Research Paper *IJMSRR*
*Impact Factor :**3.029*** *E- ISSN - 2349-6746*
Peer Reviewed & Indexed Journal *ISSN* -2349-6738

DECOY EFFECTS IN DUMMY AND REAL PRODUCTS USING GENDER AND TECHNICAL EXPERTISE AS MODERATING VARIABLES

Rusha Das
Assistant Professor, NL Dalmia Institute of Management Studies and Research.

The theory on the irrationality in decision making is no longer limited to the domain of academic research papers but is now the theme of many popular books (Ariely, 2009) (Kahneman D. , 2011) (Taleb, 2010) (Thaler & Sunstein, 2008). There is a general agreement that the standard utility theory is not capable of explaining human behaviour in all the decision situations. Many new theories have been propounded to explain the logic of decision making deviations.

We work with the idea that human decisions are not necessarily irrational, as the decisions by normative theories may also not be optimal (Einhorn & Hogarth, 1981). Instead of using a seemingly negative label like 'irrational' to describe behaviour, we need to work towards creating a better logic of understanding the behavioural deviations. This paper is an attempt to understand behavioural deviations in the case of context oriented preference reversal with asymmetrically dominated decoys. We do not seek to offer reasons for reversal in this paper, but rather seek to understand the factors that may cause this effect. We also attempt to use different experimental design so that the results may be more applicable in real life.

Literature Review

We can trace back the concept of preference reversal in the choice-pricing discrepancy in the evaluation of two gambles with equal expected value (Shu Li 2006). One gamble with a high chance of winning a small cash amount was called the P bet and the other gamble with a low chance of winning a large monetary amount was called the $ bet. Subjects in the preference reversal experiment stated a higher cash equivalent for the $ bet when asked at what price would they be willing to sell the gambles if they owned it. However majority of the subjects had chosen the P bet when asked to make a choice between the two lotteries. The tendency to chose $ bet in the choice task and P bet valued more highly was called counter preference reversal phenomenon.

Since the 1970s economist (Grether and Plott, 1979, (Fishburn, 1985; Loomes & Sugden, 1983; (Holt, 1986; Karni & Safra, 1987; Goldstein & Einhorn, 1987) and psychologist (Tversky, Sattath, & Slovic, 1988; Slovic, Griffin and Tversky,1990; Fischhoff, 1983; Hershey & Schoemaker, 1980; Schneider & Lopes, 1986; Kahneman & Tversky, 1979) have conducted several researches on preference reversal, suggesting possible explanation of this anomaly in human decision making. However explanatory strategies of the economists varied greatly from that of the Psychologists. Economists were consistent with the assumption that the behaviour is governed by context independent preferences and the psychologist assumed that preference were context dependent (Cubitt, Munro and Starmer 2000).

A series of research papers that were published in the late 1980s stated that unless subject's preferences satisfy the axioms of expected utility theory, preferences that are recorded using the canonical design maybe biased and take the form of standard preference reversal (Cubitt and Starmer, 2000). An alternative explanation is provided by Loomes and Sugden 1983 by the regret theory.

Psychologist like Tversky, Sattath and Slovic 1988 stated different hypothesis for the context sensitive preference reversals namely the prominence hypothesis which is concerned with the choice and matching task which states that prominent attribute weighs more heavily in choice task than in matching task. The scale compatibility hypothesis states that a task of any kind has a response mode and mode may be compatible with certain types of attribute.

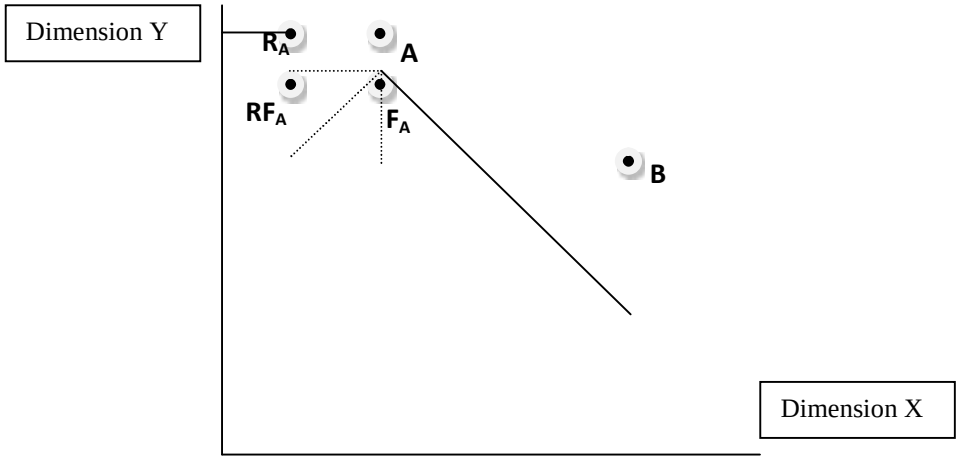
We can find several research papers offering explanations for this the preference reversals. The violation of transitivity was offered as one of the reason, later supported by Loomes and Sugden. A violation of procedure invariance sighted by Tversky 1990 is another explanation.

There are primarily three classes of preference reversal: Task induced, Frame induced and Context induced (Wedell, 1991). The task induced methods were possibly the first experiments to demonstrate the preference reversal in gambling (Lichtenstein, 1971). Here the reversal is due to the way people process information or the method that is used to evaluate the alternatives. Frame induced reversals are because of the way the problem is presented (Kahneman & Tversky, 1979).

The context induced preference reversal is more popularly known as the decoy effect. The selection of a product is dependent on the choice set (stimuli) available for selection. The compromise decoy effect uses a decoy C placed in between A and B along the equi preference contour. The attraction decoy effect uses an asymmetrically dominated decoy placed closer to either A or B. This research is based on attraction effect.

Consider two competing products A and B. When compared across two attributes X and Y, none of the products completely dominate the other. Product A dominates B on Y and B dominates A on X as shown in Figure 1. As per standard theories of regularity and similarity the introduction of a third product D should reduce the market share of both A and B. Also, among A and B, the product that is closer to D in the attributes should lose a greater market share. Experiments in 1980s (Huber J. P., 1982) proved that in certain situations the regularity axiom was violated and the similarity axiom was reversed. This research led to many other experiments, all trying to explain the deviation from standard expected behaviour.

The decoy effect has been shown to have applications in recruitment (Slaughter, Kausel, & Quinones, 2011) selection of consumer products (Heath & Chatterjee, 1995), consumer durables (Lichters, Müller, Sarstedt, & Vogt, 2014), winning elections (Shankar, 2007) and selection of apartments (Simonson, 1989).



Most experiments work with three asymmetrically dominated decoy classes (R_A, F_A and RF_A) for each the two products being considered. In figure 1, A would be the target and B the competitor brand. R_A is the range decoy for A on the dimension that A is weaker. F_A is frequency decoy of A on the dimension that A is stronger. RF_A combines the effect of both the range and frequency decoys. In most cases, the introduction of decoys increases the preference for the target product. In this case, the preference for A with any of the decoys would be higher than the share without decoys.

We can use the range frequency theory of judgement (Parducci, 1974). The decoy R_A extends the range along Dimension 1 where target A is weaker. Thus the weakness of A is perceived to be lesser. Similarly F_A increases the difference on the dimension that A is stronger. This again would create a preference for A.

Another theory seeks to explain the attraction effects by the concept of change of weights. The introduction of the decoy would increase the weight of the stronger dimension in the target and thus make it preferable.

The prospect theory (Tversky, 1991) has been used to explain the decoy effect through the concept of loss aversion. The decoy R_A would create a reference state at D_{2A}. Thus target A would have a small gain over RA on Dimension 1 and no loss on Dimension 2. The competitor B would have a large loss on Dimension 2 and a large loss on Dimension 1. As losses are weighed more, the obvious selection would be A. The theory can also explain the case of using decoy F_A or when B becomes the target.

The Emergent Value Model (Pettibone & Wedell, 2000) suggests that the decision maker is looking for some additional reasons to make a selection. An additional reason could be the need to justify the decision to others or oneself (Simonson,

1989). The decoy that is clearly dominated by the target but not the competitor product thus gives a strong reason for selection of the target product.

John Mowen and James Gentry studied preference reversals in new product development. Their subjects were undergraduate students of Marketing and Consumer Behaviour, the stimuli was hypothetical products defined according to the probability of success and failure and the projected profits and losses associated with those probabilities. (Slovic & Lichtenstein 1983). However in the context of inducing preference Hogarth and Camerer (1999) show that simple monetary incentive frequently effect mean behaviour and variance differently. This was further extended by Joyce, John and Thomas (2002) who show that inducing risk averse or risk seeking preference reduces reversal rates and inverts the typical pattern of reversals that is observed in previous research.

There has been a general criticism of experimental methods that they do not reflect realism. It has been demonstrated that the behaviour in the lab "parallels" the behaviour in real life so long as the relevant conditions remain same (Smith, 1982). It has been thus mandated that the experiments be designed carefully so that all the variables in real life are included and the unnecessary details are avoided (Katok, 2011).

Towards this end, Lichters et.al. (2014) have highlighted five major points for research in consumer choice. They have proposed that the experiments should incorporate: *(1) real products at realistic price (2) with a realistic number of meaningful attributes describing the options (3) the possibility to opt for a no-buy (4) the possibility to evaluate the products physically or visibly prior to making a choice and (5) real buying obligations.*

If we look at the existing research, most of it fails on all the 5 aspects of making the laboratory conditions more applicable in real life settings. The compromise effect was found to have a significantly reduced effect in case of real choices (Muller, Kroll, & Vogt, 2012). Doubts have been also included on the impact of categorical variables like brand names (Pan & Lehmann, 1993). Also, the impact of preference reversal could be impacted by the varying buying processes that consumers have for different products (Brazell, Diener, Karniouchina, Moore, Severin, & Uldry, 2006) (Dhar & Simonson, 2003) (Laurent & Kapferer, 1985).

Our study would be the first methodical choice based study with Indian participants. A previous judgement based study (Trott, 2012) in Mumbai had only 22 participants. Also the fact that the study had within sample design with 3 experiments could cast doubts on the impact of carryover effect on the results.

Methodology

Both within subject (Huber & Puto, 1983) and between subject designs (Pan & Lehmann, 1993) have been used for such studies. Since we want to avoid the impact of carryover effects we would use the between sample design. The between sample design has a disadvantage of requiring a larger sample size for the same power. We have compensated for this by using an adequately large sample size. Since our population is limited to individuals between the age group of 20 to 28 we do not see the sample size as a hurdle. The samples are all be from India.

The selection of the student category is based on the convenience of samples available. The participants have been asked if they plan to purchase a phone over the next six months. The participants who rely in positive are a part of the Real Product Test (RPT) and the others in a Dummy Product Test (DPT). The value of the quality and the price dimensions in both RPT and DPT are exactly same of every product and decoy.

In each of the tests we have seven sub categories. One category is a control group, testing between A and B. The remaining six categories include R_A, F_A, RF_A, R_B, F_B and RF_B as decoys. The student participants are randomly assigned to any of the fourteen groups (seven in RPT and seven in DPT). The research design satisfies three of the five points raised by Lichters et.al. (2014).

We define the reversal coefficient as $\frac{Ppc - Ppt}{Ppc}$

For each of the decoy conditions (R, F and RF) and each of the two products (A and B) the reversal coefficient is the change of preference for the product in control and test group (P_{pc} - P_{pt}) as compared to the preference in the control group. We thus focus on a relative measure of change rather than the absolute.

We use the t test when comparing two samples and single factor or two factor ANOVA when the numbers of samples are greater than two.

Hypothesis

In this research we seek to verify the results of the earlier research by designing experiments using the guidelines of Lichters (2014). In addition to the verification we would slice the results for gender and the hours spent on internet per week.

H1: The change of preference for respective decoys in RPT and DPT would be different.

We believe that the decision in case of a real product that the participants plan to buy and in case of dummy products would lead to different levels of involvement. Hence the decoy effect would be different for the respective categories in RPT and DPT. Thus the preference reversal for R_A in RPT would be different for the preference reversal for R_A in DPT.

H2: The change of preference for the respective decoys for each target product would be different

This is a verification of the results of other similar tests conducted previously but with a between sample design. Thus the R_A for RPT would be different than R_B for RPT. The extent of the decoy effect possibly depends on the nature of the dimension variables. The terms 'Quality' and 'Cost' could create different connotations in the consumers mind. Hence the impact of similar decoys in both cases could be different.

H3: The decoy effect varies across gender

There have been numerous studies that link behaviour to gender. We have check for the same in case of preference reversal. It would be interesting to see if the gender causes a different change in the RPT and DPT. We expect gender neutral results for DPT but differential effect in case of RPT.

H4: The level of internet usage impacts the decoy effect

We assume the time of internet usage per week to be a proxy for awareness levels about mobile phone features. We want to test if the level of technical expertise has an impact on the preference reversal. We feel that with higher expertise, the decoy effect could be reduced.

Results and discussion

The study was mailed to xx number of students and 259 usable responses were obtained. The responses as per the test and their product selection are given in the Table 1 below.

	Product A	Product B	Product C	Phone A	Phone B	Phone C	Grand Total
Control	16	5		7	1		29
Ra	21	4		3	3	1	32
Fa	21	4		7			32
RFa	19	3		10		1	33
Rb	9	4	1	12	4		30
Fb	8	7	2	8	2		27
RFb	26	15	1	22	10	2	76
Grand Total	120	42	4	69	20	4	259

Table 1

The distribution of the sample as per other parameters is described in the Appendix tables AT2 to AT5. Since the sample size is each sub category is small we would be providing descriptive analysis is some cases. Where the sample size permits us we would be conducting inferential tests.

H1: The change of preference for respective decoys in RPT and DPT would be different

We do not have enough data to test this fact. In case of RF_b where we do have enough data the preference for the Real Products and Dummy Products is not significantly different. At least for RF_b we can say that the 'product' is not the reason for the selection. In case of Huber (1982) the preference for the products differs according to the product category. Our result suggests that price may be the confounding variable in deciding the preference and not the product.

H2: The change of preference for the respective decoys for each target product would be different
We combine the real and decoy products to get a very clear result for this hypothesis. The Table 2 provides the proportion of the samples preferring the products in the each of the 7 tests.

	A	B	C
Control	0.79	0.21	0.00
Ra	0.75	0.22	0.03
Fa	0.88	0.13	0.00
RFa	0.88	0.09	0.03
Rb	0.70	0.27	0.03
Fb	0.59	0.33	0.07
RFb	0.63	0.33	0.04

Table 2

The reversal coefficients for the 6 treatments are provided in Table 3.

	A	B
R_a	-0.05	0.06
F_a	0.10	-0.40
RF_a	0.11	-0.56
R_b	-0.12	0.29
F_b	-0.25	0.61
RF_b	-0.20	0.59

Table 3

None of the preferences in the Table 2 are significantly different from the Control group. This is primarily due to the low sample size. However preliminary results from Table 3 give us an indication that the decoys work with the stronger dimension. Thus both R_a (-0.05) and R_b (0.29) have a lower change of preference as compared to F_a (0.10), RF_a (0.11), R_b (0.61) and RF_b (0.59). Also, unlike most other tests (Heath & Chatterjee, 1995), we observe a larger reversal in case of price dominated decoy. This fact needs to be explored further.

H3: The decoy effect varies across gender
The Table 4 displays the percent of females/males preferring the product in a particular test to the total number of females/males preferring the product. We observe that there is no significant difference between the genders in the preference. In fact there is a glaring similarity. For the future research we would thus abandon gender as a moderating factor.

	Product A		Product B		Product C	
	Female	Male	Female	Male	Female	Male
Control	0.12	0.12	0.17	0.05	0.00	0.00
R_a	0.14	0.12	0.17	0.08	0.33	0.00
F_a	0.12	0.16	0.00	0.10	0.00	0.00
RF_a	0.18	0.14	0.09	0.03	0.00	0.20
R_b	0.12	0.11	0.17	0.10	0.00	0.20
F_b	0.07	0.09	0.09	0.18	0.00	0.40
RF_b	0.25	0.26	0.30	0.46	0.67	0.20
Total	1	1	1	1	1	1

Table 4

H4: The level of internet usage impacts the decoy effect
The table 5 displays the average hours spent on internet by the respondents for every product and each of the test groups. We find no significant difference between these individual or total values. We would also drop the idea of using internet usage as a proxy for mobile phone knowledge in our further studies.

Row Labels	Product A	Product B	Product C	Phone A	Phone B	Phone C
Control	6.25	3.50	NA	9.64	12.50	NA
R_a	7.74	6.25	NA	12.50	17.50	12.50
F_a	8.21	5.00	NA	4.64	NA	NA
RF_a	5.13	5.83	NA	6.00	NA	2.50
R_b	6.39	5.00	2.50	7.08	5.00	NA
F_b	5.00	4.64	5.00	12.50	10.00	NA
RF_b	6.35	7.50	12.50	6.14	9.00	7.50
Total	6.63	5.83	6.25	7.50	9.75	7.50

Table 5

Conclusion

We have comprehensively proved that the decoy effect does exist. Because of sample size issues we were not comprehensively able to prove the results. The next stage for us would thus be to increase the sample size of the experiment. There is also tremendous scope to design different types of experiments and further explore our results in other product categories. For example, our results point to the fact that the price and not the product type is a moderator for the decoy effect. This should be verified with other products as well. We have comprehensively proved that gender and level of internet usage does not have a significant impact on preference reversal. We plan to continue this research with factors like Cognition Reflection Test to check if the level of cognition maturity has an impact on reversals We would also test for the level of product knowledge though a product quiz. It is highly likely that high product knowledge could lead to lesser reversals.

Bibliography

1. Ariely, D. (2009). *Predictably Irrational.* Harper.
2. Brazell, J. D., Diener, C. G., Karniouchina, E., Moore, W. L., Severin, V., & Uldry, P. F. (2006). The no-choice option and dual response choice designs. *Marketing Letters, 17(4),* , 255-268.
3. Dhar, R., & Simonson, I. (2003). The effect of forced choice on choice. *Journal of Marketing Research, 20* , 146-160.
4. Einhorn, H. J., & Hogarth, R. M. (1981). Behavioral decision theory: Processes of judgment and choice. *Journal of Accounting Research* , 1-31.
5. Heath, T. B., & Chatterjee, S. (1995). Asymmetric decoy effects on lower-quality versus higher-quality brands: Metaanalytic. *Journal of Consumer Research, 22* , 268-284.
6. Huber, J. P. (1982). Adding asymmetrically dominated alternatives: Violations of regularity and the similarity hypothesis. *Journal of consumer research* , 90-98.
7. Huber, J., & Puto, C. (1983). Market boundaries and product choice:Illustrating attraction and substituition effects . *Journal of Consumer Research, 10* , 31-44.
8. Kahneman, D. (2011). *Thinking Fast and Slow.* Macmilan.
9. Kahneman, D., & Tversky, A. (1979). An analysis of decision under risk. Econometrica. *Journal of the Econometric Society* , 263-291.
10. Katok, E. (2011). Laboratory Experiments in Operations Management. *INFORMS.* Charlotte.
11. Laurent, G., & Kapferer, J. (1985). Measuring consumer involvement profiles. *Journal of Marketing Research, 22(1)* , 41-53.
12. Lichtenstein, S. &. (1971). Reversals of preference between bids and choices in gambling decisions. *Journal of experimental psychology, 89(1)* , 46-55.
13. Lichters, M., Müller, H., Sarstedt, M., & Vogt, B. (2014). How Durable are Compromise Effects? New Experimental Evidence of Context-dependent. *Beiträge zur Jahrestagung des Vereins für Socialpolitik 2014: Evidenzbasierte Wirtschaftspolitik - Session: Industrial Organization I, No. A11-V1.*
14. Muller, H., Kroll, E. B., & Vogt, B. (2012). Do real payments really matter? A re-examination of the compromise effect in hypothetical and binding choice settings. *Marketing Letters, 23(1)* , 73-92.
15. Pan, Y., & Lehmann, D. R. (1993). The influence of new brand entry on subjective brand judgements. *Journal of Consumer Research, 20* , 76-86.
16. Parducci, A. (1974). *Contextual effects: A range-frequency analysis. Handbook of perception.* New York.

17. Pettibone, J. C., & Wedell, D. H. (2000). Examining models of non dominating decoy effects across judgement and choice. *Organizational Behavior and Human Decision Processes, 81* , 300-328.
18. Shankar, V. (2007, April 2). *The Decoy Effect, or How to Win an Election.* Retrieved August 30, 2014, from Washington Post: http://www.washingtonpost.com/wp-dyn/content/article/2007/04/01/AR2007040100973.html
19. Simonson, I. (1989). Choice based on reasons: The case of attraction and compromise effects. *Journal of Consumer, 16* , 158-174.
20. Slaughter, J. E., Kausel, E. E., & Quinones, M. A. (2011). The Decoy Effect as a Covert Influence Tactic. *Journal of Behavioral Decision Making, 24* , 249-266.
21. Smith, V. (1982). Microeconomic Systems as an Experimental Science. *American Economic Review, 72* , 923-955.
22. Taleb, N. N. (2010). *Black Swan: The Impact of the Highly Improbable Fragility.* Random House LLC.
23. Thaler, R. H., & Sunstein, C. R. (2008). *Nudge: Improving decisions about health, wealth, and happiness.* Yale University Press.
24. Trott, S. (2012). Concept of Decoys - An Indian perspective. *International Journal of Research in Management, Economics and Commerce, Volume 2(11)* , 509-515.
25. Tversky, A. a. (1991). Loss aversion in riskless choice: A reference-dependent model. *The Quarterly Journal of Economics* , 1039--1061.
26. Wedell, D. H. (1991). Distinguishing among models of contextually induced preference reversals. *Distinguishing among models of contextually induced preference reversals. Journal of Experimental Psychology: Learning, Memory, and Cognition, 17(4)* , 767-778.
27. Choplin, M. Jessica & Hummel, E. John (2005). Comparison Induced Decoy Effects. *Memory & Cognition 2005, 33 (2), 332-343.*
28. Stalmeier, M.F, Peep & Wakker, P. Peter (1997). Preference Reversals: Violation of Unidimensional Procedure Invariance. *Journal of Experimental Psychology, Vol. 23, No. 4,* 1196-1205.
29. Cubitt, R. & Munro A. & Starmer, C. (2000). Preference Reversal: An Experimental Investigation of Economic and Psychological Hypothesis. Economic and Social Research Council.
30. Tversky, A. & Slovic, P. & Kahneman, D. (1990). The Causes of Preference Reversal. *The American Economic Review*, Vol. 80, No. 1 (Mar., 1990), pp. 204-217
31. Li, Shu. (2006). Preference Reversal: A new look at an old problem. *The Psychological Record*, 2006, 56, 411-428.

Appendix

Dummy Product Test			
	Brands	Quality Rating	Price
1 Control	A	90	14200
	B	60	9500
2 R_a	A	90	14200
	B	60	9500
	C	90	14900
3 F_a	A	90	14200
	B	60	9500
	C	82	14200
4 RF_a	A	90	14200
	B	60	9500
	C	82	14900

Real Product Test			
	Brands	Quality Rating	Price
1 Control	Phone A	90	14200
	Phone B	60	9500
2 R_a	Phone A	90	14200
	Phone B	60	9500
	Phone C	90	14900
3 F_a	Phone A	90	14200
	Phone B	60	9500
	Phone C	82	14200
4 RF_a	Phone A	90	14200
	Phone B	60	9500
	Phone C	82	14900

5 R_b	A	90	14200
	B	60	9500
	C	54	9500

5 R_b	Phone A	90	14200
	Phone B	60	9500
	Phone C	54	9500

6 F_b	A	90	14200
	B	60	9500
	C	60	10200

6 F_b	Phone A	90	14200
	Phone B	60	9500
	Phone C	60	10200

7 RF_b	A	90	14200
	B	60	9500
	C	54	10200

7 RF_b	Phone A	90	14200
	Phone B	60	9500
	Phone C	54	10200

AT1: Test description

Gender	Frequency
Females	83
Males	176
Grand Total	**259**

AT2: Gender distribution of samples

Age Group (years)	Frequency
20 – 22	59
22 – 24	79
More than 24	121
Grand Total	**259**

AT3: Age distribution of samples

Yearly Family Income (Rs)	Frequency
Less than 300,000	21
300,000 – 500,000	65
500,000 – 700,000	55
More than 700,000	118
Grand Total	**259**

AT4: Income distribution of samples

Product tested	Frequency
Dummy Product	166
Real Product	93
Grand Total	**259**

AT5: Products tested in samples