

3D Shapes with Walls

Joshua Gutwill and Nina Hido

October 2003

THIS IS **NOT** A DEFINITIVE FINAL REPORT

FORMATIVE evaluation studies like this one often:

- **are conducted quickly**, which may mean
 - small sample sizes
 - expedited analyses
 - brief reports

- **look at an earlier version** of the exhibit/program, which may mean
 - a focus on problems and solutions, rather than successes
 - a change in form or title of the final exhibit/program

3D Shapes with Walls

Formative Evaluation report

10/15/03

Joshua Gutwill and Nina Hido

Goals

- To determine whether placing walls and benches around the 3D Shapes exhibit would lead to longer holding times than having the exhibit in the sound abatement area, without extra walls and benches.
- To determine whether creating two or more different shapes (a shape was defined as two or more geometrical pieces connected together) held visitors significantly longer than putting together a single (but possibly large or intricate) shape.
- To determine the degree to which visitors interact with the eight experiment cards that are located on the exhibit.
- To begin to assess whether the main label that states “Make anything you want. Or lift a card for an idea” encourages visitors to get started with the exhibit or has some kind of negative impact on initial engagement.

Methods

- We videotaped visitors at the exhibit on different occasions, once in the sound abatement area (4/21/02) and again in the prototype area with walls around the exhibits (first on 8/17/03 and again on 10/12/03). All videotaping was implemented on weekend days.
- 37 visitor groups were observed for holding time in the sound abatement area without any extra walls around it (4/21/02).
- 54 visitor groups were observed for holding time in the prototype area with extra walls and benches around the exhibit (10/12/03).
- 24 visitor groups were observed for their interaction with the experiment cards and their reaction to the main label, in the prototype area with walls and benches (8/17/03). We defined three ways to interact with an experiment card: 1) Pull up the card and read aloud, 2) Pull up the card and read silently, and 3) Read the title of the card aloud without pulling up the card. We observed visitors interacting in these ways, and then we recorded whether they seemed to build the suggested shape. These 24 visitors’ holding times were also correlated with the number of shapes they built and the number of cards they tried. However, we did not compare the average visitor holding time from this video to the others because a few visitors were using the exhibit during a change in the videotapes, and a substantial portion of their data were lost. Finally, we listened for any evidence of a positive or negative visitor reaction to the main label that states, “Make anything you want. Or lift a card for an idea.”

Results

Holding time

- There was no statistically significant difference in the log of the amount of time visitor groups spent at the exhibit when walls were added (unpaired $t_{89} = 1.2$, $p = .22$). (The log of the time is used because holding times are not normally distributed, but the log of the times are distributed normally.) The mean time spent at the exhibit increased from 143 seconds to 189 seconds when walls were added. The median increased from 53 seconds to 83 seconds). See Figure 1 for the holding time distributions.

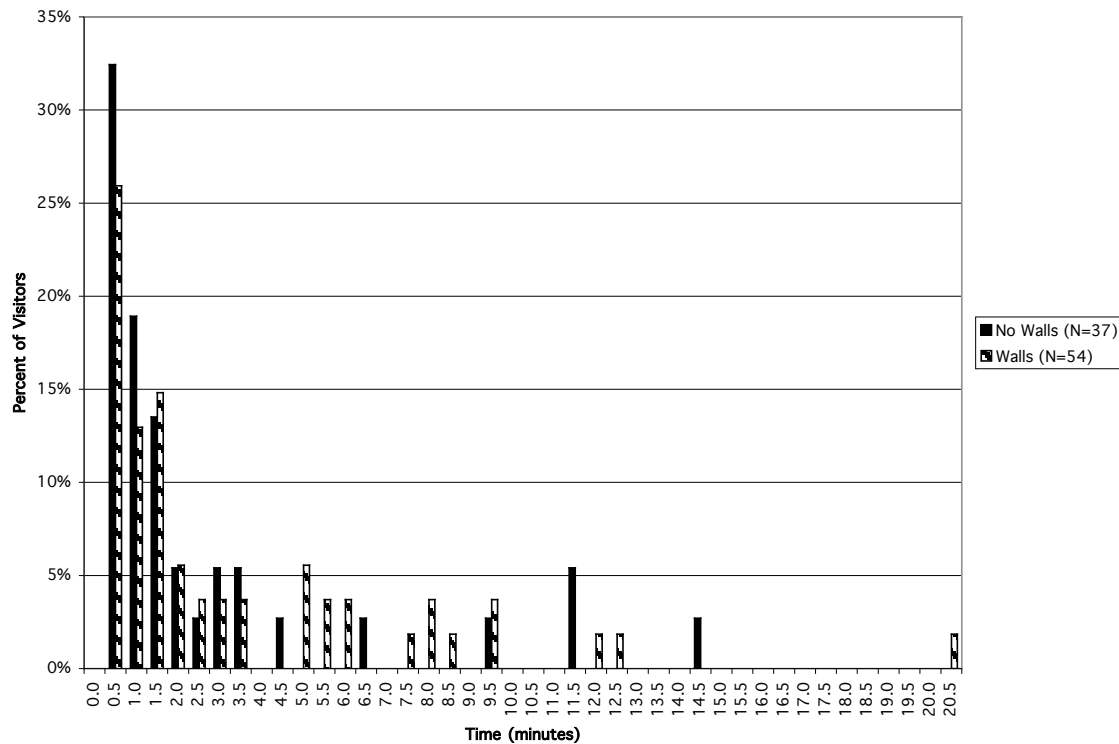


Figure 1. Visitor group holding times at the 3D Shapes exhibit, with and without walls around it.

- An Analysis of Variance (ANOVA) revealed a significant difference in the log of the holding times for the visitor groups who made no shapes, made one shape and made more than two or more shapes ($F_{2,20} = 18.2$, $p < .0001$). “Making a shape” was defined as connecting together two or more 3D shape pieces. Groups who made more shapes spent significantly more time at the exhibit. See Figure 2 for a graph of the mean holding times.

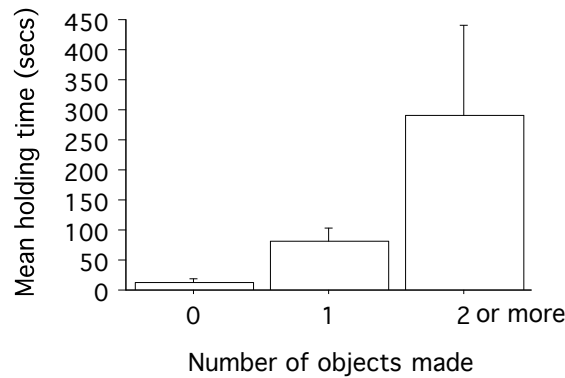


Figure 2. Holding times for visitor groups making 0, 1 or 2+ objects.

Using the experiment cards

- 10 out of 24 visitor groups (41%) interacted with at least one experiment card in one of the defined ways. Some of these groups interacted with more than one card. The total number of cards with which visitor groups interacted was 23. Of the 10 groups who interacted with a card, 3 (30%) seemed to build the suggested shape.
- An ANOVA found that the three groups who built shapes suggested by the experiment cards spent significantly more time at the exhibit than the groups who did not build shapes suggested by the cards ($F_{1,22} = 12.2$, $p = .002$). See Figure 3 for a graph of the mean holding times.

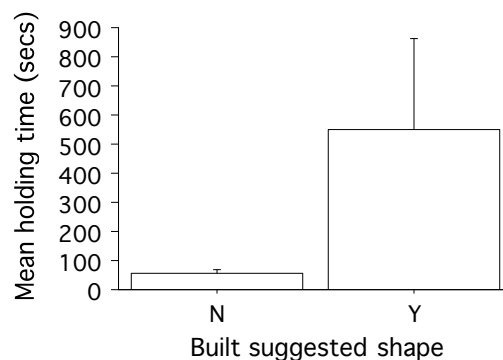


Figure 3. Holding times for visitor groups who did and did not build shapes suggested by the experiment cards.

Using the main label: “Make Anything You Want”

- Of the 24 visitor groups we observed, only 2 (8%) read the main label aloud. Both groups also interacted with the experiment card labels.

Conclusions and Recommendations

Placing walls around the exhibit did not seem to significantly increase the holding time at the exhibit. Based on these results, we would recommend displaying the exhibit without walls, unless there were some other reason for including them.

The distribution of overall holding time for the exhibit, with or without walls, looks like an exponential decay curve, which is typical of Exploratorium exhibits. However, there was a substantial fraction of visitor groups (30-40%) who spent more than 2 minutes at the exhibit, and even a few visitor groups who spent over 10 minutes. This suggests that the exhibit offers opportunities for visitors to become engaged in a prolonged manner, but that only a minority of visitors makes use of those opportunities.

As in a previous study, we found a correlation between the number of shapes a visitor group made and the time the group spent at the exhibit. We found that same relationship in the current study, which supports the idea that getting visitors to build a second shape may be an important step in fostering prolonged engagement.

The data regarding the experiment cards also suggest some possibilities for encouraging visitors to become more engaged with the exhibit. Although only a small number of visitor groups actually followed the suggestions offered in the cards, those groups spent significantly more time with the exhibit than those who did not. This suggests that the experiment cards, if interesting to visitors, may be effective at fostering prolonged engagement. However, the data also suggest that most visitor groups did not find the suggestions in the cards compelling enough to try. We recommend trying out different card ideas with visitors in a quick-and-dirty way, perhaps by sitting at the exhibit and offering alternatives to see which ones visitors enjoy.

Acknowledgements

We would like to thank Suzanne Buennagel and Adam Klinger for collecting and entering some of the data in this study. This material is based upon work supported by the National Science Foundation under Grant number 0087844. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.



