That's My Spot! Examining Spatial Habit Formation in a Naturalistic Setting

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Abstract

Although we are constantly making spatial decisions about where to place our objects and ourselves, few studies in psychology have investigated this phenomenon in-depth. In the current study, we examined how spatial decisions are made over time by tracking students' seating choices in classrooms over the course of a semester (i.e., 12 weeks). We found that seating choice became more fixed over time (i.e., a decrease in the distance between seats chosen on adjacent days), though this was disrupted by individuals' time of arrival to class; latecomers often sat further away from where they last sat. We also observed a surprising de-stabilization of this pattern on the last day of class wherein seating choices became more varied. These results suggest that although spatial preference stabilizes over time, this pattern of stabilization may weaken once individuals no longer expect to occupy that space in the future.

Keywords: spatial decision; spatial organization; spatial habit; spatial cognition; situated cognition; territoriality

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That's My Spot! Examining Spatial Habit Formation in a Naturalistic Setting

As agents embedded in an ever-changing environment, we are constantly making decisions about where to place our objects or ourselves in relation to the environment, whether it involves choosing a parking spot at the mall or deciding how to arrange one's books and supplies in the workspace. These types of decisions, which we term *spatial decisions*, involve choosing a single spatial location for the placement of our bodies or objects when multiple alternatives are present. While the kinds of everyday spatial decisions we make may seem mundane and inconsequential, the product of these decisions can play an important role in how we process and search for information (Solman & Kingstone, 2017a, 2017b), as well as how we interact with (Holahan, 1972; Koneya, 1976) and form impressions of others (Gosling, 2008). Yet, relatively little is known about spatial decisions. Recent laboratory evidence suggests that spatial decisions are shaped by several factors, one of which being an individual's history of past spatial decisions (Zhu & Risko, 2016). The current project examines this idea further in a naturalistic context—seating behavior in a classroom.

Spatial decisions are ubiquitous and occur in a wide array of everyday situations. An intuitive idea regarding spatial decisions is that they are strongly influenced by task performance considerations (Kirsh, 1995, 1996). For instance, we may arrange a space to draw attention to specific objects or tasks (e.g., placing important documents near the top of a pile of paperwork; Malone, 1983), to serve as an external memory source (e.g., placing keys in a designated spot to avoid being lost; Gilbert, 2015; Risko & Gilbert, 2016), or to promote more systematic search by placing relevant items near one another (e.g., organizing ingredients in the order they are used in a recipe; Kirsh, 1995; Solman & Kingstone, 2017a). In other words, spatial decisions may allow individuals to simplify a given task at hand (e.g., by reducing effort) in order to make task performance more efficient (Kirsh, 1995).

Though recent research has found evidence consistent with the notion that individuals make spatial decisions that lead to improvements in task performance, there is also evidence that efficient task performance is not the only factor at play. For instance, Berry and colleagues (2019) found that even though school-age children recognize that organizing coloured blocks in

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their task space (i.e., by colour categories) makes performing a subsequent spatial working memory task easier, they do not necessarily opt to rearrange their space when provided with the opportunity to do so. In a similar vein, Zhu and Risko (2016) found that the tendency to place objects in positions that facilitated task performance depended on the physical effort required to reach for these objects. When overall physical costs were high, individuals tended to bring frequently used objects closer to them. However, when the physical effort required was relatively low, individuals tended to maintain an object's initial placement in space after they were given opportunities to reconfigure it, even if doing so resulted in an inefficiently arranged environment that made individuals incur a greater physical cost. Importantly, Zhu and Risko (2016) showed that the more frequently individuals adopted an object's initial configuration, the more likely they were to choose that same configuration later in the study. The tendency for individuals to repeatedly choose the same spatial configurations over time may reflect a form of spatial habit formation whereby individuals learn to associate a cue or context (e.g., a red pen) with specific responses (e.g., placing it next to the keyboard; Wood & Neal, 2007). As the strength of this association increases, the target response will be induced with increasing reliability in the presence of the cue or context (Neal et al., 2012). The results shown in Zhu and Risko (2016) provide preliminary evidence that spatial decisions are more complex than previously emphasized (e.g., Kirsh, 1995), and that there are likely multiple—and sometimes competing—factors at play.

The research reviewed above, on the development of spatial habit, focused on individuals' placement of objects in space. Do individuals exhibit similar behavior in locating themselves in space? There is evidence in studies examining seating behaviour that individuals

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do in fact display a preference for choosing the same seats when occupying the same classroom over some period (Clément & Bukley, 2017; Costa, 2012; Guyot et al., 1980; Kaya & Burgess, 2007). For instance, using unobtrusive photographic tracking, Costa (2012) observed students' seating behaviour in a classroom and found that, across 6 class sessions, individuals tended to occupy the exact same seat across consecutive classes 47.8% of the time. Furthermore, even when individuals did not occupy the same seat across consecutive classes, they generally sat in the same area in class, showing only small seating displacements (Costa, 2012). More recently, Clément and Bukley (2017) conducted an observational study where they tracked examined individuals' daily seating choice over a 19- and 44-day course respectively. They observed what they termed a *settling behaviour* in both classes such that an increasingly larger proportion of individuals occupied the same seats across consecutive classes, until this behaviour eventually plateaued. Importantly, their data suggested that this settling behaviour did not depend on the frequency with which classes occurred but on the total number of days they spent in class.

Studies that have examined seating preference thus far have been positioned within the framework of human territoriality, or the tendency for individuals to assert control over a given geographical area with some degree of exclusivity for a period of time (Edney, 1974). The expression of territoriality is social in nature (Edney, 1974; Sack, 1983); that is, when an individual exerts dominance over a given space, this signals to others that the space is occupied, and vice versa. While individuals' seating choice within a given space is thought to reflect the development and maintenance of territoriality over a given location to avoid renegotiating spaces with others each time (Clément & Bukley, 2017; Costa, 2012; Guyot et al., 1980), a mechanism regarding how and why individuals' seating choice stabilizes *over time* has not been discussed in

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detail. We argue that the stabilization in individuals' seating pattern can be sufficiently explained through a basic habit formation framework (Lally et al., 2008; Neal et al., 2006, 2012). Early work in territoriality suggested the possibility that habitual and consistent use of a space may contribute to the experience and development of territoriality (Guyot et al., 1980; Sundstrom & Altman, 1974), and there is some evidence from the psychological ownership literature to support this. For instance, recent research suggests that when an individual was shown to habitually use a communal object, both children and adults perceived that person as having psychological ownership over that object, despite not actually owning it (Cleroux & Friedman, 2020). As such, the formation of spatial habit may represent one basic psychological mechanism underlying the development and perception of territoriality or ownership over public spaces.

The proposed investigation extends previous research in a number of important directions. In the current study, we examined students' seating behaviour in classrooms over a 12-week period using archival data. Studying seating behaviour using the current data set offers several advantages over previous studies. First, we tracked and examined *overall seating distance* between seats chosen on adjacent class days instead of limiting the analysis to only instances in which students chose the same seats consecutively across class sessions (i.e., instances where the seating distance equals zero; e.g., Clément & Bukley, 2017), or separately examining consistent seating behaviour from inconsistent ones (e.g., Costa, 2012). In examining overall seating distance across adjacent classes, stabilization in seating choice would take the form of a decrease in student's seating distance over time. Secondly, each chosen seat is also linked to a timestamp, allowing us to examine an additional factor that may influence the way a spatial decision is made, namely the time of arrival of individuals to class. Finally, the 12-week

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course span offers a far longer time range than in previous research (e.g., Clément & Bukley, 2017). Overall, the method used in this study will provide a more comprehensive understanding of how individuals make spatial decisions about where to place themselves over time.

With regards to previous studies examining spatial habit in more controlled, laboratory settings (e.g., Zhu & Risko, 2016), investigating classroom seating behavior also offers a number of advantages as well. Firstly, individuals have multiple opportunities to make spatial decisions in the same environment and can do so over an extended timespan providing a window into the time course of behavior. Further, classrooms provide a relatively large range of available locations for individuals to select from and the act of selecting seats in a classroom is not clearly causally associated with any direct performance benefits, unlike in previous experimental designs (e.g., Zhu & Risko, 2016). Though there is evidence of a correlation between proximity to the front of the class/instructor and academic performance (Montello, 1988; Will et al., 2020; Zomorodian et al., 2012), there is, at best, mixed evidence that choosing certain seats lead to better academic performance in the classroom (Lacroix & Lacroix, 2017). While some research has found a causal link between assigned seating and student grade (Blume et al., 2019; Perkins & Wieman, 2005), there are also a number of other studies suggesting that academic performance is not directly affected by where students are assigned to sit in a classroom (Kalinowski & Taper, 2007; Meeks et al., 2013; Montello, 1988). Therefore, evidence for a casual relation between seating location and grade is mixed at best. All in all, the current study would allow us to examine spatial decisions in a less restricted environment, with minimal influence from possible performance trade-offs (e.g., response time or task accuracy) as a direct result of the seat selection itself. Finally, although laboratory-based experiments provide a medium through which

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factors can be isolated and controlled, behaviours observed in laboratory settings can sometimes deviate from how they organically emerge in real-world settings (Kingstone et al., 2008; Risko et al., 2012). Thus, the naturalistic observation approach adopted here can be a useful complement to, and check on, more controlled work.

Methods

Archived information regarding students' login activity was obtained from a university database. We obtained data from 4 courses that took place in a common computer lab with 42 available seating spaces. This data set provided information regarding which computers users logged on to and timestamps for each instance that a student logged on to or out of a computer. For each computer station, we obtained x- and y-coordinates for each seat by measuring the distance between the center of each computer station and an arbitrary reference point (see Figure 1 for a layout of the classroom). The classes comprised two sessions each of two different courses. For one course, classes occurred once a week and had two unit exams (one mid-way through the course and one on the last day of classes). For the other course, classes occurred twice a week and there were 5 unit exams throughout the course (roughly one exam every other week, with the last unit exam falling on the final day of class). Note that a number of students also opted to bring their own laptops; as such, we did not have every students' login information. Data were collected from 66 students across all 4 classes; 27 of these students had taken both classes. This resulted in a total of 1718 seating choice observations. As the current study involved archived data, we could not pre-determine the sample size for this study. However, in order to maximize power, we obtained data for all available classes that were comparable in size and format (i.e., small lecture-based classes).

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Exclusion Criteria

The data set reflected students' naturalistic behaviour in classrooms such that users were freely able to switch between different seats or log in and out of computer stations at any point during class (e.g., logging out during break time in class). As such, we applied a number of exclusion criteria to ensure that individuals' seating choice could be meaningfully analyzed and interpreted. Firstly, we included only login sessions from 30 minutes before the start of the lecture through to the end of class. Secondly, if a student made multiple login attempts in the same class, we included only the entry for the first login session as long as the login session was longer than or equal to 5 minutes in duration. After these exclusion criteria were applied, 1412 observations remained.

Since the classroom is a dynamic environment, one factor that may influence a user's seating choice is their time of arrival relative to others in the class. To account for this, we ordered individuals based on the timestamp of their first valid login session. If two or more users had the same login timestamp, the same order number was assigned to them and the next individual would be assigned an order number equal to the total number of people with an earlier timestamp than them (i.e., the first two people who arrived at the same time would both be assigned an order number of 1; the next person after them would be assigned an order number of 3).

Analysis

In order to more easily interpret two-dimensional spatial coordinates with respect to our research hypothesis, we calculated the Euclidean distances between the coordinates for a seat on any given day to the coordinates of the seat chosen the day immediately before. If coordinates for

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a given date were missing, then a difference score could not be calculated for that day or the day after, and these data points were not included in the analysis. This resulted in the exclusion of 112 observations in the data set; as a result, one individual was removed due to insufficient data (i.e., having fewer than 2 data points).

Since the same individuals made multiple spatial decisions over the course of a semester (and sometimes across different courses), mixed-effects models were used to account for the within-subject variance in seating choice. This was conducted using the *lme4* package (Bates et al., 2015) in R (R Core Team, 2019), and maximum likelihood estimation was used in fitting the model. Time, as measured by the number of days since the first day of class in each course, as well as individuals' order of arrival on each day, were both centered and included as fixed factors in the model. Individual students (rather than sets of observations) were included as a random effect, and we allowed only the intercept to vary by individual. Given that degrees of freedom can be difficult to estimate accurately in mixed-effects models (Bates et al., 2015), we provide approximated *p*-values using Wald z-statistics via the *sjPlot* package (Lüdecke, 2018) considering the relatively large number of observations in the current study. Summary tables are also generated using the *sjPlot* package.

Results

Seating Occupancy

On any given course session, 15-25 students logged on to the computer stations, with the occupancy being 20.7 students per class. Note that these courses are typically capped at 30 students. Next, we examined the area that each student in a given class occupied using standard

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deviation distance in the *aspace* package (Bui et al., 2012). The mean radius occupied by each student across the span of a given course is 1.83 meters (SD = 0.89).

Linear Effect of Time on Seating Choice

Results of this linear mixed-effects model are listed in Table 1, showing that order of arrival was a significant predictor of seating distance such that individuals tended to sit farther away from their seat in the previous class if they arrived later relative to their peers, $b = .057$, 95% CI [.039, .075], $t = 6.36$, $p < .001$. Critically, the distance between seats chosen on adjacent days reduced linearly as a function of time, $b = -.011$, 95% CI [-.015, -.007], $t = 5.58$, $p < .001$ (see Figure 2A).

In addition to general seating distance, we also looked at the number of individuals who chose to sit in the same seat on adjacent days (i.e., with a difference score of 0) and whether it changed as a function of time. For this, anyone who sat in the same seat on adjacent days were assigned a score of 1, and those who did not were assigned a score of 0. Similar to the previous analysis, a logistic mixed-effects model, as shown in Table 2, revealed that later arrival resulted in a significant decrease in the likelihood of sitting in the same seat, $b = -.07$, 95% CI [-.094, -.046], $z = 5.75$, $p < .001$, while the likelihood of sitting in the same seat increased with time, $b = .008$, 95% CI [.003, .013], $z = 3.05$, $p = .002$ (see Figure 2B). Interestingly, a separate linear mixed-effects model looking at students who did not choose to stay in the same spot on adjacent days revealed a negative linear trend between seating distance and time, $b = -.011$, 95% CI [-.015, -.006], $t = 4.65$, $p < .001$ (see Table 3). This suggests that over and above the individuals who are more likely to sit in the same seats as a course progressed, there is also an overall

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reduction in their seating distance across time. Altogether, the analyses thus far support the notion that seating distance becomes more constrained over time.

Curvilinear Effect of Time on Seating Choice

A closer examination of the mean distance between seating choices for each week (i.e., solid triangles in Figure 2) revealed that while seating choice does become more fixed over time, there was an unexpected increase in seating distance near the end of courses. To examine the observed curvilinear relation, we added time as a quadratic variable to the existing linear mixedeffects model. The full results of this model can be found in Table 4. As with the previous model, order of arrival remained a significant predictor, $b = .056$, 95% CI [.038, .074], $t = 6.25$, $p < .001$, and the curvilinear relation was indeed also significant, $b = .0002$, 95% CI [.00005, .00042], $t = 2.54$, $p = .011$. Importantly, adding time as a quadratic factor significantly improved the goodness of fit compared to a model with only first-order polynomial variables, $\chi^2(1) = 6.44$, $p = .011$. This curvilinear relation went away when we excluded the data points associated with the last day of class, $b = .00002$, 95% CI [-.00019, .00022], $t = .16$, $p = .87$.

One potential reason for the increase in seating distance at the end of the courses might be that in all courses examined in this study, the final unit exam fell on the last day of classes. As such, we wanted to investigate whether there was a difference in seating behaviour between lecture sessions and all unit exams, or if the increase in seating distance was specific only to the last unit exam (and correspondingly the last day of class). During exam sessions, students may have different goals than during lecture sessions (e.g., to avoid faulty or slow computers as opposed to sitting with friends), which may be reflected in their seating choices. These patterns

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may be obscured in the way the current data is presented, as not all unit exams fell on the same days across different courses (except for the last unit exams). If this account was true, then we would expect there to be an increase in seating distance for not only the last unit exam relative to previous lecture sessions, but other exam sessions as well.

To test this idea, we conducted a linear mixed-effects model to examine whether the distance from a previously chosen seat on lecture versus exam days would be moderated by the type of exam (i.e., last unit exam vs. other unit exams). If the above account were true, then we would not expect the interaction term to be a significant predictor. For this analysis, we only included sets of observations that contained data across all 4 cells to ensure that if the results aligned with our prediction, it would be the same individuals contributing to the observed effect, and we were left with 62 sets of observations comprising 49 individuals. As with previous mixed-effects models, individuals (rather than sets of observations) was included as a random factor wherein only the intercept was allowed to vary by individual. Contrary to the idea that seating behaviour differed on exam versus lecture sessions in general, the analysis revealed a significant interaction between class type (lecture vs. exam) across different exam types (final exam vs. other exams), $b = -.27$, 95% CI [-.45, -.08], $t = 2.78$, $p = .005$. Specifically, follow-up analyses showed that the seating distance from a previous class was significantly larger on exam days (M = 2.40 m) compared to the immediately preceding lecture sessions (M = 1.23 m; $b = 1.17$, 95% CI [.65, 1.69], $t = 4.40$, $p < .001$). However, the observed increase in seating distance was localized to the last exam session, as no difference in seating distance was found for the remaining unit exams on the day of the exam (M = 1.89 m) versus the lecture immediately prior

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(M = 1.78 m; $b = .11$, 95% CI [-.46, .67], $t = .37$, $p = .71$). As such, it appears that the observed increase in seating distance is only associated with the last day of classes, rather than any differences in seating patterns chosen between exam and non-exam classes.

General Discussion

We set out to extend current understanding of spatial decisions by examining the role of seating selection in classrooms. In the current study, we identified three factors that influenced individuals' spatial decisions. Firstly, individuals' seating choice becomes more constrained over time, providing strong corroborating evidence that spatial habit may play an important role in spatial decisions. Secondly, order of arrival appears to impede the expression or development of one's spatial habit, as latecomers tended to choose seats located further away from where they sat in the class immediately prior. Finally, we observed an unexpected disruption in seating choice near the end of the courses, as shown in the curvilinear relation between seating distance and time. Importantly, this curvilinear effect does not appear to be driven by differences in seat selection during lectures versus exams; rather, it appears to be a result of an increase in seating distance between the final day of class and the lecture immediately preceding it. As such, the observed curvilinear pattern may have resulted from two different effects: one that helps to stabilize spatial decisions over time (i.e., spatial habit), and one that leads to a de-stabilization of those same spatial choices. We discuss each of these three effects in more detail below.

Consistent with previous research (Clément & Bukley, 2017; Costa, 2012; Guyot et al., 1980), individuals displayed a tendency to choose the same seats even when they were provided with a wide range of seats to select from. Consistent with Costa (2012), we also found that individuals tended to occupy the same general region in space, even if they did not choose to sit

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in the same seat, as evidenced by the spatial dispersion of their seating choices across a semester. In addition, consistent with the results reported in Clément and Bukley (2017), we found an increase in the proportion of individuals who chose to sit in the same seats over time. Over and beyond previous research, we also found a marked decrease in seating distance between adjacent classes for individuals who did not sit in the same seats. Altogether, these results point to a stabilization of seating choice across time and are consistent with a habit formation account (Lally et al., 2008; Neal et al., 2006) wherein individuals form an increasingly strong association between recurring contextual cues related to the class they attend (e.g., time of day, individuals present in the room, etc) and particular behaviours (i.e., choosing which seats to sit in), and that this association is reinforced with repetition.

In addition to a general tendency for seating choice to become more constrained over time, we found that order of arrival may hinder seating stabilization, as seating distance between consecutive sessions increased with later arrival. For individuals with formed spatial habits, later arrival within a given class session could limit the expression of those habits. As more individuals arrive in the classroom, fewer seats become available. While those who arrive early to class may be able to express their spatial habits by choosing their preferred seats, latecomers can only choose from the limited number of unoccupied seats. From a territoriality perspective, it is possible that arriving late to class—especially when individuals have yet to fully establish territoriality over a seat or localized region in space—opens the possibility for others to attempt exerting dominance over that space and renegotiate ownership over it if a given location is perceived to be more desirable. In both cases, therefore, latecomers may be making seating choices based on availability rather than preference, especially since the likelihood of their

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preferred seats being occupied increases the later they arrive to the room. In other words, even if an individual has formed a moderately strong spatial habit or established territoriality over a region in space, they may also need to arrive relatively early to ensure that they are able to choose their desired seats.

Intriguingly, individuals' spatial preferences seemed to dissipate near the very end of a course, as demonstrated by a marked increase in seating distance between the last day and the class before. While it is not entirely clear why a de-stabilization in seating pattern emerged, our results suggest that this observed pattern of behaviour is not due to differences between lecture and exam sessions, but rather the termination of the course itself. Based on a spatial habit formation framework, one explanation is that individuals on the last day may experience a substantial shift in mental context brought on by the termination of one's expectation to return to a given environment in the immediate future (Godden & Baddeley, 1975; Wright & Shea, 1994). As a result of this context shift, cues associated with eliciting one's spatial habit may be obscured, thus reducing the influence of spatial habit on one's seating choices. In contrast with this idea, it is possible that the de-stabilization in individuals' seating pattern could reflect the changing weights associated with the multiple factors likely contributing to individuals' spatial decisions. That is, there is at least one other factor influencing individuals' spatial decisions, which does not directly alter or act on the strength of one's spatial habit. For instance, this force could work in the same direction as spatial habit (i.e., biasing individuals to select the same seat when provided with the opportunity to do so) and diminish in strength upon approaching the end of a course (e.g., a lack of need to signal one's ownership over a given space). In contrast to these explanations, it is possible that individuals may have a weakened sense of territoriality over

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a space since they would presumably be relinquishing psychological ownership over the space once the course is over. In other words, the utility of maintaining territoriality may only be limited to the period during which individuals need to occupy that space; once we no longer expect to occupy a given space, the need to maintain psychological ownership over that space may be drastically reduced.

In summary, the current study set out to understand spatial decisions in a more complex, naturalistic environment. We found that consistent with a spatial habit formation account, seating choice became increasingly more constrained over time. The current study was able to identify additional factors that were not observed in previous studies. Specifically, we find that latecomers showed more varied seating choices compared to individuals who arrive early, Moreover, we also observed an unexpected weakening of the observed stabilization of seating choice at the end of the course, when individuals may experience a context shift as they no longer expect to occupy a given space. Compared to previous studies examining spatial habit in laboratory settings, the current study also highlighted the importance of using real-world approaches to complement and validate experimental findings. Altogether, the identification of additional factors, in addition to the observed stabilization in seating preference, allowed us to gain a more systematic understanding of factors that contributed to individuals' seating decisions.

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Tables

Table 1

Linear mixed-effects model using seating distance between seating choice in adjacent class sessions as the criterion variable.

	Seating Distance			
Predictors	*b*	*CI*	*Wald z-statistic*	*p*
Intercept	1.840	1.607 – 2.072	15.521	**<0.001**
Time	-0.011	-0.015 – -0.007	-5.577	**<0.001**
Order of Arrival	0.057	0.039 – 0.075	6.356	**<0.001**
Random Effects σ^2	3.08			
$\tau_{00\ ID}$	0.71			
ICC	0.19			
N_{ID}	65			
Observations	1300			
Marginal R^2 / Conditional R^2	0.051 / 0.230			
AIC 5268.160				

Note. Unstandardized b-weights listed.

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Table 2

Logistic mixed-effects model using whether individuals sat in the same seat in adjacent class sessions as the criterion variable. Same seating position in adjacent class session was coded as 1 and different seating positions were coded as 0.

	Proportion Choosing Same Seat			
Predictors	*Log-Odds*	*CI*	*Wald z-Statistic*	*p*
Intercept	-0.587	-0.905 – -0.270	-3.626	**<0.001**
Time	0.008	0.003 – 0.013	3.051	**0.002**
Order of Arrival	-0.070	-0.094 – -0.046	-5.753	**<0.001**
Random Effects σ^2				
	3.29			
$\tau_{00\ ID}$	1.31			
ICC	0.28			
N_{ID}	65			
Observations	1300			
Marginal R^2 / Conditional R^2	0.048 / 0.319			
AIC	1515.716			

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Table 3

Linear mixed-effects model using seating distance (excluding any data wherein individuals sat in the same location, i.e., having a seating distance of 0) between seating choice in adjacent class sessions as the criterion variable.

	Seating Distance			
Predictors	*b*	*CI*	*Wald z-Statistic*	*p*
Intercept	2.960	2.747 – 3.174	27.179	**<0.001**
Time	-0.011	-0.015 – -0.006	-4.654	**<0.001**
Order of Arrival	0.030	0.010 – 0.050	2.892	**0.004**
Random Effects σ^2				
	2.64			
$\tau_{00\ ID}$	0.47			
ICC	0.15			
N_{ID}	61			
Observations	800			
Marginal R^2 / Conditional R^2	0.033 / 0.178			
AIC 3126.064				

Note. Unstandardized b-weights listed.

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Table 4

Linear mixed-effects model using seating distance between seating choice in adjacent class sessions as the criterion variable.

	Seating Distance			
Predictors	*Estimates*	*CI*	*Statistic*	*p*
Intercept	1.6910	1.4316 – 1.9505	12.7758	**<0.001**
Time	-0.0110	-0.0149 – -0.0072	-5.6214	**<0.001**
Order of Arrival	0.0560	0.0384 – 0.0736	6.2459	**<0.001**
Time^2	0.0002	0.0001 – 0.0004	2.5409	**0.011**
Random Effects σ^2				
	3.06			
$\tau_{00\ ID}$	0.72			
ICC	0.19			
N_{ID}	65			
Observations	1300			
Marginal R^2 / Conditional R^2	0.055 / 0.235			
AIC 5263.722				

Note. Unstandardized b-weights listed.

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Table 5

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Data Availability Statement

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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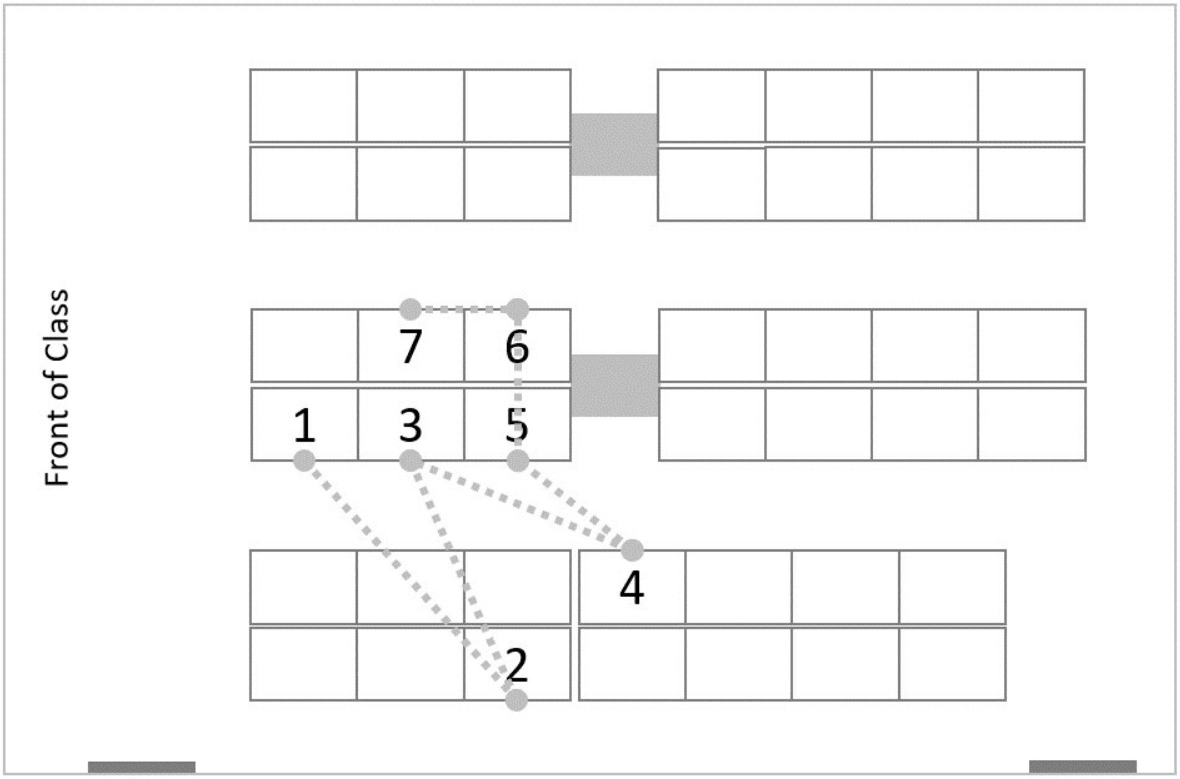

Figure 1. A visual depiction of the layout of the classroom and an example illustrating the critical dependent variable. The dark grey bars at the bottom of the figure represent the location of the entrances. Aside from the computer stations, there are also two pillars (represented as grey boxes in the figure) in the room. The centre of the seat facing the computer screen (as shown by the solid dots) are measured with regards to the origin (i.e., bottom left corner of the room). The numbers indicate the order in which seats were selected. The critical dependent variable is the distance between seats on two adjacent days (e.g., day 1 and day 2, day 2 and day 3, etc).

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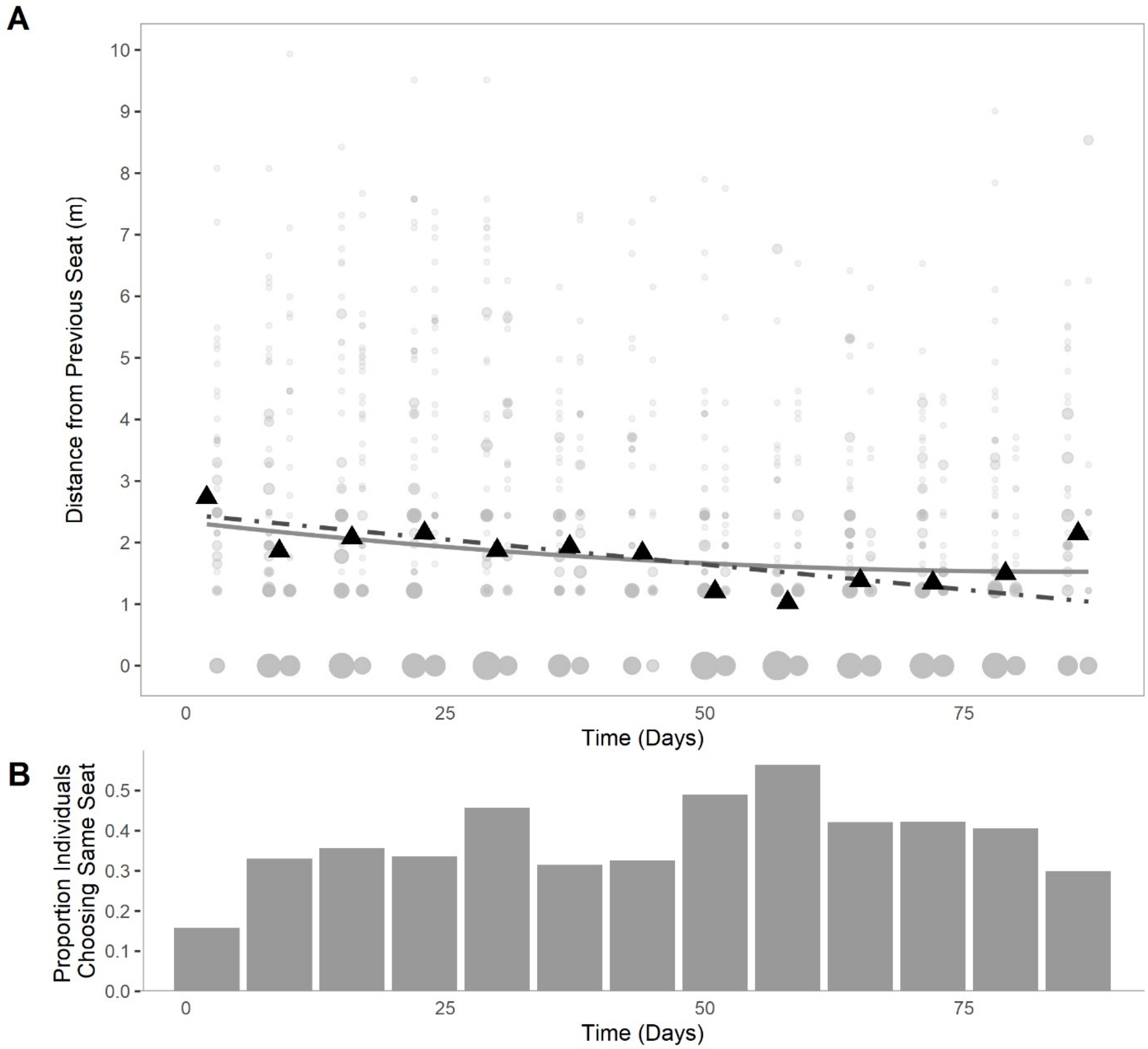

Figure 2. Distance between seating choice (A) and whether individuals moved seats (B) on two adjacent days as a function of time across all courses. For Figure 2A, black triangles represent mean distance between seats for classes averaged across a given week. The size of each point in the scatterplot increases as a function of the number of observations associated with that point. Solid grey lines represent the curvilinear trendline between time and seating distance in the full

data set, and dotted black lines represent the linear trendline after data points from the final day of each course was removed. For Figure 2B, the proportion of individuals choosing the same seat on any given week is plotted as a function of time.

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