



REPORT

Front-end Evaluation: When Things Get Moving Exhibition

PREPARED BY

Kera Collective

FOR

Science Center of Iowa

DATE

May 2023



Front-end Evaluation: When Things Get Moving Exhibition



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IMAGE CREDITS

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SUGGESTED CITATION

Kera Collective, 2023. *Front-end Evaluation: When Things Get Moving Exhibition*. Unpublished report written for *Science Center of Iowa*.

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01 Key Takeaways



About the Key Takeaways



The following pages present key takeaways from the front-end evaluation of *When Things Get Moving*, based on interview data with intergenerational groups collected by Kera Collective for the Science Center of Iowa (SCI) over Spring Break in March 2023. **The Key Takeaways represent Kera Collective’s interpretation of the most salient points**, given our understanding of the SCI’s goals for the revitalized exhibition. Please see the Findings (beginning on page 14) for detailed analysis.

01

Visitors love the current *When Things Get Moving* exhibition, though many are also excited for it to change.

Throughout the interviews, visitors highly praised *When Things Get Moving*, whether they had visited before, or it was their first time. Most (especially children) named multiple exhibits they would miss if they were gone, explaining that the hands-on nature of the space has a contagious “energy” that made them want to linger. Overall, visitors of all ages were drawn to exhibits they felt encouraged their creativity and imagination by allowing them to “test and retest” designs (e.g., Rocket Launch) and those with visually stunning displays unlike anything they could see at home (e.g., Ball Wall) over ones that lack an immediate payoff or that felt overly familiar (e.g., Dominos). While many said there was “nothing to dislike” about the space, others (mostly adults) were turned off by the crowding and intense competition for materials at popular exhibits, so were excited to hear that SCI is considering updates. As one put it, “We’ve been coming here for many years, and everything is still the same.”



VISITORS’ LOVE FOR THE CURRENT *WHEN THINGS GET MOVING* EXHIBITION IS HIGHLY ENCOURAGING. HOW CAN SCI RETAIN ITS BEST ASPECTS (THAT VISITORS ALREADY LOVE) WHILE MAKING ROOM FOR NEW EXPERIENCES?

CONSIDER:

- Continuing to offer the experiences that visitors find energizing (i.e., ones that encourage imagination and creativity through “testing and retesting” original designs or that elicit awe through visually stunning displays) and dropping experiences that feel overly familiar.
- Ensuring that visitors know change is coming through continued evaluation and prototyping. Doing so will help visitors (especially repeat visitors and members) who love the current space feel excited about and invested in the revitalized exhibition.

02

Visitors perceive play, fun, experimentation, and collaboration as more central to the *When Things Get Moving* experience than science.

Tellingly, when asked what drew them to *When Things Get Moving*, the top reason visitors gave was wanting to play and experiment, followed closely by wanting to experience the exhibition’s “fun” atmosphere—none said they wanted to learn about physics, forces, or motion. Yet, when asked what they thought the exhibition was “about,” visitors’ responses often indicated that they see learning about science and play as inextricably tied. Many children over age 10, for instance, said *When Things Get Moving* allows them to have fun using “trial and error” to explore new things in STEM, and many adults likewise praised how the exhibition helps children learn science without realizing it through play. By contrast, most children under age 10 said the exhibition was just about “having fun” (not science) and a few adults questioned if it is realistic to expect young children to take away “complex” ideas about physics.



VISITORS APPRECIATE WHEN SCIENCE IS APPROACHED IN A FUN AND PLAYFUL MANNER, BUT IT IS IMPORTANT THAT SCIENCE IS NOT LOST AT THE EXPENSE OF PLAY (AND VICE VERSA). HOW CAN THE REVITALIZED DESIGN OF *WHEN THINGS GET MOVING* STRIKE A BALANCE BETWEEN FUN, PLAY, AND CONVEYING COMPLEX SCIENCE TO ALL AGES?

CONSIDER:

- Using humor to convey core science ideas, both in writing, media, and hands-on activities. For instance, can the script tell jokes? Can hands-on activities result in funny outcomes that demonstrate core scientific principles?
- Providing a range of entry points for all ages and interests, but also being realistic about the expected outcomes for different age groups, knowing that the exhibition’s target audience (children ages 6-12 and their caregivers) contains people with a wide variety of developmental levels and experiences.

03

Visitors made connections between the “invisible forces around us” and their everyday lives but their thinking could be pushed further.

Overall, visitors of all ages were intrigued and excited by the idea that there are forces around us “we can’t see” that control “how things work.” Positively, their initial ideas of what these invisible forces are mostly aligned with the exhibition’s core themes (e.g., air pressure, gravity, friction, momentum, electricity), though they sometimes took more creative and abstract turns (e.g., religion and curiosity and personal energy levels as “invisible forces”). Many, especially children over age 10 and adults, also named numerous everyday situations where these forces and/or the three laws of motion are in action, often citing activities like walking, driving, or sports. Notably, however, their examples were often limited to slight twists on those shown in the materials; for instance, after seeing the prepared example of the second law of motion (that it takes less force to push an empty versus a full grocery cart due to its lower mass), some groups said another example is lifting an empty versus a full bucket of water. Meanwhile, several younger children (under age 10) struggled to name any examples of invisible forces or the laws of motion in action.



VISITORS NEED SUPPORT IN THINKING BEYOND WHAT THEY KNOW. HOW CAN THE REVITALIZED EXHIBITION HELP VISITORS ENVISION NEW AND DIFFERENT WAYS INVISIBLE FORCES AFFECT THEIR EVERYDAY LIVES?

CONSIDER:

- ▶▶▶ Providing examples of invisible forces in both mundane *and* unusual activities, to spark visitors’ imagination beyond their usual routines.
- ▶▶▶ Showcasing how *multiple invisible forces* (e.g., gravity, motion, friction) and *all three laws of motion* work together to influence a particular scene, situation, or story holistically; this may help visitors see how every invisible force manifests in any situation.

04 Despite visitors' general excitement over the exhibition experience and its core ideas, a few barriers and misconceptions persist.

These tensions came up explicitly and implicitly throughout the interviews, ranging from a lack of confidence in their knowledge to basic misunderstandings of science. Nearly all visitors (children and adults), for instance, were unsure how to articulate the three laws of motion despite having just visited *When Things Get Moving*. Adults answered with things like “it’s been a while” since school, and children (mostly under 10, but also some older) said they had never heard of them. Yet, as mentioned earlier, most *could* provide accurate examples of the three laws of motion in action when reminded of each law (though the examples they gave were relatively commonplace versus creative). Other barriers that emerged were mostly present among younger children (under age 10) but also sometimes in older children and adults; for instance, using circular logic to explain motion, equating higher mass with larger size, or not being able to describe physics or a force. A few adults hoped the revitalized exhibition would more clearly explain some of these concepts through videos so they could more easily remind themselves of the basics and support their children.



THESE BARRIERS AND MISCONCEPTIONS SPEAK TO A HUGE OPPORTUNITY TO CLARIFY THESE IDEAS AND BOOST VISITORS' CONFIDENCE. IN WHAT WAYS CAN THE REVITALIZED EXHIBITION DESIGN SUPPORT CONFIDENCE-BUILDING AROUND SCIENCE KNOWLEDGE FOR ALL AGES?

CONSIDER:

- 》》》 Finding striking and “can’t miss” ways to introduce core scientific principles at a high level to help prime visitors to think about them before using individual exhibits. Perhaps, through some sort of video-based entrance experience.
- 》》》 Injecting storytelling throughout the exhibition; for instance, could each invisible force become a “character” that teaches visitors about itself through frequent, bite-sized interactions?

02 Study Background



About the Study

In 2023, the Science Center of Iowa (SCI) contracted Kera Collective (Kera) to conduct a front-end evaluation to support the revitalization of the *When Things Get Moving* exhibition, which aims to bring the invisible forces around us to life for visitors in hands-on ways. Front-end evaluation is done early in the design development process and is used to explore visitors' existing understandings and experiences with content related to a proposed exhibition (baseline knowledge of, preconceptions of, personal experiences with content, etc.). The goal is to bridge any gaps between visitors and the proposed exhibition so that the eventual content and design will resonate with visitors.

The primary audience for the *When Things Get Moving* exhibition, and thus for the front-end evaluation, **is intergenerational groups of adults and children ages 6-12.**

Study Objectives

The following study objectives (what we hoped to learn) were collaboratively developed by Kera and SCI in February 2023, as SCI began imagining what the revitalized *When Things Get Moving* exhibition might look like, but before they officially started the redesign process. Through the front-end evaluation, we sought to understand and explore:

- What aspects of the current *When Things Get Moving* exhibition do visitors find most and least appealing, and why?
- What are visitors' understandings of and associations with the "invisible forces" around us?
- What about *When Things Get Moving's* Big Idea and key concepts piques visitors interest (and why or why not), especially ideas of hands-on play and experimenting, and the three laws of motion?
- How, if at all, do visitors relate to the "invisible forces" around us personally? To what extent and in what ways do they feel like they relate to their daily lives?
- What questions and curiosities do visitors have about the "invisible forces" around us?
- What potential barriers exist to engaging visitors in these topics and ideas?
- What about *When Things Get Moving* would they miss the most if it were changed or taken away, and why?
- How, if at all, do the above questions differ by age and among members v. non-members, repeat v. first-time visitors?

Methodology

Kera Collective conducted onsite interviews with intergenerational groups of adults and children ages 6-12. Kera conducted a total of 40 onsite interviews with intergenerational groups from March 9-19, 2023, during SCI's extended Spring Break. Each interview took about 15 minutes.

Intergenerational interviews contain a mix of close-ended and open-ended questions, which allows for data to be collected quickly at scale while still retaining room for nuance. Close-ended questions were mostly demographic in nature (e.g., Is this your first time at SCI?). Open-ended questions focused mainly on the exhibition concepts and encouraged interviewees to express their opinions, understandings, and the meanings they constructed.

All interviews were conducted onsite at SCI, as visitors exited the current *When Things Get Moving* exhibition. Most interviews took place on a weekday in the afternoon. Kera followed a continuous random selection method to identify intergenerational groups and administered a screener question to adults to determine their eligibility (i.e., were they visiting with at least one child ages 6-12), and then invited eligible groups to do an interview. Once a group agreed to participate, Kera conducted the interview at the table and chairs provide by SCI, using the interview script and materials in Appendix A and asking probing or clarifying questions along the way to better understand participants' experiences. Each group received a \$15 Starbucks gift card for their participation as a thank you. Kera took notes on an iPad to capture the data and audio-recorded the interviews as a backup, to help facilitate analysis.

Analysis and Reporting

Data from intergenerational interviews are mostly qualitative, meaning that the results are descriptive. In analyzing the data, Kera Collective studied the notes and recordings for meaningful patterns and trends. Data from close-ended questions are presented in tables and charts. The objectives of the study, as well as our professional experience, informed the analysis. All data were collected during the COVID-19 pandemic and this context has also been considered in interpreting the findings.

Throughout this report, findings are reported in narrative, supplemented with exemplary quotations from participants. Trends and themes in the data are presented from most- to least-frequently occurring. Verbatim quotations from interviews (edited for clarity) illustrate participants' thoughts and ideas as fully as possible.

When describing the findings, this report uses qualitative data terms such as "most" and "a few," as is appropriate for the sample size and the type of data collected. Such descriptive language is intended to provide readers with a sense of the general trends. Readers should regard the trends as general categories rather than rigid numerical counts.

03 Findings:

Onsite Intergenerational Interviews



Overview

Kera Collective conducted interviews with intergenerational groups in March 2023, over the Science Center of Iowa's extended Spring Break. All interviews were conducted onsite at SCI just outside of the current *When Things Get Moving* exhibition. One hundred groups were recruited and 40 agreed to participate, for a participation rate of 40 percent. A total of 104 individuals participated in the 40 interviews: 43 adults and 61 children.¹

Participant Characteristics

The table below details characteristics of the intergenerational groups we interviewed.

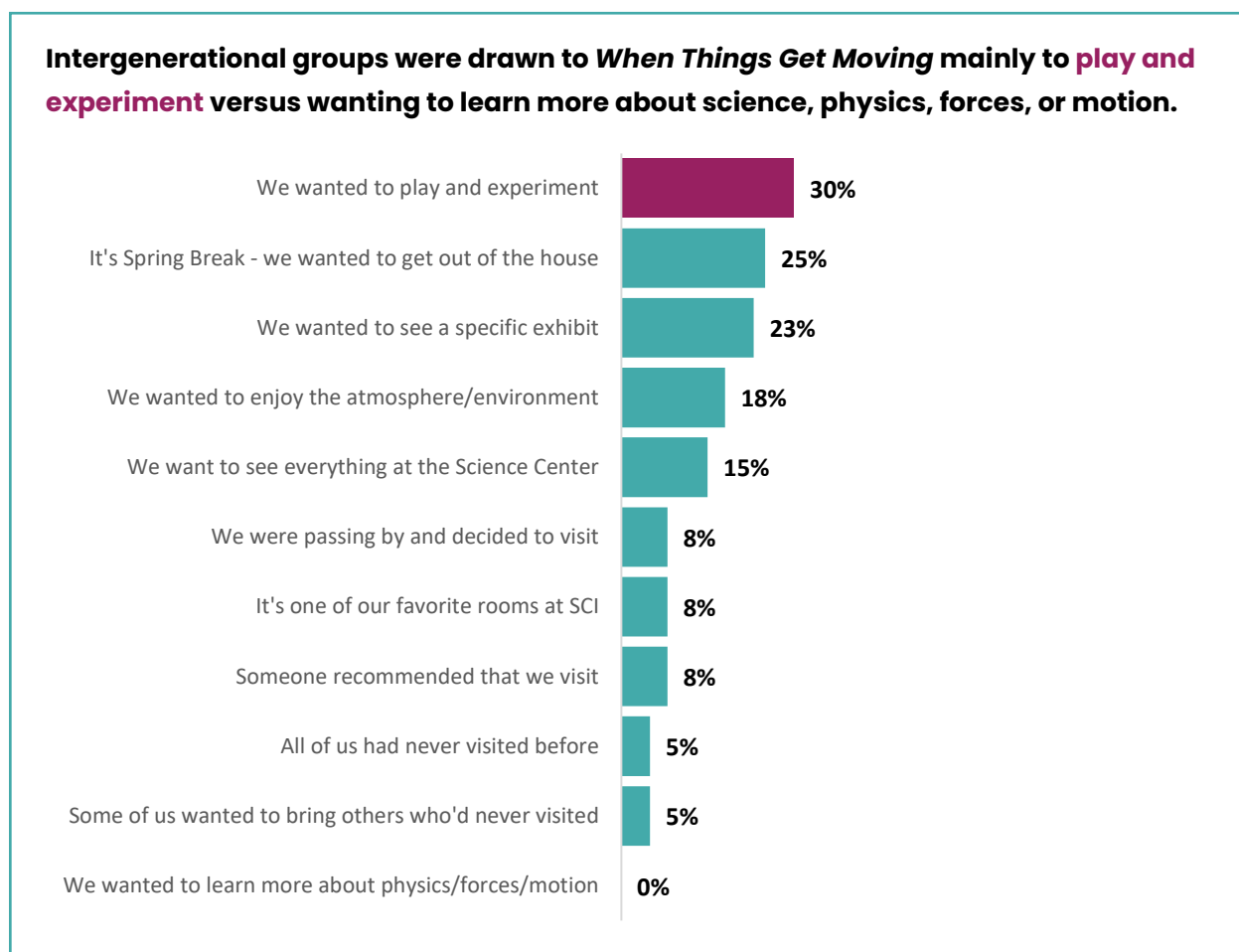
| | |
|---|--|
| Adults Age & Gender Identity | Adult participants range in age from 18-74 years, with a median age of 37 years. Around two-thirds identify as female, and more than one-third identify as male. |
| Children's Age & Gender Identity | Child participants range in age from 6-12 years, with a median age of 11 years. More than one-half identify as female, and the other less than one-half identify as male. |
| Residence | Nearly all intergenerational groups reside in Iowa, while one group each resides in Kansas, Missouri, Nebraska, and South Dakota. Of those who reside in Iowa, a little over one-half reside in Polk County. |
| Past Visitation | Most intergenerational groups are repeat visitors to SCI and to <i>When Things Get Moving</i> . One-quarter are first-time visitors to both the museum and the exhibition. |
| Membership | Among intergenerational groups who are repeat visitors, nearly three quarters are not Science Center of Iowa members. |

¹ All interviews were with two to four individuals (adults and children); typically, one adult and between one and three children.

Motivation to Visit

To begin the interviews, data collectors asked intergenerational groups what drew them to the *When Things Get Moving* exhibition. Data collectors listened to their answers and marked response options accordingly—participants were not shown a list of response options.

About one-third (30 percent) said they visited *When Things Get Moving* because they wanted to play and experiment. One-quarter (25 percent) wanted to get out of the house during Spring Break.² About one-quarter (23 percent) wanted to see or use a specific exhibit in *When Things Get Moving*; many of these groups mentioned the Rocket Launchers and/or Boats and Floats. Nearly one-fifth (18 percent) wanted to enjoy the atmosphere or environment of *When Things Get Moving*, with some describing it as “family friendly” or having “high energy.” Notably, none stopped because they wanted to learn more about science, physics, forces, or motion.



² Note that while visitors were asked why they visited *When Things Get Moving*, their responses sometimes focused more on why they visited SCI in general versus *When Things Get Moving* specifically.

Exhibition Experience

Next, data collectors asked intergenerational groups about their experience in the *When Things Get Moving* exhibition that day, including what they liked most and least and what they would miss most if the exhibition changed.

Overall Reactions to *When Things Get Moving*

Intergenerational groups—whether first-time or repeat visitors—had extremely positive things to say about their experiences in *When Things Get Moving*.

Participants in most groups (children and adults) **named multiple exhibits they enjoyed**, and many said there was nothing to dislike (“everything is fun”). Adults named several things they appreciated about the space: it provides hands-on science learning opportunities (children can “touch and interact”); promotes creativity and critical thinking through iteration (children can “revise things and make them better”); invites families to collaborate (“brings people together”) but also allows adults to easily step back from their caregiving duties (“so much [children] can do without assistance”); and has a motivating energy (“the excitement of the kids”).

At the same time, **many adults (both first-time and repeat visitors) shared critiques**. Mainly, they were turned off by the crowding, citing “long lines” at popular exhibits, competition for materials, and having trouble locating the proper materials (i.e., if children from other groups moved them to another part of the room). One also hoped for more “explanation” of the science behind each exhibit, perhaps through videos.

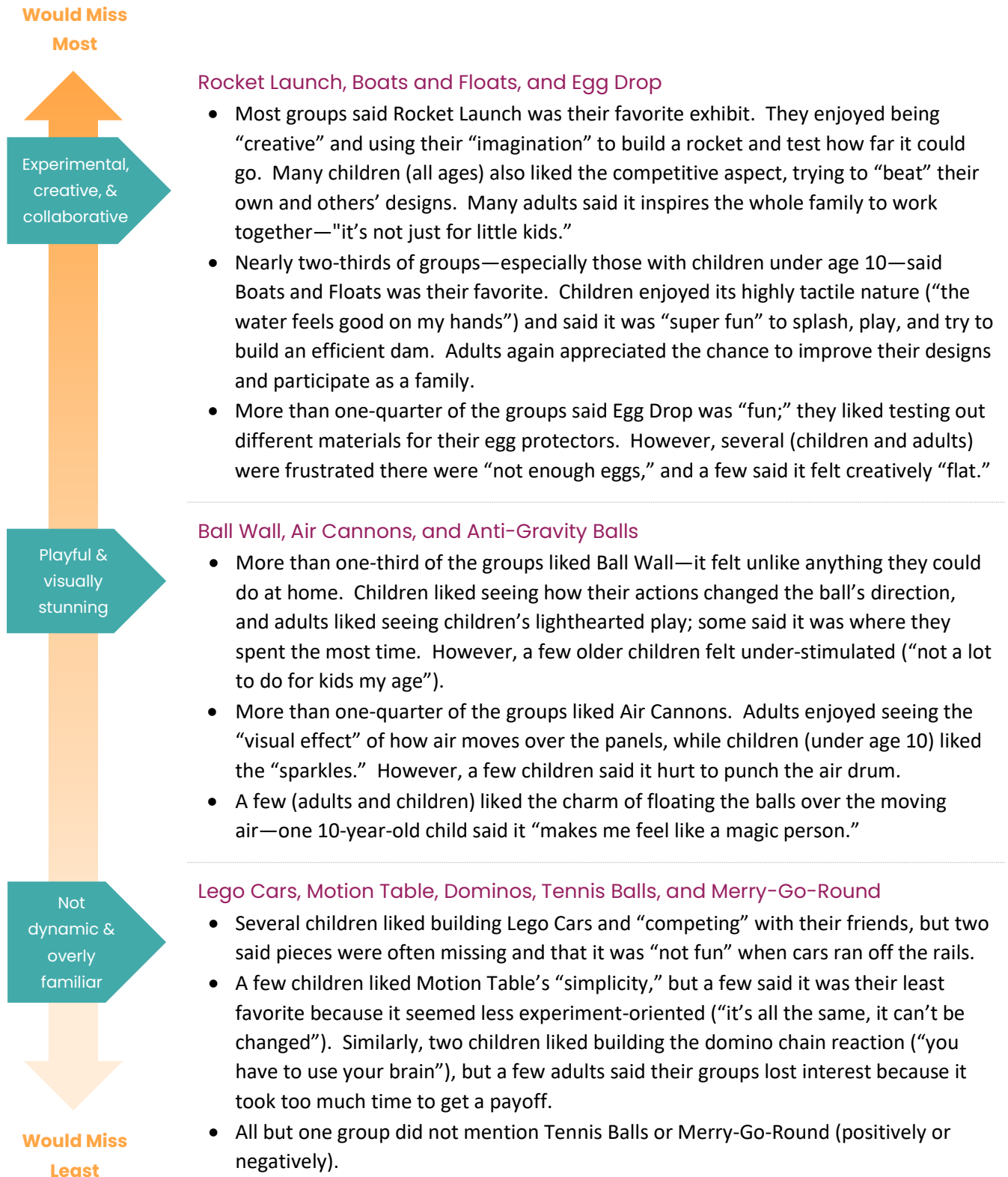
Overall, **children stressed how much they would miss their favorite exhibits** if/when the exhibition changed (“I’d miss everything if it were gone”), but **adults were more open to change**; as one put it, “We’ve been coming here for so many years and everything is still the same.”

“The **energy in here** [is what I would miss if the exhibition changed] ...you walk in and because you see certain things happening with motion and air, and you hear the excitement of the kid, and the **energy of the crowd and activity**.”

—Female, 44 years old

Intergenerational groups also shared many things they liked (and sometimes disliked) about specific exhibits in *When Things Get Moving*. Their comments are presented on the next page, in order from the exhibits they would miss most to those they would miss least.

Reactions to Specific Exhibits in *When Things Get Moving*



Understanding of the Exhibition's Big Idea

Next, intergenerational groups were asked what they thought the *When Things Get Moving* exhibition was “about,” based on their visit experience. Data collectors then showed groups the exhibition’s Big Idea and asked what about it was exciting, not exciting, or confusing.

Understanding of Big Idea from Visit Experience

When asked what they thought the *When Things Get Moving* exhibition was “about,” ideas related to **science, hands-on experimentation, and fun** rose to the top.



The science of “how things work”

In more than one-half of intergenerational groups, participants (both children and adults) said the goal of *When Things Get Moving* is to teach people “the science behind how things work.” They named many STEM branches in their responses, especially physics and engineering (“I assume this is the physics area”) as well as various specific topics like motion/movement, friction, gravity, air pressure, force, and kinetic energy (“They want everyone to learn about energy and motion”). While children’s comments were more general, a few adults specifically perceived a focus on science in our everyday lives; as one put it, “exploring natural interactions with forces and motions that kids have every day.”



Hands-on experimentation

In over one-half of the groups, participants (mostly adults, but also some children aged 10 and over) thought the big idea was about “hands-on” experimentation and problem-solving, stressing how the various exhibits in *When Things Get Moving* encourage “trial and error,” “exploring new things,” and “testing out what works and what doesn’t.” Several adults said seeing their children do activities that challenge them to use their creativity, imagination, and problem-solving skills was the highlight.



Having fun

In around one-half of the groups, children (especially those under age 10) said the exhibition revolves around having fun. While some of their responses were vague (“I think they mainly want people to have fun”), others talked about how “play,” “entertainment,” and “creativity” are central to the experience. Similarly, a few adults said the exhibition helps children learn science without realizing it (“by playing”).

“I would describe “the big idea as 1. Having fun, and 2. **learning while you’re having fun with the experiments you’re doing.** It’s not just sitting and reading a book; you can experience it.”

—Female, 12 years old

Reactions to Big Idea Shown

Most intergenerational groups—including both children and adults—were excited by the exhibition’s Big Idea (at right), pointing out many ideas that piqued their interest, while a few had critiques.

Their specific reactions are described below.

When Things Get Moving Exhibition

Everything around us is always moving. Motion can be straight (like an arrow being shot at a target), circular (like a merry-go-round), up and down (like a pogo stick), zig-zag (like skiing), side-to-side (like dancing). But what makes things move? What makes them stop moving?

*In “When Things Get Moving,” visitors will **play and experiment together** with the **invisible forces around us that control how things move.***

Participants in most intergenerational groups were **excited by the focus on motion**. Many (especially children) said they liked “anything that has to do with motion,” and they were **drawn to the idea that not only are there are many different types of motion** (“doesn’t have to be just up and down”) **but also seeing how these different types of motion manifest in our everyday lives** (“examples from every day, right in front of us”). Many (both children and adults) identified motion examples from the description that they would be excited to see as exhibits in *When Things Get Moving*, either because they made personal connections or sounded fun. For instance, several adults liked the arrow and dancing (“I used to be an archer,” “I like dancing”), while a few children were energized by the zig-zag motion of skiing. Notably, several were turned off by the idea of a merry-go-round exhibit (“would make me sick”).³

Other ideas that stuck out (in a good way) include invisible forces, play/experimentation, and asking questions. One-third (mostly adults, but also a few children), for instance, were **intrigued that there are forces “we can’t see” that control “how things work”** and were curious how the museum would make the invisible visible; as one adult put it, “being able to realize and learn how things work around us is exciting.” Additionally, several were **drawn to the phrase “play and experiment together;”** children said it’s “fun” to try new things, while adults liked the collaboration aspect (visitors experimenting together). And, a few adults **valued the provocative questions** (“What makes things move? What makes them stop moving?”) because they encourage children to be curious about their surroundings.

However, a few groups were less enthusiastic; they had trouble envisioning how the Big Idea would come to life and worried the concepts were too advanced for children. Children in these groups said the description is “not exciting,” and adults agreed, adding that the terminology seemed advanced (“poly-syllabic”) and suggesting caregivers would need to provide support to help children grasp these ideas (“as long as the parents teach them”).

³ These participants did not seem to realize there is already a merry-go-round exhibit in *When Things Get Moving*.

Associations with Core Exhibition Concepts

Finally, data collectors asked questions to gauge intergenerational groups' associations with the core ideas of *When Things Get Moving* (knowing that all groups had just visited the exhibition). These include “the invisible forces around us,” keywords related to the exhibition, and the three laws of motion.

“The Invisible Forces Around Us”

When asked what they thought of when they heard the phrase “the invisible forces around us,” air, gravity, and friction were top of mind for both adults and children.



Air

Many children and adults mentioned air, including how invisible gases surround us (e.g., oxygen, water vapor) and the movement of air (e.g., feeling a breeze when someone walks by). Several also referenced Air Cannons (“when you hit the drum, you make the wall shiver...you can’t see [air] but it’s there”).



Gravity and Friction

Many children and adults also said gravity is the “first thing that comes to mind” and that it is “really important” because it “keeps us glued to the earth.” A few groups said the Egg Drop, Rocket Launch, and Anti-Gravity Balls exhibits show gravity in action, while a few said the Lego Cars exhibit demonstrates friction.



Unsure

In almost one-third of the groups, participants (mostly children ages 6-8) were unsure about invisible forces; one 6-year-old child said, “it makes me wonder, what is a force?”



Motion and Momentum

Several children and adults thought of motion and momentum; their responses were largely vague, though some mentioned “inertia” and “push and pull.”



Social or Emotional Forces

Several (mostly children) thought of intangible social or emotional “forces,” ranging from religion to the fun and curiosity of play.



Magnetics and Electricity

Several children and adults said electricity and/or magnetism came to mind, with one referencing the Star Theater show (“zap presentation”) elsewhere in the museum.



Miscellaneous Ideas

A few groups mentioned other ideas they thought of as invisible forces, such as dark matter, water erosion, UV light, and sound.

When Things Get Moving “Keywords”

Intergenerational Groups were also shown keywords that relate to *When Things Get Moving*—**Energy, Physics, Gravity, Friction, and Motion**. Most recognized them⁴ and gave everyday life examples, though had an easier time doing so for some ideas over others.

Most Familiar

Motion

Most children and adults were **quick to say motion is a familiar idea and named everyday examples** like walking, dancing, biking, roller skating, swinging a baseball bat, jumping, and a current of water. But many (mostly children, but also a few adults) used circular logic to describe motion (e.g., “motion is how things move”).

Gravity

Many children and adults **reiterated that gravity “keeps us down”** and stops us from floating away, with children giving examples like jumping on a trampoline or out of a plane, and adults referencing gravity exhibits in *When Things Get Moving* (e.g., Egg Drop). A few also thought of space (“the solar system,” “black holes”).

Energy

Many children (and several adults) said **energy is “everywhere,”** primarily thinking about their own energy either generally (“I have a lot of energy”) or in specific activities (e.g., running, walking). A few said electricity, power, lights, and the sun are everyday examples.

Friction

Many children and adults said **friction is a familiar concept and described it as “rubbing two things together,”** with they said, “helps you stop,” “slows things down,” and creates heat and static. A few mentioned tires as everyday examples, again referencing Lego Cars.

Physics

Several children and adults **vaguely named activities or exhibits they thought had to do with physics** (e.g., riding a bike, math, Anti-Gravity Balls, Rocket Launch), with little to no elaboration. However, one child said, “physics is how the world works.”

Least Familiar

⁴ See “Understanding of the Exhibition’s Big Idea” section on page 18 and note that many intergenerational groups had *already* mentioned these keywords prior to this point in the interview.

The Three Laws Of Motion

Overall, intergenerational groups lacked confidence when trying to recall the Three Laws of Motion; many adults said their memories from school were not fresh (“it’s been a while”), while most children (especially those under age 10) said they had never heard of them. After seeing the prepared definitions, however, many confidently and accurately provided examples for each Law of Motion in action. Their specific responses are outlined below.



“An object in motion stays in motion unless it is stopped.”

First Law of Motion

Many (children and adults) readily thought of examples of the First Law of Motion. For instance, many said a car or bicycle will stay in motion until friction from brakes or the road slows the car down, and several connected the First Law to exhibits in *When Things Get Moving* (e.g., Rocket Launch and Egg Drop). The prepared example (of a soccer ball in the air) mostly sparked further ideas of this law in action in sports.



“The more massive an object is, the more force it takes to move it.”

Second Law of Motion

Many (especially children) gave examples of the Second Law of Motion, often falsely equating more mass with larger size. For instance, several said it is harder to pick up small items like pebbles than large items like boulders. Others (adults and children) said the pulleys and Air Cannons exhibits are examples of the Second Law in action. The prepared example (of an empty versus full grocery cart) inspired related ideas, like how it is hard to lift a full bucket of water.

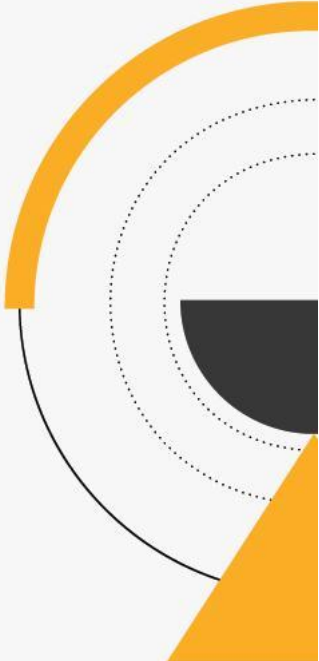


“For every action, there’s an equal and opposite reaction.”

Third Law of Motion

More than one-half (children and adults) said the Third Law of Motion is the most familiar law. While several children gave scientific examples (e.g., a ball thrown up must come down, kickback from a hitting a baseball with a bat), a few adults interpreted the law more abstractly (“every life action has consequences”). After seeing the prepared example (of sitting in a chair), a few said the Third Law applies to walking—as a person walks, the ground pushes back.

04 Appendix



Appendix A: Intergenerational Group Interview Guide

Page 1

Intercept

Hello, today I'm talking with visitors about this exhibition. I would like to ask you and your children some questions that will help the Science Center improve the experience. It will take about 15 minutes.

[make sure you end up with a group of at least one adult and one child between ages 6-12]

- Agree (continue interview)
- Decline (fill out refusal information)

Page 2

Intro

Thanks for talking with me. Today we are going to have a discussion to help the Science Center improve this exhibition over **[gesture to *When Things Get Moving*]**. The Science Center is going to redesign it and wants your feedback before getting started.

Please know that any time I'm asking questions I want to hear from everyone – so adults, you should feel free to answer, and kids you should feel free to answer too. The Science Center really wants to hear from groups of adults and kids your age visiting together.

Also, there are NO right or wrong answers— we just want your honest thoughts and opinions. Anything you say, positive or negative, will help, I promise!

And, as a thank you for participating the Science Center would like to give you a \$15 Starbucks Gift Card—more on that the end!

[Recording consent] Last thing—[speak to adult], I would like to audio record our conversation so I have an accurate record of your feedback. I need your permission to interview your child and record the responses. I'm going to type some notes, but the recording will help me later in case I miss anything. Your responses are confidential—I will not even ask for your names or contact information. I'm the only one who will know what you said. Is that okay with you?

- Agree (turn on recorder and continue interview)
- Decline (continue interview but without audio recording)

[If Agree, start recording and state ID (this is LB1...)]

[If Decline, say “No problem! We can continue without recording. I’ll just take notes.”]

Contextual Questions

1. Is this your first time visiting the Science Center, or have you been before? **[Listen to response and select applicable option]**

- All first-time visitors **[skip to Q4]**
- Some first-time visitors and some repeat visitors
- All repeat visitors

Notes: _____

2. **[if Repeat Visitors]** And are you members? **[Listen to response and select applicable option]**

- No, not members
- Some are members and some are not members
- Yes, entire group are members

Notes: _____

3. **[if Repeat Visitors]** And have any of you ever been to this exhibition **[gesture]**, which is called *When Things Get Moving*, before today? **[Listen to response and select applicable option]**

- None of us have been to *WTGM*
- Some have been to *WTGM* and some have not been to *WTGM*
- Yes, entire group has been to *WTGM*

Notes: _____

4. What drew you all to this exhibition today **[gesture to *When Things Get Moving*]**? What made you want to stop and visit it? **[Listen to response and select all that apply]**

- We were passing by and decided to visit
- Someone recommended that we visit (e.g., family, friend, colleague)
- All of us had never visited before
- Some of us visited and wanted to bring others who had never visited
- We wanted to learn more about physics/forces/motion
- We wanted to enjoy the atmosphere/environment
- We wanted to play and experiment
- We want to see everything at the Science Center
- Other. Please specify: _____

5. What was your favorite thing about it? Why is that? Can you tell me more?

[get a response from the adult and at least one child]

6. What was your least favorite thing about it? Why is that? Can you tell me more?

[get a response from the adult and at least one child]

7. I know you might not have used or tried everything in this exhibition, but based on your experience today, how would you describe what this entire exhibit is about? What is the museum going for? What makes you say that?

[If needed, remind them to talk about the entire *When Things Get Moving* gallery and not just one individual exhibit they may have used or liked]

Page 4

Baseline Questions & Three Laws of Motion Activity

Thanks! Now I want to ask you some general questions. Remember, there is no right or wrong answer, we are just curious what comes to your minds.

[Write visitors' responses as verbatim as possible, labeling if it is the adult or children who speak as you go]

8. Thinking about your experience in this exhibition **[gesture]**, *When Things Get Moving*, what comes to mind when you hear this phrase: "the invisible forces around us?" **[Show phrase on paper]** Can you tell me more or give me an example?

[Listen and probe about what they mean, or why that comes to mind. Get a response from the adult and at least one child]

9. Thank you. Those are interesting ideas. Now I'm going to ask you about some more specific ideas from *When Things Get Moving* **[show list of key words]**. Are any of these words familiar?

[if yes] How do they affect you in your daily life? Can you tell me more about that? Can you give me an example?

[Listen and probe for elaboration or specific examples. Get a response from the adult and at least one child]

10. Have you ever heard of the three laws of motion?

[if yes] How would you describe them?

[if no] That's ok!

Description: _____

I have them all here on cards. Let's go through them one at a time and you tell me if you can think of an example of each one in real life. Ready? **[for each, start by getting feedback from child, and then from adult]**

11. The first law of motion is **[show card and read aloud]**. Can you think of an example of that in action?

Description: _____

Good ideas! Here's one example of the first law of motion that the Science Center likes to use **[flip card over and show example and read it aloud]**.

12. The second law of motion is **[show card and read aloud]**. Can you think of an example of that in action?

Description: _____

Nice! Here's an example of the second law of motion **[flip card over and show example and read it aloud]**.

13. Last one—the third law of motion is **[show card and read aloud]**. Can you think of an example of that in action?

Description: _____

Great! And here's an example of the third law of motion in real life **[flip card over and show example and read it aloud]**.

14. Does seeing these descriptions and examples bring anything else to mind for you? Anything you are wondering about now?

Page 5

Big Idea Reactions

That was fun! To wrap up, I have a short description of the Science Center's vision for this exhibition. I'll read it out loud **[also show on paper]**:

When Things Get Moving exhibition

Everything around us is always moving. Motion can be straight (like an arrow being shot at a target), circular (like a merry-go-round), up and down (like a rollercoaster), zig-zag (like skiing), side-to-side (like dancing). But what makes things move? What makes them stop moving?

*In “When Things Get Moving,” visitors will **play and experiment together with the invisible forces around us that control how things move.***

15. Can you point out at least one thing in this description that excites you? Why is that?

16. Can you tell me which part of this description is least exciting, or maybe even confusing? It is ok if it is, we really want to know. Can you tell me about that?

17. Here is my last question. What do you think you'd miss most about this exhibit if it changed **[gesture to When Things Get Moving]**? Why is that? **[Check all that apply and write their reasons, noting each person if they have different comments]**
 - Names specific exhibit
 - Overall look and feel
 - The energy of the space
 - Something else

Reason: _____ [write in the specific exhibit if named] _____

Great, thank you so much! Before I let you go, I have a few quick background questions for you.

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Visit Group Background Information

1. May I ask each of your age(s) and the gender(s) you identify with?

Adult 1 Age: _____

Adult 1 Gender: _____

Adult 2 Age: _____

Adult 2 Gender: _____

Adult 3 Age: _____

Adult 3 Gender: _____

Child 1 Age: _____

- Under 6
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- Over 12

Child 1 Gender: _____

Child 2 Age: _____

- Under 6
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- Over 12

Child 2 Gender: _____

Child 3 Age: _____

- Under 6
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- Over 12

Child 2 Gender: _____

2. What is your zip code? [only need 1 per group, gather from intercepted adult]

[Address adult] As a thank you for your time, we are offering a \$15 Gift Card **[hand them the gift card]**. Thank you so much, and have a great rest of your day!

Page 7

Data Collector Log

1. ID **[Initials#, e.g., LB1]**: _____
2. Data Collector Initials
 - LB
 - ML
3. Day
 - Weekend
 - Weekday
4. Time:
 - Morning (before 12pm)
 - Afternoon (after 12pm)
5. Notes—describe any important context about data collection for this interview **[Write PRETEST or TRAINING if applicable]**:

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Refusal Log

1. What age(s) were the children in the group? Check all that apply
 - Under 3
 - 3-5
 - 6-8
 - 9-11
 - 12-17

2. Observed gender of intercepted adult:

- Man
- Woman
- Another gender identity
- Unsure

3. Refusal reason [**Write PRETEST or TRAINING if applicable**]: _____

6. Data Collector Initials:

- LB
- ML

7. Day:

- Weekend
- Weekday

8. Time:

- Morning (before 12pm)
- Afternoon (after 12pm)

Appendix B: Intergenerational Group Testing Materials

During Intergenerational Group Interviews, participants were shown some materials on paper that related to preliminary ideas and concepts related to the revitalization of the *When Things Get Moving* exhibition. The slides were collaboratively developed by Kera Collective and the Science Center of Iowa, and can be found here:

[When Things Get Moving Front-end Evaluation, Interview Testing Materials](#)

With gratitude, Kera Collective thanks the Science Center of Iowa for the opportunity to help shape the When Things Get Moving exhibition.

Our doors are always open—don't hesitate to reach out with anything that's on your mind!



Kera Collective explores, measures, and furthers the meaning-making that occurs between museums and people.

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