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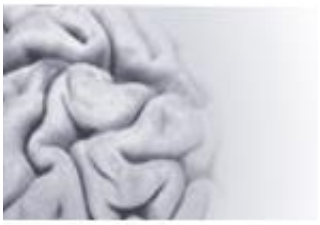

Us, them, and my dilemma:

The influence of observation and dependence on decision making in the Volunteers Dilemma.

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Abstract

Previous research suggests that both observability and dependence (having a reliant other subgroup in a collective) are influential factors, in promoting prosocial behaviour in social dilemmas. This study explores the influence of observability, dependence and a combination of both, on volunteering within the Volunteer's Dilemma (VoD). It was hypothesized that observation and dependence would increase volunteering, with the combination of both factors being the most effective in increasing volunteering. For the dependence conditions, it was further hypothesized, based on previous research, that participants would identify more with a superordinate identity, and that this would correlate with increased volunteering.

However, both the observability and dependence conditions did not significantly increase volunteering behaviour, when compared to a control, whilst the observability & dependence condition had a negative correlation with volunteering. Participants also identified more with the subordinate identity, which was found to be significantly negatively correlated to volunteering.

Introduction

It is early on a cold Friday morning, and it is bin collection day for a student residence. Despite the bins being full and in desperate need of emptying, they have not been put on the road the night before, in readiness for the collection. Several members of the student household are awoken abruptly by the sound of the bin men outside their house. With no time to communicate to one another, they have a choice before them: stay in their warm beds and hope one of the others takes the bins out or venture out into the cold for the benefit of everyone.

The above example is one of innumerable instances where individuals are faced with the dilemma of incurring a cost to themselves for the collective benefit or to pass this responsibility onto another, otherwise known as the Volunteer's Dilemma (VoD) (Diekmann, 1985). The VoD is a daily occurrence for most individuals, with the decision to volunteer for the collective good being present, in one way or another, at all levels of group interaction (Kartz, 1964). Much like other social dilemmas, the VoD reflects a choice to either cooperate or defect within a group. However, for the VoD a collective good can be achieved for multiple members, without them all deciding to cooperate (volunteer). Indeed, only a certain number (usually 1) of the members of the said group are actually required to undertake the volunteering and incur a cost to themselves. The stipulation to this, however, is that if no member chooses to volunteer there is no collective benefit. The cost to benefits ratio is clearly weighted towards those who choose not to volunteer, with the volunteer in effect incurring a cost for the collective benefit. It must be noted however, that whilst there is a cost to the volunteer, they still do receive the same collective benefit.

Whilst voluntary behaviour is essential for all informal societal and community-based action (Katz, 1964), the dilemma to volunteer reflects less of a social decision and more of an individual decision. The decision-making process can be condensed down to an individual's evaluation of two factors: the propensity for someone else within their group to volunteer and the potential cost they will incur if they themselves volunteer. The latter is confounded by the fact that over-volunteering is inefficient and does not lead to an increase in benefits. Based on these factors, Rapoport (1987) identified three individual decision-related eventualities: 1) An extra volunteer will not be beneficial, as insufficient

individuals have volunteered; 2) An extra volunteer will be sufficient for achieving collective gain; 3) An extra volunteer is not needed as the required necessary number has been met. However, these eventualities are generally regulated by the need for only one individual to meet the requirement for volunteering (Fischer et al., 2011; Heck & Krueger, 2017). Therefore, a decision to volunteer, whilst seemingly straightforward, is dependent upon the availability of sufficient information indicating which of these three eventualities is most likely (Murnighan et al., 1993). The dilemma truly arises, when this is coupled with little or no available time for members to coordinate their choices to ensure efficient and beneficial outcomes for all, as in the case of one-shot VoDs (Krueger, 2018).

This current study explores individual decision making within the one-shot VoD, to offer a clearer understanding of the process of choice, in situations where coordination between group members is unavailable.

An absence of communication or feedback within a group is the most likely reason for co-ordination deficiencies in one-shot VoDs, such as that exemplified at the beginning of this paper. In such instances of uncertainty, people tend to rely on certain social heuristics, such as social projection (Krueger et al., 2016). Social projection suggests that when there is great uncertainty about the likely action's others will make in a VoD, individuals will make predictions based on their own decision-making (Krueger, 2018; Krueger et al.,2016). The above heuristic provides an explanation for the possible decision-making process influencing individuals' choices to volunteer in one-shot VoDs. However, outside of the limited communication conditions of one-shot VoDs, that stimulate certain social heuristics, very little is understood about other factors which may directly influence individual decision-making in the VoD.

The somewhat self-sacrificing and mostly visible nature of many voluntary behaviours suggests a link to cost-signalling theory within evolutionary psychology. The theory suggests that individuals will incur a cost to themselves to demonstrate attractive personal qualities to a potential ally or mate, thus encouraging the formation of a beneficial relationship (McAndrew, 2018; Nowak & Sigmund, 2005). However, Smith (1983) argues that the performance of volunteering, whilst seemingly borne of pure altruistic intent, is representative of individuals performing a behaviour based on tactile and/or

abstract motives, such a social promotion through reputational gain. In effect, volunteering is representative of altruistic desires or a belief in one's own altruistic tendencies, as demonstrated in the self-projection heuristics, being utilised to bring some form of benefit to the Individual. Accountability for volunteering, therefore, may naturally represents an extension of this motive, based on the correct attribution of gratitude for the volunteering by the beneficiaries or observers. Ultimately, this allows for the volunteers to be duly rewarded/compensated for their pro-social behaviour.

Though the above provides a seemingly ego-centric view of why an individual may independently choose to volunteer, there are many real-world examples of people displaying their volunteering behaviour. Most recognisable is the wearing of accessories, such as stickers or wrist bands, that indicate the that the wearer is a performer of voluntary/charitable acts. Supporting this, finding by Karlan and McConnel (2014) demonstrated that participants' voluntary donations significantly increased when they were told that there would be public recognition for donors. Based on the above, the presence of observers in a proximity to a potential volunteer, may stimulate volunteering based on an evolutionary desire to display positive qualities for individual gain. Therefore, this study will investigate how positive accountability can influence participants' propensity and motivation towards volunteering.

Whilst cost-signalling and most forms of altruistic behaviour demonstrate a system of performance and direct reciprocation of the said behaviour, which act as a motivator for the initial performance (Trivers, 1971), this process is unlikely in one-shot VoDs.

Due to the situational constraints, e.g. one-off interactions, expectations of direct reciprocation from a beneficiary(ies) of voluntary behaviour are redundant and thus cannot be explained by the processes which rely on this form of reciprocity.

In this sense, voluntary behaviours within one-shot VoDs, may be representative of indirect reciprocity. Indirect reciprocity defines processes in which an individual performs a behaviour with no expectation of a subsequent repayment. Rather, the performance is motivated by reputational benefits, that increase the assumed likelihood of receiving help from another party in the future (Nowak & Roch, 2006).

As the minimum situational requirement, for the occurrence of indirect reciprocity in a social setting, is the witnessing of a single prosocial act by a third party (Mujcic &

Leibbrandt, 2017). It is plausible that despite the possible constraints of a one-shot VoD, based on intuition about future interactions (Haley & Fessler, 2005), indirect reciprocity could exist as a motivational factor in such a dilemma.

A mechanism for the expression of indirect reciprocity, as briefly mentioned previously, is the presence of individuals who are able to observe volunteer's behaviour and reciprocate in the future (Nowak & Sigmund, 2005).

Indeed, pro-social behaviour research has found that there is a general positive correlation between the observation of prosocial acts, such as volunteering, and the performance of the said act (Haley & Fessler, 2005; Lacetera & Macis, 2010). Further, Bradley et al. (2018) identified potential links between the number of observers of voluntary acts and the expression of volunteering; found in the difference in result from pro-social research using social dilemma's, compared to research using bargaining games. The connection between number of observers and the expression of pro-social behaviour is strongly supported by findings from Yoeli et al. (2013), who found that not only, did the number of potential observers significantly increase pro-social behaviour, but also, that the effect of observability was a stronger determinant when performance of voluntary behaviour was framed as a public good, compared to when all public good messaging was removed. The implication of these findings is that when presented with the ability to defect or cooperate for the benefit of others, under observation, individuals are motivated to behave pro-socially. This likely relates to an innate understanding by individuals, that cooperative behaviour in these types of settings will increase reputational benefits (Pfeiffer et al., 2012), based on the social norms associated with self-sacrificing behaviour for the common good. However, a key factor with regards to observation, which must be taken into account, is the perception of the observation by the performer and the consequences of their decision.

Primarily, the perception of whether a performer and their behaviour is visible/identifiable to the observers, influences pro-social decision-making (Bradley et al., 2018). Bradley et al. identified three types of visibility/ identifiability factors: Overt, pseudo and perceived observation. Despite the varying degree of identifiable information that each present, with the perceived observation relying simply on the assumed presence of an observer (Haley & Fessler, 2005; Panagopoulos, 2014), Bradley et al. (2018) found

that all observation types had a significant positive effect on the performance of prosocial behaviour. These findings demonstrate that people may make unconscious assumptions about future benefits, mainly in terms of reputation, from the mere perceived presence of observers, irrespective of whether there are observers or not and whether information available to potential observers makes indirect reciprocation feasible or not. Whether this inherent assumption-making behaviour is sufficient to convince individual subjects to volunteer in a one-shot VoD, when they are presented with the notion that over-volunteering is a wasteful endeavour which will not offer any additional benefit, is a topic that this study will seek to address.

Alongside the perception of observation, the performers' understanding and awareness of the consequences of their decision (for themselves and co-dependents) and the social norms associated with cooperation, are also amplified by the observability effect.

A pertinent example, to understanding the role observability could have during volunteering, is that of the social responsibility norm and the processes relating to its internalisation: In situations where individuals' actions are observed, the avoidance of social disapproval and thus internal sanctioning may occur even when observer feedback is unlikely, based solely on an individual's instinct about social approval from their observers (Rege & Telle, 2004). Therefore, it is possible that the presence of an observer during this study, will activate an internalised social responsibility norm, stimulating participant volunteering to prevent internal sanctions. Overall, the mechanisms pertaining to the perception of an observation, demonstrates an innate and internalized intuition and reaction towards indirect reciprocity and prosocial behaviour when deciding to volunteer. Therefore, this study will investigate whether the observability of participants' decisions to volunteer or to defect, increase volunteering in a one-shot VoD.

If the relationship between the observer and the performer is likely to promote decision-making, due to internalised social norms/heuristics, then it appears plausible to suggest that the relationship between a performer and a potential beneficiary, may also activate similar social norms/heuristics relating to altruism. As mentioned previously, the internalisation of social norms can guide an individual's performance of a behaviour in a social setting. However, this raises an important question about why such norms would

be present between individuals in a one-off situation, where communication is non-existent?

The emergence of social norms which dictate the performance of a behaviour have been attributed to how that behaviour affects others (Axelrod, 1986; Ostrom, 2014). With the degree to which the behaviour affects the outcomes for the performer and others, used to predict how readily the said social norm is activated (Diekmann & Przepiorka, 2016). Turning to the limits imposed by the lack of communication and the single interaction, social norms may be activated in these seemingly socially void environments. Findings relating to the emergence of solitary-volunteering in the VoD, irrespective of personal preference for pro-social or pro-self related behaviour (Social value orientation) (Przepiorka et al., 2021), provide an indication that collective social factors influence individual decisions to volunteer. This suggests that even in the confines of a one-shot VoD, behavioural decisions based on pre-established social norms are possible. A possible factor which may induce the activation of the aforementioned social norms, is the dependence of outcomes between individuals.

Dependent outcomes between individuals in social settings can facilitate the formation of a psychological group (Turner & Bourhis, 1996), potentially leading to social categorisation (Giles et al., 2018). Logically, an adherence to shared social norms relating to altruism/self-sacrificing behaviour, which are commonly found within social groups, should be more apparent when the dependence between individuals is stronger. However, would this same reasoning be true for a dependent relationship within the VoD? To measure this, the current study will increase the sphere of influence that potential performers decision-making effects, by signalling the existence of a group whose outcomes are singularly reliant on the primary group.

The making salient of a level of social categorisation, based on a number of individuals possessing similar shared goals, is also referred to as a common category membership. Previous research has found that when a common category membership becomes salient, due to principles such as common fate, individuals demonstrate a greater amount of contribution to their salient category (Brewer & Kramer, 1986; De Cremer & van Vugt, 1999). Based on this, it can be predicted that the dependence placed on the volunteering group, will play a role in common category membership formation, which in turn will

lead to the activation of habitual social/group norms such as social-responsibility and altruism, influencing performers decision-making behaviour towards volunteering. Therefore, this study will investigate how the inclusion of a dependent external group influences participants volunteering behaviour, with the expectation that there will be a greater tendency for volunteering, because of an adherence to social norms, such as the social-responsibility norm.

However, the above hypothesis, makes one glaring assumption, which must be addressed. The above assumes that the common category membership will occur at the superordinate level, in that individuals will view themselves as part of a superordinate group, which should promote greater concern for the collective interests than any other level (e.g. individual and subgroup) (Wit & Kerr, 2002). The making salient of this level of social categorisation, whilst presumably based on a shared goal, may be challenged by counter social heuristics which emphasises differences between individuals in the collective, rather than similarities. The possibility of conflicting social heuristics raises an interesting question about their relative ability to influence social categorisation and consequently the performance of volunteering behaviour for the collective's benefit.

Drawing all the points together, this study will measure volunteering at the individual level, when: group members behaviour is observed, external groups outcomes are dependent on ingroup volunteering and the combined effect of these two factors. The aim of this study is to identify how the decision-making process for the performance of volunteering behaviour, is moderated by observability and dependence and will also examine what influence the interaction effect of these two factors has on volunteering.

Based on the discussion above, it can be hypothesised that:

1) Volunteering will be more readily expressed when individual's voluntary behaviour is observed by another subgroup compared to the control condition.

2) Volunteering will be more readily expressed when another subgroup, within the collective, is dependent on an individual's voluntary behaviour, compared to the control condition.

3) A superordinate identity will be more likely to be made salient in the dependence conditions, than the subgroup level of categorisation.

4) If the superordinate level of category membership is salient, this will result in a greater amount of volunteering in the dependence conditions.

5) Of all the conditions, volunteering is more willingly performed in the presence of observation and a dependent external group, compared to the control condition.

Methods

Participants and Design:

A total of 168 participants were recruited for the study. Participants were randomly divided into groups of three, with 14 groups in total, equating to 42 participants per condition. From this total, 18 participants were removed, due to failure to complete all the comprehension questions and/or inactivity.

Participants were recruited using opportunity sampling, through social media and research participation sites (e.g., Facebook.com, Whatsapp.com, ul.sona-systems.com). The study was run using oTree.com.

A 2x2 one-shot VoD design was devised, containing: a control condition (no observation or dependence), an observation condition (observation, but no dependence), a dependence condition (dependence, but no observation) and an observation & dependence condition (a combination of both observation and dependence) (see Table 1).

Table 1:
Experimental design

		Dependence (*Another subgroup, within the collective group, are dependent on the participant subgroup*)	
		No	Yes
Observability (*Participants observed and evaluated by another subgroup*)	No	Control Condition	Dependence condition
	Yes	Observability condition	Observability & Dependence

Binary logistic regressions were used to test hypothesis 1, 2, 4 and 5, whilst a chi-squared 'goodness of fit' was run to test hypothesis 3. The presence of increased volunteering was assessed by measuring the number of people who volunteered in each condition.

Measures:

The experiments were conducted via Otree. A real effort task, in the form of an APA referencing task, was devised to operationalise the VoD and was only undertaken by volunteers. The APA referencing task consisted of 5 sections, each displaying the front cover of a scientific journal article, with participants asked to enter the correct APA referencing for each of the papers that they were presented with. Participants were given 20 minutes to complete the task (4 minutes per section). To ensure that all participants were able to undertake the task, an APA referencing example was included on each section.

The number of participants per group who chose to undertake the task and thus volunteer was recorded. Comprehension questions (see Table 2) were used to ensure that

participants understood that they were part of a three-person group, and the premise of the VoD, relating to the necessity for one individual in their group to volunteer for all individuals to receive a benefit. Specifically, participants were informed that they had a choice between abstaining and volunteering, with the choice to volunteer securing a €1 benefit for each group member, but requiring them to undertake the APA task.

Table 2:
General comprehension questions

	Content
Question 1	"How many persons does your group consist of?"
Question 2	"How large is the bonus that each group member gets when your group completes the task?"
Question 3	"What happens when none of the group members volunteer to do the task?"
Question 4	"What when at least one of the group members volunteers to do the task?"

Condition specific comprehension questions (see Table 3) were also provided to determine whether participants fully understood the nature of the condition they were in.

Table 3:
Condition-specific comprehension questions

	Content
Question 1	"Is the other 3-person group dependent on the decision of your group?"
Question 2	"Will the other 3-person group observe and evaluate the decisions of your group?"

A modified version of the Group Identification scale (Sani et al., 2012) was used to identify individual's category identification to assess the second and third hypotheses. The questionnaire was presented in the form of what participants thought of the group they had just interacted with (see Table 4). Group identification was measured through identification with the collective group via a Likert scale (1 = strongly disagree, 7 = strongly agree). The direction of group categorisation was calculated by averaging the reported scores of four statements relating to group identification. Average scores higher than five indicate that the individual identifies with the collective group.

Table 4:
Group identification questionnaire

	Content
Question 1	"I identify with this group"
Question 2	"I see myself as part of this group"
Question 3	"I'm glad to be part of this group"
Question 4	"I feel strong ties with this group"

An evaluation questionnaire, consisting of 3 questions, was designed to operationalise the observation of participants' decisions in the observation conditions. Participants from the non-observation conditions were presented with the volunteering decisions of one of the observation groups and asked to indicate their opinion of each member's character, via a Likert scale, for example, participants were asked to indicate "To what extent do you find Person X competent".

Procedure:

Prior to joining the study, Individuals were given a single use personal link to the experiment. After following the link, participants were required to complete an informed consent, which indicated that the study would take between 15-20 minutes to complete and that a reimbursement of €2 or 1 participation credit would be provided in return for their participation. Further to this, individuals were told that they would be participating as part of a 3-person group and that they had the chance to earn and additional €1 for all members, on top of the €2 or 1 participation credit that they would receive for participating.

After providing consent, participants within the dependence condition were also informed that there was an external group which would form a collective superordinate group, with their own. The premise of the VoD was present to participants, highlighting the need for

at least one group member to volunteer for all members to receive a bonus of €1, on top of the €2 or one participation credit that they would receive for participating.

The nature of the APA referencing task was presented to participants prior to the decision section of the experiment, with participants being told that they would have access to an APA referencing guide throughout, to ensure that all individuals were able to undertake the APA referencing task.

Additional information was provided to cue for observation and/or dependence. For the observation conditions, participants were also informed that their choice to volunteer or abstain would be evaluated by another sub-group. For the dependence conditions, participants were informed that their group was linked to another sub-group, containing 3 members, and that this group would also receive a benefit if a member from the participants' own group volunteered.

Following the introduction sections, participants were required to correctly answer six comprehension questions, to ensure that they fully understood the nature and requirements of the experiment.

Participants were then presented with the option to volunteer and undertake an APA referencing task or to not volunteer. For clarity, a further note was added to remind participants that choosing to volunteer would mean that they would have to undertake the APA referencing task.

At the end of the experiment all participants were asked to fill in the identification questionnaire. For the control and dependence condition, an additional questionnaire, for the evaluation of another group from the observation condition or observation & dependence condition, was presented. They were told which participants did and did not volunteer. After completing the questionnaire, the participants were de-briefed.

Ethics

No identifiable information about participants was collected to ensure the anonymity of all individuals.

Results

Analysis of the results from the comprehension questions (see Tables 2 & 3) revealed that the majority of participants understood the nature of the condition they were in. For the dependence groups' comprehension questions: 83.8% of participants from condition 1, 78.9% from condition 2, 81.1% from condition 3 and 85.7% from condition 4, answered the questions correctly. Similarly, for the observation groups' comprehension questions: 91.9% of participants from condition 1, 71.1% from condition 2, 86.6% from condition 3 and 94.3% from condition 4, answered the question correctly. From these findings we can conclude that comprehension, relating to the experimental instructions, was not a significant covariate during the experiment and thus should not have impacted the results, and/or that the manipulations were successful.

Hypotheses 1, 2 & 5:

A Binary Logistic regression was undertaken, the 3 contrasts (observation, dependence, and observation & dependence); the control and volunteering (as the outcome variable) were all included in this analysis. The purpose of this Binary Logistic regression was to investigate the influence of observability, dependence and the combination of the two on the probability of participant volunteering, compared to the control (Hypotheses 1, 2 & 5). The Binary Logistic regression model was significant, $X^2(3) = 9.249$, $p < .05$. This model explained 8.3% (Nagelkerke R^2) of the variance in volunteering and correctly classified 66.0% of cases. Specificity was 82.4%, Sensitivity was 39.3%, the positive predictive value was 68.81% and negative predictive value was 42.11%.

Of the 3 contrasts, only the volunteering behaviour of the observation & dependence condition was found to be statistically significant, when compared to the control condition (see Table 5). However, participants from the observation & dependence condition had a significantly negative relationship with volunteering, compared to the control, which deviates from the prediction made in hypothesis 5.

A chi- squared 'goodness of fit' was used to determine whether the expected frequencies of volunteering behaviour differed significantly from the observed frequencies, across the contrasts.

Analysis of the participant frequencies reveals that of the 147 participants recruited in the four conditions, 91 volunteered and 56 abstained (see Table 6). The minimum expected frequency for the control and observability condition was found to be 18.5, for the dependence condition it was 17.5 and for the observation and dependence condition it was 19.0.

Table 5

Binary Logistic Regression predicting the probability of Volunteering based on observation, dependence and observation & dependence, compared to the control.

							95% C.I.for Odds Ratio	
	B	S.E.	Wald	df	Sig.	Odds Ratio	Lower	Upper
Conditions			8.959	3	0.030			
Dependence	-0.467	0.509	0.841	1	0.359	0.627	0.231	1.701
Observation	-0.133	0.516	0.066	1	0.797	0.875	0.318	2.407
Observability & Dependence	-1.312	0.495	7.023	1	0.008	0.269	0.102	0.711
Constant	0.993	0.370	7.199	1	0.007	2.700		

Table 6

Frequencies of Volunteering of the four conditions

		Observed N	Expected N	Residual
Control	Abstained	10	18.5	-8.5
	Volunteered	27	18.5	8.5
	Total	37		
Dependence	Abstained	13	17.5	-4.5
	Volunteered	22	17.5	4.5
	Total	35		
Observability	Abstained	11	18.5	-7.5
	Volunteered	26	18.5	7.5
	Total	37		
Observation & Dependence	Abstained	22	19.0	3.0
	Volunteered	16	19.0	-3.0
	Total	38		

The chi-square 'goodness of fit' demonstrated that there was a statistically significant difference between the expected and observed frequencies of decisions to volunteer for the control condition (X^2 (1) = 7.811, p = .005), with 27 participants volunteering and 10 abstaining, compared to an expected frequency of 18.5 volunteering and 18.5 abstaining. A statistically significant difference was also found for the observability condition (X^2 (1) = 6.081, p = .014), with 26 participants volunteering and 11 abstaining, compared to an expected frequency of 18.5 volunteering and 18.5 abstaining. However, non-significant values were found for the dependence condition (X^2 (1) = 2.314**,** p = .128) and the observation & dependence condition (X^2 (1) = .947, p = .330) (See Table 6), showing that there was not a significant difference between the expected frequencies and observed frequencies of volunteering in these two conditions (see Table 7).

To provide an overview of the effects of observation and dependence and to contrast the overall difference in volunteering of these two predictors, a binary logistic regression was performed, with overall observation (both observation conditions) and overall dependence (both dependence conditions) and volunteering as the outcome variable. The Binary Logistic regression model was significant, X^2(2) = 8.229, p = .016. This model explained 7.4% (Nagelkerke R^2) of the variance in volunteering and correctly classified 66.0% of cases. Specificity was 82.4%, Sensitivity was 39.3%, the positive predictive value was 68.81% and negative predictive value was 42.11%.

Of the 2 predictors, only the volunteering behaviour of overall dependence was found to be statistically significant (see Table 8). However, participants from the overall dependence had a significant negative relationship with volunteering. These findings suggest that collectively in the observation conditions, observation had no influence on individuals' decision to volunteer. However, in the overall dependence condition there was a collective negative influence on participants' decision to volunteer which led to reduced volunteering.

Table 7

Chi-squared 'goodness of fit' for Volunteering across the four conditions

		Decision to Volunteer
Control	Chi-Square	7.811[a]
	df	1
	Asymp. Sig.	.005
Dependence	Chi-Square	2.314[b]
	df	1
	Asymp. Sig.	.128
Observability	Chi-Square	6.081[a]
	df	1
	Asymp. Sig.	.014
Observation & Dependence	Chi-Square	.947[c]
	df	1
	Asymp. Sig.	.330

a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 18.5.

b. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 17.5.

c. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 19.0.

Table 8

Binary Logistic Regression predicting the probability of Volunteering based on the Observability conditions and Dependence conditions, compare to the control

	B	S.E.	Wald	df	Sig.	Exp(B)
OverallObservation	-.519	.351	2.190	1	.139	.595
OverallDependence	-.846	.351	5.803	1	.016	.429
Constant	1.200	.325	13.650	1	.000	3.320

Hypothesis 3, Group Identification:

Using the Group Identification scale (Sani et al., 2012), analysis of the participant frequencies in the dependence conditions reveals that of the 73 participants recruited in these two conditions, 13 identified with the superordinate group and 60 identified with the subordinate group (see Table 9). A chi-squared 'goodness of fit' was undertaken to assess whether the dependence conditions' identification differed significantly from the hypothesized frequencies, e.g. that there would be a greater identification with the superordinate group in the dependence conditions. The minimum expected frequency of participant identifying with a certain group was found to be 24.3, for the subordinate group. However, the chi-square 'goodness of fit' demonstrated that there was a highly statistically significant difference between the expected and observed frequencies of group identification across the two conditions (X^2 (1) = 78.418, $p < .001$) (see Table 10). Which shows that the participants identified significantly more with the subordinate group, than with the superordinate group.

Table 9

Frequencies of group Identification of the two Dependence conditions

	Observed N	Expected N	Residual
Superordinate group	13	48.7	-35.7
Subordinate group	60	24.3	35.7
Total	73		

Table 10:
Chi-squared 'goodness of fit' for group identification across the Dependence conditions

	Group Identification for the Dependence conditions
Chi-Square	78.418[a]
df	1
Asymp. Sig.	0.000

a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 24.3.

Hypothesis 4:

A binary logistic regression was undertaken to investigate the influence of group identification on the probability of participants volunteering in the dependence conditions, due to the presence of both a potential superordinate group and the subordinate group in these conditions. The binary logistic regression model was significant, $X^2(2) = 7.931$, $p = .019$. This model explained 7.1% (Nagelkerke R^2) of the variance in volunteering and correctly classified 63.3% of cases. Specificity was 68.1.4%, Sensitivity was 55.4%, the positive predictive values was 71.26% and negative predictive value was 51.66%. Of the 2 identification groups, only the subordinate group was found to be statistically significant (see Table 11). However, participants who identified with the subordinate group had a significant negative relationship with volunteering. Meaning that participants identification with the subordinate group was strongly associated with a reduced preference for volunteering.

Table 11:
Binary Logistic Regression predicting the probability of Volunteering based on group identification within the Dependence conditions

	B	S.E.	Wald	df	Sig.	Odds Ratio	95% C.I.for Odds Ratio	
							Lower	Upper
Subordinate group	-0.992	0.365	7.393	1	0.007	0.371	0.181	0.758
Superoridante group	-0.115	0.654	0.031	1	0.861	0.892	0.247	3.212
Constant	0.926	0.258	12.890	1	0.000	2.524		

Discussion

This research provides an interesting perspective on the influence of observation and dependence on decision making processes relating to volunteering. Counter to what was predicted, the observation condition did not increase volunteering behaviour, compared to the control (Hypothesis 1). These findings provide a contrasting conclusion to previous research linking observation with the performance of prosocial behaviour (Bradley et al., 2018; Haley & Fessler, 2005; Lacetera & Macis, 2010; Yoeli et al., 2013).

Similarly, there was no support for the dependence condition increasing volunteering in participants (Hypothesis 2). With participants in the dependence condition showing no significant preference for volunteering, when compared with the control condition.

The results also show that there was no support for the prediction that participants in the dependence conditions would identify more with the superordinate group than the subgroup (Hypothesis 3). In fact, participants conversely identified more with their subgroup that with the superordinate group, with this difference being highly significant. These findings suggest that participants viewed the dependent group more as an outgroup than as an ingroup, despite possessing shared goals.

Following this, there was no direct support for the assumption that identification with the superordinate group would lead to greater volunteering (Hypothesis 4). However, findings do show that the significantly higher subgroup identification was associated with a reduced willingness to volunteer, which whilst not unequivocally pointing to superordinate group identification increasing volunteering, does provide evidence that group identification can influence volunteering decision making.

Finally, similar to the dependence condition, no support was found for volunteering being performed more in the observation & dependence condition than all other conditions, when compared to the control (Hypothesis 5). The opposite was true, with the observation & dependence condition sharing a negative relationship with volunteering, meaning that participants of this condition were more likely to abstain than they were to volunteer.

Consequently, the findings of this study, whilst rejecting the predictions of the hypotheses, do support the notion that individuals are attuned to and receptive of factors in their environment, which extends even to scenarios where there is no traditional interaction, seen in the virtual setting of this study.

Where this study diverges from previous findings, is that whilst the use of observability and dependence in other social dilemmas often elicits pro-social behaviours, within this study these factors do not stimulate strong pro-social tendencies, as previous research predicted. Therefore, this study provides an insight into the contrasting effects of dependence and observation in online VoDs, compared to other social dilemmas.

A number of possible heuristics that may have dictated participants behaviour in the study, based on the unique elements of the varying conditions, are discussed below.

Firstly, looking at observation in this study, whilst a number of studies have highlighted the positive influence observation can have on altruistic tendencies in a wide variety of settings (Filiz-Ozbay & Ozbay, 20l4; Karlan & McConnel, 2014; Pei et al., 2020; Raihani & Smith, 2015; Yoeli et al., 2013), the contrary results in this study may be reflective of the differing nature of the VoD, from other social dilemmas. Two aspects which make VoD distinct from most social dilemmas, are worthy of note: A single individual can be responsible for the attainment of outcomes for the whole group (with messaging provided

to that effect) and a real-effort task is a pre-requisite for achieving outcomes for the group.

The combination of these two aspects together with participants awareness of observation and evaluation of their decision making, creates a performance pressure to volunteering, unlike most other social dilemma scenarios. Pertinent to this, is that although there was no articulation that a correct completion of the real-effort task was a necessary requirement to attain the bonus, participants likely perceived it to be so and this could be a potential reason for reluctance to volunteer in the study. An individual might plausibly predict that observers would hold them responsible for an unsuccessful outcome in the real-effort task, dissuading them from volunteering. Indeed, in a number of different scenarios, previous research has found that observers/others often hold performers wholly accountable for outcomes, with punishment being singly directed at them for failure to secure the group outcome (Bartling et al., 2015). Previous studies have also found that individuals are successfully able to avoid taking any responsibility for an outcome, by using responsibility attribution heuristics (Oexl & Grossman, 2013; Collins et al., 2017).

Responsibility attribution, in the field of social psychology, is defined as, a decision to shift responsibility to avoid taking personal liability for potentially negative outcomes. In this way, responsibility attribution is an effective social heuristic when faced with a dilemma which has social implications, especially in situations where the performance of a task is a pre-requisite for group reward.

Applying this to the results of the current study, the utilisation of responsibility attribution heuristics may reflect a reaction to both the responsibility and accountability of volunteers. The increased social implications of volunteering in the observation conditions, when compared to those in the control condition, correlate with a reduction in the predicted volunteering behaviour. Most notably, comparing the findings from the observability & dependence condition with the control condition offers a clear demonstration of the interplay, between volunteering behaviour and the social implications of volunteering. An increased awareness of social accountability, inherent in the observation of volunteers' actions by an external group, as well as the presence of a dependent group, provides a perfect setting for responsibility attribution to direct decision making.

To provide more clarity and support for the use of responsibility attribution heuristics, in response to observation and/or dependence, within the VoD, future research should consider investigating performers' self-reported perceptions of the real-effort task and the degree to which they feel socially accountable.

Turning the focus to the dependence conditions in this study, elements which may have deterred participants from volunteering include inequality of contribution (one group contributing more than another for a collective good). Based on a cost-benefit ratio, the effort required for a collective benefit is disadvantageous for subgroup participants, as the effort to acquire the collective benefit is fixed solely on them. Within social dilemmas, individuals have an innate tendency and desire to ensure that their expected utility is maximized, which is commonly combined with a strong preference for fairness (Bhogal et al., 2016; Bhogal et al., 2019; Fehr & Schmidt, 1999; Rand et al., 2013;). Hetzer & Sornette (2013) described this interplay between expected utility and fairness, as disadvantageous inequality aversion. This type of aversion reflects a particular opposition to situations in which individuals feel disadvantaged, which can result in altruistic punishment behaviour (Hetzer & Sornette, 2013; Bochet et al., 2006). In the current study, this maybe illustrated by a desire for fairness resulting in non-volunteering. Whilst altruistic punishment represents a seemingly irrational reaction, the punishment of norm violations such as fairness, even at personal cost to the individual (Egas & Reidl, 2008; Fudenberg & Pathak, 2010), reflects the promotion of ideas of fairness over self-gratifying preferences (Camerer, 2003; Raihani & McAuliffe, 2012).

Relating this to the current study, participants in the dependence conditions were clearly faced with disadvantageous inequality between their subgroup and the collective group. As a result, abstinence may represent a desire to altruistically punish the collective group, in spite of the potential cost to one's own outcomes. Logical reasoning and justification for this decision making, based on the above, can be seen as an attempt to uphold norms relating to fairness and thus borne out of a pro-social idealism. It is possible, therefore, that participants viewed their abstinence in a positive pro-social light.

Further support for the emergence of disadvantageous inequality aversion, comes from the content of the information provided to participants about the collective group. Mohnen et al. (2008) found that when individuals were provided with information about

others' contributions, which indicated that a state of inequality existed between the two counterparts, then effort levels significantly reduced. However, when no information is provided to individuals, then inequality aversion does not influence the amount of effort exerted.

The findings of the current study are in line with this previous research, as the information provided about the collective indicated a one-sided dependency. At 2 points during the participant introductions, emphasis was placed on the responsibility for the participant subgroups to volunteer, with a clear indication of the benefit that the dependent group would receive, without any reference to any additional benefit (on top on the bonus for volunteering) to the individual and/or the subgroup. A perception of disadvantageous inequality could have been fostered from this information. Cementing this, was the requirement for participants to indicate this relationship within the comprehension questions, drawing attention to the state of inequality between the two groups and also clarifying participants' understanding of this difference. Whilst drawing attention to the disadvantageous inequality was not a premeditated intention on the part of the researchers, this unforeseen outcome could have played a part in the variation in findings between the observation, dependence and the observation & dependence conditions. Future research may want to explore framing of information and its effect on volunteering behaviour.

The notion of disadvantageous inequality aversion, may in turn provide a basis for the findings for group identification within the dependence conditions, seen in hypothesis 3 & 4. The Bounded Generalised Reciprocity theory (BGR) of cooperation, postulates that membership of a group is reliant on members acquiring certain basic evolutionary expectations (e.g., protection and prosperity), which in turn provides a heuristic for decision making processes in cooperative scenarios, also known as parochial cooperation (Balliet et al., 2014; De Dreu et al., 2014; Yamagishi & Mifune, 2016). The current study, evidencing significantly higher sub-group identification within the dependence conditions, supports this theoretical assumption. This observation is also supported by previous research by Aaldering et al. (2018). They who found that within Nested Social Dilemmas, expectations of ingroup cooperation and ingroup identification correlated with parochial cooperation and, research has found that even in very simplistic group settings

(e.g. such as those where there is no communication between individuals and no information about other members), as seen in this study, parochial cooperation can arise (De Dreu et al., 2015; Dovidio & Gaertner 2010; Tajfel et al., 1971).

However, the significant correlation between sub-group identification and abstaining, seemingly conflicts with parochial cooperation. Whilst parochial cooperation has been associated with behaviours that favour the ingroup, BRG, supported by the findings from previous research, states that this is conditional on the absence of out-group harm (Aaldering et al., 2018; Baron, 1995; Mifune et al., 2010; Weisel & Zultan, 2021).

So, whilst identification maybe stimulated by parochial cooperation, decisions not to volunteer in the dependence conditions are likely dictated by other heuristics, such as disadvantageous inequality aversion, as mentioned above.

Pertinent to this final point, for the observation & dependence condition, it is difficult to exactly determine which factor and thus which type of heuristic (responsibility attribution or disadvantageous inequality aversion), was responsible for this condition's findings. Irrespective of this, both provide ample explanation for the reduced preference for volunteering and so could have been used analogously from one participant to another, depending on personal cognition.

However, this does raise a possible limitation of this study, relating to the clarity to which either factor was responsible for the negative significant findings in the observation & dependence condition. This stems from the lack of participant feedback on both the participants perception of the observations, but also specificity on the group identification questions. The questionnaire on Group identification (see Table 4) was vague in specifying which group the questions were referring too. Some participants may have assumed these questions were related to the subgroup and not the superordinate group. This reflection is pertinent to the findings from hypothesis 3 and 4 and indeed the type of heuristics that may have been used. Future investigations might consider 2 questionnaires (one for the subgroup and one for the collective), as an appropriate solution.

This study represents one of the first inquiries into social factors which may influence volunteering decision making in the VoD, thus potential limitations of this study must be addressed. Firstly, as previously mentioned the nature of the real-effort task that volunteers were required to complete, may have inadvertently influenced participants

volunteering behaviour. Whilst the use of APA referencing didn't innately provide an insurmountable challenge to participants (because of examples of how to reference in an APA style were included), as the participant pool was expanded, from exclusively Leiden University Psychology students, to include all demographics (to increase the power of the study), it is possible that a number of participants may never have referenced before, let alone heard of APA referencing. Abstinence could for some participants be due to confusion relating to the real-effort task, rather than decision-making relating to the presence of observers and/or dependents. Recommendation for future research is therefore two-fold: Design a real-effort task which is appropriate to the knowledge and experience of the target group and test the real-effort task on a control group prior to the study, to ensure its suitability and thus, limit the influence the content of the real-effort task has on volunteering.

A final limitation of this study was its setting and the medium where groups interacted and were observed. The online nature of the experiments almost certainly influenced participants perceptions of the observation and dependence conditions, this is well documented in the literature (Balliet, 2010; Bradley et al., 2016; Brosig et al., 2003). Whilst the use of an online format does not indicatively mean that the findings of this study are invalid, it would be useful if future studies investigated the effects of observation and dependence, in the VoD, within a face-to-face setting, to establish what influence the physical presence of others has on volunteering decision-making.

Conclusion

The current study offers an initial look into the influence of observability and dependence on volunteering behaviour, within an online VoD. The findings, whilst not supporting the hypotheses, do provide a useful reference point for the further investigation of observability and dependence on decision making in the VoD. This study explores social heuristics, including responsibility attribution, disadvantageous inequality aversion and parochial cooperation, as tools used by individuals when faced with a decision to volunteer for the benefit of themselves and others. Utilising the findings from this study may enable future researchers to turn negatives into positives and incentivise volunteering in real world scenarios.

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