

A Neuroeconomic Approach To The Rationality And Homoeconomicus Concepts And The Research Discussed In The Frontal Lobe, Reptilian Brain And Serotonin Levels Basis

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Abstract

After developments of methodological techniques in neurology, especially since fMRI was started to use for social sciences research, process of individual decision and behaviour in human models of economic theories have been started to determine rationally and these methods have been started to use in reality, too. In this context, discussing the social sciences research in the base of neurology has increased the methodological efficiency of social sciences research. The literature search of this study was developed with the relation between methodological techniques of discussion of the findings and rationality and homoeconomicus concepts of economics.

In this research, a consumption desire scale was developed and the correlation of consumption desire and serotonin levels that change seasonally were analysed. The findings show that there is a positive correlation between serotonin levels and consumption desire. The relation between consumption desire and actual purchase was also analysed in this research and higher rise in consumption desire, based on serotonin levels, was determined. Approximately at the rate of 10% inhibition has been found. Consequently, these findings were discussed as the reptilian brain, which is the ultimate decision maker in purchasing and consumption decision and behavior, is inhibited by frontal lobe at this rate. The discussions were made in the perspective of neuroeconomics.

In the suggestions part of the study, methodological evaluations were made for other studies to be carried out in the economics, especially for marketing, by comparing with the methods of this study. Neuromethodological self-criticism of this study was made in the limitations part of the text.

Keywords: Neuroeconomics, Methodology, Serotonin, Frontal Lobe, Reptilian Brain, Consumption, Purchase

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Homöekonomik Ve Rasyonelite Kavramlarına Nöroekonomik Yaklaşım Ve Serotonin Seviyesi, Frontal Lob Ve Sürüngen Beyin Sınırlılığında Uygulanan Bir Araştırma

Özet

Nöroloji alanındaki yöntemsel teknik gelişmelerin ardından, özellikle fMRI'nin sosyal bilimlerde kullanıma başlandığından bu yana, ekonomi teorileri oluşturulurken modellenen bireylerin karar alma ve davranış süreçleri rasyonel bir şekilde tespit edilmeye başlanmış ve bu yöntem yine realitede beklenen karar alma ve davranış tiplerini öngörmeye de kullanılmaya başlanmıştır. Bu bağlamda sosyal bilimlerde yapılan araştırmaların, nörolojik tabanda yorumlanması da çalışmaların etkinliğini artırmayı yöntemsel olarak sağlamıştır. Çalışmanın literatür taraması saha araştırmasındaki bulguların yorumlanmasıyla ilintili olarak rasyonelite ve homöekonomik kavramları tabanında geliştirilmiştir.

Araştırmada tüketim arzusu ölçeği geliştirilmiş ve bu tüketim arzusu ile mevsimsel geçişlere bağlı olarak değişen serotonin seviyesinin korelasyonu incelenmiştir. Bulgular değişkenliği diğer nörotransmitterlere göre fazla olan serotonin seviyesi ile tüketim arzusu arasında paralellik olduğu görülmüştür. Ayrıca anket çalışmasında tüketim arzusu ile fiili satın alma arasındaki ilişki de incelenmiş ve tüketim arzusundaki artış, fiili satın almadan yüksek olduğu tespit edilerek analiz edilmiş ve yaklaşık %10 oranında ket vurulduğu ölçülmüştür. Bu bulgular ise satın alma ve tüketim kararı ile davranışında nihai karar verici olan sürüngen beyne, frontal lob tarafından bu oranda ket vurulduğu yönünde değerlendirilerek bulgular nörolojik tabanda yorumlanmıştır.

Sonuç olarak araştırmanın öneriler kısmında ise pazarlama başta olmak üzere ekonomi alanında yapılacak çalışmalar için yöntemsel değerlendirmeler yapılmış ve daha çok çalışmanın nöroekonomik metodolojisi değerlendirilmiştir. Sınırlılıklar bölümünde ise yine araştırmada uygulanan yöntemlerin nörometodolojik özelleştirilmesi yapılmıştır.

Anahtar Kelimeler: Nöroekonomi, Metodoloji, Serotonin, Frontal Lob, Sürüngen Beyni, Tüketim, Satın Alma

1. Rationality and Homoeconomicus Concepts

Before discussing the definition and historical development of rationalism, it is necessary to refer to the concept of “rational person”, which is used in other sciences, especially in economics, sociology, philosophy and psychology. For making the theories that have been developed for social sciences become operative and self-consistent, the decision and behaviours of the individuals involved in the models must be predictable. Understanding this fact has an important place to understand why the rational human models have been created and preferred in the theories.

If we need to define rationality, it is to make the most likely choice to be true in the base of the information that one has¹. When this definition in the literature is examined, it is seen that rationality involves the person which makes the right choice with the current knowledge. But, no opinion has given on the accuracy of the information and discussion of this information. When rationality concept is examined in the base of this definiton, it is possible to say that, it dates back to the rationality concept of Aristotales –Human beings are a rational animal-². This hypothesis in the literature has been used by philosophers throughout history. After developing Classical Economics that was constituted by Adam Smith, rationality concept has been started to be used intensely in the economic theories. According to Classical Theory, individuals have accurate information about the market, right along with being rational. This model has been named as Homoeconomicus concept³. The studies about homoeconomicus concept continued in the measurement of the utility more with the scope of economic theory. In this context, Cardinal and Ordinal Utility Theories were developed in the prospect of Homoeconomicus concept⁴. Final modern criticisms were made by Stiglitz and Akerlof in the 90's and Kahneman and Tversky in the 2000's in the scope of Revisionist Approaches in economics⁵.

The era that Classical Economics played an important role in economic policies practically, there were serious criticisms for Classical Theory, too, especially for the Homoeconomicus hypothesis. The first systematic criticism was made by Simon under the name of Bounded Rationality Model. According to Bounded Rationality Model approach, individuals take decision under the influence of psychological, social and cultural facts⁶. So, according to the Bounded Rationality Model individuals are faraway from the homoeconomicus.

The criticisms that were made in the context of rationality to the homoeconomicus concept have been explained as the main factors that influence humans behaviour

1 Stuars Sutherland, *Irrationality: The Enemy Within*, London: Pinter&Martin Ltd.2013, s.4

2 Sutherland, age, s.2

3 Billur Şeniğne, *Rasyonalite Kavramına Deneysel ve Davranışsal İktisat Bağlamında Yeni Bir Bakış Açısı: “Nöroiktisat”*, İstanbul: T.C.Marmara Üniversitesi Sosyal Bilimler Enstitüsü İktisat Anabilim Dalı Uluslar Arası İktisat Bilim Dalı Doktora Tezi. 2011, S.5

4 Praag Van, Bernard M.S. . “Ordinal and Cardinal Utility: An Integration of the Two Dimensions of the Welfare Concept”, *Journal of Econometrics*,1991,s.69

5 Meltem Kaynaş, *Tüketicilerin Mantıksal Olmayan Davranışlarının Ekonomik Sonuçları*, İstanbul: T.C.İstanbul Kültür Üniversitesi Sosyal Bilimler Enstitüsü Yüksek Lisans Tezi. 2012, s.10

6 Kaynas, age, s10

and decision processes and these are unconscious mind, intrinsic motivators, unconscious needs and unconscious conflicts⁷. On the other hand, another hypothesis of homoeconomicus is having accurate information about the market has been criticised in the asymmetric information basis. In the literature, asymmetric information has been defined as the difference of information between suppliers and demanders. The change in the literature was made by George Akerlof with his famous study "Market for Lemons: Quality Uncertainty and the Mechanism"⁸.

If asymmetric information is discussed in the context of globalization, it is obvious that it has not decreased. On the contrary, it has increased because of the infollution⁹. Especially the internet has been disambiguated people to the infollution and manipulation because of being open and unchecked source.

2. The Homoeconomicus Concept in the Base of Neuroeconomics

The neuroeconomic literature search should be participated in this study. Because operative research of this study was discussed in the neuroeconomic basis.

The studies that can be defined as classical approaches has added classical information to the literature that were found by classical methods. But the examining the classical informations with rational data became possible with the favour of multidisciplinary studies. The main support of these multidisciplinary studies is constituted by neuroeconomics. Imaging and mapping of the brain have become possible with the favour of technologic developments in neurologic methodology since 90's¹⁰ and thus examining the human models in social sciences theories rationally became possible in the neurologic basis. In this context, neuroeconomics was used as a term in a research that implemented with fMRI by a firm from US in 2002¹¹. The use of neuroeconomics concept in academic literature was made by Kevin McCabe from George Mason University in 1998¹².

Neuroeconomic studies mostly hinge upon the observation of neurological function process of brain. As a result of these studies, the first findings that are related with rationality show that rationality and bounded rationality concepts are specific

7 Cengiz Güleç, "Homo Economicus, Psikiyatri, İktisat ve Ötesi", İstanbul Üniversitesi İktisat Fakültesi Mezunlar Cemiyeti İktisat Dergisi, 2004, s.453

8 Sumeyra Duman Kurt. Davranışsal Ekonomi Yaklaşımlarının Tüketici Karar Verme Tarzları ile Açıklanması ve Bir Uygulama, İzmir: T.C.Dokuz Eylül Üniversitesi Sosyal Bilimler Enstitüsü İşletme Anabilim Dalı İşletme Programı Doktora Tezi, 2011, s.40-41

9 Hüseyin Çağatay Karabiyik, Nöröpazarlama Çerçevesinde Tüketici Teorisi ve Yeniden Tanımlanması Gereken Homoekonomikus Kavramı, Konya: T.C.Konya Necmettin Erbakan Üniversitesi Sosyal Bilimler Enstitüsü Yüksek Lisans Tezi, 2016, s.58

10 Duman Kurt, age, s.34

11 Carl Eric Fisher, vd. , "Defining Neuromarketing: Practices and Professional Challenges", National Institutes of Health, 18, 4, 2010, s.231.

12 Haldun Soydal, . Yeni Ekonomi, 1.Baskı, Konya: Palet Yayınları, 2010, s.99

circumstances that occur in the specific parts of the brain¹³. When the study results are discussed, it is possible to say that the studies of Classical Economics are based on observing the human behaviours, but neuroeconomic studies are based on investigating the decision-making process itself in the neurology basis. From this perspective it is obvious that neuroeconomics does not use deductive methods as much as Classical Economics. On the other hand, it is possible to say that, neuroeconomics focuses on the non-linear results, too¹⁴. If other developments of neuroeconomics are examined, it appears that neuroeconomics divided into subdisciplines by developing in 2000's.

In this study, the findings that acquired from the "rationality of the individuals" part of the survey were discussed in the frame of neuroeconomics. So it is necessary to search literature on the neurologic perspective of individuals purchase and consumption behaviours.

3. The Human Physiology in the Frame of Neuroeconomics

It is scientifically known that buying and consumption behaviours and decisions occur in the neurologic basis. Inputs that are provided by perceptions are interpreted by brain. As a consequence of this, individuals take decisions about purchase and consumption by process of brain and behave like that as well¹⁵.

The neurology of behaving purchase comes true with the relation between frontal lobe and reptilian brain, with the influence of amygdala. The reptilian brain that is the oldest part of the brain has existed for 450 million years and manages the mechanism of "fight or flight" and intrinsic motivators¹⁶. The main approaches of reptilian brain are egocentric, hasty, reactive to the inputs that include contrasts, according to tangible data and result-orientedness¹⁷. One of the data obtained by neuromarketing studies is that reptilian brain is the ultimate decision maker for purchasing decision and it makes decision in the base of its basic functions such as sexual activities, competition, eating and consumption¹⁸. Reptilian brain, the ultimate decision maker on purchasing, contradicts with homo-economic hypothesis of Classical Economics because of its approach to individuals as a rational decision maker. On the other hand, it is possible to say that rational decision maker part of the brain is frontal lobe. But, frontal lobe is not the ultimate decision maker. Its function is to perform a "Stop!" mechanism to the decision or desire that come from the reptilian brain¹⁹. In

13 Colin Cameer, George Loewenstein ve Drazen Prelec, "How Neuroscience Can Inform Economics", *Journal of Economic Literature*, 2005, s.31

14 Karabiyik, age s.72

15 Karabiyik, age s.81

16 Joseph LeDoux, . "The Emotional Brain, Fear, and the Amygdala", *Cellular and Molecular Neurobiology*, 23, 4-5, 2003, s. 727.

17 Patrick Renvoise, ve Christophe Morin . *Nöromarketing*, 3.Baskı, İstanbul: Mediacat Kitapları, 2015, s.23-28

18 Joseph LeDoux, . "Emotion Circuits in the Brain", *Annu.Rev.Neuroscience*, 2000, s.155

19 Karabiyik, age, s.84

daily life, the frontal lobe functions as the differentiation of options and showing the gains by rational analyses²⁰. Even if the frontal lobe gets involved to the purchasing and consumption process by rational analyses, it is important not to ignore the fact that ultimate decision is taken by reptilian brain which cannot perform rational functions. Likewise, if this process is evaluated in the perspective of neurobiochemicals it is obvious that emotions are very effective in the whole process of decision and behaviour and it means that neurobiochemicals, especially neurotransmitters, affect the whole process even rational part of the process, too²¹.

As an overview on neurology of purchase decision and desire, it is possible to say that reptilian brain makes the final decision for the process with the partial effects of data that are acquired from the frontal lobe by rational analyses. During this process, the other factors that affect the mood of person are neurotransmitters. The consequence part of this study was discussed in the base of these factors.

4. An Applied Research: At What Rate, Does The Frontal Lobe Decrease the Consumption and Purchase Desire by Rational Data

4.1. The Model of Research

This research was designed to find at what rate, consumption desire and actual purchase that irrationally come from reptilian brain are decreased by frontal lobe. The examining Serotonin levels that change depending upon the seasons and the effects of this change in consumption desire and purchase is at the center of the research. The increase in the serotonin level was confirmed by the emotional changes in people such as energy and happiness with examining blood values as well. The neurologic studies in literature show that the amount of serotonin changes from 5% to 34% in the different regions of the brain in summer²². When the data obtained from Parschak-Rieder's study were given value relative mean, serotonin levels changing in the base of season changes is 12.85%²³. The findings that were obtained by the survey which was applied according to the consumption desire scale were discussed in the perspective of Parschak-Rieders's findings.

4.2. The Hypotheses of Research

The hypotheses of the research were developed in the frame of correlation between serotonin levels and consumption desire-purchase. Hypotheses of the research are:

20 Renvoise, age, s.71

21 Joseph LeDoux, "Feelings: What Are They & How Does the Brain Maket hem?", American Academy of Arts & Sciences, 2015, s.97

22 Nicole Praschak-Rieder, "Seasonal Variation in Human Brain Serotonin Transporter Binding", Arch Gen Psychiatry, 2008, s.1072-1074

23 Karabiyik, age, s.123

There is a positive correlation between serotonin levels and consumption desire.

Increase in consumption desire levels regarding to serotonin levels is higher than actual purchase because of inhibition of frontal lobe.

4.3. Sampling And Discussion Process of the Research

The sample space of survey is:

The people who live in Turkey/Konya City

The people who have regular income

The people who predict not having financial risks in the near future

“ $n = N \cdot t^2 \cdot p \cdot q / d^2 (N-1) + t^2 \cdot p \cdot q$ ” formula was used to determine the sample size that can represent the sample space.

According to this formula:

N: The number of individuals in the target group

n: The number of individuals in the sample

p: The frequency of observed events

q: The frequency of not observing events

t: Theoretical value found according to t table at a certain level of significance

d: \pm Sampling error admitted according to the frequency of appearance

The survey was applied to 434 people with 95% confidence interval ($\pm 5\%$ sampling error) for inhomogeneous sample space and the descriptive model was preferred. The survey has 30 statements and each statement has options 1 to 5 for summer and winter. Cronbach Alpha was calculated for confidence test and high reliability has acquired with the value of 0.965. Varimax method was preferred for factor analysis so the relation structure between the factors was kept stable. The four main factors were established by choosing the ones that have 65.792% total variance between variables. Factors were named as:

F1: Hedonic consumption

F2: Perception of Self-Rationality rates

F3: Social effect rates

F4: Social consumption rates

4.4. The findings of the Research

Factor structures of consumption desire scale as seen at Table 1

Factor	Statement	Factor Value	Variance	Cronbach'sAlpha
F1 (Hedonic Consumption Rates) (Value=15.420)	Shopping makes me pleasure and happy	0,822	37,394	0,971
	Shopping makes me pleasurable	0,814		
	Trying new products gives me excitement	0,807		
	I feel energetic and happy for shopping	0,774		
	I occasionally do shopping to be happy	0,772		
	I want to have products by searching new trends	0,751		
	Shopping makes me relaxed, psychologically	0,750		
	I feel free during the shopping	0,733		
	I do shopping as a hobby	0,725		
	I like to find and buy new products	0,716		
	I do shopping to spend free time	0,714		
	I want to buy immediately when I see a product that excites me	0,709		
	My shopping behaviour is influenced from my instant mood	0,685		
	I visit local and online stores of brands that I follow	0,681		
	Campaigns and opportunities influence my shopping behaviour	0,646		
	Aesthetic, colorful and vivid places increase my shopping instinct	0,634		
	I do non-obligatory shopping for myself	0,617		
I do shopping without considering	0,615			
I make purchase decisions by my emotions	0,614			
There is times that I can not suppress my desire to buy something even I do not need it	0,574			
There is times that I shop more than I need	0,530			
There is times that I do unplanned shopping	0,523			
F2 (Perception of Self-Rationality Rates) (Value=1.694)	I think I am Homoeconomicus	0,831	12,148	0,840
	My consumption behaviours are rational	0,816		
F3 (Social Effect Rates) (Value=1.336)	People around me influence me when I buy something	0,755	9,131	0,687
	Shopping in crowded places makes me feel that I am doing right thing during the shopping	0,697		
	My acquaintances increase my consumption pleasure	0,655		
	I see shopping as an adventure and follow it	0,493		
F4 (Social Consumption Rates) (Value=1.287)	I go places like cinema, cafe etc. to socialise	0,767	7,119	0,671
	There is times that I go out to taste new things	0,752		
Total Variance 65.792%				

Table 1. Factor structures of consumption desire scale

4.4.1. Demographic Findings

Statement	Groups	Frequency(n)	Rate(%)
Gender	Female	210	48,4
	Male	224	51,6
	Total	434	100,0
Age	20-30	190	43,8
	31-40	171	39,4
	Over 40	73	16,8
	Total	434	100,0
Marital Status	Married	235	54,1
	Single	199	45,9
	Total	434	100,0
Education Level	High School	56	12,9
	Associate Degree	53	12,2
	Bachelor Degree	264	60,8
	Master & Doctorate	61	14,1
	Total	434	100,0
Monthly Income	1000 TL or less	25	5,8
	1001-2000 TL	97	22,4
	2001-3000 TL	144	33,2
	3001-4000 TL	113	26,0
	4001-5000 TL	39	9,0
	Over 5000 TL	16	3,7
	Total	434	100,0
Economic Freedom	Never	62	14,3
	Sometimes	218	50,2
	Always	154	35,5
	Total	434	100,0
Economic Freedom of Acquaintances	Yes	81	18,7
	No	90	20,7
	Partly	263	60,6
	Total	434	100,0
Influencing From My Acquaintances Shopping Habits	Yes	45	10,4
	No	149	34,3
	Partly	240	55,3
	Total	434	100,0

Table 2. Distribution of demographic features

4.4.2. The “Consumption Desire” Findings of Summer and Winter

	Never		Rarely		Sometimes		Usually		Always		Avr	Ss
	f	%	f	%	f	%	f	%	f	%		
There are times that I do unplanned shopping	86	19,8	179	41,2	130	30,0	31	7,1	8	1,8	2,300	0,928
I feel energetic and happy for shopping	54	12,4	132	30,4	125	28,8	98	22,6	25	5,8	2,790	1,103
There is times that I do shopping more than I need	70	16,1	193	44,5	114	26,3	43	9,9	14	3,2	2,400	0,978
People around me influence me when I buy something	115	26,5	173	39,9	96	22,1	40	9,2	10	2,3	2,210	1,010
I go places like cinema, cafe etc. to socialise	70	16,1	134	30,9	120	27,6	85	19,6	25	5,8	2,680	1,132
I like to find and buy new products	39	9,0	111	25,6	169	38,9	98	22,6	17	3,9	2,870	0,991
Aesthetic, colorful and vivid places increase my shopping instinct	99	22,8	195	44,9	72	16,6	56	12,9	12	2,8	2,280	1,041
Shopping in crowded places makes me feel that I am doing right thing during the shopping	162	37,3	171	39,4	71	16,4	24	5,5	6	1,4	1,940	0,939
I want to have products by searching new trends	67	15,4	131	30,2	147	33,9	74	17,1	15	3,5	2,630	1,045
Campaigns and opportunities influence my shopping behaviour	26	6,0	82	18,9	140	32,3	140	32,3	46	10,6	3,230	1,061
I want to buy immediately when I see a product that excites me	39	9,0	130	30,0	138	31,8	96	22,1	31	7,1	2,880	1,075
My shopping behaviour is influenced from my instant mood	61	14,1	150	34,6	106	24,4	74	17,1	43	9,9	2,740	1,188
There is times that I can not suppress my desire to buy something even I do not need it	115	26,5	168	38,7	103	23,7	35	8,1	13	3,0	2,220	1,023
I occasionally do shopping to be happy	123	28,3	155	35,7	100	23,0	37	8,5	19	4,4	2,250	1,091
I do shopping without considering	132	30,4	167	38,5	94	21,7	36	8,3	5	1,2	2,110	0,972
Shopping makes me pleasurable	51	11,8	102	23,5	127	29,3	116	26,7	38	8,8	2,970	1,151
I do shopping to spend free time	143	32,9	146	33,6	104	24,0	27	6,2	14	3,2	2,130	1,046
Trying new products gives me excitement	58	13,4	116	26,7	141	32,5	102	23,5	17	3,9	2,780	1,071
My acquaintances increase my consumption pleasure	146	33,6	166	38,2	84	19,4	21	4,8	17	3,9	2,070	1,036
I see shopping as an adventure and follow it	255	58,8	93	21,4	48	11,1	34	7,8	4	0,9	1,710	1,006
There is times that I go out to taste new things	40	9,2	128	29,5	167	38,5	75	17,3	24	5,5	2,800	1,011
I visit local and online stores of brands that I follow	50	11,5	106	24,4	131	30,2	119	27,4	28	6,5	2,930	1,111
I feel free during the shopping	67	15,4	116	26,7	134	30,9	87	20,0	30	6,9	2,760	1,144
I think I am homoeconomicus	33	7,6	59	13,6	112	25,8	137	31,6	93	21,4	3,460	1,187
My consumption behaviours are rational	9	2,1	52	12,0	103	23,7	164	37,8	106	24,4	3,710	1,031
I make purchase decisions by my emotions	89	20,5	170	39,2	107	24,7	55	12,7	13	3,0	2,380	1,040
I do non-obligatory shopping for myself	110	25,3	193	44,5	105	24,2	20	4,6	6	1,4	2,120	0,889
I do shopping as a hobby	139	32,0	153	35,3	102	23,5	33	7,6	7	1,6	2,120	0,997
Shopping makes me relaxed, psychologically	74	17,1	125	28,8	143	32,9	66	15,2	26	6,0	2,640	1,112
Shopping makes me pleasure and happy	56	12,9	113	26,0	145	33,4	87	20,0	33	7,6	2,830	1,121

	Never		Rarely		Sometimes		Usually		Always		Avr	Ss
	f	%	f	%	f	%	f	%	f	%		
There is times that I do unplanned shopping	19	4,4	79	18,2	169	38,9	116	26,7	51	11,8	3,230	1,021
I feel energetic and happy for shopping	13	3,0	52	12,0	97	22,4	134	30,9	138	31,8	3,760	1,113
There is times that I do shopping more than I need	27	6,2	77	17,7	146	33,6	128	29,5	56	12,9	3,250	1,085
People around me influence me when I buy something	98	22,6	135	31,1	133	30,6	54	12,4	14	3,2	2,430	1,068
I go places like cinema, cafe etc. to socialise	40	9,2	81	18,7	113	26,0	120	27,6	80	18,4	3,270	1,224
I like to find and buy new products	21	4,8	54	12,4	97	22,4	118	27,2	144	33,2	3,710	1,187
Aesthetic, colorful and vivid places increase my shopping instinct	55	12,7	86	19,8	159	36,6	92	21,2	42	9,7	2,950	1,142
Shopping in crowded places makes me feel that I am doing right thing during the shopping	138	31,8	117	27,0	121	27,9	49	11,3	9	2,1	2,250	1,084
I want to have products by searching new trends	44	10,1	77	17,7	87	20,0	93	21,4	133	30,6	3,450	1,352
Campaigns and opportunities influence my shopping behaviour	15	3,5	47	10,8	98	22,6	115	26,5	159	36,6	3,820	1,143
I want to buy immediately when I see a product that excites me	13	3,0	64	14,7	97	22,4	135	31,1	125	28,8	3,680	1,128
My shopping behaviour is influenced from my instant mood	16	3,7	35	8,1	76	17,5	146	33,6	161	37,1	3,920	1,094
There is times that I can not suppress my desire to buy something even I do not need it	56	12,9	76	17,5	125	28,8	121	27,9	56	12,9	3,100	1,216
I occasionally do shopping to be happy	63	14,5	64	14,7	122	28,1	123	28,3	62	14,3	3,130	1,253
I do shopping without considering	83	19,1	83	19,1	111	25,6	118	27,2	39	9,0	2,880	1,255
Shopping makes me pleasurable	23	5,3	51	11,8	91	21,0	121	27,9	148	34,1	3,740	1,197
I do shopping to spend free time	83	19,1	71	16,4	108	24,9	118	27,2	54	12,4	2,970	1,304
Trying new products gives me excitement	40	9,2	63	14,5	81	18,7	98	22,6	152	35,0	3,600	1,337
My acquaintances increase my consumption pleasure	125	28,8	125	28,8	114	26,3	41	9,4	29	6,7	2,360	1,183
I see shopping as an adventure and follow it	146	33,6	114	26,3	98	22,6	60	13,8	16	3,7	2,280	1,172
There is times that I go out to taste new things	30	6,9	63	14,5	139	32,0	114	26,3	88	20,3	3,380	1,162
I visit local and online stores of brands that I follow	31	7,1	55	12,7	103	23,7	100	23,0	145	33,4	3,630	1,260
I feel free during the shopping	26	6,0	60	13,8	107	24,7	135	31,1	106	24,4	3,540	1,173
I think I am homo-economicus	160	36,9	104	24,0	92	21,2	65	15,0	13	3,0	2,230	1,183
My consumption behaviours are rational	127	29,3	104	24,0	93	21,4	84	19,4	26	6,0	2,490	1,259
I make purchase decisions by my emotions	24	5,5	66	15,2	96	22,1	123	28,3	125	28,8	3,600	1,207
I do non-obligatory shopping for myself	59	13,6	81	18,7	120	27,6	119	27,4	55	12,7	3,070	1,229
I do shopping as a hobby	71	16,4	83	19,1	109	25,1	111	25,6	60	13,8	3,010	1,288
Shopping makes me relaxed, psychologically	35	8,1	60	13,8	89	20,5	100	23,0	150	34,6	3,620	1,300
Shopping makes me pleasure and happy	22	5,1	56	12,9	87	20,0	103	23,7	166	38,2	3,770	1,227

Table 4. Distributions of answers of the summer consumption desire

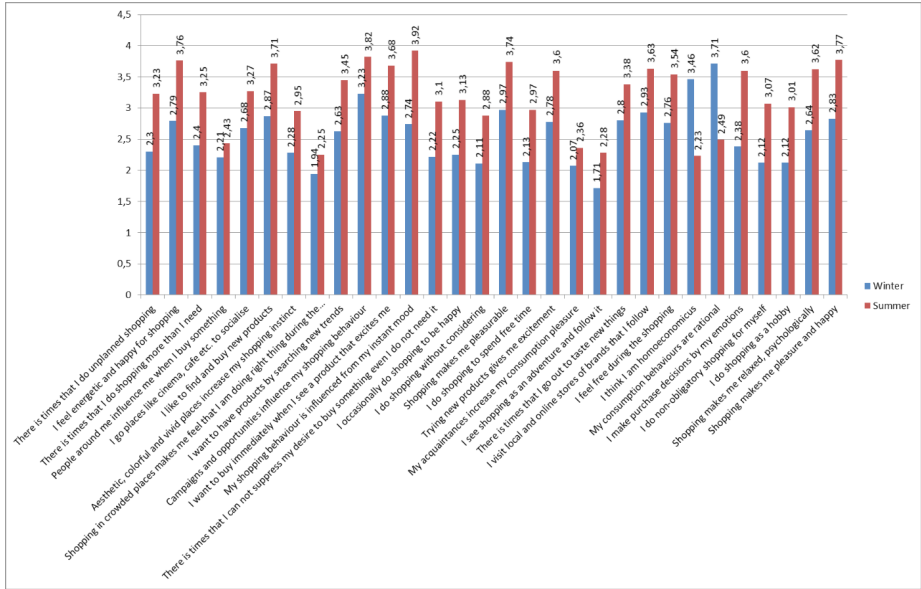
4.5. The Analyses of Findings and Conclusion

Until this point, no discussion was given about the findings. The Tables from 1 to 4 just present the findings of survey to give a detailed information to the readers. The discussion was made in this title. For this, Table 5 was established by consolidating tables 3 and 4 to discuss properly. The comparative findings were showed at the table 5.

Statements	Winter		Summer		N	t	p
	Avr	Ss	Avr	Ss			
There is times that I do unplanned shopping	2,300	0,928	3,230	1,021	434	-19,175	0,000
I feel energetic and happy for shopping	2,790	1,103	3,760	1,113	434	-19,059	0,000
There is times that I do shopping more than I need	2,400	0,978	3,250	1,085	434	-17,589	0,000
People around me influence me when I buy something	2,210	1,010	2,430	1,068	434	-6,747	0,000
I go places like cinema, cafe etc. to socialise	2,680	1,132	3,270	1,224	434	-11,427	0,000
I like to find and buy new products	2,870	0,991	3,710	1,187	434	-17,080	0,000
Aesthetic, colorful and vivid places increase my shopping instinct	2,280	1,041	2,950	1,142	434	-14,685	0,000
Shopping in crowded places makes me feel that I am doing right thing during the shopping	1,940	0,939	2,250	1,084	434	-8,398	0,000
I want to have products by searching new trends	2,630	1,045	3,450	1,352	434	-15,848	0,000
Campaigns and opportunities influence my shopping behaviour	3,230	1,061	3,820	1,143	434	-13,762	0,000
I want to buy immediately when I see a product that excites me	2,880	1,075	3,680	1,128	434	-15,189	0,000
My shopping behaviour is influenced from my instant mood	2,740	1,188	3,920	1,094	434	-17,975	0,000
There is times that I can not suppress my desire to buy something even I do not need it	2,220	1,023	3,100	1,216	434	-16,867	0,000
I occasionally do shopping to be happy	2,250	1,091	3,130	1,253	434	-17,126	0,000
I do shopping without considering	2,110	0,972	2,880	1,255	434	-14,981	0,000
Shopping makes me pleasurable	2,970	1,151	3,740	1,197	434	-15,136	0,000
I do shopping to spend free time	2,130	1,046	2,970	1,304	434	-16,393	0,000
Trying new products gives me excitement	2,780	1,071	3,600	1,337	434	-15,601	0,000
My acquaintances increase my consumption pleasure	2,070	1,036	2,360	1,183	434	-7,994	0,000
I see shopping as an adventure and follow it	1,710	1,006	2,280	1,172	434	-12,299	0,000
There is times that I go out to taste new things	2,800	1,011	3,380	1,162	434	-10,437	0,000
I visit local and online stores of brands that I follow	2,930	1,111	3,630	1,260	434	-14,763	0,000
I feel free during the shopping	2,760	1,144	3,540	1,173	434	-15,560	0,000
I think I am homoeconomicus	3,460	1,187	2,230	1,183	434	18,093	0,000
My consumption behaviours are rational	3,710	1,031	2,490	1,259	434	17,486	0,000
I make purchase decisions by my emotions	2,380	1,040	3,600	1,207	434	-17,431	0,000
I do non-obligatory shopping for myself	2,120	0,889	3,070	1,229	434	-18,626	0,000
I do shopping as a hobby	2,120	0,997	3,010	1,288	434	-17,939	0,000
Shopping makes me relaxed, psychologically	2,640	1,112	3,620	1,300	434	-17,926	0,000
Shopping makes me pleasure and happy	2,830	1,121	3,770	1,227	434	-17,805	0,000

Table 5. Distributions of answers of the summer and winter consumption desire

Graphic 1. Graphic view of Schedule 5



The scale points were divided into five parts to discuss as:

1.00-1.79 very low

1.80-2.59 low

2.60-3.39 average

3.40-4.19 high

4.20-5.00 very high

The Table 5 shows that all statements that increases together with the serotonin level in summer. It shows the positive correlation between serotonin levels and consumption desire. On the other hand the participants of survey admitted that they are more rational in winter. So, this finding gave similar results with consumption desire results. If the average values of consumption desire statements (it means all statements except statements about the rationality and homo-economicus) are compared, it is obvious that average value of the winter is 2.49 and the summer is 3.26. It means people have 30.92% more consumption desire in summer. This rate makes sense with Parschak-Rieder's study that found the amount of serotonin increases from 5% to 34% in the different regions of the brain in summer by taking value between 5% and 34%²⁴. On the other hand, the average value of being homo-economicus and rati-

onal statements are 3.59 in winter and 2.36 in summer. So it means people think that they are less rational in summer at the rate of 34.26% and this rate shows that people are rationally aware of the change of their rationality in summer. As the findings have very similar rates with each other as 30.92% increase in consumption desire and 34.26% decrease in rationality and being homoeconomicus.

In addition to these analyses, the survey has 10 statements that were divided as their relation with consumption desire and actual purchase. The differences between desire and actual purchase were analysed by these statements as well. These statements and their values have been showed in schedules 6 and 7.

Statement	Change
I feel energetic and happy for shopping	0,97
I want to have products by searching new trends	0,82
Trying new products gives me excitement	0,82
I want to buy immediately when I see a product that excites me	0,80
I visit local and online stores of brands that I follow	0,70
Total Change	4,11

Table 6. Statements that relevant to consumption desire and their changes (The increase rates that are observed in summer)

Statement	Change
There is times that I can not suppress my desire to buy something even I do not need it	0,88
I like to find and buy new products	0,84
I do shopping without considering	0,77
Campaigns and opportunities influence my shopping behaviour	0,59
I see shopping as an adventure and follow it	0,57
Total Change	3,65

Table 7. Statements that relevant to actual purchase and their changes (The increase rates that are observed in summer)

Table 6 and 7 show that there is 4.11 points increase in consumption desire in summer but actual purchases increased 3.65 point in summer. There is a difference between increase in consumption desire and actual purchase at the rate of 11.19%. Actual consumption increases 11.19% less than desired consumption. If this difference is discussed in the frame of neuroeconomics, it is possible to say that the frontal lobe inhibits the consumption desire in the base of actual purchase at the rate of 11.19%. So, it makes sense to predict approximately 10% decrease between economic desires and actual phenomenon in other neuroeconomic research.

4.6. The Limitations of the Study

The limitations of the research are as follows:

The homo-economic concept was discussed in the frame of consumer behaviour theory. The other fields as investment or management were kept out of the study.

Neuroeconomic methods were not directly used in this study. Instead, neuro-economic information were accepted as true like “*ceteris paribus*” and the findings of the survey were discussed in the frame of neuroeconomics.

According to the neuromethodology, the behaviours like consumption decision and purchase that are done by reptilian brain were measured by using this survey that is a method done by frontal lobe. So it means, the survey methods ask questions to the frontal lobe but, in this survey, the questions about the issue are done by reptilian brain in reality. So, it is a paradox for survey methods. The possible differences in this basis were ignored.

4.7. Suggestions

This research shows that there is a positive correlation between serotonin levels – consumption and consumption desire – actual purchase. So, doing experimental research makes sense for this theory. This research is a preparatory for the experimental research such as pharmacologic and neuroimaging methods that could cost much.

To measure specifically and directly at what rate the frontal lobe inhibits the reptilian brain does not seem possible with the current technologic opportunities. But, examining rationally this research data is possible by designing an experimental research by using neuroimaging methods and pharmacological interferences at the same time

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