Supplemental Material for Manuscript: Salience and Social Choice

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1. Algebraic Calculations for SWUP demonstrating the predictions for the basic specification

We apply the basic specification of SWUP to explain eight behavioral patterns:

Basic Specification of SWUP

To focus on the role of the salience functions in driving our results, we set w(x) = x in our analysis. We illustrate SWUP using the basic salience function from the main text, reproduced below, when it is not the case that both arguments of the function are zero, and $\mu(0,0) = \phi(0,0) = 0$.

$$\mu(x,y) = \frac{|x-y|}{|x|+|y|}, \qquad \phi(n,m) = \frac{|n-m|}{n+m}.$$

SWUP formula for Social Choice: Allocation A is chosen over Allocation B if and only if (A.1) holds:

A.1 $$\rho(A,B) = \sum_j \left[\phi(n_j,m_j)(n_j-m_j)\left(\frac{w(x_j)+w(y_j)}{2}\right) + \mu(x_j,y_j)(w(x_j)-w(y_j))\left(\frac{n_j+m_j}{2}\right)\right] \geq 0.$$

Substituting in the basic salience functions, and setting w(x) = x for all x, A.1 becomes A.2:

A. 2. $$\rho(A,B) = \sum_j \left[\frac{(n_j-m_j)|n_j-m_j|}{n_j+m_j}\right]\left(\frac{x_j+y_j}{2}\right) + \left[\frac{(x_j-y_j)|x_j-y_j|}{x_j+y_j}\right]\left(\frac{n_j+m_j}{2}\right) \geq 0.$$

1.1. Demonstration that SWUP predicts the Common Consequence Effect in Social Choice

The common consequence choice pairs from the experiment are reproduced below:

Common Consequence Pair 1

A) 5 people receive $3, 4 people receive $3, and 1 other person receives $3
B) 5 people receive $5, 4 people receive $3, and 1 other person receives $0

Common Consequence Pair 2

A) 6 people receive $3 and the other 4 people receive $0
B) 5 people receive $5 and the other 5 people receive $0

The SWUP model predicts the majority choices from the experiment: A in Pair 1 and B in Pair 2. Applying A.1, SWUP predicts that allocation A is chosen over allocation B if the following inequality holds:

$$\mu(3,5)(3-5)(5)+\mu(3,0)(3-0)(1)>0.$$

Applying A.2, allocation A is chosen over B for the basic salience function since $-(20/8)+3>0$.

In addition, SWUP predicts that B is chosen over A in Common Consequence Pair 2 if

$$\frac{\mu(3,5)(3-5)(6+5)}{2}+\frac{\phi(6,5)(6-5)(3+5)}{2}<0.$$

Applying A.2, allocation B is chosen over A for the basic salience function since $\left(-\frac{44}{16}\right)+\left(\frac{8}{22}\right)<0$.

1.2. Demonstration that SWUP predicts the Common Ratio Effect in Social Choice

The common ratio choice pairs from the experiment are reproduced below:

Common Ratio Pair 1

A) 5 people receive $2 and the other 5 people receive $2
B) 5 people receive $5 and the other 5 people receive $0

Common Ratio Pair 2

A) 2 people receive $2 and the other 8 people receive $0
B) 1 person receives $5 and the other 9 people receive $0

The SWUP model predicts the majority choices from the experiment: A in Pair 1 and B in Pair 2. Applying A.1, SWUP predicts that allocation A is chosen over allocation B if the following inequality holds:

$$\mu(2,5)(-3)(5) + \mu(2,0)(2)(5) > 0.$$

Applying A.2, allocation A is chosen over B for the basic salience function since $\left(\frac{-45}{7}\right) + 10 > 0$.

In addition, SWUP predicts that B is chosen over A in Common Ratio Pair 2 if

$$\frac{\mu(2,5)(-3)(2+1)}{2} + \frac{\phi(2,1)(1)(2+5)}{2} < 0.$$

Applying A.2, allocation B is chosen over A for the basic salience function since $\left(\frac{-27}{14}\right) + \left(\frac{7}{6}\right) < 0$.

1.3. Demonstration that SWUP predicts a Magnitude Effect in Social Choice

The choice pairs investigating scale invariance from the experiment are reproduced below:

Magnitude Effect Pair 1

A) 1 person receives $5 and the other 9 people receive $5
B) 1 person receives $50 and the other 9 people receive $0

Magnitude Effect Pair 2

A) 1 person receives $0.25 and the other 9 people receive $0.25
B) 1 person receives $2.50 and the other 9 people receive $0

The basic SWUP specification predicts the majority choices in the experiment: A in Pair 1 and A in Pair 2: Applying A.1, SWUP predicts that allocation A is chosen over B if the following inequality holds:

$$\mu(5,50)(-45)(1) + \mu(5,0)(5)(9) > 0.$$

Applying A.2, allocation A is chosen in Pair 1 for the basic salience function since $-\frac{2025}{55} + 45 > 0$.

In addition, the basic specification of SWUP predicts that A is chosen over B in Pair 2 if

$$\mu(0.25, 2.50)(-2.25)(1) + \mu(0.25, 0)(0.25)(9) > 0.$$

Applying A.2, allocation A is chosen in Pair 2 for the basic salience function since $-\frac{5.0625}{2.75} + 2.25 > 0$.

Bordalo et al. (2013) apply the basic salience function to consumer choice. Bordalo et al. (2012) employ the following salience function for payoffs in their salience model of choice under risk, where $\theta > 0$:

$$\mu(\mathbf{x}, \mathbf{y}) = \frac{|\mathbf{x}-\mathbf{y}|}{|\mathbf{x}|+|\mathbf{y}|+\boldsymbol{\theta}},$$

The predictions of SWUP for the common consequence, common ratio, skewness, and framing effect pairs are robust to whether $\theta = 0$ (as in the basic specification we use) or whether $\theta > 0$ for the payoff salience function μ (for instance, they each hold for $\theta = 1$). For the test of scale invariance, the predictions of SWUP differ depending on whether $\theta = 0$ or whether $\theta = 1$. For instance, if the payoff salience function has the form from Bordalo et al. (2012) with $\theta = 1$, then the analysis changes as follows:

Applying A.2, allocation A is chosen in Pair 1 since $-\frac{2025}{56} + \left(\frac{225}{6}\right) > 0$.

Applying A.2, allocation B is chosen in Pair 2 since $-\frac{5.0625}{3.75} + \left(\frac{0.5625}{1.25}\right) < 0$.

1.4. Demonstration that SWUP predicts a Preference for Tail-increasing Transfers

The 'tail-increasing transfers' choice pairs from the experiment are reproduced below:

Tail-increasing Transfers: Pair 1 (Top panel) and Pair 2 (Bottom panel)

A) 7 people receive $12 and the other 3 people receive $11
B) 7 people receive $16 and the other 3 people receive $6

A) 7 people receive $12 and the other 3 people receive $11
B) 7 people receive $10 and the other 3 people receive $20

The SWUP model predicts the majority choices from the experiment: A in Pair 1 and B in Pair 2. Applying A.1, SWUP predicts that allocation A is chosen over allocation B in Pair 1 if the following inequality holds:

$$\mu(12,16)(-4)(7) + \mu(11,6)(5)(3) > 0.$$

Applying A.2, allocation A is chosen over B in Pair 1 for the basic salience function since $-\frac{112}{28} + \frac{75}{17} > 0$.

In addition, SWUP predicts that B is chosen over A in Pair 2 if

$$\mu(12,10)(2)(7) + \mu(11,20)(-9)(3) < 0.$$

Applying A.2, allocation B is chosen over A in Pair 2 for the basic salience function since $\frac{28}{22} - \frac{243}{31} < 0$.

1.5. Demonstration that SWUP predicts the Alignment Framing Effect in Social Choice

The framing effect choice pairs from the experiment are reproduced below:

Alignment Framing Effect Pair 1

A) 2 people receive $5, 2 others receive $5, 4 others receive $0, and 2 others receive $12
B) 2 people receive $0, 2 others receive $13, 4 others receive $5, and 2 others receive $0

Alignment Framing Effect Pair 2

A) 2 people receive $0, 2 others receive $0, 4 others receive $5, and 2 others receive $12
B) 2 people receive $0, 2 others receive $0, 4 others receive $5, and 2 others receive $13

For the alignment framing effect pairs, SWUP predicts that A is chosen over B in Pair 1 if:

$$\mu(5,0)(5)(2) + \mu(5,13)(-8)(2) + \mu(0,5)(-5)(4) + \mu(12,0)(12)(2) > 0.$$

Applying A.2, A is chosen over B in Pair 1 for the basic salience function since $10 - \frac{128}{18} - 20 + 24 > 0$.

For the alignment framing effect pairs, SWUP predicts that B is chosen over A in Pair 2 if:

$$\mu(12,13)(-1)(2) < 0.$$

Allocation B is chosen over A in Pair 2 for all salience functions since salience functions are non-negative (e.g., as in Definition 2 in Section 4.1 of the main text).

1.6. Demonstration that SWUP can explain a preference for lower inequality

The choice pairs from Figure 5 of the main text are reproduced below:

Preference for Minimizing Inequality and Maximizing Efficiency

Preference for Lower Inequality

	$	N	$	N
A	**5**	**1**	**5**	**1**
B	10	1	0	1

Preference for Higher Efficiency

	$	N	$	N	$	N
A	10	1	8	1	1	1
B	**16**	**1**	**8**	**1**	**5**	**1**

For the example of inequality aversion in the left panel in Figure 5, SWUP predicts that allocation A is chosen over B if the following inequality holds: $\mu(5,10)(-5) + \mu(5,0)(5) > 0$. This inequality holds for any salience function as a result of the properties of symmetry and diminishing sensitivity. In particular, by symmetry and diminishing sensitivity, $\mu(5,10) = \mu(10,5) = \mu(5+\epsilon, 0+\epsilon) < \mu(5,0)$.

1.7. Demonstration that SWUP can explain a preference for higher efficiency

For the example of a preference for efficiency in the right panel in Figure 5, SWUP predicts that allocation B is chosen over A if the following inequality holds: $\mu(10,16)(-6)(1) + \mu(1,5)(-4)(1) < 0$. This inequality holds generally for all salience functions since salience functions are non-negative.

1.8. Demonstration that SWUP can explain the Medical Treatment Paradox

The example from Figure 6 of the main text is reproduced below:

Observed deviation from Inequity Aversion, Rawls and Utilitarianism

	Health	N	Health	N
Treatment 1	**1**	**48**	**0.91**	**27**
Treatment 2	1	27	0.95	48

For the medical treatment example in Figure 6, SWUP predicts that Treatment 1 is chosen over Treatment 2 if the following inequality holds:

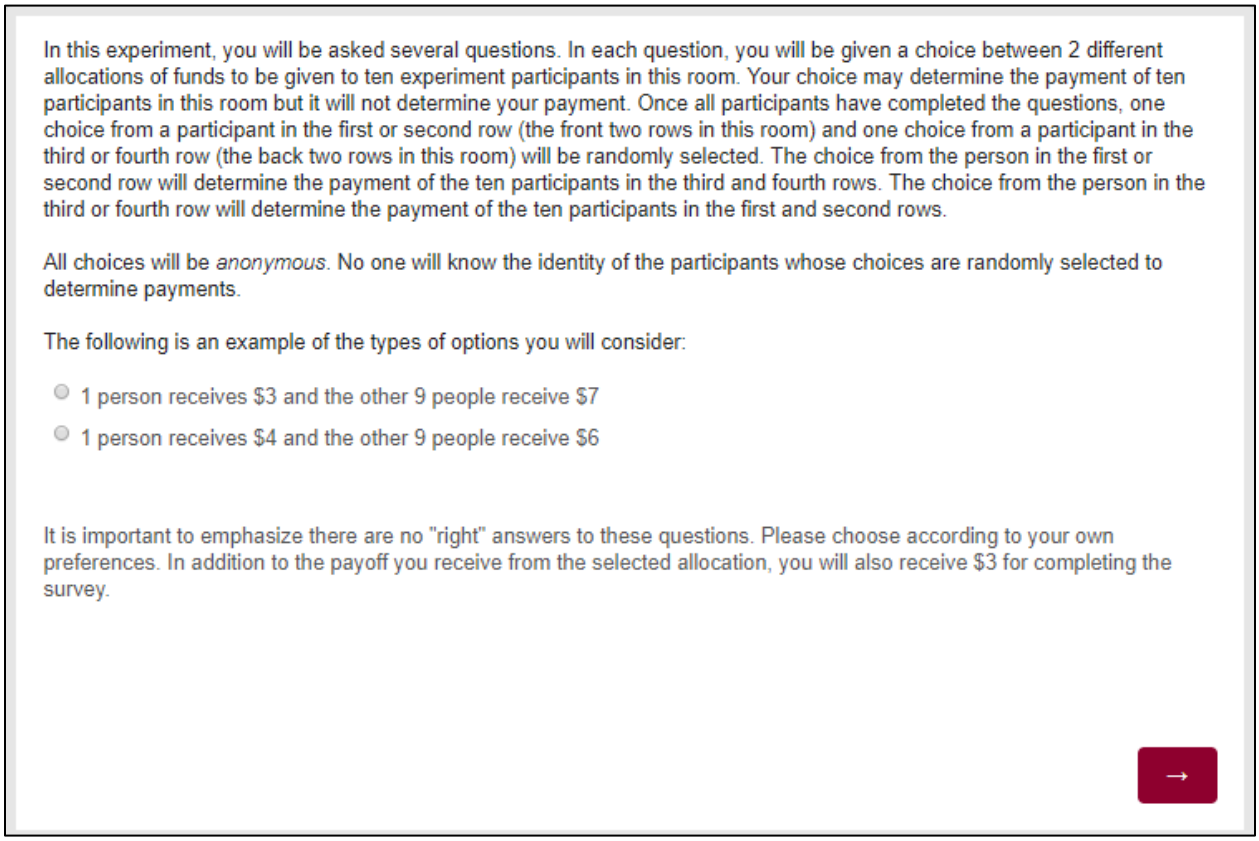
$\phi(48,27)(21) + \mu(0.91,0.95)(-0.04)(37.5) + \phi(27,48)(-21)(0.93) > 0.$

Applying A.2, Treatment 1 is chosen over Treatment 2 since $\frac{441}{75} - \frac{0.06}{1.86} - \frac{410.13}{75} > 0$.

2. Screen Shots from Experiment

Experimental subjects responded to the choices as presented below. Only one choice was displayed on a screen at any time. The order of choices and the option that appeared on the top or bottom row in each choice were both randomized within subjects. The labels in bold font above each screen shot were not shown to subjects. They are included below to facilitate comparison to the main text.

Instructions



Common Consequence Pair 1

Please select the allocation of money below that you most prefer to be randomly distributed to ten people in this room (*not* including yourself)

- 5 people receive $5, 4 people receive $3, and 1 other person receives $0
- 5 people receive $3, 4 people receive $3, and 1 other person receives $3

Common Consequence Pair 2

Please select the allocation of money below that you most prefer to be randomly distributed to ten people in this room (*not* including yourself)

- 6 people receive $3 and the other 4 people receive $0
- 5 people receive $5 and the other 5 people receive $0

Common Ratio Pair 1

Please select the allocation of money below that you most prefer to be randomly distributed to ten people in this room (*not* including yourself)

- 5 people receive $2 and the other 5 people receive $2
- 5 people receive $5 and the other 5 people receive $0

Common Ratio Pair 2

Please select the allocation of money below that you most prefer to be randomly distributed to ten people in this room (*not* including yourself)

- 2 people receive $2 and the other 8 people receive $0
- 1 person receives $5 and the other 9 people receive $0

Magnitude Effect Pair 1

Please select the allocation of money below that you most prefer to be randomly distributed to ten people in this room (*not* including yourself)

- 1 person receives $0.25 and the other 9 people receive $0.25
- 1 person receives $2.50 and the other 9 people receive $0

Magnitude Effect Pair 2

Please select the allocation of money below that you most prefer to be randomly distributed to ten people in this room (*not* including yourself)

- 1 person receives $50 and the other 9 people receive $0
- 1 person receives $5 and the other 9 people receive $5

Skewness Effect Pair 1

Please select the allocation of money below that you most prefer to be randomly distributed to ten people in this room (*not* including yourself)

- 7 people receive $12 and the other 3 people receive $11
- 7 people receive $10 and the other 3 people receive $20

Skewness Effect Pair 2

Please select the allocation of money below that you most prefer to be randomly distributed to ten people in this room (*not* including yourself)

- 7 people receive $12 and the other 3 people receive $11
- 7 people receive $16 and the other 3 people receive $6

Alignment Framing Effect Pair 1

Please select the allocation of money below that you most prefer to be randomly distributed to ten people in this room (*not* including yourself)

- 2 people receive $5, 2 others receive $5, 4 others receive $0, 2 others receive $12
- 2 people receive $0, 2 others receive $13, 4 others receive $5, 2 others receive $0

Alignment Framing Effect Pair 2

Please select the allocation of money below that you most prefer to be randomly distributed to ten people in this room (*not* including yourself)

- 2 people receive $0, 2 others receive $0, 4 others receive $5, and 2 others receive $13
- 2 people receive $0, 2 others receive $0, 4 others receive $5, and 2 others receive $12

Cognitive Reflection Test (Seven-question version from Toplak et al., 2014)

Please answer the following questions

A bat and a ball cost $1.10 in total. The bat costs $1.00 more than the ball. How much does the ball cost?

If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets?

In a lake there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake?

If John can drink one barrel of water in 6 days, and Mary can drink one barrel of water in 12 days, how long would it take them to drink one barrel of water together?

Jerry received both the 15th highest and the 15th lowest mark in the class. How many students are in the class?

A man buys a pig for $60, sells it for $70, buys it back for $80, and sells it finally for $90. How much has he made?

Simon decided to invest $8,000 in the stock market one day early in 2008. Six months after he invested, on July 17, the stocks he had purchased were down 50%. Fortunately for Simon, from July 17 to October 17, the stocks he had purchased went up 75%. At this point, Simon has:

broken even ○ gained money ○ lost money ○