

Air Reed

Post-Redesign Evaluation

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THIS IS A POST-REDESIGN EVALUATION REPORT

After an exhibit has been renovated, redesigned, or refurbished in preparation for the Exploratorium's move from the Palace of Fine Arts to Pier 15, an interview and observation study is conducted. The purpose of the study is to identify any major issues that would require immediate attention prior to the move. This collection of redesign evaluations will serve as a baseline of information for the Exploratorium's new exhibit set at Pier 15.

Post-redesign studies like this one **are conducted quickly**, which may mean:

- small sample sizes
- expedited analyses
- brief reports

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Study Goals

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General goals:

- To confirm that visitors are able to access and use the exhibit
- To confirm that visitors can build a basic understanding of the exhibit's content
- To uncover visitors' frustrations and confusions
- To understand whether visitors move on from an exhibit for intrinsic or extrinsic reasons

Exhibit Description

How does a hollow tube make beautiful music? Air blowing across the opening in this flute-like pipe flutters up and down, alternately flowing inside and outside the tube. This in-and-out flow makes the air inside the tube vibrate. Your ears perceive these vibrations as sound.



Methods

Uncued observations and interviews were conducted. A researcher randomly selected visitors who crossed an imaginary line on the floor that stopped facing the exhibit with two feet planted and either looked at or touched the exhibit for approximately 15 or more seconds.

Uncued visitors do not know they are part of the study until after they finish using the exhibit so their behavior can be considered representative of normal use patterns. This means that some of the visitors in this study may have used the exhibit only briefly.

Visitors were approached after they left the exhibit and asked if they would be willing to participate in a 7-question interview about their experience at the exhibit.

Demographics

Gender	Count (N=12)
M	7
F	5

English as a Second Language?	Count (N=12)
N	11
Y	1

Estimated Age	Count (N=12)
8-12	0
13-17	4
18-29	0
30s	5
40s	1
50s	1
60+	1

Visitor Group Composition	Count (N=12)
Adults-only	5
Adults with children	2
Adults w/ teens	5
Adults w/ teens and children	0

Findings

Holding Time

This is the time the visitor spent using or otherwise engaged with this exhibit. The amount of time a visitor spends at an exhibit is influenced by many factors and can indicate level of engagement or interest, but not as a measure on its own.

Time at exhibit	mm:ss (N=12)
Mean	0:45
Median	0:35
Minimum	0:21
Maximum	1:53

Visitor Interest

Visitors were asked about their interest in the exhibit and why they rated from “not interesting” to “very interesting” (1 – 7).

Interest Level	Count(N=12)
High Interest (6-7)	3
Moderate Interest (4-5)	7
Low Interest (1-3)	2

Visitor responses:

H	Cool you can see the air move. I don't know if it's polarized light, but it's cool to see it (the sound/ air).
H	How you pull the thing (knob) and it makes sound, it's awesome! .
H	By doing this (pulling) it changes it (the sound) up and down. I am not sure what I get there (the screen) perhaps that's for another question! (laughed)
M	Clever idea. [What exactly about it was clever?] Trying to show the turbulence in air and how it affects the light stream.
M	I like how you could change it and it's interactive. [change what?] The sound.
M	Um, how the sound would change the different ways that you put it (the knob). [Anything else?] Seeing how it changed on the screen.
M	I didn't spend time, but it looks like liquid but it's air. Very graphic.
M	When I moved the thing back and forth it made different noise, higher or lower.
M	Well, the visual along with the sound. How you can adjust the sound in a visual, as well as an auditory, way.
M	I can't see enough of what trying to teach in the reflection. [Could you elaborate?] Since looking for frequency, I am not sure how to corroborate that with what I see in the screen. I see less turbulence when low pitch, but not much more.

L	Seeing the wave, my son played the clarinet, so seeing air flow through the whistle and affecting the sound.
L	Compared to other stuff, it is less exciting.

Visitor Understanding

Visitors were asked what they think the exhibit was about with the goal to determine whether or not they have a basic understanding of the concepts presented and to identify possible areas of misunderstanding. We acknowledge that this study has a small sample size and that these findings illustrate trends and may not be representative.

Visitor responses:

- Sure. For me, seeing how speed of air changes so that the sound changes (how the speed of the air changes the sound).
- About how when you push air different ways, it makes different sound. [Any ideas how it makes the sound different?] The air flow or something.
- As I said, to illustrate refraction of sound waves by atmosphere, isn't it? (sounded like he was second guessing himself) how the turbulence in the air affects the light. How it disturbs the waves of light. I think that's what's happening. (I believe he thinks the change in sound was creating the turbulence that affected the light waves).
- Music. [What about music?] The notes in music.
- About music and air and stuff. [What kind of stuff?] Like if I cover the hole no music comes out.
- About how... the difference between how air moves through tube, so as you move lever it lets more or less air in, and that changes the sound. That's what I got without reading it.
- How different instruments work, specifically a sax or clarinet...ones that are hollow inside. Showing that air makes it work. [Could you elaborate how the air affects it?] Pressure and how much air going in affects it being higher or lower.
- To me, showing you how much pressure when you blow in to an instrument affects how much air goes in. So when you cover certain holes it affects the amount of air that is released.
- Showing sound waves of different pitches.
- Understanding how wind instruments work. [Could you elaborate?] Shows how, when you change, I don't know, when air moves across slit it makes a vibration that we perceive as sound.
- (Laughed) Sound creates waves in the air, so the light with the magnifiers show you the waves. I'm not sure, because I didn't read it, but so much to try here that I can't do it all. Not in 2 hours!
- Shows how column of air creates pitch. Changing the pipe depth/ or air changes the frequency of pitch. I think!...I'm pretty sure. It's an instrument!

Visitor Reasoning for Leaving the Exhibit

The goal of this question is to explore how open or closed-ended the exhibit seems to be for the visitor. Visitors tend to leave exhibits for intrinsic reasons, such as feeling bored, or finished with the experience, or for extrinsic reasons, like having to go to lunch or being distracted by another exhibit. Leaving for intrinsic reasons could suggest a more close-ended exhibit experience.

Reasons for moving on to the next exhibit	Count (N=12)
Extrinsic	7
Intrinsic	4
Both	1

Visitor responses:

Extrinsic	I wanted to see the other exhibits
Extrinsic	To be honest, I didn't have time because she wanted to move on. Kids age level makes you move on. (though, as noted, he left before she did)
Extrinsic	I wanted to see other exhibits to if they are awesome too.
Extrinsic	I think... so much to look at here, but there are just sound exhibits up here, so much kinesthetic stuff downstairs...nice that sound is up here, but if they were mixed together...also, kids are tired and sometimes cannot understand the exhibits or lose interest in them.
Extrinsic	Actually, I was going to get my kids to show then the exhibit!
Extrinsic	No parking. Only two hour parking and it's a busy day!
Extrinsic	Family! (he said this right as his wife came to grab him again)
Intrinsic	My kid was uninterested!
Intrinsic	I saw it. It was done.
Intrinsic	I had read what caused it and tried the different frequencies.
Intrinsic	I think I did everything it could do (it refers to the exhibit).
Both	She (her mom) wanted to use it! [Anything else?] Uh, no exact notes to play.

Conclusions

Based on this small sample, we conclude that the redesigned exhibit does not require immediate remediation. This evaluation did not identify sufficient impediments to visitor use, engagement or basic understanding.

APPENDIX: Redesigned Graphic Panels

air reed How does a hollow tube make beautiful music?

- Press the **start button**.
- Look at the screen at the far right of the exhibit. Can you see an airstream that looks a bit like a flapping tongue?
- Slide the **red knob** in or out to change the sound, and watch how the airstream changes.



What's going on?

Air blowing across the opening in this flute-like pipe flutters up and down, alternately flowing inside and outside the tube. This in-and-out flow makes the air inside the tube vibrate. Your ears perceive these vibrations as sound.



PHOTO: BERG TOWN

In clarinets and saxophones, a vibrating reed creates sound by pushing and pulling on the air inside the instrument. In flutes and recorders, an invisible airstream pushes and pulls on the air inside, just like a reed.

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