pay to get access to the resource. This amount could range from 0 to 25 points to each player. At the same time, the other two co-owners would indicate their Willingness-to-accept (WTA) value i.e. how many points they would minimally want to receive in order to grant access to the resource. This amount could again range from 0 to 25 points from each player. The deal could be met only if the amount offered by the interested player would be equal to or higher than the amount asked by the other two players. Each participant was informed that he/she aimed to reaching a deal with the other two co-owners, getting access to the resource and harvesting 50 points from it. However, each player who got access to the resource, would of course have to pay the amount of points he/she had offered to the other two players. The amount of points set by each player could not be changed in the future. It was made clear to each participant that at the same time all co-owners had a common aim, to get access to the resource. Therefore, all the three players

would have to set their WTP and WTA prices. Finally, players got informed that they could not communicate with each other during the task.

After reading the task instructions, participants should answer five multiple-choice questions about the task comprehension (Appendix I). Only if they gave the correct answers to all the five questions, could they continue with the game.

For the 78 participants who were randomly assigned to the control condition, no further information was presented.

The 89 participants of the experimental condition viewed an additional important note before answering to the central questions. They were informed that if they set a high asking price, this might have negative consequences for the collective, i.e. the 3 co-owners together. Specifically, if the amount they asked in order to allow access to the resource was higher than the offers by the rest co-owners, co-owners would be able to gain access to the resource. This would have as a consequence that the resource would be underused and the group payoff would be lower than it could have been. Conversely, if their asking price was relatively low, it would be possible that the offers by the rest co-owners would be higher and that they would get access to the resource. If everyone set low asking prices, everyone could harvest from the resource. In that case, the consequences would be beneficial for all, because the resource would be optimally used and the group payoff would be pretty high. This important note in the experimental condition aimed to make participants aware of the externalities i.e. the negative consequences that the high asking prices would cause to the group of co-owners.

After this, participants had to answer to the two central questions; the first referred to the maximum amount that they were willing to pay to the rest co-owners, in order to get access to the resource (0-25 points); the second referred to the minimum amount that they would accept from the rest co-owners to grant them access to the resource (0-25 points).

Afterwards, two brief questionnaires followed. The first one, consisted of four questions and aimed to measure how aware of the externalities participants were (Appendix II). The mean-score of those items was then calculated and used for the manipulation check of awareness. The second questionnaire included eleven questions and measured the amount of uncertainty that participants felt during the task (Appendix III). When participants finished with the two questionnaires, the last step for them was to fill in their age and gender.

Finally, the research aim of the game, studying the anticommons dilemma situation, was revealed to the participants. They were informed that within a week they would receive the amount of dollars corresponded to their participation fee and their payoffs. Contact information was again given and participants were thanked and debriefed.

3. Results

i. Factor and Reliability Analysis of Awareness

The factorability of the 4 items related to Awareness was examined. Several well-recognized criteria for the factorability of a correlation were used. Firstly, the Kaiser-Meyer-Olkin measure of sampling adequacy was .695, very close to the commonly recommended value of .70. Secondly, Bartlett's test of sphericity was significant (χ^2 (6) = 155.866, $p < .001$). The diagonals of the anti-image correlation matrix were also all over .5. Finally, three communalities were above .5 and one close to .5, confirming that each item shared common variance with other items. Given these overall indicators, factor analysis was deemed to be suitable with the 4 items. Initial eigen-values indicated that all four items as one component explained 56.71% of the variance.

Awareness component consisting of 4 items, was tested for reliability, using Cronbach's alpha (*a*). According to Table 1, it showed moderate to high internal consistency with an overall *a* of .739. Item total-correlations were generally at least moderate, the squared multiple regression confirmed that variance was moderately to highly explained throughout. Cronbach's alpha would not benefit from the removal of any item.

Table 1. Reliability Statistics for Awareness component

Cronbach's alpha	Cronbach's alpha based on standardized items	N of items
.739	.743	4

ii. Manipulation Check

An ANCOVA was undertaken to check for the effect of Awareness Manipulation on Awareness Mean Score while controlling for Social Value Orientation. The results from the ANCOVA only showed a significant main effect of awareness, F (1,164) = 9.16, p = .003, η^2 = .053 (medium sized effect), revealing that the awareness manipulation was successful. Participants in the externalities awareness condition (M = 6.09, SD = 0.96) reported being more aware than the participants in the control condition (M = 5.61, SD = 1.10).

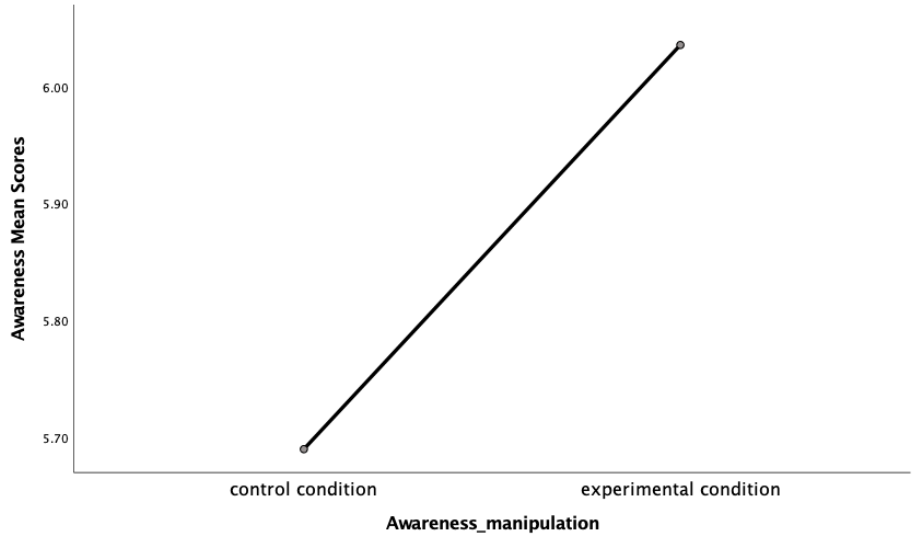

Figure 1. Mean scores of awareness as a function of externalities awareness manipulation

iii. Main Results

As a first step, normality checks for the continuous variables were undertaken which showed that none of the variables was normally distributed. This fact was taken into account when choosing statistical tests.

In the sample of the current study 92 participants had a Proself Value Orientation (55.1%) and 75 participants a Prosocial Value Orientation (44.9%). The lowest SVO angle (M = 21.31°, SD = 12.13°) found in the study was -8.30° and the highest 52.91°.

Groups and group payoffs

After the study was conducted, participants were randomly classified into 3-person groups. 26 groups were formed in the control condition and 29 groups in the experimental condition.

Group payoffs were calculated based on the willingness-to-accept (WTA) and willingness-to-pay (WTP) values of their group members and on whether individuals managed to get access to the resource or not. The highest group payoff found in the control condition (M = 192.15, SD = 31.47) was 290 points (all group members got access to the resource) and in the experimental condition (M = 193.62, SD = 25.87) was 250 points (two out of three group members got access to the resource).

The lowest group payoff in both conditions was 150 points and was found in groups in which none of their members got access to the resource. In 3 groups in the control condition none of the members managed to get access to the resource, whereas in the experimental condition only in one group it occurred that none of the members got access to the resource. In the control condition 60.3% of the participants did not get access to the resource, slightly more than in the experimental condition (58.6%). The mean of the WTP values in the control condition (M = 16.24, SD = 6.36) was slightly higher than in the experimental condition (M = 14.91, SD = 6.89); however, this difference was non-significant, $p > .05$.

Main effect of externalities awareness

First of all, it was hypothesized that participants who were made aware of the externalities would set lower WTA values compared to those who were not made aware. To test Hypothesis 1, a Mann-Whitney U independent t-test was undertaken to see whether WTA values were higher in the control than in the experimental condition. The results were not in line with the first hypothesis, as it was shown that WTA values were not significantly different between control (M = 16.62, SD = 6.77) and experimental condition (M = 15.06, SD = 8.07), U = 3137.50, z = -1.085, p > .05.

Main effect of Social Value Orientation (SVO)

According to the second hypothesis, participants with a higher Social Value Orientation would set lower WTA values compared to participants with a lower Social Value Orientation. Social Value Orientation and WTA values were subjected to a Spearman's Correlation to investigate whether WTA values decrease when participants score higher on the SVO slider angle. According to Table 2, there was a weak negative Spearman's correlation between the independent and the dependent variable. In line with Hypothesis 2, higher SVO slider angle scores were associated with lower WTA values, r (165) = -.171, p = .027. This suggests that 2.9% of the variance in WTA values is explained by Social Value Orientation in this sample, when the outcome is explored using non-parametric methods.

Table 2. Spearman's correlation between SVO slider angle and WTA value

			SVO slider angle	WTA value
Spearman's rho	SVO slider angle	Correlation Coefficient	1.000	-.171*
		Sig. (2-tailed)	.	.027
		N	167	167
	WTA value	Correlation Coefficient	-.171*	1.000
		Sig. (2-tailed)	.027	.
		N	167	167

* Correlation is significant at the 0.05 level (2-tailed)

Interaction effect between externalities awareness and Social Value Orientation (SVO)

Moreover, it was also hypothesized that there would be an interaction effect between externalities awareness and Social Value Orientation (SVO). Participants who scored lower on the SVO slider angle would be influenced more by the externalities awareness in setting lower WTA values compared to participants who scored higher on the SVO slider angle. To test Hypothesis 3, a One-Way ANOVA was undertaken with externalities awareness and Social Value Orientation as the independent variables and WTA values as the dependent variable. Social Value Orientation was used as a categorical variable (SVO classification) with two levels: proselfs and prosocials. To test the homogeneity of the samples, Levene's test for equality of variances was used (Table 3).

Table 3. Levene's test of equality of error variances [a, b]

WTA value		Levene Statistic	df1	df2	Sig.
	Based on Mean	2.683	3	163	.049
	Based on Median	2.053	3	163	.109

a. Dependent variable: WTA value

b. Design: Awareness manipulation + SVO classification + Awareness manipulation*SVO classification

Levene's test based on median was not significant for the dependent variable, $p > .05$. The variability of scores for each group was similar, which means that there were no heterogenous variances.

According to Table 4, there was no statistically significant effect interaction between the effect of awareness manipulation and SVO classification, F (1, 163) = .695, $p > .05$. The main effect of awareness manipulation was not significant, F (1, 163) = 2.797, $p > .05$. This indicates that there was no significant difference between the two conditions and that Hypothesis 3 could not be confirmed. The main effect of SVO classification was significant, F (1, 163) = 6.367, $p = .013$. This means that there was a significant difference between proselfs (M = 17.03, SD = 6.841) and prosocials (M = 14.25, SD = 8.036). The total model explained 5.3% of variance of WTA values. Additionally, 3.7% was explained by SVO classification.

Table 4. Test of between-Subject effect with dependent variable WTA values

	Sum of Squares	df	Mean Square	F	Sig.	η^2
Corrected Model	496.626[a]	3	165.542	3.046	.030	0.053
Intercept	40021.208	1	40021.208	736.314	<.001	
Awareness Manipulation	152.001	1	152.001	2.797	.096	0.016
SVO classification	346.053	1	346.053	6.367	.013	0.037
Awareness Manipulation*SVO classification	37.798	1	37.798	.695	.406	0.004
Error	8859.613	163	54.353			
Total	50964.000	167				
Corrected Total	9356.240	166				

a. R Squared = .053 (Adj. R Squared = .036)

iv. Additional Results

The factorability of the 11 variables related to Uncertainty was examined. Several well-recognized criteria for the factorability of a correlation were used. Firstly, the Kaiser-Meyer-Olkin measure of sampling adequacy was .709, above the commonly recommended value of .70. Secondly, Bartlett's test of sphericity was significant (χ^2 (55) = 618.101, p < .001). The diagonals of the anti-image correlation matrix were also all over .5. Finally, all communalities were above .5, confirming that each item shared common variance with other items. Given

these overall indicators, factor analysis was deemed to be suitable with the 11 items. Initial eigen-values indicated that the Uncertainty items as 3 components explained 62.93% of the variance.

However, the third factor given, which included 3 items in total (Uncertainty items 2, 4 and 5) was hard to understand, as it could not be integrated to a wider category of Uncertainty, and had a low Cronbach's *a* (.596). These three items had very low communalities in the rest components and caused problems to the MSA index. Uncertainty item 6 also had low communalities in each component. After these four items were deleted, Kaiser-Meyer-Olkin measure and Cronbach's alpha were increased.

After items 2, 4, 5 and 6 were deleted, the Kaiser-Meyer-Olkin measure of sampling adequacy for the remaining 7 items was .752. Bartlett's test of sphericity was significant (χ^2 (21) = 446.858, $p < .001$). Again, the diagonals of the anti-image correlation matrix and all communalities were above .5. According to the Scree Plot (Figure 2) and the Rotated Component Matrix (Table 5), two Uncertainty components were extracted. Initial eigen-values indicated that the two components explained 69.12% of the variance. The first component given includes three items and refers to uncertainty about own behavior and its consequences. The second component given includes 4 items and is associated with the task's environment uncertainty.

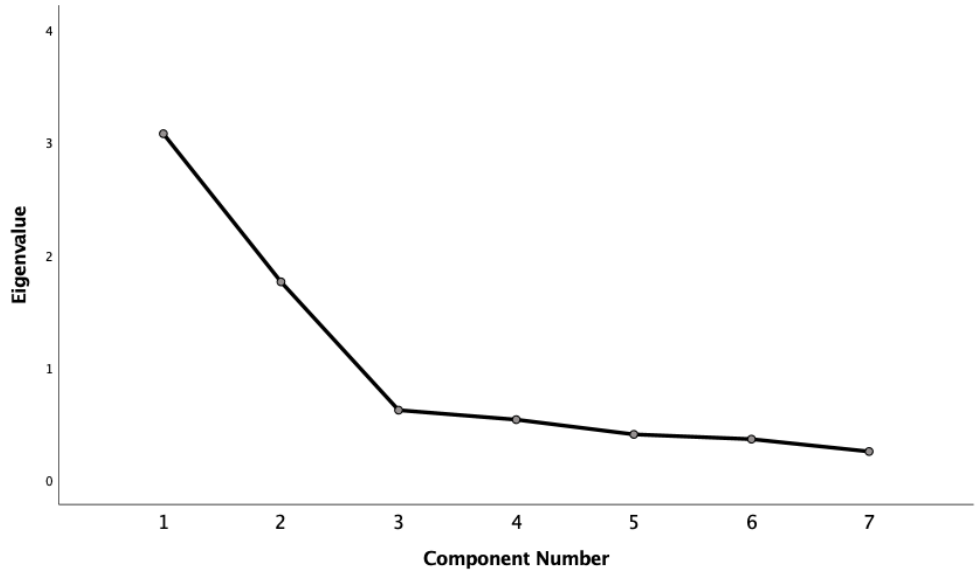

Figure 2. Scree Plot for Uncertainty items

Table 5. Rotated Component Matrix

	Component	
	1	2
Uncertainty Item 1	**.767**	-.084
Uncertainty Item 3	**.845**	-.001
Uncertainty Item 7	-.049	**.847**
Uncertainty Item 8	.191	**.833**
Uncertainty Item 9	-.616	**.604**
Uncertainty Item 10	-.549	**.619**
Uncertainty Item 11	**.805**	.062

The two Uncertainty components produced by the Principal Component Analysis were tested for reliability, using Cronbach's alpha (*a*). Table 6 illustrates that component 1 (Behavior Uncertainty) showed moderate to high internal consistency with an overall *a* of .775. Item-total

correlations were moderate to high, the squared multiple correlation generally confirmed that variance was well explained throughout. Cronbach's alpha would not benefit from the removal of any item.

Table 6. Reliability Statistics for Behavior Uncertainty

Cronbach's alpha	Cronbach's alpha based on standardized items	N of items
.775	.778	3

According to Table 7, component 2 (Task's Environment Uncertainty) showed moderate to high internal consistency with an overall *a* of .773. Item-total correlations and squared multiple correlations were moderate, confirming that variance was well explained throughout. Cronbach's alpha would benefit only a little (.777) if item 8 was deleted. However, due to the fact that the difference was small, this item was kept.

Table 7. Reliability Statistics for Task's Environment Uncertainty

Cronbach's alpha	Cronbach's alpha based on standardized items	N of items
.773	.774	4

Using the new variable of Uncertainty, some additional statistical analyses were conducted. First of all, a multiple linear regression was undertaken to examine variance in WTA values predicted by Social Value Orientation and uncertainty mean scores. Table 8

illustrates that the model was able to explain 11.7% of the sample outcome variance (*Adj.* R^2 = .101).

Table 8. Linear regression: Model Summary

Model Summary[b]				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.342[a]	.117	.101	7.119

[a] Predictors: (Constant), SVO slider angle, Uncertainty component 1, Uncertainty component 2

[b] Dependent Variable: WTA value

The regression model was significantly better at predicting outcome than some random method, F (3, 163) = 7.213, p < .001 (Table 9).

Table 9. Significance of model

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1096.459	3	365.486	7.213	<.001[b]
	Residual	8259.780	163	50.673		
	Total	9356.240	166			

[a] Dependent Variable: WTA value

[b] Predictors: (Constant), SVO slider angle, Uncertainty component 1, Uncertainty component 2

In addition to the Social Value Orientation effect mentioned earlier, an effect of uncertainty was also found. Uncertainty component 1 (Behavior Uncertainty) contributed to

the model and was related to WTA values (B = 1.299, t = -3.566, p < .001). The more uncertain participants were about their behavior and its consequences, the higher WTA values they set. Finally, uncertainty component 2 (Task's Environment Uncertainty) did not contribute significantly to the model, p > .05 (Table 10).

Table 10. Model Parameters

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	12.507	2.716		4.605	<.001
	SVO slider angle	-.103	.046	-.166	-2.247	.026
	Uncertainty component 1	1.299	.364	.283	3.566	<.001
	Uncertainty component 2	.002	.409	.000	.004	.997

Additionally, the file was split so that the groups with different Social Value Orientation can be compared in respect to how much uncertainty influences the height of WTA values. A simple linear regression was undertaken to examine variance in WTA values predicted by uncertainty, separately for proself and prosocial participants. According to Table 11, the model was able to explain 10.2% of the sample outcome variance for proselfs (*Adj.* R^2 = .092) and 5.9% for prosocials (*Adj.* R^2 = .046).

Table 11. Linear regression: Model Summary

Model Summary[b]					
SVO classification	Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
Proself	1	.320[a]	.102	.092	6.518
Prosocial	1	.243[a]	.059	.046	7.849

[a] Predictors: (Constant), Uncertainty Component 1

[b] Dependent Variable: WTA value

Table 12 indicates that the regression model is significantly better at predicting outcome than some random method, $F_{proself}(1, 90) = 10.250$, $p = .002$, $F_{prosocial}(1, 73) = 4.566$, $p = .036$.

Table 12. Significance of model

SVO classification	Model		Sum of Squares	df	Mean Square	F	Sig.
Proself	1	Regression	435.451	1	435.451	10.250	.002[b]
		Residual	3823.451	90	42.483		
		Total	4258.902	91			
Prosocial	1	Regression	281.293	1	281.293	4.566	.036[b]
		Residual	4496.894	73	61.601		
		Total	4778.187	74			

[a] Dependent Variable: WTA value

[b] Predictors: (Constant), Awareness Manipulation, SVO slider angle

According to Table 13, Uncertainty Component 1 significantly contributed to the model and was related to WTA values set by Proselfs (B = .320, t = 3.202, p = .002) and to WTA values set by Prosocials (B = .243, t = 2.137, p = .036). For every unit that uncertainty increases, WTA values rise by 1.342 of a point for proselfs and by 1.208 of a point for prosocials. This means, that proselfs are influenced a bit more by uncertainty in heightening their WTA values compared to prosocials.

Table 13. Model Parameters

SVO classification	Model		Unstandardized Coefficients		Standardized Coefficients		
			B	Std. Error	Beta	t	Sig.
Proself	1	(Constant)	11.104	1.972		5.630	< .001
		Uncertainty Component 1	1.342	.419	.320	3.202	.002
Prosocial	1	(Constant)	9.475	2.413		3.927	< .001
		Uncertainty Component 1	1.208	.565	.243	2.137	.036

Additionally, it was investigated whether Uncertainty influenced the group payoffs that participants achieved. A multiple linear regression was undertaken to examine variance in group payoffs explained by the two components of uncertainty. Unfortunately, the result was non-significant, $p > .05$.

4. Discussion

i. Main Findings

Main effect of externalities awareness

The present study investigated the role of externalities awareness in the behavior of participants in an anticommons dilemma. Specifically, it was tested whether individuals who are made aware of the consequences that noncooperative behavior will have for their group, ask for lower compensation (lower WTA values) in order to allow access to the anticommons resource. Participants took part in an online anticommons game and the variable of externalities awareness was manipulated through different information given to each condition. Participants in the experimental condition got informed about the collective consequences that underuse of the resource would have, while participants in the control condition got no further information about the externalities.

It was expected that when participants were aware of the externalities, they would behave more cooperatively compared to when they were unaware of them (Stern, 1976; Rapoport, 1988; Foddy & Veronese, 1996). If so, individuals in the game would set lower WTA values in the experimental condition, more readily allowing their co-owners access the resource, compared to the control condition. This would lead to efficient use of the anticommons resource by all the three co-owners. However, it was found that WTA values were not significantly different between the two conditions. Although, participants in the experimental condition were made aware of the externalities, they did not set significantly lower WTA prices than the participants in the control condition. This finding is not in line with previous research in social dilemmas as well as with Dhont, Van Hiel and De Cremer (2012) who found that individuals asked for less money when externalities were made salient in an anticommons dilemma.

Nevertheless, a significant effect of externalities awareness was found on the manipulation check. This means that participants were indeed more aware of the collective consequences in the experimental condition compared to the control condition. Although the manipulation of externalities awareness was successful, participants did not behave more cooperatively in the experimental condition. A possible reason for that could be that the current study is based on an incentivized anticommons game, where participants have to make real decisions and can earn real money. Conversely, the study by Dhont, Van Hiel & De Cremer (2012) was based on a hypothetical scenario of an anticommons dilemma, where participants should imagine of themselves owning a part of an anticommons resource (oil well). Moreover, the payoff scheme was hypothetical too, as participants only got paid for their participation. The different results of the two studies may be due to the following factors. In a scenario study it is possible that participants are influenced by Social Desirability, which means that they think of which behavior is deemed socially desirable, instead of which behavior they would show, if they participated in a real anticommons dilemma. On the other hand, in an incentivized game, like the one included in the current study, participants are influenced by the monetary consequences of their decisions.

Main effect of Social Value Orientation (SVO)

Although the role of Social Value Orientation (SVO) has been investigated multiple times in social dilemmas, the current study was the first to explore it in an anticommons dilemma. Social Value Orientation was measured using the SVO Slider Measure as developed by Murphy, Ackerman & Handgraaf (2011). It was expected that prosocials would be more cooperative than proselfs, meaning that they would set lower WTA prices and give easier access to the resource for their co-owners.

The results are in line with former research findings, which showed that Social Value Orientation strongly influences decision making in social dilemmas. A negative correlation was found between Social Value Orientation angle and WTA values. The more prosocial participants were, the lower WTA values they set. According to Au & Kwong (2004), Van Lange, De Cremer, Van Dijk & Van Vugt (2007) and Balliet, Parks & Joireman (2009), prosocials tend to cooperate more easily in social dilemmas than proselfs do. Similarly, participants who were more prosocial in the current anticommons dilemma asked for lower compensation and let their co-owners use the resource more easily compared to participants who were more proself.

Prosocials' cooperative behavior in the current study can be explained through their tendency to view social dilemmas from a morality dimension, where cooperative behavior seems to be the most rational choice (Liebrand, Jansen, Rijken & Suhre, 1986; Van Lange & Kuhlman, 1994). They put greater effort into maximizing joint outcomes and promoting the collective interest. In an anticommons dilemma this means that they are willing to ask for less in order to give to someone else access to a resource; that way the group's interest can be satisfied, the resource is not being underused and an "Anticommons Tragedy" is being prevented. Conversely, people who were more proself in the current study did not cooperate as much as prosocials. They asked for higher WTA prices and they blocked others from using the resource, which eventually demoted the collective interest. For instance, two out of the four groups that did not manage to harvest at all from the anticommons resource consisted only of participants with proself Value Orientations. An explanation for this noncooperative behavior could be that proselfs -in contrast to prosocials-view social dilemmas from a power perspective, where cooperativeness is perceived as a weakness whereas defection as a powerful act (Liebrand, Jansen, Rijken & Suhre, 1986; Van Lange & Kuhlman, 1994).

Goal-Expectation Theory (Pruitt & Kimmel, 1977) and its consequences for people with different Social Value Orientations could also be applied in the results of the current study. It is possible that participants who scored lower on the SVO Slider Measure, did not only show non-cooperative behavior because they wanted to prioritize their individual benefits, but also because they thought that their co-owners would be proself too. According to the Triangle Hypothesis, proself owners of the anticommons resource may have thought that their co-owners will block others from using the anticommons resource, by setting high WTA values. Consequently, they themselves did not cooperate either, because they were afraid of being exploited by the other "proself" co-owners. Exploitation would mean that they would allow others to use the resource but they would be blocked by their co-owners from using the resource, because the WTA amounts asked would be higher than the WTP values offered by them. On the other hand, prosocial participants may have thought that both prosocial and proself co-owners do exist but cooperated by setting somewhat low WTA values because firstly, they wanted the whole 3-person group to be benefited and secondly, they thought that there will be also some other prosocial participants who will try to cooperate and promote joint gains.

Interaction effect between externalities awareness and Social Value Orientation (SVO)

As far as the third hypothesis is concerned, it was expected that externalities awareness would influence more those participants who scored lower on the SVO Slider Measure and were more proself, in setting lower WTA values compared to participants who were more prosocial. It was observed that prosocials in general did not set high WTA values either in the control or in the experimental condition; they asked per person an average of 14 points in general. This implies that in line with the findings by Bogaert, Boone & Declerck (2008), prosocial participants had an inherent willingness to cooperate by setting lower WTA values

compared to proselfs and therefore allowing their co-owners to also take part in the resource. Due to their inherent motivation to be cooperative, their behavior did not differ significantly between the two conditions. On the other hand, it was expected that proselfs' behavior would significantly differ between the control and the experimental condition. According to Bogaert, Boone & Declerck (2008) and the "Interactive Model of Social Value Orientation", proselfs in contrast to prosocials, need external incentives in order to be motivated for cooperation. Externalities awareness was expected to operate as an external cue that would show to the proself participants that their personal interest aligns with the collective one. By the additional information it would be made clear to them that if they allow others to access the resource, the resource's efficient use would lead to larger group and individual benefits compared to what the benefits would be like, if everyone had blocked the others from using the resource. That way, cooperative behavior would be more tempting for them. However, proselfs' behavior did not differ between conditions as the WTA values that they set in the experimental condition were not significantly lower than the ones they set in the control condition.

This non-significant interaction effect between externalities awareness and Social Value Orientation might have occurred due to the fact that Social Value Orientation had been measured exactly before the main phase of the anticommons game. It is possible that, due to this measurement, proself participants got aware of their Proself Value Orientation and this influenced their subsequent decisions in the game. If the SVO measurement had taken place as a separate session, for instance two weeks before the anticommons game, participants would probably have not been influenced by their Social Value Orientation in such a degree; they would possibly have taken more into account the externalities and what an influence these would have had on the collective and individual gains. Another possible scenario, as mentioned also above, might be that again participants wanted to gain more money, due to the realistic structure of the game and the fact that the payoffs consisted of real money. Therefore, they

possibly refused to lower their WTA values, underestimating the collective costs, and tried to maximize as much as possible the amount, that they would eventually gain after the completion of the game.

ii. Additional Findings

As part of the additional statistical analyses, the relationship between social uncertainty and the amounts for compensation asked by the participants was observed. Social uncertainty reaches high levels in situations where individuals are not able to communicate with each other and are therefore uncertain about which decisions their co-owners will take (Messick, Allison & Samuelson, 1988; De Kwaadsteniet, Van Dijk & De Cremer, 2006). Therefore, they are also uncertain about what they themselves will do in order to be able to get access to the anticommons resource; in other words, how high WTP and WTA prices they will set. In the current study it was found that the more uncertain participants were, the higher WTA values they set. These results were in line with Budescu, Rapoport & Suleiman (1990) and Glöckner, Tontrup & Bechtold (2015), who have suggested that the more uncertain people get in an anticommons situation, the less cooperative their behavior becomes. Consequently, lack of cues about others' intentions and uncertainty about how to behave led to increased WTA values and prevented the deal from succeeding.

As also suggested by Depoorter & Vanneste (2006), when individuals feel uncertain, they tend to adopt selfish behaviors and overprice their owned goods or parts of property. Similarly, the results found in the current study suggest that individuals thought of their owned parts of the property as the most crucial for attaining profits and therefore they raised their WTA values when they felt uncertain.

Moreover, it was observed that uncertainty influenced proselfs a bit more in heightening their WTA values compared to prosocials. As Van Dijk, De Kwaadsteniet & De

Cremer (2009) have suggested, when people are found in social dilemmas, where they feel uncertainty, they base their decisions on their Social Value Orientation. It is possible that this has also influenced proself participants in not lowering their WTA values in spite of the externalities in the experimental condition. Participants were somehow uncertain, especially about being able to get access to the resource and probably this has partially led proselfs into following their selfish motives, protecting their part of the anticommons resource and blocking the access of the rest co-owners.

iii. Limitations and Suggestions for Future Research

As far as the design is concerned, it should be made clear that the complexity of an anticommons dilemma is very hard to be successfully translated and experienced in a computer-based game. This is due to the fact that real-world situations include many more factors that can have an influence both on the individuals' decisions and on the final result of whether the endeavor is successful or not.

Furthermore, subjects took part in the anticommons game through their computer, without knowing who the rest members of their groups will be. Deindividuation Theory suggests that, when individuals experience anonymity, they can be easier influenced by other cues while taking decisions (Postmes & Spears, 1998). In the current study, it can be the fact that participants got more influenced by their uncertainty about what behavior they and their co-owners will adopt and therefore acted selfishly. Due to anonymity, participants may have felt less accountable for their actions. It is possible, that lack of accountability has also influenced them in setting high WTA values despite knowing about the externalities. Had they been held accountable for their decisions to cooperate or not, they could have acted in a more consistent way with the externalities.

As far as the non-significant effect of externalities awareness is concerned, different results may have been found if the anticommons game had included a second round, before which participants would have received feedback on their past choices, as is often the case in real-world social dilemmas. It is possible that in the current study participants underestimated the externalities because the game included only one round and they could not realize the consequences of their noncooperative behavior. Future studies could apply anticommons games that would consist of multiple rounds. Participants would be able to receive feedback before the second round of the game and really experience the consequences of their decisions. It would then be possible that they change their behavior, trying to act in a more cooperative manner so that they use the anticommons resource more efficiently and increase their profits. However, one limitation would be that not only the externalities awareness but also the feedback on their choices might change their behavior.

5. Conclusion and Implications

The "Tragedy of the Anticommons" generates negative consequences both for the group placed in the dilemma and for the society in general. Anticommons dilemma constitutes a new research field, whose in depth understanding can also have important implications for the organizational field. Managers usually urge their subordinates to psychologically own their work, so that the company's morale and output are increased (Vandewalle, Van Dyne & Kostova, 1995). However, if this psychologically owned resource is shared by more employees, then there might be a conflict between what is rational for the individual and for the organization. Additionally, this tragedy is unfortunately often met in social issues, that if had been tackled with more cooperational behaviors between the groups or members taking part, they would have led to more benefits and less costs for the whole society. The present study hopefully contributes to the understanding of decision-making in anticommons dilemmas by exploring why some people tend to block others from using a common resource, while others are more willing to cooperate by allowing access to the resource. Additional research of the "externalities awareness" factor might reveal even more useful information. The more humans' behavior in anticommons dilemmas is understood, the better this social dilemma will be tackled and prevented.

6. Acknowledgments

I would like to warmly thank Dr. Erik de Kwaadsteniet for his time and valuable guidance. Although I have completed my study program from my home country and we have not met in person, our online meetings and virtual communication made the thesis procedure a very fruitful and positive experience for me.

I would also like to extend my gratitude to Prof. Dr. Van Dijk, as the second reader of the current thesis, whose feedback was very constructive.

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8. Appendix

I. Quiz for the comprehension of the task

Question 1:

How many co-owners are involved in the task (including yourself)?

- 1 co-owner
- 2 co-owners
- 3 co-owners
- 4 co-owners

Question 2:

How many points can each co-owner harvest from the resource (if he/she gets access)?

- 10 points
- 25 points
- 50 points
- 100 points

Question 3:

How many co-owners do you have to make a deal with in order to get access to the resource?

- 1 co-owner
- 2 co-owners
- 3 co-owners
- 4 co-owners

Question 4:

What is the maximum amount of points that you can ask from each co-owner to give them access to the resource?

- 10 points
- 25 points
- 50 points
- 100 points

Question 5:

What is the maximum amount of points that you can offer to each co-owner to gain access to the resource?

- 10 points
- 25 points
- 50 points
- 100 points

II. Questionnaire about Awareness

Below are a number of questions about the task you just completed. Please answer each question on a scale from 1 to 7 (1 = to a small extent, 7 = to a large extent).

Question 1:

To what extent were you aware of the consequences of your decisions?

1 2 3 4 5 6 7

Question 2:

To what extent were you aware of the fact that if all participants ask for a small amount of points, every co-owner benefits?

1 2 3 4 5 6 7

Question 3:

To what extent were you aware of the fact that if all participants ask for a big amount of points the collective interest will be harmed?

1 2 3 4 5 6 7

Question 4:

To what extent were you aware of the fact that the resource would be left unused if all participants would not be granted access?

1 2 3 4 5 6 7

III. Questionnaire about Uncertainty

Below are a number of questions about your motives in the task. Please answer each question on a scale from 1 to 7 (1 = to a small extent, 7 = to a large extent).

Question 1:

To what extent were you uncertain about the consequences of your decision?

1 2 3 4 5 6 7

Question 2:

To what extent did the task provide you with enough information to make a good decision?

1 2 3 4 5 6 7

Question 3:

To what extent were you uncertain about the asking price you had to determine?

1 2 3 4 5 6 7

Question 4:

To what extent was the asking price you have set based on what you personally wanted?

1 2 3 4 5 6 7

Question 5:

To what extent did the task provide you with clear guidelines for setting an asking price?

1 2 3 4 5 6 7

Question 6:

To what extent did the task provide you with a wide variety of possible responses?

1 2 3 4 5 6 7

Question 7:

To what extent did the task guide you towards the choice you eventually made?

1 2 3 4 5 6 7

Question 8:

To what extent did the task make clear what was appropriate to do?

1 2 3 4 5 6 7

Question 9:

To what extent did you feel pressured to set a low asking price?

1 2 3 4 5 6 7

Question 10:

To what extent did you feel pressured to make sure the other co-owners would get access to the resource?

1 2 3 4 5 6 7

Question 11:

To what extent were you uncertain about getting access to the resource?

1 2 3 4 5 6 7