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HOMOPHILY:
AN EXPLORATION OF FRIENDSHIP DYNAMICS AT HABIB UNIVERSITY

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Abstract

This paper explores the dynamics among student friendship groups at Habib University in Karachi through the lens of "homophily". Homophily is the tendency of people to have greater social contact with people who are similar to them. This similarity can be based on many factors such as race, faith, shared ideals, social status or class. The paper first introduces homophily in general, its types and causes, then discusses some of the ways in which it is quantified. It uses network analysis as a framework to explore key drivers behind the general friendship dynamics within the Habib University student body, in particular, the social divide across the two disciplinary schools (school of engineering sciences and school of humanities). For reference, the research draws upon the results of a previous study conducted at Habib University on friendship dynamics of engineering students with students of different majors and genders (Alam & Pasta, 2014). The methodology takes a majorly quantitative approach, by conducting a survey of the student body to collect data regarding friendship preferences of students from each major. The survey results are depicted through graphical representation and statistically analyzed for existence of homophily within and in between different majors. Although results showed very limited polarization among Habib University students, there are various factors that should be considered in the explanation of this pattern. Finally, the paper lays out how its findings can be expanded upon, by setting up questions and proposing a hypothesis for future research.

Introduction

As the authors stood observing the happenings around Habib University campus one day, they joked about the student groups they saw and how they could identify the major each student belonged to, simply by observing them. The science and engineering students were likely to be found heading into a library discussion room to study together, while arts or social science majors were found to be studying alone, or relaxing at one of the campus dining facilities. This prompted a debate about whether the social dynamics on campus were truly as segregated as the authors assumed. Which then led to an extensive discussion about the possible factors that students kept in mind when choosing their friends.

This paper is a result of the aforementioned discussion. It sets out to explore the dynamics behind student friendship groups at Habib University, Karachi, through the lens of "homophily." The word homophily is derived from two Greek words, homo meaning "same" and philia meaning "love", and in general, it can be taken to mean "love of sameness" (Hanf, 2019, para. 8). The paper discusses how the presence of homophily has led to some observed social polarization across the two schools within the university, the Dhanani School of Science and Engineering (DSSE), and the School of Arts, Humanities, and Social Sciences (AHSS). Specifically, the paper will compare the friendship dynamics of students belonging to the Computer Science and Social Development & Policy majors.

The paper first introduces homophily as a concept, and discusses the many different types and causes in which it is experienced across the world. Using network analysis as a formal framework, it then discusses some concepts related to the study of graphs (discrete mathematical structures) and patterns of connections between people. Many real-world networks, such as friendship groups, involve millions of people and can be too complex to analyze (Wang, 2020). Designing network models that simulate the behavior of real-world networks, allows us to analyze and perform controlled experiments on real-world situations. These help us make more sense of real-world social networks, many of which deal with millions of users, such as small-world and scale-free networks. Small-world networks have the "small-world" property, in that any two people in the world are likely to be connected through a small number of acquaintances. This also holds true for a smaller set of people, such as the student community at a university, which is where this research was conducted.

The main method used in this research was a survey, that was conducted among Habib University students to gain insights into friendship patterns by asking respondents to assess the proportions of their close friends that they shared a major, gender or batch with. Quantitative analysis of the survey results, together with the findings of the previous work done on this topic, helped provide an understanding of whether or not students had a bias towards interacting with other students based on shared factors. It also shed light on the potential reasons behind this bias. Furthermore, the research looked into whether these shared factors were strong enough to form social identities shaped by difference, and how students perceived those with different, or "other" social identities (Pompper, 2014). It aimed to understand the effect that "othering" had on people's interactions with one another, and whether it was strong enough to create polarization at Habib University. In particular, this paper explores whether there is a long-standing social divide between students from the two schools at Habib University. Lastly, it acknowledges gaps in knowledge in the research, and sets up several alternate methods through which homophily at Habib University and other institutions could be investigated in a quantifiable manner. It concludes with several potential questions and hypotheses that could be explored based off of the findings.

Homophily

The term "homophily" or "love of sameness" was first coined in 1954 by American sociologists Paul Lazarsfeld and Robert Merton (Hanf, 2019, para. 8). However, the concept dates as far back as the Hellenistic Period (320 BCE - 30 BCE), when Plato noted in Phaedrus that "similarity begets friendship," and Aristotle noted in his Rhetoric and Nicomachean Ethics, that people "love those who are like themselves" (McPherson et al., 2001, p. 416).

It refers to the tendency or likelihood of people having stronger non-negative ties with, or greater social contact with people who are similar to them, rather than with those, who are dissimilar to them. This similarity was initially thought of as internal preferences, however, over time, it has evolved to include opportunity, i.e. external factors as well. An internal preference would be not wanting to interact with someone based on the color of their skin, while an external factor would be the predominance of white families in a neighborhood that can result in interaction being limited to only white people. The level of homophily in a society, therefore, determines the extent to which information, whether genetic,

cultural or material, spreads through it (McPherson et al., 2001).

Types and Causes

To test the relevance of homophily, academics have distinguished between baseline homophily and inbreeding homophily. While the former is simply the amount of homophily that would be expected by chance, the latter is the amount of homophily over and above this expected value (McPherson et al., 2001). Baseline homophily would be the presence of shared characteristics in a group of people with varying characteristics. For example, in a group of people with different religions, baseline homophily would be when multiple people share a religion. Inbreeding homophily is when personal preferences come into play, like choosing to interact with people belonging to your religion.

There are many types of homophily which form the basis on which humans interact with people similar to themselves. Lazarsfeld and Merton (1964) distinguished between status homophily and value homophily. The former refers to the idea of people belonging to the same socio-economic background, tending to be similar in nature, and therefore, having greater homophily between them. The latter refers to the tendency to associate with others who think in similar ways, regardless of differences in socio-economic class and status. "Status homophily" includes people having stronger relations on the basis of race, ethnicity, sex, and age, along with acquired characteristics such as religion and level of education. In addition, it also takes into account the gender people identify with, especially in school, which is where students tend to have high gender homophily (Lazarsfeld & Merton, 1964). On the other hand, "value homophily" may be a result of occupation, political inclination and preference for a certain sports team.

One of the causes of homophily can be summarized based on geography, as people located physically closer tend to have higher homophily. Family ties or new marriages outside of immediate family circles can also increase the homophily in an area over time. Individuals working with organizations tend to have similar ideas, and are likely to be surrounded by like-minded people. Discovering a new hobby or interest in a topic can also introduce a person to new people who share those interests.

Effects of Homophily

The Benefits of Homophily

Forming social connections with other students from your major can prove to be beneficial long-term. Wolff and Moser (2009) defined networking as "behaviors that are aimed at building, maintaining and using informal relationships that possess the (potential) benefit of facilitating work-related activities of individuals by voluntarily granting access to resources and maximizing common advantages" (pp. 196-197). College interactions among peers can turn into meaningful professional connections in the future, as they are likely to end up in the same professional field. While large levels of homophily can cause othering, this can sometimes prove beneficial. However, there is also potential for "bad" or harmful othering to exist.

Othering and Polarization.

Othering can be described as a result or consequence of too much homophily, when people start taking their "social identities shaped by difference" extremely seriously. Interacting with people similar to yourself may result in a person becoming closed-minded and intolerant, and when an entire community shares this view, a strong bias and negative attitude towards others is created. This can result in isolation of entire groups of people, or much worse. Common examples include political situations like the case of Brexit, where the parties that were in favor of, and those against it, staunchly saw the other in the wrong (OtheringandPolarisation.org, n.d.). In extreme cases, othering can even result in racist temperaments that can lead to hate motivated movements such as ethnic cleansing.
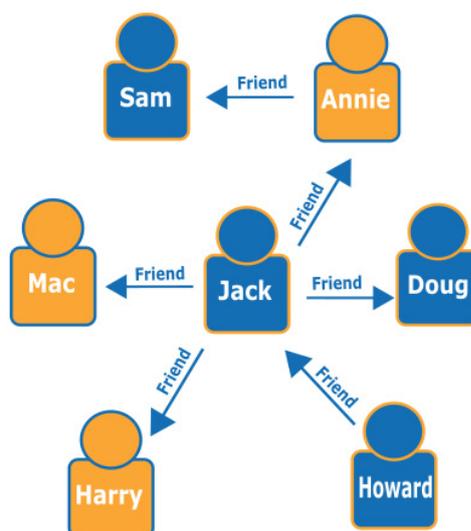
Networks

Networks provide one of the most useful analytical and theoretical frameworks for studying social interactions. Social networks, in particular, have a strong presence in our socio-economic lives, because the transfer of important information is dependent on them. They also help us understand and conceptualize the spread of diseases like the Coronavirus, the psychology behind auctions, and how political events such as election voting can be rigged (Talaga & Nowak, 2019). Small-

world networks best mimic the structure of social network.

It is important to note that this section only covers a few key concepts on network analysis, that the authors feel are relevant to understanding homophily and social structures, and does not cover the topic of networks exhaustively.

Terminology

Social networks are formally modeled using graphs. A graph is a mathematical structure that comprises vertices or nodes (that represent individuals) that are connected through edges (e.g., social relations such as friendship).


Figure 1: An example of a social network graph with edges between different people. Note. (Amazon, 2018).

Each edge represents the connection or relationship between two individuals. There can be two types of edges: directed and undirected. If we think about this in the context of friendships at Habib University, an undirected relationship would be when two individuals both consider each other to be their close friend. However, if Person A considers Person B to be their close friend, but the converse does not hold true, then this will be a directed relationship, as the friendship has a particular direction (from one person to another, rather than it being reciprocated).

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A bridge is an edge of a graph whose deletion will increase the number of individual components with no links to each other. In social networks, it can represent a person who is friends with members of various different social circles. That person can then act as the bridge between those different social groups (Tabassum et al., 2018). If this person is removed from the equation, it would reduce the chances of members belonging to different social groups interacting.
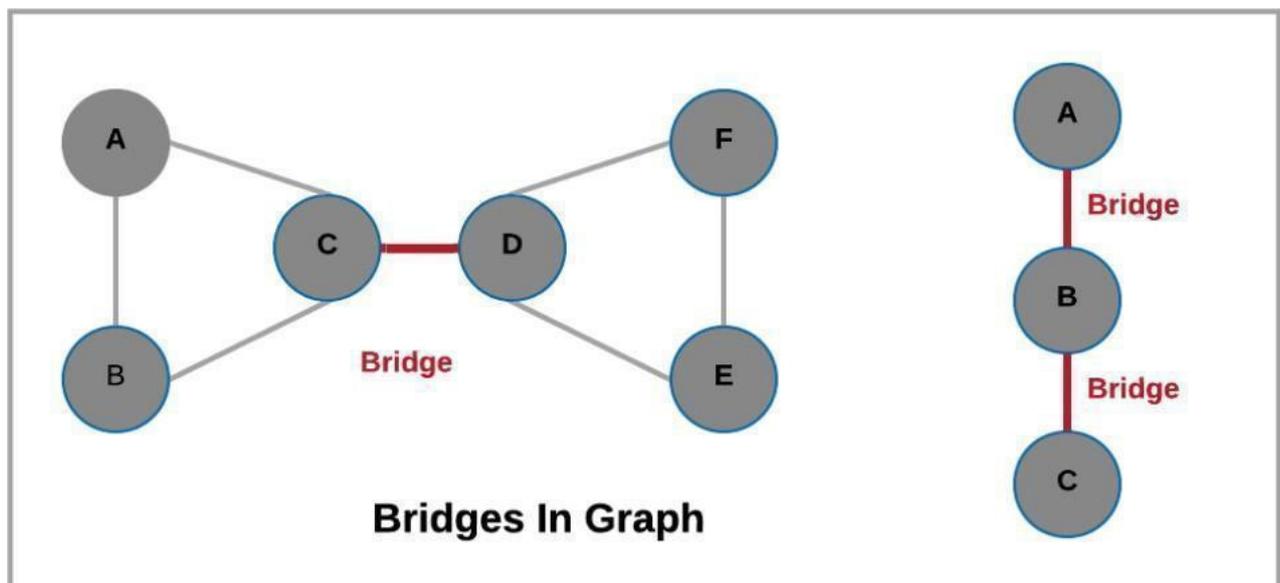
Figure 2: An example of a bridge in graphs
Note. (Jain, 2020).

Small-World Networks

A small-world network is defined as a network where the typical distance L between two randomly chosen nodes, i.e., the number of steps required to get from one of the nodes to another grows proportionally to the logarithm of the

number of nodes N in the network, as represented in the equation below.

$$L \propto \log N \qquad\qquad (1)$$

Small-world networks tend to contain cliques, meaning that every two distinct vertices are adjacent. In other words, the friends of any given person are likely to be friends with each other, i.e., the prevalence of mutual friendships, and that most nodes can be reached from every other node by a small number of hops or steps. Therefore, due to its nature, we also expect the presence of "hubs", or individuals in our network that are connected to members of different social groups. In social networks, celebrities, politicians and sports personalities are some examples of hubs, as they have many followers and a large social reach.

The "six degrees of separation" concept is based on this network model and is a theory that states that any two people on the planet can be connected through "a chain of acquaintances that has no more than five intermediaries" (WhatIs, 2017, para. 1). This theory was verified in 1967 by American sociologist Stanley Milgram, when he randomly selected people in the Midwest and tasked them with delivering a package to a stranger in Massachusetts, whose name and general location was known. The catch was that each person could only forward the package to someone they knew personally. This person had to be someone who was likely to know the intended recipient, or know someone who was likely connected to the intended recipient. While participants expected the chain of intermediaries to be quite long, it was found that, "it only took (on average) between five and seven intermediaries for each package to be delivered successfully" (WhatIs, 2017, para. 3).
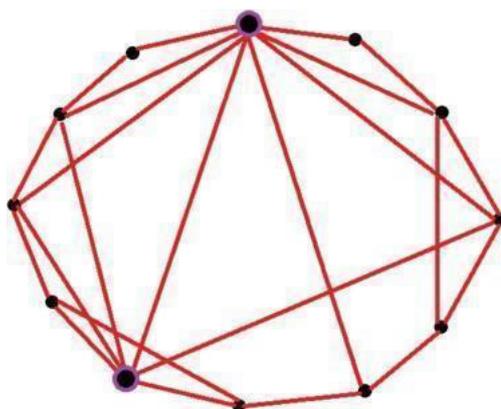
Figure 3: An example of a Small-World network

Note. The figure depicts the structure of a small-world network, where each node is only a few connections away from every other node (Holladay, 2017).

This popularized the "small-world concept", whereby each individual is only a few hops or connections away from everyone else in the world. Examples of small-world networks include telephone call graphs, airport networks and social influence networks (Wang, 2020). This is the type of network that we expect to find in a setting like Habib University. The small-world network theory inspired us to search for patterns in friendship connections at Habib University. Keeping this theory in mind, and assuming that all students at the university are not more than a few acquaintances apart, we attempted to explore the friendship dynamics at play among them.

Our Research

Abbreviations

Following are some abbreviations that will prove helpful in communicating the results of this study:

- **DSSE:** Dhanani School of Science and Engineering, one of the two schools at Habib University. Students belonging to this school will be referred to as DSSE students.
- **AHSS:** School of Arts, Humanities and Social Sciences, the second of the two schools at Habib University. Students belonging to this school will be referred to as AHSS students.
- **CS:** Computer Science, one of the majors offered by DSSE. Students of this major will be referred to as CS students.
- **EE:** Electrical Engineering, another major offered by DSSE. Students of this major will be referred to as EE students.
- **SDP:** Social Development and Policy, one of the two majors offered by AHSS. Students of this major will be referred to as SDP students.
- **CND:** Communication and Design, another major offered by AHSS. Students of this major will be referred to as CND students.

Some History on the Divide between AHSS and DSSE students

Based on the authors' own experiences as Habib University students, it is at times, apparent that students from the two schools have trouble relating to each other because of a factor of reasons, including, but not limited to DSSE students believing they have a tougher workload than AHSS students. On the other hand, it has been observed that AHSS students feel that their education is not taken as seriously by their DSSE counterparts, and also believe them to be less aware of and educated on important social issues. There also exists, a divide by design, in the way the major requirements are structured. For the most part, students take classes with peers from their own major and have comparatively limited interaction with students from other majors as part of their academics.

A survey conducted in 2014 among DSSE students, showed results that affirm the existence of this divide between majors, at least to an extent (Alam & Pasta, 2014). The survey asked DSSE students to pick 5 people they would want to socialize with. In Figure 4, we can see that the connections between students (represented by the nodes) have a particular direction. This reflects direct relationships, in that it does not assume the friendship to be mutual, and is only looking at whether someone wants to befriend someone else, regardless of whether the feeling is reciprocated.

The results show that most DSSE males and females wanted to socialize with peers from inside their own school, with relatively few people wanting to make connections with AHSS males and females (Alam & Pasta, 2014). It can also be seen that most DSSE females appear to have predominantly listed other DSSE females as students they would want to socialize with, as there are very few links (green arrows) going to the other groups. We can see that there are a lot of connections among DSSE males, showing that a lot of them appeared to have named each other as people they would want to socialize with. However, interestingly, DSSE males also appeared to show interest in socializing with members from other groups. This is in contrast to DSSE females, who appeared to mainly want to socialize with their female DSSE peers (Alam & Pasta, 2014).
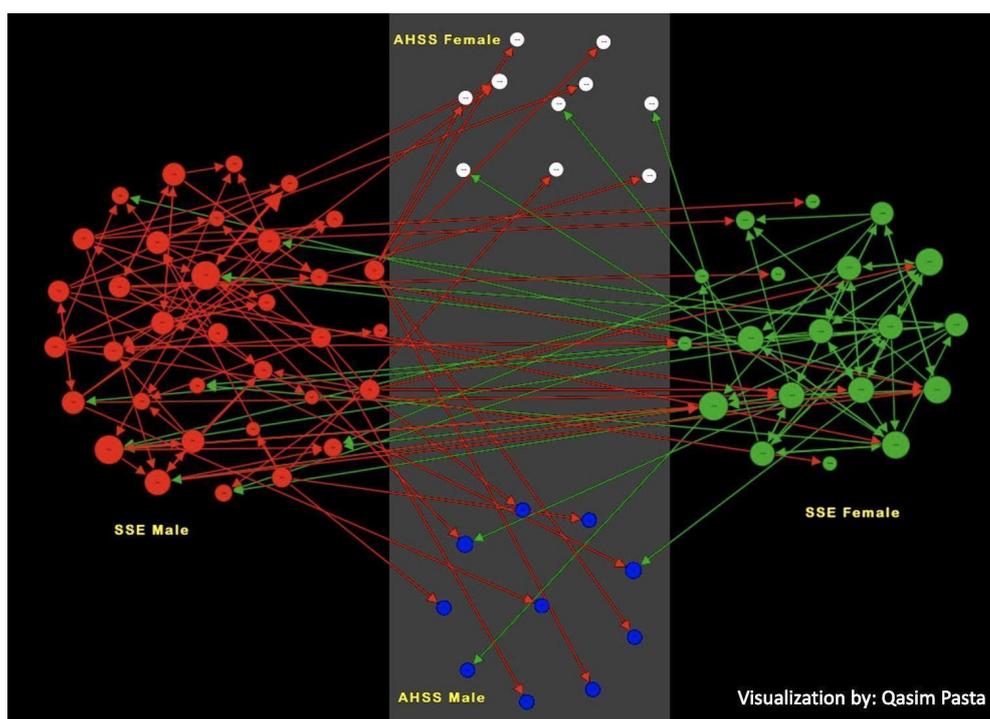
Figure 4: Visualization of 2014 Study Exploring the Divide between DSSE and AHSS students

Note. The four different groups of vertices show polarization between different schools and genders (Alam & Pasta, 2014).

Method

Sampling

This study takes a majorly quantitative approach by conducting a survey of the student body to collect data regarding friendship preferences of students from each major. The survey results are depicted through graphical representation and analyzed for existence of homophily within and in between different majors. The survey was designed to be conducted among Habib University students to understand their friendship dynamics with each other. The sample consisted of students currently enrolled at Habib University and belonging to the batches of 2020 to 2023. Due to time constraints, convenience sampling was used, and the survey was shared online on the student forum[1], as well as on the authors' personal Facebook profiles and WhatsApp. The survey was live for six days and a total of 110 responses were collected.

A statement at the beginning of the survey clarified that by "friends", the survey was referring to those friends who respondents considered to be close, or someone with whom they would interact, outside of classes as well. The survey asked respondents their batch, gender and major. This information was required to understand the distribution of responses. It also asked respondents to approximate and choose the closest percentage (with percentages listed as multiples of 10) of their total number of friends on campus that they would say were from their own major, batch and gender, separately for each category. It then asked for an approximate percentage of people that the respondents interact with during classes, with whom they also interact with outside classes. This was to understand whether students make close friends with people they have class with, the criteria for close friendships being, those that included interactions outside of class as well. The survey was designed to gather information that could help support not only the initial hypothesis, but also lead to potential further research on the Habib University student community.

Survey Participant Statistics and Distributions
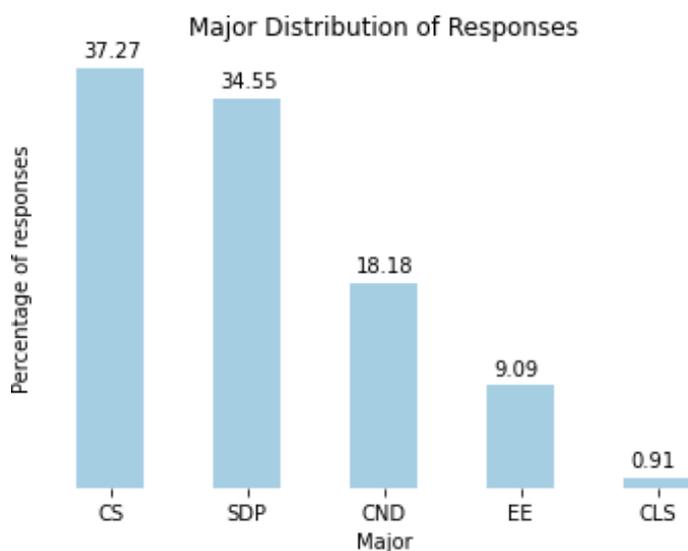
Batch Distribution

Survey results showed that 53.64 percent of respondents belonged to the batch of 2021. A likely reason for this is that since the authors of this paper belong to the batch of 2021, and the method used was convenience sampling, it was naturally easier to reach out to students of the same batch, and convince them to participate in the study.
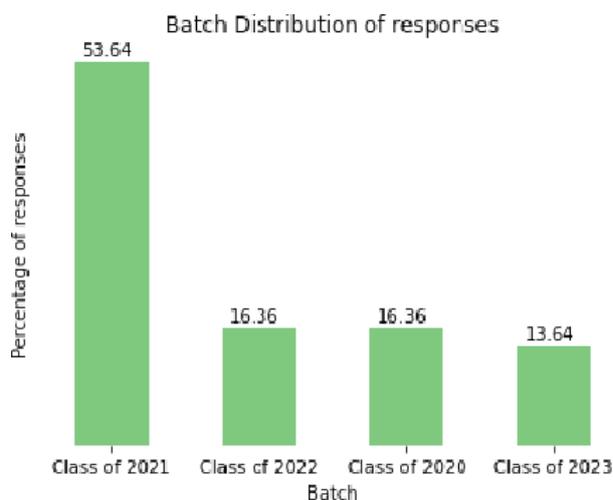
Figure 5: Batch Distribution of Responses
Note. Batch Distribution of the 110 survey respondents.
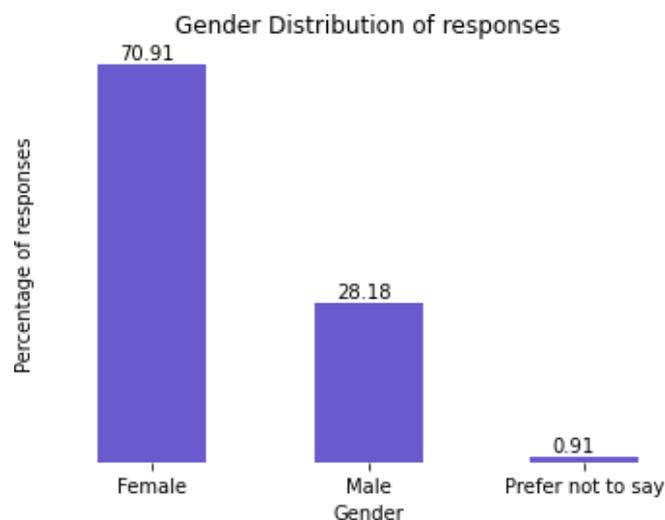
Major Distribution

A combined 71.82 percent of respondents were either Computer Science (37.27 percent) or Social Development and Policy (34.55 percent) majors. The two majors constitute the largest majors by number of enrolled students at Habib University, and this was reflected in the results.

Figure 6: Major Distribution of Responses
Note. Major Distribution of the 110 survey respondents.

Gender Distribution

70.91 percent of respondents identified as female. This can be attributed to Habib University's majorly female population (Habib University Registrar's Office, personal communication, November 23, 2021).


Figure 7: Gender Distribution of Responses
Note. Gender Distribution of the 110 survey respondents.

Distribution of Participants who interact with their Classmates outside of Class.

The distribution is shown below (see Figure 8). The responses were relatively evenly spread out, however, there are two peaks at 80 percent and at 70 percent. Around 28.09 percent of respondents chose a value greater than 70 percent. This tells us that most respondents interacted with less than 7 out of 10 of their classmates outside of class.
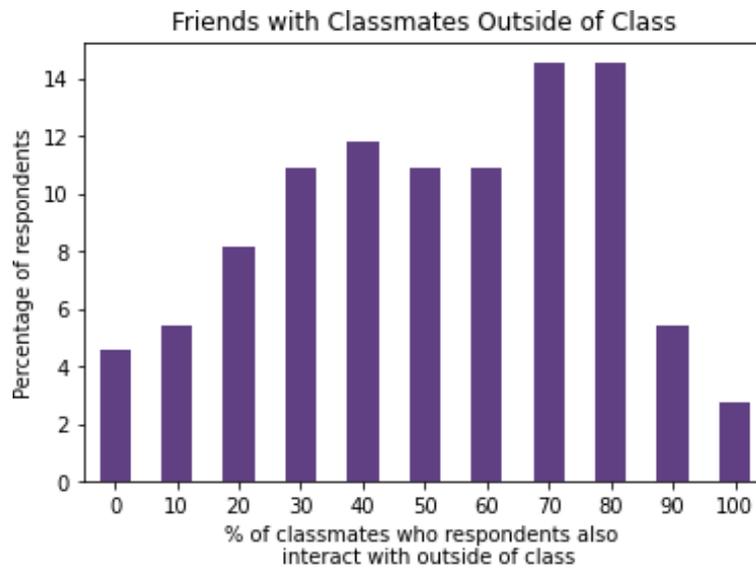
Figure 8: Friends with Classmates Outside of Class
Note. This figure represents that percentage of classmates that respondents claimed to interact with both inside and outside of class.

Results

For the scope of this paper, we will mainly focus on the Computer Science and Social Development and Policy majors, because they are the largest majors at Habib University, and made up the largest percentage of respondents.

Figure 9 graphs responses from all majors, about the proportion of their total friends that are from within their own major, while Figures 10 and 11 reflect responses from CS and SDP students, respectively.
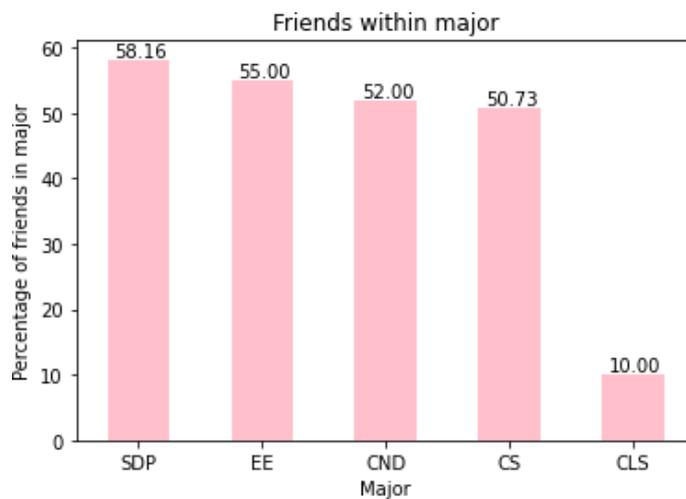
Figure 9: Friends Within Major

Existence of Homophily In CS Majors

From Figures 9 and 10, it is apparent that there is a high tendency in CS students to interact with other CS students. Figure 10 shows that, on average, CS respondents claimed that 50.73 percent of their friends were from CS. Figure 10 showed us that while the most common options were 70 percent and 80 percent respectively, overall, 56.1 percent of all CS respondents claimed that they interacted with less than 70 percent of their classmates outside of class as well.
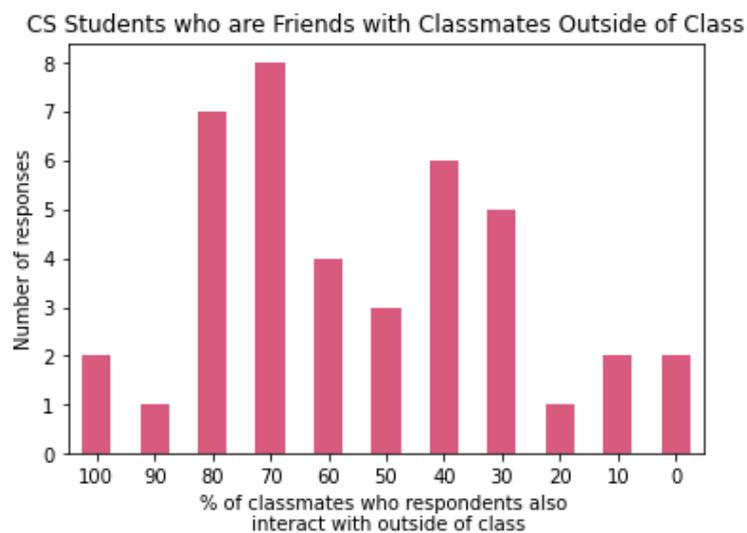
Figure 10: CS students who are friends with classmates outside of class
This figure represents the distribution of SDP students who claimed to socialize with their classmates outside of class as well.

Existence of Homophily in SDP Majors

From Figures 9 and 11, it is apparent that there is also a high tendency in SDP students to interact with other SDP students. Figure 9 shows that, on average, SDP respondents claimed that 58.16 percent of their friends were SDP majors as well. This is a higher statistic than that of CS respondents (50.73 percent). Figure 11 appears to be relatively more consistent in comparison to Figure 10. There are fewer peaks or extremes, and about 68.42 percent of the total respondents belonging to SDP claimed that they interacted with less than 70 percent of their classmates outside of class as well. Again, this is a higher statistic than that of the CS respondents.
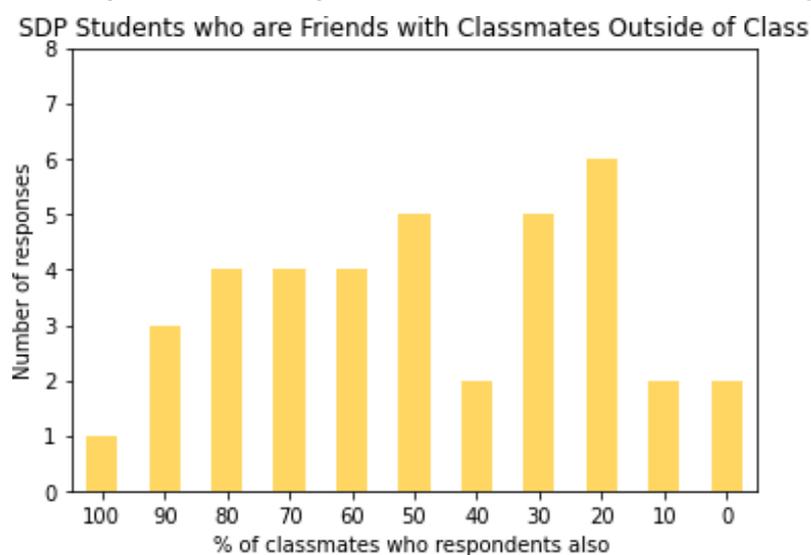
Figure 11: SDP students who are friends with classmates outside of class
Note. This figure represents the distribution of SDP students who claimed to socialize with their classmates outside of class as well.

Existence of Gender Homophily in DSSE Students

Figure 12 shows that on average, around 41.12 percent males and 52.92 percent females majoring in sciences or engineering claimed to have friends that identified as a gender other than their own.
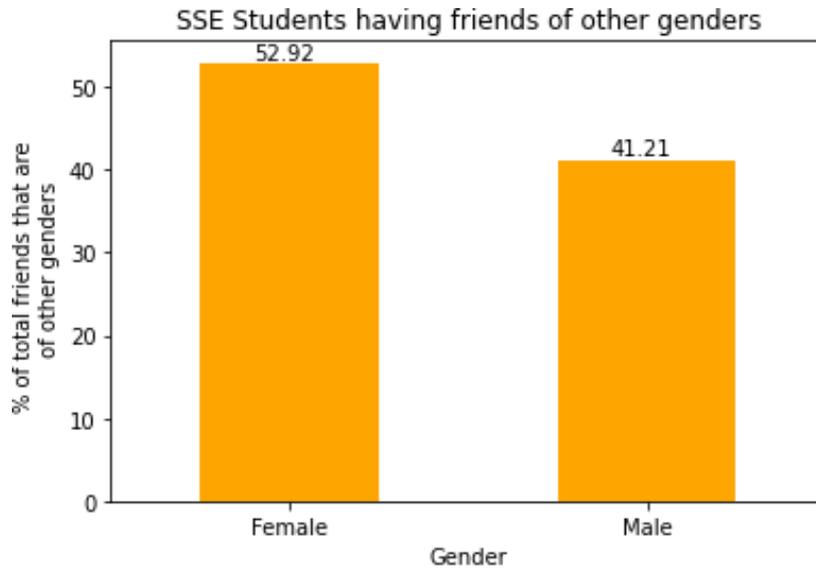
Figure 12: DSSE students with friends identifying as another gender

Figure 13 shows that on average, around 57.67 percent of males and 30.32 percent of females majoring in arts or humanities claimed to have friends that identified as a gender other than their own. The percentage of AHSS males with friends of another gender is significantly higher than that of DSSE males.
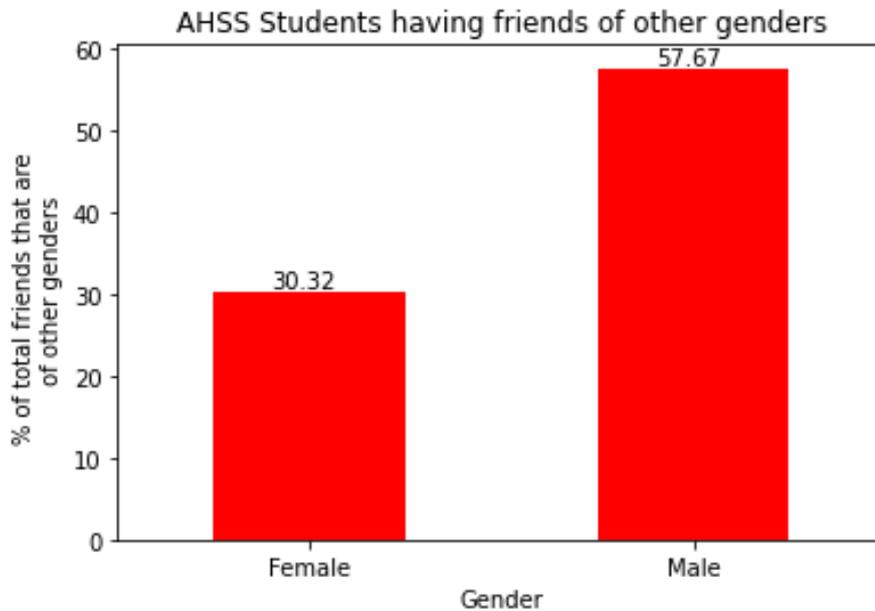
Figure 13: AHSS students with friends identifying as another gender

Discussion

There are some possible reasons for the results obtained which are apparent in differences between each major's gender demography, as well as how their course outline is designed. For instance, CS majors usually follow a relatively strict course outline in their four years of undergraduate education, from which there is usually very few deviations. This means that for most students, classes in their formative years at the university are mostly major based, and this is why they have most exposure to peers of their own major. In this way, there is a divide by design. The schedules of many of the CS core courses are often such that a lot of students do not have much free time in between classes. In the free time that they do have, many prefer to work on assignments and projects, or study for assessments, for which it is helpful to work with other CS students.

There are some possible reasons for the results obtained which are apparent in differences between each major's gender demography, as well as how their course outline is designed. For instance, CS majors usually follow a relatively strict course outline in their four years of undergraduate education, from which there is usually very few deviations. This means that for most students, classes in their formative years at the university are mostly major based, and this is why they have most exposure to peers of their own major. In this way, there is a divide by design. The schedules of many of the CS core courses are often such that a lot of students do not have much free time in between classes. In the free time that they do have, many prefer to work on assignments and projects, or study for assessments, for which it is helpful to work with other CS students.

SDP students generally have more flexibility in choosing courses, as their course plan has fewer required courses (18, compared to 27 for CS students, according to the course catalogue for the batch of 2021) (Habib University, 2014). They have creative practice and literature requirements, which are often fulfilled by electives outside of their major, and even school. Thus, when we compare Figures 10 and 11, we can see that there are fewer peaks or extremes in the graph for SDP majors, whose distribution is relatively more consistent. This could be due to the fact that a lot of the courses taken by SDP students have students from majors other than their own. Therefore, there may be mostly SDP students in core SDP courses, that are requirements for their major, but a mixture of CND, SDP, CS and EE students in non-SDP, elective courses. This does not hold true for CS students, because a lot of the required and elective CS courses require a

background in technical CS knowledge. Without meeting certain prerequisites, students of other majors are relatively less likely to take CS courses, which leads to CS students having classmates that are mostly from their own major.

Furthermore, the type of workload that exists for DSSE and AHSS students is different. Therefore, students within a major might find it easier to connect with other students in the same major, because they share the same kind of work. We tested this by picking a major from each school, and then comparing the responses of students with each major, i.e., CS and SDP students. For CS students, a majority of the course work related to their major involves examinations, projects, viva voce, and technical assessments. For SDP students, a majority of the course work related to their major involves presentations, research work, and writing papers. For this reason, there might be a natural inclination on the part of each major's students to be around other students of the same major, since they are more likely to share similar concerns about assignments and the same approaching deadlines. This could stand for all other majors in both schools.

As for gender divide, there are fewer females in DSSE (Habib University Registrar's Office, personal communication, November 23, 2021). This supports our survey results, which indicate that more than half of the DSSE female respondents claimed to have friends from the opposite gender. This could be due to having less same-gendered people to befriend within their major. However, there is a large DSSE male population at Habib University (Habib University Registrar's Office, personal communication, November 23, 2021), and this could be why many DSSE male respondents claimed to predominantly be friends with other male peers. Meanwhile, there are comparatively fewer AHSS males (Habib University Registrar's Office, personal communication, November 23, 2021), so there is a lack of same-gendered students to befriend, which could explain why many AHSS male respondents claimed to have friends of other genders. The female majority in AHSS could explain why fewer females mentioned befriending males.

Furthermore, Figures 8 and 9 showed us that while, due to group assessment, a lot of students might be forced to interact with their classmates in class, there is a high percentage of them, who do not engage in interactions outside of class. This might be indicative of homophily based on majors not being as prevalent. It also shows that classrooms, or interactions with classmates over work, are not necessarily platforms that must lead to establishing friendships.

Key Takeaways

As far as the scope of this research paper goes, there was no evidence found, that either proves or disproves that a high level of polarization, based on majors or genders, exists at Habib University. The data showed the existence of very limited polarization, and this can be attributed to the existence of the Liberal Core. The Liberal Core is a set of courses that attempts to provide all students, regardless of major or batch, with knowledge of various essential subjects like quantitative reasoning, philosophy, religion, historical and social thought, etc (Habib University, 2014). This allows humanities students to get exposure to the essential sciences, and vice versa. What results from this, for the most part, is an environment where open-minded discussions are encouraged, along with the idea that no particular gender, major or batch is superior to another, and so, polarization on this basis is discouraged. Furthermore, the Liberal Core courses encourage and provide a platform for students from all genders, majors and batches to interact with each other, since its classes comprise of students from all majors.

It can be concluded that while polarization leading from othering can definitely be a problem, there is not enough evidence to suggest that this problem is highly prevalent at Habib University. It is easy to acknowledge that some divide does exist between the engineering students (CS and EE), and the non-engineering students (mainly SDP and CND). The survey employed in this research, taken six years after a similar survey, showed similar trends in the divide between friendships among the different schools.

In consideration of the relatively mixed responses, as well as the lack of an equal number of responses across all batches and majors, it is important to acknowledge the gaps in this study's data and consequently, the research. While the existence of a divide between the schools is apparent, it still remains to be proven either qualitatively or quantitatively, whether it has led to any kind of polarization among the Habib student community.

Future Plans

A possible reason for the specific results of this study could be attributed to the Liberal Core, which may be contributing to the mitigation of polarization that might otherwise be caused by the divide. This leads to a possible hypothesis that can be addressed through further research: Does the Habib Liberal Core play a role in mitigating the effect of othering and polarization at the University? This hypothesis can be taken in two directions. A similar survey can be conducted across other universities in Pakistan to understand the extent to which there exists a divide between engineering and non-engineering students in other universities. Along with this, specific questions can be added to the survey to further explore the different opinions as well as assumptions that engineering and non-engineering students across Pakistani universities hold about each other. A comparative analysis can then be performed, to see whether the opinions held about each major are more, less, or equally as polarizing as they are at Habib University. This can allow an assessment of the Liberal Core's influence on othering and polarization in Habib University. Another angle that can be explored is the effect of various meta-curricular activities—such as music classes and student clubs—on friendship dynamics.

The survey used within our research also included a checkbox question to get some added clarity on what participants look for when making friends at Habib University. This question allowed respondents to choose any number of options from a given set of choices, including shared interests, a similar social status, a similar personality to the respondent and similar morals. Participants were also allowed to manually enter their own answer statements. Although the results of this question were not included in this study, they can be replicated in future studies to explore whether status homophily or value homophily is more prevalent in friendship groups at Habib University. Yet another possible thesis could investigate the relation of female to male ratios in universities with friendships. Statistics show that Habib University has a larger female population, compared to other, predominantly engineering institutions like the National University of Sciences and Technology (NUST) and Ghulam Ishaq Khan Institute of Engineering Sciences and Technology (GIKI), where the male-to-female ratio is much higher, with an enrollment of 1 female for every 9 males (World University Ranking, 2021). There is also a notable number of females in the engineering school at Habib, which gives males with science and engineering majors a greater exposure to members of different genders, and increases the chances of them becoming

accustomed to working in female dominated environments. This, however, may not be the case in the above-mentioned institutions. The survey showed that on average, around 41.12 percent of males majoring in sciences claimed to have friends of the other genders, as shown in Figure 13. It would be interesting to explore whether a comparable statistic is found in other engineering institutions. There is potential in exploring how the larger female presence at Habib University has shaped engineering male students' attitudes towards women, when compared to the attitudes of male students at other universities across Pakistan who have lesser exposure to female peers within their major.

Quantifying Homophily

While it could be assumed that a theoretical concept such as homophily can only be explored in a subjective manner, interestingly, there are several methods that allow for it to be quantified. As such, this research could be further expanded by using its findings and the methods listed below to quantify the level of homophily in a university setting.

There are differing views on how to empirically quantify and measure the level of homophily in a society. One common method is assortative mixing, which refers to the process of observing how "attributes of vertices (in this study's case, individuals) correlate across edges (friendships, in this context)" (Clauset, 2013, p. 5). In a social network, assortative mixing is the study of how individuals' attributes such as race, gender etc. influence the connections they make. According to Clauset (2013), assortative mixing can further be broken down into distinct attributes by either their labels or enumerative values, or even scalar values. Labels or enumerative attributes consist of all those attributes that vertices may possess in a network, that follow no particular order or hierarchy. Examples in general networks can include colors and shapes, while examples of humanistic attributes in societies can include gender and ethnicity (Clauset, 2013). Scalar attributes consist of all those attributes that vertices may possess in a network, that have a particular numerical ordering or hierarchy. In humanistic societies, these can include age, weight and income (Clauset, 2013 & Newman, 2002).

Another common method of empirically quantifying homophily is to calculate the proportion of links that exist within the community, to the total number of links (including those with members of different communities). If there are two

distinct groups, based on a social category or identity like gender, age or race, and a friendship network is constructed between them, we can measure homophily by dividing the number of friends an individual has in their own group by the total number of their friends (Alam, 2020).

Limitations

There were certain limitations that hindered the study from reaching a conclusive outcome. Firstly, the survey results were not entirely representative. There was a definite bias as a greater number of responses was received from the Batch of 2021, and from CS and SDP students, due to which, analysis had to be limited to the two majors' responses. The EE majors in particular, were underrepresented in this study, and in any attempt to replicate the study or take this research further, EE representation should be taken into consideration. Their input would help get a better idea about the divide between engineering and non-engineering students as well as the friendships within students belonging to the same school.

Furthermore, this survey was only made available to respondents for six days, a longer time frame would have gathered more varied responses. COVID-19 and time constraints restricted the method used in the study to convenience sampling and an online survey, which impacted the number and distribution of responses collected. Moreover, the survey results were not descriptive enough to conclusively assess the attitudes of engineering and humanities majors towards each other, and the authors had to draw on a lot of their own experiences to generalize and make assumptions.

Conclusion

This paper explored the dynamics of friendship groups at Habib University through the lens of homophily. It established that there is a divide between the engineering and non-engineering student communities. However, there was not enough evidence to conclusively suggest whether this divide was strong enough to cause polarization. It explored the various factors that contribute to this divide such as schedule restrictions, study habits, and subjects that are shared within each major. It proposed several directions the research could be built upon to further

explore homophily in university friendship networks, such as testing whether the level of polarization is equally prevalent in universities across Pakistan that do not offer Liberal Core courses, or testing for polarization based on gender in different engineering universities. The research has further scope for expansion and applicability to other institutions, as well as more factors that influence friendship networks.

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