University of Oregon

Visual Framing and Judgement of Risk and Probability

by

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A thesis submitted in partial fulfillment for undergraduate honors

Approved by:

Advisor: Jiabin Wu

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Content

Abstract

People's decision makings are sensitive to how the environment they situate in is framed. In this study, we test whether visual framing can influence people's perception of risk and probability by conducting an online experiment. In the experiment, participants were asked to select among wheels that had either winning wedges (Gain frame) or losing wedges (Loss frame) adjacently-located or non-adjacently-located on the wheels. We hypothesize that people perceive the probability of winning/losing differently across adjacent/non-adjacent wheels even if the objective probabilities of winning/losing are the same. The data supports our hypothesis. In particular, we find that people are more inclined to choose non-adjacent ones. We hope that this study would expand our knowledge about risk and probability perceptions.

Keywords: Decision-Making; Framing effect; Gain/Loss Frames; Risk Perception; Affect Heuristic; Visual Framing.

Acknowledgements

First of all, I would like to thank my advisor, Dr. Jiabin Wu, for supporting me and providing many great advice and directions throughout the project, including his funding. Without Dr. Wu, this whole project wouldn't be possible. I also would like to thank Dr. Paul Slovic and Marcus Mayorga for giving me some insightful feedback and useful articles that I could use as a reference. Lastly, I would like to thank my friends who participated in the pre-trial of the experiment and helped me improved the survey.

Introduction

In classical economic theory, people's decisions were assumed to follow rational preferences. However, much evidence has showed the opposite. People may choose differently from the same set of options when context and time change. In this paper, we study how people's judgement of probability and risk based on visual framing affect their decisions.

Framing Effect

Tversky and Kahneman (1981) proposed many different ways that people's decisions can be framed. In particular, people are sensitive to whether an option is perceived as a gain or a loss. In the gain frame, they tend to be risk-averse. In the loss frame, they tend to be risk-taking. In addition, people tend to averse to loss more than they like gain, which is called loss-aversion by Kahneman & Tversky, 1979.

Affect Heuristic and Risk Perception

Affect is the feeling toward a stimuli. Zajonc (1980) claimed that affective reactions usually occur as the first reaction automatically. An affect can influence our decisions as a heuristic. Alhakami and Slovic (1994), for example, found that the perception of risk has a reverse relationship with the perception of benefit, such that when we perceive something as high risk, we usually think of it as low benefit as well. Therefore, people make decisions, not only based on their deliberations, but also their feelings towards stimuli.

Loewenstein, Weber, Hsee & Welch (2001) proposed the risk-as-feelings hypothesis claiming that a risky situation can create emotions, and eventually drive our behaviors. The feelings play an important role in judgment and decision-making. Loewenstein *et al.* (2001)

concluded that there are two different stages of reactions toward risky situations: cognitive risk evaluation and emotional reaction. However, both stages are related to one another. While the risk evaluation is about measuring probability of outcomes, emotion is more reactive to visual presentations, time duration, etc. Subsequently, people can experience the feeling of risk and evaluate risk at the same time (Loewenstein *et al*., 2001).

Intuitive vs Rational Processing

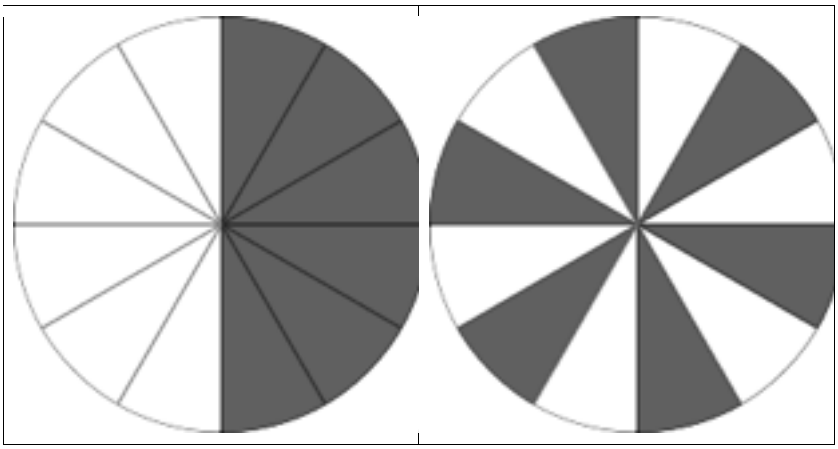
Denes-Raj and Epstein (1994) conducted a study to measure how people perceive proportion by using jelly beans. Participants were asked to choose between the two options: small bowl (one red jelly bean and nine white jelly beans) vs large bowl (nine red jelly beans with another ninety-one white jelly beans). After choosing an option, a participant would randomly draw a jelly bean. If it was read, the participant received a prize. The result showed that 61% of the participants preferred the big bowl (9%) to the small bowl (10%). Denes-Raj & Epstein concluded that even though participants were aware of the proportions on each option, the experiential system (or fast and frugal cognitive process) overrides the rational system (or slow and effortful cognitive process). Specifically, the experiential system is highly responsive to concrete representations such as absolute numbers (Denes-Rag & Epstein 1994).

In our study, we are going to test whether risk and probability perceptions can be manipulated by visual framing. Using the wheels of fortune, participants choose between wheel s with adjacently and non-adjacently winning (provide a gain frame)/losing wedges (provide a loss frame). Rational people should perceive probability and risk equally for both adjacently and non-adjacently-located wedges. However, we hypothesize that even though the proportions of winning/losing wedges between wheels in the same sets are equal, people may perceive the

winning or losing chances differently for each wheel according to the orientations of wedges. Whether to choose adjacent or non-adjacent wedges may depend on the amount of wedges, location and size of each wedge on the wheel. The data confirms our hypothesis. In particular, we find that people tend to choose non-adjacent ones because they believe that they are associated with higher chance of winning. Figure 1 provides an example of wheels that we use in the experiment.

Figure 1: Left: Examples of adjacently-located wedges wheel

Right: Examples of non-adjacently-located wedges wheel



Methodology

Participants

Two hundred and fifty-four participants from Amazon Mechanical Turk participated in our experiment. All participants must be 18 years and older to participate. The average earning is approximately $1 for 10 mins of study.

Material

This study is an online-based experiment. Amazon Mechanical Turk members participated directly through its website. See Appendix 1.

Methods

Participants filled out their demographic information on the survey, including their Amazon MTurk IDs. To begin the task, participants would see ten different sets of two wheels out of forty-eight sets displayed in random orders: five Beauty (i.e. Gain frame) and five Beast (i.e. Loss frame) (See Appendix 2). . On each wheel, the proportions of gray wedges (winning or losing) to white wedges (win-nothing or lose-nothing) are equal within the same set. The only difference is the orientation of wedges, either adjacent or non-adjacent for the gray wedges. In the Beauty condition (i.e. Gain frame), gray wedges correspond to winning a bonus and white wedges correspond to win-nothing. In the Beast condition (i.e. Loss frame), gray wedges correspond to losing a bonus and white wedges correspond to lose-nothing. Subjects were told that one of the wheels they chose would be randomly selected and spin for an extra bonus. Thus, subjects had to choose which wheels from each set that would maximize their chance of winning a bonus and minimize their chance of losing a bonus. In the last two sets of wheels, participants were asked to

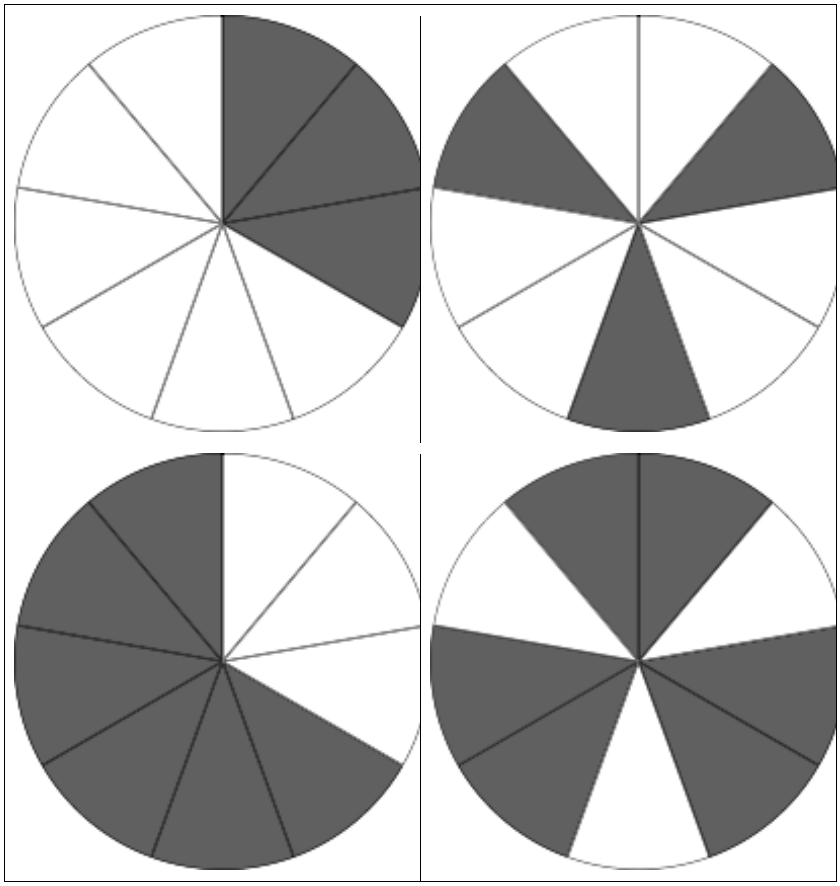
provide their reasons for choosing the specific wheels from the sets. Finally, they answered whether or not they had a knowledge about Loss Aversion and Prospect Theory.

Results

Using the SPSS program and Excel Spreadsheet for analysis, overall, there was no significant difference between Gain and Loss frames whether they choose adjacent or non-adjacent wheels across different proportion types of wheels. See Appendix 4 for full response table. The conditions are calculated as four different conditions: Gain, nothing wedges > winning wedges; Gain winning wedges > nothing wedges; Loss, nothing wedges > losing wedges, and Loss, losing wedges > nothing wedges.

Figure 2: Top: Example of winning/losing wedges > nothing wedges

Bottom: Example of nothing wedges > wining/losing wedges



In the Gain frame with all proportion types of wheels, the total amount of responses for adjacently-located wedges was 47% out of the 1235 responses (*N*=581) while the amount of responses for non-adjacently-located wedges was 53% (*N*=654). In the Loss frame with all proportion types of wheel, the total amount of responses for adjacently-located wedges was 50% out of the 1237 responses (*N*=641) while the amount of responses for non-adjacently-located wedges was 50% (*N*=623). We compare data among the wedge proportions, in the Gain frame, when win-nothing wedges amount is more than winning wedges amount on the wheel, the response for adjacent winning wedges is 46% out of the total of 564 responses (*N*=260) and non-adjacent winning wedges is 54% (*N*=304). When nothing wedges amount is fewer than winning wedges amount on the wheel, 47% of responses chose adjacent winning wedges (*N*=267) out of 571 responses, while the other 53% chose non-adjacent winning wedges (*N*=304). In the Loss frame, when the amount of losing wedges was fewer than the nothing wedges on the wheels, 51% out of 566 responses chose adjacently-located losing wedges (*N*=290) and 49% chose non-adjacently-located losing wedges (*N*=276). When -nothing wedges amount is more than losing wedges amount on the wheel, 48% of 567 responses chose adjacent losing wedges wheel (N=271), while the other 52% chose non-adjacent losing wedges wheel (N=296). Although, overall, non-adjacently-located wedges were more favorable than adjacently-located wedges wheel in both Gain and Loss frames, this effect was not significant (p>.05, η^2=.027) (see Table 1) and we cannot exclude the possibility that the participants made their decisions purely randomly

Tests of Between-Subjects Effects

Dependent Variable: VAR00001

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	.009[a]	1	.009	1.264	.267	.027
Intercept	11.233	1	11.233	1663.609	.000	.973
VAR00002	.009	1	.009	1.264	.267	.027
Error	.311	46	.007			
Total	11.552	48				
Corrected Total	.319	47				

a. R Squared = .027 (Adjusted R Squared = .006)

Table 1

To explore the motives behind the participants' decisions, we categorize the reasons they provide for the last two wheels according to the coding criteria provided in Appendix 3. Analysis on the frequencies of the provided reasons of preferences showed that for 261 out of 477 justifications of participants' wheel preference were that they believed that the specific wheel they chose would provide them a higher chance to win or lose than the other wheel. This supports the hypothesis that people can perceive risk and probability differently when the distributions of probability are framed distinctively. If otherwise, majority of the participants should express that both of the wheels in the sets were equal and chose randomly accordingly. The frequency is displayed in Table 2.

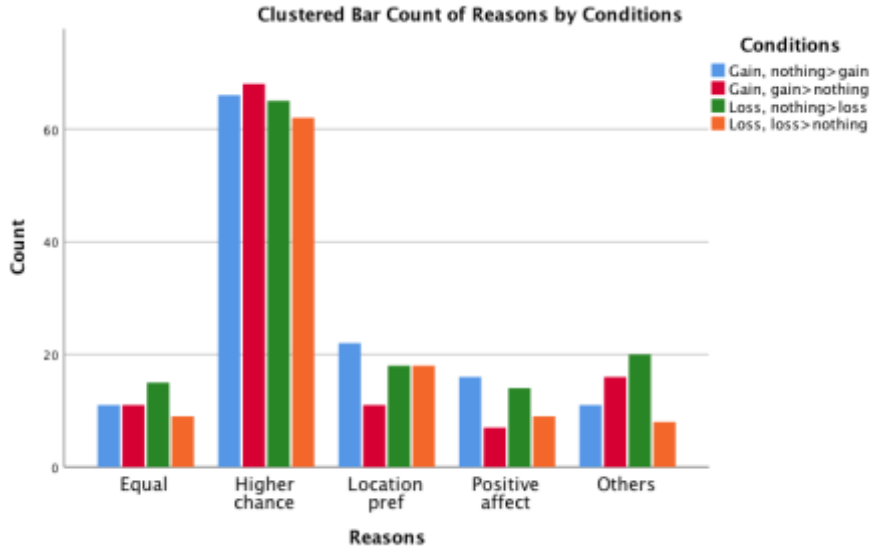
Reasons

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Equal	46	9.6	9.6	9.6
	Higher chance	261	54.7	54.7	64.4
	Location pref	69	14.5	14.5	78.8
	Positive affect	46	9.6	9.6	88.5
	Others	55	11.5	11.5	100.0
	Total	477	100.0	100.0	

Table 2: Frequency for reasons

Figure 3: Comparison between conditions across different reasons

Y axis: the frequency of people who expressed specific reasons when choosing the wheels



Next we investigate whether people have particular preferences on adjacent and non-adjacent wheels. We want to see if the participants may choose differently across the four conditions under every category of reasonings. Nevertheless, using the chi-square test, there was no significant difference across the conditions for every reason, ($\chi^2(12)=.381$, $\varphi_c=.164$), as well as across choices, ($\chi^2(4)=.422$, $\varphi_c=.09$) (see Table 3 and 4 on Appendix 5).

Focusing solely on the "higher chance" reason using the binomial test, we found no significance differences between conditions (Table 5, Appendix 5) and choices (Table 6, Appendix 5).

We, then, omitted the 300-wedges wheel sets results from analysis (N=355) as we predicted that the 300-wedges wheel sets would provide distinct outcomes, comparing to the rest of the wheel sets (see Appendix 2). Using the binomial test, we found that there was a significant difference between choices but not the conditions (Table 7, Appendix 5). In other words, 57% of

the responses of higher chance prefer the non-adjacent type of wheel where the other 43% chose adjacent type of wheel (*N*=203, *p*=.049) as shown in Table 8.

Figure 3: Example of 300-wedges wheel set

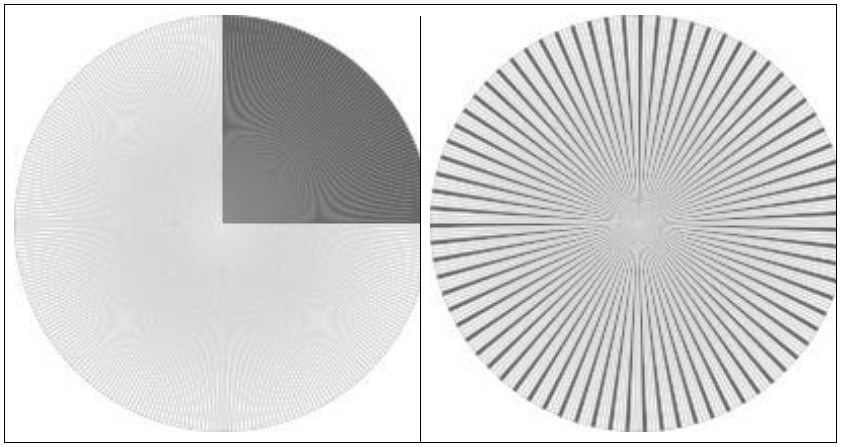


Table 8: Testing the difference between choices for people who responded that there was a higher chance choosing particular

Binomial Test

		Category	N	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
Choices	Group 1	Non-adj	116	.57	.50	.049
	Group 2	Adj	87	.43		
	Total		203	1.00		

wheel (*p*=.049).

Figure 4: Bar graph presenting the distribution of choices across the four conditions when people chose a "higher chance" reason and without the 300-wedges wheel sets

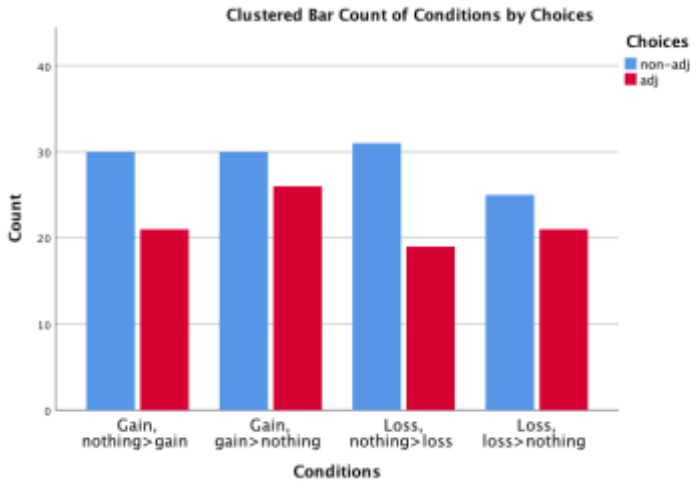


Figure 4 shows that across all conditions, the participants prefer non-adjacent wheels to adjacent ones although the differences are not significant. : Gain, nothing > gain, (N=51, p>.05); Gain, gain > nothing, (N=56, p>.05); Loss, nothing > loss, (N=50, p>.05), and Loss, loss > nothing, (N=46, p>.05). However, when we compared between nothing wedges vs win/loss wedges, we found a significant difference between choices when the amount of nothing wedges is more than the amount of the win/loss wedges conditions combined, (N=101, p=.046), where 60% chose non-adjacent wedges. Despite this fact, the difference was not found when the amount of nothing wedges is fewer than the amount of win/loss wedges conditions combined, (N=102, p>.05) (see Table 9). In sum, the result confirms our hypothesis that people tent to misperceive probabilities given visual framing. Moreover, the data provides some supports for that people prefer non-adjacent wheels to adjacent ones.

Table 9.1: Difference between choices in the gain, loss > nothing conditions, there was no significant difference between adjacent

Binomial Test

		Category	N	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
Choices	Group 1	non-adj	55	.54	.50	.488
	Group 2	adj	47	.46		
	Total		102	1.00		

and non-adjacent choices (*p*>.05).

Table 9.2: Difference between choices in the nothing > gain, loss conditions, there was significant difference between adjacent and non-adjacent choices (*p*=.046).

Binomial Test

		Category	N	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
Choices	Group 1	non-adj	61	.60	.50	.046
	Group 2	adj	40	.40		
	Total		101	1.00		

For the consistency of responses from participants who expressed a reason of getting a "higher chance", we used the code "1" for choosing non-adjacent wedges wheel and "2" for adjacent wedges wheel. We averaged all responses for each participant, excluding the 300-wedges set responses. For example, if a participant chose 1, 2, 1, 2, 1, 1, the average would be 1.33 which indicates that the participant changes her/his choices over time. In other words, there was inconsistency in a participant's choice. The consistency result is displayed in Figure 5.

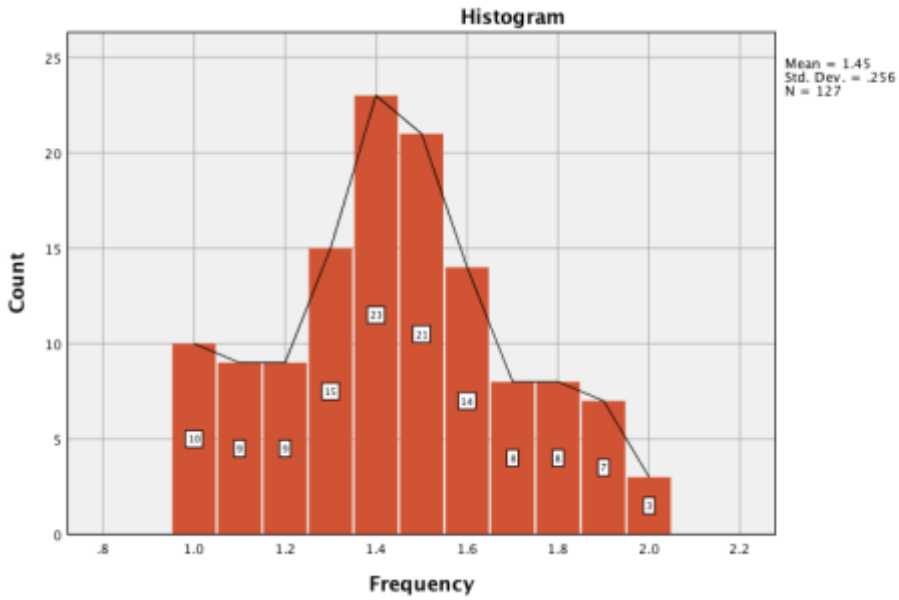


Figure 5: Frequency of the average of consistency (*N*=127, *M*=1.45, *SD*=.256)

Frequency

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.0	10	7.9	7.9	7.9
	1.1	9	7.1	7.1	15.0
	1.2	9	7.1	7.1	22.0
	1.3	15	11.8	11.8	33.9
	1.4	23	18.1	18.1	52.0
	1.5	21	16.5	16.5	68.5
	1.6	14	11.0	11.0	79.5
	1.7	8	6.3	6.3	85.8
	1.8	8	6.3	6.3	92.1
	1.9	7	5.5	5.5	97.6
	2.0	3	2.4	2.4	100.0
	Total	127	100.0	100.0	

Table 10: Frequency of the average consistency

This histogram shows that majority of participants changed their preferences across the wheel sets (*N*=127). Only 10 participants consistently chose non-adjacent wedges and 3 participants chose adjacent wedges. To explore further, we separate the frequency of the

consistency average into two conditions (i.e. Gain and Loss). Each participant would see five Gain and five Loss question sets and this also includes 300-wedges wheel sets (see Figure 6).

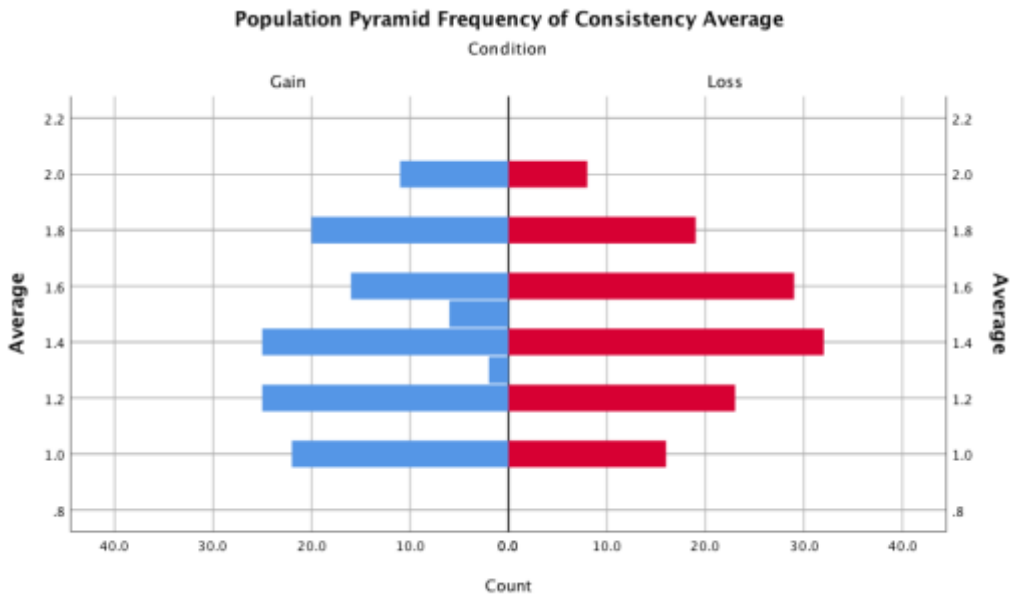


Figure 6: Gain frame and Loss frame consistency average distribution

On average, the inconsistency level in the Gain frame condition is 1.435 and 1.457 for the Loss frame condition. By looking only at the average of 1 and 2, there was more consist response in the Gain frame condition than in the Loss frame condition. Using the independent sample t-test, there was no significant difference between the two conditions, (t=-.589, p>.05, 95%CI[-.0957,.0516]).

Discussion and Conclusion

Even though, in general, we did not find any significant systematic patterns across Gain and Loss conditions as well as choices of adjacency, we are still able to conclude that people can misperceive risk and probability based on the orientations of the wedges. As in the nothing > win/lose wedges, people preferred non-adjacently-located wedges more than the adjacently-located, a possible explanation could be that the result of the spin would make them feel more random and consequently, this randomness of chance perception leaves them a space for motivated reasoning if the outcome was negative, explaining why they did not win or lose the bonus. Perception of randomness of events raises hopes. For example, in a slot machine experiment, when participants saw the sign of winning early on beginning with the first wheel (out of the three wheels), they tended to continue playing this slot machine for a longer time (Strickland & Grote, 1967). On the other hand, when the wedges were adjacent and the outcome was negative, people would have no excuse or offer a "randomness" explanation. Levitt (2016) demonstrated that people tended to be more satisfied when relying on randomness (e.g. flipping a coin) when making a major decision in their life and making a change accordingly.

Future research can utilize our experimental design to determine whether there is a systematic pattern of risk/probability perception based on adjacency or if risk/probability perception only adheres to each individual experience.

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Appendix 1

Survey Material

Consent Form

You are invited to participate in a research study conducted by Tanainan Chuanchaiyakul from the University of Oregon Economics Department.

WHAT IS THE PURPOSE OF THIS STUDY?
This is a research study. From this study, we hope to learn more about people's decision making processes in several domains including in the context of daily routines.

WHAT WILL I BE ASKED TO DO?
In this study, you will be asked to complete questions involving decisions in different hypothetical scenarios. You will be asked to read each item and to provide your answer on multiple choices based on your judgments and opinions. Some demographic information will also be collected (e.g. age, etc.).

HOW LONG WILL THE STUDY TAKE?
This study will take no longer than 10 minutes to complete. You will be paid in a range of $0.75 to $1.25 based on your performance in the participation.

WHAT ARE THE RISKS INVOLVED?
This study poses minimal risk. We do not expect that you will feel any discomfort or inconvenience beyond concentrating on the survey questions. If you decide to participate, your consent can be withdrawn at any time during the study.

WHAT ARE THE BENEFITS OF THIS STUDY?
You will not directly benefit from being in this study. However, we hope that in the future other people might benefit from this study because we are learning more about how people make decisions based on their perception and reasoning strategies.

WHAT ABOUT CONFIDENTIALITY?
No information that you provide in this survey will be linked to your identity in any way. While researchers do not have access to individual responses.

WHAT IF I HAVE QUESTIONS?
If you have any questions, feel free to contact Tanainan Chuanchaiyakul at tchuanc4@uoregon.edu or her faculty advisor, Dr. Jiabin Wu (541-346-5778) at jwu5@uoregon.edu.
If you have any questions concerning your rights as a research participant, please contact Research Compliance Services (Research Compliance, 5237 University of Oregon Eugene, OR 97403, 541-346-2510,
researchcompliance@uoregon.edu).

IS BEING IN THIS STUDY VOLUNTARY?
Your participation is voluntary. If you decide to participate, you are free to withdraw your consent and discontinue participating at any time without penalty.

By clicking below you indicate that you have read and understand the information provided above, that you willingly agree to participate, that you may withdraw your consent at any time and discontinue participation, and that you are not waiving any legal claims, rights, or remedies.

☐ I have read and understand the information provided above, and willingly agree to participate.

☐ I choose NOT to give consent. (This will end the survey immediately.)

Pre-screening questions

What is your age (in years)?

Please enter your MTurk ID

Please read the instruction very **carefully**.

You are given a chance to spin a wheel of fortune to win a bonus prize. Before you start this game, we give you an opportunity to choose which wheel you would like to spin. There are 10 pairs of wheels. You have to choose one wheel for each pair.

There are 2 types of wheel pairs you will be seeing:

The first type is called the "**Beauty**" If a **Beauty** is selected, you will be first endowed with $0.75. If spin the wheel and the arrow falls on gray wedge, you will win another $0.50 bonus. If the arrow falls on white wedge, you will win-nothing.

The second type is called the "**Beast**". If a **Beast** is selected, you will be first endowed with $1.50. If spin the wheel and the arrow falls on gray wedge, you will lose $0.50. If the arrow falls on white wedge, you will lose-nothing.

You will see 5 Beauty pairs and 5 Beast pairs of wheels in a random order. The type of pairs will be notified before you start choosing.

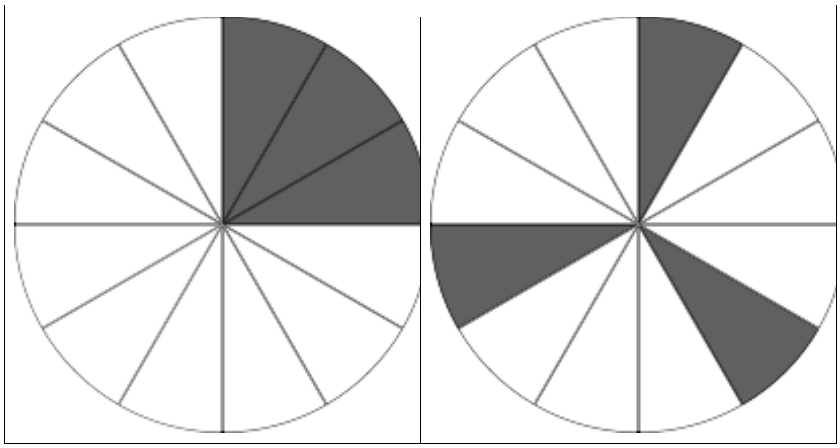
In the end, ONE of the 10 chosen wheels will be used to spin and win or lose money. Therefore, you will want to maximize your chance to win and minimize your chance to lose.

Please click the "next" button to see the example.

Example of wheel pairs:

Beauty (gray wedges: win $$; white wedges: win-nothing)

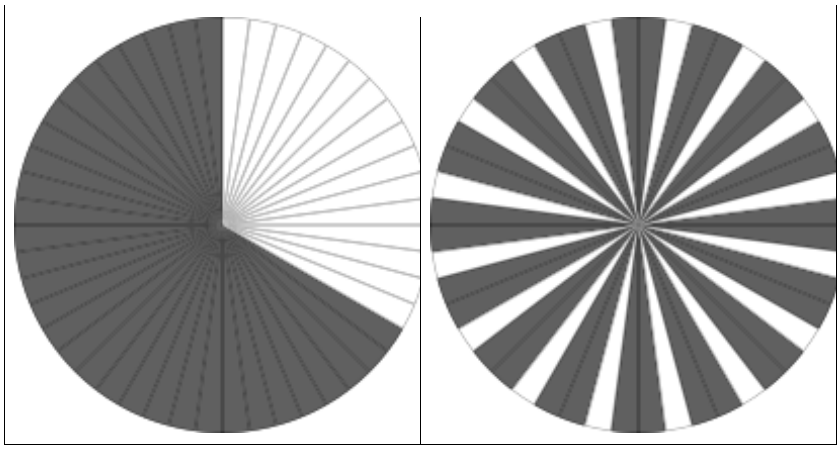
Please note that the total area of gray wedges for both wheels are equal and they are fair wheels.



Wheel A Wheel B

Beast (gray wedge: lose $$; white wedges: lose-nothing)

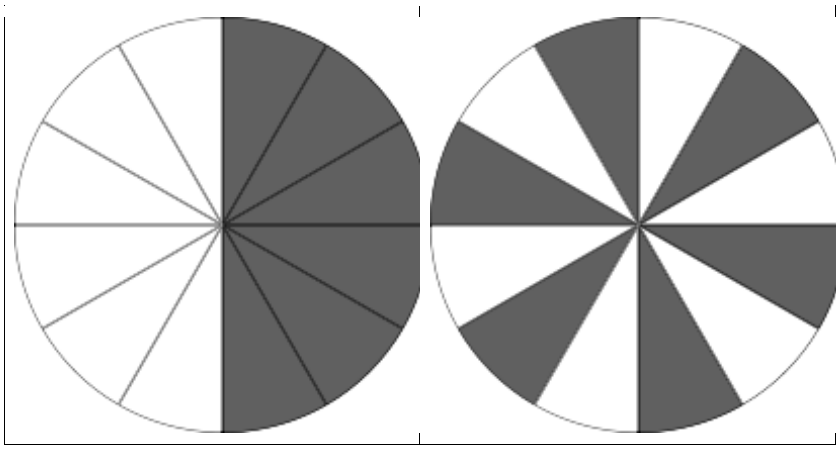
Please note that the total area of gray wedges for both wheels are equal and they are fair wheels.



Wheel A Wheel B

Beauty (gray wedges: win $$; white wedges: win-nothing)

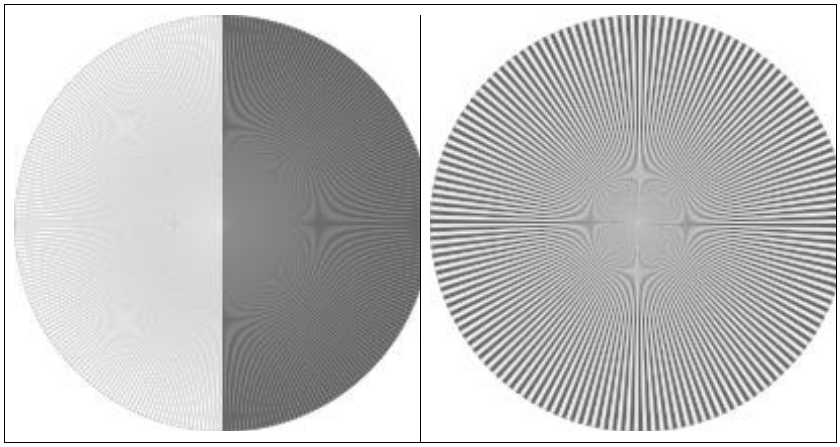
Please note that the total area of gray wedges for both wheels are equal and they are fair wheels.



Wheel A Wheel B

Beast (gray wedge: lose $$; white wedges: lose-nothing)

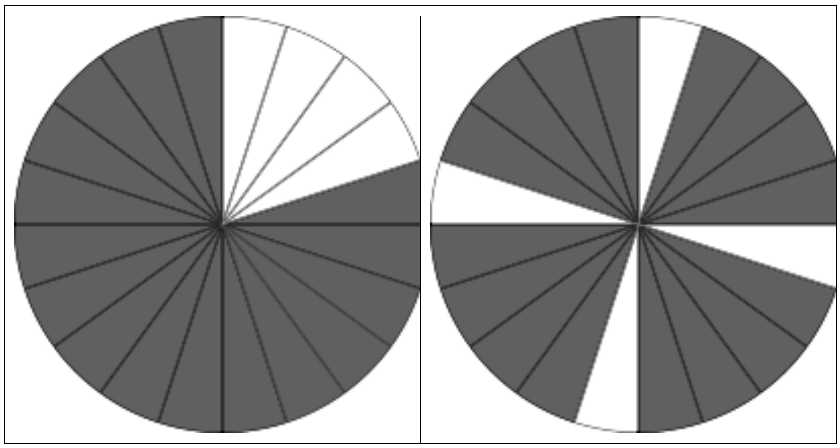
Please note that the total area of gray wedges for both wheels are equal and they are fair wheels.



Wheel A Wheel B

Beauty (gray wedges: win $$; white wedges: win-nothing)

Please note that the total area of gray wedges for both wheels are equal and they are fair wheels.

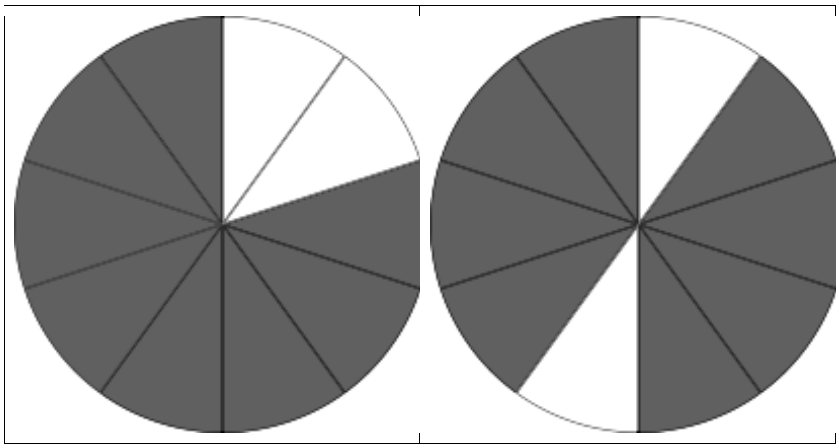


Wheel A Wheel B

Please indicate why you chose this wheel by writing a few sentences in the box below.

Beast (gray wedge: lose $$; white wedges: lose-nothing)

Please note that the total area of gray wedges for both wheels are equal and they are fair wheels.



Wheel A Wheel B

Please indicate why you chose this wheel by writing a few sentences in the box below.

Do you know what the Loss Aversion is?

- Yes
- No

Do you know what the Prospect Theory is?

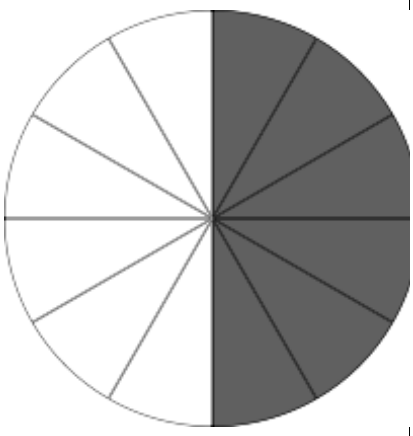
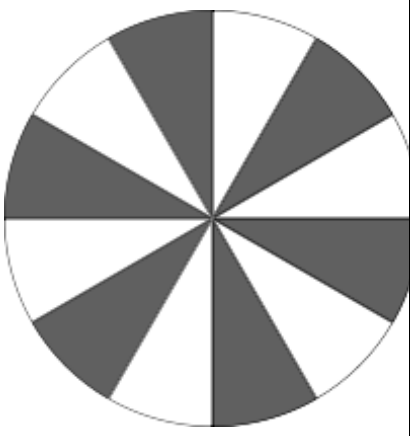
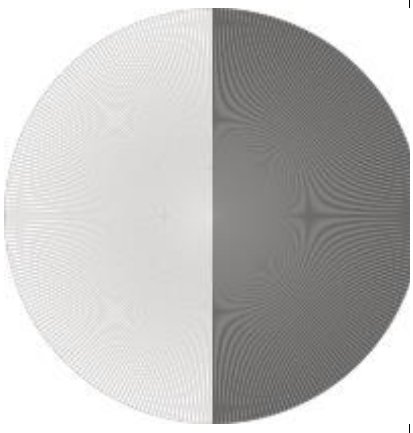
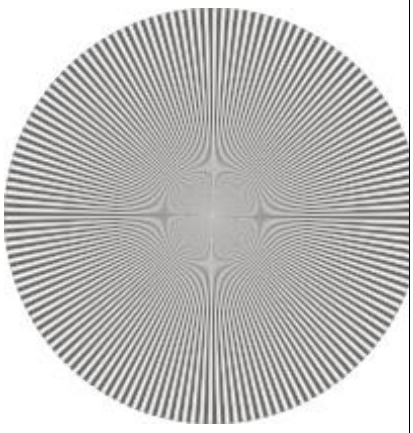
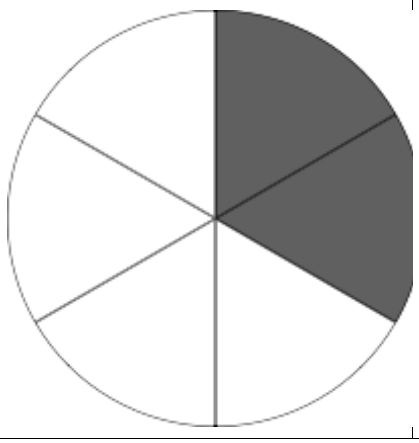
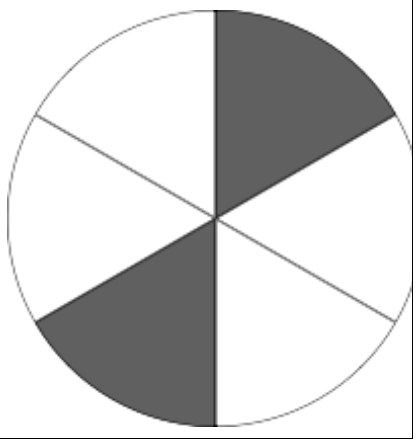
- Yes
- No

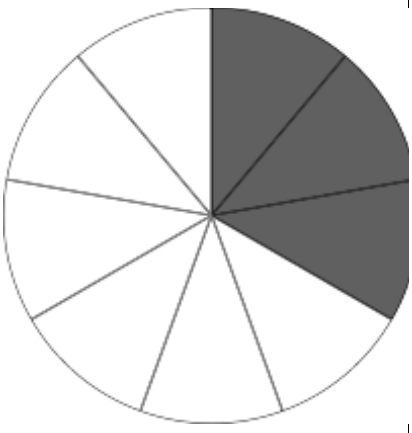
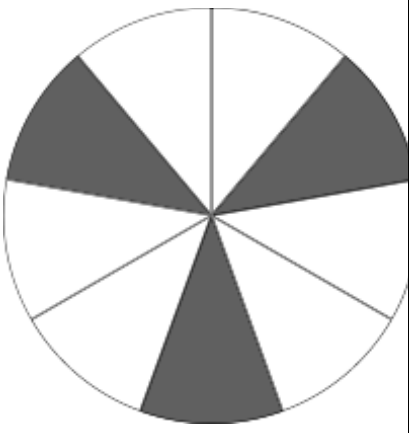
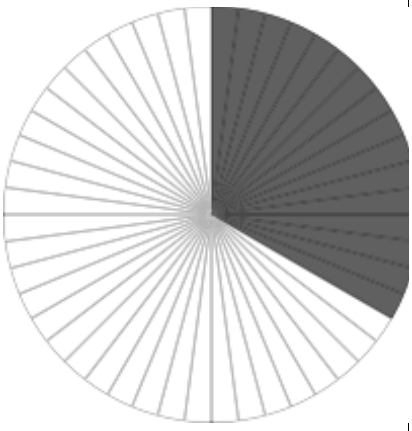
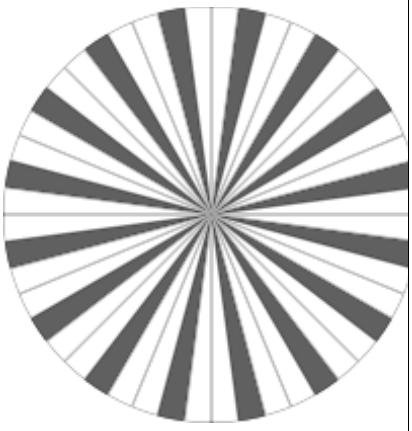
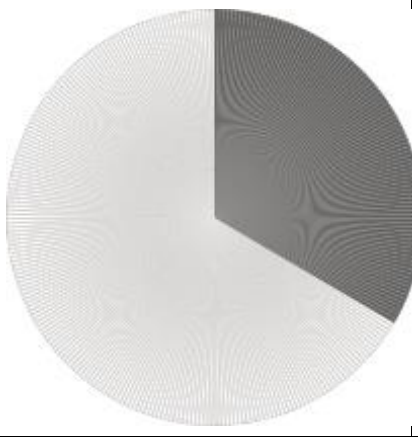
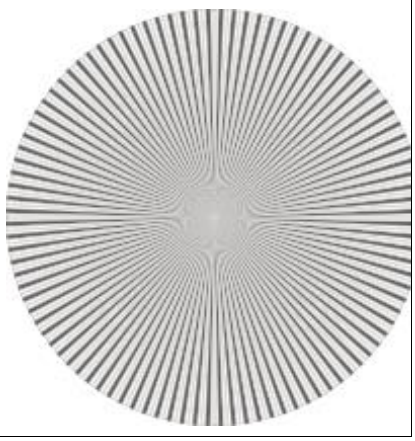
Thank you for participating in our study. You will receive the payment, including the result of the wheel's spin, after the researcher finish reviewing your participation. If you have any questions, please contact the researcher at tchuanc4@uoregon.edu or jwu5@uoregon.edu

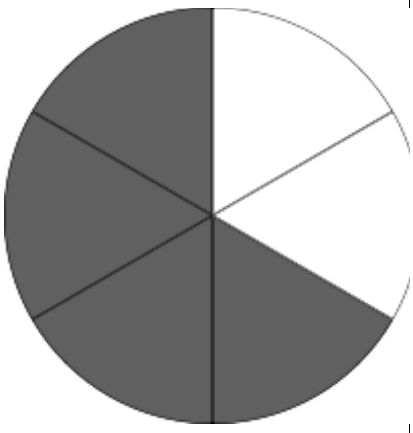
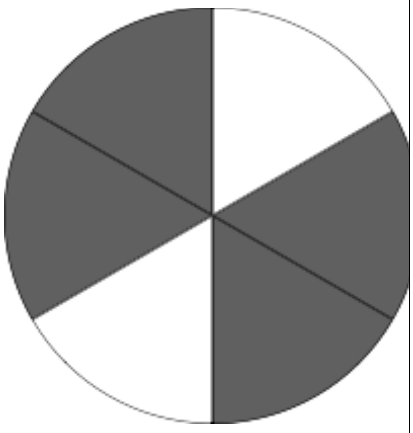
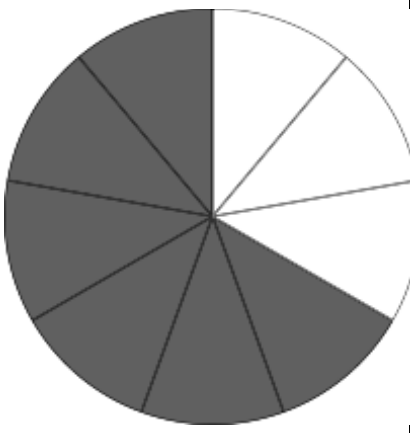
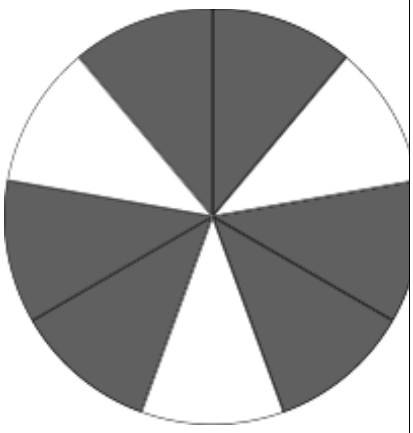
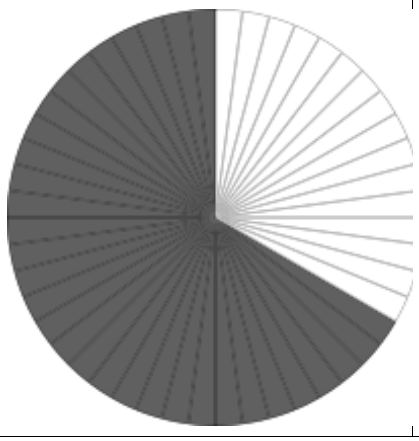
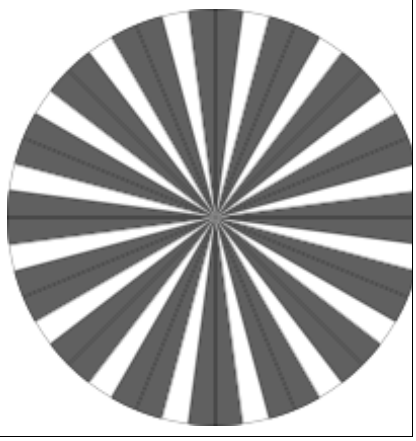
Please click the "Next" button to end the survey.

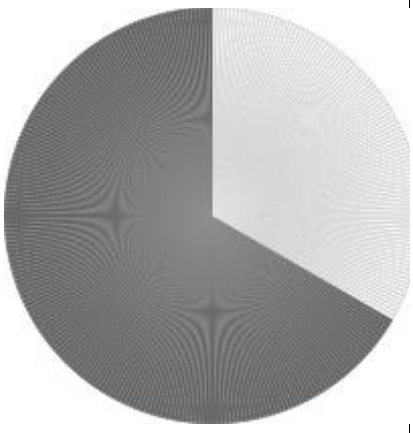
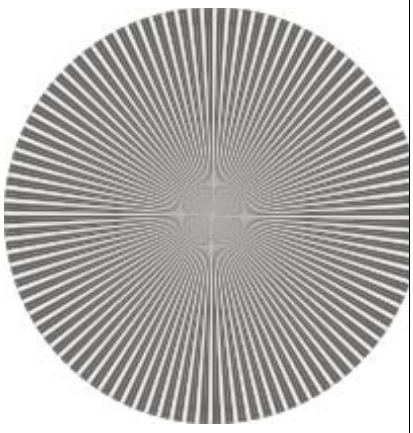
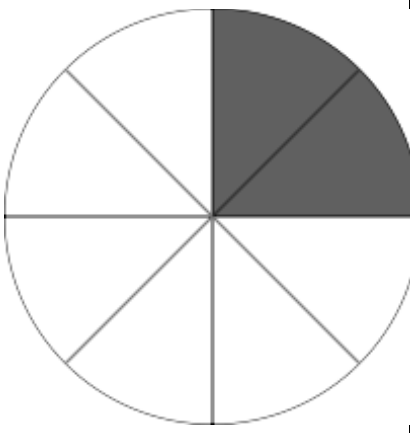
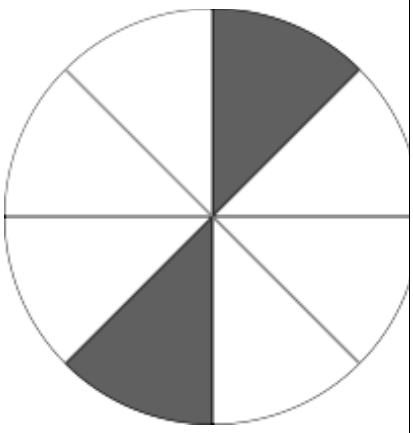
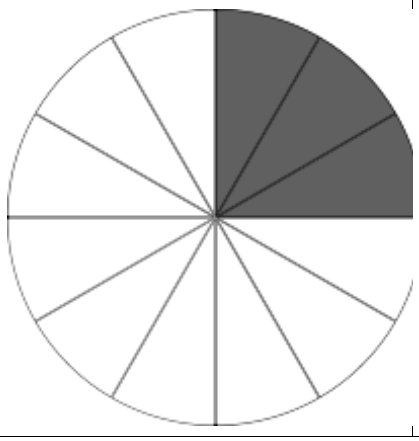
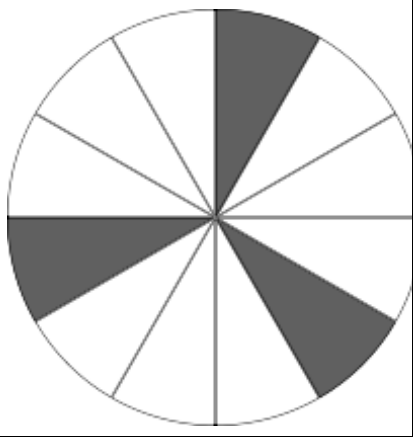
Appendix 2

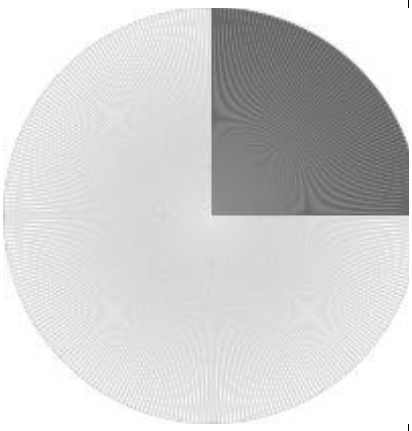
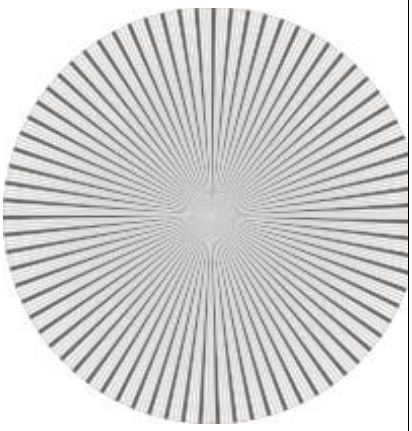
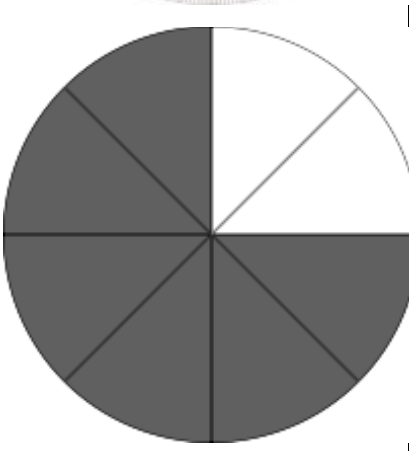
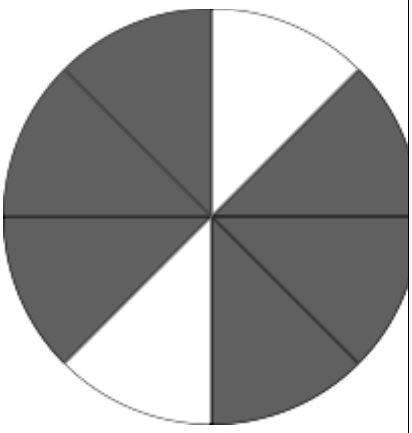
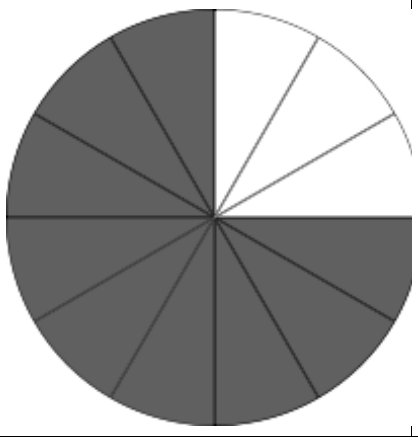
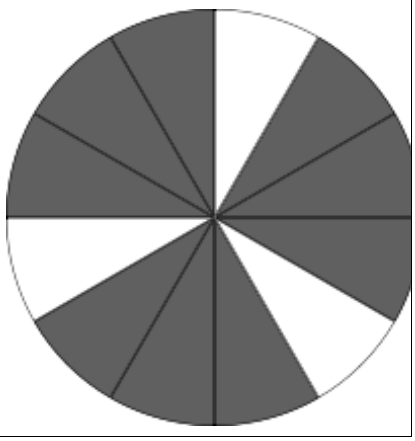
Wheel Sets

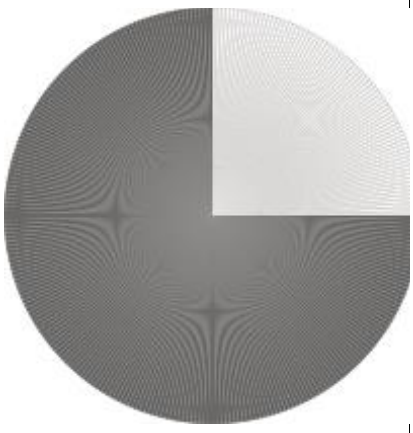
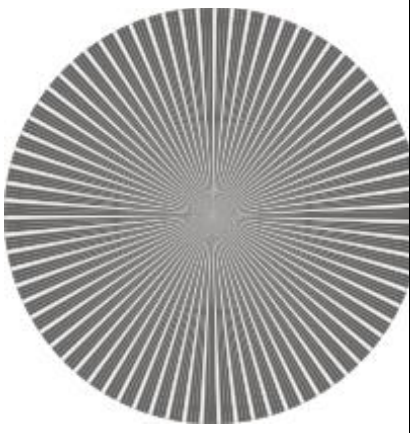
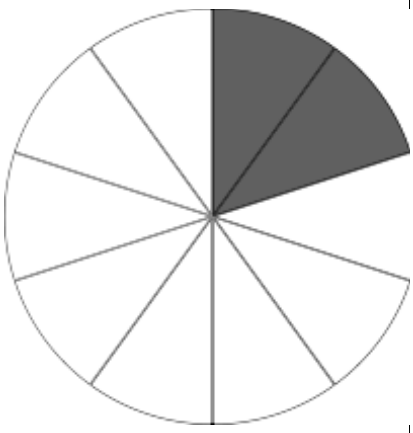
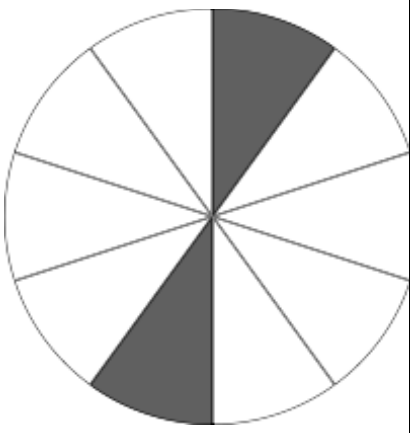
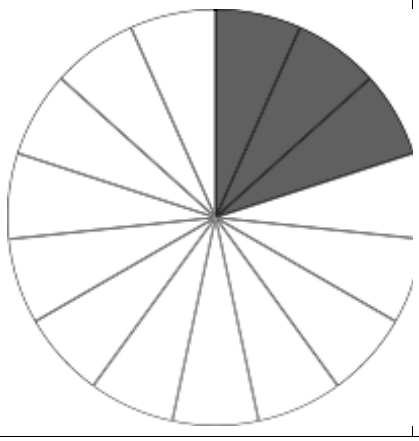
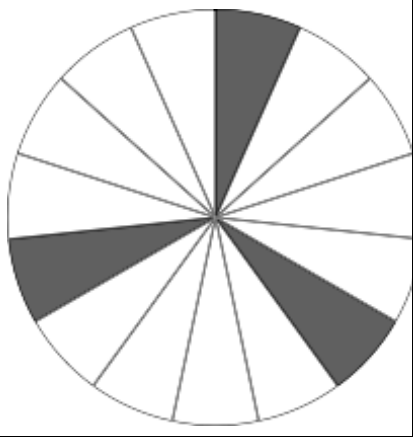
Wheel Proportions Gray: White x Total Number of Wedges on the Wheel	Adjacent	Non-Adjacent
1:1 x 12		
1:1 x 300		
1:2 x 6		

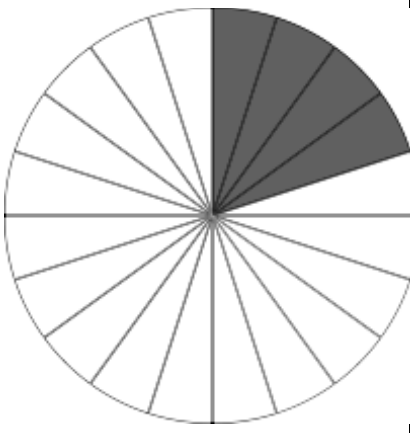
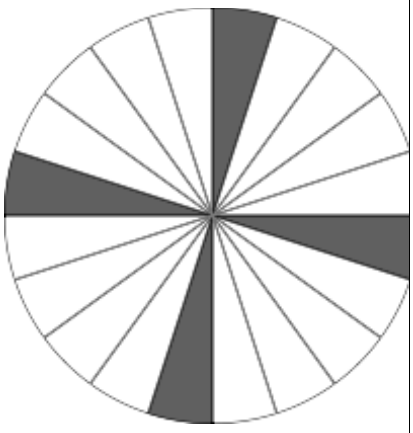
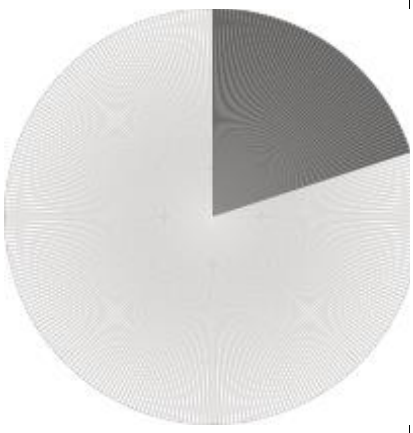
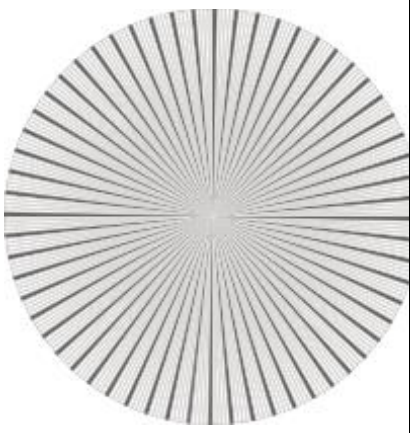
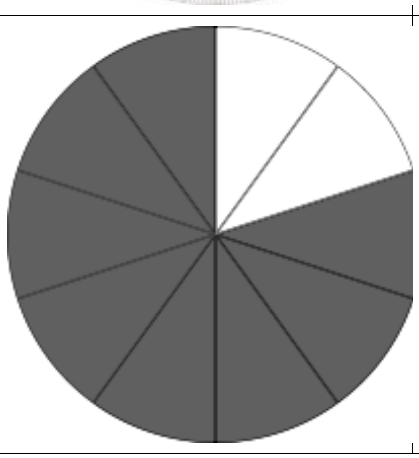
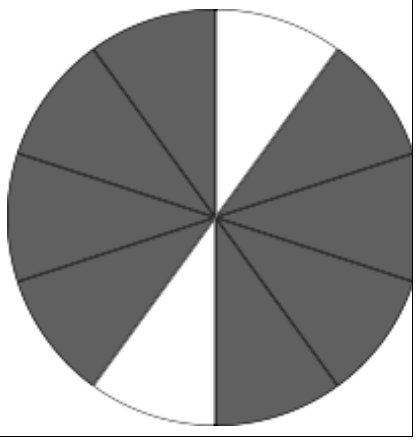
Wheel Proportions Gray: White x Total Number of Wedges on the Wheel	Adjacent	Non-Adjacent
1:2 x 9		
1:2 x 48		
1:2 x 300		

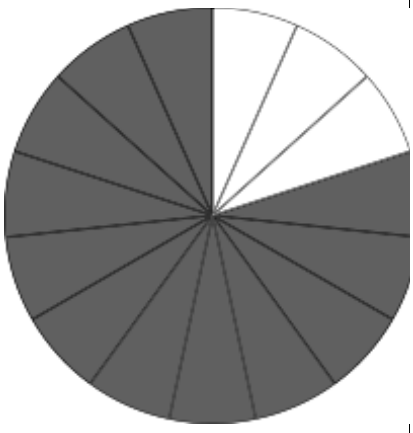
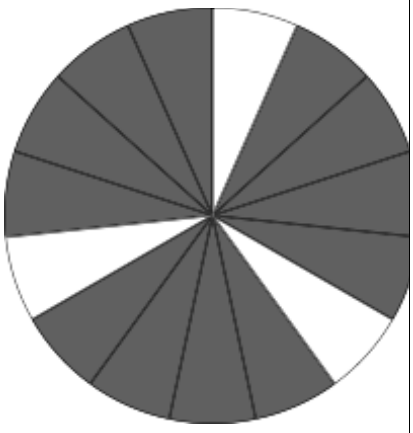
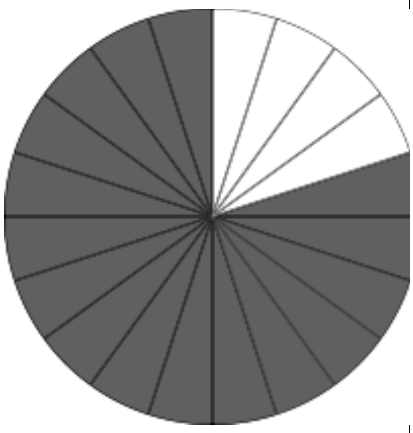
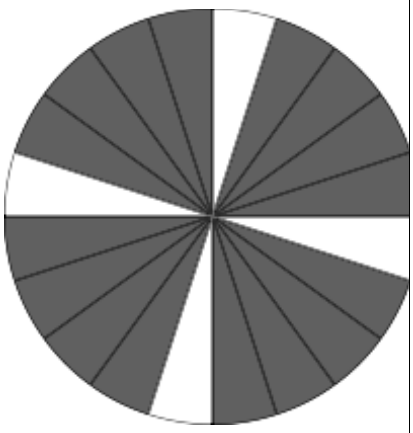
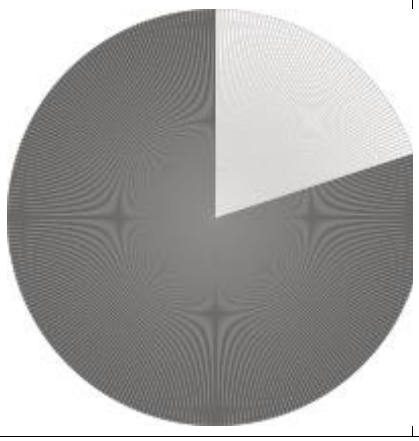
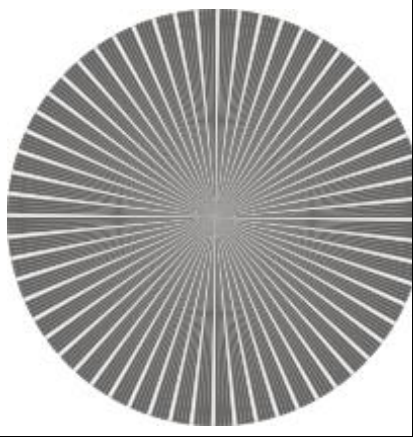
Wheel Proportions Gray: White x Total Number of Wedges on the Wheel	Adjacent	Non-Adjacent
2:1 x 6		
2:1 x 9		
2:1 x 48		

Wheel Proportions Gray: White x Total Number of Wedges on the Wheel	Adjacent	Non-Adjacent
2:1 x 300		
1:3 x 8		
1:3 x 12		

Wheel Proportions Gray: White x Total Number of Wedges on the Wheel	Adjacent	Non-Adjacent
1:3 x 300		
3:1 x 8		
3:1 x 12		

Wheel Proportions Gray: White x Total Number of Wedges on the Wheel	Adjacent	Non-Adjacent
3:1 x 300		
1:4 x 10		
1:4 x 15		

Wheel Proportions Gray: White x Total Number of Wedges on the Wheel	Adjacent	Non-Adjacent
1:4 x 20		
1:4 x 300		
4:1 x 10		

Wheel Proportions Gray: White x Total Number of Wedges on the Wheel	Adjacent	Non-Adjacent
4:1 x 15		
4:1 x 20		
4:1 x 300		

Appendix 3

Coding Criteria

1 = Subject thinks that both wheels have equal proportion and therefore randomly chooses the wheel.

2 = Subject thinks that there is a higher chance to win or lose for the particular wheel that they chose.

3 = Subject thinks that both wheels are equal but the chooses a specific wheel over another because they prefer the orientation of that wheel. There is no expression of higher chance perception.

4 = Subject chooses the particular wheel because it made her/him felt good; believed in her/his intuition; or she/he thinks that this wheel would give her/him a good luck.

5 = Other irrelevant comments.

Appendix 5

Appendix 4

Wheel Sets	Gain Frame	# of Adj	# of Non-adj	Total Responses	% of Adj	Loss Frame	# of Adj	# of Non-adj	Total Responses	%
1:1 x 12		25	26	51	0.49		23	30	53	
1:1 x 300		29	20	49	0.59		30	21	51	
1:2 x 6		24	28	52	0.46		21	33	54	
1:2 x 9		28	25	53	0.53		23	28	51	
1:2 x 48		23	26	49	0.47		27	21	48	
1:2 x 300		24	25	49	0.49		31	18	49	
2:1 x 6		28	24	52	0.54		26	26	52	
2:1 x 9		25	23	48	0.52		27	24	51	
2:1 x 48		23	30	53	0.43		23	26	49	
2:1 x 300		31	21	52	0.60		22	31	53	
1:3 x 8		28	28	56	0.50		29	24	53	
1:3 x 12		17	35	52	0.33		22	28	50	
1:3 x 300		20	27	47	0.43		27	27	54	
3:1 x 8		27	28	55	0.49		24	28	52	
3:1 x 12		20	32	52	0.38		18	36	54	
3:1 x 300		25	28	53	0.47		26	26	52	
1:4 x 10		20	31	51	0.39		29	20	49	
1:4 x 15		29	25	54	0.54		26	28	54	
1:4 x 20		26	24	50	0.52		16	35	51	
1:4 x 300		21	30	51	0.41		39	14	53	
4:1 x 10		22	29	51	0.43		27	24	51	
4:1 x 15		20	33	53	0.38		29	22	51	
4:1 x 20		22	29	51	0.43		27	24	51	
4:1 x 300		24	27	51	0.47		22	29	51	

Table 3: Chi-square test result — Reasons across Conditions

Reasons * Conditions Crosstabulation

Count

		Conditions				
		Gain, nothing>gain	Gain, gain>nothing	Loss, nothing>loss	Loss, loss>nothing	Total
Reasons	Equal	11	11	15	9	46
	Higher chance	66	68	65	62	261
	Location pref	22	11	18	18	69
	Positive affect	16	7	14	9	46

Table 4: Chi-square test result — Reasons across Choices

Reasons * Choices Crosstabulation

Count

		Choices		
		non-adj	adj	Total
Reasons	Equal	21	25	46
	Higher chance	141	120	261
	Location pref	36	33	69
	Positive affect	21	25	46
	Others	23	32	55
Total		242	235	477

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3.887[a]	4	.422
Likelihood Ratio	3.895	4	.420
Linear-by-Linear Association	1.634	1	.201
N of Valid Cases	477		

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 22.66.

Table 5.1: With a “higher chance” reason, using the binomial test, no significant difference was found between Gain, gain > nothing and Gain, nothing > gain, (p>.05)

Binomial Test

		Category	N	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
Conditions	Group 1	Gain, gain> nothing	68	.51	.50	.931
	Group 2	Gain, nothing> gain	66	.49		
	Total		134	1.00		

Table 5.2: With a “higher chance” reason, using the binomial test, no significant difference was found between Loss, nothing > loss and Loss, nothing > loss, (p>.05)

Binomial Test

		Category	N	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
Conditions	Group 1	Loss, nothing> loss	65	.51	.50	.859
	Group 2	Loss, loss> nothing	62	.49		
	Total		127	1.00		

Table 5.3: With a “higher chance” reason, using the binomial test, no significant difference was found between Gain, nothing > gain and Loss, nothing > loss, (p>.05)

Binomial Test

		Category	N	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
Conditions	Group 1	Gain, nothing> gain	66	.50	.50	1.000
	Group 2	Loss, nothing> loss	65	.50		
	Total		131	1.00		

Table 5.4: With a “higher chance” reason, using the binomial test, no significant difference was found between Gain, gain >

Binomial Test

		Category	N	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
Conditions	Group 1	Gain, gain> nothing	68	.52	.50	.661
	Group 2	Loss, loss> nothing	62	.48		
	Total		130	1.00		

nothing and Loss, loss > nothing, (*p*>.05)

Table 6: With a “higher chance” reason, using the binomial test, there is no significant difference between adjacent and non-

Binomial Test

		Category	N	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
Choices	Group 1	non-adj	141	.54	.50	.216
	Group 2	adj	120	.46		
	Total		261	1.00		

adjacent location preferences (*N*=261, *p*>.216).

Table 7.1: With a “higher chance” reason without 300-wedges sets, using the binomial test, no significant difference was found

Binomial Test

		Category	N	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
Conditions	Group 1	Gain, gain> nothing	56	.52	.50	.699
	Group 2	Gain, nothing> gain	51	.48		
	Total		107	1.00		

between Gain, gain > nothing and Gain, nothing > gain, (*p*>.05)

Table 7.2: With a “higher chance” reason without 300-wedges sets, using the binomial test, no significant difference was found

Binomial Test

		Category	N	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
Conditions	Group 1	Gain, nothing>gain	51	.50	.50	1.000
	Group 2	Loss, nothing>loss	50	.50		
	Total		101	1.00		

between Gain, nothing > gain and Loss, nothing > loss, (p>.05)

Table 7.3: With a “higher chance” reason without 300-wedges sets, using the binomial test, no significant difference was found

Binomial Test

		Category	N	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
Conditions	Group 1	Loss, nothing>loss	50	.52	.50	.760
	Group 2	Loss, loss>nothing	46	.48		
	Total		96	1.00		

between Loss, nothing > loss and Loss, loss > nothing, (p>.05)

Table 7.4: With a “higher chance” reason without 300-wedges sets, using the binomial test, no significant difference was found

Binomial Test

		Category	N	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
Conditions	Group 1	Gain, gain>nothing	56	.55	.50	.373
	Group 2	Loss, loss>nothing	46	.45		
	Total		102	1.00		

between Gain, gain > nothing and Loss, loss > nothing, (p>.05)