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**THE EFFECTS OF ABILITY HOMOPHILY ON INDIVIDUAL
PERFORMANCE**

THESIS

Michael J. Gray, First Lieutenant, USAF

AFIT/GEM/ENV/06M-04

**DEPARTMENT OF THE AIR FORCE
AIR UNIVERSITY**

AIR FORCE INSTITUTE OF TECHNOLOGY

Wright-Patterson Air Force Base, Ohio

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AFIT/GEM/ENV/06M-04

THE EFFECTS OF ABILITY HOMOPHILY ON INDIVIDUAL PERFORMANCE

THESIS

Presented to the Faculty

Department of Systems and Engineering Management

Graduate School of Engineering and Management

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Air University

Air Education and Training Command

In Partial Fulfillment of the Requirements for the
Degree of Master of Science in Engineering Management

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Abstract

Homophily is a powerful social force that can cause people to surround themselves with similar others (McPherson, Smith-Lovin, & Cook, 2001). Homophily of ability could lead to grouping of people who have similar performance levels. Grouping by ability is of interest because it has been linked to increased performance in experiments involving undergraduate (Goethals, 2001) and primary (Lou et al., 1996; Tieso, 2003) school students. However, previous studies have not examined the consequences of ability grouping when it results from homophily occurring naturally rather than being imposed by a researcher or teacher. To determine if performance benefits are associated with ability homophily, a longitudinal study was conducted to measure the advice and friendship relationships of 404 adults in a military management training course. Performance was measured by an end of course formative test, instructor evaluations, and peer evaluations. The results confirm that ability homophily in advice relationships is related to increased performance. Ability homophily among friendship relationships was not related to increased performance.

AFIT/GEM/ENV/06M-04

To my wife and child

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I would like to express my sincere appreciation to my faculty advisor, Major Kent Halverson. His enthusiasm and knowledge allowed me to learn much more than I would have imagined before starting this project. I would also like to thank my committee members Dr Michael Rehg and Dr Dennis Strouble. I asked them to be on my committee because they taught the classes at AFIT that I learned the most and also enjoyed, and I appreciate their help with my thesis.

Michael J. Gray

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THE EFFECTS OF ABILITY HOMOPHILY ON INDIVIDUAL PERFORMANCE

I. Introduction

Homophily is a sociological term for a principle that is easily observed and understood: similar people tend to associate with one another (or the well known saying: “Birds of a feather flock together”). Homophily creates divides among people with numerous demographic characteristics and causes people to surround themselves with others who are similar to themselves (McPherson et al., 2001). Race and ethnicity have the greatest influence on relationship choices followed by age, religion, education, occupation, and gender (McPherson et al., 2001). While studies of homophily of race and gender are quite common, few studies have examined homophily based on instrumental attributes such as a person's ability or intelligence. With the exception of Ibarra's (1992, 1995) studies of the consequences of gender and racial homophily, few have explored the consequences of homophily based on ability.

Most of the previous research on homophily related to ability comes from educational researchers. Similar academic achievement has been shown to be a factor in student friendship choices (Crosnoe, 2000). The ability homophily among students is important because the attitudes about academics of students' friends are related to academic performance (Crosnoe, Cavanagh, & Elder, Glen H., Jr., 2003). While friendships between students with similar academics may result from ability, schools often facilitate this process by the use of ability groups. Ability groups are groups within classes composed of students with similar abilities in areas such as reading or mathematics. Ability grouping has been shown to improve learning among students,

including even groups of low performers (Lou et al., 1996; Tieso, 2003). Ability grouping has been studied mostly among young students, but recent research has shown that it can benefit undergraduate students (Goethals, 2001). Homophily can lead to groups of individuals with similar ability and these groups may offer the same benefits as the formal ability groups that have been studied by educational researchers.

While ability grouping can be easily implemented among primary school students, it would be difficult to use such a technique with adults. In an organizational setting, managers may occasionally form a group of all high performing people for a special project, but it is unlikely that they would group low performing people together and expect benefits. However, just because managers may not usually group people solely by ability does not mean that ability grouping does not occur in organizations. One of the first studies of homophily demonstrated that people tend to group together because of homophily of intelligence (Almack, 1922). People may tend to form informal ability groups because of homophily. The consequences of informal ability grouping has not been studied among adults. However, there is evidence that homophilic relationship could be associated with positive outcomes. Homophilic relationships are stronger (meaning that they are less likely to dissolve) than heterophilic relationships (Burt, 2000), and relationship strength is positively associated with increased performance outcomes from the relationship (Hausman, 2001). Homophilic relationships also lead to increased trust (Ibarra, 1992), and trust is associated with increased individual performance (Dirks, 2001). Homophily of ability will likely increase performance because of the benefits associated with homophilic relationships.

Homophily of ability is an important concept for managers to understand because it could influence the performance of people in the organization. Human resource development programs generally attempt to increase individual performance by training and education (Rummler & Brache, 1995). However, most training for adults only has one offering regardless of the ability levels of those in the training. To determine how ability homophily influences performance, a field study of 404 people was conducted at a management training program for senior enlisted leaders in the United States Air Force. Performance was measured by a quantitative test, peer evaluations, and instructor evaluations.

II. Literature Review

People tend to associate with similar others for a variety of reasons. The explanations for homophily can be divided into two categories: base-line homophily and inbreeding homophily (McPherson et al., 2001). Base-line homophily occurs because people are born into families, communities, and nations of similar others (McPherson et al., 2001). Racial, age, and religious homophily are greatly influenced by baseline homophily. Inbreeding homophily occurs when people seek out similar others because of personal preference (McPherson et al., 2001). There are two good explanations for inbreeding homophily: status similarity and distinctiveness. People tend to form friendships with others who have status similar to themselves (or slightly higher) (Laumann, 1966). Laumann (1966) explained that people may want to have relationships with people of superior status; class pressures lead people to form relationships with people of similar status. The perception of status is largely psychological and Laumann (1966) speculates that people who could imagine themselves as a higher status person could have an advantage at connecting with higher status people. Another explanation for inbreeding homophily is that people tend to form homophilic relationships based on traits that are distinctive (Mehra, Kilduff, & Brass, 1998). For example, in a group where Hispanics were the minority and African-Americans were the majority, race was a more important predictor of friendship choices with Hispanics (Leonard, Mehra, & Katerberg, 2005). This demonstrates that if a characteristic is relatively rare in a group, then those who have the characteristic will tend to identify with it (Mehra et al., 1998) resulting in

homophily. For these reasons people tend to associate with others who are similar to themselves, creating worlds that can mirror themselves.

The consequences of homophily have been studied to understand racial and gender based discrimination. Racial and gender homophily is often cited as an explanation for continued inequality (Lin, 2000), for that reason they have received much more attention than other types of homophily. The consequences of racial homophily are striking: in a representative sample of the United States, only 8% of people discuss important matters with a person of a different race (P. V. Marsden, 1987). Homophily of a majority group may also lead to the exclusion of minorities. The marginalization of women seems to result from exclusionary preferences of males rather than females' own gender homophily (Mehra et al., 1998). The marginalization of racial minorities seems to result from a combination of homophilic tendencies among the minority race and exclusionary pressures of the majority (Mehra et al., 1998). The consequences of racial and gender homophily demonstrate that the homophily is a powerful social force.

Racial and gender homophily are not the only types of homophily that have been identified. Homophilic tendencies exist for characteristics such as religion, occupation, intelligence, and personality (McPherson et al., 2001). Similar academic achievement has also been shown to be a factor in the development of student friendships (Crosnoe, 2000). Certain characteristics could be of particular interest because they are instrumental characteristics, meaning that they are directly related to job performance (Jackson, May, & Whitney, 1995), such as a person's knowledge, skills, and abilities. Ability is defined as power or skill needed to do something (Cambridge Dictionary, 2006). Traits that have been shown to be homophilic, such as intelligence (Almack,

1922) and occupation (Laumann, 1966), are related to individual ability. However, few if any studies have explored how ability shapes relationship choices. Given that status is closely related with ability, and ability level can create distinction (for example sports stars, business executives, and academics), it is reasonable to assume that ability level can cause homophily in relationships.

Homophily influences relationship choices in every type of relationship including marriage, support, information transfer, friendship, and advice (McPherson et al., 2001). Advice and friendship relationships have been widely studied in organizational research. The advice relationships that people use to complete work (Sparrowe, Linden, Wayne, & Kraimer, 2001). Advice relationships develop over time as individuals obtain information, advice, and opportunities for problem solving among others in the organization (Gibbons, 2004). The structure of the advice relationships is related to performance (Baldwin, Bedell, & Johnson, 1997; Sparrowe et al., 2001; Yang & Tang, 2003b). Friendship relationships are based on trust, which allows individuals in the networks to take greater risks and benefit from improved communication (Gibbons, 2004). Groups of friends may even out-perform groups of acquaintances on some decision making and motor tasks (Shah & Jehn, 1993).

While homophily could cause people to form relationships with others of homogeneous ability, primary school teachers often facilitate homophily by placing young students in ability groups based on their reading or mathematical ability. Ability grouping of students has been frequently studied. The first study of homogeneous ability grouping of students occurred in 1927 when two classes of elementary school students were divided into homogeneous and heterogeneous ability groups (Kulik & Kulik, 1992).

At the end of the year the homogeneous class had improved by two grade levels compared to the heterogeneous class. In recent years ability grouping among young students has been criticized because of issues relating to equity and racism (Oakes, 1985; Slavin, 1990), but most researchers agree that some form of ability grouping can have a significant impact on student achievement (Lou et al., 1996; Tieso, 2003). Ability grouping has also been shown to benefit older students (Goethals, 2001). Goethals (2001) found that college students placed in homogeneous ability groups outperformed heterogeneous groups in writing and analysis tasks. The groups of lower ability students benefited considerably from the homogeneous groups demonstrating performance close to the groups of all high performing students.

Goethals (2001) suggests that these dramatic results could be explained by social comparison theory. Social comparison theory is the principle that people evaluate their ability by comparing themselves to others (Festinger, 1954). People compare their performance to that of others and compete because of a desire to be better than their peers (Goethals, 2001). A person in a group with significantly different ability may be viewed as non-comparable and people may no longer compare themselves or compete against this distinct person. For example, if lower ability students are paired with higher ability students, the lower ability students may not feel that the higher ability students are comparable and not see any value in competing with them. The higher ability students may realize that they are can perform better than the lower ability students without competing and not put forth effort to improve. Homogeneous ability groups could encourage students to compete against each other and improve performance. Social

comparison could explain the advantages of homogeneous ability groups, but it also raises questions about the influence that peers have on individual performance.

While most studies of the peer effects on performance have been with younger students, a few researchers have begun to examine peer effects among undergraduates (Hoover, 2003). Initial studies had mixed results linking student academic performance to randomly assigned roommates (Sacerdote, 2001; Winston & Zimmerman, 2004; Zimmerman, 2003). High performing students did not seem to be affected by the academic ability of their roommate, but the performance of average students appeared to be positively associated with their roommate's verbal SAT score (Zimmerman, 2003). These initial studies assumed that high performing students would be a benefit to other students regardless of the difference in ability. The perspective that low performing individuals will benefit from the presence of a high performing individuals is contradicted by the demonstrated performance advantages of homogeneous ability groups. This paper presents an alternative approach to peer influence: individuals could benefit from peers of similar ability.

As discussed earlier, adults tend to form networks that are largely homogeneous because of the principle of homophily (McPherson et al., 2001). There are many positive outcomes associated with homophily despite the fact that it can lead to racial and gender inequality. Homophily in social networks can increase trust and improve reciprocity. (Ibarra, 1992). In relationships, increased trust can lead to increased performance (Dirks, 2001). Increased reciprocity could also increase individual performance. Increased reciprocity means that people are more likely to reward favors and punish transgressions (Gouldner, 1960). If properly exploited, a person could benefit from increased

reciprocity by exchanging favors, such as assistance with a task. Another advantage of homophilic relationships is that they are not only more likely to form, they are also less likely to dissolve over time (Burt, 2000), indicating that they are strong. In contrast, relationships between those with very different values are more likely to lead to dissatisfaction, alienation, and eventually relationship dissolution (Lazersfeld & Merton, 1954), indicating that they are weak. Relationship strength has been positively associated with increased performance outcomes from the relationship (Hausman, 2001).

Previous research on homogeneous ability groups has used tests to evaluate performance (Goethals, 2001). Informal ability groups could be formed by ability homophily in advice relationships. As discussed earlier, advice relationships are used to accomplish work (Sparrowe et al., 2001). Informal work groups that are created because of advice relationships should be similar to the homogeneous ability groupings used in Goethal's (2001) experiment. If ability homophily results in individual benefits then ability homophily should be positively related to performance as evaluated by a test.

Hypothesis 1a. Ability homophily in advice relationships is positively related to final test evaluated performance.

Although not always directly related to work, friendship relationships can influence task performance (Shah & Jehn, 1993). Friendships provide three key resources: emotional, cognitive, and material (Solano, 1986). The emotional, cognitive, and material benefits of friendship could be enhanced by ability homophily. Friendships of similar ability could offer more emotional benefits because homophilic relationships

are usually longer lasting and more stable (Burt, 2000). Long lasting and stable friendships could be described as close, and close friendships provide more emotional support (Hays, 1988) A cognitive benefit of friendship is social comparison (Hays, 1988). Friends provide a person with a pool of associates that can be used to gauge personal performance. As discussed earlier, social comparison between people of similar ability can increase performance because of competition (Goethals, 2001). Friendships between people of similar ability could provide more cognitive benefits because of social comparison. Material benefits of friendship include task assistance and support (Hays, 1988). Homophily could lead to close friendship, and close friendships provide more informational support than casual friendships (Hays, 1988). Because ability homophily could increase the benefits of friendship, ability homophily among friends could also lead to increased performance:

Hypothesis 1b. Ability homophily in friendship relationships is positively related to final test evaluated performance.

Performance in a workplace environment is not normally evaluated by objective tests, but rather supervisor evaluations. Supervisor evaluations are the most reliable estimates of individual performance when compared to peer, subordinate, and self evaluations (Conway & Huffcutt, 1997). However, supervisor evaluations are based on perceptions of performance rather than actual performance and are prone to judgment errors such as the halo effect and leniency (Dreher & Dougherty, 2001). Supervisors could judge individual performance by how a task is completed rather than how well it is

completed. As discussed earlier, ability homophily could provide performance benefits because of increased competition (Goethals, 2001). A person who remains competitive because of ability homophily may be viewed more positively by a supervisor than a person who is less competitive and engaged. Competition resulting from ability homophily in either advice or friendship relationships could result in a positive supervisor evaluation.

Hypothesis 2a. Ability homophily in the advice relationships is positively related to supervisor evaluated performance.

Hypothesis 2b. Ability homophily in friendship relationships is positively related to supervisor evaluated performance.

Peer evaluations provide the second most reliable estimate of performance (Conway & Huffcutt, 1997). However, peers often have the ability to observe aspects of performance that are inaccessible to supervisors (Dreher & Dougherty, 2001). Peer evaluations may be of a lesser quality than supervisor evaluations, but peer evaluations compensate by having greater immediacy, frequency, and volume (Topping, 1998). Because peer evaluated performance is a reliable measure of performance (Topping, 1998), peer evaluated performance should also be positively related to ability homophily. Ability homophily could also lead to relationship benefits such as increased trust, communication, and reciprocity (Ibarra, 1992). If ability homophily improves a person's peer relationships, the person may receive better peer evaluations. Ability homophily

should benefit peer evaluations regardless of whether the homophily is in advice or friendship relationships.

Hypothesis 3a. Ability homophily in advice relationships is positively related to peer evaluated performance.

Hypothesis 3b. Ability homophily in friendship relationships is positively related to peer evaluated performance.

III. Methodology

Sample

This field study was performed at the Air Force Senior Non-Commissioned Officer Academy. The academy provides leadership and management training to senior enlisted personnel. The training seeks to give new or newly selected senior enlisted managers the leadership skills that they need to perform effectively in their new role. The students came to the six week course from military installations around the world. The average student was 40.40 years old. Of the 404 students, 87% were male and 13% were female. Seventy-four percent of the students said that they were white and 16% African American. Fifty-two students had an associate's degree, 22% had a bachelor's degree, 14% had some college, and 8% had a master's degree. The students were grouped into 28 flights which each had between 12 and 16 students. Students remained in the same flight for the duration of the course. Almost all instruction for each flight was provided by the assigned instructor. The only opportunities that the students had to interact with students in other flights were during mass briefings and during off-duty time.

Measures

Performance

Performance at the end of the course was measured using three separate secondary measures: an academic multiple choice test, an instructor rating, and a peer rating. These evaluations were used by the training program to rank students for evaluations and awards.

Test Performance

A multiple choice test evaluated the student on the leadership and management lessons taught during the class along with general knowledge related to the military profession. The test was administered on the last instruction day of the course.

Supervisor Evaluation

Instructors evaluated students by assigning students points at the end of the course. Each instructor dispersed a total of 45 points among flight members. Instructors could give a high performing student up to 15 points. Other high performing students could earn 10 or 5 points. Students who the instructor did not evaluate favorably were given no points.

Peer Evaluation

The peer evaluation allowed students to recognize the top performing students in their flight. Each student was asked to the first, second, and third best students in the flight. Each first place vote that a student received was worth five points, second place was worth three points, and each third place nomination was worth one point. The student rating is the sum of all the points that a student received.

Ability Homophily

To calculate ability homophily, students were evaluated on their public speaking, writing, and physical fitness ability at the beginning of the course. These measures were selected to operationalize ability because they were observable by others in the class and thus would allow students to evaluate their own relative performance. Ability was calculated as the average of the first public speaking, written, and physical test for each student. Each flight member was categorized into one of three groups based on person's ability relative to others in the flight. The three groups consisted of the top third, middle third, and bottom third of the flight. The student groupings were used to create a matrix that identified students who have similar levels of ability. If a student had a connection with another student who shared the same ability level, the connection was scored one, if not, zero.

The point correlation coefficient, also known as the S_{14} equation (Gower & Legendre, 1988; Krackhardt, 1990) was used to measure ability homophily. This is the same measure of correspondence used by Ibarra (1992) in her well known study of gender homophily in an advertising firm and Mehra, Kilduff, and Brass (1998) in their study of the distinctiveness of minorities. The equation calculates the homophily of a social network given the availability of the characteristic specified. This corrects the homophilic bias in networks when one of the groups studied is significantly larger or smaller than the other group (for example: if an organization only has one female, then social networks will be dominated by males because of their increased availability).

$$S_{14} = \frac{ad - bc}{\sqrt{(a+c)(b+d)(a+b)(c+d)}} \quad (1)$$

where

a = the number of ties the person sent to a similar other

b = the number of ties the person sent to dissimilar others

c = the number of similar others the person could cite but did not

d = the number of dissimilar others the person could cite but did not

This equation has a range from 1 to -1. A positive value indicates a preference for similar others. A negative value indicates a preference for dissimilar others. A value of 0 indicates a balance between similar and dissimilar others in the social network.

Procedure

To test the influence of ability homophily on student performance, students were first tested to determine their approximate ability coming into the course. Public speaking ability, writing ability, and physical fitness were used to assess performance. The students were asked to prepare and present a public speech which was observed by their peers and graded by the instructor. Writing ability was evaluated by a paper that was graded by the instructor. Physical fitness was judged by the Air Force physical fitness test, which includes running, pushups, and sit-ups. The physical fitness test has different score systems for different ages and genders.

On day 17, approximately the middle of the course, the students completed the network survey that was used in the analysis. The survey used a Likert scale from 1 to 5

to describe their relationship with other classmates during the past week. The students responded to two statements in order to identify members of their advice relationships and two statements to identify members of their friendship relationships. For friendship relationships, the statements were: “I spend time in social-oriented activities with this person (dining out, movies, sports, etc.)” and “I enjoy hanging out with this person”. For advice relationships the statements were: “I spend time on work-related tasks with the person (project, studying, etc.)” and “I go to this person for work oriented advice”. The friendship and advice networks used for analysis were created by taking the average of the two network statements for each network. At the end of the course students were again tested on speaking, writing, and physical ability.

IV. Results and Analysis

Tables 1 and 2 contain the descriptive statistics for homophily on friendship and advice relationships. All types of homophily studied have average values greater than zero, indicating that race, gender, education, and ability all could slightly influence relationship formation with similar others. However, there is a large amount of variation between individuals as indicated by the large ranges and standard deviations. In both types of relationships racial homophily has the highest average value, confirming that race has the greatest impact the formation of relationships with similar others, which was expected (McPherson et al., 2001). The correlation table (Table 3) indicated that race, education, and gender were significantly related to final performance.

Table 1. Descriptive Statistics of Homophily in the Friendship Network

	Mean	SD	Min	Max
Racial Homophily	0.036	0.123	-0.33	0.39
Gender Homophily	0.006	0.151	-0.46	0.42
Educational Homophily	0.003	0.12	-0.33	0.39
Ability Homophily	0.008	0.144	-0.38	0.43

Table 2. Descriptive Statistics of Homophily in the Advice Network

	Mean	SD	Min	Max
Racial Homophily	0.021	0.129	-0.34	0.39
Gender Homophily	0.005	0.161	-0.6	0.52
Educational Homophily	0.011	0.116	-0.3	0.39
Ability Homophily	0.008	0.149	-0.44	0.32

Table 3: Correlation Table

	N	Mean	St. Dev.	1	2	3	4	5	6	7	8
1 Gender	404	.871	.335	-							
2 Education	404	.312	.464	-.188**	-						
3 Race	404	.740	.439	.126*	-.174**	-					
4 Ability Homophily - Advice	351	.008	.149	.042	.177*	.002	-				
5 Ability Homophily - Friendship	350	.008	.144	.058	.101	-.058	.861**	-			
6 Academic Performance	403	86.451	5.563	.025	.059	.164**	.072	.076	-		
7 Supervisor Evaluation	404	3.119	4.822	-.204**	-.003	.085	-.024	-.011	.233**	-	
8 Peer Evaluation	404	8.955	10.881	-.082	.111	.112*	.008	-.019	.218**	.475**	-

*: p < .05, **: p < .01; Gender was coded: 1=male, 0=female; Education was coded: 1 = bachelor's degree of higher, 0 = high school or associates degree; Race was coded: 1 = white, 0 = minority

The data in this study could be divided into two levels for analysis. The first level was the individual students, the second level was the 28 flights that the students were assigned. Multilevel data poses an analysis problem because some variation occurs in the first level while variation also occurs at the second level. For example, in an educational setting each student tests individually, a level one variable, but each class' performance is influenced by the performance of the teacher, a level two variable. With traditional analysis it is not possible to differentiate between level 1 and level 2 effects. Hierarchical linear modeling (HLM) allows analysis to be performed on the performance of individual students, while accounting for the differences among the various flights. Hierarchical linear modeling involves simultaneously estimating several regression equations for the dependant measure. For the first level of analysis, the following model was specified:

$$Y_{ij} = \beta_{0j} + \beta_{1j}(Gender) + \beta_{2j}(Education) + \beta_{3j}(Race) + \beta_{4j}(Ability_Homophily) + r_{ij} \quad (2)$$

where Y_{ij} was the performance of student i within flight j . β_{0j} is the mean performance of flight j , without considering the influence of gender, education, race, and ability homophily. It is important to note that HLM allows each flight to have its own β values. In addition, β_{1j} , β_{2j} , β_{3j} , and β_{4j} represent the regression slope of the relationship between gender, education, race, and ability homophily.

In the second level models (equations three through seven), variables were added to account for flight level effects on ability homophily. Level two effects were not added for the intercept, gender, education, and race therefore, the terms γ_{00} , γ_{10} , γ_{20} , and γ_{30} are equivalent to β values for the intercept, gender, education, and race respectively. γ_{40} is the ability homophily-performance regression slope across the flight.

$$\beta_{0j} = \gamma_{00} + u_{0j} \quad (3)$$

$$\beta_{1j} = \gamma_{10} + u_{1j} \quad (4)$$

$$\beta_{2j} = \gamma_{20} + u_{2j} \quad (5)$$

$$\beta_{3j} = \gamma_{30} + u_{3j} \quad (6)$$

$$\beta_{4j} = \gamma_{40} + \gamma_{41}(\text{Flight}_{-}\text{Size}) + \gamma_{42}(\text{Flight}_{-}\text{Density}) + \gamma_{43}(\text{Flight}_{-}\text{Knowledge}) + u_{4j} \quad (7)$$

Three variables were added to the model to control for level two effects that could influence the relationship between ability homophily and performance. The first variable, γ_{41} , accounted for the number of students in the flight. The number of people in a group is positively related to the amount of individual homophily (McPherson & Smith-Lovin, 1987). The flights varied in size from 12 to 16 people, so members of the larger

flights are expected to have greater homophily because of the size of their flights. The second variable, γ_{42} , accounts for variations in flight density. Density is the mean level of interaction that each member of the group has with other members of the group (Sparrowe et al., 2001). By definition, groups that have few divisions and much interaction will have the greatest density. The denser a group is, the more the group functions the more it resembles a clique (Reagans & Zuckerman, 2001), that is a cohesive group without subgroups. Forming subgroups based on ability is a primary reason that ability homophily would affect performance; therefore a variable was added to account for differences in flight densities. The final variable, γ_{43} , accounted for the average initial knowledge about the course subject matter possessed by students in a flight. The initial knowledge of students was assessed on day two with a pre-test that asked questions relating to the classes that the student would take throughout the course. The average initial knowledge that a flight had was expected to have a negative relationship to the regression slope of ability homophily-performance. The negative relationship was expected because the greater the flights initial knowledge, the less room there is for performance improvement. Lower performing students simply have more room for improvement than high performing students.

HLM coefficients were standardized by multiplying them by the standard deviation of each predictor, respectively, and dividing by the standard deviation of the outcome variable, which converts the coefficients to standard deviation units (Hox, 2002). Standardizing the HLM coefficients removes the effects of instrument scaling and makes it easier to observe the relationship relative to the variance of the measure.

The main hypothesis of this study is that ability homophily is positively related to final performance. To test the hypothesis three different approaches to evaluating performance were used: test scores, supervisor evaluations, and peer evaluations. The hypothesis was also tested for both advice and friendship relationships for each type of measured performance.

The first hypothesis was that ability homophily is positively related to test evaluated performance. The results of the HLM analysis are presented in table four. Ability homophily was a significant predictor of performance for advice relationships ($\gamma_{40}=1.127, p<.05$), supporting hypothesis 1a. Ability homophily was not significant for friendship relationships, rejecting hypothesis 1b. In the level one model race was also a significant predictor of final performance. The average initial knowledge of a flight was negatively related to the regression slope of the ability homophily-performance relationship. The second hypothesis stated the ability homophily is positively related to performance that is evaluated by a supervisor. Again the hypothesis was confirmed for advice relationships ($\gamma_{40}=.696, p<.05$), but not for friendship relationships (table five). Supervisor evaluated performance was significantly related to gender and race, with females and whites receiving more favorable evaluations. The average initial knowledge of a flight was again negatively related to the ability homophily-performance regression slope. The final hypothesis was that ability homophily is positively related to peer evaluated performance. For advice relationships the hypothesis was again confirmed ($\gamma_{40}=2.216, p<.01$), but not in the friendship relationships (table five). Peer evaluated performance was related to gender, education, and race.

Table 4. Summary of HLM Analysis Predicting Final Test Evaluated Performance

	Friendship Network		Advice Network	
	Raw Coefficients	Standardized Coefficients	Raw Coefficients	Standardized Coefficients
1. Intercept, γ_{00}	84.398 (1.029)		84.391** (1.044)	
2. Gender, γ_{10}	0.274 (0.838)		0.393 (0.827)	
3. Education, γ_{20}	0.830 (0.686)		0.743 (0.659)	
4. Race, γ_{30}	2.279** (0.710)	0.092	2.113** (0.720)	0.085
5. Ability Homophily, γ_{40}	44.310 (29.769)		81.897* (36.570)	1.127
Level II Predictors of the Regression Slope of Ability Homophily				
6. Number of Students, γ_{41}	-1.675 (1.364)		-2.582 (1.676)	
7. Flight Density, γ_{42}	7.431 (23.658)		-18.862 (17.749)	
8. Average Initial Student Knowledge, γ_{43}	-0.356* (0.176)	-0.360	-0.530* (0.223)	-0.536

Standard errors are in parentheses; *: $p < .05$, **: $p < .01$
 Gender was coded: 1=male, 0=female; Education was coded: 1 = bachelor's degree or higher, 0 = high school or associates degree; Race was coded: 1 = white, 0 = minority

Table 5. Summary of HLM Analysis Predicting Final Supervisor Evaluated Performance

	Friendship Network		Advice Network	
	Raw Coefficients	Standardized Coefficients	Raw Coefficients	Standardized Coefficients
1. Intercept, γ_{00}	5.226** (1.014)		5.451** (1.100)	
2. Gender, γ_{10}	-3.505** (0.965)	-0.109	-3.687** (1.020)	-0.115
3. Education, γ_{20}	-0.016 (0.499)		0.028 (0.498)	
4. Race, γ_{30}	1.335* (0.530)	0.054	1.254* (0.541)	0.051
5. Ability Homophily, γ_{40}	27.900 (35.480)		50.568* (25.162)	0.696
Level II Predictors of the Regression Slope of Ability Homophily				
6. Number of Students, γ_{41}	-0.150 (1.621)		-1.208 (1.313)	
7. Flight Density, γ_{42}	-26.448 (23.562)		-27.830 (18.371)	
8. Average Initial Student Knowledge, γ_{43}	-0.197 (0.219)		-0.304 (0.185)	

Standard errors are in parentheses; *: $p < .05$, **: $p < .01$
 Gender was coded: 1=male, 0=female; Education was coded: 1 = bachelor's degree of higher, 0 = high school or associates degree; Race was coded: 1 = white, 0 = minority

Table 6. Summary of HLM Analysis Predicting Final Peer Evaluated Performance

	Friendship Network		Advice Network	
	Raw Coefficients	Standardized Coefficients	Raw Coefficients	Standardized Coefficients
1. Intercept, γ_{00}	8.889** (2.05)		9.329 (2.133)	
2. Gender, γ_{10}	-3.188 (2.207)		-3.933* (2.204)	-0.123
3. Education, γ_{20}	2.958** (1.094)	0.128	2.988** (1.111)	0.129
4. Race, γ_{30}	2.854** (1.047)	0.115	2.822** (1.119)	0.114
5. Ability Homophily, γ_{40}	99.032 (74.953)		161.001** (63.250)	2.216
Level II Predictors of the Regression Slope of Ability Homophily				
6. Number of Students, γ_{41}	-1.702 (3.397)		-4.193 (3.210)	
7. Flight Density, γ_{42}	-50.529 (45.861)		-30.779 (62.415)	
8. Average Initial Student Knowledge, γ_{43}	-0.832* (0.451)	-0.842	-1.401** (.395)	-1.418

Standard errors are in parentheses; *: $p < .05$, **: $p < .01$
 Gender was coded: 1=male, 0=female; Education was coded: 1 = bachelor's degree or higher, 0 = high school or associates degree; Race was coded: 1 = white, 0 = minority

V. Discussion

In general, the results confirm that ability homophily is positively related to individual performance for advice relationships. There was no significant correlation between ability homophily and friendship relationships. These results support the idea that people who choose to get help and advice from people of like ability experience performance benefits similar to ability grouping at the primary school level. People may not derive the same benefits from friendship relationships because they rely on friends for social support and not for work related benefits (Hays, 1988). Advice relationships are used for accomplishing work and are thus more closely related to performance (Gibbons, 2004). Because ability homophily has positive benefits only in the advice network, individuals should benefit from seeking help from others of like ability. Managers could take advantage of ability homophily by encouraging advice relationships between people of similar ability.

Ability homophily in advice relationships could be encouraged by creating contexts, often called organizational foci, which would appeal to people of similar ability. When people want to meet similar others they often seek out foci that would appeal to similar people rather than looking for specific people (Feld, 1981). For example, a person who likes to play basketball is most likely to meet other people who like basketball by going to a basketball court rather than asking random people if they like to play basketball. Managers could use this phenomenon to facilitate ability homophily. Training classes could be divided by ability. Managers may not even need to assign

people to low or high ability groups, and probably should not because an incorrect assignment could lead to resentment. Students in training could be allowed to select the level of training that they need. A high ability employee could select the advanced training for additional challenge, and a lower ability employee could select remedial training. By dividing training by ability managers could take advantage of the performance benefits of ability homophily. Military managers could especially benefit from dividing training by ability. Most Air Force training, such as firearms, first-aid, and nuclear, biological, chemical training, is repeated every year with no differentiation between students who are taking the class for the first time and students who are experts in the area. Training could be more effective if different ability levels of training were offered rather than repeating the same class.

Ability homophily could also be a consideration when designing a mentorship program. Mentorship relationships could be more useful if the mentored person is paired with a mentor with a similar ability. For example, a high performer may benefit from being paired with a high performing manager and even a low performer may benefit from a relationship with a manager who had to struggle to get promoted. The mentorship relationship could benefit from the increased strength, trust, and communication that is related to homophily (Burt, 2000; Ibarra, 1992). If employees think of their mentor as someone of similar ability, then they may be more likely to view the mentor as someone who is comparable. According to social comparison theory, people will benefit from relationships with comparable others because it will encourage them to compete to achieve the performance level of the other person (Goethals, 2001), in this case the

mentor. The benefits of ability homophily suggest that mentorship relationships could be most if effective if they are between people of similar ability.

Future research should be conducted to determine the effect of ability homophily on minorities. Ability grouping among children is very controversial because it may reinforce inequality and racism (Oakes, 1985; Slavin, 1990). It is unclear whether informal ability homophily has the same effect, however ability homophily could lead to inequality if a particular type of ability is strongly associated with race or gender. In the study presented, whites had higher performance scores on the final test and were evaluated more favorably than minorities. Additional research is required to determine how race affects the consequences of ability homophily. From one perspective, minorities may benefit from ability homophily and increase performance in comparison to the majority. In the study presented, ability homophily was negatively related to the average initial ability of the group, meaning that groups of high performing people could experience less ability homophily and thus have diminished benefits. Another possibility is that if ability is closely related to race, then ability homophily will reinforce racial divisions by motivating people of similar ability to associate. Care must be taken to ensure that with any type of ability grouping, the positive benefits of homophily outweigh the negative effects of possible inequality.

One limitation of this study is that reliability of the social network measures was not assessed. Reliability is not commonly assessed in social network studies and that is a weakness. To partially address this problem the students were asked to respond to two statements for both the friendship and the advice networks, and the responses for each person were averaged. There is also evidence that network measures are generally

reliable when a roster of possible connections is provided (P. V. Marsden, 1990). The social network surveys contained the names of all of the students in each individual's flight, which may also address this problem.

Another limitation was that only one week's social network surveys were used. Homophily in relationship creation and dissolution is dynamic. Traits that initially lead to homophily may not have as strong of an impact at a later time. Internal characteristics, such as preferences and abilities, may result in greater homophily later in a relationship (van Duijn, Marijtje A. J., Zeggelink, Evelien P. H., Huisman, Stokman, & Wasseur, 2003). The social network data from day 17 was used because it was approximately half way through the course and the final week's surveys had an unacceptably low response rate. The course was also only 33 days long, so it was not possible to say if the effect of ability homophily is stronger or weaker two months or even a year later. A long range study of ability homophily could address this problem.

This paper argued that ability homophily among people can lead to improved performance. This is an interesting finding because it implies that the benefits that students may receive from learning in homogenous ability groups may occur outside of the class room. People can create their own ability groups by preferring to associate with others of similar ability. The research presented that homophily of ability in advice relationships can result in benefits not just in performance on a test at the end of the class, but also performance as viewed by peers and instructors. The benefits that were associated with ability homophily will hopefully encourage others to explore the consequences of homophily in organizations. There is very little research on the

consequences of homophily outside of race and gender, but homophily of traits such as ability impact performance and deserve further study.

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Vita

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