

# **A Choreographer, a physicist, and an evaluator walk into a theater: Mixed methods research designs for evaluating impact at the art/science/engagement interface**

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# Introduction and Overview

Presentation Team (5 mins)

Our Evaluation Research (20 mins)

- About *The Matter of Origins*
- About Our Collaborative Research Approach
- About Our Findings (handout)

Rigor and Creativity (35 mins)

- Strengthening rigor in research design
- Adding creativity to research design
- Incorporating community partner voices

Question and Answers (10 mins)



# *The Matter of Origins*

Choreographed by Liz Lerman and Dance Exchange

- 35 + years of creating dance and engaging people in making art
- Won MacArthur Genius Award in 2002 for community organizing
- Uses dance as a vehicle for human inquiry and engagement with contemporary issues of our time

Two Act Contemporary Dance Performance

- Act One—on stage, multi-media, intergenerational dance explores Big Bang, Los Alamos, and origin stories
- Act Two—in “tea room,” dialogue convened by provocateurs and punctuated by dance interruptions and led by physicist host

Let's take a look—The Matter of Origins video



# Our Evaluation/Research Challenge

**How do you rigorously evaluate the impact without the research interrupting the learning activities?**



# We Wanted To Know...

## NSF Informal Science Education/Early Concept Grants for Exploratory Research (EAGER)

- Changes in attitude
- Changes in interest
- Changes in knowledge
- Changes in behavior

## Dance Exchange and Michigan State

- Connection between art/science ways of knowing
- Emotional engagement with content and learning
- Patterns in changes by demographic and background variables



# Our Collaborative Approach



MSU learned about the performance & its goals.

MSU proposed questions & methods.

DE gave feedback, made counter suggestions.

DE helped us focus in on the different areas, especially for the attitude, interest, knowledge, behavior.

DE suggested the emotion clouds.

MSU made revisions & sent them new questions.

DE made the instruments look fun & engaging.

MSU & DE used the instruments & then made adjustments at upcoming performance sites.

# Evaluation Research



**R**

## Strong Designs

- Mixed methods
- Multiple sources
- Multiple measures
- Linked data

## Reliability & Validity

- Pilot test & refine
- Repl

## **TIMING**

- Pre-performance
- Intermission
- Post-performance
- Delayed post-performance

## **TYPES OF QUESTIONS**

- Nine content questions (Likert, quantitative)
- Emotion clouds (closed, qualitative)
- Creative questions (open qualitative)

## **APPROACHES TO ANALYSIS**

- Randomly equivalent comparison groups
- Linked pre/intermission/post/delayed
- Crosstabs by background and demographics

## Embedded

- Imaginative
- Themed
- Seamless

## Creative Formats

- Shapes & sizes
- Textures & colors
- Word choice



# What about rigor?

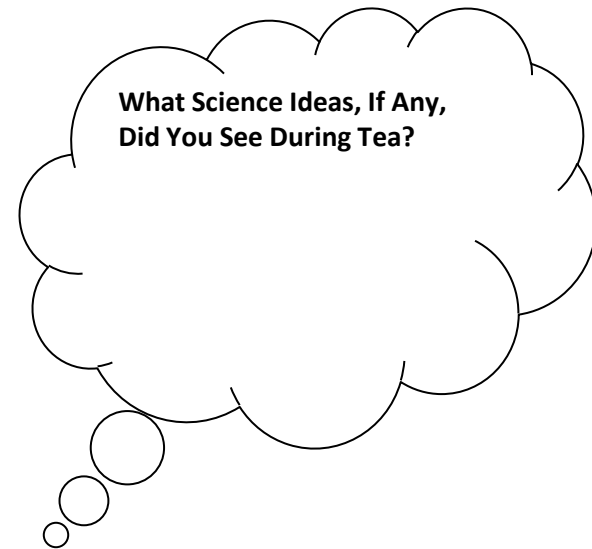




# Mixed Methods

Combine quantitative and qualitative data for stronger results.

Measuring the Matter of You Please tell us where you're coming from...	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	[Circle your opinion]				
I find the connections between physics and dance intriguing.	SD	D	N	A	SA
"Dark matter" has been directly observed and photographed.	SD	D	N	A	SA
Science and art seek understanding and meaning through creativity.	SD	D	N	A	SA
Bodies in motion stay in motion unless acted upon by another force.	SD	D	N	A	SA
The universe is expanding at an accelerating rate.	SD	D	N	A	SA
Origins of the universe are revealed through science, faith, and art.	SD	D	N	A	SA
Scientists smash tiny particles to recreate the conditions just after the Big Bang.	SD	D	N	A	SA
With the right instruments, scientists can measure everything precisely.	SD	D	N	A	SA
Atomic particles are constantly in motion, coming together and breaking apart.	SD	D	N	A	SA



To measure changes in audience members' science knowledge, we asked Likert scale questions (quantitative) as well as open ended questions. (qualitative).

# Multiple Sources

Consider gathering data from more than one perspective or source.

## One More Measure

The Tea is almost over. Please tell us about your experience.

Circle all the words below that describe you right now. Feel free to write in any additional words.

Engaged	Moved	Distracted	
Questioning	Bored	Amused	Comfortable
Content	Intrigued	Nervous	Curious
Connected	Intimidated	Puzzled	
Awe-Struck	Stimulated		

From Audience Members

4. At the CONCLUSION of the tea, what was the atmosphere at your table? Circle all that apply.

- |             |                       |                       |
|-------------|-----------------------|-----------------------|
| Engaged     | Nervous               | Worried, apprehensive |
| Confused    | Puzzled               | Harmonious            |
| Comfortable | Stimulated, Imagining | Contentious           |
| Touched     | Distracted            |                       |
| Amused      | Bored                 |                       |
| Curious     | Intimidated           |                       |
| Serious     | filled with wonder    |                       |

From Provocateurs

We asked audience members about their emotions at the end of tea and asked tea table provocateurs about the audience members' emotions at the end of tea. Two sources can increase the validity of the data.

# Multiple Measures

Consider asking the same questions at different times for stronger evidence of change.

**Measuring the Matter of You**  
Please tell us where you're coming from...

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
	[ Circle your opinion ]				
I find the connections between physics and dance intriguing.	SD	D	N	A	SA
"Dark matter" has been directly observed and photographed.	SD	D	N	A	SA
Science and art seek understanding and meaning through creativity.	SD	D	N	A	SA
Bodies in motion stay in motion unless acted upon by another force.	SD	D	N	A	SA
The universe is expanding at an accelerating rate.	SD	D	N	A	SA
Origins of the universe are revealed through science, faith, and art.	SD	D	N	A	SA
Scientists smash tiny particles to recreate the conditions just after the Big Bang.	SD	D	N	A	SA
With the right instruments, scientists can measure everything precisely.	SD	D	N	A	SA
Atomic particles are constantly in motion, coming together and breaking apart.	SD	D	N	A	SA

Pre Performance Survey

**1. Please tell us where you are coming from today.**

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I find the connections between physics and dance intriguing.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"Dark matter" has been directly observed and photographed.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Science and art seek understanding and meaning through creativity.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bodies in motion stay in motion until acted upon by another force.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The universe is expanding at an accelerating rate.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Origins of the universe are revealed through science, faith, and art.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Scientists smash tiny particles to recreate the conditions just after the Big Bang.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
With the right instruments, scientists can measure everything precisely.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Atomic particles are constantly in motion, coming together and breaking apart.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Delayed Post Survey

We asked the same Likert scale questions twice during the performance (pre and intermission OR pre and post) and in the delayed post survey six to eight months later.

# Linked Data

Develop ways of linking pre-test and post-test data together for stronger analysis.

	<b>ROW</b>	<b>SEAT</b>
Act One seat number (one last time):	<input type="text"/>	<input type="text"/>

*Sincerely,  
The Guest with number*

**GA -**

At our first site, we asked for email address as a “linker.” At subsequent sites, we used seat/ticket number because everyone had one and felt more comfortable sharing that number than their email.

# Pilot test & refine

Develop your instruments over time by learning from what your audience says and refining your questions through experience.

What struck me most about the tea was...

**One More Measure** The Tea is almost over...

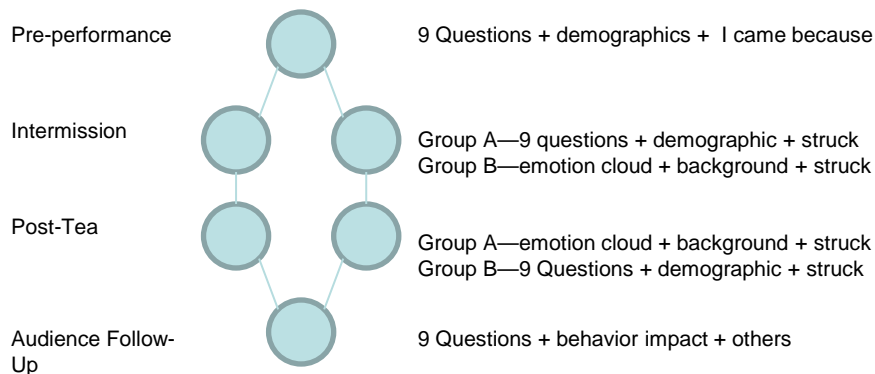
...how did these elements of the tea experience strike you?

	not at all	a little bit	a medium amount	a great deal	blew my mind
Innovative, unconventional atmosphere overall	—	—	—	—	—
People with different perspectives at my table	—	—	—	—	—
Choreography, complexity, flow of the performance	—	—	—	—	—
Being so close to the performers	—	—	—	—	—
Conversations about ideas and themes suggested by the performance	—	—	—	—	—
Music and projected video	—	—	—	—	—
iPads	—	—	—	—	—
Opportunity to reflect on current events	—	—	—	—	—

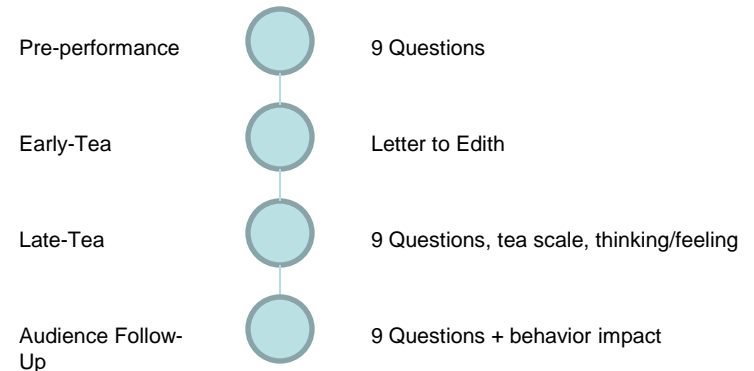
At the first site, we asked an open-ended qualitative question—what struck me most about the tea? After analyzing responses from a few sites, we developed a quantitative measure to gauge audience members' reactions to Act 2.

# Replicate

**Consider exploring the same research questions, with different populations or at different sites—to find out whether the results are consistent.**



**University of Maryland**



**Wesleyan University**

At all study sites, we examined the impact of a dance performance and a tea discussion on audience members' attitude, interest, knowledge, and behavior concerning science.

# What about creativity?





# Imaginative

**Be creative with your data collection, especially for qualitative data.**

At one site, audience members wrote “Letters to Edith” thanking her for the lovely tea and commenting on their experience so far. Their “letters” were sources of qualitative data.

TEA TABLE GUEST

25 Feb. 2011

Dear Edith,

Thank you for inviting me to tea at your place. Your chocolate cake was ...

So far, what strikes me most about the tea experience is...

What I'm wondering about is...

I wish there were more of...

Sincerely,  
The Guest with number

GA -

# Themed

**Repeat your learning theme throughout your evaluation activities.**

Tea servers wore physics-themed aprons in the lobby pre-performance and at intermission while distributing and collecting instruments. They rewarded audience members with a chocolate candy.



# Seamless

**Incorporate the evaluation into the learning activities.**

Post-performance instruments were hidden under tablecloths for audience members to “discover” as part of Act 2.

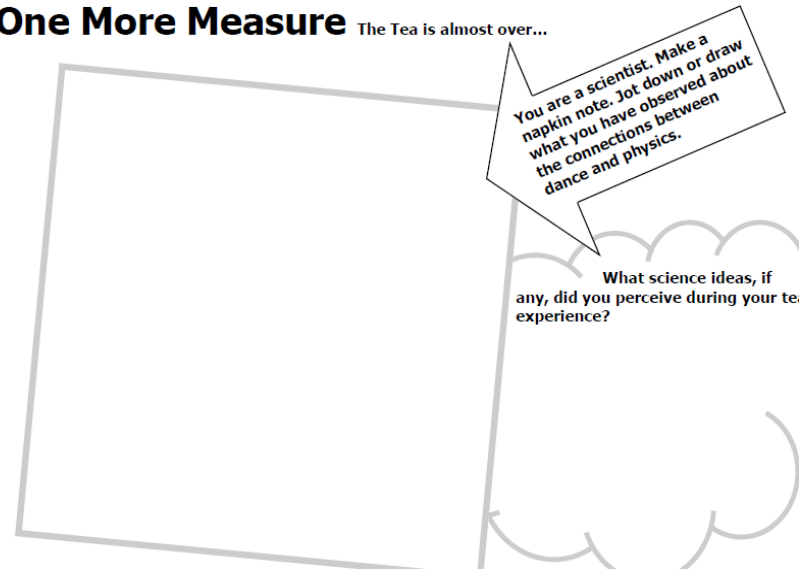


# Creative Formats

At one site, audience members were asked to be scientists and jot down “napkin notes” about their experiences.

At another site, the Likert scale questions were on the back of a teacup shaped survey.

## One More Measure The Tea is almost over...



Please tell us where you're coming from!  
Circle your opinion.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Understanding variations of theme is important in both the arts and sciences.	SD	D	N	A	SA
With the right instruments, scientists can measure everything precisely.	SD	D	N	A	SA
Dancing can be a way of exploring society's "big questions."	SD	D	N	A	SA
Scientific inquiry removes imagination and intuition from the discovery process.	SD	D	N	A	SA
Moving, writing, and conversing are alternative ways of knowing.	SD	D	N	A	SA
Experimentation, rigor, and technique are essential elements of measurement.	SD	D	N	A	SA

# What about community partner voices?



# What about community partner voices?

At each of the four evaluation sites, we collaborated with faculty and staff on campus to ask site-specific questions.

At Montclair State, we asked about education level as a background question, since many of their students are first generation college students.



# Emotion Clouds

**Ask your community partners about their ideas for the evaluation research.**

Dance Exchange suggested an “emotion cloud” to measure audience members’ emotions at intermission and post-tea.

**Circle all the words below that describe you right now. Feel free to write in any additional words.**

Engaged  
Amused  
Serious  
Distracted  
Confused  
Bored  
Worried/Apprehensive  
Comfortable  
Curious  
Nervous  
Puzzled  
Touched  
Intimidated  
Awe-Struck  
Stimulated



# Data Collection

## University of Maryland

- 3 performances, 3 tea rooms (Sept 2010)
- Data collected from 1,100 audience members

## Wesleyan University

- 2 performances, hybrid tea (February 2011)
- Data collected from 159 audience members

## Montclair State University

- 5 performances, 1 tea room on stage (March 2011)
- Data collected from 590 audience members

## Arizona State University

- 1 performance, 2 tea rooms (April 2011)
- Data collected from 282 audience members

To date, 2,131 audience members have completed at least one survey.

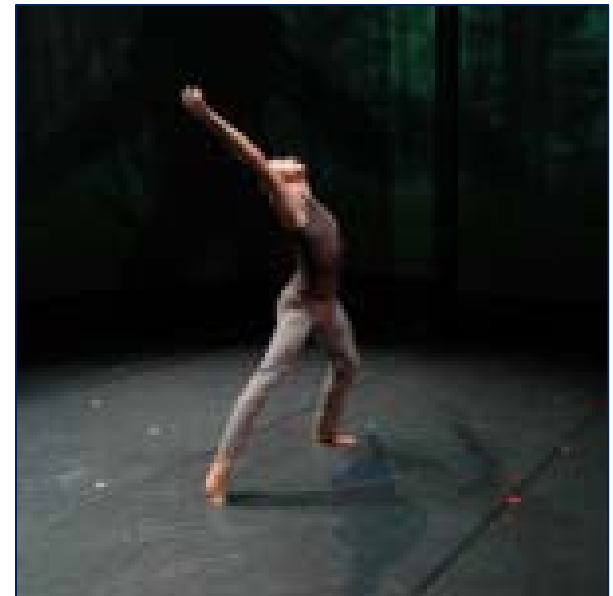
# Discussion Scenarios

**Instructions:** Work in teams to consider how you would improve the rigor and creativity in EITHER scenario #1 OR scenario #2. Be prepared to report your ideas to the full group.

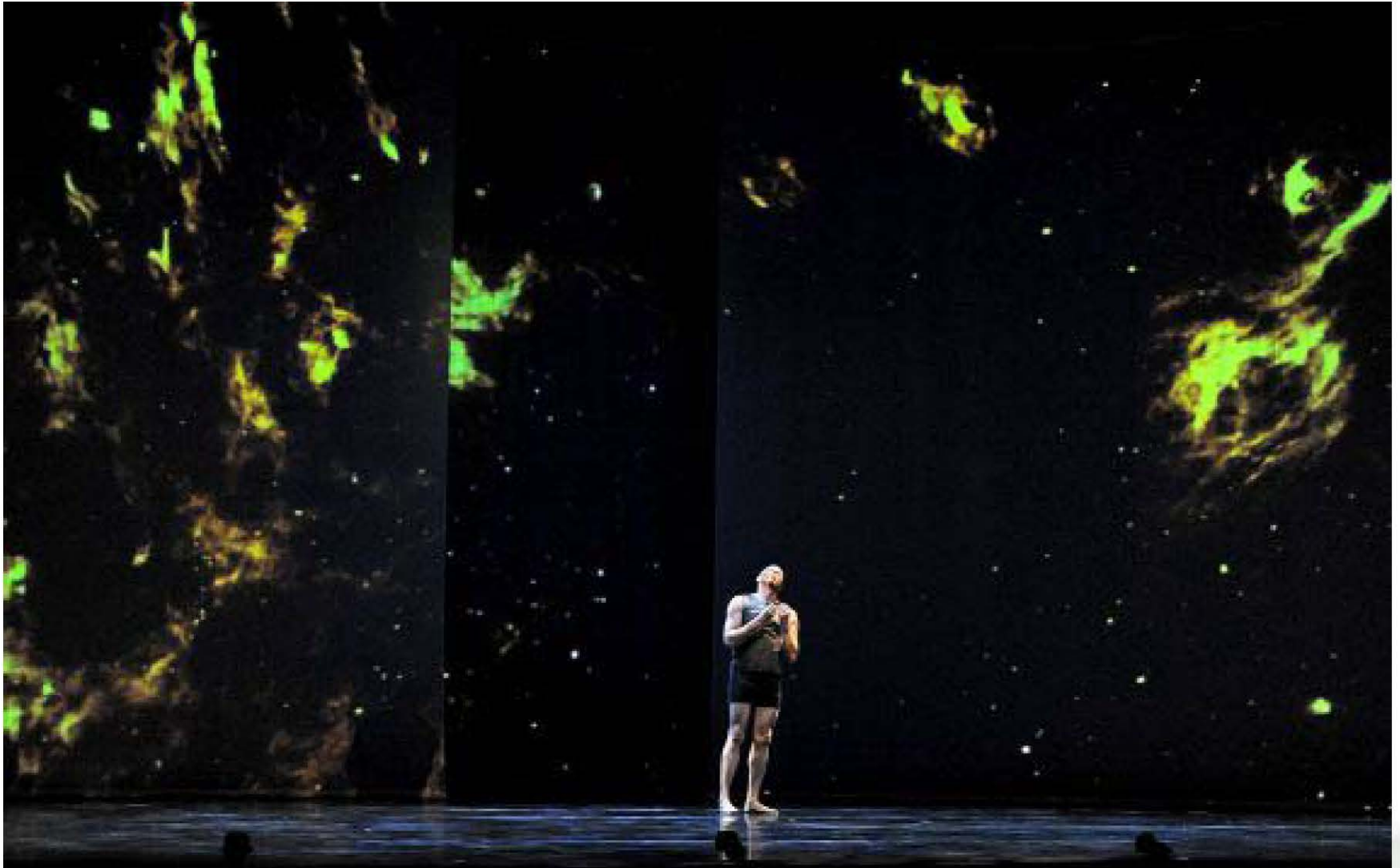
1. Positive youth development through after-school sports programs at a community-based organization focused on immigrant youth
2. Community-engaged study abroad program in Tanzania that brings faculty researchers, U.S. students, Tanzanian students, and Tanzanian community members together to address needs in two rural villages

# Reporting Out

- How did you address rigor through your research design?
- How did you add more creativity to the evaluation process?
- How did you include community partner voices in your process?
- What other issues did you choose to address in your proposed evaluation/research plan?



# Questions and Answers



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*Photos in this presentation were provided by the Dance Exchange.*

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