

Shaking Shapes

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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

Shaking Shapes

Formative Evaluation

Josh Gutwill
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[Note: The photo of the exhibit above includes a button next to the knob which did not exist in the version studied in this evaluation. The label was placed on a removable stand immediately to the right of the vibration knob.]

Goals

- Assess the degree to which the exhibit promotes Active Prolonged Engagement to help determine whether the exhibit should be included as one of the fifteen exhibits in the APE publication. This includes measuring holding time, assessing the degree to which visitors drive their own experience at the exhibit, and determining the reasons visitors leave the exhibit.
- Determine whether holding time is affected by the presence or absence of an exhibit label.
- Determine whether visitors prefer having a label, and to what extent the label helped them use the exhibit.

Summary of findings

- The mean holding time is 2.1 minutes.
- The maximum holding time is 14.2 minutes.
- Six of 50 visitors spent more than 4 minutes at the exhibit.

- The mean holding time is longer when a label is present, but the difference is not statistically significant (mean time with label = 2.7 min; time without = 1.4 min).
- In the interviews, 3 of the 5 groups who had not seen a label mentioned wanting more instructions or context for the activity.
- The interviews also revealed that visitors were engaged in building and testing 3D structures, watching 2D patterns bind together and spread apart, and making real world connections.
- After informally watching an hour of videotape, I noticed that most visitors did not sit down on the exhibit, but rather kneeled or stood around it. This could have been due to the placement in the sound abatement area, which is carpeted.

Methods

Visitors were audio and videotaped for 4-5 hours on November 21, 2004. Each hour, the label condition was changed (the label either was added or removed). 50 visitors groups were coded for holding time, 26 in the Label condition and 24 in the No Label condition.

In addition to coding for holding time, I informally watched one hour of tape (30 minutes with a label and 30 minutes without one), looking for Attributes of APE behavior.

Uncued interviews were also conducted with 11 visitor groups as they left the exhibit. 5 of the interviewed groups had seen the label; 6 had not.

Detailed Findings

Video results

The mean holding time was 2.1 minutes. The mean and maximum holding times were a bit longer in the Label condition than in the No Label condition, though this difference was not statistically significant (see Table1).

Table 1. Holding time for groups in the Label and No Label conditions.

Holding Time (minutes)	Label (N=26)	No label (N=24)	Overall (N=50)
Mean	2.7	1.4	2.1
St. Dev.	3.6	1.3	2.8
Median	1.3	1.0	1.2
Maximum	14.2	4.9	14.2

Note: The apparent difference in the means was not statistically significant (Mann-Whitney $p=.42$).

Figure 1 shows the holding time distribution of visitor groups at the exhibit.

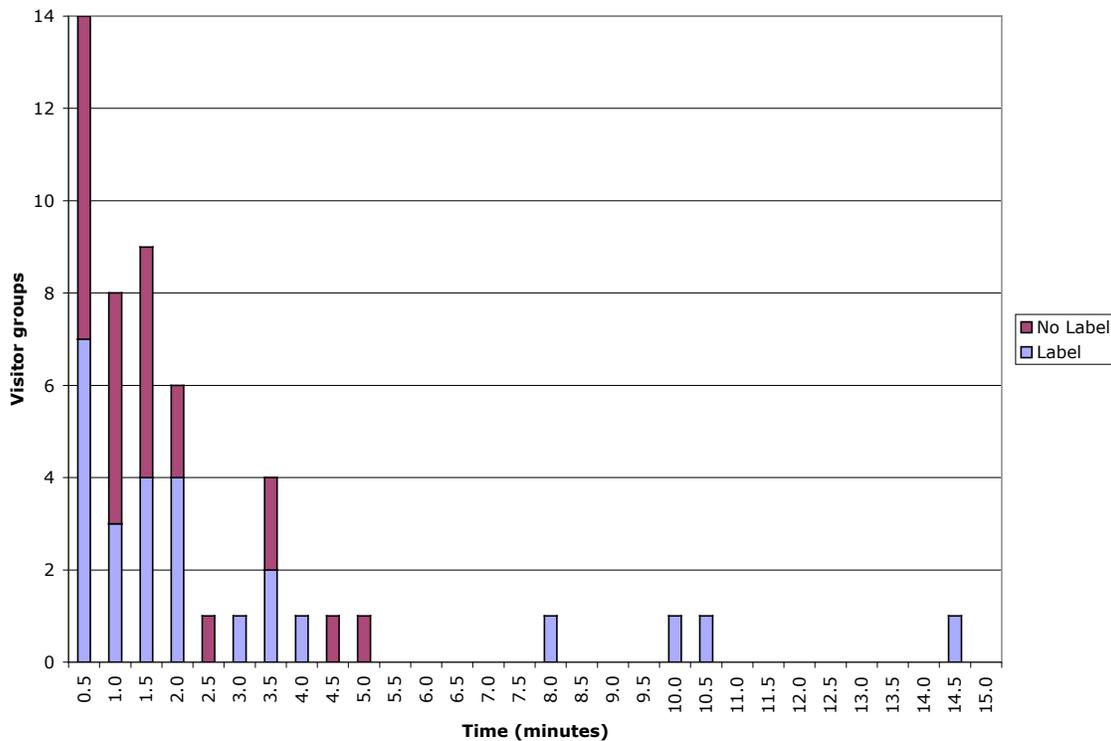


Figure 1. Holding time distribution for 50 visitor groups.

Informal viewing of the video

I watched 30 minutes of video with the label and 30 minutes of video without to observe behavior that seemed relevant to the Attributes of APE or important to the affordances of the exhibit. All these observations are tentative, since 30 minutes is a short period for comparison. My observations were:

- When the label was present, visitors seemed more engaged in building structures and testing their stability in the face of vibration. This usually took the form of a single “build-test” cycle. In other words, they would turn off the vibration, build a structure, turn on the vibration, watch the structure respond, and then leave.
- When the label was not present, visitors’ activities seemed a bit more varied. Although some visitors were still building structures, others were making two-dimensional patterns (like visitors make at Tiling Table) and watching to see how the flat patterns jiggled apart and came together during vibration.
- Overall, very few visitors sat down on the table-top of the exhibit. Instead, they would kneel on the carpet or bend over at the waist.

- Some visitors would make structures or patterns inside the copper square, while others used the copper square as a “reservoir” for the pieces, and created their structures on the wooden top of the exhibit.

Interview results

Wanting more information

In the interviews, 3 of the 6 groups who had not seen a label mentioned wanting more information about the activity at the exhibit:

It wasn't apparent what it was supposed to do.

Because we didn't know what it was for and what it was supposed to show us.

There was no description. What we should be watching for or anything to describe what was happening or what should have happened. Or what typically happens or should happen.

Visitors engaged in various activities

Visitors were engaged in testing their structures, making connections to the real world, and watching their children use the exhibit.

Because I am from Costa Rica, there are many volcanoes there. It is very common to have earthquakes...how to find a way to make houses stable. That (the exhibit) is like an earthquake movement. Maybe I could try to be an engineer, try to have better houses and help people back home.

Girl: I had the triangles as people, I played with them all around the building and then I made a building that was this (she shows me how tall with her hands) tall. It was good to have it stop shaking whenever you wanted. I like building the stuff. Man: I was engaged because I watched them be engaged.

Because there was a lot of surprise, what would happen when you shake it? You don't know. You don't expect it to dance around.

F: It was memorizing, the challenge of building and see if it held up, trial and error. M: fun, I like the colors and building with blocks.

Visitors want more blocks and stronger vibration

When asked if there was anything frustrating about the experience, two visitor groups mentioned wanting more blocks and two mentioned wanting stronger vibration. One group mentioned wanting an indicator light to turn on when the vibration was activated.

Not really, it would be nice to have more shapes, more pieces?
[Interviewer: Different shapes or more total pieces?] Both. It would be good to have more pieces if there are a lot of kids.

F: Not really, there could have been more blocks. Bigger triangles. Maybe you could connect the blocks with beams, with holes, kinda like legos, but if they connect, then the vibration wouldn't work very much. M: ...Well then give it more vibration.

No...it could shake harder and faster. Yeah, larger earthquakes.

It was not clear when the vibration starts, maybe there should be a blinking light on the table. Unclear what does it mean, you can feel it, but you don't know that it is on. You have to touch it to feel it vibrate, it is hard to tell what is going on. (He was having a bit of a language problem...what I understood was that when you turned the knob, it was hard to tell if the vibration was on or not unless you actually touched the table)

Visitors wanted to see how structures (2D and 3D) would respond to vibration

When asked what they were trying and thinking about, most visitors said they were trying to see how a structure, imaginary figure (e.g., an animal), or a pattern would respond to vibration.

I made buildings - I made two buildings and a house. All of them fell. I have to keep working on it. You know that building you have downtown, the TransAmerica building? I made a building like the TransAmerica building and it fell too.

Basically, we stacked all the like blocks together and then we saw the vibration control so we were seeing how long it would take for all the blocks to tumble after stacking them. [Thinking?] I thought that it was for little kids because there's blocks and no instructions.

Girl: I made those people go around and then made that one big tall building. [Thinking?] Well, I was thinking it was a shopping mall, then the shoppers were all around...but first it was a business building and then I made it a mall.

Girl: I was making different circus animals, because at school we have blocks, but here you can make cool things with it. (dad says, “what, circus animals?” and she says, “yes”) Man: I made a tower, it shut off, the shaker. It was wonderful. (said sarcastically...meaning his building was really wonderful!)

We built a big symmetrical shape, it fit together tight like a snowflake with all the pieces that were there. We made a big shape and kept growing it until it filled the space. Vibration started slow, at the lower level to if did anything. It didn't even do anything at medium. I was wondering if it would all form another shape in the corner. We left before we knew what it was going to do. I wanted to read something afterwards.

Try different shapes, what would shake out. (“shake out” is his way of saying “shake”). [anything on your mind when you were using the exhibit?] I was thinking maybe it will shake out certain patterns, but nothing happened.

F: I was just playing around, but you were doing something cool...M: I was making spaces between the blocks to see how they are absorbing the vibrations. I put the bigger blocks in the middle...more stable.

I wanted to see if it would self arrange into inter-locking patterns...that is all I expected out of it.

I couldn't tell you. I was just... [trailed off] They [her boys] like making things and seeing how the vibrations makes it move.

I didn't know that it vibrated until I read the sign, then I touched it.

He was just smooshing the blocks around, sitting in the middle.

Visitors left for intrinsic and extrinsic reasons

As with most APE exhibits, visitors gave both intrinsic and extrinsic reasons for leaving the exhibit. (At Planned Discovery exhibits, most of the reasons for leaving are intrinsic to the exhibit.)

Extrinsic

Oh, the lights next to it (Light Island). The little kid playing with the lights, he combined purple, green and orange. I am going to do that next. [Anything else?] No, the lights.

Girl: (she didn't know what to say...) Man: She is a hi-speed pass kinda kid. [Anything else?] (man was pushing the girl to respond) girl: the little boy, kinda....

They were away (meaning his family). [Anything else?] just that. I might go back.

Spent 5 to 10 minutes, Get a feeling what it is. [Anything else?] Other people there, give a chance to play with it. [and is that what happened when you were there?] yes.

Just because it's time to leave. [Anything else?] No.

F: He got a structure that lasted, we tried it a couple of times and then moved on. I like it when it tells you what the exhibit is about (as she is talking she looks over to the exhibit and sees the label and is confused. When they were there it wasn't there) I didn't mind.

M: There are blocks and it vibrates, it sorta suggests...why don't we just play with it. At first we were building with it vibrating and we started to walk away, then we saw to turn the knob. (back to the no label discussion) When you figure it out...it is more exciting.

Intrinsic

My knees were hurting, no stools, nothing...really about....(trails off). I am tired of kneeling here and watching it do the same thing. [Anything else?] no

It wasn't dynamic, nothing happened. [Anything else?] It doesn't move as fast as you want.

Both Extrinsic and Intrinsic

Girl: you want to try all of them. [Anything else?] Also because I couldn't think of anything else to build. I was done, because it fell down.

He started to walk away, when he is bored, we get bored. (then ran off to follow kid, I couldn't ask "Anything else?")

It just wasn't entertaining and we didn't know what it was for, so there was nothing to keep us. [Anything else?] No. We just wanted to see other exhibits, especially when we can't figure (this one) out.

Conclusions / Recommendations

The exhibit seems to promote Active Prolonged Engagement in several of the visitors. Of the 50 visitors groups coded for holding time, 12% spent 4 or more minutes at the exhibit. Moreover, the exit interviews indicated that visitors were setting and meeting challenges for themselves, thereby driving their own experience. I recommend including this exhibit in the recipe list for the APE publication.

It is unclear whether the presence of the label significantly improved the experience for visitors. There was no statistically significant difference in mean holding time between the groups that saw a label and those that did not. However, a few more groups that saw a label spent over four minutes at the exhibit, so it seems like the trend was for the label to increase holding time. In addition, several visitor groups in the No-Label condition complained in the interview that they wanted more information about the exhibit. On the other hand, the informal viewing of the video suggested that visitors in the Label condition were more narrowly focused on building structures, while those in the No Label condition seemed to build structures and also make 2D patterns. Taking all this (weak and contradictory) evidence into account, it is my recommendation that the label remain on the exhibit.

Since few visitors sat down on the exhibit, I suggest adding to the label some kind of invitation to sit, if the developer desires that behavior.

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