Designing Podcast Content to Spark Family Conversations:

Learnings from the Brains On! Podcast

BRAINS ON! UNIVERSE

Science Museum of Minnesota

Introduction

Many families spend a considerable amount of time together in their vehicles, and podcasts can provide a highly engaging, screen-free educational alternative for children during this time.

In 2019, we carried out a study to explore the listening experience of children and their families with the popular children's podcast Brains On!. We learned that one of the places most children (91%) listened to Brains On! was in a vehicle with their family. Among these families, almost all had a conversation (99%) while listening (Grack Nelson et al., 2019). These findings piqued our curiosity about the listening behaviors occurring in this unique everyday space. The fact that most families engaged in conversation while listening was intriguing. We wanted to know what those conversations sounded like and what was prompting them. Was there something about the way the Brains On! podcast was designed that helped spark and facilitate family conversations in this space? There were some design features that the Brains On! team assumed might lead to interaction, such as their Mystery Sound segment. However, we wanted to test these assumptions and understand what specific design features prompt family members to engage verbally with the content and lead to meaningful conversations.

With National Science Foundation funding, we conducted a first-of-its-kind video-based research study to see how families interact with each other while listening in a vehicle environment and how a podcast can help facilitate that engagement. We are excited to share what we learned from that study. In the following pages, you'll find details about the specific design features of Brains On! that prompted verbal engagement by children and adults and the nature of the resulting conversations. We hope what we learned about Brains On! can help other content creators make design choices that enhance family interactions and learning conversations, which in turn support children's interests, knowledge, and curiosity.

Even though this study focused on the vehicle environment, we know from our research that many families also listen at home together. Parents noted that there can be more distractions at home and family members may be more prone to multitasking while listening, which could lead to fewer conversations. However, the learnings we share here can be helpful for sparking conversations wherever families listen together.

How Was the Research Conducted?

To understand how families interacted with each other while listening in their vehicles and how the podcast design sparked that interaction, it was important to see firsthand what that listening experience looked and sounded like. Science Museum of Minnesota researchers collected video data from 32 families as they listened to the Brains On! podcast in their cars. Video and audio recording equipment (GoPros and wireless microphones) were set up in each family's vehicle to capture their experience. While driving, families listened to a 30- to 45-minute Brains On! episode that was new to them, chosen from a list of nine episodes. Families were given the episode on an iPod or CD and instructed to listen as they normally would, without any expectations about interaction from the researchers. Each family drove a route in an already-familiar neighborhood. Afterward, families were interviewed about their listening experience. Families participated in a follow-up interview a week later to view and discuss video clips of their family listening together. Each family received $100 for participating in the study.

The study included 32 Brains On! listener families with children aged 6 to 12 across Minnesota and the Los Angeles area. All participant families had listened to Brains On! together in a car within the past year and had varying listening habits. Family groups varied in terms of family size, structure, and individual demographic characteristics, including race/ethnicity, gender identity, and age of children.

What Is the Brains On! Podcast?

Brains On! from American Public Media is an award-winning science podcast for kids and curious adults. Each week, a different kid co-host joins Molly Bloom to explore questions kids ask about the world. Its mission is to encourage kids' natural curiosity and wonder using science and history . . . but there's no age limit on curiosity.

Brains On! engages and educates children about the core ideas of STEM in a creative and highly entertaining way. The target audience is children aged 5 to 12, but program content and presentation are intelligent enough to also appeal to adults and older children. Episodes range from 20 to 45 minutes in length. Each episode presents ideas from a variety of STEM disciplines, featuring sound-rich explanations of concepts through creative skits, fun characters, original songs, games, and interviews with top scientists. All content is delivered in a kid-friendly way for easier comprehension. To maintain listeners' attention, the show is produced with short segments. The episodes use a lighthearted, humorous approach to make complex STEM information accessible. To provide an interactive experience, hosts encourage the audience to participate with the show by doing things like sending in drawings, and photos of plants and animals they discover in their backyard, or posing questions to be answered in future episodes.

How Did Brains On! Spark Family Interactions?

There were several design features of Brains On! that sparked family interactions. While each episode contains different content, and the design features may be adjusted accordingly, they generally follow the same structure and are included with the same intention. There were five primary ways that the design of Brains On! sparked interactions among listeners, and while these findings are not intended to be prescriptive, each design feature is summarized below to provide ideas and insights for how other creators may spark interactions amongst their own listeners.

1. Feature Kids Questions
2. Invite and Share Listener Contributions
3. Pose Questions to Kids
4. Gamify Science Learning
5. Share Science Facts in Creative Ways

Feature Kids Questions

Brains On! encourages children to ask questions about their world and submit them to the podcast. Each episode's topic is based on questions children send to them, thus grounding all episodes in children's STEM interests. An episode's topic is introduced by hearing the children who submitted the questions read them aloud. This approach emphasizes the authenticity of the questions and brings a variety of young voices to the show.

In some episodes, Brains On! included a segment called Moment of Um, in which a child's question unrelated to the main topic is featured. The child's first name is often included, helping to bring the voice to life. This segment has two parts: first, the child reads their submitted question, and later in the episode, they restate it before an expert provides the answer.

Examples of Moment of Um questions that led to family interactions:

- *"Do we sneeze when we are sleeping, but we just don't notice?"*
- *"Why do we have tongues?"*
- *"Do we have our own gravity, like how the Earth pulls stuff toward it?"*

When children hear other kids' questions on the podcast, it can spark a variety of responses. Child listeners might make a personal connection to a question, demonstrate their prior knowledge, or wonder about the answer together with their family. Adults may use these questions to initiate discussions with their children and explore their perspectives and understanding. After hearing questions from children, in their own voices and words, child listeners may share their own curiosities about the world or similar questions they've considered themselves.

Feature Kids Questions

Moment of Um conversation example:

My name is Libby, and I am eight years old, and I live in Nederland, Colorado, and my question is, do we sneeze when we are sleeping, but we just don't notice? Bye.

Parent: What do you think? I don't think I sneeze when I'm sleeping. And if I do, I think I wake up. [Laughs] [Imitates snoring and sneezing and waking up suddenly] Like have you ever woken up from a sneeze?

Child (9 years old): No.

Parent: Me neither.

Child: Maybe you do it in the middle of your sleep and you're just like "Achoo" [Snore] Achoo [Snore] Achoo [Snore]

Parent: Maybe.

[Parent turns down podcast]

Child: Achooo.

Parent: [Yawns.] I feel like if you sneeze, you'd wake me up.

Child: [Laughs]

[Podcast in background]

[Parent turns up podcast]

Parent: And if I sneezed, I'd wake you up. Sometimes.

Child: Oh, I slept through a tornado siren.

Parent: [Laughs]. That's true, that's true. That's true, you might not wake up, but I would probably wake up.

Invite and Share Listener Contributions

Invite Kids to Contribute Content

Brains On! encourages listener submissions for future episodes through callouts, a design feature that asks children to submit responses to a specific question. The fun and open-ended nature of the callout questions encourages child listeners to use their imagination to submit creative responses, often in line with their own interests and knowledge.

Example of a callout prompt that sparked interaction:
Right now, we're working on an episode all about spacesuits. And that got us thinking, what if we could have cool super suits that let us do something right here on earth? Well, listeners, we want to hear your super suit ideas, too, so please send them to us.

Callout questions provide great opportunities for family engagement. When a callout question was in an episode, most families (81%) responded to it. The invitation to send something in can cause child listeners to think aloud unprompted about what they might submit for their own idea, sparking children's imagination and creativity. Adults may use the prompt as a guide to ask their children what their own response would be if a child doesn't respond themselves. As we saw firsthand, children don't need to submit their ideas to Brains On! for these prompts to provide fruitful family conversations.

Features Kids' Submissions

Children's callout submissions are then featured on the Brains On! episode about the relevant topic. Children of various ages and gender identities are included, reading their own submissions during the episode in their own words.

Listening to children's callout responses can also prompt interactions. Hearing responses from previous questions read within an episode can prompt children and adults to explore what their own answers might be or if they had similar ideas. We observed listeners building on a child's contribution by relating it to their own experiences or noticing where there were differences. Adults also used these moments to direct their child's attention to the podcast and encourage them to share their own thoughts.

Pose Questions to Kids

Brains On! hosts strive to pose questions to the child co-host in a way that encourages curiosity and creativity around science content and to converse with them in a supportive and respectful manner.

Host/Child Co-host Conversations

In every episode, the Brains On! host interacts with a kid co-host, treating the child as an equal. The child co-host's voice is centered as the host asks them questions about the episode topic, their own experiences, or their prior knowledge. The host responds supportively as the child shares their response, ensuring the child co-host's ideas, experiences, and scientific curiosity are at the forefront.

The host asking questions of the child co-host was fruitful in sparking interactions within listener families, particularly among children. Listeners shared with each other their own ideas and personal experiences related to the question or asked follow-up questions. Some listeners even responded to questions as if they were talking directly to the host, reflecting the Brains On! philosophy that the child co-hosts act as surrogate listeners.

It wasn't just the host's questions that sparked interactions; the child co-hosts' answers to the host's questions also elicited engagements from listeners. Listeners would add on to the child co-host's responses with their own personal experiences or point out how they also knew what the child co-host had shared. The conversational structure provided ample moments for listeners to respond to questions and jump in with their own ideas.

Gamify Science Learning

Brains On! incorporates game-type activities within its episodes to engage listeners in fun and interactive science learning experiences. While the games are presented as interactions between the host and co-host, they are designed to support listeners in playing along.

Mystery Sound

The Mystery Sound is a popular guessing game in each episode where the host and co-host try to identify a sound sent in by a young fan. Podcast listeners engage at two points. First, when the sound is introduced and played. The co-host makes a guess and discusses their thoughts with the host. There's a second opportunity to engage later in the episode; the sound is played again, the co-host gets another chance to guess and discuss, and the answer is revealed. The answer is accompanied by a recording from the child who submitted the sound. This game allows listeners to use the science skill of observing the world around them through listening, gathering data on what they are hearing, and making inferences about the sound's source.

The Mystery Sound sparked engagement for all 32 families in the study. We noted a variety of ways families interacted during the Mystery Sound. Typically, at least one child would voice a guess. Adults also guessed more than half the time, often after responding to a child's guess. Children occasionally verbalized their reasoning or evaluation of the sound, which occurred more frequently for sounds that were already familiar or less obscure. Adults would often encourage children's participation with questions such as, "What do you think?" after hearing the recording to initiate guessing or thinking out loud.

This recurring feature also supported repeat listener families in developing their own routines and patterns. As they know what to expect in every episode, repeat listeners were able to develop guessing systems and questioning patterns, and were often observed to be waiting for the feature as they listened. Some listeners responded verbally to the Mystery Sound's introductory music at the start of the segment, and adults used the musical cue to direct children's attention to the game. We noticed listeners verbalizing the Mystery Sound jingle as it played and looking at each other in anticipation as they waited for the game to start. Once the mystery sound was played, some repeat listeners began guessing or prompting each other to guess before the host prompted the child co-host to do so.

Gamify Science Learning

Mystery Sound example conversation:

Molly: *That's some of our collection of mystery sounds. Do you want to open one?*

Violet: *Hmm. I'll try this one.**

[Whispering Mystery Sound jingle]

Child (8 years old): [At same time as podcast] Mystery sooound. I don't know why I said that.

Molly: *Ok. Let me unscrew the cap. Ok. Here it is. [Sound plays]*

Child: Like a wrench or something? [Laughs] Like a wrench, like —

Adult: What do you think it is?

Child: Like a wrench tightening a bolt or something?

Adult: [looks in rear view mirror] It sounds like crushing cans, a little. [Mimes crushing a can]

Child: Oh yeah! Like grabbing a can and just like crushing it with your hand?

Adult: Mhmm.

Molly: **Ok Violet. What is your guess?*

Violet: *I have no idea.*

Molly: *Do you want to hear it again?*

Violet: *Yeah, yeah. [Sound plays]*

Child: Oh! Yeah, that's it, that's it.

Adult: You think so? [looks in rear view mirror]

Child: I heard a little sound like every time I grab a can when I was [I]I was crunch it a little bit and I always hear a little bink —

Violet: *It kind of sounds like someone like crushing a can maybe.*

Adult: Aha, she just said crushing a can.

Child: That little sound, it's a little like popping, it's like a pop — like a — like, like cracks sound.

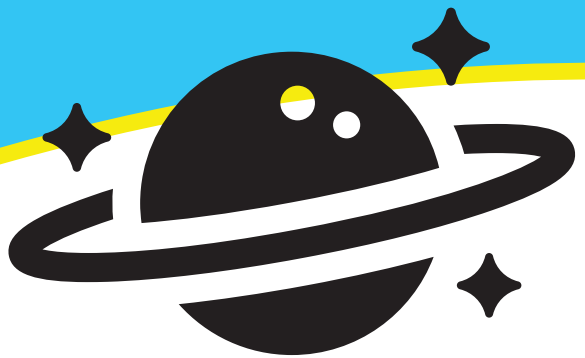
Gamify Science Learning

Interactive Games

Interactive games are typically quiz-style, play-along games between the host and child co-host that are included to introduce content in an entertaining way. Interactive games are useful for sharing many short, interesting facts about a topic without getting too bogged down in complex scientific details. For instance, in an episode about sweat, a game called “Sweat or No Sweat” had the child co-host guess whether certain animals sweat, followed by the host providing the answer and additional fun facts about the animals.

The games are designed in a back-and-forth structure to provide a clear engagement opportunity for listeners, with the host often setting up the game by asking the co-host prompting questions such as, “Are you ready to play?” Children’s engagement usually began with them answering the quiz questions aloud. Adults, on the other hand, often initiated interaction by pointing out the questions to children or prompting them to answer using guiding questions such as, “What do you think?” Adults sometimes expanded upon the game by posing different but related questions or making personal connections to the content for themselves or their children.

Share Science Facts in Creative Ways



Kids love a science factoid, the more surprising and obscure, the better. We know from prior research that child listeners enjoy sharing science facts they learn from Brains On! (Grack Nelson et al., 2021), and in this study, we saw children and their adults engaging directly with science facts they learned while listening.

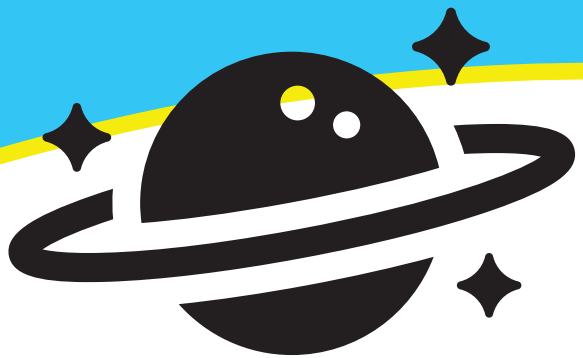
Brains On! shares a broad range of science information in each episode in a variety of kid-friendly ways, such as the previously described interactive games. Brains On! also includes skits with short, digestible sections of content, interspersed with humorous elements, where listeners hear science facts and make connections to prior knowledge. The child co-host interviewing an expert is a more traditional means of presenting information but still finds ways to include the fun science facts and ways to connect with children's experiences.

Skits and Stories

Brains On! uses comedy sketches, skits, and stories with historical, anthropomorphized, or made-up characters to help explain a scientific idea or topic. Skits and sketches are often silly and at times modeled after something from pop culture (which we observed can help draw in adults).

A majority of families (81%) had interactions while listening to skits. Interactions were often prompted by the skits' characters or hosts sharing intriguing science facts; at times, the use of humor to convey scientific information helped spark conversation. Family members would ask each other questions about the science facts being shared, and adults would sometimes check to see if children understood something they had heard. Adults also pointed out interesting science facts to children by repeating the fact or making short exclamations, such as "Wow!" This helped children notice these interesting facts, and would often lead to conversation.

Share Science Facts in Creative Ways



Experts on the Show

Most episodes feature a kid co-host interviewing an expert about the show's topic. Brains On! intentionally chooses the experts based on their background and ability to clearly communicate complex information in kid-friendly language.

Over half of families (60%) had interactions during an expert interview, particularly when experts shared an interesting scientific fact, a real-world example, or personal experience. When experts share science information, it can support listeners to ask questions about the topic, connect the topic to their own personal life, or share their own prior knowledge about the subject. At times, adults may point out some of the new science information, repeat key concepts, or ask questions to extend learning.

Example from expert talking about black holes:

> ***Expert:*** *And by that we mean we like to compare the mass to the mass of the sun, our own star, which is by itself already very, very big. And we like to use a solar mass, the mass of the sun, as a unit like how you would use a pound as a unit to weigh ourselves. So in the units of the sun, these black holes, the biggest ones that I have found, they have a mass about 20 billion times that of the sun.*
>
> **Parent 1:** Whoa.
>
> ***Expert:*** *And they are at a distance of millions and millions of light years away from the earth.*
>
> **Child (5 years old):** Ten billion times bigger?
>
> **Parent 2:** Yeah.
>
> ***Expert:*** *So a light year is a distance light can travel in one year and . . .*
>
> **Child (7 years old):** And sometimes in very rare cases they can be even bigger than that.

Lessons Learned from Brains On!'s Design

Below are some of the key lessons learned about Brains On!'s design that sparked family engagement while listening together in a vehicle environment.

Feature Kids' Questions

Feature questions kids wonder about, in their own words and voices. When listeners hear other kids on a podcast in authentic ways, it can inspire them to engage in conversations and share their own thoughts, ideas, questions, and personal connections to the content.

Invite and Share Listener Contributions

Request listener contributions to help facilitate family interactions. Brains On! had callouts for listeners to submit responses to a question related to a future episode topic. The fun, open-ended nature of the callout questions sparked conversations, as child listeners thought about what they might submit as a response.

Regularly share children's submissions in their own voices. Episodes that featured callout submissions read by children sparked family conversations and encouraged creative and imaginative thinking.

Pose Questions to Kids

Pose questions to a child co-host, as it can encourage listener engagement. Hosts directing questions to the child co-host, rather than the listeners, led to engagement and interaction from listener families. Families talk about the listeners' own personal connections and prior knowledge related to the question.

Lessons Learned from Brains On!'s Design

Gamify Science Learning

Include play-along elements that are fun for both adults and kids. Play-along activities can lead to high levels of joint family engagement and conversation, where family members wonder together, share their prior knowledge, and discuss personal experiences to answer the game's questions.

You don't need to talk directly to listeners to get them to play along. Brains On presents games as interactions between the host and co-host, and listeners readily played along out loud without being directly prompted, whether it was guessing the Mystery Sound or joining in quiz-type games.

Add sound effects to cue the start of a common feature and help hold attention. A brief jingle or sound effect used to start a game can help listeners focus attention and get ready to participate together, establishing familiar interaction routines.

Share Science Facts in Creative Ways

Include fun, attention-grabbing, memorable facts. When skits and experts shared short, interesting science facts, listeners directed their attention to the podcast by repeating the fact, sharing prior knowledge, or checking in with other family members for their thoughts.

Present complex topics in more accessible, kid-friendly ways. Skits provided a means to deliver content-heavy information in a novel or silly way, making it more digestible and engaging.

References and Citation

References: Grack Nelson, A., Dominguez, J., & Van Cleave, S. (2019). Brains On! research: Listener survey. Science Museum of Minnesota. https://files.apmcdn.org/production/3cc59c392f673b0ce7b97e4b4bd97e56.pdf

Grack Nelson, A., Her, C., Van Cleave, S., & Dominguez-Flores, J. (2021). Children's STEM-focused podcasts as promising learning experiences: Research summary. Science Museum of Minnesota. https://files.apmcdn.org/production/dfd304f691e8785c1a166b15bbecb341.pdf

Suggested citation: Grack Nelson, A., Tsakakis, E., Christian Ronning, E., Bloom, M., Sanchez, M., Totten, S., & Pearlman, B. (2025). Designing podcast content to spark family conversations: Learnings from the Brains On! podcast. Science Museum of Minnesota and American Public Media.

If you have questions about this study, please contact Dr. Amy Grack Nelson, Director of Evaluation and Research in Learning at the Science Museum of Minnesota, at agnelson@smm.org.

About

About the Researchers

This research was carried out by the Science Museum of Minnesota's Department of Evaluation and Research in Learning. We study how people learn STEM in informal and everyday places like museums, classroom programs, family vehicles, outdoor spaces, and more. For questions about the research, please contact Dr. Amy Grack Nelson at agnelson@smm.org.

About the Science Museum of Minnesota

Through education, in-person experiences, online learning, and everything in between, the Science Museum of Minnesota is dedicated to collaborating with our community to create a world where everyone has the power to use science to make lives better. With the help of our visitors, volunteers, staff, and community partners, we're using science to figure out how our world works. Among our interactive exhibits, collection with over two million objects, and continuous scientific and educational research, we believe there's always something new to discover.

About Brains On!

Brains On! is an award-winning science podcast for kids and curious adults from American Public Media. Our mission is to encourage kids' natural curiosity and wonder using science and history . . . but there's no age limit on curiosity.

Funding

This material is based upon work supported by the National Science Foundation under Grant No. 1907014 titled Brains On! the Move: STEM Podcasts as Facilitators of Automobile-Based Family Learning Experiences. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the U.S. National Science Foundation.

Learn more at BrainsOn.org/research