

## A Study on Investigation of Effect of Student's Intelligence Level over YGS (Examination for Transition to Higher Education) Success

Battal Odabasi

Assistant Professor, Faculty of Education, Aydin University, Istanbul, TURKEY

E-mail: [battalodabasi@aydin.edu.tr](mailto:battalodabasi@aydin.edu.tr)

**Abstract:** The purpose of this study was to investigate the relationship between the intelligence and success. The relational screening model was used for the study. Sample of the study was consisted of 40 students at grade 12 who were receiving education at a private teaching institution offering a service for YGS/LYS (Examination for Transition to Higher Education/ Undergraduate Placement Exam) during 2012-2013 academic year. The study investigated the relationship between students' intelligence level and their academic (YGS) success. Intelligence level of the students was measured by "Cattel Intelligence Test". The resulting data from measurement was analyzed by "t" test which is the difference approach to relationship between correlation technique and intelligence-success. SPSS 17.0 packet program was used for statistical calculation of analysis. The relationship between the intelligence and the success was examined at the end of the study and concluded that there is a significant relationship between them. Syllabus should be formed by the intelligence structure and type of individuals. Processes of program development should be performed according to individual's abilities and brain structure, taking into account of supporting and improving period.

[Battal Odabasi. **A Study on Investigation of Effect of Student's Intelligence Level over YGS (Examination for Transition to Higher Education) Success.** *Life Sci J* 2013;10(7s):976-982] (ISSN: 1097-8135). <http://www.lifesciencesite.com>. 159

**Keywords:** Intelligence, success, Cattel, Program development, syllabus.

### 1. INTRODUCTION

Definition of intelligence, what intelligence is, and how intelligence should be defined have been a subject in which many psychologists, psychiatrists, scientists and educators have been interested for long years. It is possible to find a variety of definitions with intelligence when reviewing the literature. There is not a single definition on which a consensus is reached. According to Spearman, the intelligence is a mental energy affecting the entire mental functions of an individual. Weschler defined the intelligence as a general ability of an individual to act purposefully, think rationally, and to deal effectively with their environment. Intelligence is an ability to understand the world, to think, and to effectively use your sources when you encounter with difficulties (Çakar & Arbak, 2004; Kulaksızoğlu, 2005; Fogarty & Stoehr, 2008). It is defined as a very general mental capacity including reasoning, planning, problem solving, abstract thinking, comprehension of complicated opinions, quick learning, and learning by experience. Intelligence is not only to learn what is in the books, pass the exams, or academic ability. On the contrary, it is much larger and deeper capacity enabling us to understand what is around us.

According to Alfred Binet who performed the first intelligence test, the intelligence is a tendency of heading for a certain goal, standing for to achieve the goal, adaptation and self-criticize. Binet also defines the intelligence as an ability of good reasoning, good

judgment and having a critical opinion (Kulaksızoğlu, 2005).

According to Gardner, intelligence is the total of specific skills and abilities contained in each individual in order to accord with the life and changes in a changing world. All people are born with these types of intelligence at a variety of levels and may be more prone to some of these types of intelligence (Vural, 2005).

Piaget defines the intelligence as general congenital cognitive ability underlying any types of complicated reasoning. Dictionary of psychology defines the intelligence in general meaning as a total of mental abilities such as abstract thinking, comprehension, problem solving, ability to apply what you know to new situations, reasoning, and using information gained from past experiences (Budak, 2003).

The intelligence has recently been defined to be multiple, functional and cultural. Some psychologists define the intelligence as cognitive characteristics, some define it emotional and personal characteristics while the others define it as competency to adapt to the environment. The intelligence is also a functional ability. Intelligent action always heads towards a problem to solve or task to complete (Titrek, 2007).

Intelligence is expression of cognitive competences and affective characteristics steering activities such as understanding, comprehension, association, integration, interpretation, evaluation, and

predictive during learning process. In this sense the intelligence is a complex concept affecting and covering any selection, classification, orientation, generation, and creation activities in an individual life. Because it is an abstract concept, it has always been a matter of debate in terms of either definition or measuring. The word "Intellectus" in Latin means perception, knowing, and understanding. Intelligence is a combination of many mental functions including perception, memory, learning, thinking, abstraction, and adaptation to new conditions (Köknel, 2003).

As seen in the definitions, intelligence incorporates many mental functions. Each individual has different mental functions which generates differences between persons even though each individual has the same intelligence level. Some people are successful at works requiring handcraft while others are successful at more abstract subjects (Baymur,1996;Gould,1996; Gürdal,2011; Özgüven, 2011; Toker et al.,1968; Bacanlı,2001; Demirel,2009; Elmacioğlu,1998; Kasatura, 1991; Selçuk et al., 2002; Bal & odabaşı,2012).

### 1.1. Academic Success

Success is achievement of something desired by acting planned in accordance with predefined objectives. Four means to lead an individual to success are desire, belief, strategy and patience. For an individual, the success is primarily academic success (progression of the student to achieve the predefined results determined by the school, class and lesson where she/he is in) and then success in life (success of family life, success of social life, and success of business life). In this sense, the question 'whether academic success determines the success in life' comes to the mind (Elmacioğlu, 1998).

A lot of factors affecting the success at school have been investigated. These factors basically include traditional intelligence (Terman, 1920), social abilities (Malecki & Eliot, 2002), family factor (Kasatura, 1991), friendship relations (Bjarnason, 2003) participating in social activities and social intelligence (Marsh, 1987; Bağçeci & Odabaşı, 2013, Rodegers, 1999), multiple intelligence (Gerdner, 1999) and sense of self (Can, 1986).

Many studies in the literature (Shaikh, 2004; Petrides, frederickson&furnham, 2004; Van der zee, Thijs & schakel; 2002, Celkan & odabaşı, 2010; Mayer et.al, 2000) find a significant positive relationship between the traditional intelligence and academic success (Odabaşı, 2011). However, long-term studies show that higher intelligence level did not bring with a general success. A study that was initiated by Terman in 1920 and still is in progress has periodically monitored a group of 1500 children with superior intelligence who have an intelligence level

higher than 140. It is found that the participants are more successful at school. This study also shows that having a superior intelligence does not always guarantee a successful graphic. Some significant failures were observed in the group studied by Terman. Superior intelligence does not mean higher academic success and success in life (Gould, 1996).

In another study in which a group of students graduated from Harvard was monitored until they reached at their middle age, Vallant (1977) found that those students with higher intelligence level and school success were not more successful than their friends in terms of performance and status. Sternberg (1985) believes that superior intelligence can lead to academic success but does not result in goal-oriented actions in other fields of life. In his opinion, people who have achieved success in line with their standards or others' standards are individuals who have gained skills in many fields, improved and implemented these skills rather than relying on static intelligence valued by only schools.

One of the most important determinants of academic success is family factor. It is known that students with peaceful and safe environment in the family have higher success at their lesson (Elmacioğlu, 1998). In addition, the relationship between the socio-economic level of the family and the academic success is significant. Academic success of children having a family with lower socio-economic level is lower than the others (Kasatura, 1991).

### 1.2. The relationship between the intelligence and the success

Success is achievement of something desired by acting planned in accordance with predefined objectives. Academic success and success in life are not same. For a child, the academic success is progression of the student to achieve the predefined results determined by the school, class and lesson where she/he is in. A study investigating success at school and success in life and continuing for twenty years has examined students' success at high school and their success in life in later years. According to the results of the study, the relation between the success at school and the success in life is directly proportional. However, there were individuals who had lower success in life despite higher success at school, or who were successful at family and friendship relations despite lower success at school.

The attitudes and behaviors that enable a student to benefit from education at school are social skills, motivation, working skills and determination. Many factors may determine a child success at school: e.g. traditional intelligence, social abilities, family factor, friendship relations, participating in the social activities, and sense of self. Many studies find

an association between the intelligence and the success at school; however long-term studies show that superior intelligence does not always bring with success. This is the point where we may think there are other factors involved in. Family life and social skills of students play an important role in being successful. On the other hand emotional intelligence appears to be associated closely with the success in the entire life.

## 2. STUDY METHOD

Relational screening model was used in this study. Relational screening models are intended to determine presence and/or degree of variation between two or more variables. In this system, variables between which a relationship is investigated are symbolized separately. This symbolization (giving a value, and measuring) is performed to allow a relational analysis. A relational analysis can be performed in two different ways. These are relations obtained by correlation type and through comparison (Karasar, 2010).

### 2.1. Subject of The Study

The subject of the study is the relationship between the intelligence and the success; the effect of intelligence over academic success; comparison of results from Cattell Intelligence Test applied on students preparing for university exam with their YGS points.

#### 1.2. Limitations

1. The sample of the study is limited to 40 YGS students at a private teaching institution in Bakirkoy during 2012-2013 academic year.
2. Measurement of intelligence of students included in the study is limited to data from Cattell Intelligence Test.

### 2.2. Universe and Sample

Study universe is consisted of YGS students at grade 12 who received education at Ç.Bilimler private teaching institution located in Bakirkoy, Istanbul during 2011-2012 academic year. A total of 40 students of which 20 had higher success level were included in the study.

### 2.3. Materials and Methods to Collect Data

To determine the intelligence and performance level of students, "Cattell intelligence test" which was developed by Cattell and adapted to Turkish version by Bağlan Toğrol was used. In addition to this test, Neuro-Socio Culture Test developed by Battal Odabaşı was also applied on students.

This test developed by Cattell is a paper-pen test which is free from any cultural events and can be used internationally. Cattell test was prepared in three scales. Scale:1 for ages 4 to 8 and adults with a mental disability; Scale:2 for ages 8 to 13 and adults with average mental level; Scale:3 for those at grade 10 and over and superior adults. Each of three scales

has parallel forms, A and B. Scale 2 and 3 are the same in terms of quality of the questions. However, difficulty level of the questions is different. Both the scales include four tests. Of the Cattell international intelligence scales, the second one was adapted to our country and is used by counseling and research centers. Of the four tests in the scale, the first one is "a sequence of drawings to be completed by choosing among response options"; the second one is finding one drawing out of five resembling the others; the third one is finding a drawing completing the three drawings out of five; the fourth one is finding a drawing fulfilling the condition. Reliability of Cattell international intelligence scale is approximately .70 (Özgül, 2011).

A (Numeric/Logical) and B (Verbal/Emotional) parts of the test by Odabaşı were applied. Reliability of part A of Odabaşı's test was .768 while D was .712.

#### Part A

##### Reliability Statistics

| Cronbach's Alpha | N of Items |
|------------------|------------|
| ,768             | 12         |

#### Part D

##### Reliability Statistics

| Cronbach's Alpha | N of Items |
|------------------|------------|
| ,712             | 12         |

#### Premises

1. Determination of frontal situation (left-handed students have a reverse situation) :
  - a. Biological determination of the left frontal: Two hands are clasped in comfortable position, as the left finger aiming on the top, left eye is closed.
  - b. Biological determination of the right frontal: Two hands are clasped in comfortable position, as the right finger aiming on the top, left eye is closed.
  - c. Two frontal are equal: Two hands are clasped in comfortable position, as the right finger aiming on the top, right eye is closed.
2. Determination Test of Analytic or Emotional Intelligence with drawings:
  - a. Pythagorous' Triangle Test With Dots: If the person finishes drawing the triangle with one dot from top to down then 2,3,4, and 5 dots downward he is analytic. If he draws the triangle with diagram or starts drawing from one side he has emotional intelligence.
  - b. Polygon (pentagon or hexagon) and Hollow Star Drawing Test: If the person can draw

polygon or hollow star easily he has analytic intelligence, if he can not draw he has emotional intelligence.



( smooth star drawing ) Analytic

c. Tree Drawing Test: If the person draws a tree by closing the tree crown he is analytic, if he draws a tree as in form of dry branches he is emotinal.

“t” test which is the difference approach to relationship between correlation technique and intelligence-success was used in this study. Coefficient of correlation provides information on the direction of variables and how they interact. SPSS 17.0 (statistical package for the social sciences) was used in statistical calculations for analysis.

**2.4. Process of Data Collection**

The means for collecting data used in the study were applied to the students in the private teaching institution by the permission of manager of the

institution. Data collection was performed on the 12<sup>th</sup> of May, 2013. The students were provided necessary information on the study during the application, were explained how they should answer the test. Adhering to the privacy policy, the students were assured that their personal information would not be disclosed to the third parties and then the data was collected by the measuring tools above defined. Five advisors graduated from Psychological Counseling and Guidance Department of Faculty of Education of Istanbul Aydin University who work in Istanbul and received training on testing provided support for testing.

**3. Results and Comments**

This section includes the findings about hypothesis. The purpose of this study is to investigate the relationship between the intelligence and academic success. In addition, the relationship between the gender and the success, the gender and the type of intelligence, the gender and the intelligence, and the success and the type of intelligence was also investigated. For this reason, “t” test was used to analyze the differences between the two independent groups, and the correlation technique was used for the data.

Findings for Personal Characteristics

**Table 1.** Distribution of the students in the study by gender

|         | Frequency | Percent | Valid Percent | Cumulative Percent |
|---------|-----------|---------|---------------|--------------------|
| Males   | 18        | 45,0    | 45,0          | 45,0               |
| Females | 22        | 55,0    | 55,0          | 100,0              |
| Total   | 40        | 100,0   | 100,0         |                    |

45% of the universe included in the study was males and 55% were females.

Findings for the study

**Table 2.** Relationship between the results from Cattell intelligence test and YGS points of the students

|  | Results of intelligence test | YGS Point |
|--|------------------------------|-----------|
| Results of intelligence test Pearson Correlation | 1                            | ,922      |
| Sig(2-tailed)                                    |                              | ,000      |
| N  | 40                           | 40        |
| YGS Point Pearson Correlation                    | ,922                         | 1         |
| Sig(2-tailed)                                    | ,000                         |           |
| N  | 40                           | 40        |

As seen in Table 2, there was a positive association between the intelligence and the success in the measuring work performed by comparing the results from Cattell intelligence test and YGS results

performed in April, 2012. Based on the findings, there was a significant positive association between the intelligence and the success in YGS.

**Table 3.** Success levels by gender

| Gender  | N  | X    | SS   | Sd | t    | p    |
|---------|----|------|------|----|------|------|
| Females | 22 | 2,32 | .99  | 38 | 2.39 | .035 |
| Males   | 18 | 3.28 | 1.53 |    |      |      |

As seen in Table 4.3, the arithmetic mean of YGS success rate of female students was 2.32 and the standard deviation was.99. The arithmetic mean of YGS success rate of male students was 3.28 and the standard deviation was 1.53. T test was performed to see whether there were any differences between the

female and male students, and the t value 2.39 was obtained as a result.

The success did not significantly vary by gender according to the findings. The male students were more successful than the female students in the measurement based on YGS points.

**Table 4.** Intelligence level by gender

| Gender  | N  | X    | SS  | Sd | t    | p    |
|---------|----|------|-----|----|------|------|
| Females | 22 | 3.59 | .73 | 38 | 2.98 | .037 |
| Males   | 18 | 4.33 | .84 |    |      |      |

As seen in Table 4, the arithmetic mean of the points from Cattell intelligence test of female students was 3.59 and the standard deviation was.73. The arithmetic mean of the points from Cattell intelligence test of male students was 4.33 and the standard deviation was.84. T test was performed to see whether there were any differences between the

female and male students. The t value 2.98 was found as a result of calculations.

The intelligence level did not significantly vary by gender according to the findings. The male students were more successful than the female students in the measurement based on the results from Cattell intelligence test.

**Table 5.** Association between the type of intelligence and the YGS points

|   | Emotional intel. / Analytical Intel. | YGS point     |
|---|--------------------------------------|---------------|
| Emotional intelligence/Analytical Intelligence<br>Pearson Correlation Sig(2-tailed) | 1                                    | -,672<br>,000 |
| N   | 40                                   | 40            |
| YGS point<br>Pearson CorrelationSig(2-tailed)                                       | -,672<br>,000                        | 1             |
| N   | 40                                   | 40            |

As seen in Table 5 there was a significant negative association in the measurement performed by comparing the results of emotional and analytical intelligence and the results from YGS. The findings show that the academic success decreased as the emotional intelligence increased. Most of the successful students were those with analytical intelligence.

#### 4. Results and Recommendations

- There was a statistically significant association between the academic successes and intelligence points of the students.
- There was a difference in the intelligence points of the students according to the gender.
- The academic success of the students with analytical intelligence was higher.

Intelligence quotient is a potential that can provide an individual with a higher and quicker success in learning and profession when placed correctly in thinking and learning system. However, there are more important factors in determining the success of an individual in life. These factors are common sense, experience, foresight, being an inventor and having social and practical intelligence. An individual's success in life and profession depends on personal characteristics, motivation, experience,

and the positive-negative influence of social and economical world over him/her as well as intelligence quotient.

Our intelligence level is an important factor for success. Individuals with lower success level should not be approached telling them they do not have sufficient intelligence. Lower success level may result from many different factors. These factors include individual's friends, in-family relations, his/her mental problems, fields of interest, anxiety and many more. The hypothesis that only persons who have a certain field of intelligence can be successful is not correct. People make progress in the field of intelligence where they are powerful and achieve great successes. What matters here is to identify the field of intelligence of individuals when they are at their younger ages. So that they can be ensured to encounter with fields they are skilful through a correct guidance. Syllabus should be formed by the intelligence structure and type of individuals. Processes of program development should be performed according to individual's abilities and brain structure, taking into account of supporting and improving period.

- The teachers should not consider students clever or stupid, assuming each individual is powerful in different fields of intelligence.
- The teachers should take into account that difference in gender between female and male students affect field of intelligence of the students, and teaching methods in the classroom should be arranged by that.
- The students should be guided towards areas where they have powerful intelligence fields and be engaged with activities based on brain dominance. For example, a student with right dominance brain (verbal/creative) should be directed to creative musical activity while a student with left frontal dominance brain (numeric) should be directed to more harmonic and technical music profession.
- The teachers guiding the students need to interview with students in person, introduce the fields where they can be successful, and direct students on this basis. Counselors should identify the fields in which the students have shown success during the year and recommend them suitable faculties or departments during the period of selection.
- Various measurements and tests should be performed to identify the fields in which the students can be successful.

#### References

1. Bacanlı, H. Gelişim Ve Öğrenme. Ankara: Nobel yayınları, pp 60-231 (2001)
2. Baymur, B.F. Genel psikoloji. İstanbul: İnkilap kitabevi, pp 231(2004)
3. Bağceci, B. & Odabaşı, B.(2013). The relationship between 12.th grade students interpersonal relationship and academic success levels, International Journal of Academic Research Part B,5(2),128-133
4. Bal, P. N., Odabaşı, B. The Effect Of Group Therapy On Assertive Behaviour, Bulgaria:12th International Multidisciplinary Scientific Geo Conference SGEM 2012, June 17-23, vol.3, pp.1175-1182 (2012)
5. Bjarnason, Thoroddur and Thordis J. Sigurdardottir. Psychological Distress During Unemployment and Beyond: Social Support and Material Deprivation Among Youth in Six Northern European Countries. Social Science & Medicine, Vol. 56, s. 973-985. (2003),
6. Budak, S. Psikoloji Sözlüğü. Ankara: Bilim Ve Sanat Yayınları, pp 848 (2003)
7. Can, G. Lise Öğrencilerinin Benlik Tasarımı Düzeylerini Etkileyen Bazı Etmenler. Hacettepe Üniversitesi, Published Phd Thesis, pp 161 (1986)
8. Celkan, H.Y. ve Odabaşı, B. Beyin Temelli Öğrenme Yaklaşımının 12.sınıf Öğrencilerinin Başarıları Üzerine Etkisi, Çukurova Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, Cilt: 19 / Sayı: 3 (2010)
9. Çakar, U. ve Arbak, Y. Modern Yaklaşımlar Işığında Değişen Duygu-Zeka İlişkisi Ve Duygusal Zeka. Dokuz Eylül Üniversitesi Sosyal Bilimler Enstitüsü Dergisi, 6(3):23-48, (2004).
10. Dağlı, E.M. Ergenlikte Zeka Bölümü, Duygusal Zeka Ve Akademik Başarı Arasındaki İlişki. Mersin Üniversitesi Sosyal Bilimler Enstitüsü. Published Master's Thesis, (2006)
11. Demirel, Ö. Öğrenme Sanatı: Öğretim İlke Ve Yöntemleri. Ankara: Peageme Akademi, pp 141 (2009).
12. Elmacıoğlu, T. Başarıda Aile Faktörü. İstanbul: Hayat Yayıncılık İletişim Eğitim Hizmetleri (1998).
13. Fogarty, R. and Stoehr J. Integrating Curricula with Multiple Intelligences: Teams, Themes, and Threads. California: Corwin Press. (2008)
14. Gardner, H. Intelligence Reframed : Multiple Intelligences for the 21st Century, New York, NY: Basic Books (1999).
15. Gould, S. J. The Mismeasure Of Man. New York: Norton & Company (1996)
16. Gürdal, M. Duygusal Zeka İle Akademik Başarı Arasındaki İlişki. Süleyman Demirel Üniversitesi. Published Master's Thesis, (2011).
17. Kabataş, E. 10.Sınıf Öğrencilerinin Zeka Alanları İle Fizik, Kimya, Biyoloji Ve Matematik Başarıları Arasındaki İlişki. Atatürk Üniversitesi Sosyal Bilimler Enstitüsü. Published Master's Thesis, (2006)
18. Karasar, N. Bilimsel Araştırma Yöntemleri. Ankara: Nobel Yayın Dağıtım, pp 81 (2010)
19. Kasatura, İ. Okul Başarısından Hayat Başarısına. İstanbul: Altın Kitapları Yayıncılık (1991)
20. Köknel, Ö. Akıl ve Düşünme Gücü. İstanbul: Altın Kitapları Yayınevi, pp 243 (2003)
21. Kulaksızoğlu, A. Ergen Psikolojisi. İstanbul: Remzi Kitabevi. pp 135-152 (2005)
22. Malecki, C. K. & Elliott, S. N., Children's Social Behaviors As Predictors Of Academic Achievement: A Longitudinal Analysis, School Psychology Quarterly, 17(1), 1-23, (2002).
23. Marsh, H. W. The Hierarchical Structure of Self-concept and the Application of Hierarchical Confirmatory Factor Analysis. Journal of Educational Measurement. (24): 17-39 (1987)
24. Mayer, John D., Salovey, P. and Caruso, D. R. Handbook of Intelligence. Cambridge: R. Sternberg (Ed), Cambridge University Press (2000).
25. Odabaşı, B. Beyin Temelli Öğrenme Yaklaşımının Öğrenci Başarısı Üzerine Etkisi. Gaziantep Üniversitesi Sosyal Bilimler Enstitüsü. Published Phd Thesis (2010)

26. Odabaşı, B. Beyin Temelli Öğrenme: Sınav Sınav Dediğin. Konya: Çizgi Yayınları (2011)
27. Özgüven, E.İ. Psikolojik Testler. Ankara: Pdrem Yayınları, pp 166-241 (2011)
28. Petrides, K. V., Frederickson, N., & Furnham, A. The Role Of Trait Emotional İntelligence İn Academic Performance And Deviant Behavior At School. *Personality And Individual Differences*, 36,277-293 (2004)
29. Rodgers, G. (1999). Yin and yang: The Eugenic Policies Of The United States And China Is The Analysis That Black And White? Houston Journal Of International Law. Retrieved May, 2011 from <http://www.questia.com/googleScholar.qst;jsessionid=HgJZh37r5Cdw14wGsnJ9txQbHcy84J1DBvJ2blYK3QQLPC1njnR8!-137151043?docId=5001886056>.
30. Selçuk, Z., Kayılı, H.ve Okut, L. Çoklu Zeka Uygulamaları. Ankara: Nobel Yayınları (2002)
31. Titrek, O., IQ'dan EQ'ya. Ankara: Pegem Yayıncılık, pp 5 (2007)
32. Toker, F., Kuzgun, Y. ve arkadaşları. Zeka Kuramları Ankara:M.E.BB. pp 32-33 (1968)
33. Vallant G (1977) Adaptation to Life. Boston: Little Brown
34. Van der Zee, K., Thijs, M. and Schakel, L. The Relationship Of Emotional İntelligence With Academic İntelligence And The Big Five. *European Journal Of Personality*. Vol.16.p103-125, March/April (2002)
35. Vural, B. Öğrenci Merkezli Eğitim Ve Çoklu Zeka. İstanbul:Hayat Yayıncılık, pp 237-238(2005)
36. Yılmaz,S. Duygusal Zeka Ve Akademik Başarı Arasındaki İlişki. Atatürk Üniversitesi Sosyal Bilimleri Enstitüsü Published Master's Thesis. (2007).
37. Yüksel, M. Duygusal Zeka Ve Performans İlişkisi. Atatürk Üniversitesi Sosyal Bilimler Enstitüsü. Published Master's Thesis, 2006)

3/18/2013