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Exploring individuals' social value orientation and decisions in a Prisoner's Dilemma

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Abstract

This study explores the relationship between social value orientation (SVO) and individuals' decisions to cooperate or defect in a one-shot Prisoner's Dilemma (PD). It compares a standard SVO measurement and the results from the PD to a Galileo, which determines how individuals perceive the correlation between themselves and to social value orientation-related concepts. SVO predicted decisions in the PD, but the Galileo space did not show that individuals clearly saw themselves as being close to their social value orientation categorization. The Galileo map showed a clear cluster of the prosocial and individualist terms, but did not show a clear cluster of competitive terms. Further analyses indicated that the interpretation of the concept "competition" was significantly different among the three SVOs, as well as between those who cooperated or defected in the PD. Results from this study add to our current understanding of how individuals think about terms related to cooperation, individualism, and competition.

Keywords: Social value orientation, Prisoner's Dilemma, Galileo, triple dominance measure

Exploring individuals' social value orientation and decisions in a Prisoner's Dilemma

Whether an individual has a disposition to act prosocially or is inclined to act selfishly, most can be induced to act prosocially under the right conditions. This study will try to tease out the particular differences in how words related to cooperation, individualism, and competition are viewed by those who act prosocially and those who do not, in hopes that these differences will reveal what can be done in future situations to get those who are not prosocially inclined to act prosocially.

Social value orientation (SVO) describes the extent to which individuals' personalities may underlie their motivations to make choices that either benefit them individually or collectively as a group. In the Prisoner's Dilemma (PD), an individual has two choices: a choice that benefits the individual, defecting, or a choice that benefits the group, cooperating. De Dreu and McCusker (1997) explored how SVOs affect decision-making in the PD. In many aspects, this current article replicates their study, adding to it a Galileo measurement, which examines how individuals perceive the correlation between themselves and other concepts. Using this method, we aim to create a more accurate picture of the differences among individuals who act prosocially and those who do not. Three instruments are used to assess these differences, the PD, triple dominance games, which assess SVO, and a Galileo survey. The justification for choosing these instruments to evaluate prosocial behavior is reviewed in the following section.

Literature Review

The Prisoner's Dilemma. The PD is a matrix game used for the study of conflict. In its basic form, the PD represents a simple two-choice, two-person game in which each individual's decision influences both players' scores. Each player is asked to choose between two options, which are often called cooperation and defection. The typical payoff matrix is as follows:

Figure 1: PD Matrix

	C	D
C	3 / **3**	5 / **0**
D	0 / **5**	1 / **1**

Row Player Bold   Column Player Italic

In this case, solo defection leads to the highest score and solo cooperation leads to the lowest score; however, if both players choose to defect, their scores will each be lower than if both players choose to cooperate. This is where the dilemma comes into play. Although it is in the best interest of each player to defect, it is better for the pair if both cooperate; therefore, the game embodies the tension between self- and group-interest.

In a one-shot PD, where there is no fear of future interaction, defecting is the dominating strategy, regardless of what the other player chooses. This is because solo cooperation leads to a worse outcome than both players defecting and solo defection leads to a better outcome than joint cooperation. One can avoid the worst possible outcome and gain the best possible outcome by defecting. However, when both players act in their own self-interest, both receive inferior outcomes compared to if both had cooperated (Tutzauer, Chojnacki, & Hoffman, 2006). This problematic set of decisions is why the PD is considered a true dilemma.

Individuals often find themselves caught in social dilemmas in which one's own self-interest conflicts with the collective interest. These dilemmas are pervasive in social interactions, ranging from the individual level (e.g., whether to volunteer take out the garbage) to the community level (e.g., whether to volunteer to clean a public park). It is thus important to consider SVOs, which may influence the decisions one makes in conflict interactions such as the PD.

Social value orientation. Understanding why individuals would act selfishly or unselfishly is essential for solving social dilemmas (Dawes & Messick, 2000). Social psychologists have long used the concept of SVO to understand the ways in which individuals differ in their judgments, strategies, and reactions concerning others in interdependent situations (e.g., McClintock & Liebrand, 1988; Van Lange & Kuhlman, 1994).

Social value orientation is defined as preference for particular outcomes for self and others (McClintock & van Avermaet, 1982). Deutsch (1958) first categorized social value orientation into three types: *cooperative*, *individualistic*, and *competitive*. Cooperative individuals (*cooperators*) have a tendency to collaborate and seek to maximize joint outcomes for the self and others. Individualistic individuals (*individualists*) focus on only maximizing their own outcomes regardless of others' outcomes. Competitive individuals (*competitors*) are inclined to maximize their gain relative to others' outcomes; that is, they aim to be the winner of the situation. Sometimes cooperators are labeled as *prosocials,* whereas individualists and competitors are grouped together as *proselfs* in some SVO literature (e.g., Boone, Declerck, & Kiyonari, 2010).

According to Interdependence Theory (Kelley & Thibaut, 1978), when confronted with a given payoff structure such as a PD, individuals will make a psychological transformation and act on the perceived "effective" payoff structure. Individuals' preferences for desired outcomes are revealed in the choices they make in the payoff structure such that the subjective payoff structures of cooperators and competitors are different from the objective payoff structure of the PD. For cooperators, capitalizing on others is far less appealing than achieving a mutual win-win situation. In contrast, for competitors, being exploited is the worst scenario.

SVOs have been shown to predict cooperative and competitive behavior in experimental settings (e.g., Liebrand, Wilke, Vogel, & Wolters, 1986), helping behavior such as volunteering and donation (e.g., Van Lange, Bekkers, Schuyt, & Van Vugt, 2007), negotiation (De Dreu & Van Lange, 1995), information exchange (Cress, 2005) and real-life social dilemmas in choosing to commute by car or public transportation (Van Vugt, Meertens, & Van Lange, 1995).

A recent meta-analysis of eighty-two studies explored how elements of a social dilemma would moderate the relation between SVO and cooperative behavior (Balliet, Parks, & Joireman, 2009). In this study, there was no significant difference in the effect of SVO on cooperation between one-shot and iterated games when the effect of SVO was averaged over all the trials in iterated games. This finding differed from previous theoretical assumptions on behavioral assimilation (Kelley & Stahelski, 1970), which states that individuals' cooperation is not unconditional and tends to reciprocate what the others have done, irrespective of their social orientation. One possible explanation offered by the researchers is that individuals actually need a much longer time to assimilate to others' strategies, and studies in the meta-analysis are not iterated enough for this to happen. For simplicity, the present study utilized the one-shot game to capture the psychological calculation of individuals with different SVOs when they are making their decisions.

SVO will be measured using the triple dominance measure (Van Lange, Otten, DeBruin, & Joireman, 1997). This measure, a series of nine matrix games, is used to assess an individual's SVO as cooperative, competitive, or individualistic. The payoff matrix in each game is varied, however, every choice corresponds to one of the three SVOs: *cooperative*, *competitive,* or *individualistic*. If a player chooses 6 or more answers that correspond to a particular orientation,

the player is categorized as belonging to that orientation. Players who do not answer at least 6 answers the same way are not classified.

Galileo. Previous research examining the PD and SVO has compared how players of various orientations actually play the game (De Dreu & McCluster, 1997). However, these previous studies generally stop short of examining how individuals perceive themselves and whether or not these orientations accurately describe the players of the game. In contrast, the present study allows us to examine these issues by using Galileo, a term used to identify both the technique and associated questionnaire (Woelfel & Evans, 2009).

The Galileo model assumes that the attitudinal concepts are not one-dimensional but instead rest in a multidimensional non-Euclidean space (Woelfel, 1980). The Galileo model's comparative measurement technique generates this space to describe social objects, including self, using equations rooted in physical science to model the motions of points in space (see Woelfel & Fink, 1980 for a full explanation of these equations). The first three dimensions of this space are displayed graphically, but those visualizations are relatively imprecise since the full set of dimensions go beyond what can be plotted in a three dimensional space.

Galileo has previously been used to examine attitudes and beliefs on a number of issues including politics (Kim, Su, & Hong, 2007), consumer products (D'Elia, Jörgensen, Woelfel, & Rodger, 2002), and organizational communication (Fink & Chen, 1995). Studies have also linked distance between self and other concepts to use of media (Cheong et al, 2010) and adoption/non-adoption of technology (Vishwanath & Chen, 2006). These studies use the Galileo system to gauge how individuals perceive concepts as similar or different to one another on continuous scales as well as where they perceive themselves in relation to these concepts. The results of these analyses indicate how an individual defines a concept (Woelfel & Fink, 1980). The closer

an individual rates concepts to the self, the more likely it is that the individual feels like that

concept has meaning to him or her.

With the literature on the PD and SVO, as well as the abilities of the Galileo

measurement in mind, we propose three hypotheses and two research questions:

H$_1$:   SVO will predict decisions in the PD. Prosocials will cooperate most frequently

and competitors will cooperate least frequently.

H$_2$:   The Galileo space will have three clusters related to the three SVOs.

H$_3$:   In the Galileo space, the self will be closest to the concepts related to the SVO

into which the triple dominance measure categorized each participant.

RQ$_1$:   How will the three SVO categorizations differ in the Galileo space?

RQ$_2$:   How will those who defected and those who cooperated in the PD differ in the

Galileo space?

Method

To examine the relationship between SVO and cooperation in the one-shot PD,

participants were asked to complete three measures: a one-shot PD, a triple dominance measure

(Van Lange et al., 1997), and a Galileo, consisting of 78 pair comparisons; general demographic

information was also collected. LimeSurvey was used to host the web-based survey.

Comparisons on how participants filled out each measure were made using standard statistical

procedures as well as the Galileo software.

Procedure

Participants first completed a one-shot PD. To avoid potential priming effects for later

survey questions, the concepts "cooperation" and "defection" were never used in the instructions.

The matrix displayed was a colored version of Figure 1, where C was replaced by A and D was

replaced by B. Because this situation was hypothetical and no player 2 existed, participants were

not informed of the results of this game.

Following the completion of the PD game, participants were then asked to complete a

series of nine games that make up the triple dominance measure (Van Lange et al., 1997) using

the following instructions:

> In this task we ask you to imagine that you have been randomly paired with another
> person, to whom we will refer simply as the "Other." This other person is someone
> you do not know and who you will not knowingly meet in the future. Both you and
> the "Other" person will be making choices by choosing either the letter A, B or C.
> Your own choices will produce points for both yourself and the "Other" person.
> Likewise, the other's choice will produce points for him or her and for you. Every
> point has value: the more points you receive, the better for you, and the more points
> the "Other" receives, the better for him or her.

> Here is an example of how this task works:

> Figure 2: Triple Dominance Measure Example

	A	B	C
You Get	500	500	550
Other Gets	100	500	300

> In this example, if you choose A, you receive 500 points and the other receives 100
> points; if you choose B, you receive 500 points and the other receives 500 and if you
> choose C, you receive 550 points and the other receives 300. So, as you can see, your
> choice influences both the number of points you receive and the number of points the
> other receives. Before you begin making choices, please keep in mind that there are
> no right or wrong answers; you should choose the option that you, for whatever
> reason, prefer most. Also, remember that the points have value: the more of them you
> accumulate the better for you. Likewise, from the "Other's" point of view, the more
> points he or she accumulates, the better for him or her.

Participants were then asked to choose A, B, or C for the nine games provided to them. Their

answers to these questions were used to classify participants into one of the three SVOs. For

example, in the matrix provided above, choice A is the *competitive* choice, because it maximizes

the payoff difference between player 1 and player 2, choice B is the *cooperative* choice, because

it gives each player an equal and large payoff, and choice C is the *individualistic* choice, in

which the individualist wants to achieve as the most points possible, regardless of the payoff

received by the other player. A player needs to choose 6 or more answers that correspond to a particular orientation in order to be classified.

After completing the triple dominance games, participants then completed a survey in which they were asked to compare a series of concepts relating to the three SVOs. We choose three concepts to correspond to each of the three classifications (Table 1) using the dictionary definitions of the words and synonyms associated with these concepts.

Table 1. Social value orientations and related concepts

Cooperation	Individualism	Competition
Prosocial	Pragmatic	Power
Collaboration	Independent	Aggression
Harmonious	Self-interest	Ambition

A list of these concepts, the three classification titles, and the word *self* were randomized and then used to create a thirteen concept Galileo survey with a total of seventy-eight pairs. The Galileo required participants to compare each concept on a scale of 0 to 1000, with 0 indicating that the concepts are very similar and 1000 indicating that they are very different. They were instructed "*collaboration* and *independent* are 500 units apart." This is the criterion pair, an example pair that is meant to give participants some idea of scale for their responses. Participants also compared each concept to the concept *self*, placing it close to the self if the concept was similar to the individual and far from the self if the concept was different from the individual.

Participants

Participants were drawn from a pool of students at a large Northeastern university who were enrolled in an introductory communication course. The study was announced in class and students who participated in this study received one half hour of credit toward a research requirement. Participation was both voluntary and anonymous.

Three hundred and nineteen surveys were gathered; of these 12 were completely blank and only 110 filled out the survey in its entirety. After examining the responses for any systematic difference in those who completed the full survey and those who skipped some questions, the researchers decided to use some of the incomplete responses.

The decision on whether to keep incomplete responses on the first two measures was simple. Responses to the one question on the Prisoner's Dilemma were crucial to the analysis and the triple dominance games measure separates participants into groups based on whether they responded to six of the questions in the same way. Therefore, only respondents who filled out the Prisoner's Dilemma and completed 6 or more questions on the Triple Dominance Game measure were included.

The Galileo was by far the longest section of the survey. The average number of blank values per questions was 6.71 (SD = 6.08). All questions that were answered less frequently than two standard deviations above the mean (19 blanks or more) were investigated. All six cases involved comparison pairs that included *pragmatic*. The researchers concluded that students might have skipped these questions because they did not know what the word meant. This problematic term was deleted from the set, leaving sixty-six pair comparisons. Afterwards the average number of blanks dropped to five (SD = 3). To check for the effect of fatigue, the average for the first ten questions given (6.1) was compared to the last ten (6.5) and no significant difference was found. The Galileo answers were checked to see if any participants put more than half as 0, 500, or 1000, which would likely indicate a lack of attention. Two questionnaires were dropped for this reason. Only those surveys with at least eighty percent of the Galileo questions filled out were kept. The final sample included 232 participants. These

participants were undergraduate students with an average age of 20. Slightly more than half of

the participants were female (58.3%) and the vast majority was Caucasian (87.1%).

Results

Using the Triple Dominance Scale, 180 participants were classified into one of the three

categories. In order to avoid confusion between cooperating in the PD and being *cooperative*

according to the SVO, the term *prosocial* will be used instead of *cooperative* for the rest of the

analysis. Table 2 shows how each group responded in the Prisoner's Dilemma.

Table 2. Prisoner Dilemma Responses for each group

| Category	Cooperate	Defect
Prosocials (73)	56 (77%)	17 (23%)
Individualists (54)	25 (46%)	29 (54%)
Competitors (53)	25 (47%)	28 (53%)

An ANOVA was run to find whether these differences were significant. Due to violation

of the assumption of homogeneity of variance, a modified F statistic was used and found to be

significant, $F(2, 157)=8.408$, p<.001. A look at post-hoc test of multiple comparisons showed

that the prosocials were more likely to cooperate than either of the other two orientations.

Hypothesis 1 was supported. This is consistent with prior research, showing that across various

manipulations, prosocials consistently cooperate more than their individualist or competitive

counterparts (De Dreu & McCusker, 1997).

Interestingly, when the Triple Dominance Measure is broken down by number of

responses that fit into each category, there is no sign of a linear trend with cooperation or

defecting in the Prisoner's Dilemma; i.e. those who answer more questions competitively are not

more likely to defect than those who answer fewer questions. However there is a jump in

cooperation between those who answered 2 or fewer questions prosocially and those who

answered 3 or more, meaning it may only take some prosocial tendencies to get individuals to act

cooperatively. More research would be necessary to confirm and further examine this result.

Figure 3 shows the percentages of cooperation for those answering the indicated number of prosocial, individualistic, and competitive responses.

Figure 3: Percentages of Cooperation for each response level
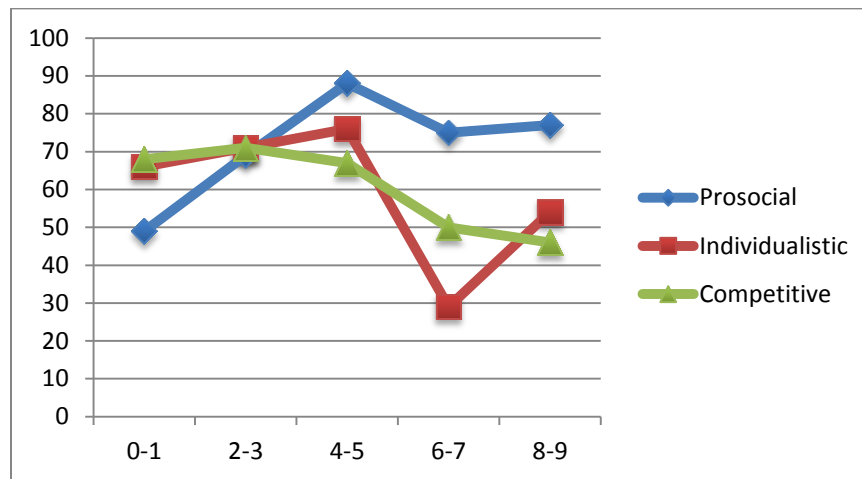
To examine Hypothesis 2, the Galileo results were examined. For each word pair the mean value for that pair is given in the Galileo results. For example, the mean value for the word pair *prosocial* and *cooperation* was 437.603, as seen in Table 3 column 1 row 2. To test to see if the set of words associated with each SVO formed a cluster, first the researchers looked at whether the mean values of the word pairs within a predicted cluster, were smaller than the mean values of the word pairs outside of the cluster. In Table 3 the clusters are boxed off and bolded: these values were tested against the other values in their respective columns. For example, in the prosocial cluster the means of the six values in the prosocial cluster box were compared to the means of the other values in columns 1-4. As seen in Table 3, all of the pairs in the prosocial cluster and all but one pair in the individualistic cluster meet this standard. Four terms outside of the competitive cluster are smaller than word pairs within the cluster. Predictably, when running t tests on these values, the prosocial cluster (*t* (5)=2.83, p<.05) and the individualistic cluster (*t*

(2)=4.089, p<.05) were significant, but the competitive cluster was non-significant (t (5)=.08, p≥.05). There are two clear clusters, but the terms *competition* and *power* come close to *self-interest*, which is in the individualistic cluster, and the term ambition is close to two terms in the individualistic cluster: *individualism* and *independent*, making it a slightly less clear-cut cluster. When the subsets of those grouped by SVO and those who either cooperated or defected in the Prisoner's Dilemma are examined, similar patterns are seen with one interesting exception. In the competitive subset, there is a clear competitive cluster; the mean for the competitive terms is 514.348 and the non-competitive terms is 467.756 (t (5)=2.215, p<.05). Hypothesis 2 was partially supported.

Table 3: Mean Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11
1	Prosocial Cluster										
2	**437.603**										
3	**429.758**	**444.496**									
4	**456.357**	**455.411**	**467.982**								
5	521.264	532.366	531.415	490.304	Individualist Cluster						
6	505.640	527.338	537.478	508.392	**453.374**						
7	514.754	489.500	504.898	514.429	**440.397**	**472.377**					
8	547.983	525.102	537.308	528.295	467.105	464.568	459.696	Competitive Cluster			
9	526.830	511.462	510.960	541.314	485.409	474.834	441.873	**453.070**			
10	550.183	526.543	539.535	543.237	506.128	486.076	465.819	**438.987**	**454.179**		
11	478.550	492.737	509.261	504.828	453.396	461.393	479.187	**468.483**	**460.079**	**473.834**	

Key: 1=Cooperation, 2=Prosocial, 3=Collaboration, 4=Harmonious, 5=Individualism, 6=Independent, 7=Self-Interest, 8=Competition, 9=Power, 10=Aggression, 11=Ambition.
Bold indicates predicted clusters.

To test whether *self* was closest to the cluster into which an individual was categorized three new variables were created that categorized each participant as either belonging to or not belonging to a particular SVO categorization. The only difference found was between *power* and *self* (t (175)=2.473, p<.05) for those categorized as competitive and everyone else. When the subsets of each SVO are examined, the smallest distance in the entire Individualistic space is that

between *individualism* and *self*: 361.074 (*t* (53)=-2.704, p<.01), but no other pattern between self and the key terms can be seen. Hypothesis 3 was not supported.

There were, however, interesting group differences. Table 4 shows all of the significantly different pairs. It is clear from this table that the groups view the concept *competition* differently.

Table 4: ANOVA between concept pairs by SVO

Concept Pair	SVO	N	Mean	SD	SE	F (df)	Sig
Power Self	Competitive	49	545.750	264.667	37.810	3.295 (2, 174)	.039
	Individualistic	53	441.925	330.135	45.348		
	Prosocial	72	402.542	290.145	34.194		
Individualism Collaboration	Competitive	49	437.735	261.647	37.378	4.380 (2,173)	.014
	Individualistic	52	583.346	227.573	31.559		
	Prosocial	73	500.822	253.641	29.686		
Competition Individualism	Competitive	51	538.078	296.064	41.457	3.897 (2,175)	.022
	Individualistic	54	541.889	284.659	38.737		
	Prosocial	73	416.740	264.898	31.004		
Competition Aggression	Competitive	53	506.377	356.329	48.946	3.359 (2,176)	.037
	Individualistic	54	457.407	334.834	45.565		
	Prosocial	72	357.222	304.765	35.917		
Competition Ambition	Competitive	53	541.396	320.819	44.068	4.698 (2,171)	.010
	Individualistic	54	436.593	329.792	44.879		
	Prosocial	73	372.890	272.438	31.886		
Competition Harmonious	Competitive	52	419.712	267.414	37.084	5.690 (2,170)	.004
	Individualistic	51	525.647	268.653	37.619		
	Prosocial	72	573.333	227.256	26.782		
Aggression Harmonious	Competitive	51	467.647	331.713	46.449	3.227 (2,173)	.042
	Individualistic	52	585.288	282.983	39.243		
	Prosocial	73	597.192	278.849	32.640		

The Galileo spaces for these three groups also had several differences. The Competitive space had the largest overall mean (485.261), but none of the terms were significantly different than this mean. Although competitive individuals found the terms in general to be more different than the other groups perceived them, they did not see any of the terms as being much more different or much more similar than other words in the group. The smallest distance between pairs was 416.981 between *cooperation* and *prosocial* and the largest was 549.560 between *aggression* and *prosocial*.

The overall mean for the individualistic space was 480.882. As noted above, the smallest

distance between pairs was 361.074 between *self* and *individualism* and the largest was 586.340

between *collaboration* and *aggression*. Table 5 illustrates how many pairs were significantly

different than the mean for the space. One interesting finding is that all of the prosocial terms

(*cooperation*, *prosocial*, *collaboration*, and *harmonious*) are significantly further from

aggression as compared to any other words in the set. Individualists in this sample see the term

aggression as being very different than their cluster of prosocial terms.

Table 5: t-tests between concept pairs in the individualistic space

Concept Pair	N	Mean	SD	SE	t (df)
Independent Collaboration	52	566.750	287.405	39.856	2.154* (51)
Individualism Collaboration	52	583.346	227.573	31.559	3.247** (51)
Individualism Cooperation	54	560.704	228.346	31.074	2.569* (53)
Individualism Self-Interest	54	387.463	266.869	36.316	-2.572* (53)
Individualism Competition	54	541.889	284.659	38.737	-2.100* (53)
Individualism Self	52	405.462	372.883	51.710	-2.704** (53)
Aggression Prosocial	53	551.283	218.074	29.955	2.350* (52)
Aggression Cooperation	53	439.264	297.158	40.818	3.022** (53)
Aggression Collaboration	53	586.340	247.531	34.001	3.102** (52)
Aggression Harmonious	52	585.288	282.983	39.243	2.661* (51)

*p<.05, **p<.01, ***p<.001

The prosocial space was the smallest (461.720). The smallest distance between pairs was

357.222 between *aggression* and *competition* and the largest was 597.192 between *harmonious*

and *aggression*. Table 6 shows the 19 pairs that were significantly different than the mean for the

space. Interestingly, all of the words in the prosocial cluster appear multiple times in the list of words that were different from the overall mean. This could indicate that those who are categorized as prosocial spend more time thinking about these terms. Like the individualist, they found *aggression* and *cooperation* to be very different; however, they also see *competition* and *cooperation* as very different and view the two terms *competition* and *aggression* as very similar. They differentiate less among the competitive terms and more between the competitive terms and the prosocial ones. This illustrates that they generally view competition differently than the other groups.

Table 6: t-tests between concept pairs in the prosocial space

Concept Pair	N	Mean	SD	SE	T (df)
Harmonious Cooperation	71	377.577	279.563	33.178	-2.536* (70)
Harmonious Power	70	547.457	245.981	29.400	2.916** (69)
Harmonious Competition	72	573.333	227.256	26.782	4.167*** (71)
Harmonious Aggression	73	597.192	278.849	32.640	4.150*** (72)
Prosocial Aggression	69	528.261	259.185	31.202	2.133* (68)
Prosocial Power	73	514.562	236.361	27.664	1.910* (72)
Prosocial Individualism	71	525.282	265.092	31.461	2.020* (70)
Prosocial Independent	72	531.792	257.833	30.386	2.306* (71)
Prosocial Cooperation	71	386.563	291.324	34.574	-2.174* (70)
Prosocial Competition	72	561.611	231.753	27.312	3.657*** (71)
Prosocial Self-Interest	72	531.431	243.079	28.647	2.433* (71)
Self-Interest Cooperation	70	537.014	244.078	29.173	2.581* (69)
Self-interest Collaboration	69	524.377	234.905	28.279	2.216* (68)

Ambition Self	72	381.208	302.547	35.656	-2.258* (71)
Competition Aggression	72	357.222	304.765	35.917	-2.909** (71)
Competition Ambition	73	372.890	272.438	31.886	-2.786** (72)
Competition Cooperation	73	556.685	261.004	30.548	3.109** (71)
Aggression Cooperation	72	571.389	252.888	29.803	3.680*** (72)
Aggression Collaboration	73	565.822	257.656	30.156	3.452** (72)

*p<.05, **p<.01, ***p<.001

In fact all three groups think about the term *competition* differently, placing it closer or further apart from the other terms. *Aggression* and *harmonious* also are defined differently by the three orientation groups. Figure 4 shows the 3D representation of the multi-dimensional spaces when rotated to fit on the same map.

Figure 4: SVO Galileo Space
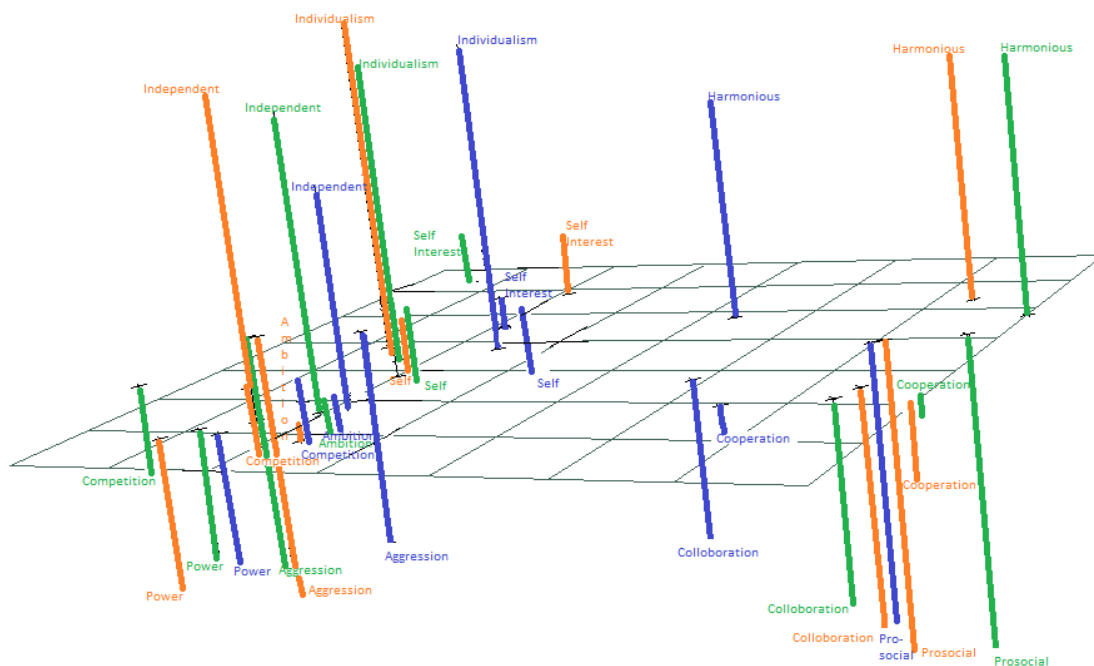
Green is Prosocial, Orange is Individualistic, and Blue is Competitive

This map clearly shows that the terms associated with each orientation do cluster when each group is viewed separately. It also depicts which terms the groups see similarly and those that they view differently.

To look at the differences between those who defected and those who cooperated in the PD in the Galileo space, the data was divided by response to the PD and then run through Galileo. Table 7 shows how many participants from each SVO were included in these two groups.

Table 7. Percentage of SVO that made up the PD Cooperate and Defect groups

Category	Cooperate	Defect
Prosocials (73)	56 (38%)	17 (20%)
Individualists (54)	25 (17%)	29 (34%)
Competitors (53)	25 (17%)	28 (33%)
Not Categorized (52)	41 (28%)	11 (13%)
TOTAL (232)	147 (100%)	85 (100%)

The mean distance for the defectors was 494.315. The smallest distance between pairs was 406.549 between *cooperation* and *collaboration* and the largest was 563.121 between *cooperation* and *aggression*. Table 8 describes the four pairs that were significantly different than the mean for the group.

Table 8: t-tests between concept pairs in the defectors space

Concept Pair	N	Mean	SD	SE	t* (df)
Prosocial Individualism	84	553.119	228.999	24.986	2.353 (83)
Prosocial Independent	83	554.735	255.162	28.008	2.157 (82)
Aggression Cooperation	83	563.120	281.801	30.932	2.224 (82)
Cooperation Collaboration	82	406.549	343.334	37.915	2.315 (83)

*All results are p<.05

The mean distance for cooperators was slightly smaller: 484.761. The smallest distance between pairs was 416.247 between *aggression* and *competition* and the largest was 575.117 between *cooperation* and *competition*. Eighteen pairs were significantly different than the mean in the cooperators space; nine of these pairs were the same as in the prosocial space suggesting a strong relationship between the two. Cooperators located all of the individualism terms and two of the competition terms significantly further from *collaboration* than the other terms. They also located all the prosocial terms further from *competition* than the other terms. All the significantly different pairs are listed in Table 9.

Table 9: t-tests between concept pairs in the cooperators space

Concept Pair	N	Mean	SD	SE	t* (df)
Collaboration Individualism	141	529.511	248.549	20.932	2.138* (140)
Collaboration Independent	144	548.090	271.518	22.627	2.799** (143)
Collaboration Self-Interest	144	523.292	231.393	19.283	1.998* (143)
Collaboration Aggression	144	531.785	249.691	20.808	2.260* (143)
Collaboration Competition	143	561.860	240.973	20.151	3.826*** (142)
Competition Cooperation	145	575.117	248.100	20.604	4.385*** (144)
Competition Prosocial	142	532.768	238.131	19.984	2.402* (141)
Competition Harmonious	142	528.817	239.332	20.084	2.194* (141)
Competition Independent	143	421.580	255.143	21.336	-2.961** (142)
Self-Interest Harmonious	139	529.583	241.782	20.508	2.186* (138)
Self-Interest Individualism	145	434.283	292.100	24.258	-2.081* (144)
Self-Interest Power	145	432.290	276.031	22.923	-2.289* (144)
Power Cooperation	146	456.308	306.065	25.330	1.996* (145)

Power Harmonious	144	553.750	241.028	20.086	3.435** (143)
Power Prosocial	141	525.851	236.489	19.916	2.063* (140)
Aggression Cooperation	146	542.829	244.710	20.252	2.867* (145)
Aggression Harmonious	145	540.366	286.720	23.811	2.335* (144)
Individualism Self	144	420.181	327.509	27.292	-2.366* (143)

*p<.05, **p<.01, ***p<.001

When compared to each other, two pairs were significantly different: *competition* and

cooperation (*t*(227)= 2.048) and *competition* and *independent* (*t*(225)=-3.257). When both

groups are mapped in the same space, the mean difference between points is 79.862. *Competition*

moves the greatest distance (108.989 units) and *cooperation* moves the smallest distance (50.654

units). Clearly these two groups look at *competition* slightly differently. Figure 5 shows the 3D

representation of the multi-dimensional space of the two groups.

Figure 5: PD Galileo Space
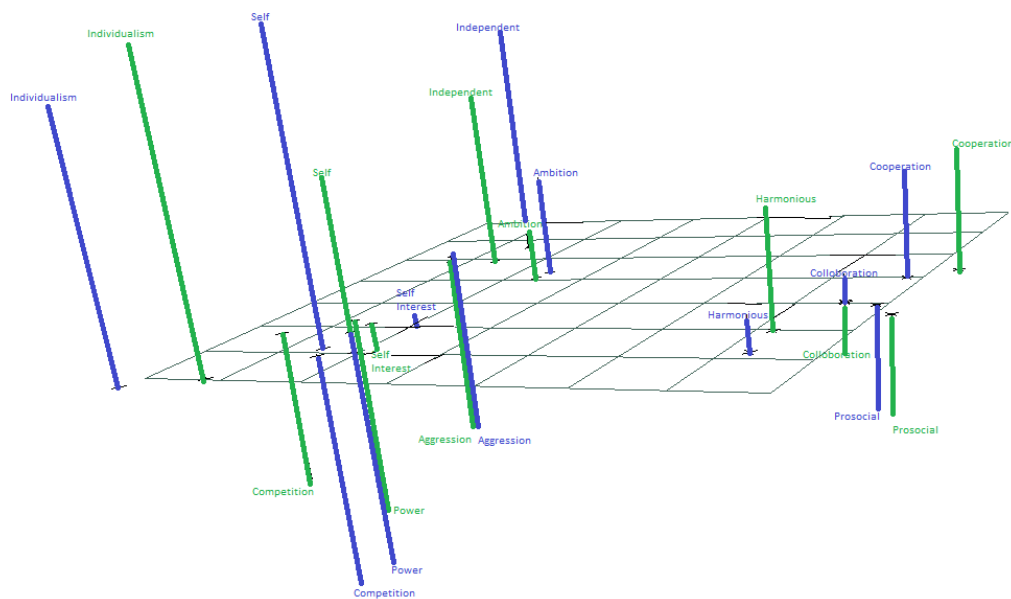
Blue is Defect and Green is Cooperate

This map shows the clustering of the prosocial terms as being very distinct, but the other two clusters get a bit messier when these groups are looked at separately. It further illustrates how the two groups consider the term *competition* differently, which is why concepts that group near them are different despite the fact that the terms themselves are relatively close together.

Discussion

This paper adds a new twist to the extant research on the Prisoner's Dilemma and social value orientation by adding Galileo measurements. SVO can be used to predict behavior in the PD; however, more research should be conducted to look into those who were not categorized as prosocial, but did answer prosocially in at least a few cases. To show that getting individuals to act prosocially some of the time can lead to desired prosocial goals would help researchers and practitioners target messages to those who may be inclined to act prosocially even if it is not their dominant orientation.

The SVO and PD Galileo maps show that both individuals of different SVOs and those who either defected or cooperated in the PD view the term *competition* differently. Future research should look into the specifics of why and how individuals see this particular term differently based on orientation.

Although the competitive terms did not form a clear-cut cluster when all responses were taken together, the individualist terms did, and the competitive cluster did appear in some of the spaces, which indicates that these do represent at least two different orientations. Researchers are cautioned not to collapse them into one proself category.

The fact that the competitive space had no pairs that were significantly different from each other and the defectors space only had four may also be worth looking into further. Both of these spaces were also larger overall than their counterparts. The prosocial space was the

smallest but had the most terms that were seen as either very different or very similar to each other. The size of the space usually indicates more differentiation; the differences among the terms themselves may indicate that prosocials think about all of these terms in a more definitive way.

Another interesting finding was that individuals did not put the term *self* close to the terms associated with the SVO they were categorized into. This may show a disconnection between how individuals behave and how they view themselves. We know that prosocials are more likely to cooperate while individualists and competitors defect in the PD (De Dreu & McCusker, 1997). However, these behaviors do not seem to be consistent with how individuals view themselves. The reasons for this may vary. It is possible that after performing competitively or individualistically, subjects indicate that they are more prosocial as a way to make them feel better about their actions. This is consistent with research on cognitive dissonance theory (Festinger, 1957), which suggests that people change their opinions of a behavior to match how they want to feel. In this case, they may want to feel like they are cooperative and nice people so therefore, after engaging in behaviors that may not be viewed as nice, they convince themselves that they are in fact cooperative as a way to mitigate feelings of dissonance. Future research could delve further into this phenomenon.

Previous research looking at SVO in the PD has shown that regardless of gain or loss frame and motivation for performance, prosocials are more cooperative and expect more cooperation from the other party as compared to individualists or competitors (De Dreu & McCusker, 1997). Our study also finds that prosocial subjects cooperate more than other subjects. They also consistently view themselves as being prosocial and distance themselves from ideas related to competition and individualist behaviors. Thus, their viewpoints were

largely consistent with their behaviors. However, this was not the case with individualist or competitive SVO subjects as noted above. Determining the reasons individualists and competitors have a less accurate view of themselves and their behavior compared to prosocials is an important direction for future research. Determining communicative techniques that could move these individuals closer to the competitive or individualist terms in the Galileo space should be explored as well.

One limitation of this study was the use of the term *pragmatic* in the original survey and the fact that it needed to be dropped from the analysis. This shows the importance of gathering terms for Galileo measurements with the help of members from the intended sample group. Future research should include pilot studies to make sure all the terms are familiar to participants. Additionally, understanding the reasons why subjects placed themselves close to or far from certain terms would help us to understand the ways that the terms are interpreted. Thus, the importance of the terms in this measurement should be considered when conducting future research.

The addition of the Galileo measurements added richness to the original measures allowing us to delve into how individuals viewed themselves and the terms involved in the study. It was particularly interesting that the classification of subjects based on their behavior did not necessarily match their self-perceptions as measured by Galileo. This suggests that even though we engage in competitive behaviors, we may not consider ourselves competitive. The reasons behind this are likely complex but could provide a constructive direction for future research on how we engage in conflict and rationalize our behaviors. It is our hope that this new lens will be a valuable addition to the study of conflict and game theory.

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