

# Thermal Impressions Interview and Observational Studies

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December 1999

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

# Thermal Impressions

## Interview and Observational Studies

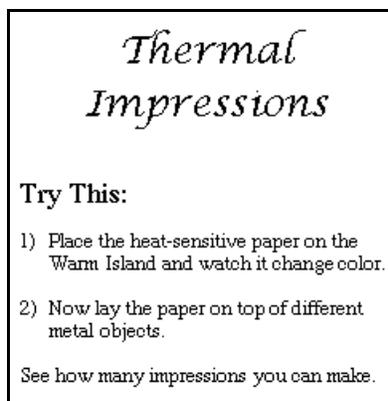
Josh Gutwill  
12/7/99

### Goals/Context

Charles Sowers, the developer of this exhibit, was concerned that visitors were not fully engaged in the exhibit. To get a sense of visitor engagement with the exhibit, the Evaluator, Joshua Gutwill, conducted a baseline interview study while making changes to the label. The goal was to ensure that every visitor could create at least one “thermal impression” — an image formed on LCD film by placing the film on warm or cool objects. Originally, Charles was concerned that many visitors did not ever make an image. Over time, Charles made iterative changes to the exhibit, including affordances and labels. After Joshua conducted the interview study to collect visitors’ baseline attitudes about the exhibit, he and Sarah Rezny, an Assistant Project Evaluator, then conducted observational studies to determine the visitors’ responses to Charles’ iterative changes. These studies, and their findings, are described below.

### Study 1 — Cued Interview                      9/17/99

The first study was a brief interview study to determine whether visitors found the experience of making a thermal image to be interesting. Joshua wrote and rewrote a label for the exhibit until all of the visitors he interviewed were able to make an image. Unfortunately, there are no photographs of the exhibit available. The exhibit in this first study looked similar to the next version (for which we have photos – see below), except that the warm plate was placed in the center of the tabletop, rather than the rear of the tabletop. A condensed picture of the label (with slightly altered fonts) is shown below:



N = 8 visitors, 4 females and 4 males

### *Findings*

- 6 of 8 visitors (75%) found the exhibit interesting.
- 7 of 8 visitors (88%) seemed to be engaged with the exhibit, making multiple thermal images.

### *Conclusions*

The exhibit seemed to be interesting and engaging. Visitors reported wanting an explanation for what was happening in the exhibit. Such an explanation was added later.

## **Study 2 — Uncued Observations 11/5/99-11/27/99**

Starting with the same exhibit and label as used in Study 1, Joshua and Sarah observed visitors' behaviors to see how they went about making thermal images. During these observations, Charles made changes to the exhibit and Joshua and Diane Burk, the Graphics Designer, made changes to the label.

On four different occasions, Joshua or Sarah observed visitors as they used the exhibit. Each occasion employed a slightly different version of the exhibit or label. Table 1 shows the changes made before each set of observations.

**Table 1.** State of the exhibit and label before each set of observations was made.

<b>Observation Set</b>	<b>Date</b>	<b>Description of Exhibit</b>	<b>Description of Label</b>
1	11/5	Warm plate moved to rear of table	Simple use label; no graphics; no explanations
2	11/5	Warm plate still at rear of table	Same main label; added "Place film here and here" labels to exhibit
3	11/19	Warm plate still at rear of table; added texture and red paper to plate	New main graphics label with Warm and Cool colored red and blue; still had labels on plate and table
4	11/27	Warm plate still at rear of table; still had texture and red paper in plate	New main graphics label without colors; still had labels on plate and table.

Table 2 shows photos of the exhibit and label for each Observation Set.

**Table 2.** Photos of the exhibit and label before each set of observations was made.

Observation Set	Photo of Exhibit & Label
1	 <div data-bbox="982 352 1373 758" style="border: 1px solid black; padding: 10px;"> <p style="text-align: center;"><i>Thermal Impressions</i></p> <p><b>Try This:</b></p> <ol style="list-style-type: none"> <li>1) Place the heat-sensitive paper on the Warm Island and watch it change color.</li> <li>2) Now lay the paper on top of different metal objects.</li> </ol> <p>See how many impressions you can make.</p> </div>
2	<p data-bbox="407 1171 740 1203">Same exhibit &amp; main label</p> 
3	 



### Findings

Successful interactions. The focus of the observation was to determine whether visitors interacted with the exhibit successfully (i.e., created a thermal image on the LCD film).

As shown in Table 3, 73 of 105 visitor groups (70%) made a thermal image on the LCD film. We also attempted to determine whether visitors read the label. (Sometimes, their eye movements were obvious; other times adults read the label aloud to children.)

Table 3. Percent of visitors engaging in various behaviors

Observation set	N	Made image	Read label*	Followed Directions**
1	18	67%	67%	33%
2	30	53%	20%	50%
3	25	88%	52%	52%
4	32	72%	47%	47%
<b>TOTAL</b>	<b>105</b>	<b>70%</b>	<b>44%</b>	<b>47%</b>

\*Seemed to read label – eyes fixed on label. Sometimes, adult read aloud to child.

\*\*Followed directions meant placing film on the warm plate (F-P) and then on top of a piece of metal (F-M) or on top of the cool table to successfully create an image.

The findings based on Table 3 are:

- Across all the observations made, 73 of 105 visitor groups (70%) made a thermal image on the LCD film. The success rate varied across the groups ( $\chi^2 = 12.7$ ;  $p = .05$ ). Observation Set 2

revealed the least success rate for visitors, while Observation Set 3 showed the greatest success rate.

- Determining whether visitors read the label was challenging, but there seems to have been a drop in Observation Set 2. Perhaps this explains why visitors were least successful in that instantiation of the exhibit.
- Visitors were fairly consistent about following directions (i.e., placing the film on the warm plate and then on top of a piece of metal or on top of the cool table to successfully create an image) during all sets of observations. This is inconsistent with the “read label” finding, and may cast doubt on our ability to observe visitors reading the label.

Visitor Engagement. Our observations included noting whenever any visitor in a group engaged in an action with the film or the metal objects. The number of actions visitors undertook provides an indication of their level of engagement – more actions suggests greater engagement. The actions and the average number of times visitors engaged in each action during each set of observations are listed in Table 4.

Table 4. Average number of times a single visitor group engaged in a particular action.

Action	Code	Obs 1 N=18	Obs 2 N=30	Obs 3 N=25	Obs 4 N=32	Total
Place film on top of:						
Warm plate	F-P	0.9	1.7	4.3	1.8	<b>1.8</b>
Metal object / cool table	F-M	0.9	2.5	3.6	2.3	<b>2.1</b>
Place metal object on top of:						
Warm plate	M-P	0.4	0.5	0.5	0.2	<b>0.4</b>
Film	M-F	0.0	0.1	0.4	0.4	<b>0.3</b>
Combinations	F-M-P	0.6	0.7	0.7	0.6	<b>0.6</b>
	M-F-P	3.3	0.2	2.0	0.7	<b>1.5</b>
Place hand on top of film	F-H	0.4	0.3	0.4	0.2	<b>0.3</b>
<b>All Actions combined</b>		<b>6.4</b>	<b>5.7</b>	<b>11.9</b>	<b>4.8</b>	

Note: “Obs” means Observation Set. N = Number of visitor groups observed.

There are several interesting points to be made about the data in Table 4:

- The most popular actions visitors took were placing the film on top of the warm plate and placing the film on top of a metal object. These were the two actions explicitly mentioned in the “Try This” section of every label.
- In every observation set, each visitor group undertook an average of about five or more actions, suggesting that the exhibit was engaging to them.
- Observation Set 3 (in which the exhibit had a red, texturized warm plate and a label with colorized wording) showed the greatest engagement, with each visitor group taking nearly 12 actions on average. This is about twice the average number of actions for every other observation set. The average number for Observation Set 3 is significantly greater than the

averages for any of the other observation sets (ANOVA  $F_{101} = 8.1$ ,  $p < .0001$ ; post hoc Obs 1 vs. Obs 3:  $p = .003$ ; Obs 2 vs. Obs 3:  $p = .0002$ ; Obs 4 vs. Obs 3:  $p = .0001$ )

### *Conclusions*

The exhibit seemed to be engaging and useable. There was a statistically significant advantage of having colorized text in the Try This section of the label (Observation Set 3). Perhaps the graphic designer ought to color the words “Warm Plate” in red and “Cool Table” in blue in the label.

We support Charles’ idea of painting the entire warm plate in red, rather than using red paper underneath it. In general, the exhibit appears to be in good shape.

Date:                      Day:                      Time:                      Location:  
 Age:                      Gender: M / F      ESL: N      Y      Yes, but fluent  
 Others in Group:                                      Flat island, J's label

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. First, I just want to ask you to play with the exhibit. (Observe exact movements)

2. What do you think about this exhibit? Why?

3. Try putting the paper on the warm part and then on the cold metal objects. Do you think that's better or worse?    **Better**                      **Worse**                      Why?

