MULTIMEDIA RESEARCH

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LISTENERS' EVALUATION OF
RADIOLAB PROGRAM: *CHOICE*

Report for
WNYC

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Radiolab is a public radio series of hour-long interdisciplinary shows, co-hosted by Robert Krulwich and Jad Abumrad, and produced by WNYC. To help guide the future development of shows, this evaluation, sponsored by the National Science Foundation, gathered feedback from listeners via online and mailed questionnaires in response to a season 4 show entitled *Choice*. The general goals for the evaluation process are:
- To explore what attributes of the format engage and interest listeners*;*
- To examine influences on awareness and comprehension of content; and
- To assess impact on post-listening behaviors.

METHOD

Procedure

Three public radio stations agreed to participate in the evaluation: Oregon Public Broadcasting Radio covering eastern Oregon; Colorado Public Radio covering most of Colorado, and WCPN ideastream covering Northeast Ohio.[1]

Two mechanisms were used to reach different public radio audiences:
1) Each participating station mailed a one-page double-sided written questionnaire and stamped return envelope to a random 500 of their mailing list, for a total of 1500 mailed questionnaires.
2) Two of the three stations emailed a recruitment message directly to their e-lists, totaling about 12,000 recipients, and the third station integrated the message into their weekly e-newsletter delivered to 45,000 recipients.

Both the mailed questionnaire and the emailed message asked recipients to help Radiolab by listening to the program *Choice*, either live or online, and answering an anonymous questionnaire to provide feedback about the show. Radiolab was described as "an hour-long interdisciplinary series hosted by Robert Krulwich and Jad Abumrad." The show *Choice* was described as discussing "how the brain filters through options to arrive at a decision." Participants could listen live or online, and the majority of respondents listened to the program online at their leisure and then completed the online or snail-mailed questionnaire. The questionnaire included open-ended questions, agree-disagree statements and multiple-choice questions related to the evaluation goals stated above as well as anonymous demographic and background questions to describe the responding sample.

Sample

Table 1 presents the demographic and background characteristics of the 248 respondents who listened to *Choice* and completed the questionnaire. Compared with national statistics of NPR listeners,[2] our *Choice* sample, which was recruited from station subscriber and e-lists, has more women, older listeners and more college graduates. Half (50%) of the *Choice* listeners are "very interested in science," which is a equivalent to national statistics of enjoyment in "learning about science and scientific discoveries."[3] One-quarter (25%) of the *Choice* sample feels "very knowledgeable" about "science as a member of the general public," which is equivalent to national statistics of those who feel they have a "very good basic understanding of science."[4]

Table 1. Demographic and Background Characteristics of Listeners of *Choice*

		% of N = 248
Gender	Male	40%
	Female	60%
Age	Range	24-91 years
	Mean	53 years
	Median	56 years
Race/Ethnicity	White, not of Hispanic origin	95%
	Minority	5%
Education	Some college	11%
	College degree	26%
	Beyond college	63%
Interest in Science	Not at all interested = 1	0.4%
	2	4%
	3	10%
	[Median = 4] 4	37%
	Very interested = 5	50%
Knowledge of Science, as member of general public	Not at all knowledgeable = 1	0%
	2	6%
	3	29%
	[Median = 4] 4	41%
	Very knowledgeable = 5	25%

Of those who listened to the Radiolab program *Choice*, 69% completed the online questionnaire and 31% mailed back the written questionnaire, a distribution which might be expected because many fewer people received the mailed request. The online and mail samples differed in only one demographic or background variable; the online sample was significantly younger than the mail sample (means = 47 vs. 65 years; respectively).[5] The subscriber donor lists draw on an older population than the e-lists.

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[2] Pew Project for Excellence in Journalism, State of the News Media annual report, 2009: "NPR listeners…54% are college graduates and 42% are over the age of 50. Most, 58%, are men."
http://www.stateofthemedia.org/2009/narrative_audio_audience.php?media=10&cat=2.

[3] 43% said they "enjoy learning about science and scientific discoveries" "very well." 2006 data in "The Internet as a Resource for News and Information About Science." http://www.pewinternet.org/Shared-Content/Data-Sets/2006/January-2006--Exploratorium.aspx

[4] 20% said their "basic understanding of science" is "very good." 2006 data in "The Internet as a Resource for News and Information About Science."

[5] A two-sample t-test, $t(55) = -9.686$, $p \leq 0.0001$.

Radiolab *Choice* Program

Figure 1 presents how much of the hour-long show respondents reported hearing. Eight out of ten respondents heard the whole show. Nine out of ten respondents heard more than half of the show. Length of listening was not associated with any Table 1 demographic or background variables nor related to answering an online or mail questionnaire.

Fig. 1. Distribution of Amount of *Choice* Show Heard

< 15 mins (4%)
15-30 mins (7%)
30-45 mins (10%)
45-60 mins (79%)
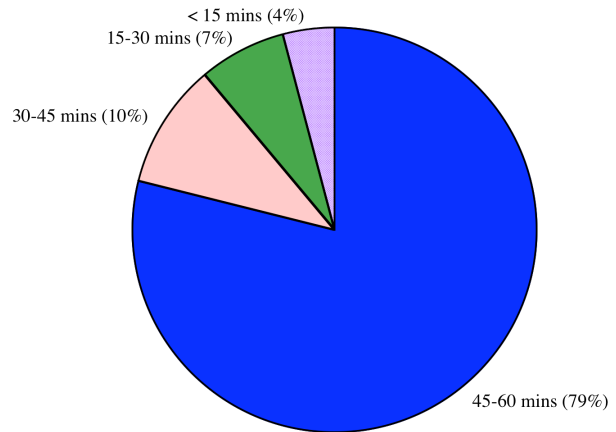
The program, *Choice*, evaluated in this report can be heard online at:
http://www.wnyc.org/shows/radiolab/episodes/2008/11/14

The following is the online description of the hour-long program:

We turn up the volume on the voices in our heads and try to make sense of the babble. On a journey around the country to understand how emotion and logic interact to guide us through our options, we ponder how we get through the million choices and decisions we make every day. Forget free will, some important decisions could come down to a steaming cup of coffee.

How Much Is Too Much?

Turns out, Robert is more impulsive than Jad, and Jad is more analytical than Robert. Shocking, right? Sadly for Jad, Robert's style may help him better navigate the overwhelming number of choices available throughout modern life's expanse of options, which may also lead him to a greater sense of well-being, according to psychologist Barry Schwartz. Jonah Lehrer helps us understand why by introducing us to George Miller's classic paper "The Magical Number Seven, Plus or Minus Two," which explains the ability of the average human to hold about seven pieces of discreet information in working memory at any given time. Any more than that, and, as researcher Baba Shiv demonstrates, our good judgment can be overwhelmed...a problem Oliver Sacks overcomes by allowing himself only limited options and a strict routine.

Overcome By Emotion

Instinct or analysis? Wouldn't things be easier if we could get emotion out of the way and let rational analysis lead? Except that so often, that gut feeling turns out to be right. We explore both extremes. Antoine Bechara, a psychology professor at USC, tells us about the case of Elliot, an accountant who, after having a tumor removed from his brain, became entirely rational. And writer Steven Johnson recounts the powerful grip emotion held over his brain in the years following a frightening event. It turns out we aren't the only ones interested in how the emotional and rational parts of our brains interact to make choices. NPR reporter Mike Pesca talks to Gary Loveman, CEO of Harrah's Casinos, to find out how Harrah's has learned to identify the triggers in casino patrons' decision making processes and use them to create a happier gaming experience, and more loyal customers.

Is Free Will Really Free?

It's scary to think that choice might just be an illusion. Perhaps we are not so in control as we would like to be. In a conversation at the 92nd St Y, Malcolm Gladwell talks to Robert about the common sense of dissatisfaction felt by people required to justify a choice to others before they made it, and he brings up the unsettling idea of priming--that certain stimuli could predispose us toward certain choices or behaviors. Yale psychology professor John Bargh takes us a step further by describing an experiment where researcher Lawrence Williams was able to alter people's opinions without their knowledge using nothing but a simple cup of coffee.

Analyses

Qualitative responses were sorted by keyword and key phrase related to show content and attributes. Reported percentages are rounded off in text and tables. Quantitative variables were analyzed for relationships with demographic and background variables, except ethnic/racial status because of the small number of minorities. To explore possible significant relationships and differences, appropriate statistics were performed including chi-square analyses, Spearman rank-order correlations, and t-tests. Only statistically significant findings at $p \leq .01$ are reported in the text and footnotes.

RESULTS: ENGAGEMENT AND INTEREST

Most Salient Attributes of Show

Listeners were asked to describe the program to someone who was unfamiliar with the show or the Radiolab series. Answers to this open-ended question reveal what listeners feel are the most salient attributes of the show. Four attributes rise to the top of the list as engaging listeners:
(1) Exploration of a topic from different viewpoints utilizing research studies and anecdotes;
(2) Presentation of thought-provoking, surprising or non-intuitive information;
(3) Fun and humorous treatment of content; and
(4) Clear and accessible explanations.

- 37% of listeners described the show as focused on a <u>central theme that is analyzed from different viewpoints and illustrated by various experiments and personal stories;</u> e.g.,

  A show which takes an inherently interesting aspect of the human experience and then dissects and analyzes the "why" and "how" of that experience, through discrete vignettes.

  It's a mish-mash of scientific anecdotes about a central concept.

  It focused on a particular subject and comes at it from various directions. Scientific explanations explored. Practical experiments.

  Casual conversation around a topic of interest, pulling in specialists and research to answer questions.

  Radiolab is a program that takes a topic and looks at different aspects of it. I like it because they bring in real studies and statistics and facts.

  It's a program that takes interesting topics and looks at them from several different perspectives with commentary/interviews from area experts and examples from the hosts to illustrate points.

- 33% described the show as <u>interesting, thought-provoking, surprising, fascinating</u>, e.g.,

  Interesting reports on social science/science research.

  I would probably just discuss the interesting facts presented in the show.

  It's interesting and intriguing.

  A program that invites you to think.

An incredibly eye-opening show about being human.
Provocative, thinking, interesting, ideas and discussion.
Listen to some ideas that might surprise you.
Fascinating review of the psychology of "choice."

- 24% described the show as <u>entertaining, fun, engaging, quirky</u>, e.g.,
  I described it to my husband as a science program that is entertaining.
  Radiolab makes science fun.
  A witty look at how the brain makes choices.
  In a really fun and engaging way we learn about why it's so difficult to decide which cereal to buy.
  Kind of quirky and entertaining, not dry tech stuff or neurological theory.
  It's a quirky, offbeat program that explores interesting questions.
  A couple of guys explain scientific topics in a humorous way.

- 21% described the show as <u>informative, accessible, easily understood</u>, e.g.,
  A very easy-going conversational way to learn about what makes people decide what they do.
  Radiolab is accessible to all, even those "not interested" in science because it exposes the mystery behind the universal experiences.
  This is a science-oriented show that brings an idea down to earth for the lay person.
  It's wonderful! Fast paced – easily understood by us "lay" persons. It's impossible to listen to and not learn something new.

- 10% spoke <u>positively about the editing of the show</u>, e.g.,
  It's a totally new, innovative style of radio production that is more like a lively conversation among friends (complete with background sounds that make you feel like you are traveling with the hosts on their quest for knowledge) than most radio programs.
  It's heavily produced (lots of sound effects, interesting audio cuts) to make it more like (gasp) TV.
  Radiolab is this neat show that explores something in depth and has a lot of fun sounds to it that makes it memorable.
  It employs a lot of art (music, sound effects) that make for interesting radio listening.

- 7% compared the show to a <u>science-focused *This American Life*</u>; e.g.,
  It's like This American Life but about science!
  It's the nerdy love child of This American Life and Mr. Wizard.
  Radiolab takes a topic each week and tells stories to illustrate the topic. It's like This American Life but takes a more scientific approach.

- 4% spoke <u>negatively about the editing of the show</u>, e.g.,
  Affected, annoying, distracting, more about the little buttons the producer is twiddling than the content. It has a "look at me" quality to the editing that makes me turn it off every time the show comes on.
  A somewhat intolerable hour, due to the addition of electronic sound effects that get on my nerves.

Cutsie sound editing.
Two guys talking about science with interviews of researchers and mildly annoying sound
  effects.

Appeal Ratings

Listeners rated their agreement with a series of statements about the appeal of the show, *Choice.*
Figure 2 below presents proportions of listeners' agreement and disagreement with statements:
- 92% of listeners enjoyed listening to the show.
- 94% felt the show made them stop and think at times.
- 91% liked learning how scientists carry out their research.
- 81% were likely to tune into the next Radiolab show. Likelihood of listening again was
  highly correlated with enjoyment of the show (r_s = .72) and enjoyment of the hosts (r_s = .66).
- 80% enjoyed the interaction of the two hosts, Jad and Robert. Enjoyment of the hosts was
  highly correlated with enjoyment of the show (r_s = .68).

Fig. 2. Percent of Agree/Disagree Responses to Statements about Appeal of Show (N = 248)
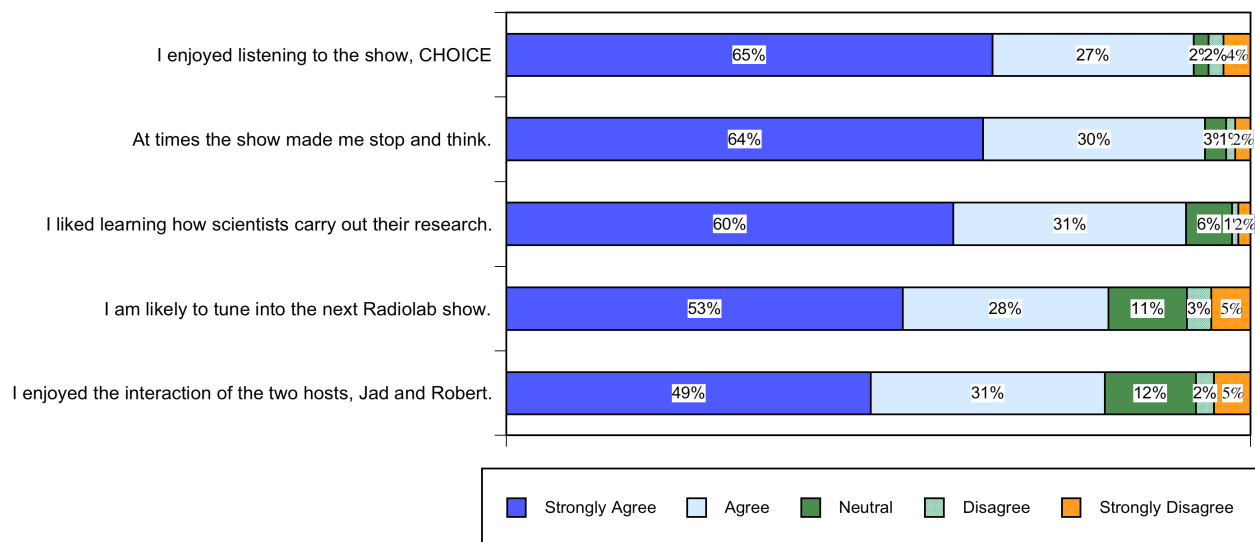
Comparison of mean agreement ratings for the demographic and background variables reveals significant differences only for age on four of the five appeal statements. Twenty, thirty and forty-somethings provided similar mean ratings. Compared with listeners over 50 years old, listeners younger than 50 enjoyed the show more, felt the show made them stop and think more, were more likely to tune into the next show and enjoyed the hosts' interaction more (see Table 2). In spite of this difference with younger listeners, the older listeners were still highly engaged with the show, as indicated by high mean agreement with the statements in Table 2.

Table 2. Mean Ratings for Appeal Statements by Age Group

Statements	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I enjoyed listening to the show, CHOICE					4.8 ($\leq$ 49 years) 4.3 ($\geq$ 50 years)[6]
At times the show made me stop and think.					4.7 ($\leq$ 49 years) 4.4 ($\geq$ 50 years)[7]
I am likely to tune into the next Radiolab show.					4.6 ($\leq$ 49 years) 4.0 ($\geq$ 50 years)[8]
I enjoyed the interaction of the two hosts, Jad and Robert					4.6 ($\leq$ 49 years) 3.9 ($\geq$ 50 years)[9]

Appeal of Host Interaction

Listeners were asked how they feel about the interaction of the two hosts, Jad Abrumrad and Robert Krulwich. Almost nine out of ten listeners (88%) wrote positive comments about the hosts' interaction. The interactions were mostly described as entertaining, having good chemistry and a conversational tone. One out of ten listeners (12%) felt the hosts' interactions were silly, forced or distracting.

- 18% described the interactions as <u>funny, humorous, entertaining, amusing</u>; e.g.,
  Funny, I enjoy it.
  Their interaction is enjoyable and funny.
  The conversation is engaging and funny.
  Lively, entertaining, humorous.
  They are both amusing and entertaining.
  They are amusing. I enjoy listening to them.

- 17% focused on how the hosts' <u>chemistry, how they play off each other, complement or balance each other</u>; e.g.,
  I like it a lot – they have an interesting chemistry and give and take.
  Good chemistry between them.
  Good chemistry and complementary methods of communication. A good team.

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[6] A two-sample t-test to test the effects of age group on show enjoyment ratings revealed a significant difference between groups, t (228) = 5.502, $p \leq 0.0001$.
[7] Two-sample t (238) = 3.114, $p = 0.002$.
[8] Two-sample t (234) = 4.240, $p \leq 0.0001$.
[9] Two-sample t (228) = 6.426, $p \leq 0.0001$.

I think they seem to get along very well and play off of each other's interests. They
  complement each other.
The hosts complement each other.
They play off one another wonderfully!
Great; they play off each other really well.
A good balance.
They seem to be good collaborators. They balance out each other.

- 10% described the interaction as having a casual, comfortable, conversational tone; e.g.,
  They are ok together, very casual.
  Very casual – generates a feeling of being part of the discussion.
  Their dialogue seemed natural and comfortable; as if I were sitting in on a conversation
    among friends.
  Enjoyed their conversational style.
  I think their interaction is a large part of why this show works. I enjoy the conversational
    style, and it feels like I'm sitting at a coffee shop with them talking about really interesting
    things.

- 8% specifically referred to the hosts' interaction positively as "banter"; e.g.,
  5 stars, really like the banter.
  It is fine. Their banter makes the show more lively.
  It was ok. Familiar, light-hearted banter.
  I liked it. Sounded spontaneous most of the time vs. carefully rehearsed, with good natured
    banter and teasing.
  A little too much at times, but generally good banter.
  They have a nice banter, but it seems a little forced.

- 6% enjoyed that each host personality brought different views to the topic; e.g.,
  I like the instinct/analytical split.
  I like the juxtaposition of their two opposite approaches to everything.
  I like how they go back and forth because it presents different viewpoints and makes you
    think about them.
  I love that they disagree on a lot of things and that disagreement never has either more right
    or wrong.
  It seems like they sometimes interact in a teacher-student manner, where one person says
    something, the other disagrees based on personal experience, then they are shown why they
    are wrong. It is an effective way to make their point.

One out of ten listeners (12%) wrote negative opinions about the hosts' interaction, and all but one of these respondents were in the 50+ age group. Those who did not enjoy the hosts' interaction were less likely to enjoy the show overall. These listeners did not appreciate the "banter" between the hosts, mainly describing the interaction as "silly," "forced," or "distracting;" for example:
  Silly guys who'd do better to drop the hot musical background & get serious; the joking
    seemed for some 1940s notions of teaching 3rd-graders.
  Distracting. Reminded me of the silly babble that local newscasters engage in when it is a

slow news day.

Would have preferred less banter & "show" & more breadth & depth to the story. It ended leaving more questions in my mind that may have been addressed w/more time on topic & less on silliness.

Inane.

Cutsie goofballs.

I thought their interaction made for a goofy presentation. This was the main reason I listened for only 15 minutes.

I couldn't get past the first 15 minutes. Too much babbling at each other, entertained by their own "cleverness", it seemed to me.

I find this one of the most irritating shows in the NPR fold - the inane "chatter" between the hosts, the fake interruptions, the lame banter. I tune in because these are fascinating stories presented by intelligent people. Without fail, I reach for the dial to turn it off at least a couple of times during each show, but I'm dissuaded by the content. The good news is that the content brings me back - just barely. The bad news is that I have to listen through teeth gritted at the juvenile interruptions of Jad and Robert.

Irrelevant banter sounds forced & makes the point unclear

A little forced I think

Sometimes got a bit too contrived.

It is a bit precious.

Okay...a tad too, too for me!

Cheesy

They were constantly interrupting each other & I found the voice over sections really annoying. Too confusing. Sounds like they're trying to make it lively & exciting, but this doesn't work for me for a serious topic.

The interaction is distracting. In my opinion, it trivializes the subject matter at times.

It's generally interesting, but slows down the story sometimes. It's a little distracting.

Too much like talking heads on local tv news

Most Intriguing Story

Listeners were asked to write which story in the show they found most intriguing and why; 82% provided their thoughts. Every story segment was represented in the comments. The main attributes of "intriguing stories" were personal relevance and surprising or thought-provoking results or conclusions. The most frequently noted stories were how memorizing digits affects food choice (28%) and how coffee temperature influences trust (13%).

How much is too much segment:
- 8% found the presentation of the rational vs. emotional choices at the Berkeley Bowl supermarket most intriguing. Most mentioned this story because they related to it personally and because it related to everyday decision-making; e.g.,
  Story about being in the "grocery" store and trying to decide about choosing an apple – perfect description of me.
  The first story on choice with the author of Paradox of choice, because it connected with personal experience of everyday decisions.

Berkeley Bowl veggies and rational vs. emotional – fits with my ideas of neural networks and how previous experience colors our emotions (gut wisdom) and decisions.

- 4% recalled the <u>Lehrer/Miller discussion of the magic number 7, plus or minus 2</u>. People who noted this story felt a personal connection to the information; e.g.,
  The idea of 'seven plus or minus two' explains why I can maintain multi-tasking to a certain point and then it all falls apart.
  Seven numbers memory usage. I have a peculiar ability to remember long number strings for exceptionally lengthy amounts of time.

- 28% described <u>Baba Shiv's experiment of how memorizing digits influenced food choice</u>, relating to rational and emotional brains. Listeners found the results novel, surprising, thought-provoking and again personally relevant; e.g.,
  It was new information to me. It was really surprising how easy it is to get people to choose things that aren't good for them if they're trying to concentrate on something complex.
  Emotional vs rational choice affected by holding numbers in your head. New and intriguing information.
  The research involving the cake and fruit. I was fascinated to learn that overload of the reason lets the base portion of the brain win that round of the classic battle.
  I enjoyed the part of the story in which Baba Shiv talked about his experiment with people trying to remember numbers while choosing between cake and fruit. I find this very intriguing because I think most people make choices like this everyday. I wonder if people who "have a lot on their minds" literally have a lot in their brains, and how this drives their decisions.
  The experiment about how the larger number of numbers to remember affected later choices offered. I had already known from personal experience that too much choice can be overwhelming but did not realize that other memory overload could affect the choices that one makes.
  The chocolate cake vs. fruit salad choice. I appreciated the insight into what happens in the brain when we are overwhelmed. It just explains a lot about why I make the choices I make sometimes.
  This particular experiment feels personal to me because I often try to control my sweet tooth. Now I know more about how to choose a more healthy snack.
  I found most interesting the show on how the number of numbers affects one's food choice, because I am an RN and Certified Diabetes Education, and I have found that people who have a lot of stressors aka a lot of responsibilities and choices make poor food choices more often than people with more social support and less stress. This story gives a simple explanation that I can use to put food choices into perspective for people.

- 8% referred to <u>Oliver Sacks' restricted food choices and kidney story</u> as thought-provoking:
  Dr. Sacks' need for routine with his food was fascinating and made me ponder about what routines I have in my life that help me keep control of the numerous choices in our world.
  That Oliver Sacks turned out to be a kind of obsessive-compulsive or rigid person – why? Was he on the program because of his fame, because he appears famous for flexible thought, innovation in theories?
  Oliver Sacks. Very thought-provoking.

Overcome by emotion segment:

- 10% were most intrigued with <u>Elliot's brain surgery story</u> because the impacts of being entirely rational were unexpected; e.g.

  Elliot's brain tumor – contradicted belief that emotion should not play a role in decision-making.

  The story about Elliot (who has impaired emotions) and there finds it difficult to make choices. I thought it was interesting because it was so contrary to what we think…that choices would be easier if we were more rational.

  The man who lost his ability to make choices after having a tumor removed. I found it intriguing because I never expected that our emotions helped us make decisions.

- 1% noted the <u>Steven Johnson storm story</u> as most intriguing.

- 10% wrote that the story of <u>Harrah's Casinos' manipulation of customers</u> was intriguing because it reinforced beliefs about casinos and marketing; e.g.,

  I don't gamble because I think it is all fixed. I'm now convinced it is with the computer getting all this information about the user.

  The story about Harrah's because I'm always interested in articles, shows, movies, etc about the psychological/business practices of casinos.

  The casino. I've always been interested in how casinos cheat their customers.

  Gambling, it explains a lot about what I observe in casinos.

  Casino story- fascinating how insightful ordinary marketing is.

Is free-will really free segment:

- 2% mentioned the story of <u>hanging cats vs impressionism posters</u> as intriguing; e.g.,

  "Hanging Cats." It's interesting that when people are challenged to explain a preference, it tends to drive the choice toward something they really don't prefer. Vast numbers of decisions are made on the basis of polling data, focus groups, etc, and that research casts doubt on that whole decision-making process.

  How when you justify your choice it can change how you feel about the choice you make.

- 2% spoke about the implications of the <u>priming</u> story; e.g.,

  The piece with Malcolm Gladwell about "priming." It was fascinating to hear of multiple studies that show that a seemingly inconsequential event prior to a decision can affect its outcome.

  I was most intrigued by the story about "priming" – the experiment where they had people think about professors vs. soccer hooligans before playing trivial pursuit, and how what they thought about beforehand significantly affected how well they did in the game. This could potentially have huge implications for anyone who wants to do well in something… just learn what the right thing is to think about before dong some activity at which you want to succeed.

  I found the "priming" story most intriguing. As a teacher, I would love to know how to prime my students to love learning!

- 13% reported surprise about the implications of the <u>Bargh/Williams hot/cold coffee</u> experiment; e.g.,

   I was equally intrigued by the "Describe Joe" experiment, with hot and cold coffee cups. Amazing how easily we are swayed.

   The free will section (coffee cup experiment), it was the most surprising.

   Hot and cold Joe – fascinating and horrifying to think that something as unrelated, so accidental could influence a choice without us knowing it.

   The impact of holding a warm cup of coffee or decision about having positive or negative impressions of a person. It's so non-intuitive, not related to obvious past experience or exposure.

Least Interesting Story

Listeners were asked to identify which story in the show they found least interesting and why; 47% provided their thoughts. The least interesting choices had in common being least surprising or least relevant to the topic of the show. Every story was noted by at least one person as least interesting, but Oliver Sacks' food anecdotes were described by the largest portion (12%) of the sample as uninformative and irrelevant to the show theme.

<u>How much is too much segment:</u>
- 10% found the presentation of the <u>apple choices at the Berkeley Bowl supermarket</u> least interesting. Most mentioned this story because it was least surprising or informative; e.g.,

   The grocery store. I believe I missed the point.

   The first story seemed unfocused and frivolous. A somewhat elitist attitude on part of participants that was off-putting, so that I wondered what the point was.

   I would say the story about the apple, and making an emotional vs. a logical choice, though it is interrelated. It didn't astound me as much as the others. It seems more intuitive.

   The story about the apples. Seemed more like filler than example or study.

   The apple/fruit stand. I didn't feel like I learned anything from it.

   I guess the apple story wasn't quite as interesting, just because the conclusion was less profound.

- 0.4% noted previous exposure to <u>the magic #7 plus or minus 2</u> story.

- 2% described <u>Baba Shiv's experiment of how memorizing digits influenced food choice</u>, as trivial or not surprising; e.g.,

   College students holding numbers in their heads and selecting between fruit or chocolate cake – something only advertising.com cares about. Why? Another vacuous 'psychology of the trivial' via a trivial experimental design.

   The numbers game. It seemed perfectly reasonable to me that the person with the more difficult task would choose the gratification of chocolate cake.

- 12% referred to <u>Oliver Sacks' restricted food choices and kidney story</u> as uninformative and irrelevant; e.g.

   I found the extended description of Oliver Sacks' unvarying routine to be unenlightening. Knowing that a world-famous researcher once made himself sick by eating kidney every

meal for a week and a half really does not seem to contribute to my understanding of how the brain deals with choice.

The Oliver Sacks segment, while an interesting look at his personality, didn't teach me anything.

The one about the fellow who had simplified his choices. i.e., only ate sardines; I think this one went on too long, and although his message about simplifying some choices is a really good one, this seemed to get off track and ramble on.

The weird dude with all the kidneys. Didn't seem to fit, have much of a point.

The story about the man that regulates his food so he doesn't have to make choices – it just didn't have as compelling a point to make as the other stories – it just seemed like ad odd little man who demonstrated behaviors more akin to adaptive skills of autistics than about making choices.

Overcome by emotion segment:
- 2% were least interested in Elliot's brain surgery story because of low appeal; e.g.
  The brain tumor one. Too individualistic. I was unable to generalize from this segment.
  The person with surgery who had trouble choosing; just didn't hook me.
  The guy with the frontal lobe tumor. It didn't really offer any new interesting facts for me.

- 1% noted the Steven Johnson storm story as least interesting because it did not clearly relate to the show theme of choice; e.g.,
  I didn't totally follow the story about the apartment and breaking glass. I didn't see how it fit in about choice, although, I understand it talked about involuntary action and reaction.
  Broken window story and later feelings of dread when hearing wind and windows. Overgeneralizations for survival semantic concept.

- 9% chose the story of Harrah's Casinos' manipulation of customers as least interesting because it was not personally relevant or because the information was not new to them; e.g.,
  The story of gambling and how to get people to stay, or come back, despite losing didn't interest me because I'm not a gambler.
  The story on gambling because I am not a gambler.
  The story about gambling. I'm not particularly interested in casinos and the information was not surprising or new to me.
  The story about Harrah's casino was least interesting, mainly because I wasn't particularly surprised by anything in that story.

Is free-will really free segment:
- 2% mentioned the story of hanging cats vs. impressionism posters as least interesting; e.g.,
  I found the story about the satisfaction that one had with the picture one chose being relevant to whether they had to describe it first or not when they chose it. I kept zoning out when that section was on, and when I listened to it again, I could not figure out how it was relevant to my life.
  I found the story of kids choosing posters least interesting. It wasn't well explained why kids would have chosen the cat poster if asked to rationalize. Furthermore, their later dislike of the poster may have had more to do with maturing than anything else.

- 0.4% noted priming.

- 2% chose the <u>Bargh/Williams hot/cold coffee</u> experiment as least interesting because they were already familiar with the study; e.g.,
  The one about coffee temperature influencing choices, because I'd heard it elsewhere repeatedly.
  The holding something hot results in more favorable impressions of people was the least interesting because I had already heard about this paper on NPR.

RESULTS: AWARENESS AND COMPREHENSION

Listeners rated their agreement with a series of statements related to awareness and comprehension of the content of *Choice*. Figure 3 below displays listeners' ratings of agree/disagree statements:

- 91% of listeners could keep up with and follow the presentation of topics.
- 77% felt the show affected the way they think about choices.
- 76% said the process of science is clear when discussed on the show.
- 68% agreed the show increased awareness of the influence of science on our lives.
- 59% thought the show raised their awareness of scientific methods and processes.
- 29% were familiar and 42% were unfamiliar with most of the information in the show.

Fig. 3. Percent of Agree/Disagree Responses to Statements about Comprehenson of Show (N = 248)
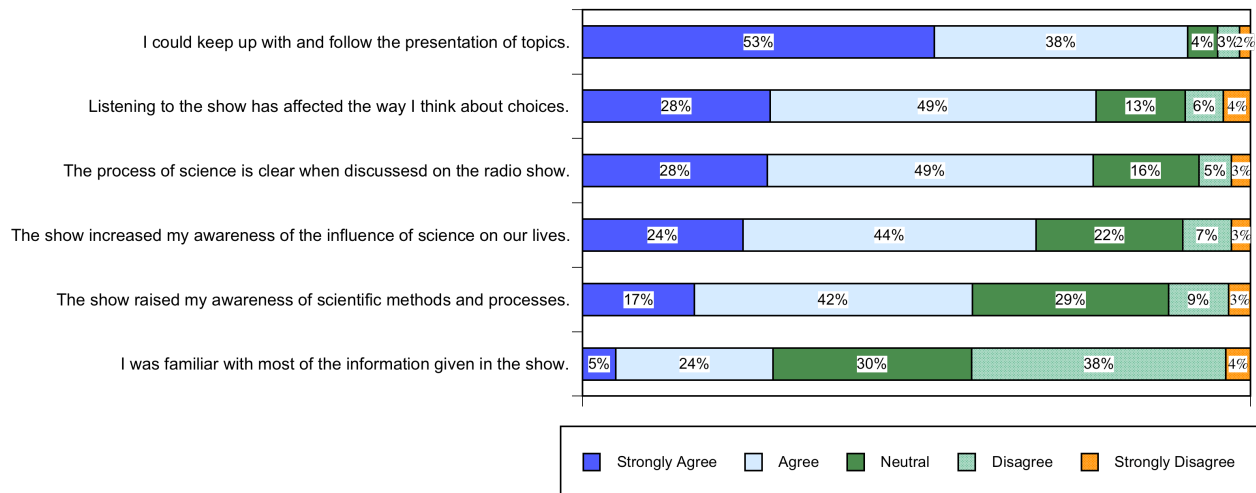
Comparison of mean ratings for the demographic and background variables reveals significant differences only for age on five of the six comprehension statements. Table 3 shows that listeners younger than 50 felt they could follow the presentation better, felt the show affected them more, felt the science process was clearer, and felt more familiarity with the information. On average, however, the older listeners still agreed that the show content was understandable and influenced their awareness of science and thinking about choices.

Table 3. Mean Ratings for Clarity and Comprehension Statements by Age Group

Statements	Strongly Disagree 1	Disagree 2	Neutral 3	Agree 4	Strongly Agree 5
I could keep up with and follow the presentation of topics.					4.7 ($\leq$ 49 years) 4.2 ($\geq$ 50 years)[10]
Listening to the show has affected the way I think about choices.					4.2 ($\leq$ 49 years) 3.8 ($\geq$ 50 years)[11]
The process of science was clear when discussed on the radio show.					4.2 ($\leq$ 49 years) 3.7 ($\geq$ 50 years)[12]
The show increased my awareness of the influence of science on our lives.					4.0 ($\leq$ 49 years) 3.7 ($\geq$ 50 years)[13]
I was familiar with most of the information given in the show.				3.2 ($\leq$ 49 years) 2.7 ($\geq$ 50 years)[14]	

Clarity of Content

About 28% of the sample described some aspect of the show that they felt confused about, including specific stories; rapid speech and overlaid sound tracks; and the show structure:

- 14% listed specific stories ranging across the hour-long show:
  - 2% apple choosing story (*Confused at the very beginning as to where they were gong and why)*
  - 2% number memory/food experiment (*I didn't really understand the correlation in the story about choosing cake or fruit, depending upon how many digits you were given to remember)*
  - 2% poster experiment (*I really didn't understand the "explaining it" concept nor the sophistication explanation.)*
  - 2% warm/cold coffee experiment (*why hot coffee makes us feel warm towards the person delivering it)*
  - 4% Oliver Sacks' story (*Oliver Sacks and his dietary choices. I was mostly confused about what all of the disparate stories had to do with each other)*
  - 2% closing discussion (*the closing discussion of whether or free will actually exists)*

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[10] Two-sample t (238) = 5.259, $p \leq 0.0001$.
[11] Two-sample t (230) = 3.034, $p = 0.0027$.
[12] Two-sample t (237) = 4.489, $p \leq 0.0001$.
[13] Two-sample t (237) = 4.489, $p \leq 0.0001$.
[14] Two-sample t (177) = 3.959, $p \leq 0.0001$.

- 8% noted <u>general confusion related to rapid speech and overlapping sound tracks</u>. All but a couple of these respondents were in the older age group ($\geq$ 50):

  The opening. Voices & conversation were confusing.

  The opening sequence with the overlay of voices made my brain hurt a bit.

  I found at times there were voices talking over one another that was distracting.

  As they sometimes interact with rapid speech, I got confused. It's unconventional, trying (at times way too hard) to be interesting by being different. It's one of those love it or hate it shows.

  I couldn't tell who was talking. The section on routine because everyone seemed to talk too fast.

  I really lost the train of thought when the "babble" between the hosts got intense.

  I don't particularly like when the hosts are talking over the guest, intermittently explaining what's going on. I'm trying to listen to both & not succeeding.

  Some parts were hard to understand-when the host was talking over a lecturer it was difficult to hear.

  They were constantly interrupting each other & I found the voice over sections really annoying. Too confusing.

  The whole program was very cluttered, sound-wise--I felt somewhat like I was (or should be) listening to just the audio track of a TV program, as I got confused about who was speaking, and if the sound effects were added or part of the background noise to the person speaking.

  Overlapping sound tracks--ironically confused making choices about what to pay attention to.

- 6% brought up <u>issues related to the show structure</u>, focusing on the overall communication goal of the program and the relation of stories to the goal and to each other. These listeners appeared to need clearer connections and transitions between stories; e.g.:

  Why it was designed as if the producer could not decide what the show was all about?

  I couldn't really tell exactly why the various stories in each of the three segments were grouped together--all of the stories discussed could have been arranged differently with seemingly little difference.

  At times, when the story direction changed I couldn't immediately see the general shape of the argument. It took me a while to make all the links over the entire hour form a cohesive whole.

  Sometimes switches to different stories, was momentarily confusing. Sometimes briefly difficult to follow or understand relevancy, thus requiring greater focus.

  The show jumped around a lot, so I was confused most of the time.

 *Sometimes I wasn't sure how a story related to choice.*

  They don't really close the loop on some of the stories they cover. It feels like they often leave the listener hanging, wanting closure on the original question of the segment; but then they go on to the next segment that is often unrelated.

  I think overall, the structure of the show is a little confusing. It goes from one topic to the next with little segue in between, and doesn't quite come to any conclusion. I keep thinking that it's leading up to one main "ah-ha" conclusion, but it never really does.

To assess the impact of the show on listener behavior, respondents were asked which of four activities they had done already, which they plan to do and which they do not plan to do. Figure 4 indicates that after listening, half (53%) of listeners were motivated to reflect on their own choice-making behavior and almost half (45%) had discussed the show with others. Most listeners planned to do these two activities, if they had not already done so. Many fewer respondents had searched for more information about an interviewed scientist (11%) or a topic (8%) or planned to do so (23%, 36%, respectively). Those in the younger age group ($\leq$ 49 years) were significantly more likely to have discussed the show with others than those in the older age group,[15] but age did not relate to the three other behaviors.

Fig. 4 Distributions of Behaviors After Listening to *Choice*
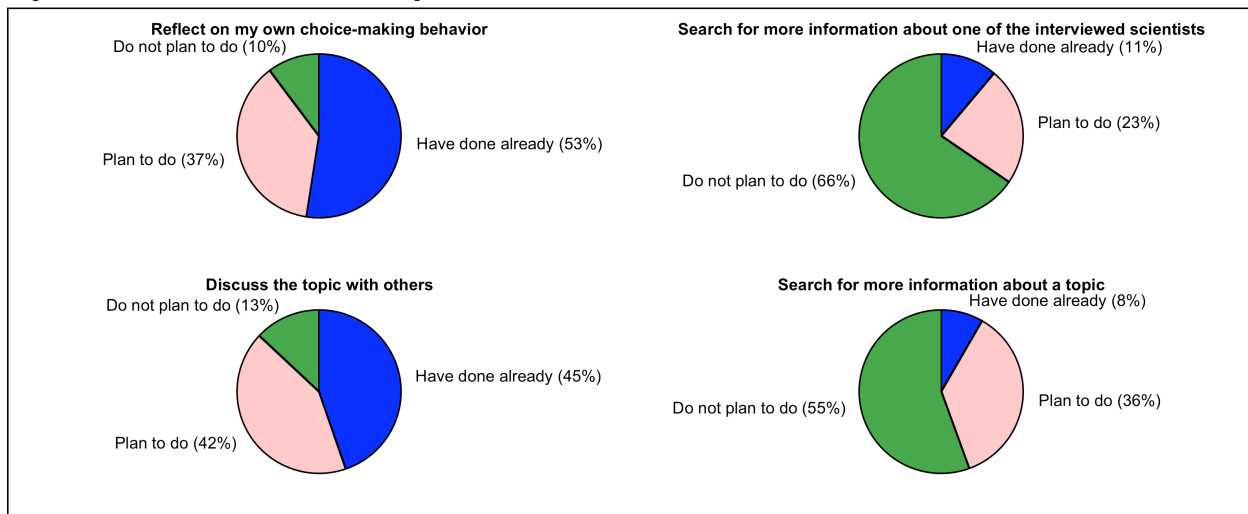
Most memorable show topic to discuss with others

Listeners were asked what the most memorable show topic is that they would likely discuss with others. Table 4 presents the percent of the sample noting a show topic and an illustrative response from listeners. All of the vignettes appeared in the answers as worthy of re-telling except the Steve Johnson's storm story. Most frequently, listeners said they had discussed already or would discuss the two experiments about the influences on choices of digit memory load and coffee temperature.

Table 4. Most Memorable Show Topic to Discuss With Others

What was the most memorable show topic that you would likely discuss with others?	Illustrative response	% noting topic
No answer given	--	27%
Experiment about number memory with choice of fruit and cake	*I went to work the next day and told my coworkers the story about people picking cake over fruit when they had to memorize a larger number.*	19%
Experiment influencing opinions with hot/cold coffee	*I keep telling people about the last one, where the cup of coffee changed people's minds.*	14%
Casinos	*The story about Harrah's is the one that I spent the most time describing to my wife after I heard it.*	10%
Elliot's brain surgery story	*The 'Spock' logic story how a brain devoid of emotional reaction was left over-analyzing life.*	8%
Rational vs. emotional influences on choices (non-specific)	*Competition between the rational and emotional responses and their advantages (emotional = cumulative gut wisdom) and limitations (can only process a limited number of information (options)*	4%
Manipulation of choices (non-specific)	*That we are manipulated by advertisers/marketers in ways that we can't easily detect and that your opinions may not really be your own.*	4%
7 +/- 2	*Keeping 7 numbers plus or minus 2 in your heard at one time.*	3%
Choice overload (non specific)	*How we live in a society with too many choices and people are going nuts over it*	2%
Supermarket choices	*I have discussed the supermarket section and how we all choose differently.*	2%
Explaining poster choices	*I immediately discussed the part about students choosing the folksy kitten poster versus the impressionistic art. I told my husband, "Now I understand why you don't like talking about a topic. Some people just prefer something, because it's JUST WHAT THEY LIKE without having to justify it.*	2%
Oliver Sacks' food choices	*How Oliver Sacks simplified his life to avoid too many decisions.*	2%
Priming	*I would be most likely to share the concept of "priming" and the stories about pre-game bias – the professor vs. hooligan.*	2%
Race	*Unconscious feelings about ethnicity and race – disturbing and relevant to recent education*	2%

A total of 248 adults from three radio stations across the country listened and reacted to the Radiolab program, *CHOICE*. Through online and mail questionnaires, listeners identified attributes that engaged them, rated the program's influence on their enjoyment, science awareness and comprehension, and reported impact of the show on their behavior. The study's results may be generalized to a similarly self-selected public radio audience willing to listen to and provide feedback to an hour-long program.

The Radiolab program was very successful in engaging the responding listeners. Nine out of ten listeners enjoyed the show. One attribute that contributed to attracting and maintaining listener interest was the focus on a central theme that is analyzed from different viewpoints and illustrated by various experiments and anecdotes. Inclusion of experiments appears critical to the success of the program, as two main experiments (memorizing digits affecting food choice; coffee temperature affecting trust) were noted most frequently as the "most intriguing story" and "most memorable show topic to discuss with others." Anecdotes contributed to listener engagement to the extent that they were clearly related to the central theme. Listeners understood the importance to the issue of decision-making of Elliot's loss of emotion; whereas few listeners noted Steve Johnson's storm story as memorable and others questioned the relevance of Oliver Sack's food anecdotes. Clear connections between anecdotes/experiments and the central topic will increase listener engagement.

Another show attribute that influenced interest was the presentation of thought-provoking, surprising or non-intuitive information. Almost all (94%) of the respondents agreed that the show made them stop and think at times. Two-fifths of the sample reported being unfamiliar with most of the information in the show compared with 29% who said they were familiar. Lack of familiarity may increase audience engagement because the "most intriguing" stories presented surprising and unfamiliar information. Listeners were surprised by the results of the digits/food experiment and the implications of the coffee experiment. They found the result of Elliot's brain surgery to be unexpected. Less surprising segments or segments presenting more familiar information were identified as less intriguing or less likely to be discussed with others; for example, supermarket decision-making, the priming concept, or the manipulation of casino customers.

Clear and accessible explanation is a show attribute that influences general appeal as well as listener comprehension. Nine out of ten listeners felt they could keep up with and follow the presentation of topics, and nine out of ten liked learning how scientists carry out their research. Eight out of ten listeners agreed that the process of science was clear and agreed that the show affected the way they think about choices. Seven out of ten felt the show increased their awareness of the influence of science on our lives. A small portion (8%) of the listeners felt that their understanding was compromised by the show's rapid speech and overlapping sound tracks.

Listeners were also engaged by the fun and humorous treatment of the content. Nine out of ten listeners enjoyed the interaction of the two hosts, which they described as entertaining, having good chemistry and a conversational tone. One out of ten listeners, mostly in the 50+ age group, described the interactions as silly, forced or distracting.

Finally, the Radiolab show had some influence on post-listening behavior. Half of listeners were motivated to reflect on their own choice-making behavior, and almost half had discussed the show with others. Most respondents expressed their intention to do these activities in the future. Many fewer listeners were inspired to search for more information about an interviewed scientist or a show topic, but up to one-third of the listeners planned to do so.

Assuming that the Radiolab series continues to include the program attributes noted above that engage and inform listeners, then the series will be successful in reaching a large and devoted public radio audience.