

Fog Chamber Testing the Label: Photo of Fog

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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

Fog Chamber Interview Results

Testing Label: Photo of fog on Golden Gate Bridge

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Goals/Context

The developer, Shawn Lani, wanted to determine whether a new graphic, with a photograph of fog rolling in over the Golden Gate Bridge (see below), would help visitors see how the exhibit is relevant to their lives. The Fog Chamber exhibit used in the study was the original version of the exhibit, except for the new label.



N = 15 Visitors
 4 Males
 11 Females
 Age: 11-13 (3)
 20-70 (12)

Visitors were chosen at random as they crossed imaginary line.

Summary of Findings

- Visitors found the exhibit significantly more interesting after using it ($t_{28} = 4.5$, $p < .0001$). See Figure 1 below for interest level before and after visitors used the exhibit.
- None of the visitors thought the exhibit was confusing.
- Nearly 80% of visitors understood that using the handle increases the air pressure, and 59% realized that pushing the button releases air out of the chamber.
- 73% of the visitors understood that the exhibit shows how fog is formed.
- Only two (17%) of the visitors seemed to understand that a temperature drop causes the water in the air to condense into fog.
- 87% of the visitors found the exhibit relevant to their lives, with 67% explicitly citing fog.
- Of the 12 visitors who found the exhibit “Somewhat Interesting” or “Interesting” at the end, 60% explicitly mentioned fog and/or its relevance as the reason for their interest.

Conclusions

- The label's text and graphics are in good shape. Visitors understand most of what's happening. Perhaps add more explanation for the condensation step. Visitors find the exhibit relevant and interesting.
- The button was hard to press for two (17%) visitors. Perhaps replace with an easier button.
- One visitor reported expecting a larger deflection on the temperature gauge. Perhaps rescale the gauge.

Detailed Results

1. It's this exhibit over here. Before you look at it closely, could you tell me just at first glance, how interesting does the exhibit seem to you?

Uninteresting	=	1
Somewhat uninteresting	=	2
Neutral	=	3
Somewhat interesting	=	4
Interesting	=	5

Pre Avg: 3.4 (before using exhibit)

Pst Avg: 4.1 (after using exhibit)

Paired t test p value: .0001

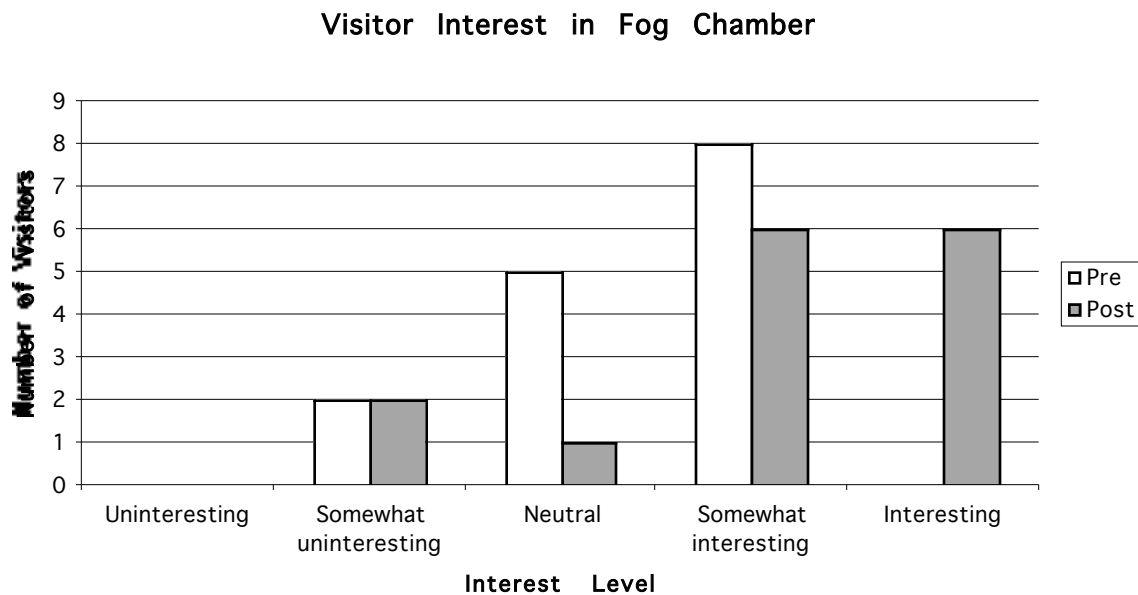


Figure 1. Number of visitors indicating their interest in the Fog Chamber exhibit before and after they used the exhibit (pre and post, respectively).

2. Can you say what it is about this exhibit that makes it (un)interesting?

Interesting because...

Fog is interesting (38%)

The fog chamber makes me interested. The title and the fog over the bridge.

Interesting to know how fog is made.

Because this [fog] is something you see here [in S.F.]. Related to what's happening in the city.

The parts look interesting (38%)

It's here, so it must have scientific value. The gauge, handle, moving parts. The sign says Fog Chamber.

I like the white face & black circle around it [of the pressure gauge]. It's striking - it catches your eye. [Anything else?] That's what caught my eye.

The fog chamber thing is fascinating. Wonder what it does.

Pressure and physics is interesting (25%)

I see [the pressure gauge] and I think of pressure. Pressure is cool I guess.

Kind of out in the middle of nowhere. Hard to see. [Anything interesting?] The experiment itself.

[What about the experiment?] The physics and relationship to other science stuff.

Neutral because...

Looks unappealing / complicated (60%)

Doesn't seem a lot to catch my eye or be appealing.

Not a lot of bright colors.

Looks really technical. Very complicated.

No different from other exhibits (40%)

It's one I'd go to like all the others. No more or less appealing than the others.

Since I don't know what it is, I can't say it's interesting or uninteresting.

Uninteresting because...

The look of the equipment. Looks old. If I'd seen the label first, it would've been interesting.

Has no appeal. No color.

What do visitors do with the exhibit? How do they use it? (Observations)

Behavior	Number of Visitors
Reads label	15
Uses compressor	15
Looks at pressure gauge	15
Uses push button	15
Looks for fog in chamber	12
Looks at temperature gauge	6

12 out of 15 visitors follow directions exactly – pumping, releasing and repeating.

Note: It was hard to tell if visitors were looking at the temperature gauge.

2 visitors had difficulty pressing the button — both older persons.

3a. What do you think is happening here when you push this up & down?

Increase air pressure / add air (79%)

Building up air pressure.
 Forcing air & condensing it in a chamber & storing it.
 Pump puts air into [chamber]. Air is hotter, so temperature increases.
 Increase the pressure in the chamber. [How?] I don't know.
 Build pressure up in the tank.
 Not sure. I don't know. Causing a pressure build up.
 You're increasing the pressure.
 Creating pressure. Air pressure.
 Pressure [Can you say more?] Pressure forming in chamber.
 Pumping air into [chamber].
 Chamber fills with pressure.

Change air pressure and temperature (14%)

Heating and cooling the air. Changing air pressure which changes temperature of the air.
 No. I don't know. I'm not good in the science. I don't have the science reasoning behind me.
 Matching temperature. There's also pressure. [Reads] When temperature increases, I guess, that's when the fog is formed. But I don't know why. This is neat!

I don't know (7%)

I don't know.

3b. What do you think is happening here when you press this button?

Releases air and Temperature decreases (25%)

Releasing the pressure. [What then?] You have the cooler. It releases air out of the chamber. First increase pressure and temperature. Then it cools quickly so water droplets form.
 Release air from the pressurized chamber [Then what?] Somehow it moisturizes and forms fog. As air cools, temperature decreases and we see fog.
 Releasing the pressure. [What then?] Combination of two actions causes fog to form. Action-reaction sort of thing.

*Releases air / decreases air pressure **from** the chamber (33%)*

Air is released from the chamber. [Anything else?] Temperature inc and pressure dec.
 Sends air out. Releases air.
 Decrease the air pressure in the chamber.
 Pressure is released on the air. Something rises and the fog disperses.

*Releases air **into** the chamber (8%)*

It lets the built up air go into the chamber. [Then what?] What makes fog?? [Reads] Chamber holds less cool air. I'm not sure. Moisture. I'm not sure.

Other / I don't know (33%)

Letting the air out. [Then what happens?] When air goes out, it gets cooler. Air in here [room] is hotter, so when we let it out, it gets cooler because it let's warm air out.
 Cool air and some moisture goes in there. [Then what happens?] Temperature decreases when cool air goes in.
 I don't know.
 I don't know.

4a. Was anything confusing about the exhibit, like getting it to work, or the way it was explained, or anything else?

All 15 visitors said that nothing was confusing. One visitor said she expected a larger temperature change.

5. What do you think the exhibit is trying to show?

How fog forms (53%)

How fog forms.

How fog is formed. You see it - tries to show how and why it happens.

The causes of fog.

What happens - how fog is produced.

How fog is formed.

Fog. [Can you say more?] Formation of fog.

The natural way fog develops.

What creates fog. Fog you see when driving.

How Temperature and Pressure cause fog to form (20%)

What happens here in the Bay Area with fog conditions. What causes it - temperature changes, pressure changes.

The temperature changes and then. As the fog's being produced. [Could you say more?] If the temperature is changing as the fog decreases. You would be creating friction as you pump. [Can you say more?] As you pump, you're building up air pressure and increasing Temp

Two things: An increase in pressure in the air and a decrease in pressure forms fog. And fog makes the temperature decrease - cooler.

The effects of Pressure and/or Temperature (27%)

The effects of pressure and temperature on weather.

Relationship between temperature & pressure. Why it's important and the environmental thing.

The conditions of pressure - air and humidity. Moisture in the air.

Why if in a small place air is warmer, than in a large place like a mansion it cooler. It's faster to heat up if in a small room.

6. Is there anything about this exhibit that feels relevant to you personally?

See fog in my life (67%)

Just after watching the fog in the bay.

This [points to label]. Fog in San Francisco is interesting. If it focused more on what's going on here [in SF] than on air pressure, it would be more interesting.

Since we live in San Francisco, it's foggy a lot, so the weather factor.

We all deal with fog when driving, so yeah.

The fact that it shows why we have fog in the Bay Area.

Somewhat. [What feels relevant?] Tells me how fog is formed since I see that all the time.

Yeah - where we live we have fog also. It's interesting to my daughter.

All the fog in San Francisco.

I'm visiting. The phenomenon outside was something beautiful. Great to duplicate it here.

Basically physics. I've studied a lot of it. Neat to see it work [Is there anything relevant on the label?] It's interesting to understand where the fog is from.

Other (20%)

So many interesting things - some of them [exhibits] you just pass through. It's interesting, but maybe it needs more color. [Is there anything relevant to you?] Not really. I live in the desert. No fog there. But interesting to know how things happen.
 When I'm camping, I put my head in the sleeping bag, it warms me up.
 Just any interest in weather patterns.

No (13%)

No.
 No.

7a. Now that you've had some time to play with the exhibit, how interesting would you say it is?

See responses to question 1.

7b. Can you say what it is about this exhibit that makes it (un)interesting?

Interesting because...

See how fog forms / fog is relevant to me (60%)

I didn't know fog makes pressure decrease.

Can see what the cause and effect is.

It's showing it in a very simplified way. Not a lot of steps. Easy and quick.

It's relevant.

There's more I understand - how it relates to the fog of San Francisco. It has more meaning. I get more out of it.

Get a feel of what creates the fog.

Effects of Temperature and Pressure (20%)

I found it fascinating that as you increase pressure, temperature increases. Which I hadn't realized. Had 2 effects you got to see. Needs to be cleaned up and spruced up.

Learned something from it (20%)

I learned something from it - already knew it, but I didn't know that I knew it.

It's different from what you'd expect [How so?] I don't know.

Neutral to uninteresting because...

Not the best exhibit. Not the worst. Middle of the road.

Just doesn't appeal to me.

8. Do you have any special interest, knowledge or training in the areas of heat and temperature?

No 13
 Science Education 2

9. Is this your first visit to the Exploratorium? Y N

Yes 11
 No 4

Date: Day: Time: Location:
 Age: Gender: M / F ESL: N Y Yes, but fluent
 Others in Group: Fog Chmber.label.iv.01

Excuse me, my name is XXX and I work here. I'm trying to find out what Vs think of one of these exhibits so that we can improve it. Would you be willing to talk with me? It'll take about five minutes.

1. It's this exhibit over here. Before you look at it closely, could you tell me just at first glance, how interesting does the exhibit seem to you?

Uninteresting **Somewhat uninteresting** **Neutral** **Somewhat interesting** **Interesting**

2. Can you say what it is about this exhibit that makes it (un)interesting?

Now, if I could ask you to spend a few minutes playing with the exhibit, reading about it, whatever, so that you get a bit familiar with it. Then when you're ready, I'd like to talk with you about it. [leave them alone with the exhibit]

Observations:

- Reads label
- Uses compressor
- Looks at Pressure gauge
- Uses push button
- Looks at Temperature gauge
- Looks for fog in chamber

3a. What do you think is happening here when you push this up & down?

3b. What do you think is happening here when you press this button

4a. Was anything confusing about the exhibit, like getting it to work, or the way it was explained, or anything else?

5. What do you think the exhibit is trying to show?

6. Is there anything about this exhibit that feels relevant to you personally?

7a. Now that you've had some time to play with the exhibit, how interesting would you say it is?

Uninteresting **Somewhat uninteresting** **Neutral** **Somewhat interesting** **Interesting**

7b. Can you say what it is about this exhibit that makes it (un)interesting?

8. Do you have any special interest, knowledge or training in the areas of heat and temperature?

9. Is this your first visit to the Exploratorium? Y N

Methods

Age \geq 10 years

Stand 5 feet from exhibit during first 2 questions

Let them refer back to the label during the interview

Grab the first person who crosses an imaginary line in the floor. If in a group, take person closest to myself.