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Research Article

Where Do You Sit in Class? A Study of Spatial Positioning During Two Courses of Different Duration

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Abstract

The objective of this study was to study the selection of seat location by individuals in a group in a confined environment and to identify the factors leading people to prefer one location to another. We analyzed the seating location of students in a lecture hall over the course of two academic programs of different durations (19 days and 44 days). The goal was to determine the rate at which participants would settle into a specific seat location. Unobtrusive photography was used to collect objective data on an hourly basis. Results showed that in both courses participants began to settle into a specific location from the second day of class. Twenty percent of the participants had settled after 4-7 days or 15.5 hours in class. Settling continued for the duration of the shorter course. However, in the longer course settling stopped after 28.5 days on average. The plateau in the number of settlers depended on the number of days, not on the time actually spent in class. At the end of the longer course 52.5% of the participants had settled, compared to 38.9% in the shorter course. Settling into the same seat location can be interpreted as a strategy to establish a personal territory. These results indicate that about half of a cohort expresses the need for establishing a personal territory when in a confined and crowded environment, and this process takes about one month.

Keywords:
Spatial exploration; spatial positioning; personal space; territorial behavior; confinement; group behavior

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Introduction

Environmental psychology studies the interactions between human beings and their surroundings, focusing on cognitive processes such as perception of the environment, spatial cognition, and personality, as well as the management of social and personal space, and human interactions [1]. Public settings with open seating have been used for studying spatial exploration, spatial positioning, and territoriality behavior among individuals [2], [3], [4], [5].

Previous studies have investigated the effects of classroom layout, including seat arrangements and entry locations, on student performance, attitude, social interaction and participation [6], [7], [8], [9], [10], [11]. Student preferences for various classroom layouts have also been examined [5], [12], [13]. For the most part, these studies relied on surveys and self-reporting. Little is known about how individual's behavior changes over time. However, one recent study used photography to observe repetitive seating patterns chosen by students in two lecture halls [14]. Six observations were taken over a span of four weeks. The study showed that participants tended to choose the same seat over time in university classrooms. The author also analyzed this territorial behavior by computing the mean seat-to-seat displacement, which showed that individual students preferred to remain in a relatively small territory within the classroom. Their interpretation is that the choice of the same seating area helps individuals to control the environment and achieve goals with minimal interference [14].

In this study, we used a similar observational method with the goal of gaining greater insight into the dynamics associated with establishing territory as a function of time. That is, we were interested in how quickly and how many of the participants settle into a preferred seat location. To accurately capture these dynamics, observations were made on an hourly basis for the duration of the study. In addition, the observations were complemented by a survey to determine whether the territorial behavior demonstrated in this study was driven by physical, psychological, or environmental factors.

Material and Methods

Participants

The work described has been carried out in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans. The test procedures were approved by and in compliance with the standards of the International Space University institutional review board for human research. Because a description of the experiment design would affect the subject's responses in ways that jeopardize the validity of the research, participants were not told

the research aims until the study ended. After a presentation of the study's preliminary results and a description of how confidentiality and anonymity would be maintained, all the participants provided their consent for publication of the study results.

Courses and Lecture Halls

This study included 99 participants (21 females, 78 males) in a professional course (PC) and 44 participants (10 females, 34 males) in a graduate course (GC). The mean age was 31.4 and 27.5 years for the PC and GC cohorts, respectively. Both cohorts included participants from 26 different countries. Both courses comprised a series of interdisciplinary lectures addressing a broad range of space-related topics. All lectures and lecture materials were delivered exclusively in English. There was a minimum of a 15-min break between consecutive classes.

The PC was a summer session program that included 60 hours of classes over a span of 19 days in the July-August period. The GC was the first module of a Master of Science program that included 83 hours of classes over a span of 44 days in September and October. Another difference between the two courses was that the participants in the PC were together essentially 24/7 while the GC participants were only together during class time.

The students were free to choose where to sit at every lecture. The PC lecture hall had 228 seats. The GC lecture hall had 110 seats. The seat-to-participant ratio was 2.5 and 2.3, respectively. Therefore, although the number of participants was different in both cohorts, the space available for positioning was essentially the same. Entry into the PC lecture hall was possible through two doors symmetrically located in the back left and right sides of the room. The GC lecture hall layout was such that it could only be entered on the left side from the front and back.

Procedure and Data Analysis

To collect the data for both courses, a high-resolution camera with a wide-angle lens was used to capture time-lapse still images at the rate of one per minute. At the end of each class day, the memory card was retrieved and a frame-by-frame analysis executed.

The PC lecture hall was represented by a matrix of 12 rows by 51 columns (figure 1A), and the GC lecture hall by a matrix of 11 rows by 10 columns (figure 1B). For each one-hour lecture, the occupied seats were marked in the matrix based on the images collected. Each seat location in the matrix was assigned x and y coordinates corresponding to its row and column position, respectively. The x and y coordinates of all occupied seats were then averaged each day to calculate the centroid (± SD) of the participant locations. In addition, the individuals in the occupied seats were compared daily to determine if the occupant was the same person. Settlement was characterized by having participants occupying the same seat location for two consecutive class days.

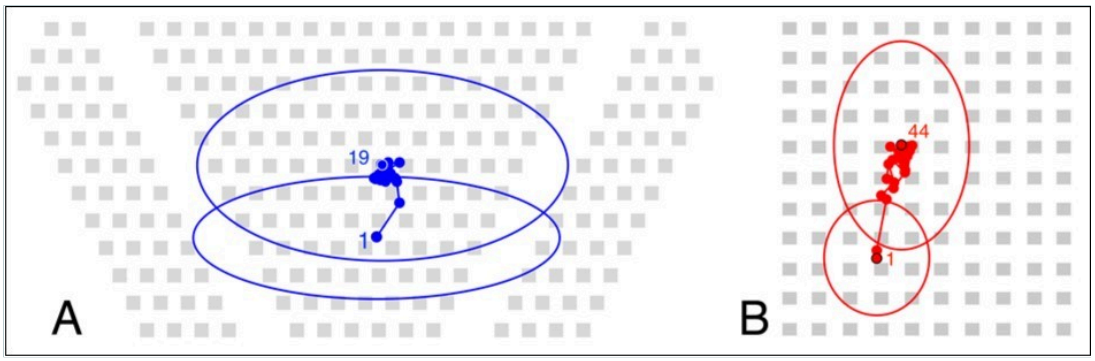

Figure 1. Lecture hall layout showing the seat arrangement (gray squares) and participant seat location centroid daily variations for the PC (A) and GC (B). The front of the lecture hall is at the bottom of the figure. Mean (blue or red dots) of all x-y coordinates of the occupied seats for each day. Standard deviations (ellipses) and numbers for the first and last day of the course.

Survey

At the end of the GC, semi-structured interviews were conducted with 11 settled individuals (approximately half of the settlers) to potentially identify those factors that had influenced them in choosing their specific seat location. Five categories of factors were addressed: (a) environmental factors such as heat, temperature, noise, crowding, lighting, and lecture hall layout; (b) student's native language, educational and professional experience; (c) personality traits, such as leadership, attitude, shyness, and enthusiasm; (d) visual, auditory, and mobility impairments; and (e) the belief that people sitting in front get better grades and are more appreciated by the faculty [6]. Interviews were not conducted with the PC participants due to their unavailability immediately after the course.

Results

Centroid

When averaged over all classes throughout the courses, student attendance was 94.6% for the PC and 92.3% for the GC. On the first day of both courses, the participants were seated near the front of the lecture hall as indicated by the location of the occupied seat location centroid in figure 1. By the third day, the centroid had migrated to the front-to-back middle of the lecture hall. The PC centroid was also right-left symmetrical, whereas the GC centroid was biased towards the left side of the room presumably because of the location of the doors.

Settling Behavior

An analysis of variance (ANOVA) was used to compare the percentage of settled participants throughout the 60 hours of class between PC and GC (figure 2A). The number of settled participants was found to be significantly different in both courses [$F(1,117) = 10.4$; $p < 0.01$]. By contrast an ANOVA comparing the percentages of settled participants throughout the first 19 days of both courses (figure 2B) indicated that the difference was not significant [$F(1,29) = 0.04$; $p = 0.85$]. This result suggests that settling is related to the duration of the course (in days) more than the actual time spent in class.

Students began to settle in a preferred seat location after the first day of class (figure 2A). In both courses 20% of the participants settled into a unique location after 15.5 hours of class. The number of settlers continued to increase throughout the 60 hours of class in the PC, but this number plateaued after about 38.6 hours of class in the GC. No further settling in the GC occurred after 28.5 days (figure 2B). At the end of the GC 52.5% of the participants had settled, whereas 38.9 % of the participants had settled at the end of the PC.

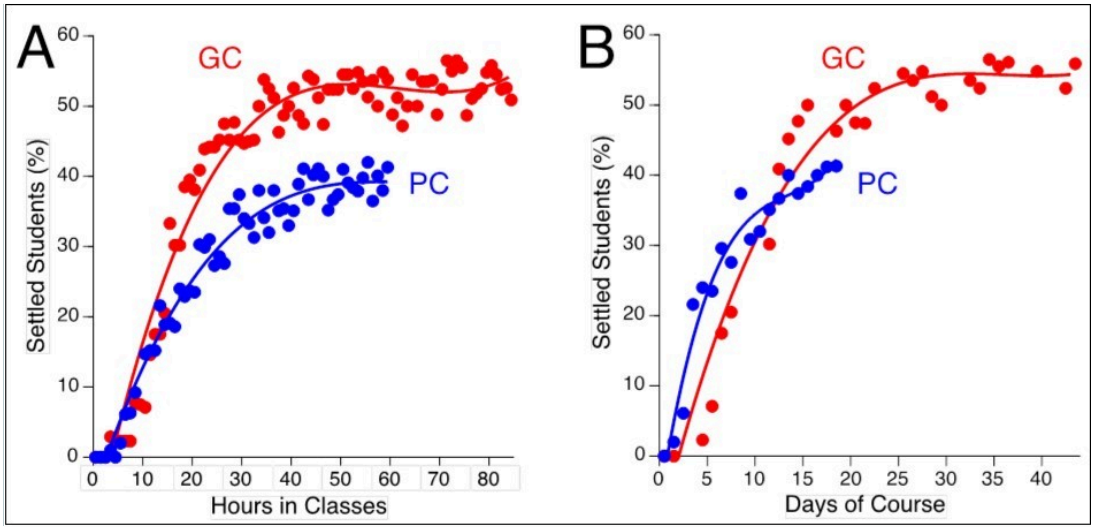

Figure 2. Percentage of settled participants in both courses as a function of time spent in class (A) and as a function of days of course (B). The solid curves are third-order polynomials fit to the data.

Table 1. Frequency chart of the five categories of factors that potentially influenced the 11 GC participants in choosing their specific seat location.

Factors	Count
Environmental parameters	2
Language/education	6
Personality traits	7
Physical impairment	3
Better grades	1

Survey

The results of the structured interviews conducted with the GC participants are summarized in table 1. These results indicate that

a) Environmental parameters such as temperature, heating, and air quality were not perceived by the settled participants as playing a significant role in their seat location choice.

b) Participants who chose seats in the front of the lecture hall did so for better interaction with the lecturer or, in the case of non-native English speakers, so that they could better see the lecturer's face and expressions.

c) Participants who self-identified as shy or timid preferred to sit on the sides of the lecture hall in less crowded areas, whereas the class leaders tended to cluster in the middle.

d) Participants with visual or auditory problems tended to sit in the front.

e) Only one student stated that he preferred to sit in the front to be noticed by the lecturer.

Discussion

The purpose of this study was twofold. First, the study was designed to examine the dynamics of territorial behavior as measured by participant settling into a specific seat location in a lecture hall over the duration of a course. The second was to investigate factors that produced the observed spatial positioning using a survey.

In agreement with past research that used self-reports of seating preference [3], [5], [14], this study confirms that participants tend to choose the same seat over time in university classrooms. Our results indicate that only about half of the participants settled into the same seat location after several weeks. Guyot et al. [3] found that students report sitting in the same seat between 78% and 86% of the time. Their study used self-reports based on choices made for completely vacant classrooms. As stated by Costa (p. 714) [14]"these reports were not validated by objective observational data. In daily life, students establish patterns of seating over time and in the presence of others, where it is less likely that seating choices remain exactly the same over time". In the present study we actually measured participant position relative to each specific seat over time. It is possible, however, that more participants actually settled in a territory that was larger than one particular seat location, gravitating to a territory spanning several adjacent seats [14].

For most individuals, settling into a particular seat location is a dynamic process that happens over the period of about one month. This process seems to be a function of the number of days rather than the number of hours spent in the lecture hall. Sixty hours of lectures were completed in 19 days in the PC compared to 29 days in the GC. Yet fewer participants in the PC had settled at the end of 60 hours than in the GC. One possibility is that because of the short duration of the course, there was not enough time in the PC for the settling process to complete.

Another possibility is that because the PC participants were together essentially 24/7 and knew each other better, they may not have been compelled to establish personal territory. People need their personal

space when they are in confined, crowded environments [15]. The size of the required personal space is affected by the physical layout of the room, duration of time participants interact, stress levels, cultural differences, and other factors. Individuals with more sociable personalities have less need for non-shared living space [16], [17]. The PC participants socialized much more than those in the GC; therefore, their personal territories may have been larger than one seat.

Settling patterns are influenced by many factors including physical, psychological, and environmental elements. Environmental parameters have been proven to be a major driver in affecting lecture hall seating position. There is a strong demand for a softer, warmer, and more intimate and effective instructional space [18]. Results of individual interviews have also stressed the importance of the room layout, furnishings, and lighting in seating preferences. However, personality traits are also a factor that drives seating preference. Pedersen [4] found that students who chose to sit in the back of the classroom desired to be out of the visual field and wanted less involvement with others. In row-and-column arrangements student participation in the front row and in the middle of each row was the highest. The results of our survey of settled participants in the GC group confirm these points.

When we can choose our seats in a lecture hall, public library, cafeteria, or church, for example, we pick a seat that gives us the vantage point, hearing ability, light, comfort and personal space that we think is best at the time. Unless something dire happens to change that perception, we will consistently return to that seat as an unspoken territorial statement. Settling helps individuals control the environment to achieve goals with minimal interference thereby reducing stress and anxiety. There are drawbacks associated with settling, though. For example, in well-attended venues settlers must arrive early to claim their seat. As well, a conflict or stressful situation could arise if someone else takes the settler's seat [19].

Conclusion

Our results confirm previous observations that students choose the same seat over time in university classroom [3], [5], [14]. This attachment to specific territory starts from the second day of class and about half of the class has settled after one month. It has been proposed that establishing a personal territory inside the lecture hall avoids the necessity of renegotiating the seating arrangement with other occupants each time [19], thereby reducing stress and anxiety. In agreement with this hypothesis, the slower dynamics of marked territoriality in the group that was together 24/7 may be due to social bonding between the occupants.

Author Contributions:

Gilles Clement and Angie Bukley participated in the design, implementation, data analysis, and writing of this paper.

Competing Interests

The authors declare no conflict of interest.

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