Tutorial on how to evaluate the SVO Slider Measure's secondary items

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Introduction

This brief tutorial is concerned with evaluating the secondary items from the SVO Slider Measure (Murphy, Ackermann, and Handgraaf, 2011). The SVO Slider Measure has two sets of items, primary and secondary. The 6 primary items yield a reliable unidimensional index of an individual's general social preferences. These items and psychological construct are typically of central interest to researchers in the social sciences; the secondary items are designed to give a more nuanced evaluation of positive social preferences. Namely this set of 9 aditional items is designed to differentiate between the prosocial preference of *inequality aversion*, and the prosocial preference of *joint gain maximization*. In many decision contexts these preferences can be satisfied simultaneously and the motivational distinction between them is of little or no interest. But there are other situations where a decision maker (DM) must make tradeoffs between these two goals, and there is evidence that different people make these tradeoffs in different ways.

The secondary items are optional and to date they have not received much attention. Nonetheless we believe there are several interesting research questions that involve understanding how individuals make tradeoffs between inequality aversion and joint gain maximization when both goals are not possible. For more information on measuring SVO in general, see Murphy, Ackermann, and Handgraaf (2011) and Murphy and Ackermann (2012).

1 Evaluation of secondary items from data gained by paper-based Slider measure

If the paper-based Slider Measure was used to collect the data, the following procedure can be applied to evaluate the secondary items for obtaining the subjects' inequality-aversion indexes (IA indexes). First, represent data in option format. That is, the first (leftmost) option in any item is understood as option 1, and the last (rightmost) option is understood as option 9. Also, for simplicity, represent the items in the order of version A of the paper-based Slider Measure.

IMPORTANT– evaluation and interpretation of the secondary items only makes theoretical sense for subjects who fall within the prosocial region of preferences as determined by the evaluation of the primary items, that is, only for subjects with an SVO angle between about 22.45° and 57.15°. The inequality-aversion indexes for non-prosocial decision makers are not readily interpretable.

Consider how an archetypically inequality averse decision maker would respond to the secondary SVO Slider items. This person would select distribution options that minimized the difference between their payoff and the payoff of the other. So for this kind of motivation there would be a pattern of choices that follows. A researcher can use this idealized type as a baseline and thus compute the difference between a particular research subject's choices and the archetypical choice pattern. If the difference is zero, then the clearly the decision maker's choices are consistent with inequality aversion as a motivation and we can observe their reviled preferences. If the difference between the idealized type and the observed choices is very large, then this particular motivation does not account for the DMs choice well.

The full basis for evaluating the secondary items are 4 separate mean difference measures using different idealized types:

1. Mean difference from archetypical inequality aversion (DIA)
2. Mean difference from archetypical joint gain maximization (DJG)
3. Mean difference from archetypical altruism (DAL)
4. Mean difference from archetypical individualism / competition (DIC)

Only the 9 secondary items are used for computing these difference measures. In each of the 9 secondary items, those options can be identified which maximize 1) equality in outcomes, 2) joint gains, 3) the other's gain, and 4) the own gain. The following list shows the option numbers (leftmost option in an item is option number 1, the rightmost option is option number 9) –according to the item order of version A of the paper-based version– for the 9 items which maximize:

- Equality in outcomes:[1] 6, 5, 4, 7, 5, 8, 5, 3, 2
- Joint gains:[2] 9, [n/a], 1, 9, [n/a], 9, [n/a], 1, 1
- Other's gain: 9, 1, 9, 9, 1, 1, 1, 9, 1
- Own gain: 1, 9, 1, 1, 9, 9, 9, 1, 9

[1]To avoid confusion, this is read as: Option number 6 in item 7, option number 5 in item 8, ..., option number 2 in item 15

[2]Items number 2, 5, and 7 are constant-sum items and thus there is no single option maximizing joint gains in these items.

To compute the difference scores for one subject and one item, calculate the absolute difference between the option chosen by a subject and 1) the option maximizing equality, 2) the option maximizing joint gains, 3) the option maximizing other's gain, and 4) the option maximizing own gain. Divide each of these 4 difference scores by 8, since 8 is the maximum distance between two options in any item.[3] This yields 4 normalized difference scores for the item. Compute these 4 normalized difference scores for each of the 9 items. And then compute the mean difference score for each of the 4 difference score categories, the result of which is then DIA, DIG, DAL, and DIC.

As a final step for computing the IA index, only consider those subjects whose choice patterns in the secondary items are more consistent with both inequality aversion and joint gain maximization compared to both individualism and altruism, i.e. $DIA \leq [DIC, DAL]$, **and** $DJG \leq [DIC, DAL]$.[4] For the subjects whose difference measures fulfill this requirement, the IA index is computed as:

$$\text{IA index} = \frac{DIA}{DIA + DJG} \qquad (1)$$

which would indicate perfect inequality aversion if IA index = 0, and perfect joint gain maximization if IA index = 1.

The IA index is computed automatically if raw data is evaluated with the Matlab function SVO_Slider.m which can be downloaded here together with a tutorial on how to use it.

1.1 Example:

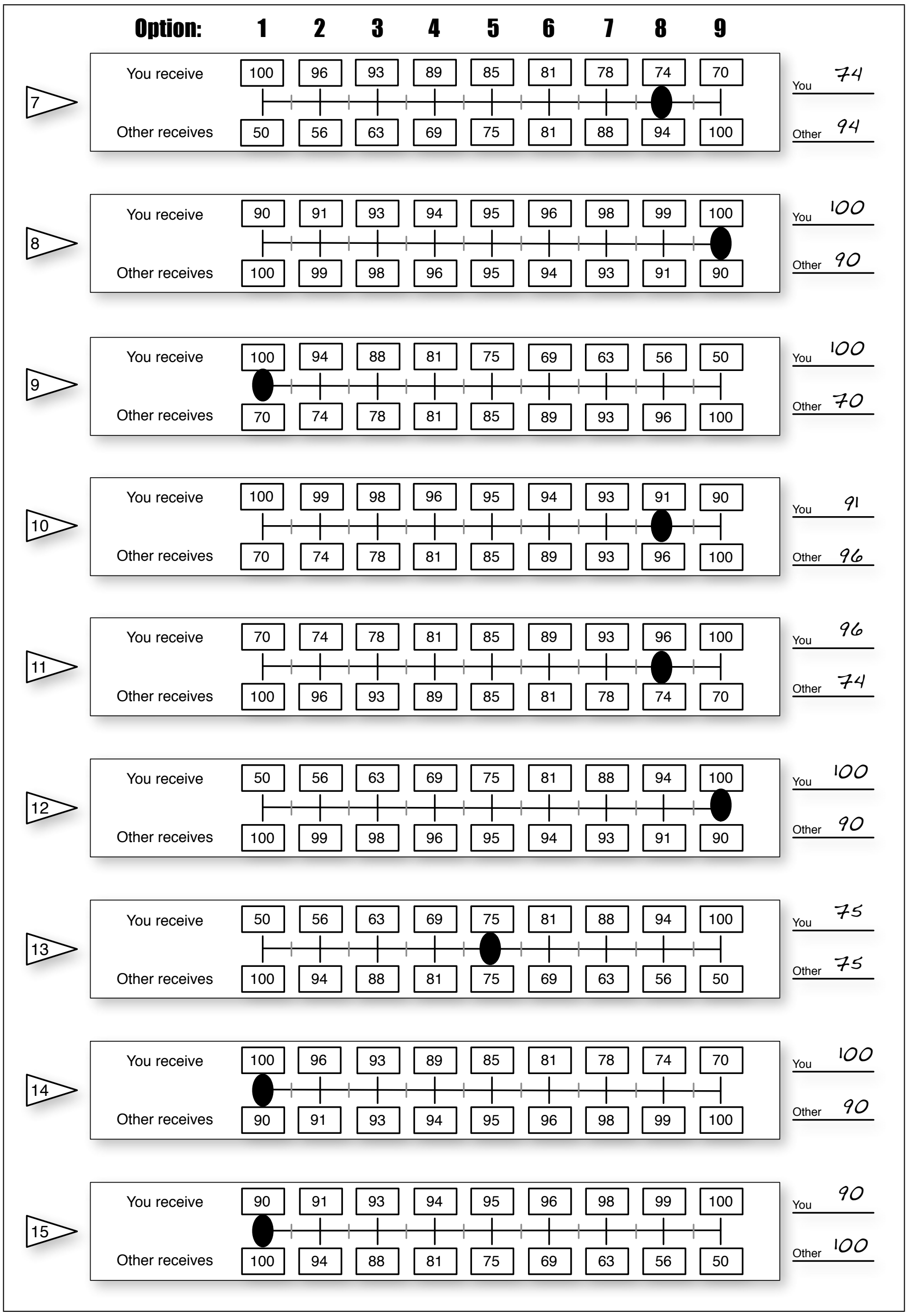
Consider a subject who has chosen the following options in the 9 secondary items ordered according to version A of the paper-based Slider Measure (see figure 1):

Subject's choices: 8, 9, 1, 8, 8, 9, 5, 1, 1

[3] The maximum distance in any item is the distance between option 1 (leftmost option), and option 9 (rightmost option), which is 8 [9-1].

[4] This is a transitivity check. An IA index should only be computed for subjects whose choice pattern is more consistent with both inequality aversion and joint gain maximization compared to individualism or altruism.

Figure 1: Examplary choice pattern in the secondary items (Options chosen: 8, 9, 1, 8, 8, 9, 5, 1, 1)



The 4 mean difference measures are then computed as follows:

$$DIA = \frac{\frac{|8-6|}{8} + \frac{|9-5|}{8} + \frac{|1-4|}{8} + \frac{|8-7|}{8} + \frac{|8-5|}{8} + \frac{|9-8|}{8} + \frac{|5-5|}{8} + \frac{|1-3|}{8} + \frac{|1-2|}{8}}{9} = .2361,$$

$$DJG = \frac{\frac{|8-9|}{8} + 0 + \frac{|1-1|}{8} + \frac{|8-9|}{8} + 0 + \frac{|9-9|}{8} + 0 + \frac{|1-1|}{8} + \frac{|1-1|}{8}}{6} = .0417,$$

Notice that for computing DJG, only 6 items are relevant, since items # 2, 5, and 7 are constant sum items.

$$DAL = \frac{\frac{|8-9|}{8} + \frac{|9-1|}{8} + \frac{|1-9|}{8} + \frac{|8-9|}{8} + \frac{|8-1|}{8} + \frac{|9-1|}{8} + \frac{|5-1|}{8} + \frac{|1-9|}{8} + \frac{|1-1|}{8}}{9} = .625,$$

$$DIC = \frac{\frac{|8-1|}{8} + \frac{|9-9|}{8} + \frac{|1-1|}{8} + \frac{|8-1|}{8} + \frac{|8-9|}{8} + \frac{|9-9|}{8} + \frac{|5-9|}{8} + \frac{|1-1|}{8} + \frac{|1-9|}{8}}{9} = .375,$$

Now we can check whether $DIA \leq [DAL, DIC]$ **and** $DJG \leq [DAL, DIC]$:

$DIA(.2361) \leq DAL(.625)$ **and** $DIA(.2361) \leq DIC(.375)$,

AND

$DJG(.0417) \leq DAL(.625)$ **and** $DJG(.0417) \leq DIC(.375)$.

Since all conditions are satisfied, we can compute the IA index:

$$\text{IA index} = \frac{DIA}{DIA + DJG} = \frac{.2361}{.2361 + .0417} = .85;$$

which tells us that the subject is neither a perfect joint gain maximizer (IA index = 1), nor perfectly inequality averse (IA index = 0), but shows a choice pattern that is more consistent with joint gain maximization than with inequality aversion.

2 Evaluation of secondary items from data gained by online Slider measure

When using the online SVO Slider measure (see SVO homepage), the raw data you can download after your experiment is completed already contains the evaluated results from the secondary items. Hence you do not have to compute the results yourself. Nevertheless, we explain here how the score is computed from data gained by the online Slider Measure for clarification.

In principle, the IA index is computed analogously to the procedure applied for evaluating the secondary items from the paper-based version as explicated in section 1. However, in the online version, there are far more than 9 options per item, since the items in the online version are quasi-continuous. Hence, DIA, DJG, DAL, and DIC are computed in a slightly different manner.

Recall that the Slider Measure items can be represented as lines on the Cartesian plane, described by linear functions, and options can consequently be represented as coordinates on the plane (see figure 2). Hence, in order to compute DIA, DJG, DAL, and DIC, we compute Euclidean distances between the coordinates of options chosen by a subjects and the options maximizing 1) equality, 2) joint gains, 3) other's gain, and 4) own gain.

Concretely, given a subject's choice in an item, the coordinates of the option chosen by the subject, and the coordinates of the options maximizing 1) equality, 2) joint gain, 3) other's gain, and 4) own gain in the respective item are determined. Since the options maximizing 2) joint gain, 3) other's gain, and 4) own gain are always located at one endpoint of an item, these options fall exactly on the continuous line prescribed by the item functions (see Murphy et al., 2011, p.779). However, this is not necessarily the case for the options maximizing 1) equality, or an option chosen by a subject, since the online Slider Measure provides subjects with integer amounts of payoffs, the coordinates of which may be slightly off the truly continuous item line as prescribed by the item function of a respective item. Hence, options for which this is the case are projected on the item line. This is done by putting a line on the Cartesian plane which runs through the coordinates of such an option and is perpendicular to the item line of the respective item. The intersection of the two lines then represents the projected option, which is then used for computing the difference scores.[5] Figure 2 shows an example. The figure

[5] The same holds in principle, of course, if data is collected with the paper-based Slider

shows the continuous item line of item number 7 according to version A of the paper-based Slider Measure. The black circles indicate the nine options a subject is presented with in the paper-based version. As can be seen, some of these options fall exactly onto the item line (such as the endpoints, for instance), while others are slightly off the line. The red asterisks show the projections of corresponding items onto the continuous item line. It is these projection points that are used for computing DIA, DJG, DAL, and DIC for data gained by the online measure. However, as already mentioned, there are far more than 9 options in the online version compared to the paper-based version, since the items in the online version are quasi-continuous.

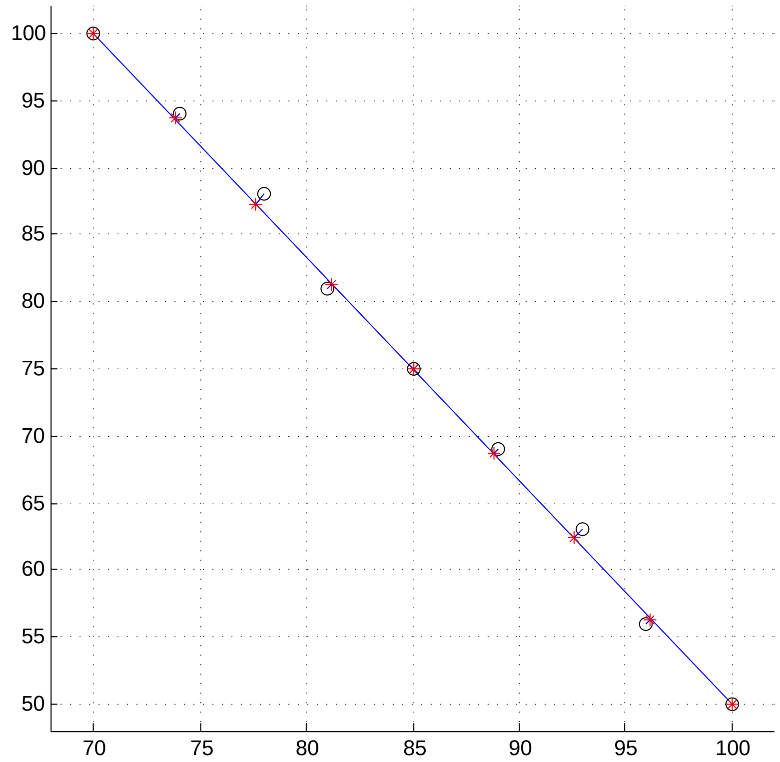
As for the calculation of the difference scores, this is again very similar to the procedure applied when data is gained by the paper-based Slider Measure. Concretely, given a subject's choice in an item, we calculate the Euclidean distance between the (projected) coordinates of the option chosen by the subject, and the coordinates of the options maximizing 1) equality (projected), 2) joint gain, 3) other's gain, and 4) own gain. These distance scores are then normalized by dividing each respective distance by the maximum distance of that item, i.e. the Euclidean distance between that item's endpoints. Finally, the mean of these difference scores is computed analogously to the procedure for the paper-based data, yielding DIA, DJG, DAL, and DIC.

Then, again, we check for each subject whether both conditions $DIA \leq [DAL, DIC]$ **and** $DJG \leq [DAL, DIC]$ hold, and compute the IA index for those subjects whose choice patterns meet the two conditions. Subjects are then categorized as inequality averse if IA index $< .5$, and joint gain maximizing if IA index $> .5$.

In case the transitivity check fails, i.e. if $DIA > [DAL, DIC]$ **and/or** $DJG > [DAL, DIC]$, no categorization will appear in the output. Also, there will be no categorization of people who are not prosocial according to their choices in the primary items. If a subject is not assigned to an IA category, the output does not provide information about which of the two reasons led to a non-categorization. The researcher can check which reason led to a non-categorization by looking at the SVO angle and the DIA-DJG-

Measure. When computing DIA, DIG, DAL, and DIC from paper-based data as described in section 1, projections are not computed for simplicity. This procedure can be justified since differences in results are minor. The projection procedure is applied for the online version, however, since the computation of projection points can be automatized and is therefore facilitated.

Figure 2: Representation of item number 7 according to version A of the paper-based Slider Measure. The circles indicate the coordinates of the 9 options of the paper-based version, and the red asterisks indicate their corresponding projection on the continuous item line. As can be seen, differences are minor.



DAL-DIC-pattern.

3 References

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