International Tour Groups at the British Museum

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International Tour Groups at the British Museum

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Abstract

The British Museum, located in Bloomsbury, London, attracts millions of international visitors, many of which experience the Museum through private tours. Despite the prevalence of these international tour groups (ITGs), their behaviours, impacts, and needs were not fully understood. This study developed methods for recording and visualizing group behaviours and impacts across the Museum. Sixteen ITGs were observed to construct a typical visit, and five ITG guides were interviewed to understand their experiences. Observations revealed that ITGs visit similar items, take similar paths, and impact other visitors. From these findings, the authors recommended specific changes to the Museum's group visitation guidelines and the design of galleries to improve the experience of all visitors.

Acknowledgements

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Additionally, we would like to thank Chrys Demetry, Rick Vaz, and Lorraine Higgins for helping us take this project from idea to reality. Their suggestions were valuable for keeping the project moving in the correct direction.

We also greatly appreciate Dominic Golding for setting up this project which we will always remember.

We likewise thank all the staff of the British Museum who helped us conduct our research, including Natasha Furey for providing crucial visitor demographics and trends, and Lisa D'Agostino for providing access to the Museum's official tours.

Lastly, we would like to thank all the guides we observed and interviewed. Without them, this project would have been impossible.

Executive Summary

The British Museum attracts millions of visitors each year, over half of which are first-time, international visitors (Frost, 2019). Many of these international visitors turn to externally run guided tours to enjoy the Museum in their native language. However, due to the size and prevalence of these tours, they can negatively impact other visitors in the museum. Our goal was to identify strategies to help the British Museum manage international tour groups (ITGs) and improve the visitor experience by:

1. Characterizing the behaviours of international tour groups
2. Determining the impact of international tour groups on other visitors
3. Understanding the needs and experiences of international tour groups

Methodology

When an ITG entered the Museum through the Montague Place entrance, we recorded characteristic information like group size, age range, time and date, and voice amplification use.

Once the group started their tour, we followed them throughout the Museum, recording the path the guide took, the places they guide stopped, and when they stopped. We also recorded participant behaviours, like engaging with the tour, as well as the group's impacts on other visitors, like blocking access to artefacts. We observed 16 ITGs. Finaly, we developed methods to visualize this data, creating heatmaps that show where ITGs spend the most time and mapping ITG behaviours and impacts to specific artefacts and locations.

We also interviewed five ITG guides to understand the challenges their groups face, such as how they interacted with the Museum led tours or if they had difficulty accessing artefacts.

Findings

The observed characteristics of international tour groups were similar regardless of spoken language, time of day, and day of week:

- Group sizes were modest, ranging between 11 and 26, averaging 18 members.
- The tour duration varied between 48 and 155 minutes, averaging 106 minutes.
- The dwell (stop) time at individual artefacts ranged from 15 seconds to over 13 minutes, with an average of 165 seconds. This increased with tour length.

- ITGs on average stopped at 17 rooms and 20 artefacts; however, this behaviour did vary significantly from group to group.
- Voice amplification systems were used by 69% of guides.

Tours largely stopped at the same artefacts. Every group stopped at the Parthenon Sculptures, stopped at either the real or replica Rosetta Stone, and entered the restricted Ancient Egypt exhibit in Rooms 61-63.

Some rooms were favoured more by groups that spoke a certain language. all three groups that visited the Chinese ceramics exhibit in Room 95 and all four groups that visited the Asia exhibit in Room 33 spoke Chinese. The one group that visited the Korea Foundation Gallery in Room 67 spoke Korean.

Groups spend the most time between Rooms 18 and 4 in the Western Range. Groups also tend to stop in similar spots without artefacts, like the south end of the Great Court at the start of the tour, or in the corner of Rooms 53, 59, or 66 to give instructions or regroup before or after dispersing into the restricted Ancient Egypt exhibit. Refer to the heatmap in Figure 1 for a more detailed summary of popular locations. It is important to note that the heatmap does not consider group movement when split, meaning restricted rooms like 61-63 appear untraveled even though they were very popular.

The 16 tours we observed followed a very similar route. Also shown in Figure 1 is the 'typical' ITG route shown as a blue line. After entering through the Montague Place entrance, most ITGs travel south into the Great Court and the Reading Room, west to the Parthenon Sculptures, north up Room 4 to the West stairs, east through the Ancient Egypt exhibit in Rooms 61-63, then down the North stairs and back out the Montague Place entrance.

Every tour group we observed backtracked at some point in their tour. This usually happened along the hallway in the Western Range formed by Rooms 4, 6, 23, 17, and 18, which is illustrated in Figure 1.

We found international tour group participants were more often engaged than disengaged throughout our observations. We observed 72 instances of engagement (taking photos, asking questions, etc.) and only 16 instances of disengagement (using a phone, ignoring the objects, etc.). Rooms 1, 8, and 23 were especially engaging, while Rooms 56 and 64 were the only disengaging rooms. However, we found it difficult to draw further conclusions from this data because it was often unclear whether the guide or the artefact itself engaged or disengaged members.

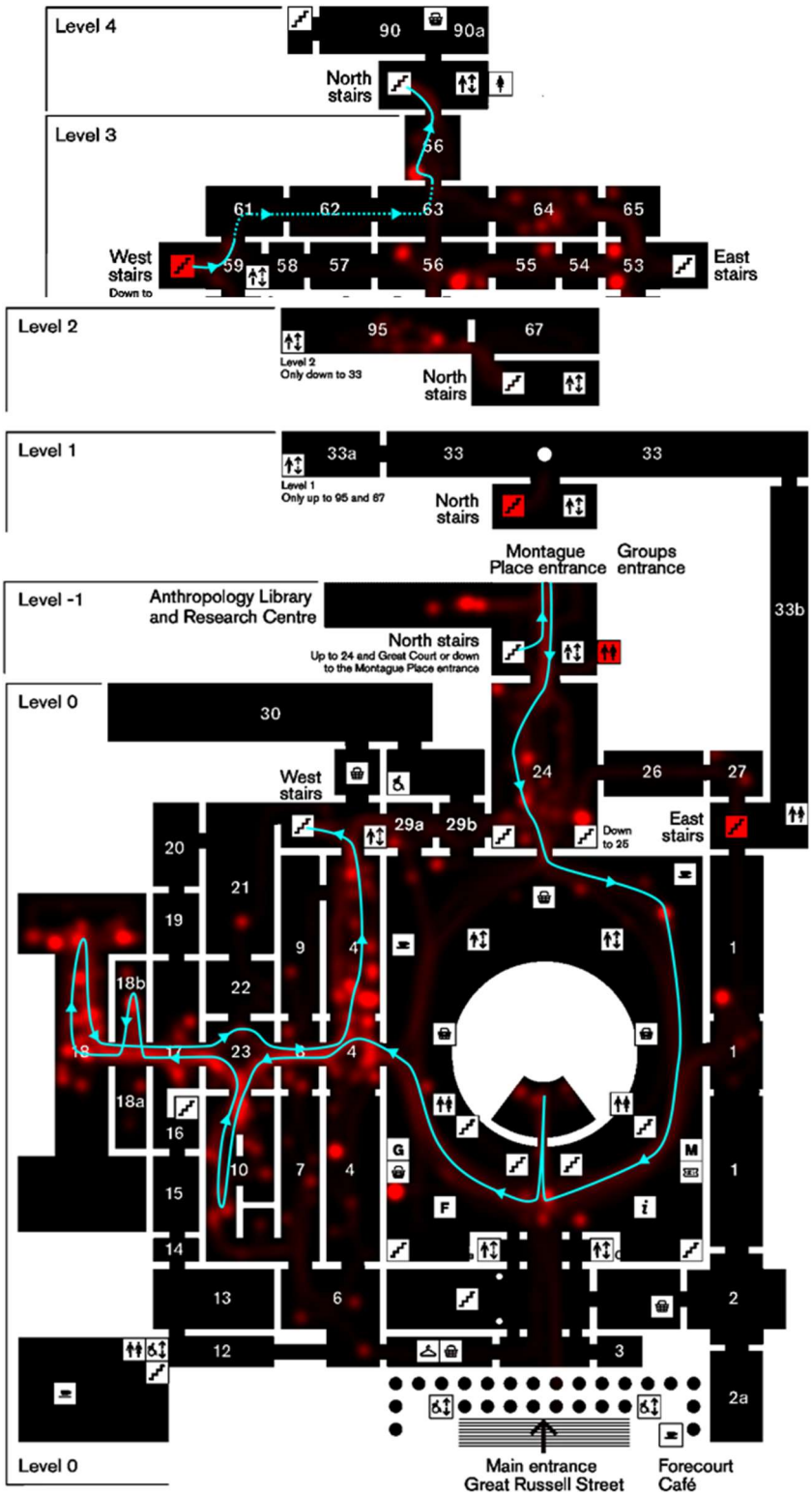

Figure 1: Heatmap of the Museum, where bright red represents areas ITGs spend the most time in. An approximated common ITG path is drawn with a blue line, created by connecting the most popular items among tour groups with the common paths from the heatmap. Arrows indicate direction of travel.

ITGs impacted other visitors most in the Ancient Assyria exhibit in Rooms 7 and 10. Visitor impact was defined as when ITGs blocked the sightlines of visitors, slowed the traffic of visitors, and/or diverted the paths of visitors. Figure 2 shows the number of instances of visitor impact per visit at artefacts within each room on a green to red scale, where we observed few or no instances of visitor impact in green rooms, and we observed ITGs having the most impact on other visitors in red rooms. ITGs have high impact in these rooms because they have nowhere to stop and discuss the artefacts on display out of the way of traffic, causing "Slowing Traffic".

We observed that ITGs in Rooms 56 and 64 had high visitor impact because of the central location of a few isolated displays. As a result, ITGs tended to surround the artefact, resulting in occurrences of "Blocking".

While we did not observe any negative interactions with the official museum tours, some ITG guides reported negative interactions with other private tours. The five tour guides interviewed attributed this to three reasons:

1. **The number of viable routes between popular artefacts is low.** Four out of five tour guides discussed how they are given a list of items they must visit by their tour company. Even when groups coordinate to vary their routes, they often encounter each other at or in between these popular artefacts.
2. **International tour guides have problems sharing space with other tours.** Two guides reported being inconvenienced by tour groups taking up too much space in an exhibit.
3. **Some guides had problems with the noise level of other groups.** This could lead to them raising their own volume and increasing the amount of noise experienced by other visitors. Of the guides we interviewed, four out of five commented on the noise levels of other groups present.

Conclusions and Recommendations

To address some of the challenges faced by ITGs, we recommend revising the established guidelines for tour groups:

1. **Incorporate Blue Badge's five-minute maximum stop time for each item.** This will allow more groups to share popular items and exhibits.
2. **Encourage or mandate the use of audio guide systems.** This will lower the volume in the Museum and make it easier for ITGs to communicate.

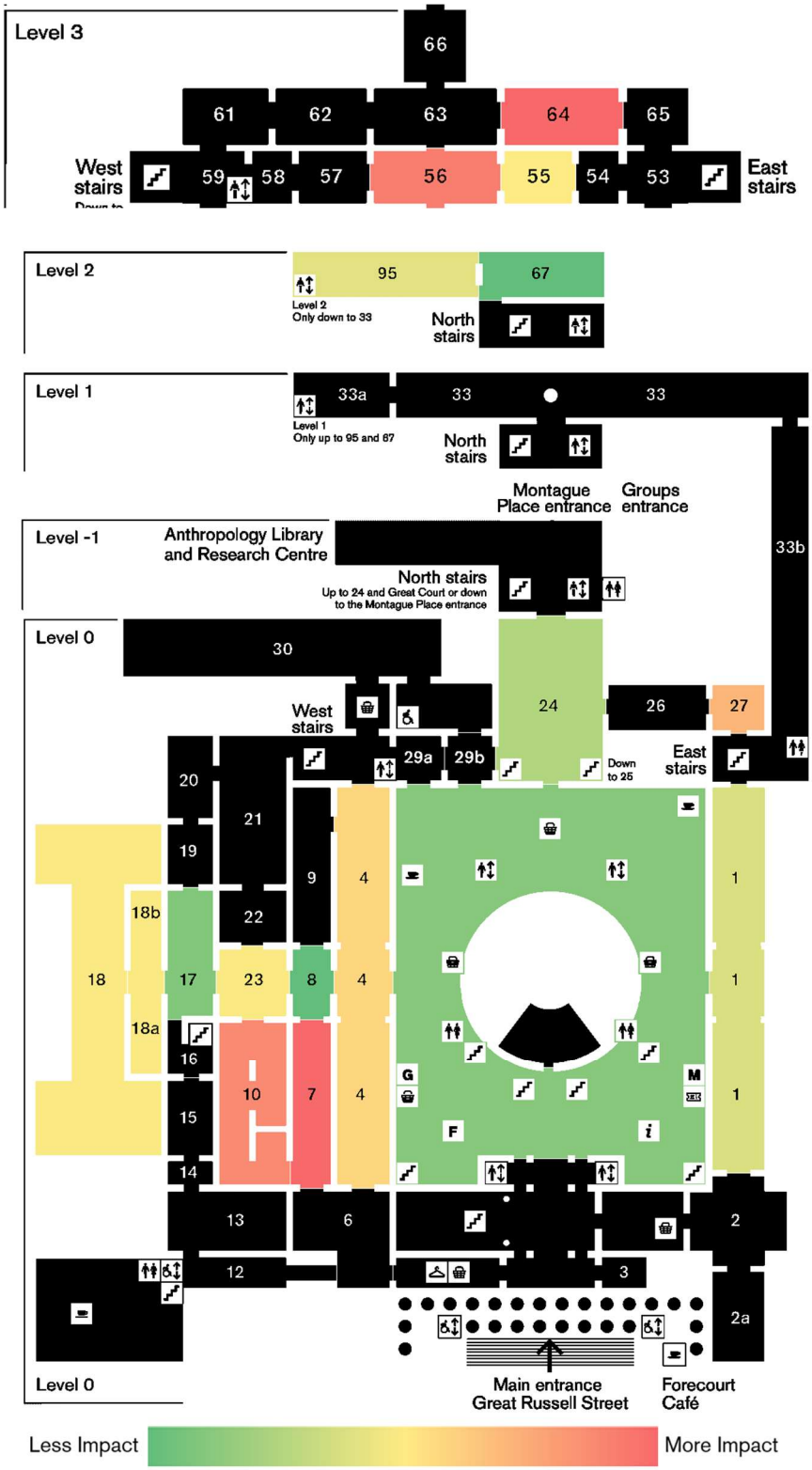

Figure 2: ITG impact on visitors in rooms across Levels -1-3 with green rooms indicating little to no visitor impact, and ITGs having the most impact in red rooms.

3. **Restrict guiding in Rooms 7 and 10.** This will vastly increase the flow of traffic in these rooms.
4. **Define the minimum number of people that are considered a tour group.** This will clear up confusion among tour guides and could allow small groups to guide in restricted rooms.

The Museum could increase the flow of traffic and improve the visitor experience by changing the design of high-visitation rooms:

1. **Add doorways to enable more circular routes and reduce backtracking.** For example, we suggest that the Museum add a doorway between Rooms 18 and 19 to encourage more circulation through the Western Range.
2. **Redistribute popular items to increase the number of viable routes between them.** Distributing the popular galleries in the Western Range more evenly throughout the Museum could reduce congestion in the Western Range, provide various routes for tour groups to reduce encounters with other groups, and encourage groups to see a wider variety of artefacts.
3. **Move larger items to the centre of the room.** Designing rooms such that large artefacts are displayed centrally and small, popular artefacts are placed along the walls with space next to them for large groups could prevent groups from surrounding a display, blocking other visitors.

While this research can provide a starting point to understanding the behaviours and impacts of international tour groups, more research is necessary for the Museum to gather a complete picture of tour group behaviour:

1. **Conduct more research in the summer** when the Museum is busier, groups are larger, and more exhibits are open.
2. **Conduct future research that centres around high-impact areas** to better illuminate groups' impacts.
3. **Gather visitor impact data from a visitor perspective** instead of a group perspective.
4. **Conduct a comprehensive study on school groups.**

The methods employed in this research can form the groundwork for conducting Museum-wide timing, tracking, and observation. While the Museum continues to research the behaviours of groups and their effects on other visitors, this Museum-wide method can be applied to other groups such as school groups, Museum-led tours, and families. It is our hope that the Museum further build off our methods, findings, and recommendations to create a more enjoyable and engaging experience for all visitors.

Authorship

When writing this report, each person had their own sections where they were the primary writer and background researcher. These sections would then be reviewed by another member of the group. Adam focused on tour groups, past research at the British Museum, and objective 2. Cullen wrote on engagement, research at the British Museum, and objective 3. Nate described the visitor studies methods and objective 1. Patrick was focused on tour guides and general information.

For later revisions, Cullen took the role of lead editor and project manager, noting areas that may be improved and keeping the team on schedule. Nate was the primary writer of additions, expanding on comments the most and writing larger sections. For observations, Patrick and Nate focused on taking notes while Adam and Cullen oversaw timing and tracking. For interviews, Patrick had the main role as he set up and helped conduct all the interviews as either a notetaker or interviewer. For data analysis, everyone was responsible for inputting the data they acquired into our databases. However, Adam took the lead organizing the observation data and developing a script for processing it into an array of helpful maps and statistics. Roles were not concrete though, and everyone did various tasks for every part of the project.

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Introduction

The British Museum, located in the Bloomsbury district of London, opened its doors to the public in 1759, making it the first free, national, public museum in the world (*History | British Museum*, n.d.). Over the last 265 years, the Museum has amassed the world's largest collection with over eight million works, and the Museum continues to acquire more works to this day. This collection includes works from six continents and over two million years of history, representing the development of civilization across the globe (*Collection | British Museum*, n.d.).

The historical significance of the Museum's collection attracts millions of visitors each year, peaking at nearly seven million in the 2015/2016 season and rebounding after a significant drop in visitation during the pandemic to reach over 4.5 million in the 2022/2023 season (Department for Digital, Culture, Media and Sport (UK), 2024). These visitors are diverse, with first-time international visitors making up over half of the Museum's visits (Frost, 2019).

A large subgroup of these international visitors experiences the Museum through private tours. These tours give international visitors the opportunity to enjoy the Museum in their native language. However, these tours can be large, with up to 30 members, and may impact other visitors in the Museum (*Guidelines for Visiting as a Tour Group*, n.d.).

In a 2017 study, the British Museum started to research the prevalence and impact of international tour groups (ITGs). They recorded the size, path, and general behaviours of the tour. However, the scope of this study was too limited to fully understand these groups and lacked comprehensive analysis. To further develop this work, our goal was to identify strategies to help the British Museum manage ITGs and improve visitor experience by:

1. Characterizing the behaviours of international tour groups
2. Determining the impact of international tour groups on other visitors
3. Understanding the needs and experiences of international tour groups

In this report, we describe the methods we used to complete these objectives, the findings we uncovered, and give our recommendations for managing international tour groups.

Background

In this chapter, we will provide a general overview of visitor studies and the field's current research into tour groups. Then, we will examine the methods by which researchers measure tour group engagement and observe the actions of museum visitors. Finally, we will dive into the British Museum's own visitor study practices, how the Museum's unique layout may affect our data gathering strategies, and the Museum's current research efforts.

Museum Visitor Studies

Visitor studies focus on understanding the "experiences, attitudes, and opinions of people in … museums" (Hooper-Greenhill, 2006) by investigating a visitor's motivations for attending the museum, their behaviours within the museum, and their impressions of their visit. In studying these behaviours, researchers can find otherwise unintuitive patterns. In this section, we will explain the role that tour groups and guides play in museums, how museums group visitors, and how museums measure engagement.

Tour Groups, Guides, and Visitor Perception

Within visitor studies, guided tours are well understood as a universal feature of tourism and are often a keystone of museum educational programs (Zillinger et al., 2012, Specht & Loreit, 2021). In a 2012 editorial, Zillinger et al. outlines four distinct reasons why visitors generally attend guided tours: time limitations, educational purposes, safety, and conflicting group interests. They argue that while guided tours are often stereotyped as "mechanical procedures where groups of people are herded as urban cattle in search for a postmodern experience pasture," guiding has complex political and economic dimensions because it can impact the visitor perception of the institution itself, and from a visitor perspective, guiding can provide a more comprehensive educational experience.

Tour guides often vary in how they act or present information depending on circumstance and the content of the tour, as well as the background of the guide themselves. Tour guides could be historians researching a relevant area, or youths working summer jobs to fill the empty job positions (Ferguson et al., 2015). Ferguson et al. (2015) categorize these different types of tour guides as *original guides* who claim to be connected to the tour location, *professional guides* who are usually employed by an outside company, *animators* who focus less on authenticity and more on entertainment, and tour *leaders* who focus more on logistics such as figuring out

where the group is going and less on the communicative aspects of tour guiding (Cohen et al., 2002).

Certain types of visitors behave differently in tours, especially their level of engagement, and museums often segment these visitor demographics to better understand the unique behaviours of each group (Schaaf, 2021). One way museums segment groups is by visitor age, categorizing groups of young children, teens and young adults, and adults (Schaaf, 2021; Specht & Loreit, 2021). Schaaf (2021) notes that young children who go to museums in school groups are most likely first-time visitors, prefer more rapid switches between objects, and are louder than other groups. According to Schaaf (2015), museums don't usually consider teens and young adults in the design of their exhibits, and those in this age group generally appear "to be disinterested in what museums might offer." In this study, observers noted that teens and young adults were less bothered by having a blocked view of the objects and often remained distant from the guide and other group members but close to friends (Schaaf, 2021). Unlike the other two groups, adults voluntarily join or book tours themselves, and usually begin the tour interested and engaged (Schaaf, 2021). Within this group, Schaaf (2021) notes that repeat visitors were more interested in new museum offerings, and in almost every group some members preferred to look around independently. In addition, group members enthusiasm, group size and composition, time constraints, and the tour guide (Best, 2012; Rodehn, 2017; Taylor & Neill, 2008; Taylor et al., 2008, as cited in Specht & Loreit, 2021) can all be important factors in "making guided tours enjoyable and meaningful" (Cox-Petersen et al., 2003, as cited in Specht & Loreit, 2021). Interestingly, for groups of adults, several studies show that group size is not an influential factor in visitor satisfaction (A. Horn, 1979; A. L. Horn, 1980). Alternatively, group size is an influential factor for student groups, as tour guides focus on "engaging … students in inquiry into artefacts, displays, and demonstration" directly, which becomes more difficult with larger groups (Martinello & Cook, 1981).

Measuring Behaviour and Engagement

The behaviours and engagement of visitors are linked, as observed behaviours can indicate the experience of visitors. Simon (2010) explored this concept, defining five stages for modelling visitor experience as summarized in Table 1. Rather than limiting behaviours to consuming information, Simon argues these stages encourage museums to build in more social activities that produce higher levels of engagement. This is not to say that museums should only provide stage five experiences though. Simon notes some people "may be happy with a blend of stage one and two experiences," but there should be some availability for visitors to engage in more

social ways if desired. This idea can be applied to describe tour groups as well. Stages one and two are fulfilled by the basic components of tour groups: listening and asking questions. While additional planning by the tour guide or museum may be required, providing the opportunity for international tour groups (ITGs) to engage at these higher stages "can make the institution more enticing and meaningful" (*Simon, 2010*).

Table 1: Summary of the 5 stages of visitor experience (Simon, 2010)

Stage 5	"make the entire institution feel like a social place full of potentially interesting, challenging, enriching, encounter with other people"
Stage 4	"helps visitors connect with particular people – staff members and other visitors-who share their content and activity interests"
Stage 3	"lets visitors see where their interests and actions fit in the wider community of visitors in the institution"
Stage 2	"provides an opportunity for inquiry and for visitors to take action and ask questions"
Stage 1	"provides visitors with access to the content they seek"

One way to track the social interactions within tour groups is through observation, which allows researchers to identify patterns and ways to increase engagement (Black, 2005). In a study of tour groups at German museums, Heidi Schaaf (2021) sought to accomplish this by taking observational notes on forty-three different guided tours. Schaaf began this process with no research question, instead wanting to "[observe] the most common activities" and allow the data to "reveal its what and how". From Schaaf's coding process, a few common themes emerged: museum activities such as "listening, following, chatting", and museum behaviour such as "movement and attention". These categories generally cover the meaningful interactions group members have both inside and out of the tour, and Schaaf uses these behaviour-based observations to draw conclusions about the overall engagement of the tour.

Visitor Studies Methods

Methods of gathering data about museum visitors come in many forms, from tracking the movement of visitors to interviewing and surveying visitors about their experience. No one method will fit every study; they each have distinct advantages and disadvantages depending on how they are applied (Latham & Simmons, 2014). A good

visitor study should incorporate multiple methods of gathering data to gain a more holistic view of the visitor experience (Jovaišaitė-Blaževičienė, 2024).

Choosing Among Methods

Latham & Simmons (2014) argue that researchers should ask guided research questions to help them determine the best method(s) for the job. Listed are some example research questions, adapted from Latham & Simmons (2014):

What population will be studied, and do they need to give consent? This informs researchers about their intended audience; an audience that is fluent in the researchers' native language may provide more complete qualitative data than an audience who is not.

What kind of data will be collected? This question informs researchers about their preferred data formats; if researchers want to track which exhibits or artefacts are most popular, counting visitors who stop at an artefact may yield more accurate data than asking visitors about where they went after their visit.

How much time and resources will be needed? This question informs researchers about which methods are viable given their resources; a technology-intensive timing and tracking method, while yielding extensive data, may be too costly to implement or take too much time to perform and process.

There are three main methods of gathering data about museum visitors: observation, interviews, and surveys (Latham & Simmons, 2014). The next sections will provide an overview of each method, discuss their advantages and disadvantages, and explore different strategies in implementing them.

Observation

Observation allows researchers to learn about visitors' actions authentically; that is, without the visitor's explicit knowledge that they are being observed for research purposes. Observation can be used to capture a wide variety of visitor behaviour, from how visitors move throughout the museum, to their interaction with the museum's works, to their interactions with other visitors and staff (Schaaf, 2021).

Timing and tracking is a style of observation where researchers time and track the movements of visitors as they make their way through the museum, noting which exhibits, artefacts, and resources visitors travel to and how long they stay there. Timing and tracking can be performed on a macro level, observing how visitors travel from exhibit to exhibit and how long they spend on each one; or a micro level,

observing how visitors travel through one room or exhibit and how long they spend at each artefact or display (S. Frost, personal communication, November 13, 2024).

Timing and tracking informs researchers about the actions of visitors inside the museum (Yalowitz & Bronnenkant, 2009). It can indicate which exhibits and artefacts are working well, which aren't getting enough attention, and which audiences are drawn to which works. The method also highlights the flow of visitors through the museum and whether this flow coincides with the exhibit's intended movement. It can reveal which areas of the museum are the most congested and if any design efforts to reduce congestion are effective. Timing and tracking can also indicate whether the museum's signage and typography is engaging; if visitors are observed to skip over an important source of information, it can indicate that the presentation of that information does not motivate visitors to read it.

Gathering this data can take on many forms, depending on the number of researchers available, their time commitment, and the project's budget. The most common method is to track visitors with paper and pencil (Yalowitz & Bronnenkant, 2009). Researchers stand at a visual vantage point and observe visitors or groups one at a time as they enter. Researchers plot their movement on a map and keep a stopwatch running constantly so they can note the time that visitors take when looking at a display, called 'dwell time'. This method is highly adaptable, but it is also subject to observer error, and aggregating the data for analysis after the observation is complete is time-consuming (Yalowitz & Bronnenkant, 2009).

Because of these drawbacks, some researchers have turned to technology to aid their timing and tracking. Some programs like Noldus Observer can streamline the process: instead of drawing out visitors' paths on a piece of paper and recording dwell times with a stopwatch, researchers draw on a map displayed by the program using a computer or tablet (Yalowitz & Bronnenkant, 2009). The program automatically logs the time when a researcher picks a location on the map, meaning the researcher only needs to track movement while relying on the software to log the time. The program automatically enters the data into a database and visual map, saving time in the analysis process (Yalowitz & Bronnenkant, 2009).

Technology makes the process of managing data and visualization easier, but gathering the data still requires an observer (or multiple observers) to manually track visitors, which is subject to error. Instead, some museums have installed cameras with human detection software or RFID trackers to do this automatically (Lanir et al., 2017). This means that data can be captured on *all* visitors, not just a sample, and this

data can be collected and aggregated without human intervention. However, this method is by far the costliest to perform, and an IT professional needs to help set up and troubleshoot the system (Lanir et al., 2017).

Heatmaps are an effective way for researchers to visualize timing and tracking data to see the most popular works in a museum (Lanir et al., 2017). Data from timing and tracking is both spatial and temporal: it tracks where visitors travel and when they do so. Because of this, heatmaps can be an efficient method of viewing this data, as it translates the temporal data—how long visitors spend at each work—into a set of colours that indicate a spot's popularity. This way, where visitors go and how long they spend in area can be presented visually at the same time.

Visitor studies researchers have already experimented with applying heatmap visualization to timing and tracking data. Lanir et al. (2017) aggregated and visualized RFID timing and tracking data from an Israeli museum, testing how effective and user-friendly certain visualizations were to the museum staff.

While timing and tracking is an effective way to gather data, it is not complete on its own. The method does reveal where visitors spend their time and what routes they take, but it does not indicate *why* they do so (Yalowitz & Bronnenkant, 2009). Is a part of an exhibit crowded because it features engaging displays, or is it because it does not provide easy entrances and exits, bunching visitors? Is a hall crowded because it is a popular place to meet and socialize, or does its design confuse visitors by not indicating a clear flow pattern? These questions must be answered by other data gathering methods.

Observation can also be used to capture qualitative data. This data can include body language, interpersonal relations, group dynamics, and other visitor behaviour. While this observation is similar in form to timing and tracking—they both involve a researcher observing visitor behaviour—the data gathered differs; instead of observing *where* visitors travel and *when* they do so, this style of observation looks at *what* visitors are doing and *how* they interact with each other and the museum.

Qualitative observation helps researchers discover how groups interact with a museum (Schaaf, 2021). Since timing and tracking, interviews, and surveys involve only one person's actions and input, qualitative observation is uniquely suited to determine how visitors act as a group. How do groups converse with each other? Do groups stay intact or do members of a group splinter off? Do visitors look confused by a certain exhibit or sign? Qualitative observation can answer these questions.

Double-entry notes are a popular way of capturing observational data (Sunstein & Chiseri-Strater, 2011). They are free-form, individual notes made by a researcher stationed in an area or following a group of people. These notes include face-value observations, written on the left side, and reflections on those observations, written on the right side. An example of double-entry notes is given in Figure 3; this example highlights how the researcher can record and remember their own thoughts while keeping them separate from the observed data. Researchers can then inspect these notes to find connections between their observations, hinting at patterns in visitor behaviour (Sunstein & Chiseri-Strater, 2011).

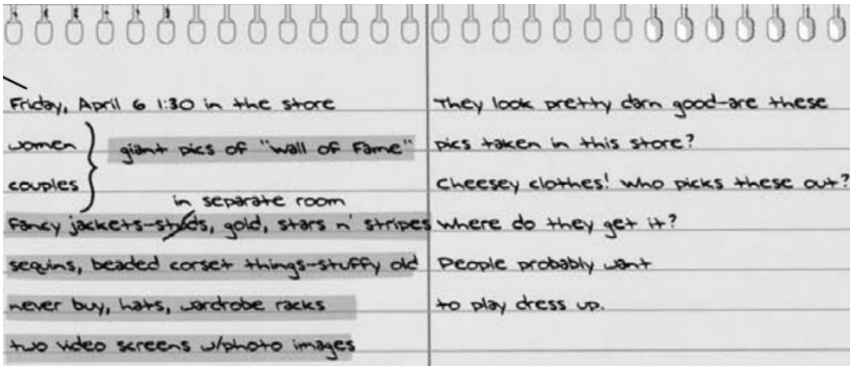


Figure 3: Example double entry notes (Sunstein & Chiseri-Strater, 2011).

While qualitative observation can yield a wide variety of data, it can take a long time to sift through the data and identify patterns. To make this easier, researchers often code their notes, systematically labelling them either by hand or by using a computer program to elucidate connections (Schaaf, 2021).

Interviews

In visitor studies, interviews normally consist of a researcher asking a visitor pointed questions to reveal their thoughts and feelings about their visit. These questions can pertain to any aspect of the visitor's experience: what motivated the visitor to attend the museum, what exhibits and works they liked the most, what displays engaged them the most, how other visitors and staff interacted with them, what museum resources they were aware of, and what signage informed or confused them.

Interviews help researchers examine what visitors are *thinking* and *feeling* during their visit. Contrary to other methods like timing and tracking, surveying, and observation, a researcher can dive deeper into certain avenues of discussion when they present themselves, often revealing surprising insights that were not specifically

accounted for in the method planning process (Berg & Lune, 2014). Interviews can also be used to corroborate the findings of other methods; for example, an interview can confirm a visitor was confused by a museum's layout, which was also indicated by observing visitors' body language.

Interviews can be structured, where interviewers ask specifically worded questions and don't deviate from a script. This is helpful when researchers want to compare responses from different visitors, but it doesn't allow researchers to prod for deeper meaning or explore unforeseen avenues of thought. On the other hand, interviews can be unstructured, operating on broad guidelines instead of specific questions. This allows researchers to adapt to unpredictable situations and further question certain areas, but the data gathered is often more difficult to analyse and harder to replicate (Berg & Lune, 2014).

Surveying

Surveying is a systematic method of gathering data from visitors to find patterns or consensus of belief. Surveys are structured and replicable and are often easier to administer and analyse than other methods (Berg & Lune, 2014). Thus, surveying has become a popular method of gathering feedback from many visitors efficiently and cost-effectively (Hooper-Greenhill, 2006).

Survey responses can be highly structured, gathering purely quantitative data (rating scales, demographics, etc.), or they can be more open, encouraging visitors to write open-response answers. However, no matter what degree of freedom visitors have in their answers, the questions asked are always the same (Groves et al., 2011). Like direct observation notes and interview transcripts, open-ended answers can be coded afterwards by a researcher to highlight patterns in the data.

The methods used to administer surveys differ based on time, cost, and the number of responses needed. Researchers can use a mailing list or posted QR code, which reaches a wide audience but does not guarantee responses, or they can use phone or intercept surveys, which yields a better response rate but is more resource intensive (Berg & Lune, 2014). It is also hard to gauge the accuracy of the data it gathers. Like interviews, surveys are "reactive", meaning that the visitor knows that they are being treated in a special way (Bitgood, 1988). Visitors may exaggerate the pleasure of their experience to be helpful (Bitgood, 1988). Unlike interviews, though, this effect can't be controlled for or rectified by the researcher. Museums often use surveys, despite their limitations, to effectively track visitor demographics, inform

entrance fees, and examine wider visitor patterns across multiple museums (Hooper-Greenhill, 2006).

The British Museum

In this section, we will provide an overview on the Museum's layout and its accessibility to English and non-English speaking groups. We will then conclude by examining previous research on international tour groups at the British Museum.

Museum Layout

The Museum has two public entrances: a north entrance and a south entrance (*Museum Map | British Museum*, n.d.). The north entrance is referred to as the "Montague Place Entrance," and is where large tour groups are asked to enter from (*Guidelines for Visiting as a Tour Group*, n.d.). The south entrance is the main entrance and leads directly into the Great Court (*Museum Map | British Museum*, n.d.). The Great Court is the hub of the Museum, featuring two cafes, all but two of the Museum's stores, and staircases and elevators to other parts of the Museum (*Museum Map | British Museum*, n.d.). The Museum map comprises a ground floor (Levels -1, 0, 1 and 2), an upper floor (Levels 3, 4, and 5), and a lower floor (Levels -2 and -1). Exhibits are sectioned by the region of origin of the works, with sections featuring works from Europe, Africa, the Americas, Ancient Egypt, Ancient Greece and Rome, Asia, and the Middle East such that each region other than Africa is represented on the ground floor (*Museum Map | British Museum*, n.d.). A map of the museum is pictured in Figure 4.

The Museum recommends popular exhibits to visit on each of its floors. These exhibits on the ground floor include the Holy Thorn Reliquary (Room 2a), Tang dynasty figures (Room 33), Shiva Nataraja (Room 33), Hoa Hakanainai'a (Room 24), Rosetta Stone (Room 4), Assyrian Lion Hunt reliefs (Room 10), and Parthenon Sculptures (Room 18) (*Museum Map | British Museum*, n.d.). On the upper floor, the Lewis Chessmen (Room 40), Astrolabe (Room 42), Oxys Treasure (Room 52), and Portland Vase are recommended (Room 70) (*Museum Map | British Museum*, n.d.). While the lower floor only has one exhibit room, the brass plaques from Benin (Room 25) are recommended as well (*Museum Map | British Museum*, n.d.). These recommendations are important for knowing which works are likely visited most often by tour groups, which are usually on a tight schedule. Other facilities of interest include the shops in the Great Court, along with the shop in Room 90a in the special exhibition rooms (*Museum Map | British Museum*, n.d.). There are many lavatories across the ground level, and two lavatories on each of the basement levels, while the other levels have either one or none, many only single-gendered (*Museum Map | British Museum*, n.d.).

The Great Court has two locations for its café on opposite sides. There is also a small café on the southern end of the third level. Additionally, the museum has a pizzeria on the ground floor and a restaurant on the third level at the top of the pillar in the great court. (*Museum Map | British Museum*, n.d.).

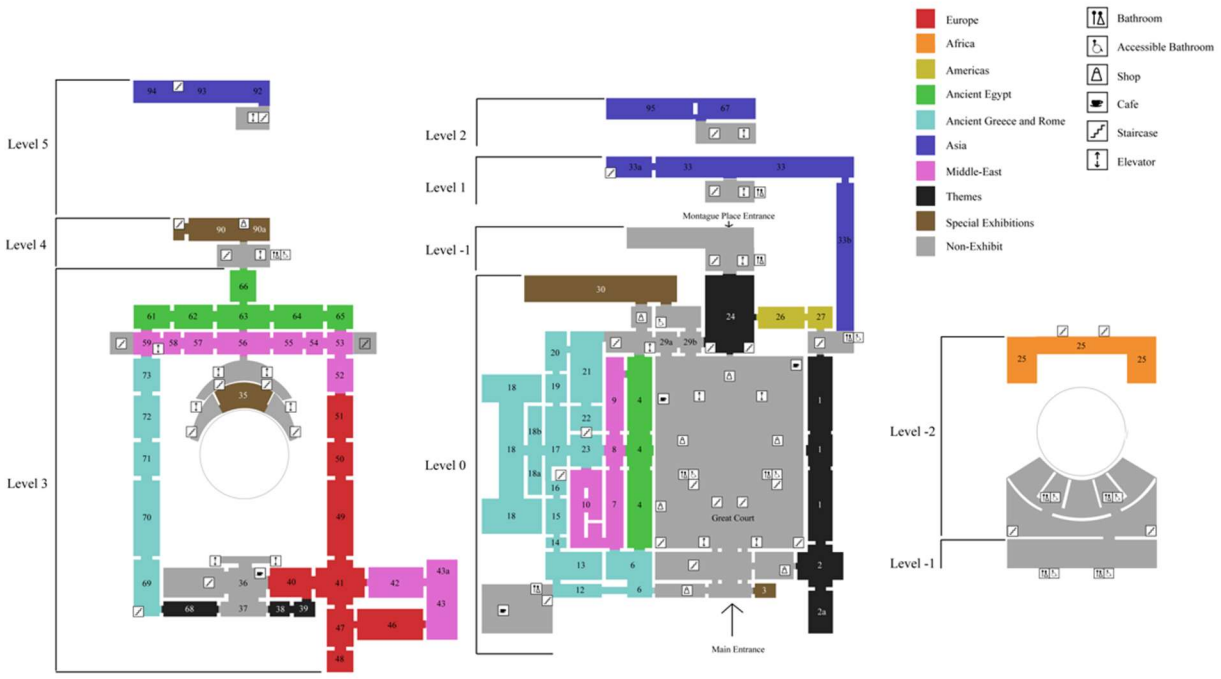


Figure 4: British Museum map, colour-coded by region. Upper floor left, ground floor middle, lower floor right.

Language Accessibility and Guiding at the British Museum

The Museum has free paper maps and volunteer guided tours, both in English. For non-English speakers, there is an official audio tour app offered in nine languages, but visitors must pay £5 to access it. The Museum also sells a print guide for £6 offered in six languages, which is the only way to access translated maps and item descriptions.

External companies are allowed to offer guided group tours in foreign languages. These tours are promoted on websites like TripAdvisor and are open for private or semi-private groups (*The British Museum*, n.d.). The museum has publicly available guidelines for groups greater than ten people, requiring them to alert the museum in advance and enter through the less-used Montague Place entrance (*Guidelines for Visiting as a Tour Group*, n.d.). Within these guidelines are requested behaviours, such as being mindful of how much space the group is taking up and how much noise they are making (*Guidelines for Visiting as a Tour Group*, n.d.). The

Museum recommends that they do not stay in hallways or staircases and that groups of thirty or more split up into smaller groups (*Guidelines for Visiting as a Tour Group*, n.d.). These guidelines also give priority to tours organized by the British Museum. The Interpretation Team at the Museum has little knowledge about the extent to which international tour group guides adhere to these guidelines.

One tour guild, Blue Badge, works closely with the Museum and has their own guidelines for tour guide behaviour. Blue Badge requires their members to conduct two years of training and recommends their guides spend no more than five minutes at an artefact (Chadwick, 2024).

Visitor Research at the British Museum

The British Museum regularly evaluates visitor experiences to ensure it is up to date with behavioural trends and can deliver an engaging experience. The group responsible for visitor evaluation is the Interpretation Team, whose aim "is to improve the British Museum visitor experience and generate learning and insights from each project to inform future exhibitions and displays" (*Visitor Research*, n.d.).

In many instances, the British Museum focuses on studying visitor behaviour in a single gallery or exhibit via three stages. The first two stages, front-end and formative, are concerned with "[establishing] visitors' prior knowledge, experience and expectations of [a] subject" and then testing more advanced ideas for the display with visitors (*Visitor Research*, n.d.). These two stages are more concerned with the development of an exhibit rather than analysing its effectiveness once it has been opened to the public. This is where the final, summative stage starts, as it is used to "establish how successful an individual project has been in meeting its objectives" (*Visitor Research*, n.d.).

The summative stage involves collecting, presenting, and drawing conclusions from data about the visitors that experienced the exhibit. This data is collected by Morris Hargreaves Mcintyre, a consulting group that has worked closely with the Museum, mainly with "interviewer-led exit surveys, kiosk surveys and an additional boost of web surveys" (Breaking New Ground: A Summative Report of Manga, 2019). However, observation, timing, and tracking are also used in some research to study how visitors use their time in exhibits (*World Conservation*, 2018). This data is then compiled into a report that breaks down the demographics of those that went to the exhibit, the needs that visitors had when going, and the types of experiences people had. Alongside this data, the report presents conclusions that are directly confirmed by the data that illustrate the strengths and weaknesses of the exhibit.

Private Tour Group Visitation

Private tour group visitation is most popular during the summer months and during the middle of the week. Museum records reveal that from April 2024 to January 2025, tour groups visited most often in the middle of the week on Thursday and Friday, tapering off at each end of the week. Figure 5 shows a chart of weekly visits. Groups also visited the most in July and the least in January and February from February 2024 to January 2025 as shown in Figure 6, adapted from the Museum's internal group visitation data.

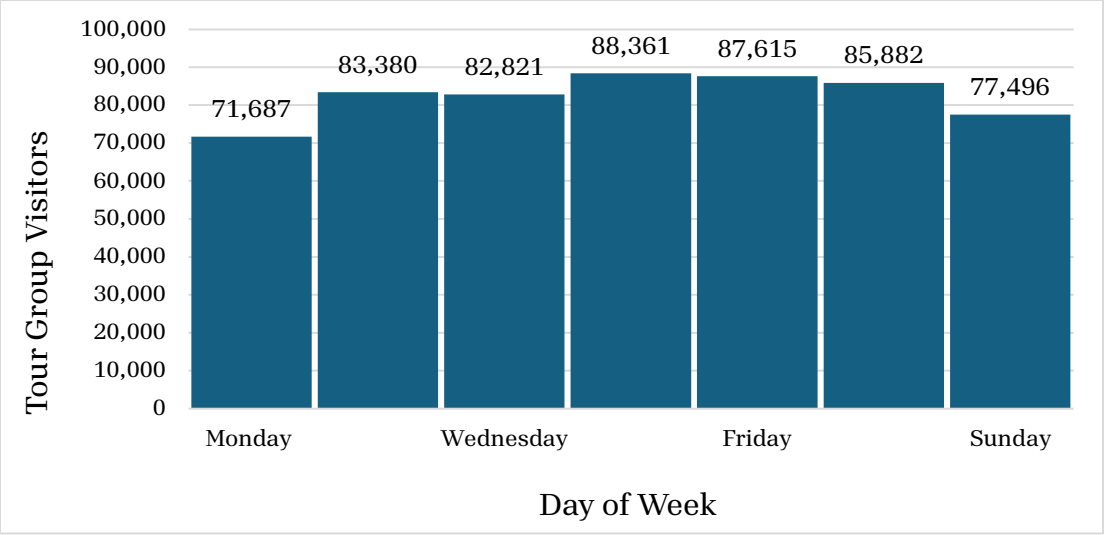


Figure 5: Number of tour group visitors for every day of the week with data sourced from Furey (2025).

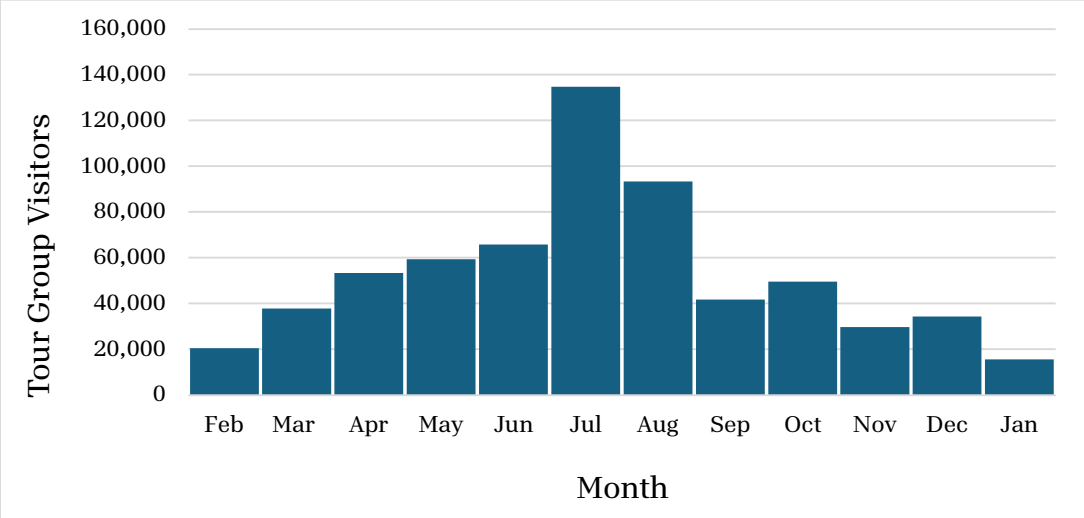


Figure 6: Number of tour group visitors per month, with data sourced from Furey (2025).

Previous Studies of International Tour Groups at the British Museum

A 2017 study of third-party international tour groups at the British Museum tracked the movements, group size, tour length, country of origin, and language spoken by the tour guide. The regional data is illustrated in Figure 7 and shows that most international tour groups at the time were from Asia. In addition, the size of international tour groups ranged from 8 to 66, with an average group size of 30. These tours lasted from 54 to 145 minutes with an average length of 90 minutes.

While more recent, post-pandemic data on international tour groups is needed, this study suggests that many international tourists likely participate in these tour groups because of language barriers, while tourists from international English-speaking countries prefer to explore the museum themselves or choose the British Museum's official tours. Notably, nearly all (98%) international tours were conducted in the same language as the region the tour group was from, and very few (6%) tours were conducted in English. However, despite the representation of groups from Asia in the 2017 tour groups, they make up less than 9% of the overall visitor demographics. Figure 8 shows the region of origins for the 2017 study and the overall visitor demographics by region for the 2023/2024 season from the British Museum's 2023-2024 MAGIC Annual Report.

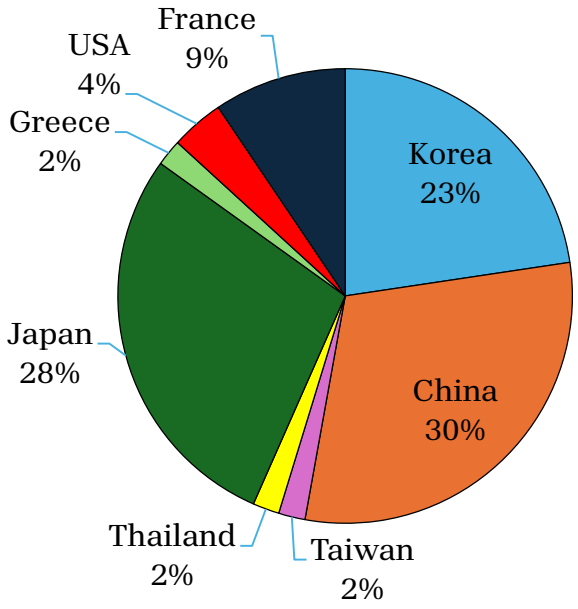


Figure 7: Country of origin of international tour groups at the British Museum in March and May 2017 by region, with data sourced from Rogers & Zhang (2017).

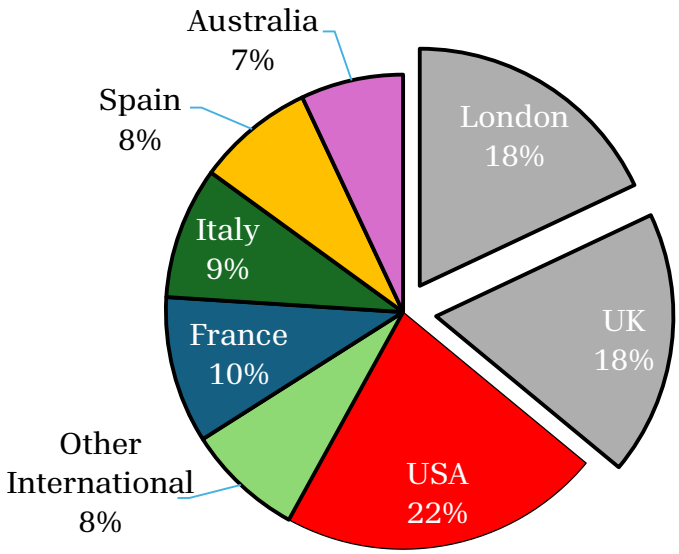


Figure 8: British Museum visitors by region (Green & Holland, 2024), sourced from British Museum's 2023-2024 MAGIC annual report.

This 2017 study on ITGs also included detailed timing and tracking as well as qualitative observational data, an example of which is shown in Figure 9. However, because the timing and tracking data and the observational data are in the same text documents, they are difficult to separate and analyse. In addition, the qualitative observations are not focused on identifying specific behaviours or occurrences and thus would be difficult to code. Finally, the data do not reveal where these ITGs go in the museum and how they interact with and impact other visitors and official British Museum guided tours.

Group enter the Museum building (North Entrance)

2:00 the group enter the building and stop briefly in the foyer.

Room 24

2:02 the group enter room 24 and look at Cradle to Grave by Pharmacopeia, and the Easter Island statue which is quiet crowded as everyone tries to take a photo, the leader also gives a long talk.

The Great Court

2:08 moving through the Great Court some stop to take a photo of the memorial poles and roof, they stop at the Tennyson quote where some leave.

2:13 some of the group move out the South Entrance to take photos of the building as others use the toilets.

2:24 they regroup by the Tennyson quote where the leader talks briefly about the building.

2:29 they move to outside room 4 where the leader holds aloft a model of the Rosetta stone and talks about it.

Room 4

2:35 entering room 4 they gather around the Rosetta stone which is not as busy as earlier, and take photos, before gathering behind the stone as the leader talks.

Room 10c

2:40 moving into room 10c they gather between the winged human headed bull statues as the leader speaks about them, and touches the statues while encouraging the group to do the same, such that they all touch and take photos of the statues.

Figure 9: Timing and tracking and observational data (2017). This is a segment of a large dataset from an unpublished, internal 2017 study conducted by the British Museum on international tour groups.

Methodology

The goal of this project was to identify strategies to help the British Museum manage international tour groups (ITGs) and improve visitor experience. Each objective and the methods we used to achieve them are shown in Table 2. The following section elaborates on why we chose these methods, what information we looked for, and why we looked for it. Also included are the procedures, instruments, and analysis techniques used to achieve each objective.

Table 2: Methods, sources of data, and instruments by objective

Objectives	Methods	Data Source	Instruments Employed
1. Characterize behaviours of ITGs	Direct observation	Observation of ITGs	Museum map, double-entry notes, spreadsheets
2. Determine the impact ITGs have on other visitors	Direct observation, semi-structured interviews	Interview of staff members, observation of ITGs	Interview questions and consent script, double-entry notes
3. Understand needs and experiences of ITGs	Semi-structured interviews	Interview of tour guides and staff members	Interview questions and consent script

Objective 1: Characterize the Behaviours of International Tour Groups

For this objective, we wanted to examine how international tour groups behave in the Museum. We intended to answer the following research questions:

- Is there a 'typical' ITG visit, and if so, what does it look like?
- When do ITGs most often visit the Museum?
- What paths do ITGs take through the museum?
- Which exhibits and artefacts do ITGs spend the most time at?
- How engaged do ITG participants appear to be during their visit?

We used observational methods to answer these questions because they allowed us to objectively see where ITGs go and for how long. This section explores the three different types of observational methods we used to address these questions: Initial Observation, Timing and Tracking, and Shadow Observation.

Initial Observation

To determine if there is a 'typical' ITG, we wanted to record characteristics of these groups. For this, we used *initial observation*, where we would observe groups as they entered the museum to get a sense of what they tended to look like. However, due to time constraints and logistical considerations, we had access to less resources than the 2017 researchers. Combined with our short time frame for information gathering, we elected to use a convenience sample when observing groups. We chose a variety of times and days of the week to diversify our data but always followed the first groups that passed by us. When an ITG entered the Museum through the North entrance, we recorded:

- Time and date of tour
- Group size: How many tour participants were there, excluding the guide?
- Spoken language: What language was the tour guide speaking?
- Estimated age range
- Amplification use: Did the tour guide use an audio guide system to transmit their voice wirelessly to tour members?

Combined with behaviour observations that we obtained using timing and tracking, which are discussed in the next section, this data allowed us to identify patterns between these ITG characteristics and specific ITG behaviours. To record this observational data, we used a spreadsheet with entry fields for the group ID (assigned sequentially) and all the characteristics noted above. An example initial observation spreadsheet is shown in Table 3.

Table 3: Initial observation spreadsheet with example data

Group ID	Date	Start Time	Group Size	Language	Age Range	Amplification
1	29-Jan-25	10:05	20	Chinese	15-60	Yes
2	30-Jan-25	10:15	15	Spanish	15-70	Yes
3	3-Feb-25	10:15	25	Spanish	20-60	No
4	3-Feb-25	10:16	19	Chinese	8-35	Yes
5	4-Feb-25	11:05	15	Japanese	20-50	Yes

Two of us stationed ourselves by the north entrance to perform initial observation. When an ITG entered the Museum, we would work together as a pair to fill in the spreadsheet. To obtain more accurate information, we consulted with each other and asked the tour guide if we were both unsure. We did not record any data

points we were not confident on. Groups were recorded on each day of the week at varied times of day. We gathered data from a total of 16 groups.

Once we finished collecting the data, we performed quantitative analysis on it. This included replicating aspects of the 2017 study discussed in the background, including calculating the average size of ITGs and quantifying the frequency of languages spoken.

Timing and Tracking

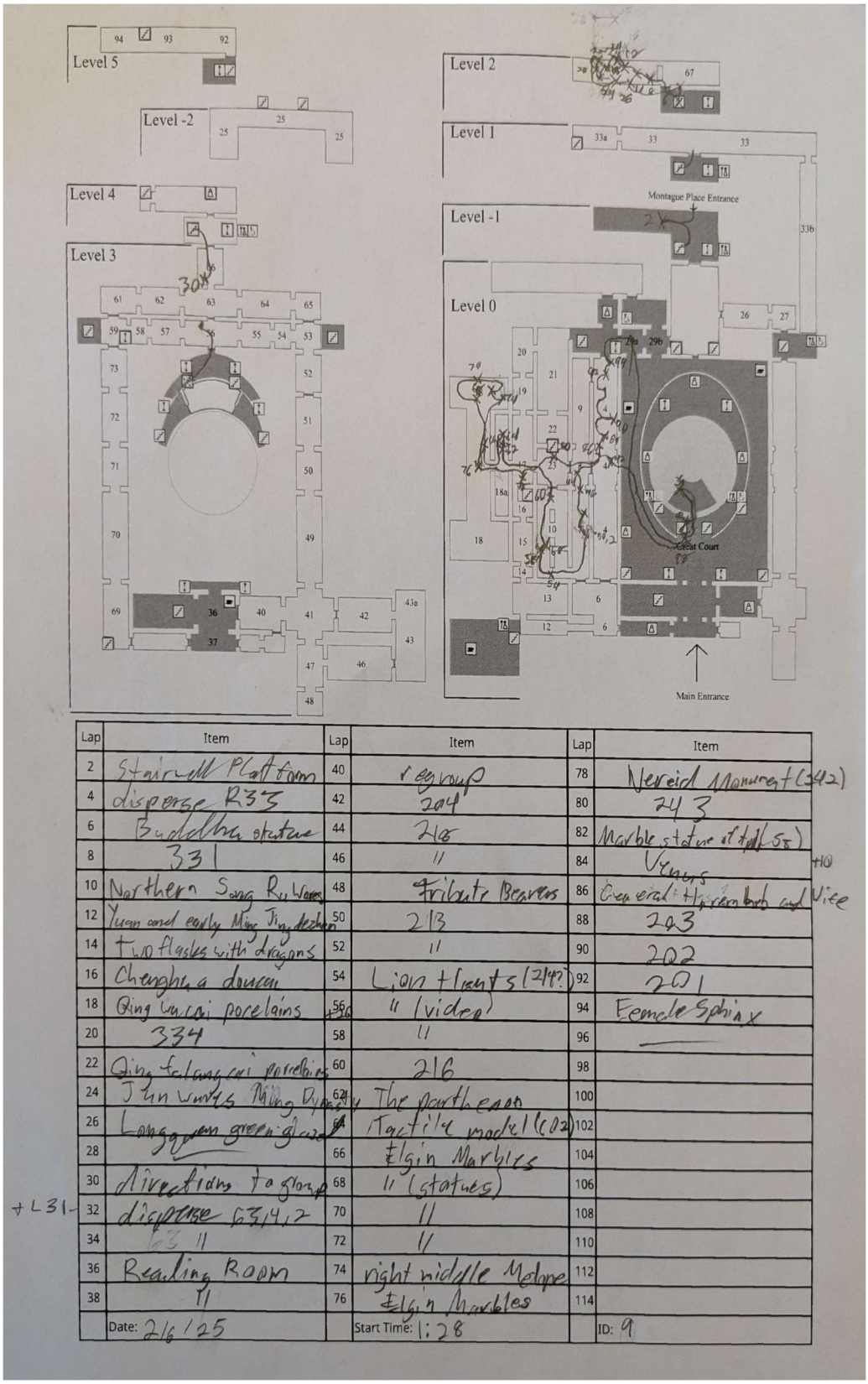
We also timed and tracked the same 16 groups that we performed initial observation on. A pair of researchers conducted *timing and tracking*, measuring four variables:

- The path tour groups take through the Museum
- The places and artefacts the tour groups stop at
- The dwell time of each stop, from stopping to walking again
- The duration of each tour

These observations helped us understand typical ITG paths through the museum, the most popular works and exhibits among ITGs, the average visit length of an ITG, and the facilities that ITGs use.

To perform timing and tracking, we used two instruments. The first was a paper museum map shown in Figure 10 which we used to track the path that groups take through the Museum. When the tour group entered the Museum through the north entrance, one researcher started a stopwatch. That same researcher drew the path of the tour guide on the map as they travelled from room to room, marking an “X” at every stop. Because it was impossible to track the movement of every participant, only the tour guide was tracked. The times when the groups were dispersed in the galleries to look on their own were not recorded on the map. A stop was counted every time the tour guide stopped at a location for 15 seconds or more.

During the tour, the researcher added a lap on their stopwatch every time the group stopped and every time the group started travelling again. This was done to gather the time spent travelling between stops and the time spent dwelling at stops. For each time the group stopped, the researcher would write the name of the object or its respective audio guide number (or room, if the group did not stop at a specific object) in the “item” section next to its associated lap number. For example, if a group stopped at the Reading Room on lap 36, the researcher would lap their timer, read what lap number the stop was at, and write “Reading Room” next to the number 36.



Lap	Item	Lap	Item	Lap	Item
2	Stairwell Platform	40	regroup	78	Nereid Monument (342)
4	disperse R33	42	204	80	243
6	Buddha statue	44	218	82	Marble statue of Hdt (58)
8	331	46	11	84	Vases +10
10	Northern Song Ru Wares	48	Tribute Bearers	86	General Hyacinth bob and Vice
12	Yuan coved early Ming Jingdezhen	50	213	88	243
14	Two flasks with dragons	52	11	90	202
16	Chenghua dou cai	54	Lion plants (247)	92	201
18	Qing Wucai porcelains	56	11 (video)	94	Female Sphinx
20	334	58	11	96	
22	Qing falang cai porcelains	60	216	98	
24	Jun wares Ming Dynasty	62	The parthenon	100	
26	Longquan green glaze	64	Tactile model (102)	102	
28		66	Elgin Marbles	104	
30	directions to group	68	11 (statues)	106	
+L31- 32	disperse 63,4,2	70	11	108	
34	23 11	72	11	110	
36	Reading Room	74	right middle Metope	112	
38	11	76	Elgin Marbles	114	
	Date: 2/6/25		Start Time: 1:28		ID: 9

Figure 10: The paper tracking instrument for Group 9.

After each tour, the path data was cleaned up and transcribed onto a digital map. The tracking map of the Ground Floor (Levels -1-2) of the Museum for Group 9 is shown in Figure 11. The path and dots on the digital maps were drawn in a vector graphics program in separate files for each floor. The paths alone were then exported as PNG files for further analysis. The resulting Ground Floor path PNG file for Group 9 is also shown in Figure 11. Digital maps for the Upper Floor (Levels 3-5) and the Lower Floor (Level -2) are filled out in an identical fashion for each group.

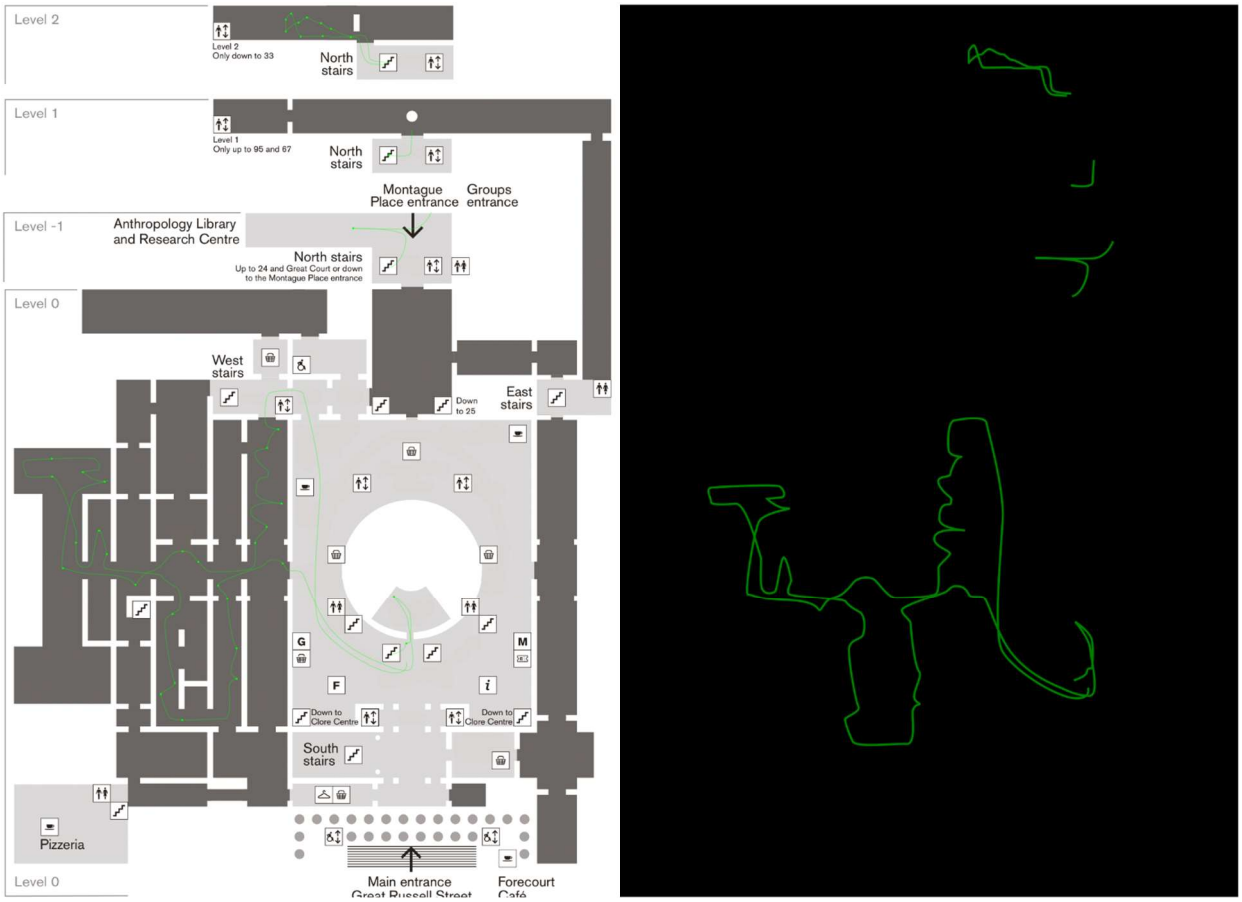


Figure 11: Ground Floor digital map for Group 9 with path and stop location dots (left), exported path PNG file (right).

Along with the digital map, a spreadsheet (shown in Figure 12) was used to record and contextualize the information about each lap. Below is a brief explanation of each column on the spreadsheet:

- **Lap number**: used to synchronize the timing and tracking data.
- **Dwell/Travel Time**: the lap time.
- **Travel/Dwell**: whether a lap is considered travel time or dwell time.

- **Object**: the name or ID of each work stopped at. Any locations that are not a work are put in parentheses.
- **X and Y Location**: the locations of the stops on the digital map, excluded when the group disperses and acts like individual visitors.
- **Floor**: the floor stopped on—Ground Floor (1), Upper Floor (2), or Lower Floor (3)

The same spreadsheet also includes the group's initial observation data along the top and the shadow observation data in the "Tags" and "Notes" columns which will be discussed in the next section. We recorded timing and tracking data for 16 tour groups.

Group ID	Start Time	Group Size	Language	Region	Age Range	Length	Amplification	# Galleries Visited	# Works Stopped At	Tour Company	Tour Guide Contact Information
9	13:28	15	Chinese	China	10-60	2:02:54	Yes				

Lap #	Dwell/Travel Time	Travel/ Dwell	Object	X Location	Y Location	Floor	Tags	Notes
1	0:32	T						
2	10:15	D	(Stairwell Platform)	1238	537	1		stop in alcove next to stairs
3	0:39	T						
4	18:41	D	(Disperse R33)				SP	split into china
5	0:00	D						
6	0:50	D	Amitabha Buddha	1302	407	1		
7	1:05	T						
8	3:34	D	331	1234	197	1	Eng	photos, group wrapping around whole case of item
9	0:16	T						
10	2:56	D	Northern Song Ru Wares	1199	182	1		
11	0:03	T						
12	1:51	D	Yuan and early Ming jingdezhen	1181	172	1		
13	0:03	T						
14	1:33	D	Two flasks with dragons	1156	162	1		
15	0:05	T						
16	2:19	D	chenghua doucai	1141	171	1	Eng SP	people taking photos at previous item
17	0:04	T						
18	1:26	D	Qing wucai porcelains	1118	187	1	Eng	photos
19	0:05	T						
20	1:58	D	334	1118	166	1		
21	0:04	T						
22	1:30	D	Qing falangcai porcelains	1128	155	1		
23	0:26	T						
24	1:31	D	Jun wares	1145	196	1		
25	0:10	T						
26	1:43	D	Longquan green-glazed wares	1184	195	1		
27	0:23	T						
28	0:10	T						
29	0:53	T						
30	0:37	D	(Directions to group)	1119	726	2	ST	slowing traffic going into egypt

Figure 12: Partial timing and tracking spreadsheet for Group 9.

We chose a heatmap to visualize the digitized timing and tracking data because it clearly shows which areas of the museum are most popular among ITGs. A Python script was created to generate a single combined heatmap from all the timing and tracking data (see Appendix A for details). This heatmap considered both the path and

the stops ITGs took throughout the museum, where the intensity of red on the heatmap represented the amount of time ITGs spent in that area of the Museum.

To reveal which artefacts were the most popular, the Python script also aggregated the timing and tracking data into a unified list of all the artefacts and facilities stopped at, including data on how many times they were stopped at, the average dwell time, how many of each tag was recorded for the artefact, and a list of all the notes taken. Each artefact was also given a unique universal ID, and artefacts visited more than four times were displayed as a green square on the heatmap with the artefact's universal ID for reference.

Shadow Observation

While one researcher recorded timing and tracking data, the other researcher captured observations of the same tour group's behaviour using two-column notes, which we call *shadow observation*. With shadow observation, three general behaviours were observed for this objective:

- **Sub-group formation and group splintering (SP):** when the larger tour group splits into smaller groups that behave differently
- **Perceived engagement (ENG):** when participants exhibit engagement more than listening and observing, such as asking questions, reading work descriptions, laughing, etc.
- **Perceived disengagement (DENG):** when the researcher observes group participants using their phones or exhibiting other signs of disengagement

The abbreviations for each occurrence were written in the 'observations' column of the double entry notes.

Shadow observation allowed us to capture behaviour exhibited by the tour participants that the tour guide doesn't intend. For example, if we observed that some members of a tour are walking around an exhibit and looking at works while a tour guide is commenting on a different work, this was noted.

The note-taker used two columns to take their notes. On the left column, researchers noted the lap number corresponding with the other researcher's stopwatch, and on the right column, researchers wrote behaviour tags and any other observations. A transcribed table of the double-entry notes is shown in Table 4, with the tags and observations separated for clarity.

Tour guides and participants remained anonymous, only being described with general demographics (i.e. "guide" or "member"). Because the British Museum is

considered a public space, researchers can observe behaviour without informed consent (S. Frost, personal communication, November 13, 2024). Thus, we did not have to gain informed consent from participants. We initially did not inform the guides of our presence beforehand to avoid influencing the tour, but we discovered that it was not possible to perform the observation discreetly. So, we started informing the guides that we were observing their tour to ensure that they and their members were comfortable.

Table 4: Section of double-entry notes for Group 9 transcribed into a table. This example data also includes observational tags from Objective 2.

Lap	**Tags**	**Observations**
2		Stop in alcove next to stairs
4	SP	Into China
8	Eng	Photos, wrapping around whole thing
16	Eng S	People taking photos at previous item
18	Eng	photos

After the tour, the researcher transcribed this data onto the timing and tracking spreadsheet into the respective “Tags” and “Notes” columns in Figure 12. Because shadow observation was performed alongside timing and tracking, the scope was the same, and the notes can be associated with specific times, objects, places, etc. within the Museum via the Python script (Appendix A). Along with the heatmap, this script outputs a unified spreadsheet with all the objects, artefacts, and facilities used, the number of times each was visited, the average dwell time, the number of occurrences of each tag, and the additional notes. A summary of the methods used in this objective are provided in Table 5.

Table 5: Types of observation used to complete Objective 1

Type	Variables	Instrument	Analysis	Scope
Initial Observation	Size, spoken language, country of origin, time & date, estimated group demographics, use of amplification devices and other resources	Spreadsheet	Statistical analysis, data visualization (charts & graphs)	16 tour groups
Timing and Tracking	Path through museum, duration of entire stay, duration in each room, works visited, display dwell times	Museum map, spreadsheet	Statistical analysis, data visualization (heatmaps, flow maps, charts, graphs)	16 tour groups
Shadow Observation	Sub-group formation and splintering, perceived engagement	Double-entry notes	Field notes coding	16 tour groups

Objective 2: Determine the Impact of International Tour Groups on Other Visitors

We also wanted to examine how ITGs could possibly affect the experience of other visitors. We intended to answer the following research questions:

- Where and when do ITGs:
    - Restrict access to artefacts or facilities in the museum?
    - Break any Museum guidelines?
- Do ITGs experience any friction with official museum-operated tours?

If non-ITG visitors are negatively affected by ITGs, they could be less likely to enjoy their stay. Shadow observation and interviews together were used to answer these as they provide an objective look into these unwanted behaviours and give opinions that may not be obvious from observing. In this section, we will further discuss the shadow observations and interviews we conducted to identify possible actions the museum might take to reduce these interactions.

Shadow Observation (II)

Shadow observation for the purposes of this objective was conducted simultaneously and with the same procedures and analysis defined for the first objective. We identified four areas of interest:

- **Blocking (B):** Noted when an ITG inhibited access to a work or its associated content (plaques, interactive activities, etc.) requiring a visitor to wait, ask for someone from the tour group to move, or strain to see.
- **Slowing traffic (ST):** Noted when an ITG created congestion in narrow hallways or areas that impeded other visitors' travel beyond a leisurely walking pace.
- **Diverting traffic (DT):** Noted when a visitor who experiences blocking or slowing traffic decided to change their route to go around or avoid the ITG.
- **Affecting facility access (FA):** Noted when visitors waited in line for access to facilities such as lavatories, shops, cafes, etc. because of an ITG.

The abbreviations for each occurrence were used in the 'observations' column of the double entry notes.

This observation would allow us to locate where these problematic behaviours occurred and count how often they occur with each group. This allowed us to see if there were any trends in these tags that would allow us to focus our recommendations to a specific cause.

We also observed one official British Museum tour led by an experienced Museum volunteer to provide a benchmark for a Museum-designed and endorsed tour as well as to observe how an official tour interacts with non-official tours. On this tour, two researchers joined as members of the tour and took open-ended notes that were further analysed after the tour.

Semi-Structured Interviews

We conducted semi-structured interviews with five ITG guides to ask about their interactions with Museum-led tours:

- How do private and Museum guides share the space?
- Do the Museum-led tours get any preferential treatment that private guides deem unfair?

The exact questions we asked are in Appendix B. We chose to use semi-structured interviews for this objective because we wanted to understand the guides insider knowledge about ITGs while remaining flexible to explore further inquiries. One

researcher conducted the interview while another researcher recorded with an audio recording device and took notes. Interviewee identities were kept confidential using pseudonyms (ex. Guide 1), and participants verbally consented to the interview before it began. A variation of this consent script was used for all interviews and is included in Appendix C. In addition to the five private tour guides, we asked a British Museum volunteer guide about friction with ITGs.

We also planned to interview five docents and museum security staff in areas of the museum where crowding is known to occur, such as in Room 4 where the Rosetta Stone is located. The goal of this was to provide us with more observations about what these groups do in the Museum since staff spends more time in the exhibits than us. However, we struggled to recruit any British Museum staff who were both attentive towards ITGs and willing to do an interview. After conducting multiple interviews with the international tour guides themselves, we concluded that the guides were a more reliable source of this information. A summary of the methods used to understand the impact of ITGs on other visitors are shown in Table 6.

Table 6: Method used to complete Objective 2

Type	Variables	Instrument	Analysis	Scope
Shadow Observation	Instances of visitor impacts	Double-entry notes	Field notes coding	16 ITGs
Semi-Structured Interviews	Explanation of private tours' interactions with official Museum tours	Interview questions and consent script	Qualitative coding	Five ITG Guides, one Museum volunteer guide

Objective 3: Understand the Needs and Experiences of International Tour Groups

We sought to understand the opinions of tour group guides and members to identify ways to improve the tour experience. We wanted to answer the following research questions:

- What do groups want to experience on their tour?
- What problems do international groups experience when they visit the Museum?

We thought interviews were best suited to answer these questions because we wanted to know the opinions of the visitors and guides on the tour. This section will

explain the interviewing process and detail our unsuccessful attempt to use online reviews to obtain the thoughts of tour members.

Semi-structured Interviews (II)

We conducted semi-structured interviews with five ITG guides to ask about their experience conducting British Museum tours, how they choose to structure their tour, any problems they encounter when touring, and any suggestions for the Museum to improve their experience. They were chosen to answer these questions because of their personal experience with the problems these tours face and their direct communication with visitors. Interview questions are included in Appendix B. These questions were asked during the same interviews described in Objective 2.

After the interviews, we coded the dataset to examine common themes in the answers and to see if these aligned with data found via the observations. For example, if a tour guide made a comment about a particularly difficult room to travel through, and our shadow observations showed that the room had consistent slowing or diverting of traffic, then we knew the problem was something that we needed to present to the Museum.

Archival Analysis

To fulfil our final objective, we planned to analyse reviews posted by visitors who toured with some of the ITG companies at the museum, aiming for at least 50 reviews from several different tour companies. This would have been done to investigate what visitors wanted from their tour, what their experiences were like, and if they had any feedback about the museum. It was also chosen because interviews and surveys with tour group members would have been difficult to conduct due to time constraints and a language barrier.

Something we quickly noticed while beginning the analysis was that reviews of individual tours were almost exclusively opinions about the tour guide, which is not in the scope of the project, or general comments on the tour being good or bad. From these realizations, we decided to pivot to examining reviews of the Museum itself. Using popular websites like TripAdvisor, it was possible to find reviews that catered more specifically to what we were trying to examine through keywords. Despite this, we did not find relevant reviews quickly. After some time of searching and getting 10 of the 50 reviews we strived to find, we concluded that we were not learning anything beyond what we were gathering through our observations and opinions of tour guides. We therefore decided not to pursue this further.

Table 7 provides a summary of the interviews used to understand the needs and experiences of international tour groups.

Table 7: Method used to complete Objective 3

Type	Variables	Instrument	Analysis	Scope
Semi-Structured Interviews	Explanation of how guides run tours and challenges they face	Interview questions and consent script	Qualitative coding	5 ITG Guides

Limitations

There were several limitations in our methods that affected the data we collected. Most notably, we performed our observations during the months of January and February, which are the months with the least amounts of group visits. As indicated by Figure 6 on page 13, July has more than 8 times the amount of group visits than January. These extra groups could result in the groups having a larger impact on the visitors in the Museum since there would be more opportunities to effect other visitors. Group sizes could also change based on the time of year, and if groups do increase in size during the Summer, they could have a greater impact. Conducting this study in the Winter also meant that more of the exhibits were closed. These closures could have altered the paths the ITG guides took, meaning our timing and tracking data may not be representative of the whole year. We also only observed a small sample of groups and interviewed five guides, so the collected data may not be representative of all ITGs.

Findings

In this chapter, we will discuss the characteristics and behaviours of international tour groups (ITGs). Then, we will review the observed impacts ITGs had on other visitors. Lastly, we will discuss the problems ITG guides face when running their tour which may affect the experience of ITG participants and other museum visitors.

Patterns in Behaviour of International Tour Groups

Our observations reveal many ITGs have similar characteristics, follow similar routes, and visit similar artefacts. In this section, we present and discuss these similarities and explore how variations to these patterns affect ITG participant engagement.

Characteristics of International Tour Groups

The observed characteristics and behaviours of international tour groups, shown in Appendix D, followed similar patterns regardless of spoken language, time of day, and day of week.

Group sizes were modest, with an average of 18 members and a range between 11 and 26 members. Groups that entered with more than 30 members broke up into smaller groups with individual guides per the Museum guidelines.

The tour duration varied between 48 and 155 minutes, with an average of 106 minutes. The average dwell time at individual artefacts was 165 seconds. From group to group, the average dwell time increased with the length of the tour, suggesting longer tours preferred to spend more time at the same artefacts rather than see more of the Museum. Within the tours, dwell times varied from 15 seconds to just over 13 minutes. Dwell time had no correlation with the popularity of an artefact.

The groups on average stopped at 17 rooms and 20 artefacts; however, this behaviour did vary significantly group to group. One group stopped at only 7 artefacts while seeing 16 rooms, and another stopped at 27 artefacts while only seeing 12 rooms.

Voice amplification systems were used by 69% of guides. The remaining 31% used their natural voice and occasionally had to speak up to be heard.

Compared to the Museum's previous 2017 study on ITGs, the 16 international tours we observed had smaller group sizes, decreasing from 30 members to 18 members, **but longer tour lengths**, increasing from 90 to 106 minutes.

This could be due to multiple factors. The COVID-19 pandemic's lasting effects may have dissuaded members and organizers from traveling in large crowds. We also gathered data in January and February—two of the Museum's least busy months—while the 2017 study was conducted in March and April, which have 150% higher group visitation.

Language distribution also varied significantly from the 2017 study. Figure 13 shows the language distribution of the 2017 study compared to the groups we observed. While only 2% of observed tours in the 2017 study spoke Spanish, 25% of the tours we observed spoke Spanish. Additionally, while 23% of tours observed in the 2017 study spoke Korean, only 6% of the tours we observed spoke Korean. This could be due to small sample sizes in both our observations and the 2017 study (16 and 52 groups respectively) or changes in visitation of these groups from month to month.

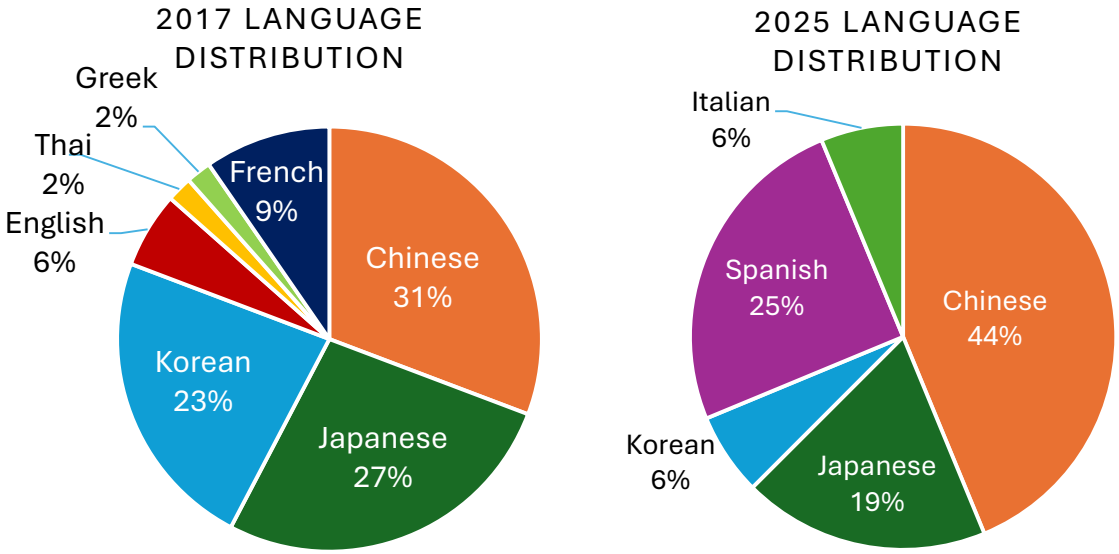


Figure 13: Distribution of languages in the 2017 study (left) vs. the 16 ITGs we observed (right).

Popular Stops

Tour groups largely stopped at the same artefacts. Every group visited the Parthenon Sculptures and either visited the Rosetta Stone itself in Room 4 or the casted touch Rosetta Stone in Room 1. Of the 16 groups, 15 visited the Bust of Ramesses the Great, 14 visited the Winged bull, and 13 visited the East Pediment.

Table 8 lists the artefacts visited by more than five groups. Additionally, four out of five tour guides discussed how they are given a list of items they must see by their

tour company, which commonly feature artefacts from the Greek and Egypt galleries. See Appendix E for a full list of artefacts that were stopped at and their location.

Table 8: List of popular artefacts.

Name	# of Visits
Parthenon Sculptures	16
Bust of Ramesses the Great	15
Rosetta stone	15
Winged bull	14
East Pediment	13
Easter Island statue	10
Nereid monument	10
Scarab	9
Lion hunt reliefs	8
Predynastic Egyptian burial	7
Tactile model of Parthenon	6
Reading Room	6
Lely's Venus	6
Bronze figure of seated cat	6
Amitabha Buddha	6
Game of Ur	5
Metopes	5
Sarcophagus of Nectanebo II	5
Cradle to Grave	5

Notable omissions from this list are artefacts like the Benin Bronzes and Lewis Chessmen. Despite the Museum considering these items highlights, they were only visited once and twice respectively.

Some rooms were favoured by groups that spoke a certain language. All three groups that visited the Chinese ceramics exhibit in Room 95 spoke Chinese, all four groups that visited the Asia exhibit in Room 33 spoke Chinese, and the one group that visited the Korea Foundation Gallery in Room 67 spoke Korean. Additionally, three out of five ITG guides interviewed discussed that they will change their tour to favour the home country of their group.

Groups spend the most time in between Rooms 18 and 4 in the Western Range. Figure 14 shows a heatmap of the Western Range, where brighter red areas represent the areas the observed ITGs spent the most time in. Full heatmaps can be found in Appendix F.

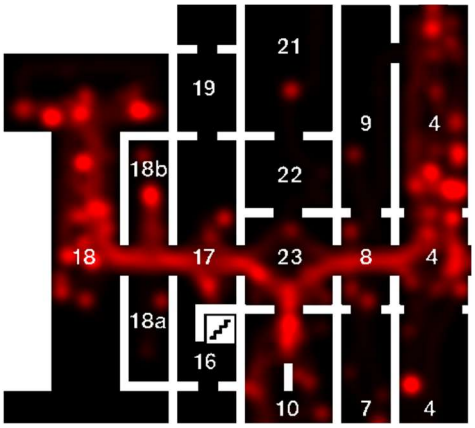


Figure 14: Heatmap cropped to show the popular Western Range.

There are several areas without artefacts where groups stopped to ensure everyone is still with them or to further explain parts of the Museum. These areas are shown in Figure 15, and include areas in the Great Court as well as Rooms 66 and the East stairs landing (Room 53), which were used as meeting points before and after groups dispersed into Rooms 61-63.

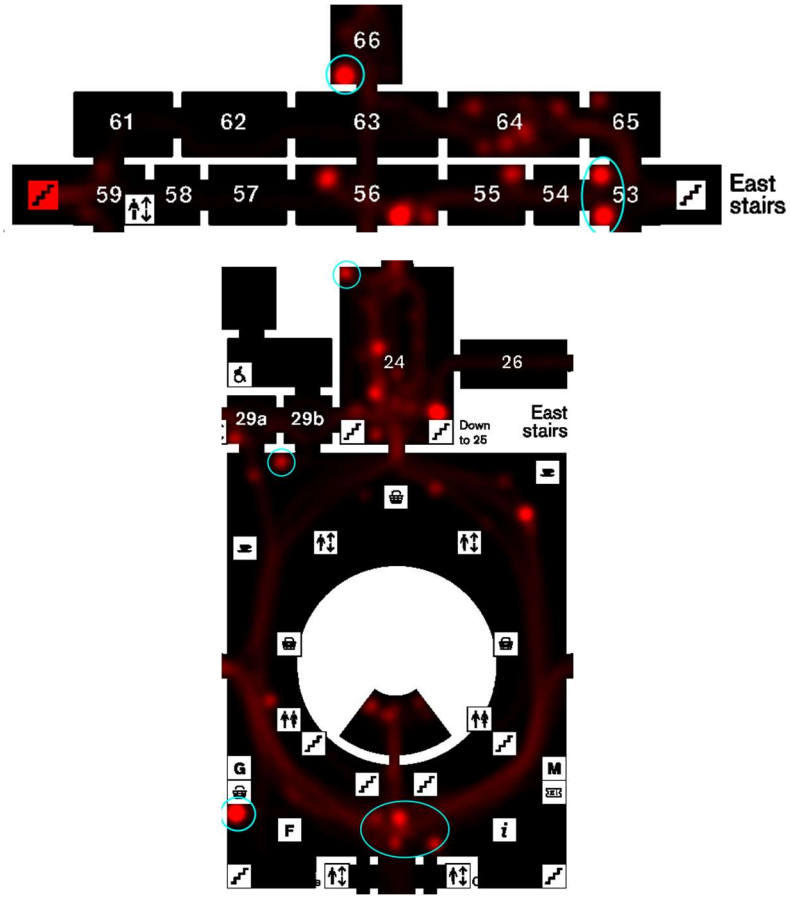


Figure 15: Heatmap with non-artefact stops circled in blue.

It is also important to consider the temporary closures that occurred during our observations. The lowest portion of Room 4 south of the Rosetta stone was closed off for nine observations. The Reading Room was closed for four observations. Room 10 was closed for two observations, and Room 7 was closed for eight observations.

Popular Routes

The 16 tours we observed followed a very similar route. From the location of the popular artefacts and the heatmap, we assembled a 'typical' ITG route, shown as a blue line in Figure 16. The average tour route is as follows:

1. Start in the Montague Place entrance and travel south to the Great Court to use the restroom, take pictures, and occasionally see the Reading Room.
2. Move west to pass by the Rosetta Stone in Room 4 and the Ancient Assyria exhibits in Rooms 7 and 10. Occasionally enter Room 10 to see the Lion Hunt reliefs.
3. Continue west to see the model Parthenon in Room 18b and the Parthenon Sculptures in Room 18.
4. Backtrack from Room 18 to Room 4 and travel north through the Egyptian Sculptures exhibit to take the West stairs to Level 3.
5. Split up and move through the restricted Ancient Egypt exhibit in Rooms 61-63 as non-guided visitors, then regroup North of the exhibit in Room 66.
6. Take the North stairs down to walk back out the Montague Place entrance.

While most groups roughly adhered to this route, no two tours took the same exact route. Notable exceptions include:

- Taking the East stairs or the Great Court stairs up to Level 3 to the Mesopotamia exhibit (Rooms 54, 55, 56)
- Visiting the Ancient Egypt exhibit on Level 3 (Rooms 61-64) before visiting the Western Range on Level 0
- Traveling up the North stairs to the Chinese Ceramics, Korea Foundation Gallery, or East Asia exhibit (Rooms 95, 67, and 33 respectively) at the very start of the tour
- Ending the tour in the Great Court, or by dispersing into the Ancient Egypt or East Asia exhibits

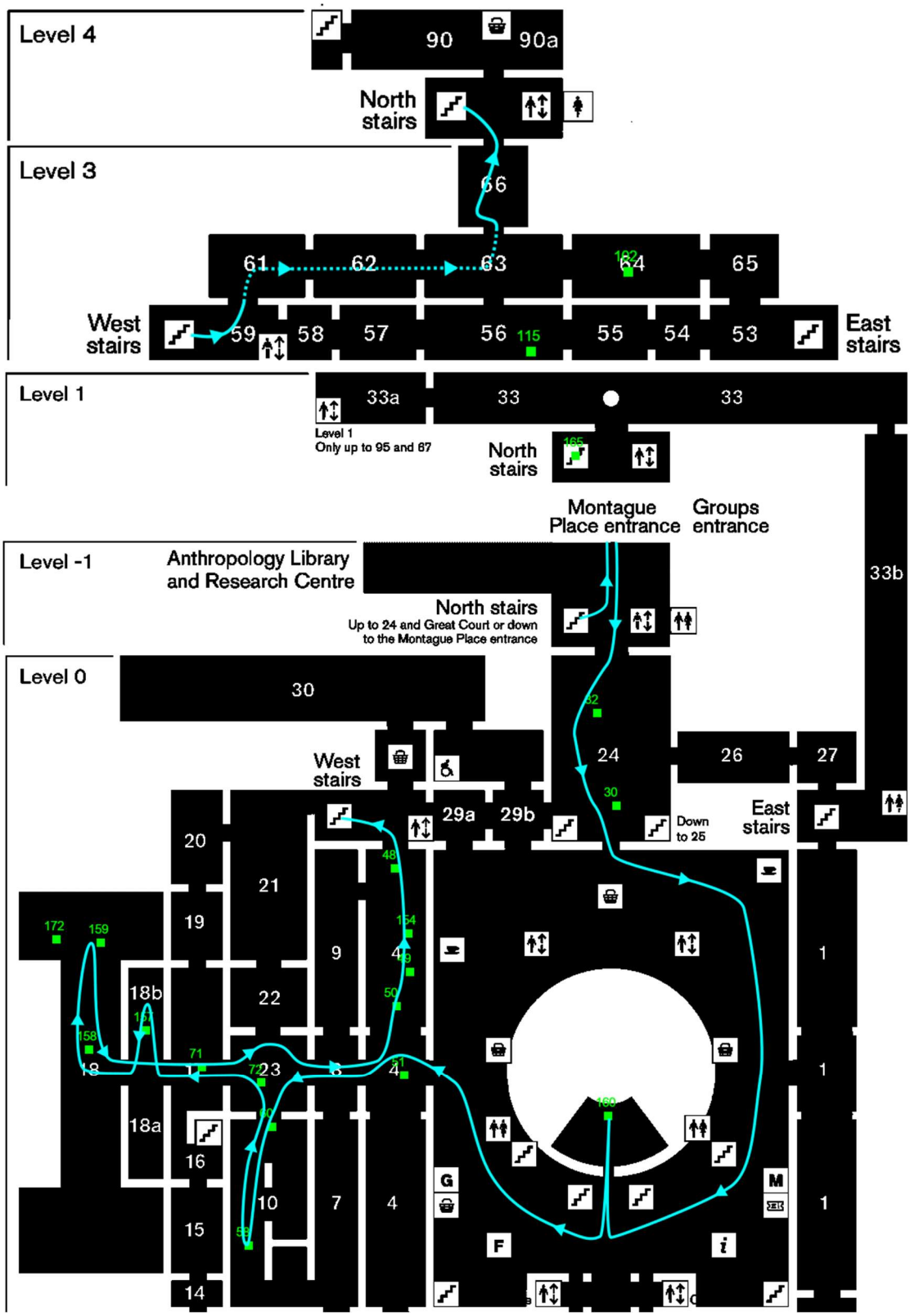


Figure 16: Most visited artefacts from 16 ITGs as green dots with the popular path in blue.

Every tour group we observed backtracked at some point in their tour. This usually happened along the hallway in the Western Range formed by Rooms 4, 6, 23, 17, and 18, which is illustrated in Figure 16 above. Because this hallway is narrow in proportion to its popularity, this action is especially congesting. However, due to the design of the Western Range, backtracking is the best option if groups want to travel to the upper level of the Museum; Room 18 only has one entrance/exit, and Room 19 was closed for most of our observation, restricting tour groups from travelling North through Rooms 19, 20, and 21 towards the West stairs.

ITG Participant Engagement

International tour group participants were more often engaged than disengaged throughout our observations; we observed 72 instances of engagement and only 16 instances of disengagement. Especially engaging were Rooms 1, 8, and 23, while Rooms 56 and 64 were the only disengaging rooms. The engagement for every stopped artefact can be found in Appendix G and is defined as the number of engagement tags recorder per stop for each artefact. Figure 17 expands this data to the rooms the artefacts are in and shows the observed level of engagement in each room on a red to green scale. In red rooms we observed more disengagement, and in green rooms we observed more engagement. Yellow rooms represent a baseline level of engagement, and black rooms had 3 or less artefact visits.

However, we found it difficult to draw further conclusions from this data because it was often unclear whether the guide or the artefact itself prompted the engaged behaviour. For example, we found no relationship between the engagement of tour participants and numerous characteristics of the tour including amplification use, average dwell time, and tour length. For charts related to engagement see Appendix G.

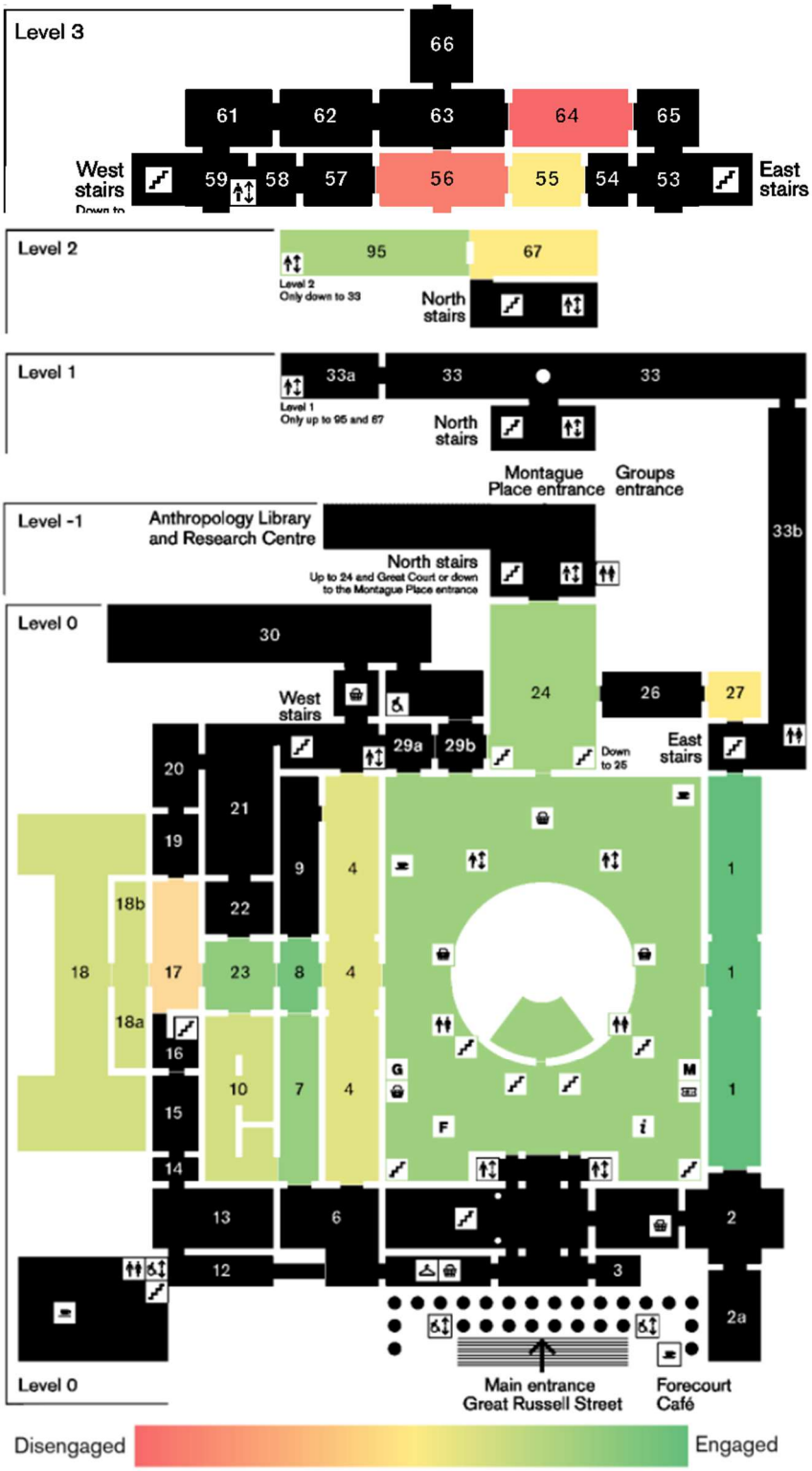


Figure 17: Engagement by room on a red to green scale, with participants being more disengaged at artefacts in red rooms and more engaged at artefacts in green rooms.

Impacts of International Tour Groups on Other Visitors

We observed that tour groups impact the experience of other visitors by blocking sightlines to artefacts, occupying the space around artefacts, constricting the space in smaller rooms, and slowing the flow of traffic through corridors. In this section, we will discuss how various factors, including group size and room design, impact other visitors and tours.

The correlation between visitor impact and the group's size is not sufficient to draw significant conclusions about how group size affects the flow of traffic for other visitors. This could be due to the consistently small group size of the observed ITGs, or because other factors such as the experience of the tour guides or crowdedness of the museum have a greater effect. More data on larger and smaller groups may be necessary to draw these conclusions. In addition, the extent to which these occurrences impact visitors is unknown, as the museum is frequently crowded with more than just ITGs.

Figure 18 shows the relationship between this visitor impact and group size. Visitor impact was quantified by summing the number of occurrences of each tag during a tour and dividing by the number of artefacts stopped at during that tour.

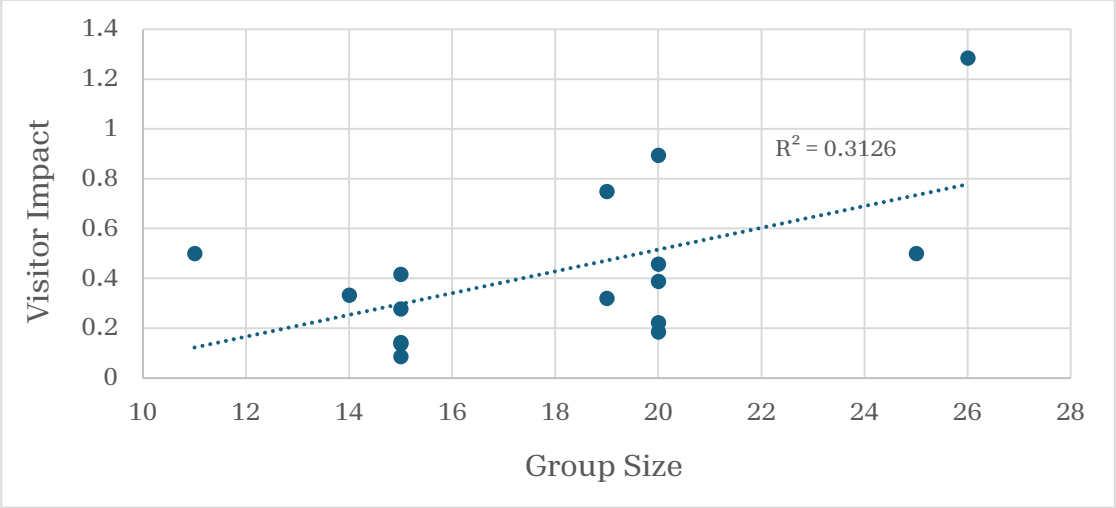


Figure 18: Correlation between group size and visitor impact.

ITGs had the most impact on other visitors in rooms 7, 10, 56, and 64. Figure 19 shows this impact within each room on a green to red scale, where we observed few or no instances of visitor impact in green rooms, and we observed ITGs having the most impact on other visitors in red rooms. See Appendix H for the visitor impact ITGs had at individual artefacts across the Museum.

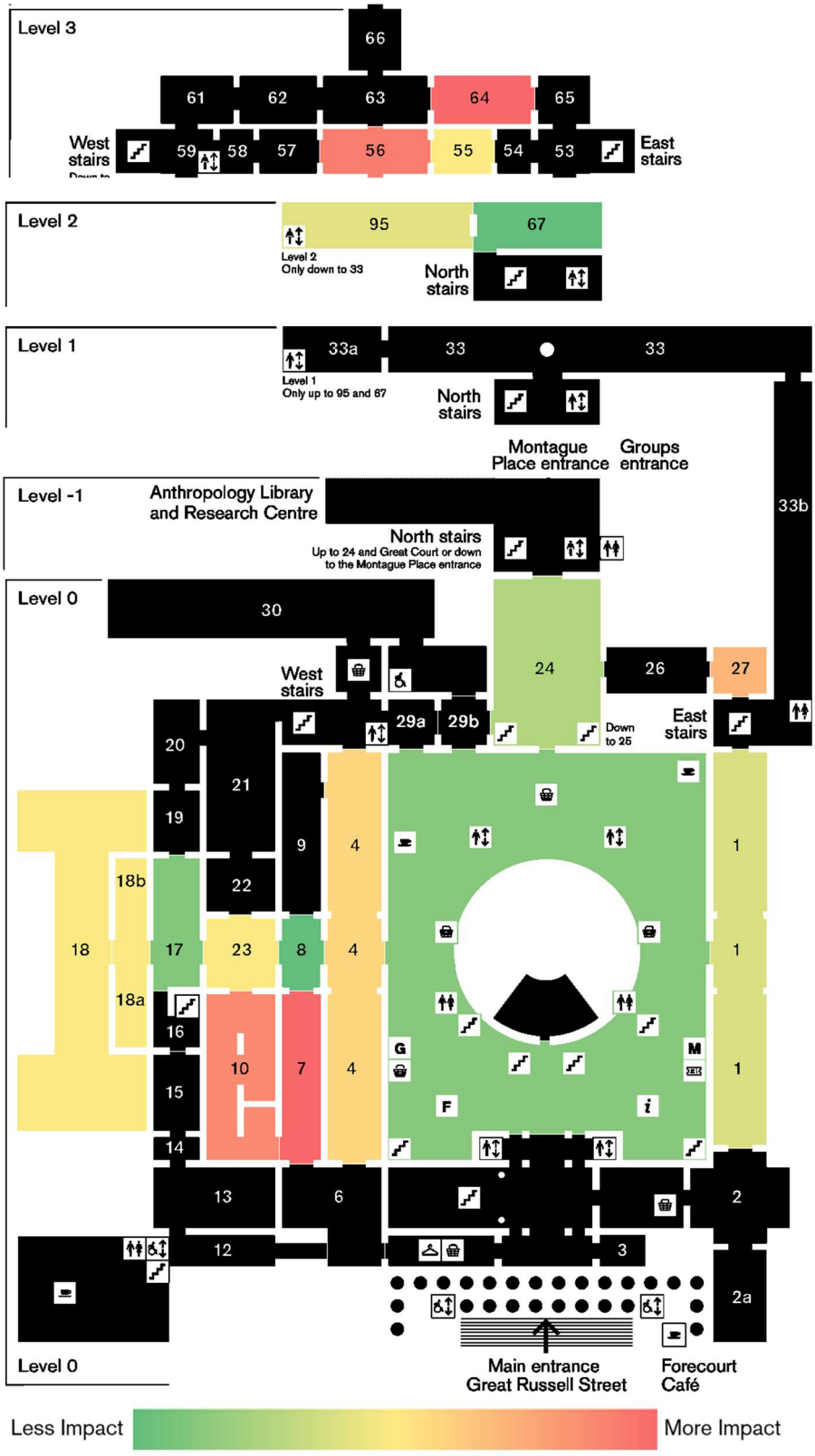


Figure 19: ITG impact on visitors in rooms across Levels -1-3 with green rooms indicating little to no visitor impact, and red rooms indicating the most visitor impact.

We observed that ITGs in Rooms 7 and 10, shown in Figure 20, had high visitor impact because of their long, linear hallways and dense artifacts. ITGs have high impact in these rooms because they have nowhere to stop and discuss the artefacts on display out of the way, causing traffic to slow around the group. While Room 4, also shown in Figure 20, has a similar linear layout, there are many nooks and areas where large groups can remain stationary out of the way of traffic. As a result, ITGs have less impact on other visitors in Room 4, despite Room 4 being a more popular area of the museum.

Figure 20: Layout of Room 7 (left) and the northern portion of Room 4 (right).

We observed that ITGs in Rooms 56 and 64, shown in Figure 21, had high visitor impact because of the central location of a few isolated displays. As a result, ITGs tended to surround the artefact, blocking the view of the artefact from other visitors.

Figure 21: Layout of Room 56 (left) and Room 64 (right).

The placement and layout of artefacts within a room strongly influenced how ITGs impacted other visitors. Figure 22 shows the number of observed occurrences of both blocking sightlines and slowing traffic per artefact visit in Rooms 7, 4, 56, and 64. Room 7 has no blocking and very high slowing traffic because the room's artefacts are along the whole wall and cannot be blocked, but there is nowhere for groups to stop out of the way. Alternatively, room 56 has relatively high blocking and low slowing traffic because its artefacts are centrally located but out of the way of traffic. Room 4 is an example of good room design for ITGs: it features large, hard to block artefacts and offers areas for groups to stop out of the way of traffic. On the other hand, Room 64 has centrally located displays that are in the way of traffic.

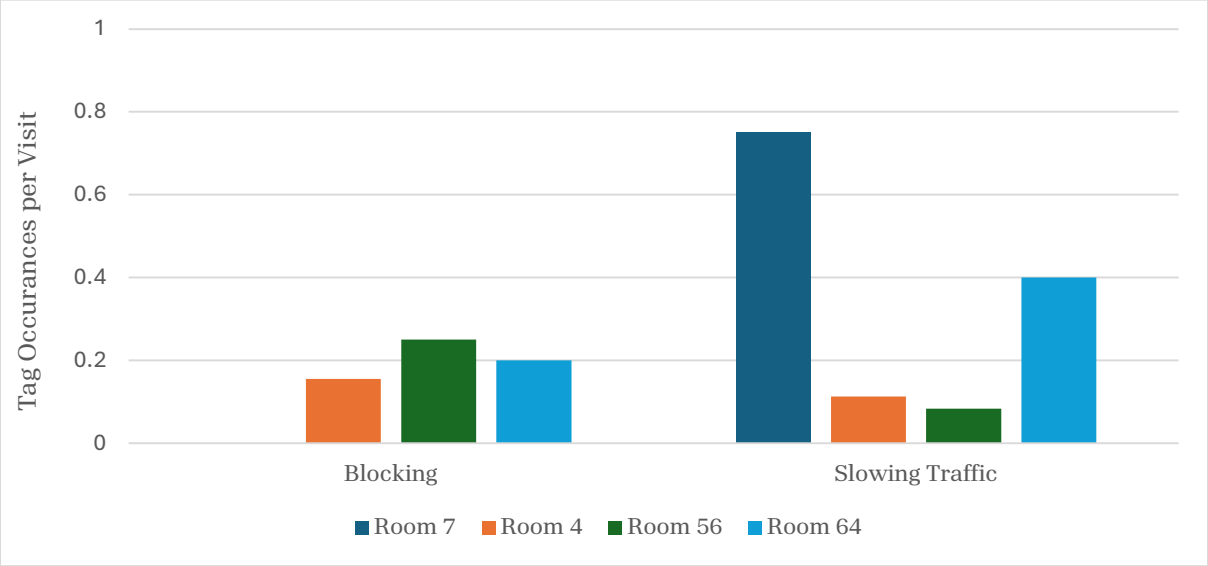


Figure 22: Number of observed occurrences of blocking sightlines and slowing traffic per visit in Rooms 7, 4, 56, and 64.

We did not observe any friction between ITGs and Museum organized tours. In an informal interview, a volunteer British Museum tour guide recalled occasionally needing to ask private tour groups to leave an artefact because they were taking too long. In our interviews with ITG guides, only one guide had experienced problems with British Museum guides, but they said it only ever happened once and that Museum guides are typically nice. When asked if they have had any negative interactions with Museum organized tours, a different ITG guide responded: "Not really, not really. In the National Gallery, I really feel they [are] sometimes quite overpower[ing]... but in the British Museum, no—always very nice, sharing." While on an official Museum tour, we also observed the tour guide thanking other private groups for waiting their turn at an object.

Challenges Faced by International Tour Group Guides

The number of viable routes between popular artefacts is low. One guide described how three tour groups can arrive at the same time, split up at the beginning to take different routes, but still end up at the same must-see artefacts at the same times as the other groups. This suggests that there are very few unique ways to see these items. We also saw this overlap during our observations, as many tours took similar routes to get to the popular artefacts.

International tour guides described problems sharing space with other private tour groups. Two guides reported being inconvenienced by tour groups that took up too much space in an exhibit. One guide attributed this to the size of the groups alone, specifically mentioning groups of 50-60 people that show up during peak season. Another guide believed that this is due to untrained guides who do not work to position their group out of the way of visitor traffic. Both suggested that the British Museum should be stricter when enforcing guidelines on group size.

Some guides had problems with the noise level of other groups. This could lead to them raising their own volume and increasing the amount of noise experienced by all guests. Of the guides we interviewed, four out of five commented on the noise levels of other groups present. One guide who did not use voice amplification systems was particularly affected by this:

> "... there were lots of schools at the same time, so I had to scream a little bit, which I don't like because this is a museum, but I have to try [for] the customers to be able to hear me."

A specific subset of these loud groups are school groups, which were cited as a problem by all four of these guides, who thought the children were louder and more disruptive than other guests. While the guides we interviewed were similar, we had only a small sample of five guides, and interviewing more could break the patterns we started to see.

Conclusions and Recommendations

This work assessed the behaviours of international tour groups (ITGs) and built on the previous research by the British Museum to quantify and contextualize how these groups impacted other visitors, and to discuss the challenges these groups face when visiting the Museum. In the following chapter, we recommend ways for the Museum to better manage ITGs. We also suggest areas of further research.

Private Tour Guidelines

To address some of the challenges faced by ITGs, we recommend revising the established guidelines for tour groups:

Incorporate Blue Badge's five-minute maximum stop time for each item. This guideline may allow tour groups to share popular works more effectively, encourage groups to see more of the museum, and reduce the effect of ITGs blocking sightlines in rooms like 56 and 64.

Encourage or mandate the use of audio guide systems. Audio guide systems can allow guides to speak at a lower volume to their members even with elevated ambient noise in the Museum, which may reduce the noise in the room. These devices are already used by the Museum's volunteer tours and by a majority of ITGs, so mandating their use may not require drastic adjustment from existing tour companies.

Restrict guiding in Rooms 7 and 10. Due to the rooms' tight hallways, tour groups in these rooms have significant impact on other visitors. Tours could still be able to explain the history of the exhibit in the entrance of Room 10 or in Room 6 and walk through the exhibit as individual visitors, much like tours already do in Rooms 61, 62, and 63. Restricting guiding in these rooms could decrease congestion, allowing both individual visitors and groups to enjoy more of the exhibit.

Define the minimum number of people that are considered a tour group. This may allow more visitors to see the restricted rooms. One ITG guide we interviewed was frustrated that they would be stopped from guiding in these areas even with small tours of only two or three people. These groups likely have no greater impact than a family group, and clarifying whether guiding or groups, and of what size, are allowed in these restricted areas could clear up confusion.

Museum Design for International Tour Groups

To address visitor impact caused by ITGs, especially in the Western Range, we recommend some changes to the design of the Museum:

Add additional doorways to enable more circular routes and reduce backtracking. By reducing backtracking, the Museum could increase the flow of traffic, increase the efficiency of tours, and improve the visitor experience. For example, we suggest that the Museum add a doorway between Rooms 18 and 19 to encourage more circulation through the Western Range, lessening the load on the central hallway. This also will allow groups to see more of the Western Range without adding time to their tour. An example tour path with these new doorways is shown in Figure 23.

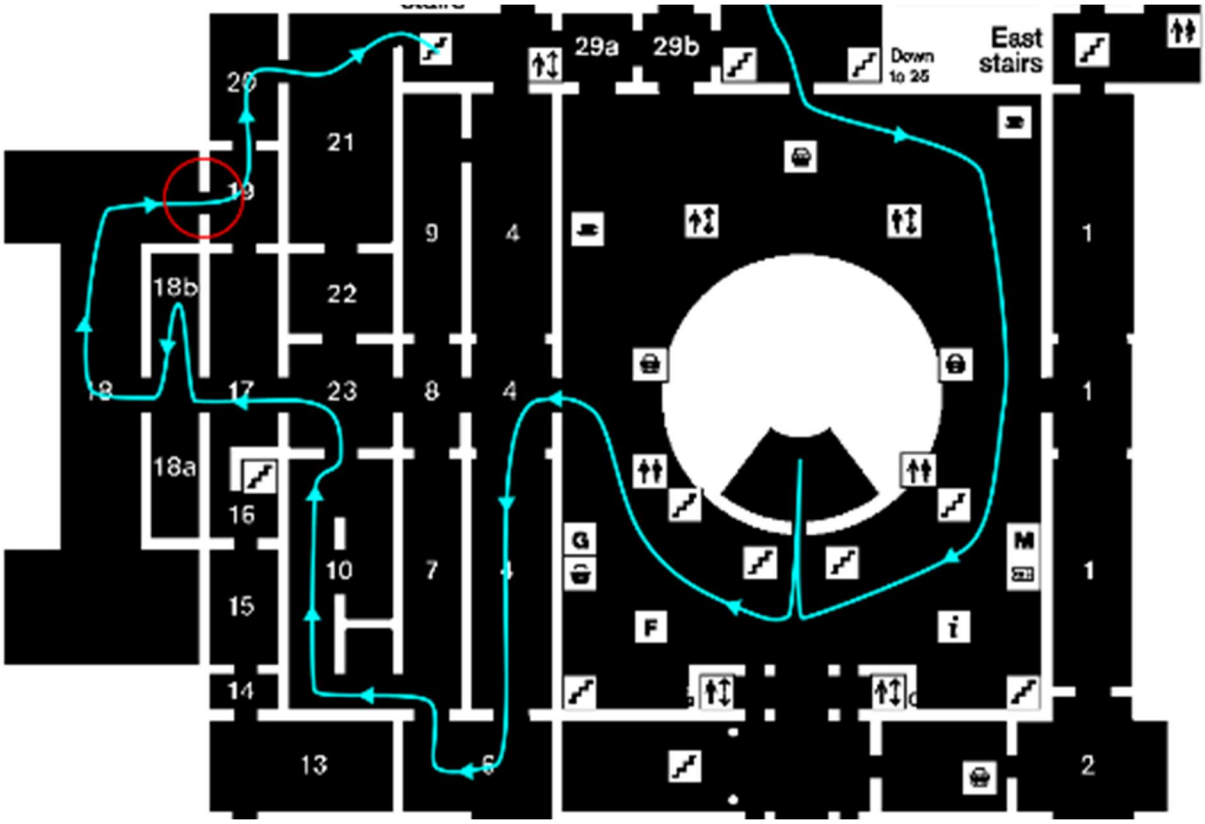


Figure 23: Example Level 0 tour path with proposed doorway in Room 18.

Redistribute popular artefacts to increase the number of viable routes between them. Our observations reveal that tour groups tend to spend most of their tour in the Western Range, usually travelling to the Upper Level only to visit the Ancient Egypt exhibit. This is because many of the Museum's most popular items like the Rosetta Stone, the Bust of Ramesses the Great, and the Parthenon Sculptures are in the Western Range. Distributing the popular galleries in the Western Range more evenly throughout the Museum could reduce congestion in the Western Range, provide various routes for tour groups to reduce encounters with other groups, and encourage groups to see a wider variety of artefacts.

Design rooms such that large artefacts are displayed centrally and with small artefacts along the walls to prevent groups from surrounding a display and blocking other visitors. Small, popular artefacts could be displayed along a wall, with an empty corner or space next to them, allowing a large group to stop in the corner while leaving the front visible for other visitors. This could be applied to Rooms 56 and 64 as discussed in the Findings.

Recommendations for Further Research

While this research can provide a starting point to understanding the behaviours and impacts of international tour groups, more research is necessary for the Museum to gather a complete picture of tour group behaviour.

We recommend conducting more research in the summer when the Museum is busier to better highlight ITG impacts on visitors. We believe that our sample size of sixteen groups, while illuminating wider trends in behaviour, was both too small and collected over too short a period to be indicative of year-round behaviour. We conducted our research over January and February, two of the Museum's least busy months of the year. The observed groups were also too similar in size to analyse how group size affects visitor impact.

We suggest conducting future research that centres around high-impact areas to better illuminate groups' impacts. While the research informed some wider design recommendations for the Museum, looking at the impact of groups on the room or exhibit level could reveal more specific and detailed findings.

We also propose that future research gather visitor impact data from an individual perspective instead of a group perspective. For example, a researcher could imitate an individual visit multiple times and report how often they were impacted by a tour group. This way, researchers won't have to assume when another visitor is changing their behaviour because of the tour group.

Finally, we recommend the Museum conduct a comprehensive study on school groups. These groups were a large proportion of the ticketed groups entering the Museum in our observation period, and both volunteer Museum guides and private tour guides reported being affected by their presence in the Museum. However, while we know that school groups affect other visitors, we do not know enough about them to make directed, informed suggestions to reduce their impact.

While more testing must be done to develop these findings, the methods employed in this research can form the groundwork for conducting Museum-wide timing, tracking, and observation. It allows researchers to gather a complete picture,

from entry to exit, of the same visitor or group as they experience an array of rooms. While the Museum continues to research the behaviours of groups and their effects on other visitors, this Museum-wide method can be applied to other groups such as school groups, Museum-led tours, and families. It is our hope that the Museum can build off our methods, findings, and recommendations to create a more enjoyable and engaging experience for all visitors.

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Appendix A: Python Script

This script uses a gaussian function to generate a heatmap (Appendix F) along the paths and the stop locations. For the paths, the function is applied at each pixel in the path with a constant amplitude. For the stops, the function is applied at the pixel location of the stop such that the amplitude increases proportionally with the stop time. The relevant parameters of the gaussian are tied to a set of constants which determine how the path and stops are weighted, ultimately allowing the appearance of the heatmap to be tuned and scaled in a consistent and replicable way. Also generated is a list of all the stopped artefacts (Appendices D and E). With this list, additional maps with dots relating these artefacts to other aspects of the data (visit count, engagement tags, visitor impact, etc.) are generated as well (Appendices G and H).

To access the script and a copy of all the observational data gathered in this study, visit the repository online at: https://github.com/ANBlanchard3/BM_Heatmap

Appendix B: International Tour Guide Interview Questions

- Do introductions: names, briefly introduce the study and yourself?

1. How do you choose where to take your tour?
    a. How do you incorporate the interests of participants into the tours?
        i. Do they have input in where they go in the Museum?
    b. Is the route you take the same for all groups or do you vary it based on the group?
    c. Do your plans ever have to be changed due to the crowds?
    d. Are there any rooms or artefacts you always try to get to?
    e. Are there any artefacts you would like to get to but can't?
2. We are interested in the feedback you receive about tours. Are there any common aspects of the tour people particularly like or dislike?
3. Have British Museum led tours ever interacted with you?
4. What challenges do you face while trying to conduct tours at the British Museum?
    a. Is there anything the Museum could do to help?

Appendix C: International Tour Guide Interview Consent Script

We are student researchers from Worcester Polytechnic Institute (WPI) hosted by the British Museum. The purpose of this study is to identify strategies to help the British Museum manage international tour groups and improve visitor experience.

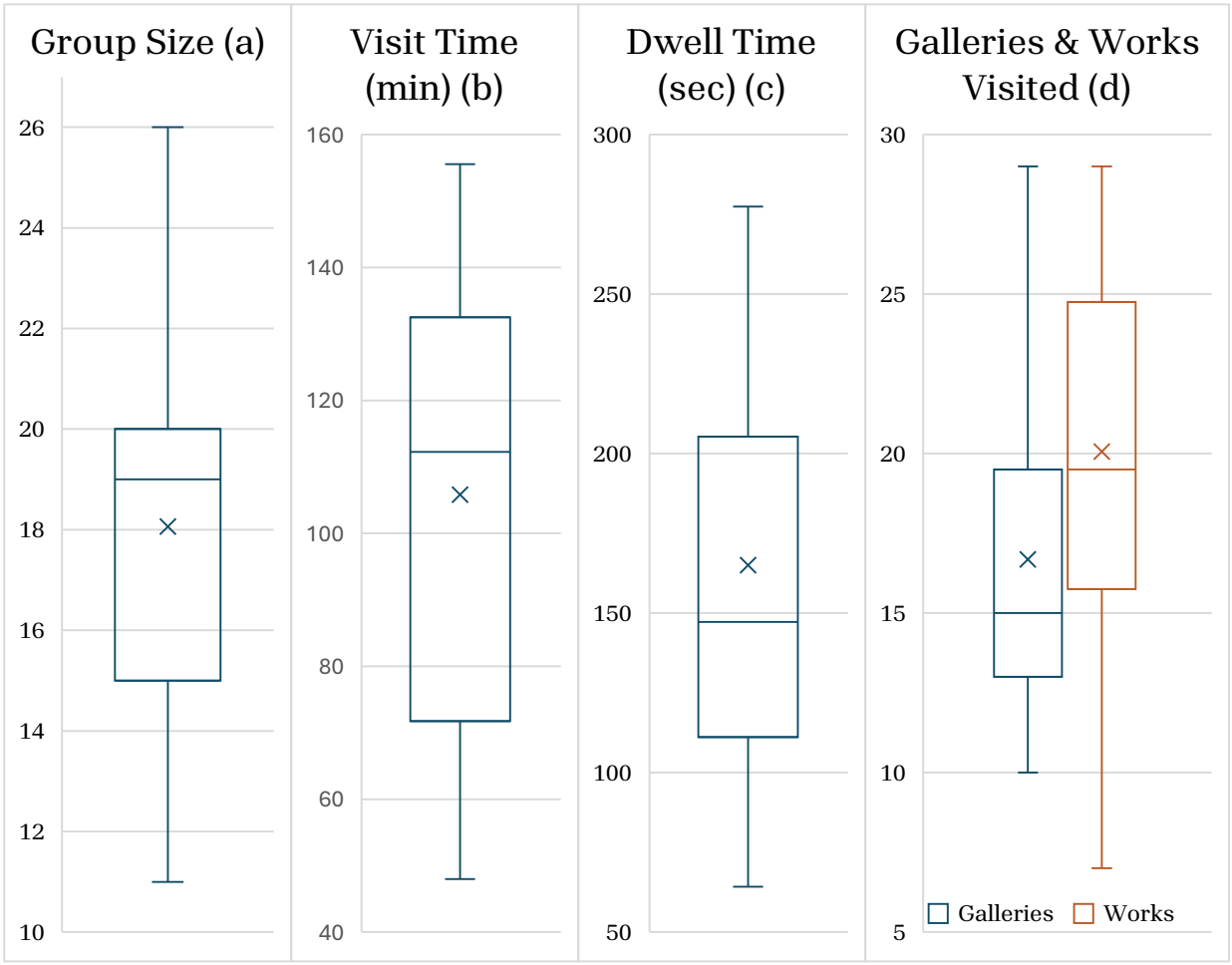
In this 15-minute interview, we would like to ask you a few questions about your experience conducting international tours at the British Museum. Your feedback will be used in a report published on the WPI website and shared with the British Museum. You will not be named in the report; any references to you will be replaced by a pseudonym (for example, Tour Guide 1).

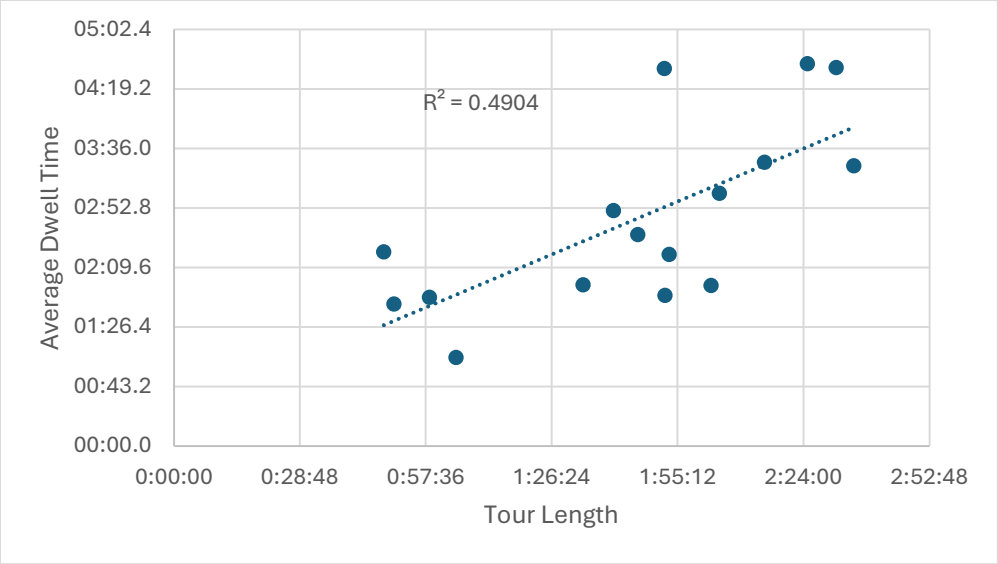
Should you choose to participate in the interview, you may choose to withdraw at any time and skip any questions you do not want to answer. We would like to audio record/ take notes of the interview with your consent. The interview recording/ notes and any personal data you choose to share with us will be stored securely and disposed of by the 16th of March, 2025 in line with the UK General Data Protection Regulation 2018. By verbally confirming your consent, you acknowledge your willingness to participate in the interview. If you have any questions, you may email the research team at gr-lonc25.bm@wpi.edu or contact our advisors at vaz@wpi.edu or cdemetry@wpi.edu.

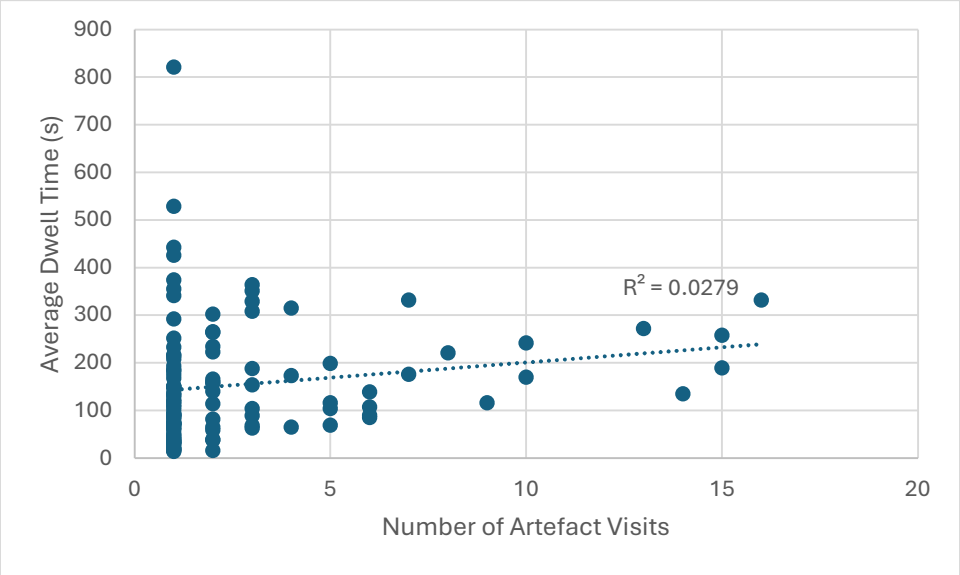
Is that all OK?

Appendix D: Group Characteristics

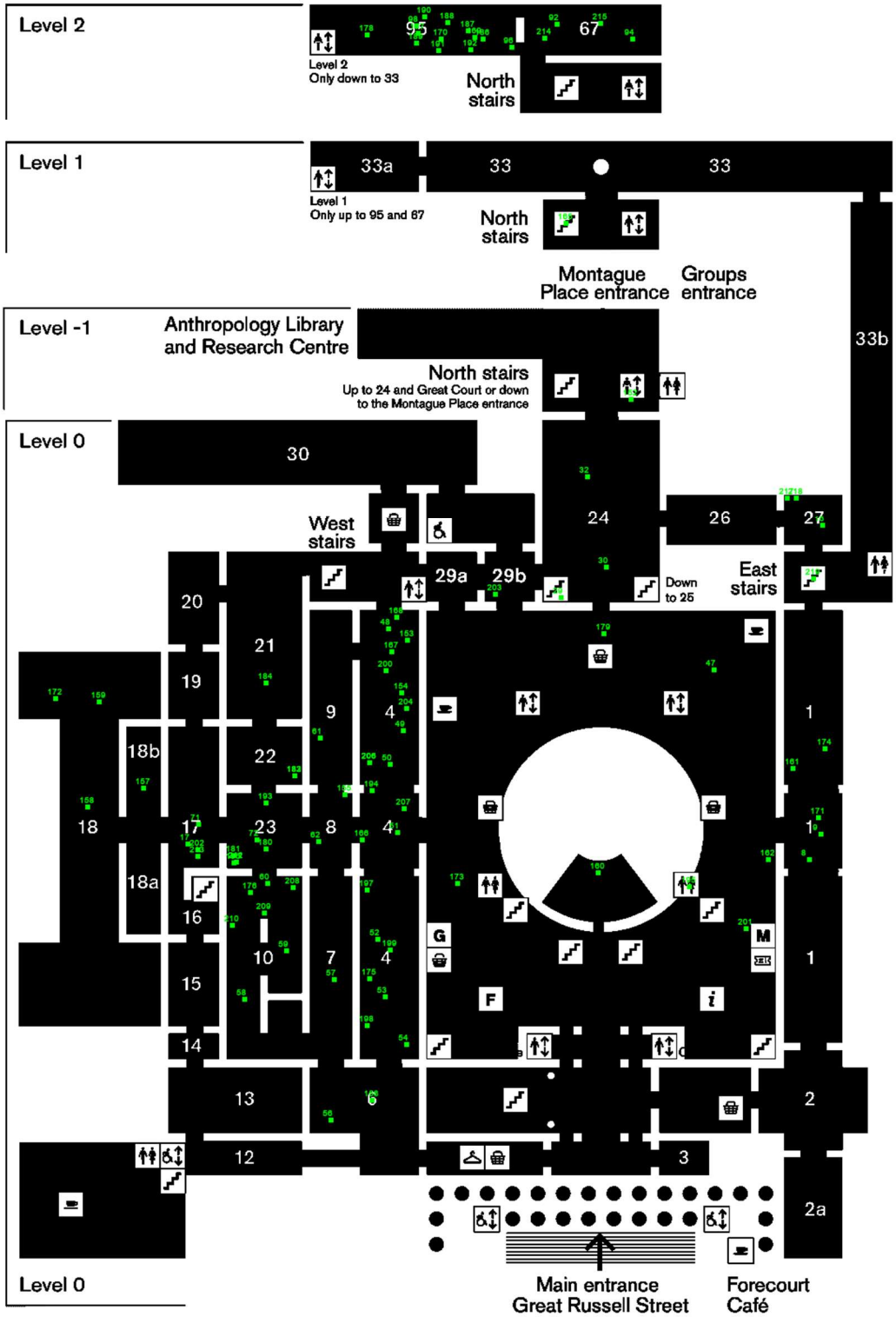
Variable	Average	Standard Deviation	Coefficient of Variation	90% Confidence Interval
Group Size	18	4.0	0.22	[16.4, 19.7]
Visit Time (minutes)	106	34.91	0.33	[91.5,120.2]
Dwell Time (seconds)	165	67	0.40	[132, 198]
% Dwell Time of Total Time	78%	7%	0.10	[75%, 81%]
Galleries Visited	17	5.4	0.32	[14.7, 19.3]
Works Visited	20	6.4	0.32	[17.4, 22.8]
Voice Amplification Use	69%	N/A	N/A	N/A

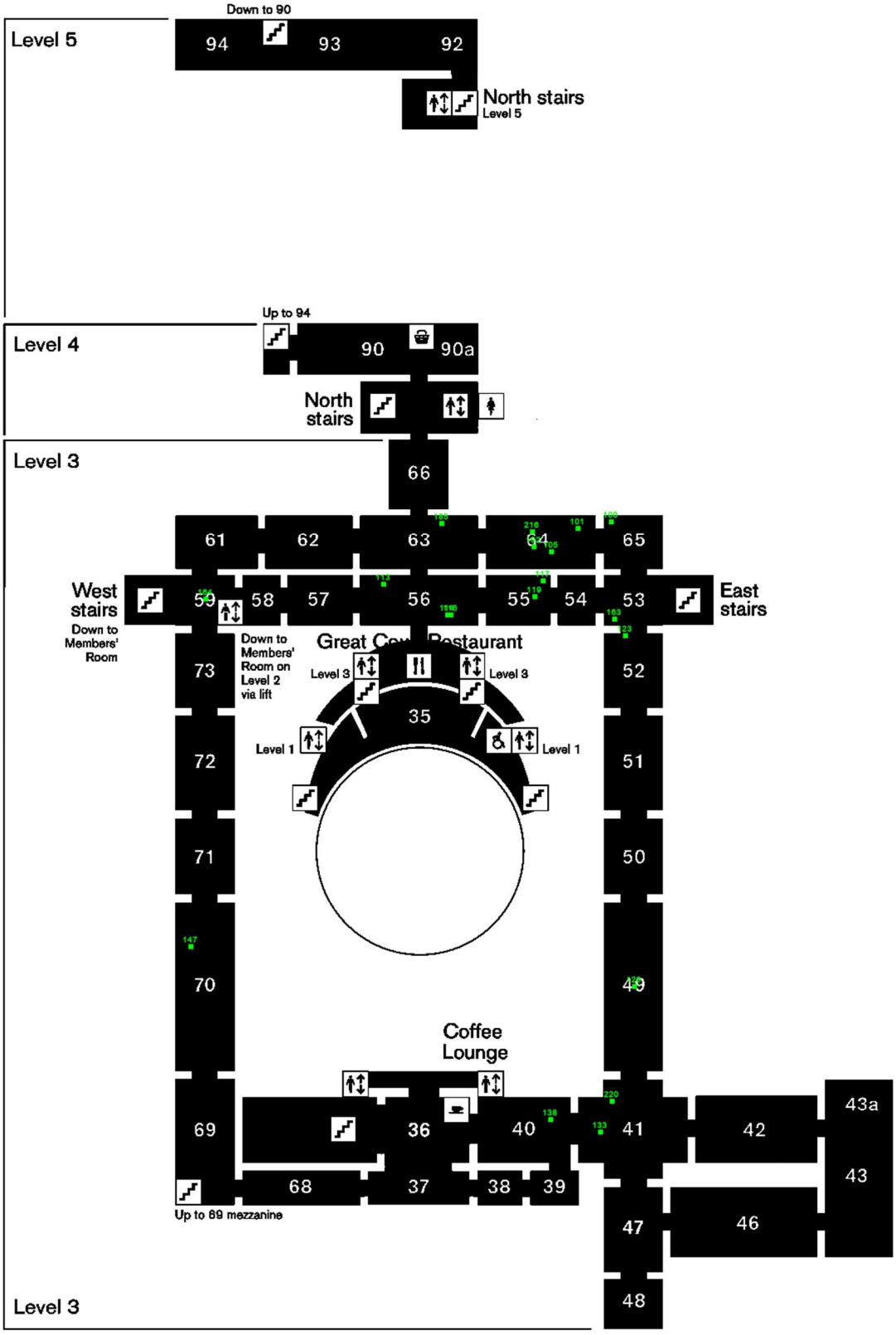


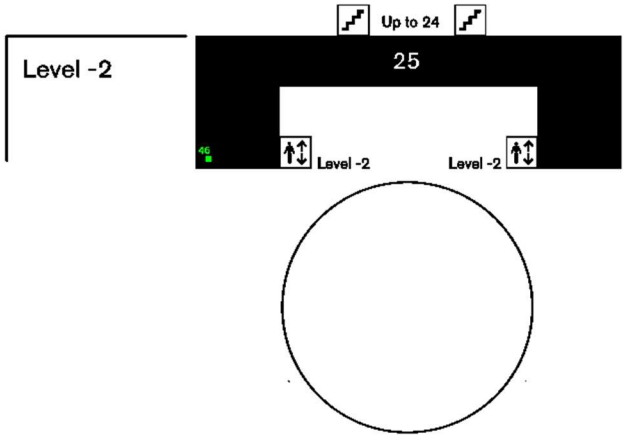

05:02.4
04:19.2
03:36.0
02:52.8
02:09.6
01:26.4
00:43.2
00:00.0
Average Dwell Time
R² = 0.4904
0:00:00
0:28:48
0:57:36
1:26:24
1:55:12
2:24:00
2:52:48
Tour Length


900
800
700
600
500
400
300
200
100
0
Average Dwell Time (s)
R² = 0.0279
0
5
10
15
20
Number of Artefact Visits

Appendix E: Stopped Artefacts




Down to 90
Level 5
94
93
92
North stairs
Level 5
Up to 94
Level 4
90
90a
North stairs
Level 3
66
61
62
63
64
65
West stairs
Down to Members' Room
59
58
57
56
55
54
53
East stairs
Down to Members' Room on Level 2 via lift
Great Co
Restaurant
Level 3
Level 3
35
Level 1
Level 1
73
72
71
70
52
51
50
49
Coffee Lounge
69
36
40
41
42
43a
43
68
37
38
39
47
46
48
Up to 89 mezzanine
Level 3

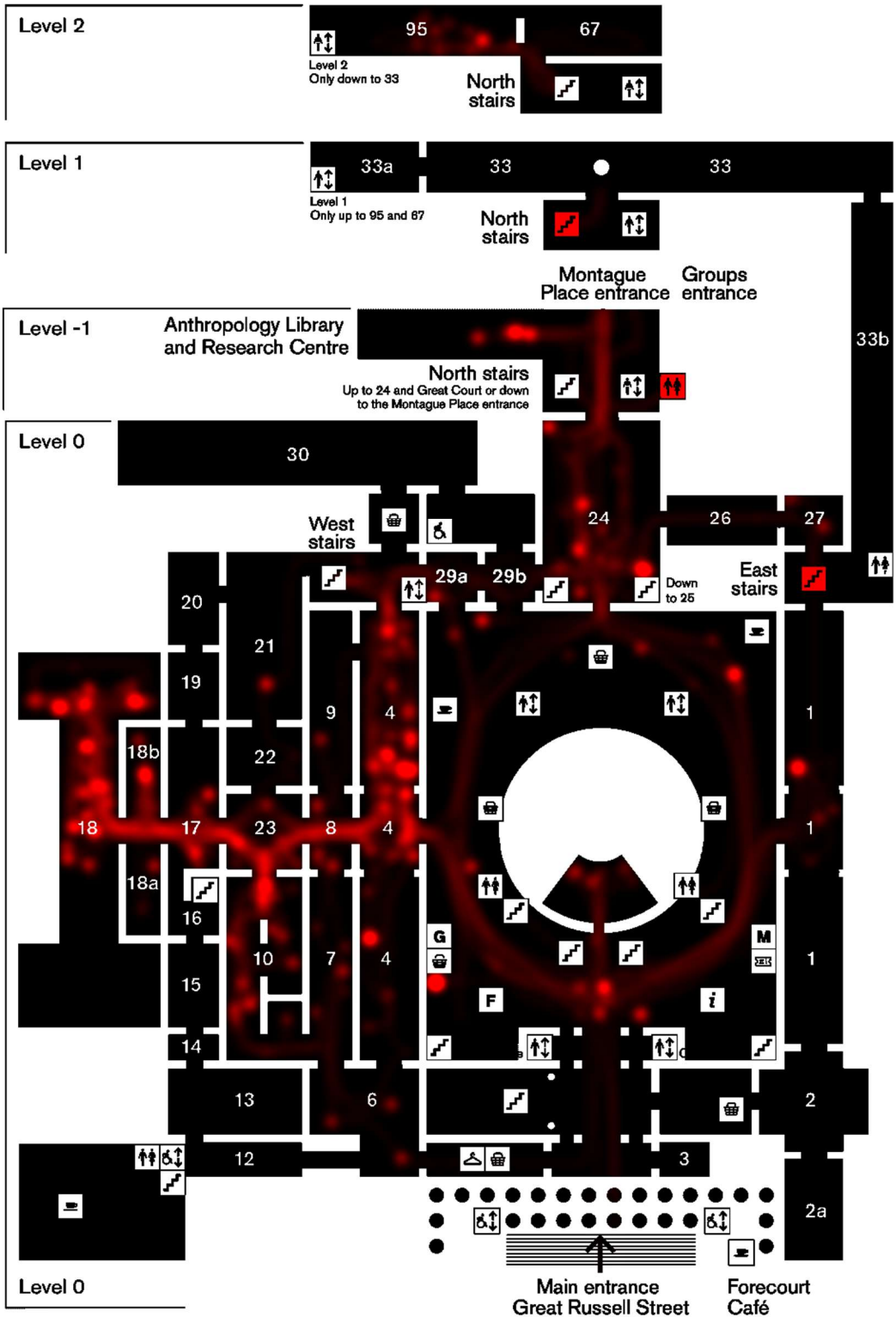

Up to 24
Level -2
25
Level -2
Level -2

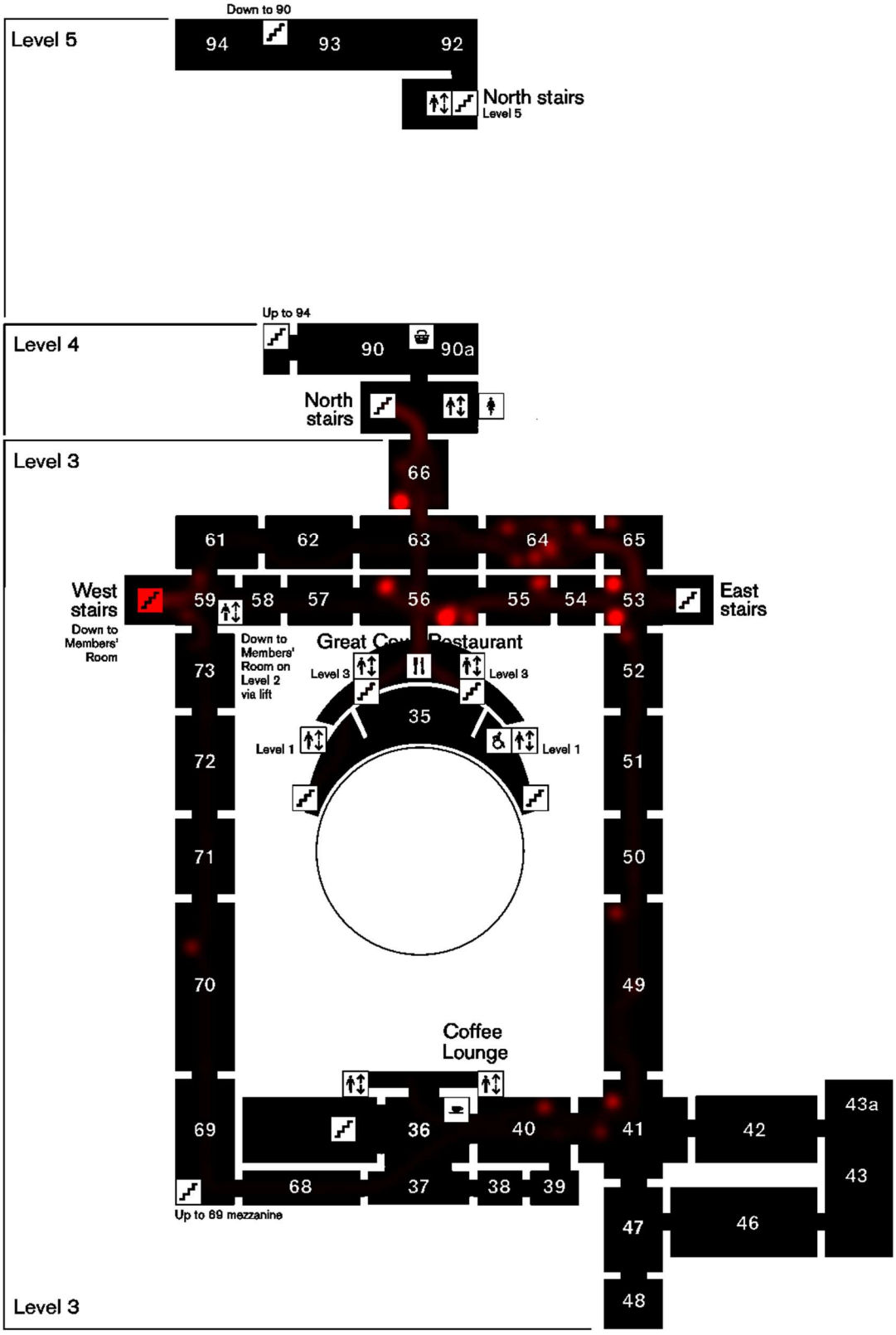
ID	Name	Visits	Average Dwell Time (s)
8	Sloane astrolabe	1	72
9	Piranesi Vase	2	82
16	Serpent mosaic	1	233
17	Mosaic mask	1	168
29	Crystal skull	3	63
30	Easter Island statue	10	242
32	Cradle to Grave	5	69
46	Benin bronzes	2	265
47	House Frontal Pole Haida	3	89
48	Scarab	9	116
49	Bronze figure of seated cat	6	90
50	Bust of Ramesses the Great	15	258
51	Rosetta stone	15	189
52	Head and Arm of a Statue of Amenhotep III	3	308
53	False door of Ptahshepses	2	166
54	List of Kings	1	138
56	Balawat gates	1	185
57	Reliefs from North-West Palace	4	173
58	Lion hunt reliefs	8	221
59	Siege of Lachish	2	223
60	Winged bull	14	135
61	Reliefs from South-West Palace	1	208
62	Human-Headed Winged Bull	3	188
71	Nereid monument	10	170
72	Lely's Venus	6	107
92	Korean sarangbang	1	33
94	Tea Bowl With a Sexagenary Cycle Year	1	41
96	The David vases	2	59
98	Porcelain moon-shaped flask	1	118
100	Rock Art and Gongs	1	215
101	Label from King Den's sandals	1	217
102	Predynastic Egyptian burial	7	332
105	Ship model	1	149
113	Record of food supplies	3	329
114	Ram in the thicket	4	315
115	Game of Ur	5	199
117	Map of the World	1	193
119	Library of Ashurbanipal	2	264
123	Cyrus cylinder	1	426
128	Hinton St Mary mosaic	1	88
133	Sutton Hoo	1	151
138	The Lewis chessmen	2	158
147	The Portland Vase	1	184
152	North Entrance Restrooms	3	351
153	Palm-Leaf Column of Ramses II	3	104

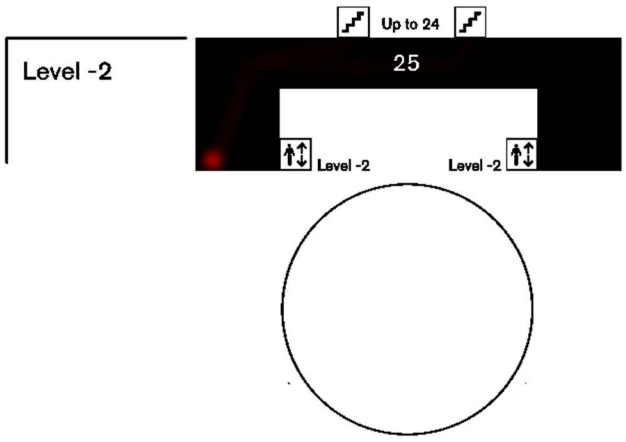
154	Sarcophagus of Nectanebo II	5	104
155	Decorations of Assyrian Palaces	3	154
156	Gateway Guardians	2	160
157	Tactile model of Parthenon	7	176
158	Parthenon Sculptures	16	332
159	East Pediment	13	272
160	Reading Room	6	139
161	Touch Rosetta Stone	3	364
162	Anglo-Saxon sandstone shaft from a cross	2	16
163	Plaster Cast from Persepolis	1	374
164	Mosaic Pavements	3	68
165	Amitabha Buddha	6	85
166	Block Statue of Teti	1	132
167	Sarcophagus of the 'God's Wife' Ankhnegneferibra	1	59
168	Female Sphinx	2	65
169	North Song Wu Wares	2	234
170	Yuan and Early Ming Jingdezhan	1	29
171	Empire and Slavery	1	124
172	Metopes	5	116
173	West Great Court Restroom	1	443
174	Sek Hmet	1	149
175	Statues of King Senwosret III	1	132
176	Pleasure Gardens	1	44
177	Chenghua Doucai	2	140
178	Qing Falanghua Porcelain	1	252
179	Anubis Standing	1	23
180	Venus	4	65
181	The God Hermes	2	39
182	Hellenistic Jewellery	1	71
183	Hellenistic Stones	1	17
184	Colossal Statue of a Persian Rider on a Rearing Horse	1	355
185	Mummies of the Ptolemaic and Roman Periods	1	19
186	Northern Song Ru Wares	1	176
187	Yuan and early Ming jingdezhen	1	111
188	Two flasks with dragons	1	93
189	Qing wucai porcelains	1	86
190	Qing falangcai porcelains	1	90
191	Jun wares	1	91
192	Longquan green-glazed wares	1	821
193	Marble Statue of Apollo Holding a Kithara	1	51
194	General Horemheb and Wife	1	70
195	East Great Court Restrooms	1	292
196	A youth with his horse and dog	2	38
197	The goddess Sekhmet	1	108

198	Tomb relief of Khnumhotep	1	81
199	Statue of King Tutankhamun II	1	14
200	Sarcophagus of Hapmura	1	16
201	Marble statue of a youth on horseback	1	64
202	Lesser Podium Frieze	2	302
203	Figure of Nandi	1	20
204	Shabaqo Stone	1	73
205	King Hormheb with Amun-Ra	1	92
206	Statue of Tutankhamun	1	119
207	Sculpture of King Thutmose III	1	48
208	Grand Entrances	1	73
209	Crossing the Threshold	1	74
210	Royal Pursuits	1	37
211	God or Athlete	1	34
212	Dionysos Wearing an Ivy Wreath	1	40
213	Three Nereids	2	114
214	Buddhism in Korea	1	101
215	Late Josom	1	31
216	Wooden Coffin	1	529
217	Lintel 24	1	150
218	Lintel 25	1	63
219	Plaster Casts from Egypt	1	35
220	The Sutton Hoo Ship Burial	1	341

Appendix F: Heatmaps

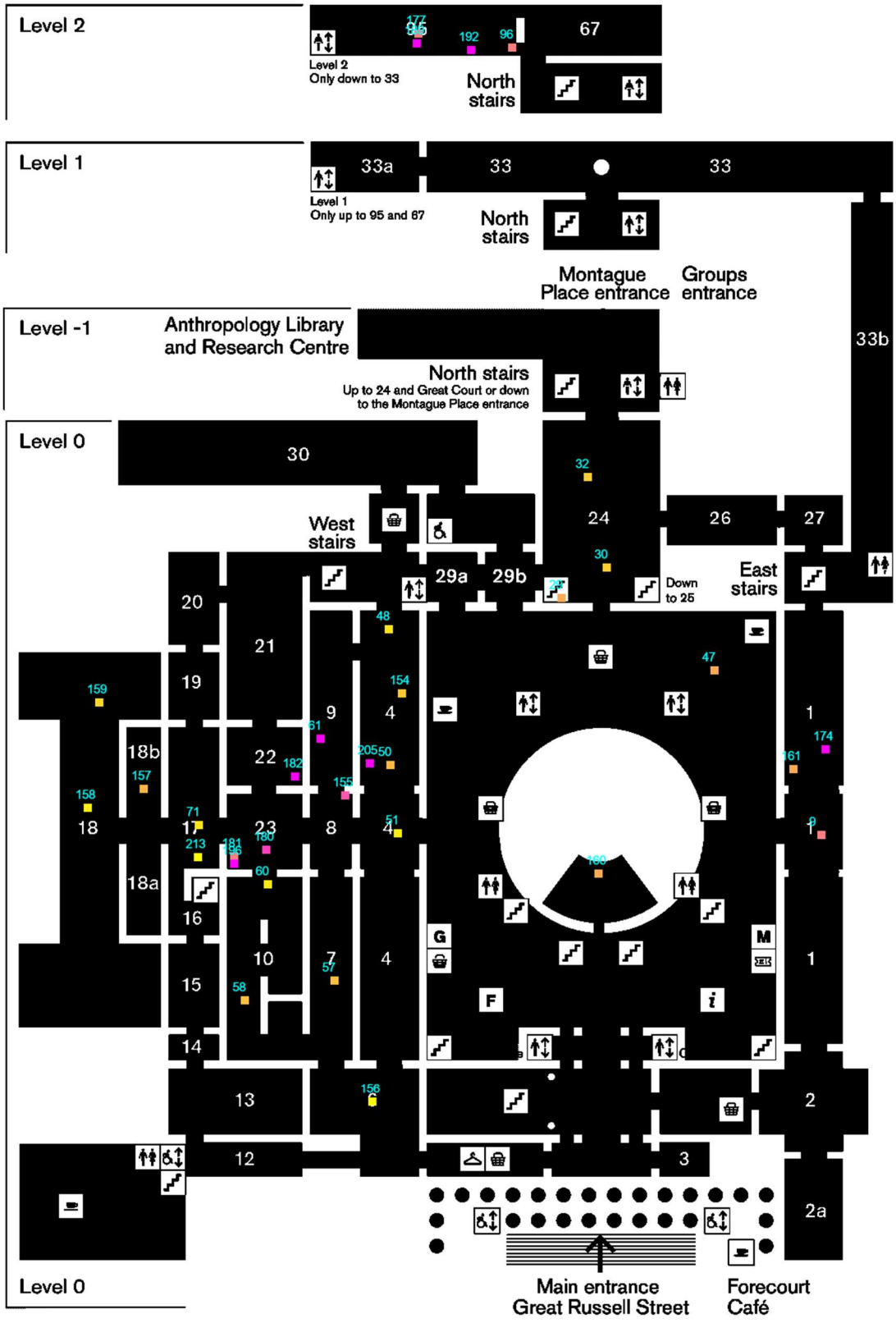


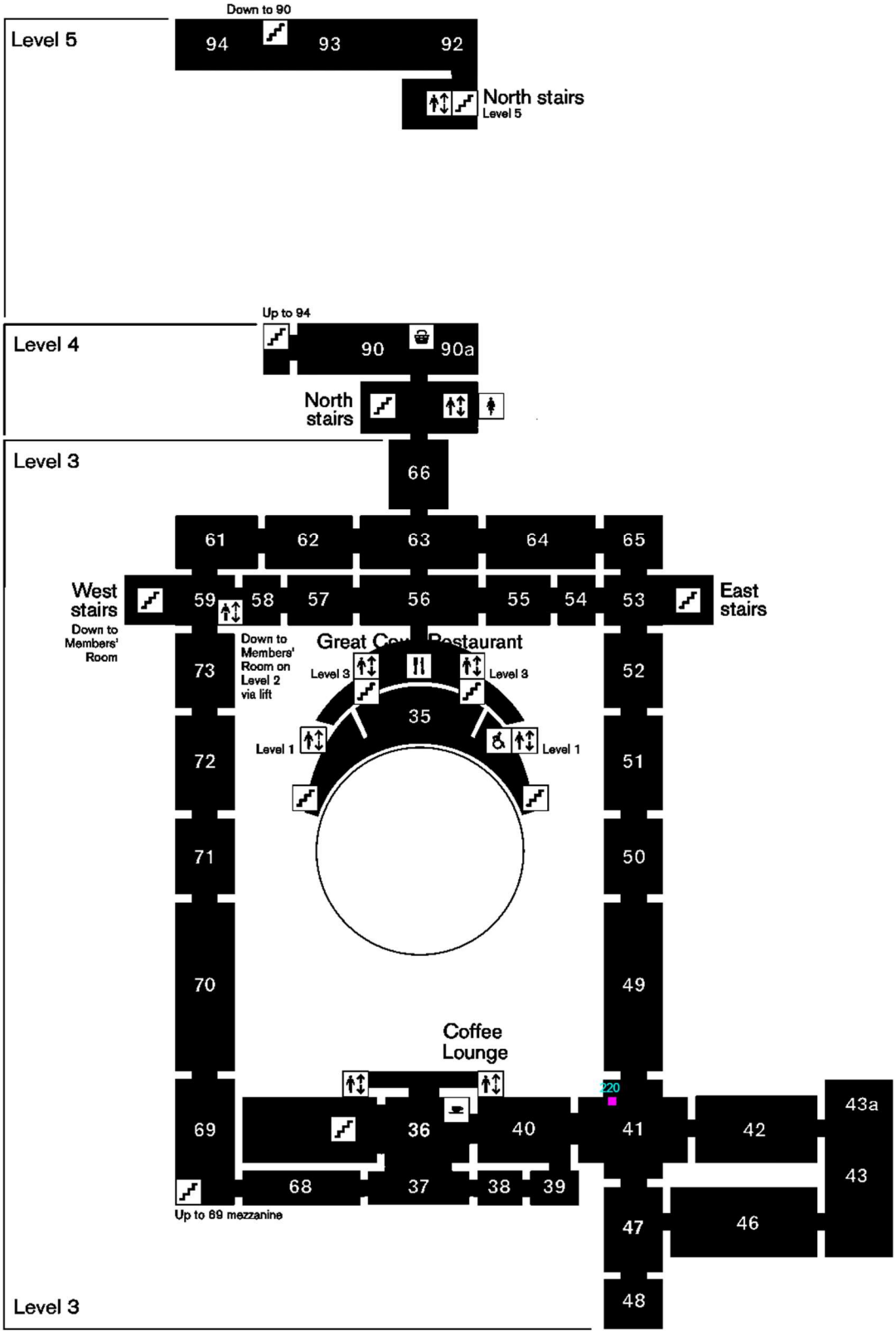

Level 5
Down to 90
94
93
92
North stairs
Level 5
Level 4
Up to 94
90
90a
North stairs
Level 3
66
61
62
63
64
65
West stairs
Down to Members' Room
59
58
57
56
55
54
53
East stairs
Down to Members' Room on Level 2 via lift
Great Co Restaurant
Level 3
Level 3
73
52
35
Level 1
Level 1
72
51
71
50
70
49
Coffee Lounge
69
36
40
41
42
43a
43
68
37
38
39
47
46
Up to 89 mezzanine
48
Level 3

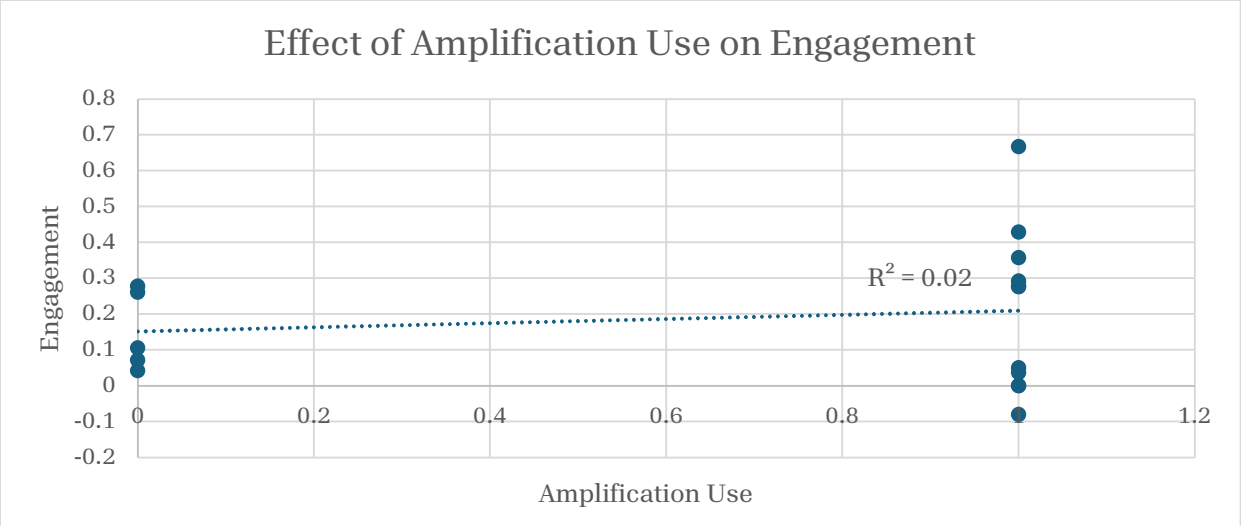

Up to 24
Level -2
25
Level -2
Level -2

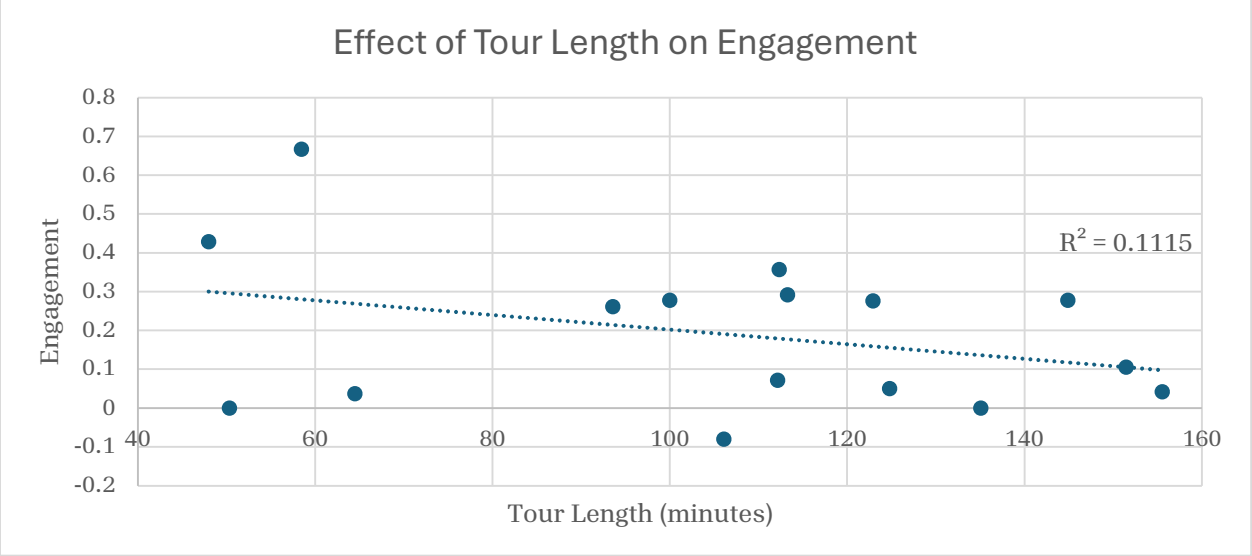
Appendix G: Engagement Visualizations

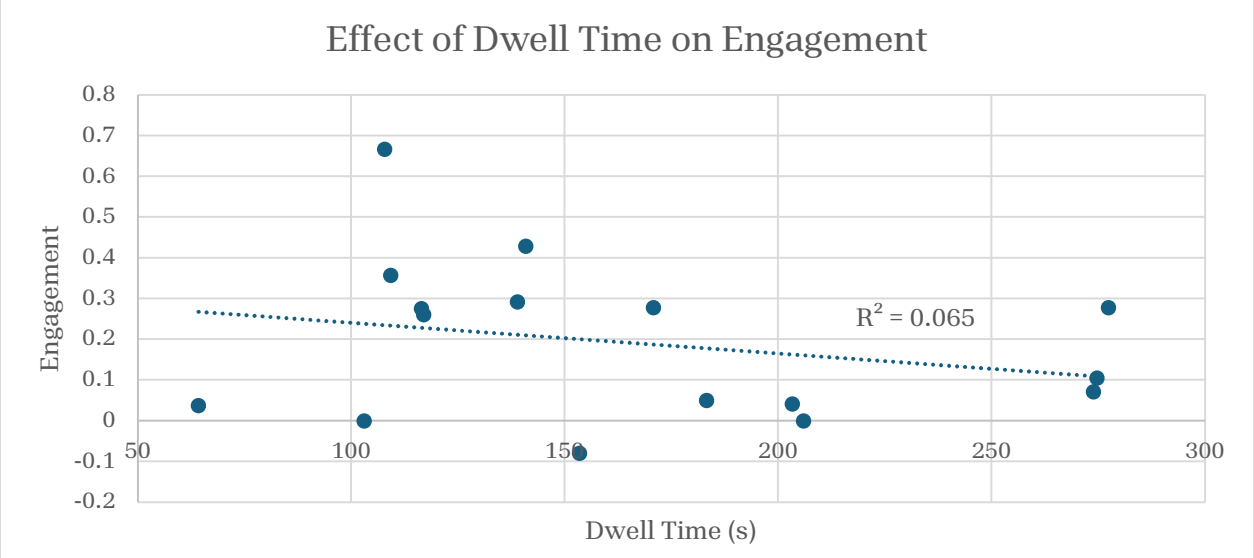
This appendix shows the engagement of international tour group participants at artefacts throughout the Museum. Engagement is quantified as the occurrences of engagement tags subtracted by the occurrences of disengagement tags per visit. Artefacts are displayed as square dots on a map of the Museum, with IDs above corresponding to the list of stopped artefacts in Appendix E. The colour of the dot represents that artefact's level of engagement on a yellow to pink scale, with yellow dots representing low observed participant engagement and pink dots representing high observed participant engagement. Artefacts with no observed engagement are excluded, and cropped or excluded areas of the map did not have any artefacts with engagement in them.


Level 2
177
95
192
96
67
Level 2
Only down to 33
North
stairs
Level 1
33a
33
33
Level 1
Only up to 95 and 67
North
stairs
Montague
Place entrance
Groups
entrance
33b
Level -1
Anthropology Library
and Research Centre
North stairs
Up to 24 and Great Court or down
to the Montague Place entrance
Level 0
30
32
24
26
27
West
stairs
29a
29b
30
Down
to 25
East
stairs
20
21
48
47
19
159
154
9
4
1
61
174
18b
22
182
205
50
161
157
155
158
71
18
17
23
8
4
1
213
181
185
180
60
18a
16
160
G
M
10
7
4
1
57
15
58
F
i
14
13
156
2
12
3
2a
Level 0
Main entrance
Great Russell Street
Forecourt
Café


Level 5
Down to 90
94
93
92
North stairs
Level 5
Level 4
Up to 94
90
90a
North stairs
Level 3
66
61
62
63
64
65
West stairs
Down to Members' Room
59
58
57
56
55
54
53
East stairs
Down to Members' Room on Level 2 via lift
Great Co
Restaurant
Level 3
Level 3
73
52
35
Level 1
Level 1
72
51
71
50
70
49
Coffee Lounge
220
69
36
40
41
42
43a
43
68
37
38
39
47
46
Up to 89 mezzanine
48
Level 3

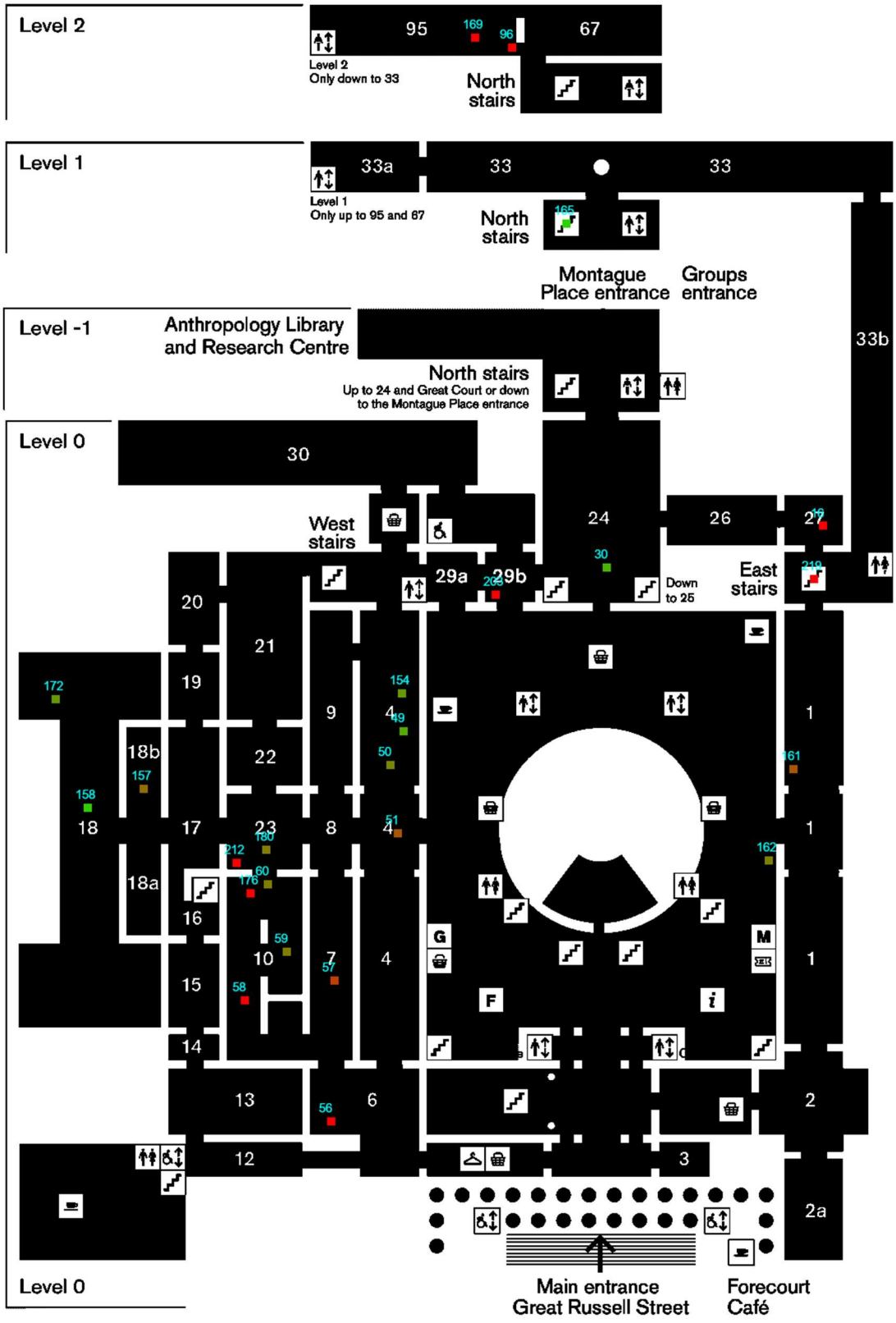

Effect of Amplification Use on Engagement
Engagement
Amplification Use
R² = 0.02
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
0
0.2
0.4
0.6
0.8
1.2

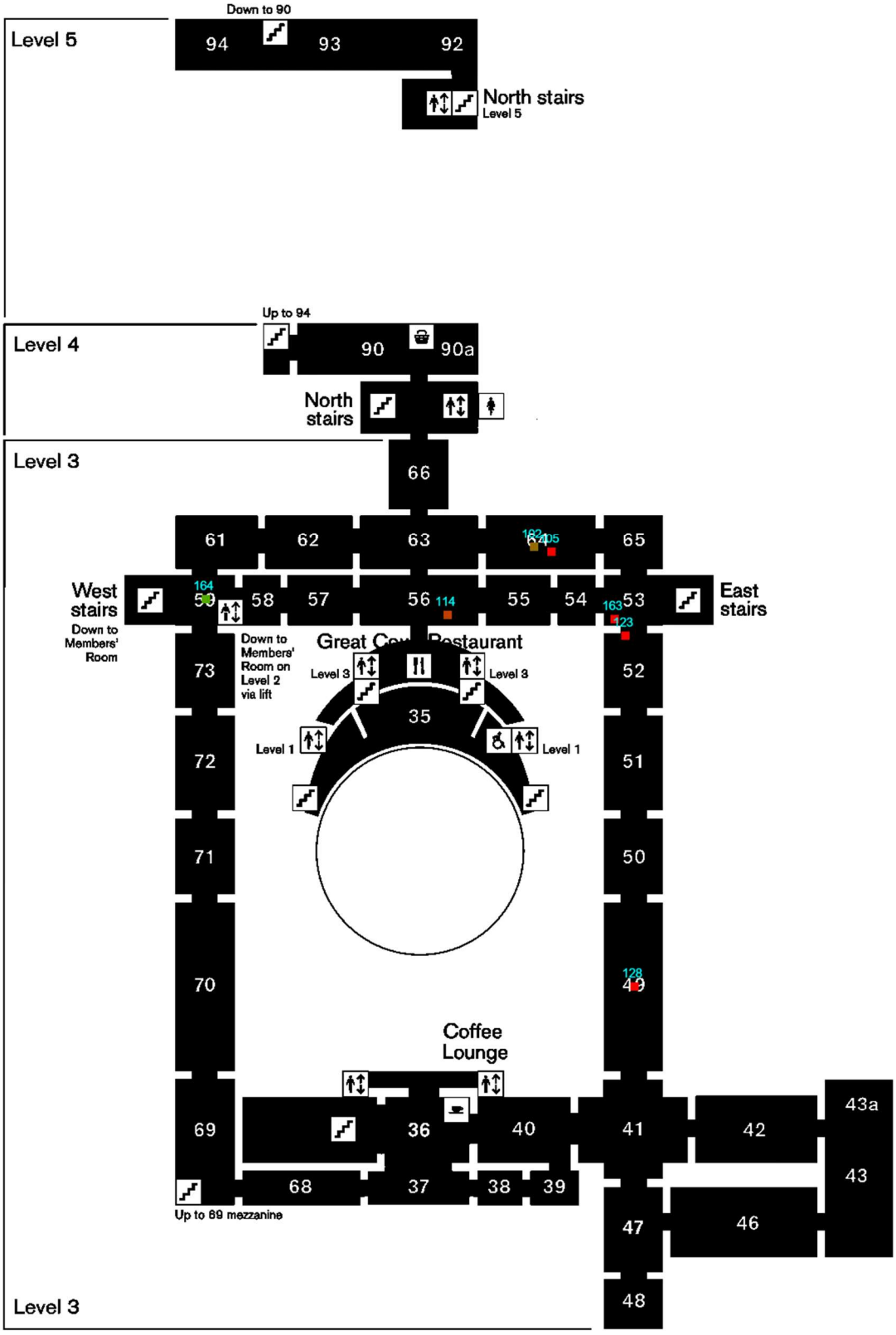

Effect of Tour Length on Engagement
Engagement
Tour Length (minutes)
R² = 0.1115
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
40
60
80
100
120
140
160


Effect of Dwell Time on Engagement
Engagement
Dwell Time (s)
R² = 0.065
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
50
100
150
200
250
300

Appendix H: Visitor Impact by Artefact

This appendix shows the visitor impact of international tour groups at artefacts throughout the Museum. Visitor impact is quantified as the summed occurrences of Blocking, Slowing Traffic, and Diverting Traffic tags. Artefacts are displayed as square dots on a map of the Museum, with IDs above corresponding to the list of stopped artefacts in Appendix E. The colour of the dot represents that artefact's level of visitor impact on a green to red scale, with green dots representing low observed visitor impact and red dots representing high observed visitor impact. Artefacts with no observed visitor impact are excluded, and cropped or excluded areas of the map did not have any artefacts with visitor impact in them.


Level 2
95
169
96
67
Level 2
Only down to 33
North stairs
Level 1
33a
33
33
Level 1
Only up to 95 and 67
North stairs
185
Montague Place entrance
Groups entrance
33b
Level -1
Anthropology Library and Research Centre
North stairs
Up to 24 and Great Court or down to the Montague Place entrance
Level 0
30
West stairs
24
26
27
30
29a
29b
269
Down to 25
East stairs
20
21
19
172
154
9
4
49
1
18b
22
50
161
157
158
18
17
23
8
51
1
212
180
162
18a
176
60
16
59
10
7
4
G
M
1
57
15
58
F
i
14
13
56
6
2
12
3
2a
Level 0
Main entrance
Great Russell Street
Forecourt Café


Level 5
Down to 90
94
93
92
North stairs
Level 5
Level 4
Up to 94
90
90a
North stairs
Level 3
66
61
62
63
64
65
182
205
West stairs
Down to Members' Room
164
59
58
57
56
114
55
54
53
163
123
East stairs
Down to Members' Room on Level 2 via lift
Great Co
Restaurant
Level 3
Level 3
35
Level 1
Level 1
73
72
71
70
52
51
50
49
128
Coffee Lounge
69
36
40
41
42
43a
43
68
37
38
39
47
46
48
Up to 89 mezzanine
Level 3