

Preliminary Tracking and Timing Results from SMM Workshop

Josh Gutwill

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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

Preliminary Tracking and Timing Results from SMM Workshop

Goals:

The aim of this study was to track visitors throughout the Geometry Playground mini-exhibition space at the Science Museum of Minnesota. Specifically, we hoped to assess whether children and adults spend different amounts of time at different kinds of exhibits, and measure the holding time at each exhibit.

Summary of results:

On average, children (<13 years old) spent significantly more time in the exhibition (18 minutes) than adults (9 minutes). There were no gender differences for time spent in the exhibition.

In general, more visitors stopped at the large scale exhibits than the small scale ones, and they spent more average time at the large scale exhibits.

Demographics:

45 people tracked

24 males and 21 females

27 adults and 17 kids (<13 yrs); 1 person's age was not recorded

Time Spent in the Entire Exhibition

	Median time per person (min)	Mean time per person (min)	Highest time spent (min)	ttest p value
Females	12.3	15.0	36.8	0.611
Males	8.7	13.2	50.6	
Adults	8.8	10.3	27.3	0.011
Kids (<13 yrs)	18.4	20.8	50.6	
Total	9.8	14.1	50.6	

The table above shows that on average, Kids spent significantly more time than Adults in the exhibition.

Time Spent at each Exhibit

		Mean time per person	Highest time spent	Number of people who	Power*	
1.	Net Climber	4.7	17.8	30	141	High
2.	Triangle Tiling	3.8	10.2	5	19	High
3.	Large Shapes	3.5	17.6	22	77	High
4.	Geometry Puzzles	3.3	15.8	7	23	High
5.	Sandbox	2.4	11.4	23	55	High
6.	Linkages	1.9	6.9	17	32	High
7.	Rolling Blocks	1.9	4.1	15	29	High
8.	Shuffler	1.9	5.4	11	21	High
9.	Small Shapes	1.8	7.6	25	45	High
10	Turntable & Eggbeater	1.8	6.8	7	13	Low
11	White Foam	1.6	7.0	21	34	High
12	Playing with Pi	1.4	5.5	12	17	Low
13	Bubble	1.2	4.1	20	24	High
14	Spiral Growth	1.2	8.0	17	20	High
15	Three Geometries	1.1	4.2	15	17	Low
16	Expanding Tiles	1.0	3.4	18	18	Low
17	Moveable	1.0	1.6	2	2	Low
18	Triangular	0.8	1.6	17	14	Low
19	Triangle Spinner	0.7	2.6	16	11	Low
20	Stellator	0.6	2.2	23	14	Low
21	Proof of Pythagorus	0.5	1.4	7	4	Low
22	Mapping Circles	0.4	1.5	7	3	Low
23	Mirror Well	0.1	2.5	11	1	Low

* Power is defined here as the mean time per person times the number of people who stopped.

Age Effects

To figure out whether some exhibits were preferred by kids and some were preferred by adults, we took the ratio of the Kids' mean time to the Adults' mean time, and the ratio of Kids to Adults for the other variables (max time, number of people who stopped, power). So, for example, if the ratio is 4.8 for mean time, that means that Kids spent 4.8 times more time at the exhibit on average than Adults. Any ratio that is less than 1 means that the Adults are spending more time or stopping more often than the Kids.

The table below is sorted in order of Mean Time spent at the exhibit.

Ratio of Kids' to Adults' Use of each exhibit

	Kids/Adults Mean time	Kids/Adults Max time	Kids/Adults stopped
Turntable & Eggbeater	4.8	9.3	0.8
Moveable Mirrors	4.6	4.6	1.0
Mapping Circles to Lines	3.0	3.6	0.8
Net Climber	2.7	1.7	1.0
Large Shapes (SRD's)	2.3	3.4	1.8
Stellator	2.1	2.2	0.7
Sandbox	1.9	1.6	1.3
Linkages	1.5	1.2	0.5
Small Shapes	1.5	1.2	0.7
Bubble	1.4	1.2	0.8
Triangle Spinner	1.2	1.4	0.6
Three Geometries	1.0	1.6	1.1
Triangle Tiling	1.0	2.6	4.0
Mirror Well	1.0	1.6	1.1
Expanding Tiles	0.8	1.0	0.4
White Foam Shapes	0.8	0.5	1.6
Triangular Wheel	0.7	0.8	0.7
Rolling Blocks	0.7	0.8	0.5
Playing with Pi	0.6	0.3	0.5
Spiral Growth	0.3	0.1	0.3
Shuffler	0.2	0.2	0.6
Geometry Puzzles	0.0	0.0	0.2
Proof of Pythagorus	no kids	no kids	no kids

Gender Effects

We did the same ratio analysis for females and males. So, for example, if the ratio is 1.8 for mean time, that means that Females spent 1.8 times more time at the exhibit on average than Males. Any ratio that is less than 1 means that the Males are spending more time or stopping more often than the Females.

The table below is sorted in order of Mean Time spent at the exhibit.

Ratio of Females' to Males' Use of each exhibit

	Female/Male Mean time	Female/Male Max time	Female/Male stopped
Bubble	1.77	1.51	1.00
Stellator	1.61	1.53	1.09
Sandbox	1.30	1.44	0.92
Triangular Wheel	1.23	0.88	1.13
Mapping Circles to Lines	No males	No males	No males
Spiral Growth	0.99	0.52	0.89
Net Climber	0.95	1.01	1.50
Rolling Blocks	0.91	0.98	1.14
Proof of Pythagorus	0.91	1.69	2.50
Small Shapes	0.79	1.19	1.50
Large Shapes (SRD's)	0.72	0.79	1.00
Turntable & Eggbeater	0.67	0.43	0.75
White Foam Shapes	0.64	0.70	1.10
Triangle Spinner	0.63	0.39	1.29
Shuffler	0.58	0.83	4.50
Playing with Pi	0.56	0.35	2.00
Three Geometries	0.52	0.62	2.00
Linkages	0.48	0.47	0.89
Expanding Tiles	0.38	0.87	1.57
Mirror Well	0.38	0.26	1.20
Triangle Tiling	0.16	0.07	0.25
Geometry Puzzles	0.13	0.18	2.50
Moveable Mirrors	No females	No females	No females

Conclusions

Whole exhibition

There were no gender differences in the total time males and females spent in the exhibition. But there were age differences; the Kids we tracked spent significantly more time in the exhibition than the Adults we tracked.

Individual Exhibits

In general, more visitors stopped at the large scale exhibits than the small scale ones, and they spent more average time at the large scale exhibits. (This isn't always true – many visitors also stopped at the small exhibits that were encountered first when walking into the room.)

Females preferred spending more time than Males at a few exhibits, namely:

- Bubble
- Stellator
- Sandbox
- Triangular Wheel
- Mapping Circles to Lines

Kids preferred spending more time than Adults at about half the exhibits:

- Turntable & Eggbeater
- Moveable Mirrors
- Mapping Circles to Lines
- Net Climber
- Large Shapes (SRD's)
- Stellator
- Sandbox
- Linkages
- Small Shapes
- Bubble
- Triangle Spinner