

Complimentary Silence-The Use of Territoriality with Manipulated Tables Layout in Libraries

Zhuoran (Weston) Ding

UW-Madison, College of Letters and Science, 53706, USA

Westonding24@gmail.com

ABSTRACT

The study was an investigation of the effects of nearby groups' sizes and physical distance to library study area users with a 2x2 Design. 15 UW-Madison students and staffs provided oral responses to 12 ice-breaking questions under 4 different library settings described by descriptive images with background noise. Their encroachment measured with the length of their oral responses. Results revealed that encroachment was significant adversely affected by the interaction effect of groups sizes and physical distance and nearby group size in agreement with previous studies. The study demonstrates it's possible for libraries without budgets for specific-designed furniture and additional furnish to reduce noising behavior by manipulating tables layout.

Keyword: *Human territoriality, Proxemics, Social psychology, Library, College students, Behavior*

1. INTRODUCTION

Territoriality, the use of space to communicate ownerships of areas, is an essential activity of humans (Beebe et al. 154) and served as a powerful strategy from bags on seats to soldiers on national borders (Sack 1). It is everywhere in our daily lives from parties to workplaces and study areas. Throughout the past 60 years, researchers forged ahead on understanding territories and corresponding territorial behavior.

All previous studies have validated that owners of territories intrinsically defend the territories they present. To express their defensibility with different physical arrangements, members and owners perform multiple behaviors including marking, personalization as well as control (Ramachandran 885). For example, personal markers such as books and bags serve as short-term basis which indicates ownership and occupancy (Becker 444). Notably, the defensibility of territory owners is influenced by multiple factors and one of the most impactful factors is the physical setting of territories (Gifford 860). Their behavior and strategies vary in the shape of the room, its furniture arrangement. Changes of factors followed by manipulated physical settings, such as social density and distance between territories' owners, could also shape their performance due to the interaction effect of these factors (Sinha and Sinha, 834).

Not only are owners and members of territories involved in territorial influence, but non-group members such as pedestrians were also found to be highly related to territoriality in numerous aspects. Contrary to the defensibility of territory owners, non-group members influence territories through conduct encroachment or intent to avoid possible encroachment. Non-group members could act submissively with less encroachment such as through physical permeation (which is a kind of

invasion) and lower frequency of talk (which is a kind of contamination) when they faced territories with different characteristics. Knowles (1) tested that people are less motivated to penetrate groups in larger sizes (4 people) than those which are smaller (2 people). Furthermore, pedestrians are more motivated to behave submissively and try to avoid nearby groups in small physical distance to them (Cheyne & Efran, 485).

Even with the significant research on territoriality discussed above, they were far from being applied to their potential. Confliction caused by the defensibility of owners and the encroachment of strangers occurred frequently in libraries. Spaces are wasted through unregulated marking and strangers' intrinsic will to avoid encroachment. According to Sommer (236), 64% of students prefer empty tables and only 10% sat beside or opposite other students. Only few researchers are dedicated to improving people's experience in territories such as classroom and library study areas and few suggestions made by existing research are very accessible to normal colleges and libraries. Kaya (873) suggests that students express less defensibility and less conflict occur with specific-designed furniture such as U-shaped arrangement tables and clusters. However, the budgets of libraries are usually occupied by acquaintances and the circulation of materials but not new furniture and furnishing.

The goal of this study is to replicate results of related previous studies in typical college library situations with undersigned tables and determine whether the simple manipulation of undersigned furniture layouts with no costs, could be feasible and effective in reducing noise in library study areas. Due to the availability of libraries during the COVID-19 pandemic, online oral surveys which simulated college library study areas with instructional images of study groups and background noise were utilized for this study. My research question for this study focuses on whether library users conduct less

territorial encroachment such as speaking loudly with manipulated furniture layout. I hypothesized that participants behave submissively in shorter answers with larger groups next to them and shorter physical distance between participants and nearby groups. Conversely, they speak more actively in longer answers with smaller groups by their sides and longer physical distance to nearby groups. Lastly, I sought to examine the accessibility of table manipulation suggestion for libraries by hypothesizing the interaction effect between two independent variables.,

2. METHODS

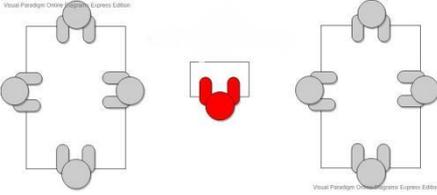
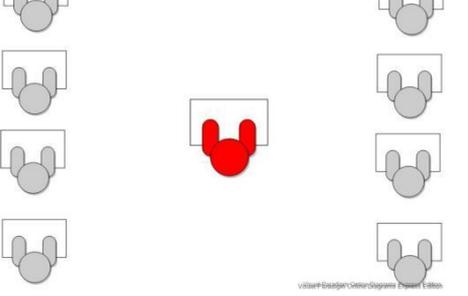
2.1. Participants

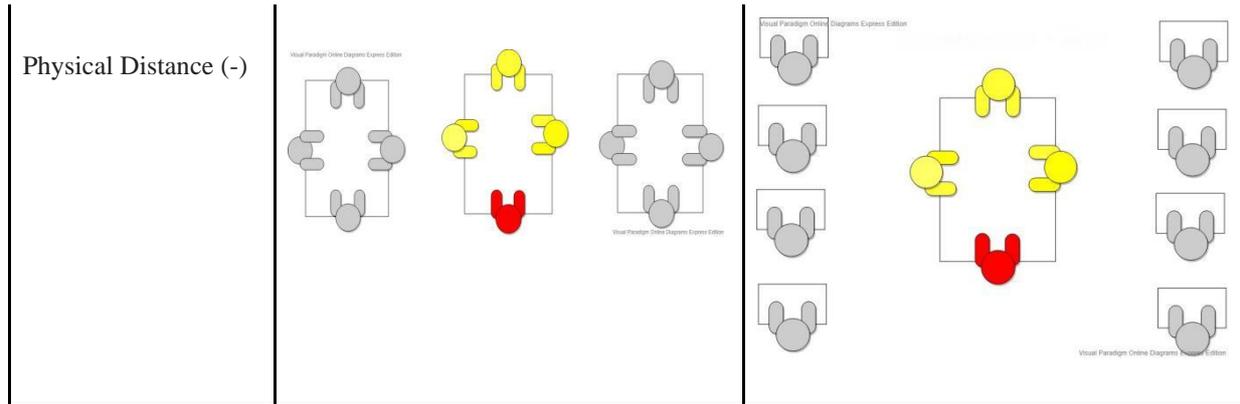
This study recruited 15 participants who are UW-Madison undergraduate students or employees (Mage=32, SDage=14). They incorporated into the study contingent on the fact that they have lived in the United States for 3 years. These participants were recruited by email and text and had the ability to sign up for this study at their own discretion. All recruited participants had access to the libraries in UW-Madison before the pandemic and had physical experience in libraries for at least 5 hours.

2.2. Material

The study consisted of one 15-questions online oral questionnaire. The first 2 and last 1 were instructional and demographic questions. The other 12 questions were test trials served to collect participants’ oral responses of ice-breaking questions under different conditions. Each of 12 test trials consists of a distinct video which describes the corresponding environment with an assortment of tips reminding correct steps to record their voices. The videos constructed via a descriptive image and an edited background noise. The background noise is 2-minutes long fabricated conversations between college students played at the same volume. All descriptive images were pretested to show physical arrangement of participants and other library-users in the simulated scenarios (see table 1). Red marks represented participants themselves. Strangers shown up with grey and yellow marks. The existence of yellow mark strangers, which sat between participants and nearby groups, shorten physical distance between them. And the grey mark strangers quantifies sizes of nearby groups. Their territorial encroachment was operational defined and measured as the length of their oral responses in assigned library settings.

Table 1: relationship between group size and distance

Table 1	Group Size (+)	Group Size (-)
Physical Distance (+)		



2.3. Design

The study had a 2 (size of nearby groups: 4-people on group table and 1-person on individual seat) × 2 (physical distance to nearby groups: participants sit next to nearby groups, and 3 people sit between participants and nearby groups) factorial design. Participants were blind and were told that this study was about how ice-breaking questions work differently in different distances. They were measured twice for each condition and were counterbalanced with 2 groups which performed tasks in reverse order. 4 filler questions in different conditions were implanted evenly between each focal trial.

2.4. Procedure

Each participant participated in this study with their own computer alone and unique link provided by the researcher. To start the study, participants complete the microphone check with a click to consent form to complete prior to beginning the survey. Then participants are instructed on how to complete each question with correct steps from the following information page explaining the meaning of images and background noise in embedded experimental videos. Next, participants provided their audio answers to 12 questions with distinct videos which simulate the corresponding physical arrangement. Once all answers of 12 test trials by each participant were uploaded, the demographic survey is pulled up to complete as the last part of the questionnaire. After all participants finished the questionnaire, the researcher told participants real goals of the study, disabled the survey link and concluded the study.

2.5. Statistical Analysis

Statistics were done using the lme4 package (Douglas et al) in R 4.0.2 (R Core Team). Hypothesizing interactional effect between two variables in the 2 x 2 design, statistical methods which assume independence amongst variables were incapable to assess results of this study. Besides, random effects had to be considered in statistical analysis

as multiple factors such as personal characteristics, which were studied by previous territoriality studies, could shape participants’ territorial behavior in the dependent measure. Linear mixed-effects models (LMMs) used in the lme4 package is capable to conduct correlated observation within clusters (Venables and Ripley, ch.10) and flexible to have both fixed and random effects been values with generalization of regression models (Baayen et al 409).

3. Conclusion

Among 15 participants who participated in the study, one did not provide answers to all questions and one provided extraordinary long and redundant answers to every question. As a result, the responses of 13 participants were collected and processed. Both variables--physical distance and group size were found to have a negative influence on participants’ oral encroachment ($\beta_{distance} = -2.13$, $\beta_{group\ size} = -2.38$, $SE = 3.16$ and 3.09 , respectively). Nevertheless, neither of the two variables were found having statistically significant fixed effects on the length of the participants’ conversations ($p_{distance} = 0.50$, $p_{group\ size} = 0.44$). Notably, participants spoke more when they sat closer to nearby groups or with small groups next to them.

However, there was a strong interaction effect of both variables on participants’ oral encroachment ($p < .5$, $SD = 9.09$). The results indicated they spoke less when there was a large distance to groups or nearby groups were large. Participants’ encroachment significantly changed with the presence of both distance and group size’ change.

4. DISCUSSION

4.1. Connection to previous studies

Statistical analysis on the independent effect of nearby groups’ size to participants’ encroachment meets the conclusion of Knowles’s study (1). However, the independent analysis of the effect of physical distances between groups and participants to the length participants’ oral response, disconfirmed my hypothesis called from

results of Cheyne & Efran (1972). The most plausible explanation of this inconsistency is participants' insufficient awareness of their different distance to nearby groups. The background noise of all groups in descriptive videos was in exactly the same volume to eliminate uncontrolled variables but it differed in actual study areas in libraries. Therefore, the effect demonstrated in Cheyne & Efran (1972) was not successfully initiated.

4.2. Implication

The interaction effect of both variables—physical distance and group size, on territorial encroachment confirmed that the manipulation of the table layout could successfully impact encroachment such as making noise even though one factor could not be completely controlled. For libraries without budgets for specific-designed furniture or expansion of room size, their utilization of conclusions from previous and current studies could eliminate a great amount of noise, which could be classed as contamination, or unpleasant permeation of study areas. This is invasive, without any additional cost through moving several tables.

4.3. Limitation and further studies.

The conclusions of this study are limited within a small sample size ($N = 15$) and its format (online oral survey). This study was planned to be conducted in realistic library study areas with actual manipulation of table layouts. Due to the COVID-19 pandemic in the U.S. from April 2020 however, study areas in all college libraries in UW-Madison were closed to the majority of students and employees. The general research goal was achieved through detailed instructions and delicate design of descriptive videos in the current study. However, several uncontrolled factors remained uneliminated or unmatched. One example is the possible changes in participants' motivation to talk when they are speaking in front of a microphone compared to real people because of personal preference toward technology. Further studies could be conducted through replicating the study as a laboratory experiment offline. Furthermore, different dependent measures including the volume of participants' voice and their eye-contact with nearby groups could be carried out to build inter-method reliability.

Reference

- [1] Baayen, R. H., Davidson, D. J., & Bates, D. M. (2008). Mixed-effects modeling with crossed random effects for subjects and items. *Journal of Memory and Language*, 59, 390-412.
- [2] Beebe, Steven A., et al. *Interpersonal Communication: Relating to Others*. Pearson new international ed, 2014. Becker, Franklin D. "Study of Spatial Markers." *Journal of Personality and Social Psychology*, vol. 26, no. 3, 1973, pp. 439-445., doi:10.1037/h0034442.
- [3] Cheyne, James A., and Michael G. Efran. "The Effect of Spatial and Interpersonal Variables on the Invasion of Group Controlled Territories." *Sociometry*, vol. 35, no. 3, 1972, p. 477., doi:10.2307/2786507.
- [4] Douglas Bates, Martin Maechler, Ben Bolker, Steve Walker (2015). *Fitting Linear Mixed-Effects Models Using lme4*. *Journal of Statistical Software*, 67(1), 1-48. doi:10.18637/jss.v067.i01.
- [5] Gifford, R. (2002). *Environmental psychology: Principles & practice*. Colville, WA: Optimal Books.
- [6] Kaya, Naz, and Brigitte Burgess. "Territoriality-Seat Preferences in Different Types of Classroom Arrangements." *Environment and Behavior*, vol. 39, no. 6, 2007, pp. 859-876., doi:10.1177/0013916506298798.
- [7] Knowles, E. (1973). Boundaries around group interaction. *Journal of Personality and Social Psychology*, 26, 327-331.
- [8] Sack, Robert David. *Human Territoriality: Its Theory and History*. Cambridge University Press, 1986.
- [9] Sinha, Sahab P., and Surat P. Sinha. "Personal Space and Density as Factors in Task Performance and Feeling of Crowding." *The Journal of Social Psychology*, vol. 131, no. 6, 1991, pp. 831-837., doi:10.1080/00224545.1991.9924670.
- [10] Sommer, Robert. "The Ecology of Privacy." *The Library Quarterly*, vol. 36, no. 3, 1966, pp. 234-248., doi:10.1086/619442.
- [11] Ramachandran, Vilayanur S. *Encyclopedia of Human Behavior*. Academic Press, 2012.
- [12] R Core Team (2020). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing, Vienna, Austria. <https://www.R-project.org/>.
- [13] Venables, W. N., and Brian D. Ripley. *Modern Applied Statistics with S*. Springer, 2011.