The endogenous nature of the measurement of social preferences

Smith, John

Rutgers University-Camden

13 June 2010

The Endogenous Nature of the Measurement of Social Preferences*

John Smith†

February 27, 2011

Abstract

We present evidence against the standard assumptions that social preferences are stable and can be measured in a reliable, nonintrusive manner. Researchers often measure social preferences by posing dictator type allocation decisions. The Social Value Orientation (SVO) is a particular sequence of dictator decisions. We vary the order in which the SVO and a lager stakes dictator game are presented. In our first study, we find that prosocial subjects act even more prosocially when the SVO is administered first, whereas selfish subjects are unaffected by the order. In our second study, we vary the order of the SVO and a nonstandard dictator game. We do not find the effect found in the first study. This suggests that the first result is driven by choices involving the size of surplus. Although we cannot determine whether the timing affects preferences or the measure of preferences, our results are incompatible with the assumptions that social preferences are stable and can be measured in a reliable, nonintrusive manner.

JEL classification: C91, D64, Z13

Keywords: experimental economics, social values, dictator game, social value orientation

*The author thanks I-Ming Chiu, Hans Czap, Sean Duffy, Matt Miller, Jack Worrall, Tetsuji Yamada and participants of the ESA conference in Washington DC and the IAREP/SABE conference in Halifax for helpful comments. This research was made possible by Rutgers University Research Council Grant #202344.

†Rutgers University-Camden, Department of Economics, 311 N. 5th Street, Camden, New Jersey 08102, United States.

1 Introduction

It is commonly assumed that subjects have stable preferences over outcomes. It is also commonly assumed that standard techniques to measure these preferences are reliable and can be performed in a nonintrusive manner. If these two assumptions hold, then the order in which we perform the measurement of preferences should not matter. However, we present evidence which challenges these assumptions.

It is significant if a systematic violation of these assumptions is found. Measures of preferences are of interest primarily because they are helpful in making predictions regarding behavior. However, if the outcome of a measurement can affect future outcomes, either because preferences are not stable or the measure is not reliable, then the value of the measure is diminished.

In order to substantiate the claim that the timing of the measurement can affect future outcomes, one might be tempted to measure preferences and have the subjects play a strategic game (for instance, the prisoner's dilemma) but vary the order in which the items are presented to the subject. However, if the experimenter detected that the relationship between the measure and behavior in the game is affected by the order in which the items are given, this difference is not exclusively attributable to the timing of the measure. This is because behavior in a strategic game is not exclusively a function of preferences but also, for instance, expectations regarding the behavior of others. Therefore, rather than directing subjects to play a strategic game, we offer two nearly identical measures of preferences, and vary the order in which they are presented to the subjects. By doing this, we are confident that the effects which we find are not due to the more complicated features involved in the play of a strategic game.

It has been known for some time that many subjects do not simply maximize their own material payoffs.[1] Specifically, it is often observed that some subjects will sacrifice their own material payoffs so that other subjects will receive a better material outcome. Researchers often attempt to infer the nature of these social preferences by posing a series of allocation decisions, often referred to as dictator games. These decisions entail a choice of an allocation of

[1] For an early example, see Deutsch (1958).

hypothetical or material outcomes distributed between the subject and another subject. One measurement technique is to simply pose a dictator game to a subject. Another measurement technique, which involves a specific sequence of dictator games, is Social Value Orientation (SVO).

In our experiment, we vary the order of the SVO and a standard, lager stakes dictator game.[2] While we find that SVO outcomes are significantly related to outcomes in the dictator game, we also find that the mapping between these outcomes are related to the order in which they are given. Specifically, we find that the subjects, for whom the SVO indicates prosocial preferences, act even more prosocially in the larger stakes dictator game when the SVO is administered first. By contrast, we find that the subjects for whom SVO indicates selfish preferences are unaffected by the order.

To help identify possible causes of the above result, we run another study identical to the first, with the exception that the dictator game exhibits a relative price of each allocation of 1 to 3, rather than the standard 1 to 1. In other words, each \$0.50 kept by the subject reduces the recipient's payoffs by \$1.50. In this case, we find no significant difference between the prosocials who complete the SVO before the dictator game and the prosocials who complete the SVO after the dictator game. This suggests that decisions involving the creation of surplus in the measurement of SVO are important to the endogeneity found in the prosocials of the first study.

Given the results of our experiment, we are unable to distinguish between whether the measurement affects the social preferences of the subject or whether the measure affects the subsequent performance of another measure. Although we cannot distinguish between these two explanations, we can conclude that, given the assumptions commonly applied to experiments, we should not observe the behavior found in this experiment. Further, as we have uncovered a systematic relationship between the treatment, the action of the subjects and the measure, we describe our results as *endogenous* rather than merely unstable.

The results of our experiment also suggest that the dictator game, without the creation or destruction of surplus, seems to be more reliable and less intrusive than measures which

[2]For more on dictator games, see Forsythe et. al. (1994), Hoffman et. al. (1994), Eckel and Grossman (1996), Ruffle (1998) and Bolton et. al. (1998).

create or destroy surplus. Perhaps most importantly, our results suggest that measuring social preferences before observing behavior might induce greater heterogeneity in subsequent behavior than that which would have occurred if the measurement had not been made.

1.1 Social Value Orientation as a Measure of Social Preferences

We use SVO because it is relatively easy to administer and interpret. The specific technique which we use, adapted from Van Lange et. al. (1997), consists of 9 items with three possible choices involving material payoffs accruing to the subject and another subject.[3] Each of the nine items has an *individualistic* response, a *prosocial* response and a *competitive* response. The individualistic response is the one in which the material payoffs accruing to oneself are the largest. In other words, selecting the individualistic choice suggests that the subject neither positively nor negatively values material payoffs accruing to the other subject. The prosocial response is the one in which the sum of the material payoffs accruing to both the subject and the other subject is the largest. In other words, selecting the prosocial response suggests that the subject positively values the material payoffs accruing to the other subject. The competitive response is the one in which the difference between the material payoffs accruing to the subject and the other subject is the largest. In other words, selecting the competitive choice suggests that the subject negatively values material payoffs accruing to the other subject.

Translated into a utility function, SVO measures the form of $u(x_{own}, x_{other})$ where x_{own} is the material payoff accruing to self and x_{other} is the material payoff accruing to another person. A prosocial choice indicates that $\frac{\partial u}{\partial x_{other}} > 0$, an individualistic choice suggests that $\frac{\partial u}{\partial x_{other}} = 0$ and a competitive choice suggests that $\frac{\partial u}{\partial x_{other}} < 0$.

Further, there is much written on the stability of SVO. For instance, Bogaert et. al. (2008) suggest that over the 40 years since its introduction by Messick and McClintock (1968), SVO has been widely regarded as providing a stable measure of a personality trait. However, recent work has suggested instances where SVO can be affected by the setting and is thereby a less than perfectly stable measure. Iedema and Poppe (1994) show that the measurement of SVO can be affected by self-presentation effects. Smeesters et. al. (2003) show that priming

[3] See the appendix for a complete description of the SVO items which we use.

certain types of behavior can lead to a different mapping from SVO to behavior.[4] While SVO is considered relatively stable, to our knowledge there is no work suggesting that outcomes of SVO can be affected by the timing of its administration.

It is obviously problematic that the timing of the measurement of preferences might affect the relationship between the measure and behavior related to the measure. A measure is primarily useful to the extent that it can form a basis for making predictions about behavior.[5] When behavior and the measure of preferences are functions not exclusively of preferences then the usefulness of the measure is somewhat degraded.

SVO also appears in the economics literature.[6] However each of these papers uses the ring measure (Griesinger and Livingston, 1973), which is slightly different than the technique which we use. The ring measure consists of 24 pair-wise items rather than 9 items with 3 responses.[7] However, similar to the technique which we employ, the ultimate objective is to classify subjects as one of a few types. Relatively little is known about the relationship between the ring measure and the measure which we employ (Bogaert et. al., 2008). However, we opt for the latter as it requires fewer responses and, in our opinion, is more transparent. As a result of these characteristics, we conjecture that the effects which we find here would only be strengthened by using the ring measure.

Finally, measuring social preferences via dictator games, like SVO, has the advantage that it only considers a situation where strategic issues are absent. Although all decisions would be made in the absence of the feedback of the actions of other dictators, it still remains possible that the subject would anticipate some reciprocal arrangement. Therefore, similar to Carpenter (2005), we employ a triadic design whereby each dictator decides an allocation involving self and another dictator. This other dictator does not decide on an allocation involving the original dictator but rather on a third dictator.

[4] Also see Au and Kwong (2004) and Hertel and Fiedler (1994, 1998).

[5] SVO has been used to study behavior in games (Parks, 1994; Kramer et. al., 1986; Pruyn and Riezehos, 2001), the decision to use public transportation (Van Vugt et. al., 1996), proenvironmental behavior (Cameron et. al., 1998; Joireman et. al., 2001) and volunteerism (McClintock and Allison, 1989).

[6] See Buckley et. al. (2001), Buckley et. al. (2003), Burlando and Guala (2005), Carpenter (2003), Carpenter (2005), Cornelissen et. al. (2007), Kanagaretnam et. al. (2009) and Offerman et. al. (1996).

[7] Sonnemans et. al. (2006) uses a visual representation of the ring whereby the subject selects their location on the *ring* with a single click rather than responding to 24 items.

1.2 Other Measures of Social Preferences

Another commonly used social preference measurement technique was developed by Andreoni and Miller (2002). SVO is similar to this technique in that both techniques pose a series of dictator games however there remain important differences. In Andreoni and Miller, choice is much less restricted than in SVO. Each SVO item has only three possible responses, whereas in Andreoni and Miller each item seeks an allocation of tokens ranging from 40 to 100. As a result, Andreoni and Miller yields less coarse data than does SVO. However, the choice in Andreoni and Miller is less transparent than SVO, as the latter explicitly lists the material allocation of each choice. We are not aware of a study which compares the relative merits of SVO and that proposed by Andreoni and Miller.

Charness and Rabin (2002) pose a series of simple games to learn the specific form of social preferences[8] related to relative wealth and reciprocity. The nature of the social preferences might depend on whether other's payoffs are higher than or lower than the subject's own payoffs, therefore Charness and Rabin vary this aspect of their items. By contrast, in SVO the subject decides among choices where monetary payoffs accruing to self are never less than that accruing to the other subject. Also, in contrast the technique employed in Charness and Rabin, SVO is not equipped to evaluate preferences for reciprocity.

1.3 Endogenous Social Preferences and Behavioral Spillovers

Consider the relationship between our paper and research on endogenous social preferences. For instance, Carpenter (2005) and Canegallo et. al. (2008) investigate how the strategic environment can affect preferences.[9] Also, Guth et. al. (2008) find that subjects who contribute more in a public goods game are significantly more trusting in a subsequent investment game. By contrast, we study whether the decision in a commonly used measure of social preferences can affect the outcome of a subsequent measure of social preferences. Further, as we find a systematic relationship, in our view the results are best described as endogenous.

[8] Chen and Li (2009) perform a similar type of analysis when considering the type, or identity, of the other subject.

[9] Schotter et. al. (1996) examines the effect of framing on judgements of fairness and is therefore related to endogenous preferences. Eckel and Grossman (2005) find that a strong identity manipulation can induce more cooperation in public goods game. Also, see Bowles (1998) and Poulsen and Poulsen (2006) for more on endogenous preferences.

There also exists a strand of literature which examines the role of the environment on play in games. For instance, Bednar et. al. (2010) describe an experiment in which subjects simultaneously play two distinct games with different opponents. The authors find that behavior in a particular game is affected by corresponding paired game.[10] This literature contends that strategies which are used in one game are often applied to the other, despite that the games should be played independently. The authors examine these behavioral spillovers but, unlike the present paper, they do not directly measure preferences.

2 Study 1

2.1 Overview

We seek to test whether outcomes in a measure of social preferences can affect subsequent measurements. Therefore, we direct subjects to complete the SVO and make an allocation in a standard dictator game, however we vary the order in which these are given to the subjects.

2.2 Procedure

A total of 96 students enrolled in economics classes at a university in the northeastern United States participated. Study 1 was conducted in 5 classes of 16, 21, 39, 12, and 8 subjects. The responses were entered on paper. The subjects were given course credit for attendance and were told that that a randomly selected 25% from each session would be paid the amount earned in the experiment. The subjects completed the SVO and decided on an allocation in a standard $10 dictator game.

The subjects were aware of the triadic design as they were told to make allocation decisions involving themselves ("You") and another subject ("Other1"). Another subject ("Other2") was to make allocations involving Other2 and You. Therefore, the amount accruing to each subject was what was kept in the You-Other1 allocation decisions plus what Other2 did not keep in the Other2-You allocation decisions. In both the SVO and dictator game, the status of You, Other1 and Other2 remained fixed. This description of the triadic design was provided

[10] Also see Bednar and Page (2007), Crawford and Broseta (1998) and Van Hyuck et. al. (1993).

verbally by the same male experimenter and in written form given to each subject. The exact form of the written instructions are provided in the appendix.

The SVO entailed the exact nine items from Van Lange et. al. (1997). The subjects were presented with three items on each of three pages. In Van Lange et. al., the subjects decide on an allocation of points which carry no financial implications. By contrast, in our experiment subjects are offered a conversion rate of points to money, whereby the subject is effectively deciding on an allocation of a small amount of money. Across all 9 SVO items, the subject could keep as little as \$0.94 and as much as \$1.06. Also across the SVO items, the subject could send as little as \$0.19 and send as much as \$0.94. The subjects were not told these amounts, however they could be easily calculated. The exact items and the conversion from points to money in the SVO are given in the appendix. The dictator game was presented to the subjects in \$0.25 increments. The subjects were directed to indicate which of the 41 dictator game allocations they most preferred. The exact form of the dictator game is provided in the appendix in order to illustrate that it is unlikely that there was any confusion about the allocation in the dictator game.

Within each of the 5 classes, approximately half of the subjects answered the SVO items then made a choice in the dictator game. We refer to this treatment as SVO First. Approximately half of each class responded to the dictator game then answered the SVO items. We refer to this treatment as SVO Last. Note that there is no feedback in this experiment. Each subject completes the experiment without knowing what the other subjects have selected.

2.3 Results

In this study, the amount kept by the subjects, which is the sum of the amount kept in the SVO and the amount kept in the dictator game, ranged from \$0.94 to \$11.06, with an average of \$7.09. The total amount accruing to the subjects, which is the sum of what was kept by the subject and what was sent by Other2, ranged from \$2.51 to \$21.93, with an average of \$11.69.

Using the procedure of Van Lange et. al. (1997), we categorized 32 subjects (33%) as prosocials, 39 subjects (41%) as individualists and 5 subjects (5%) as competitors. There were 20 subjects (21%) who we could not classify as they did not select a minimum of 6

choices of a particular type. Table 1 summarizes the distribution of subjects according to SVO categorization and the treatment.

	Prosocial	Individualistic	Competitive	Uncategorized	Total
SVO First	14	24	3	8	49
SVO Last	18	15	2	12	47
Total	32	39	5	20	96

Table 1: Number of subjects by SVO categorization and treatment

See Figure 1 for the distribution of amounts kept in the dictator game by SVO Last or SVO First treatments.[11] The figure is arranged by the first digit of the amount kept in the dictator game.

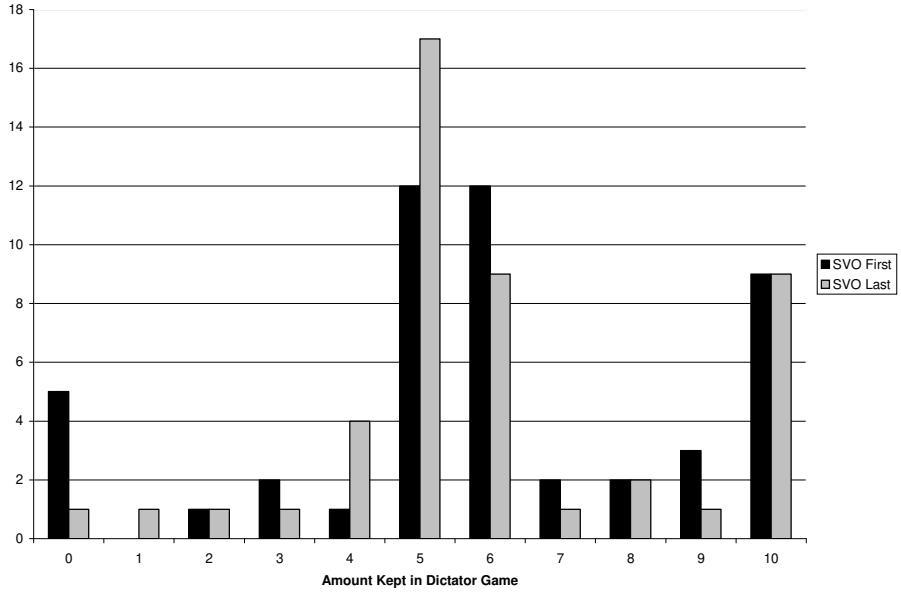


Figure 1: Distribution of amount kept in dictator game by SVO First and SVO Last treatment.

As one would expect, there is a significant relationship between choice in the SVO and choice in the dictator game. The prosocial subjects ($M = 4.68$, $SD = 1.60$) kept significantly less than did the proself (individualists and competitors) subjects ($M = 7.28$, $SD = 2.48$),

[11] See Bohnet and Frey (1999) and Cox and Sadiraj (2011) for other papers with dictator game choices in which some subjects kept less than 50%.

$t(74) = 5.19$, $p < 0.01$.[12] While unclassified subjects ($M = 5.75$, $SD = 3.19$) kept less than proself subjects, $t(62) = 2.09$, $p = 0.020$ and prosocial subjects kept less than unclassified subjects, $t(50) = 1.61$, $p = 0.057$.

An SVO measure equaling 9 indicates perfect consistency in the set of responses and a measure of 6, 7, or 8 indicates a less than perfectly consistent set of responses. See Table 2 for the amount kept in the dictator game by SVO classification and consistency.

	Prosocial	Individualistic
SVO of 9	4.31	7.95
	(1.69)	(2.12)
SVO of 6, 7, or 8	5.78	6.12
	(0.53)	(2.11)

Table 2: Average amount kept in dictator game by SVO classification and consistency of measurement with standard deviation in parentheses

Among those classified as prosocial, those with a measure equal to 9 (24 subjects) kept a significantly smaller share than those with a measure of 6, 7, or 8, $t(30) = 2.41$, $p = 0.01$. Also, among those classified as individualistic, those with a measure equal to 9 (26 subjects) kept a significantly larger share than those with a measure of 6, 7, or 8, $t(37) = 2.55$, $p < 0.001$. Therefore, we are reasonably confident of the relationship between choice in the SVO and choice in the dictator game.

We now compare dictator allocations given the treatment. First, the difference between the amount kept in the SVO First treatment ($M = \$6.04$, $SD = 2.89$) and in the SVO Last treatment ($M = \$6.16$, $SD = 2.40$) is not significant, $t(94) = 0.23$, $p = 0.41$. However, a significant relationship emerges when one looks within SVO classifications. See Figure 2 and Table 3 for the amount kept in the dictator game by SVO classification and treatment.

[12] In this paper, all given p-values are for one tail tests.

	Prosocial	Individualistic
SVO First	4.14	7.38
	(2.28)	(2.23)
SVO Last	5.10	7.28
	(0.54)	(2.40)

Table 3 Average amount kept in dictator game by SVO classification and treatment with standard deviation in parentheses

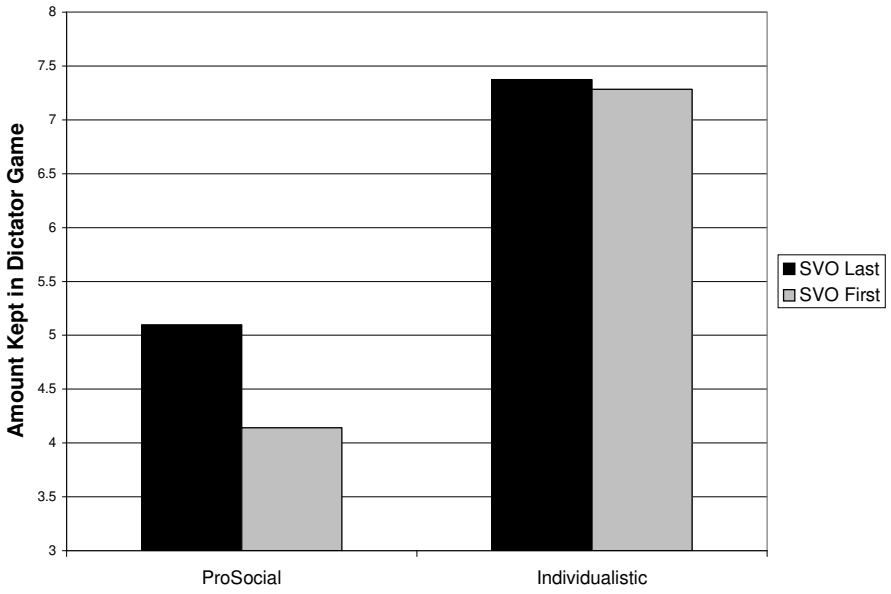


Figure 2: Average amount kept in dictator game by SVO classification and treatment

Although the individualists in the SVO First treatment do not keep a significantly different amount than the individualists in the SVO Last treatment, there is a significant difference within the prosocial subjects. Prosocial subjects in the SVO First treatment keep less than the prosocials in the SVO Last treatment, $t(30) = 1.72$, $p = 0.048$.

This relationship becomes even more significant when one restricts attention to those with a consistent SVO measure. The prosocials who had an SVO score of 9 in the SVO Last treatment ($M = 4.89$, $SD = 0.30$) kept significantly more than the prosocials who had an SVO score of 9 in the SVO First treatment ($M = 3.64$, $SD = 2.34$), $t(22) = 1.92$, $p = 0.034$.

3 Study 2

3.1 Overview

Roughly speaking, Study 1 finds that prosocial subjects act even more prosocially in the dictator game when the SVO items are administered first, whereas selfish subjects are unaffected by the order of the SVO. Based on the data available from Study 1, it is not clear to us what drives this result. As there is no choice involving the creation of surplus in the standard dictator game, it is possible that the creation of surplus by the prosocial subjects in the SVO First treatment predisposes them to be more generous in the dictator game than comparable prosocials in the SVO Last treatment. Therefore, if the dictator game was designed in a manner in which choice decided the amount of surplus then the results in the SVO Last treatment might converge to that of the SVO First treatment. However, it is also possible that with the standard dictator game, being selfish is too *easy* and so the individualists are not affected by the timing. Therefore, if the dictator game is designed in a manner in which being selfish is more costly then we expect a divergence of the results of the SVO First and Last treatments of the individualists. In Study 2, we hope to to shed some light on the relative merit of these two explanations.

Study 2 follows the same procedure as Study 1 with the exception that, rather than using a standard dictator game, we use a dictator game in which the relative allocation *price* is 1 to 3. In other words, the most selfish allocation is \$10 to self and \$0 to other and the most generous allocation is \$0 to self and \$30 to other. This nonstandard dictator game has the advantages that the amount of total surplus is a matter of choice and being selfish is relatively more costly. If we find that the timing has a reduced influence on the prosocials then we favor the former explanation. If we find that individualists are now affected by the timing then we will favor the latter explanation.

3.2 Procedure

A total of 90 students in economics classes at a university in the northeastern United States participated. Study 2 was conducted in 4 classes of 21, 42, 16 and 11 subjects. The procedures in Study 2 are identical to that in Study 1 with the exception of the form of the dictator game.

Rather than the standard dictator game in which the trade-off between own payoffs and other payoffs is 1 to 1, the dictator game used in Study 2 has a trade-off of 1 to 3. In other words, to increase the amount kept by \$0.50, the subjects must reduce the amount sent to the other subject by \$1.50. The subject's own payoffs were listed in \$0.50 increments and the other subject's payoffs were listed in \$1.50 increments. The subjects were directed to indicate which of the 21 dictator game allocations they most preferred. The exact form of the dictator game is provided in the appendix.

3.3 Results

In this study, the amount kept by the subjects ranged from \$0.94 to \$11.06, with an average of \$8.17. The total amount accruing to the subjects ranged from \$1.13 to \$42.00, with an average of \$17.36.

Again using the procedure of Van Lange et. al. (1997), we categorized 44 subjects (49%) as prosocials, 34 subjects (38%) as individualists and 4 subjects (4%) as competitors. There were 8 subjects (9%) who we could not classify as they did not select a minimum of 6 choices of a particular type. Table 4 summarizes the distribution of subjects according to SVO categorization and the treatment.

	Prosocial	Individualistic	Competitive	Uncategorized	Total
SVO First	21	16	2	5	44
SVO Last	23	18	2	3	46
Total	44	34	4	8	90

Table 4: Number of subjects by SVO categorization and treatment

See Figure 3 for the distribution of amounts kept in the dictator game by SVO Last or SVO First treatments. The figure is arranged by the first digit of the amount kept in the dictator game.

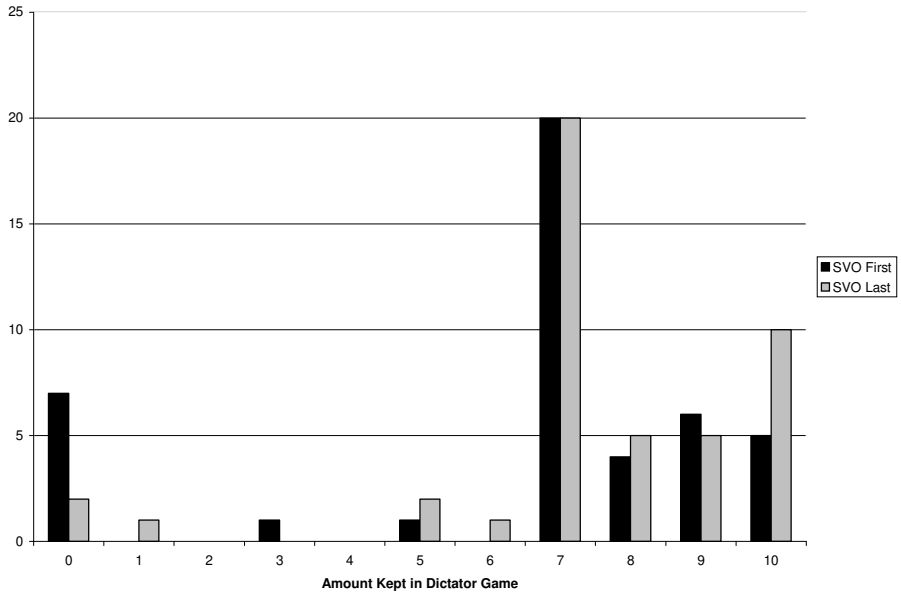


Figure 3: Distribution of subjects and amount kept in dictator game by SVO First or SVO Last treatments.

Similar to Study 1, we find a significant relationship between choice in the SVO and choice in the dictator game. The prosocial subjects ($M = 6.44$, $SD = 2.79$) kept significantly less than did the proself (individualists and competitors) subjects ($M = 8.28$, $SD = 2.33$), $t(76) = 2.86$, $p < 0.01$. As in Study 1, we find that the consistency of the SVO is related to the choice in the dictator game. See Table 5 for the amount kept across both treatments by the consistency of the SVO.

	Prosocial	Individualistic
SVO of 9	5.97	8.38
	(3.11)	(2.37)
SVO of 6, 7, or 8	7.46	7.94
	(1.57)	(2.53)

Table 5: Average amount kept in dictator game by SVO classification and consistency of measurement with standard deviation in parentheses

Among those classified as prosocial, subjects with a measure equal to 9 (30 subjects) kept a significantly smaller share than subjects with a measure of 6, 7, or 8, $t(42) = 1.70$, $p = 0.049$.

However, in contrast to Study 1, among those classified as individualistic, subjects with a measure equal to 9 (17 subjects) did not keep a significantly different amount than subjects with a measure of 6, 7, or 8, $t(32) = 0.52$, $p = 0.30$.

Finally, we may ask whether the timing matters for dictator game in Study 2. See Table 6 for the amount kept in the dictator game by SVO classification and treatment.

	Prosocial	Individualistic
SVO First	5.98	8.00
	(3.18)	(2.54)
SVO Last	6.87	8.31
	(2.36)	(2.38)

Table 6: Average amount kept in dictator game by SVO classification and treatment with standard deviation in parentheses

Although the prosocials in the SVO First treatment kept less than the prosocials in the SVO Last treatment, this difference is not significant, $t(42) = 1.06$, $p = 0.147$. However, as in Study 1, there is no significant difference in the amount kept by individualists in the SVO First and SVO Last treatments, $t(32) = 0.361$, $p = 0.360$.

The timing remains insignificant among the prosocials even when attention is restricted to subjects with perfectly consistent SVO measures. The prosocials who had an SVO score of 9 in the SVO Last treatment ($M = 6.4333$, $SD = 2.78$) kept more than the prosocials who had an SVO score of 9 in the SVO First Treatment ($M = 5.50$, $SD = 3.43$), however this relationship is not significant, $t(28) = 0.82$, $p = 0.21$.

4 Discussion

In Study 1 we found that prosocial subjects in the SVO First treatment keep significantly less in the standard dictator game than prosocials in the SVO Last treatment. In Study 2 we found that there is no significant difference between the SVO First and SVO Last treatments for either prosocials or individualists. From this we infer that the results in Study 1 are driven by the presence of choices involving the creation of surplus, as the choice of the size of surplus is present in both stages of Study 2 but only one stage in Study 1.

5 Concluding Comments

In this paper, we describe two studies in which we measure social preferences through choice in the Social Value Orientation (SVO) and choice in a dictator game. In Study 1, we vary the order of the SVO and a standard dictator game. We find evidence that subjects with prosocial preferences act more generously in the dictator game when the SVO items are given first. On the other hand, our evidence suggests that subjects with individualistic preferences are not affected by the order of the items. This result calls into question the assumption that social preferences are stable and that they can be measured in a reliable and nonintrusive manner.

To gain insights on the explanation for the main result in Study 1, Study 2 performs the identical procedure of Study 1 with the exception that a nonstandard dictator game is used. This nonstandard dictator game exhibits a 1 to 3 trade-off between own payoffs and other payoffs, whereas the standard dictator game has a 1 to 1 trade-off. We find no significant difference between those making dictator game decisions before SVO and those making dictator game decisions after SVO, for prosocials or individualists. Study 2 suggests that the main result of Study 1 is driven by the presence of decisions regarding the size of the surplus. This creation of surplus, which seems to only influence the prosocials, is absent in the standard dictator game.

It is worth reflecting on the limitations of the present experimental design. For instance, we cannot determine whether the SVO measurement affects the dictator game choices, the dictator game choices affects the SVO measurement or perhaps both. Such questions of endogeneity are notoriously tricky and would require further study. It is also unclear if the timing matters in the measurement of preferences via Andreoni-Miller, Charness-Rabin, or Chen-Li techniques. Also, we are unable to determine whether the relationship between behavior and the measure of social preferences is fundamentally less malleable than the relationship for prosocials or whether this is a result of the experimental design. For instance, the optimal choice of many individualists involves a corner solution at the most selfish allocation. In this case, it is possible that we would be unable to detect the influence of the timing of the measurement for these selfish subjects, whereas if their choice was interior their relationship would be found to be as the prosocials. Finally, SVO only measures social preferences when

the subject receives a larger share than the other subject. The significance of this detail is not clear. Hopefully, future work will shed light on these issues.

What are we to make of the results? Our results suggest that use of a measure which does not create or destroy surplus, might measure preferences in a less intrusive manner than would a measure involving surplus. Also, our results suggest that measuring social preferences before observing behavior might induce greater heterogeneity in behavior than we would observe had the measure not been given.

6 Appendix

We asked the following 9 items (from Van Lange et. al., 1997) in order to measure the SVO of the subjects. Each of the 9 items has a competitive answer, a individualistic answer and a competitive answer. Each item is stated in terms of points where 100 points corresponded to \$0.02103.

Question 1	A	B	C
You:	480 points	540 points	480 points
Other1:	80 points	280 points	480 points
Question 2	A	B	C
You:	560 points	500 points	500 points
Other1:	300 points	500 points	100 points
Question 3	A	B	C
You:	520 points	520 points	580 points
Other1:	520 points	120 points	320 points
Question 4	A	B	C
You:	500 points	560 points	490 points
Other1:	100 points	300 points	490 points
Question 5	A	B	C
You:	560 points	500 points	490 points
Other1:	300 points	500 points	90 points
Question 6	A	B	C
You:	500 points	500 points	570 points
Other1:	500 points	100 points	300 points
Question 7	A	B	C
You:	510 points	560 points	510 points
Other1:	510 points	300 points	110 points
Question 8	A	B	C
You:	550 points	500 points	500 points
Other1:	300 points	100 points	500 points
Question 9	A	B	C
You:	480 points	490 points	540 points
Other1:	100 points	490 points	300 points

The individualistic answers are: 1B, 2A, 3C, 4B, 5A, 6C, 7B, 8A and 9C. The prosocial answers are: 1C, 2B, 3A, 4C, 5B, 6A, 7A, 8C and 9B. The competitive answers are: 1A, 2C, 3B, 4A, 5C, 6B, 7C, 8B and 9A. Van Lange et. al. classifies a subject according to the above labels if six or more items are answered according to the above.

Instructions given to each subject:

Instructions:

You are to be anonymously matched with two other people. We refer to the two others as "Other1" and "Other2."

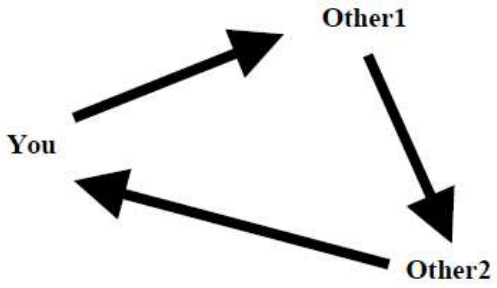
You are to make a series of allocation decisions involving Other1. This means that you are to divide a surplus between yourself and Other1. Whatever you do not keep for yourself goes to Other1.

Other1 is to make a series of allocation decisions involving Other2. This means that whatever Other1 does not keep goes to Other2.

Other2 is to make a series of allocation decisions involving you. This means that whatever Other2 does not keep goes to you.

Therefore the money accruing to you is composed of (i) whatever you do not send to Other1 and (ii) whatever Other2 sends to you.

We depict the relationship by the diagram below:



Note: A randomly selected 25% of the class will actually be paid the amount accruing to them.

Study 1 Dictator Game:

You: $10.00 Other1: $0.00	You: $9.75 Other1: $0.25	You: $9.50 Other1: $0.50	You: $9.25 Other1: $0.75
You: $9.00 Other1: $1.00	You: $8.75 Other1: $1.25	You: $8.50 Other1: $1.50	You: $8.25 Other1: $1.75
You: $8.00 Other1: $2.00	You: $7.75 Other1: $2.25	You: $7.50 Other1: $2.50	You: $7.25 Other1: $2.75
You: $7.00 Other1: $3.00	You: $6.75 Other1: $3.25	You: $6.50 Other1: $3.50	You: $6.25 Other1: $3.75
You: $6.00 Other1: $4.00	You: $5.75 Other1: $4.25	You: $5.50 Other1: $4.50	You: $5.25 Other1: $4.75
You: $5.00 Other1: $5.00	You: $4.75 Other1: $5.25	You: $4.50 Other1: $5.50	You: $4.25 Other1: $5.75
You: $4.00 Other1: $6.00	You: $3.75 Other1: $6.25	You: $3.50 Other1: $6.50	You: $3.25 Other1: $6.75
You: $3.00 Other1: $7.00	You: $2.75 Other1: $7.25	You: $2.50 Other1: $7.50	You: $2.25 Other1: $7.75
You: $2.00 Other1: $8.00	You: $1.75 Other1: $8.25	You: $1.50 Other1: $8.50	You: $1.25 Other1: $8.75
You: $1.00 Other1: $9.00	You: $0.75 Other1: $9.25	You: $0.50 Other1: $9.50	You: $0.25 Other1: $9.75

You: $0 and Other1: $10.00

Study 2 Dictator Game:

You: $10.00 Other1: $0.00	You: $9.50 Other1: $1.50	You: $9.00 Other1: $3.00	You: $8.50 Other1: $4.50
You: $8.00 Other1: $6.00	You: $7.50 Other1: $7.50	You: $7.00 Other1: $9.00	You: $6.50 Other1: $10.50
You: $6.00 Other1: $12.00	You: $5.50 Other1: $13.50	You: $5.00 Other1: $15.00	You: $4.50 Other1: $16.50
You: $4.00 Other1: $18.00	You: $3.50 Other1: $19.50	You: $3.00 Other1: $21.00	You: $2.50 Other1: $22.50
You: $2.00 Other1: $24.00	You: $1.50 Other1: $25.50	You: $1.00 Other1: $27.00	You: $0.50 Other1: $28.50
You: $0.00 Other1: $30.00			

7 References

Andreoni, J. and Miller, J. (2002) "Giving According to GARP: An Experimental Test of the Consistency of Preferences for Altruism," *Econometrica* 70(2): 737-753.

Au, W. and Kwong, J. (2004) "Measurements and Effects of Social-value Orientation in Social Dilemmas," in R. Suleiman, D. Budescu, I. Fischer and D. Messick (eds.) *Contemporary Psychological Research on Social Dilemmas*, New York, Cambridge University Press: 71-98.

Bednar, J., Chen, Y., Liu, T. X. and Page, S. (2010) "Behavioral Spillovers and Cognitive Load in Multiple Games: An Experimental Study," Working paper, University of Michigan.

Bednar, J. and Page, S. (2007) "Can Game(s) Theory Explain Culture? The Emergence of Cultural Behavior within Multiple Games," *Rationality and Society* 19(1): 65-97.

Bogaert, S., Boone, C. and Declerck, C. (2008) "Social Value Orientation and Cooperation in Social Dilemmas: A Review and Conceptual Model," *British Journal of Social Psychology* 47: 453-480.

Bohnet, I. and Frey, B. (1999) "Social Distance and Other-regarding Behavior in Dictator Games: Comment," *American Economic Review* 89(1): 335-339.

Bolton, G., Katok, E. and Zwick, R. (1998) "Dictator Game Giving: Rules of Fairness Versus Acts of Kindness," *International Journal of Game Theory* 27(2): 269-299.

Bowles, S. (1998) "Endogenous Preferences: The Cultural Consequences of Markets and Other Economic Institutions," *Journal of Economic Literature* 36: 75-111.

Buckley, N., Chan, K., Chowhan, J., Mestelman, S. and Shehata, M. (2001) "Value Orientations, Income, and Displacement Effects, and Voluntary Contributions," *Experimental Economics* 4: 183-195.

Buckley, N., Mestelman, S. and Shehata, M. (2003) "Subsidizing Public Inputs," *Journal of Public Economics* 87: 819-846.

Burlando, R. and Guala, F. (2005) "Heterogenous Agents in Public Goods Experiments," *Experimental Economics* 8: 35-54.

Cameron, L., Brown, P. and Chapman, J. (1998) "Social Value Orientations and Decisions to take Proenvironmental Action," *Journal of Applied Social Psychology* 28(8): 675-697.

Canegallo, C., Ortona, G., Ottone, S., Ponzaono, F. and Scacciati, F. (2008) "Competition Versus Cooperation: Some Experimental Evidence," *Journal of Socio-Economics* 37: 18-30.

Carpenter, J. (2003) "Is Fairness Used Instrumentally? Evidence from Sequential Bargaining," *Journal of Economic Psychology* 24: 467-489.

Carpenter, J. (2005) "Endogenous Social Preferences," *Review of Radical Political Economics* 37(1): 63-84.

Charness, G. and Rabin, M. (2002) "Understanding Preferences with Simple Tests," *Quarterly Journal of Economics* 117: 817-869.

Chen, Y. and Li, X.S. (2009) "Group Identity and Social Preferences," *American Economic Review* 99(1): 431-457.

Cornelissen, G., Dewitte, S. and Warlop, L. (2007) "Social Value Orientation as a Moral Intuition: Decision-making in the Dictator Game," Working paper, Universitat Pompeu Fabra and Katholieke Universiteit Leuven.

Cox, J. and Sadiraj, V. (2011) "Direct Tests of Models of Social Preferences and a New Model," *Economic Inquiry*, forthcoming.

Crawford, V. and Broseta, B. (1998) "What Price Coordination? The Efficiency-enhancing Effect of Auctioning the Right to Play," *American Economic Review* 88(1): 198-225.

Deutsch, M. (1958) "Trust and Suspicion," *Journal of Conflict Resolution* 2(4): 265-279.

Eckel, C. and Grossman, P. (1996) "Altruism in Anonymous Dictator Games," *Games and Economic Behavior* 16(2): 181-191.

Eckel, C. and Grossman, P. (2005) "Managing Diversity by Creating Team Identity," *Journal of Economic Behavior and Organization* 58(3): 371-392.

Forsythe, R., Horowitz, J., Savin, N.E. and Sefton, M. (1994) "Fairness in Simple Bargaining Experiments," *Games and Economic Behavior* 6(3): 347-369.

Griesinger, D. and Livingston, J. (1973) "Toward a Model of Interpersonal Motivation in Experimental Games," *Behavioral Science* 18(3): 173-188.

Guth, W., Levati, M. and Ploner, M. (2008) "Social Identity and Trust: An Experimental Investigation," *Journal of Socio-Economics* 37: 1293-1308.

Hertel, G. and Fiedler, K. (1994) "Affective and Cognitive Influences in a Social Dilemma Game," *European Journal of Social Psychology* 24(1): 131-145.

Hertel, G. and Fiedler, K. (1998) "Fair and Dependent Versus Egoistic and Free: Effects of Semantic and Evaluative Priming on the 'Ring Measure of Social Values,'" *European Journal of Social Psychology* 28(1): 49-70.

Hoffman E., McCabe, K., Shachat K. and Smith V. (1994) "Preferences, Property Rights, and Anonymity in Bargaining Games," *Games and Economic Behavior* 7(3): 346-380.

Iedema, J. and Poppe, M. (1994) "The Effect of Self-presentation on Social Value Orientation," *Journal of Social Psychology* 134(6): 771-782.

Joireman, J., Lasane, T., Bennett, J., Richards, D. and Solaimani, S. (2001) "Integrating Social Value Orientation and the Consideration of Future Consequences within the Extended Norm Activation Model of Proenvironmental Behavior," *British Journal of Social Psychology* 40(1): 133-155.

Kanagaretnam, K., Mestelman, S., Nainar, K. and Shehata, M. (2009) "The Impact of Social Value Orientation and Risk Attitudes on Trust and Reciprocity," *Journal of Economic Psychology* 30: 368-380.

Kramer, R., McClintock, C. and Messick, D. (1986) "Social Values and Cooperative Response to a Simulated Resource Conservation Crisis," *Journal of Personality* 54(3): 576-592.

Messick, D. and McClintock, C. (1968) "Motivational Bases of Choice in Experimental Games," *Journal of Experimental Social Psychology* 4(1): 1-25.

McClintock, C. and Allison, S. (1989) "Social Value Orientation and Helping Behavior," *Journal of Applied Social Psychology* 19(4): 353-362.

Offerman, T., Sonnemans, J. and Schram. (1996) "Value Orientations, Expectations and Voluntary Contributions in Public Goods," *Economic Journal* 106: 817-845.

Parks, C. (1994) "The Predictive Ability of Social Values in Resource Dilemmas and Public Goods Games," *Personality and Social Psychology Bulletin* 20: 431-438.

Poulsen, A. and Poulsen, O. (2006) "Endogenous Preferences and Social-dilemma Institutions," *Journal of Institutional and Theoretical Economics* 162: 627-660.

Pruyn, A. and Riezebos, R. (2001) "Effects of the Awareness of Social Dilemmas on Advertising Budget-setting: A Scenario Study," *Journal of Economic Psychology* 22(1): 43-60.

Ruffle, B. (1998) "More is Better, but Fair Is Fair: Tipping on Dictator and Ultimatum Games," *Games and Economic Behavior* 23: 247-265.

Schotter, A., Weiss, A. and Zapater, I. (1996) "Fairness and Survival in Ultimatum and Dictatorship Games," *Journal of Economic Behavior and Organization* 31(1): 37-56.

Smeesters, D., Warlop, L., Van Avermaet, E., Corneille, O. and Yzerbyt, V. (2003) "Do Not Prime Hawks with Doves: The Interplay of Construct Activation and Consistency of Social Value Orientation on Cooperative Behavior," *Journal of Personality and Social Psychology* 84(5): 972-987.

Sonnemans, J., Van Dijk, F. and Van Winden, F. (2006) "On the Dynamics of Social Ties Structures in Groups," *Journal of Economic Psychology* 27: 187-204.

Van Huyck, J., Battalio, R. and Beil, R. (1993) "Asset Markets as an Equilibrium Selection Mechanism: Coordination Failure, Game Form Auctions and Tacit Communication," *Games and Economic Behavior* 5: 485-504.

Van Lange, P., Otten, W., De Bruin, E. and Joireman, J. (1997) "Development of Prosocial, Individualistic, and Competitive Orientations: Theory and Preliminary Evidence," *Journal of Personality and Social Psychology* 73(4): 733-746.

Van Vugt, M., Van Lange, P. and Meertens, R. (1996) "Commuting by Car or Public Transportation? A Social Dilemma Analysis of Travel Mode Judgements," *European Journal of Social Psychology* 26: 373-395.