Astronomy Cast: Evaluation of a Podcast Audience's Content Needs and Listening Habits

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Summary

In today's digital, on-demand society, consumers of information can self-select content that fits their interests and their schedule. Meeting the needs of these consumers are podcasts, *YouTube*, and other independent content providers. In this paper we answer the question of what the content provider can do to transform a podcast into an educational experience that consumers will seek. In an IRB-approved survey of 2257 *Astronomy Cast* listeners, we measured listener demographics, topics of interest and educational infrastructure needs. We find consumers desire focused, image-rich, fact-based content that includes news, interviews with researchers and observing tips.

Introduction

Thirty years ago, US news came from three television networks, music came from a small handful of big labels, and marketers made sure we ate, drank and wore what we were supposed to. Then came cable television, and suddenly content shifted, with new networks catering to consumers' needs and supplying golf, shopping and even soap operas 24 hours a day. With the advent of the Internet, the fractioning of the market has continued to the benefit of the public, who can now find programmes designed around such specific topics as *Grammar Girl's Quick and Dirty Tips for Better Writing* and the *Talking Reef*. In this tail-wags-the-market distribution system, consumers can easily find anything they want and will readily flip from one show to the next if they become bored. Catching and keeping an audience, a goal of every content provider, requires knowing what your audience wants and providing it.

Astronomy Cast, a weekly 30-minute audio podcast that takes its listeners on a facts-based journey through the Cosmos, has sought to educate while entertaining within the competitive podcast market. In doing this type of educational outreach to the public, it has been neces-

sary to consider how to make content competitive within the greater market place. NASA and ESA's many video podcasts (vodcasts), and *Astronomy Cast* sit in the iTunes music store side-by-side with shows produced by the *New York Times*, *Scientific American*, and many public and commercial radio stations. To succeed in educating, we must take an example from the commercial marketing playbook and ask our listeners, 'What do you want?' Rather than teaching them what we think is important from pedagogical standpoints, people working on extreme public outreach — EPO that is more 'edutainment' than education — must find out what is interesting to Joe Public, and use those interests to lure Joe into learning.

To learn about the astronomy-interested audience, *Astronomy Cast* conducted a survey to find out who its listeners are, what they are interested in listening to, and what they need to improve their experience. In this paper we discuss: 1) survey setup, 2) the demographics of respondents, and 3) listener interests and self-identified needs. In the discussion section of this paper we suggest how this information can be applied, and what additional studies are needed.

Survey Administration

In designing *Astronomy Cast*, we looked to other shows to see what was popular. This led us to adopt a conversational style (*Skepticality, Skeptics Guide, IT Conversations*) that centered on science without including skits (*Quirks & Quarks, Science Friday*). This format, combined with our astronomy content, has worked. *Astronomy Cast* has ranked within the top 25 science and medicine podcasts since the third day after its September 2006 release. However, all because something works does not mean it cannot be improved. Additionally, our success is not necessarily something that can be replicated because we don't know if the true reasons for our success in the rankings have been identified. To try to create a recipe for creating popular podcasts and addressing the needs of astronomy-interested listeners, we created a listener survey that asked the listeners a series of questions relating to who they are, what they currently listen to, how podcasts have affected their attitude toward astronomy, and what we can we do to improve their experience. (The full text of this survey is in the appendix).

The listener survey was conducted from 13 to 23 July 2007, after receiving IRB approval. To safeguard the privacy of all respondents we

used a secure socket layers (ssl) connection to a secure (https) webpage. We also did not ask for any identifying information and provided the option 'prefer not to answer' for all multiple-choice questions. Every question started with a null response. To allow duplicate surveys to be removed from our sample, we did save the IP addresses of all survey participants; that information was stored in an encrypted form.

The survey was promoted via a special promo podcast as well as in the 16 July episode of *Astronomy Cast*. As a lure to get people to complete the survey we promised survey participants access to a special, hidden, episode of *Astronomy Cast*. The promo episode was downloaded 10,003 times. The survey was completed 2437 times; however, there were 180 duplicate or spurious surveys. In the case of clear duplicates, defined as surveys with the same IP address and same answers to all multiple-choice data, we retained the record with more complete answers to the fill in the blank questions if there were any discrepancies. Spurious entries were defined as entries with multiple entries from the same IP address and randomized results that included the specific contradiction of a US or Canadian state and a non-US or Canadian country being selected as place of origin. An additional fifteen respondents had non-duplicate records, but indicated contradictory residence information. This represents 0.7% of our sample, and indicates we have a potential 'randomized clicks' error of ~1% in our responses.

Our final sample size was 2257 and represents 23% of the audience during that time period. For comparison, the *Slacker Astronomy* (Gay, Price, & Searle, 2006, hereafter GPS06) surveys in 2005 and 2006 only obtained a 4% response rate. They used the potential to win a gift certificate as a lure. We believe our success in obtaining survey respondents is due entirely to providing all participants access to hidden content. This theory is supported by 8 emails from listeners who were upset that they did not get to participate in the survey and obtain access to the hidden show. We strongly recommend using premium content to encourage listener participation, with the caveat that the listener must be able to answer, 'prefer not to respond' to all questions.

While we would like to believe the survey respondents were a representative sample of *Astronomy Cast* listeners, there is no way to prove this is true. Research into non-response bias in surveys is difficult to do. How do you randomly select non-respondents when your target population is anonymous? We have been unable to identify a method to determine the actual bias in our survey. Listeners of *Astronomy Cast* download episodes anonymously. At no point is any information received that would allow us to contact listeners who do not self-identify.

Listener Demographics

To determine who is listening to our episodes, we asked our listeners to self-identify personal characteristics including gender, age and education, as well as socio-economic characteristics such as household income and whether they owned a car. These characteristics are detailed in the appendix (questions 1-16).

1. Listener Personal Characteristics
Much to our frustration, we discovered that our audience is extremely gender skewed, with only 8.43% of the 2255 question respondents indicating they are female. This is a drop from the GPS06 surveys, which had 9% and 13% female respondents. *Astronomy Cast* has worked hard to have no sexual innuendo in its content and to promote women as scientists. Our only explanation for this extreme gender bias is the frequent comment that host Pamela Gay has a sexy voice (four respondents, to the question 'What type of content do you want to see?' commented on Gay's voice. Countless emails on this topic have also been received.). As a result of this survey, *Astronomy Cast* will work with a specialist on women and communications to help make their content appeal better to women.

In terms of age, we had a flat distribution from age 26 to 53 (each year of age had N = 53±7 respondents), with an average age of 40±10 years and a mode of 31 years. Above and below ages 26 and 53 years, there is an expected rapid fall-off in listeners. Our content level is geared toward college level, and many younger listeners will find it pitched too high and turn away. At the older end, the drop is caused both by the drop in population numbers and the lower use of technology by those over 50 (*US Census 2000*; Fox & Madden 2006). That said, we were very surprised to note there were 52 respondents (2% of those responding) aged 70 years and older (Figure 1).

Our listeners also came from all professional areas with only careers related to computers (23% of 2252 responding) contributing a double-digit percentage to our respondent pool. Students make up an additional 7.8% of our listeners, and the combined categories of K-12 and college educators make up 5.9% of our listeners. The only other area to break 5% was health/medicine with 5.4%.

Our listeners tend to be educated, with 33% of the respondents having a bachelor's degree (an additional 10% are graduate students), 30% having a undergraduate degree (an additional 5% are graduate students). It is always hard to understanding what household incomes mean when comparing international survey results; however, there is an undeniable trend to affluence in out survey data, with a strong curve in out data from low incomes to high incomes (Figure 2).

Our listeners also come from all over the world (see appendix, question 6). After removing all data from individuals who indicated a country other than Canada and the US while selecting a state/providence in the US or Canada, we found 58% of our respondents are from the US, 11% are from the UK, 7% are Australian, and 7% are Canadian. No other nations contributed
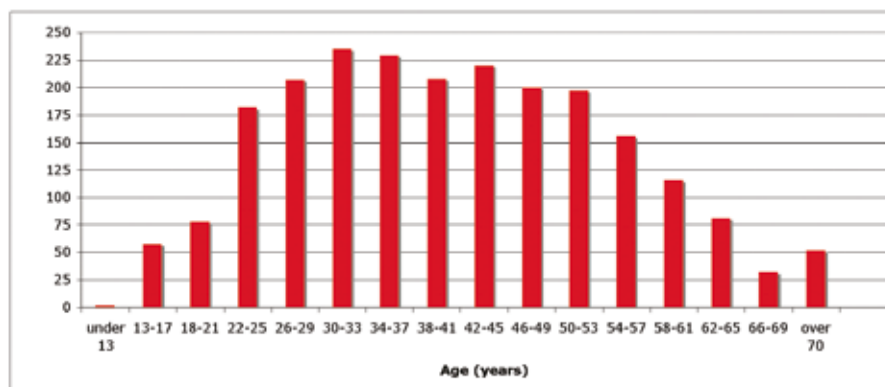

Figure 1. The age distribution of Astronomy Cast listener survey respondents. The average age is 40±10 years and a mode of 31 years.

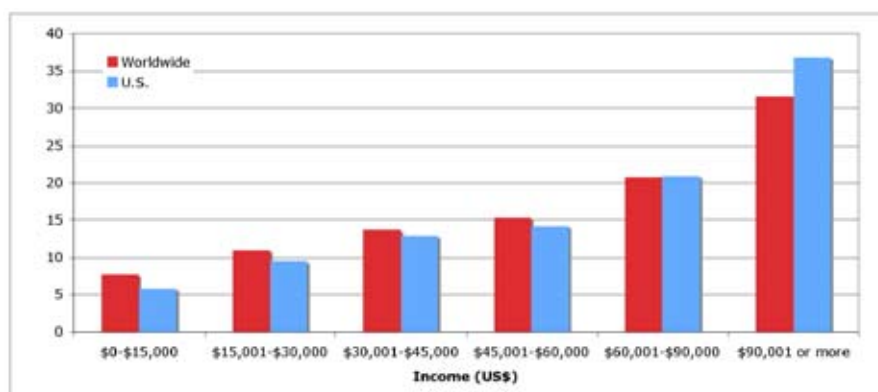Figure 2. The income distribution of Astronomy Cast listener survey respondents. The total sample (N = 1843) is shown in red, and the sample of US respondents (N = 1122) is shown in blue.

more than 2% of our respondent pool. Together, the respondents represented 72 nations.

2. Listener Socio-economic Characteristics

The average *Astronomy Cast* listener is affluent and surrounded by technology. 99.7% of the respondents have computers in their homes, and 94.9% of those homes are connected to the Internet. Over 85% of them live in homes with portable MP3 players, DVD players, and cell phones. 52% of their homes have video game players, and 56% have Digital Video Recorders. They are not subscribing to satellite radio (only 13% have it in their households), but they are listening to podcasts, with the average respondent listening to 13.11±10.53 podcasts. We do not feel this audience is necessarily typical of all podcasts, and in fact this audience is substantially wealthier than the GPS06 audience and is thus more able to have electronic gadgets.

Audience Impact and Needs

1. Impact of Podcasts on Listener Attitude toward Astronomy

One of the most significant results of GPS06 was documentation of the ability of podcasts to transform individuals from not being interested or only passively being interested in astronomy, to individuals actively seeking astronomy content. In our survey, we replicated their study and found similar results (Table 1). We found that 25% of our listener respondents had no interest or a passive interest in astronomy prior to listening to astronomy-related podcasts. After listening to astronomy-related podcasts, 70% of these individuals had begun to actively seek astronomy content or had become amateur astronomers. GPS06 saw 61% and 63% gains in their surveys.

We also found that while only 31.6% of our respondents had taken astronomy courses in high school or college, 61.2% are now either attending or interested in attending local astronomy lectures and 68.9% are interested in learning how to become involved in amateur

astronomy. To understand this result, we need to ask, 'Why didn't you take astronomy before?' and 'What created your interest?' in a future study.

We have clearly identified a population of people who have a growing interest in astronomy content. Through edutainment we have inspired individuals to seek more classical educational experiences, such as attending local lectures.

2. Type of Content Being Listened to

To determine the listening habits of the *Astronomy Cast* audience, we asked our listeners to tell us their favorite podcasts, their favorite science podcasts, and then to list up to ten podcasts they listen to on a regular basis. Listeners could leave any of the questions blank.

When asked to list up to ten podcasts listened to regularly, 1876 people responded by listing a total of 2227 unique podcasts. In their 11,805 responses (37% listed ten podcasts, 15% listed one, and 4-7% listed two-nine podcasts), they demonstrated diverse tastes in topic. We attempted to classify the format and publisher of all podcasts listed by more than twenty people. (Table 2, at the bottom of the article)

While it is hard to clearly distinguish professional podcasts from volunteer efforts, there was clear diversity. 54% were from radio, television, and magazine publishers, 3% were from NASA, and the rest were from individuals with unknown funding sources.

In terms of format 1.4% of the shows were vodcasts. It is unclear if this is indicative of a lack of interest in vodcasts in general, or if it simply reflects that there are fewer vodcasts in the preferred subjects of our audience or fewer players able to play them.

It is clear from this list that we are only reaching one niche — those interested in science and medicine. Of the ten most frequently listed podcasts (representing 29% of responses), only two are not categorized in "Science & Medicine" by iTunes. In fact, in looking at all podcasts listed at least twenty times (61% of those listed), 71% are categorized in "Science & Medicine".

The niche nature of our audience also carries into how listeners responded to the question 'What is your favorite podcast?' Table 3 lists the top ten favorite podcasts. Several trends can

be noted in this data. The top ten podcasts (representing 60% of the responses) show listeners are non-discriminatory with regard to show length, but prefer podcasts with more than one host, that operate in a panel format, or with hosts interviewing experts. Interestingly, 2.3% of respondents specifically indicated they have no favorite podcast (14% of survey participants also left this question blank). See appendix, question 21 for a complete list of responses.

Listeners were also asked to identify their favorite science-based podcast (Table 4). Respondents show a clear preference toward science podcasts with only one host (only three in the top ten had more than one host), even though they still prefer interview-style presentations. We believe this reflects a dearth of multi-host science-based podcasts. 22 of the top 25 Science and Medicine shows in iTunes are single-host productions. Of the top ten podcasts, only half are produced from radio shows. This implies that the best science podcasts can compete for listeners with radio shows made available through RSS feeds. (Table 5)

Astronomy Cast listeners are clearly a niche audience, listening to primarily science-based podcasts, while exhibiting interest in podcasts on tech news and current events. In general, most podcasts they listen to are hosted by one person, but they tend to prefer content presented in an interview, lecture or news magazine style. There is a sharp decline in the number of podcasts reported that have an average length of over an hour; by and large our respondents seem to be listening to podcasts between 30 minutes and an hour.

3. Content Sought

Each week *Astronomy Cast* presents a different topic for 30 minutes. Some shows are general (e.g. exoplanets), and others are more specific (e.g. Venus). By throwing out a variety of topics and hitting on both big picture topics and narrow topics we hope to meet the needs of our listeners. This is an uncomfortable strategy, and in the survey we asked the open-ended question, 'What type of content do you want to see?' so that we could provide what is actually wanted rather than guessing at what is wanted. Answers were sorted into 30 different bins to obtain a quantified breakdown of needs. A complete table of our bins and the number of responses fitting in each bin is listed in Appendix B. Full responses from listeners are not

Table 1. Change in listener attitude toward astronomy content after listening to podcasts containing astronomy related content. We consider the first three categories passive content acquires and the last three categories active content acquirers.

Option	% Before	% After	Change
I knew how to spell astronomy	1.1	0.4	-0.7
I thought it was neat when I was a kid	2.9	0.1	-2.7
I will pay attention if it crops up in something I already read/watch/listen to	20.8	7.1	-13.7
I actively seek and read/watch/listen to stories about astronomy	56.7	70.0	13.3
I am an amateur astronomer and/or go to local astronomy club meetings	16.7	20.1	3.5
I am a professional astronomer or astronomy major in college	1.9	2.2	0.3

Table 3. 10 podcasts most frequently listed as "favourite podcast" by respondents to the Astronomy Cast listener survey.

Podcast Name	Avg Length (hh:mm)	# Hosts	Topic	Presentation	N
Astronomy Cast	0:15 - 0:30	2	Science & Medicine	Discussion	689
The Skeptic's Guide to the Universe	1:15 - 1:30	6	Science & Medicine	Panel	200
Universe Today	0:05 - 0:15	1	Science & Medicine	Interviews	70
This Week in Tech	1:00 - 1:15	4	Tech News	Panel	48
None					45
BBC: In Our Time	1:30 - 1:45	4	Society & Culture	Panel	32
All					24
This American Life	0:45 - 1:00	1	Society & Culture	Talk Show	22
NPR: Wait, wait... Don't tell me!	0:45 - 1:00	1	News	Game show	21
Mysterious Universe	0:45 - 1:00	1	Science & Medicine	Discussion	20

Table 4. 10 podcasts most frequently listed as "favourite science podcast" by respondents to the Astronomy Cast listener survey.

Podcast Name	Avg Length (hh:mm)	# Hosts	Topic	Presentation	N
Astronomy Cast	0:15 - 0:30	2	Science & Medicine	Discussion	1244
The Skeptic's Guide to the Universe	1:15 - 1:30	6	Science & Medicine	Panel	130
Universe Today	0:05 - 0:15	1	Science & Medicine	Interviews	87
NPR: Science Friday	1:45 - 2:00	1	Science & Medicine	Interviews	43
Science Talk	0:15 - 0:30	1	Science & Medicine	Interviews	34
CBC Radio: Quirks & Quarks	0:45 - 1:00	1	Science & Medicine	Interviews	33
ABC Radio National Science Show	0:45 - 1:00	1	Science & Medicine	News	32
BBC: The Naked Scientists	0:45 - 1:00	1	Science & Medicine	Interviews	31
This Week in Science	0:45 - 1:00	2	Science & Medicine	News	30
None					24
SETI: Are We Alone?	0:45 - 1:00	1	Science & Medicine	Discussion	18
Astronomy Magazine Podcast	0:05 - 0:15	1	Science & Medicine	News	18

being made available to protect the privacy of respondents who opted to give personal information within the open response sections of this survey.

We found *Astronomy Cast* listeners are seeking a wide variety of astronomy-related content in their podcasts. Over 30 different desired topics were identified from the survey responses, ranging from the very complex and theoretical "Relativity" and "Quantum Mechanics", to the more concrete and familiar "Solar System Objects". Our respondents indicated the greatest desire to hear about thought-provoking, deep topics, with "Cosmology" requested in 5.5 % of the responses and "New Theories" following at 4.2%. Other popular requests were for more "Physics" and for more "Cutting Edge Research", at 3.3% and 3.1% respectively.

There was also a large interest in keeping up-to-date with information relating to our own Solar System. In 4.1% of the responses, listeners requested topics concerning the Sun, planets, and other Solar System objects. Another 2.1% wanted updates on the various probe and satellite missions that are under way in the Solar System, including past and possible future missions. This thirst for the latest information was also expressed more generally with approximately 6% of the responses requesting news of various types — discoveries, sky objects to observe, spacecraft missions, and general, brief news updates each week.

These results match with our multiple choice question responses to the question, 'What is your favorite type of show?' Of 2112 responding, 85% prefer the topic shows, 7% prefer shows in which we answer listener questions, and 8% prefer shows in which researchers are interviewed.

As well as asking about what content is needed, we also asked if the show is currently pitched at too high or two low a level on a five-point Likert scale. The overwhelming majority of our listeners (76% of 2154 responding) said the show is pitched just right, very few thought it was a lit-

tle too hard (3%) or way too hard (two people), and some thought it was a little too simplified (20%) or way too simplified (1%).

4. Desired Web-resources

Currently, *Astronomy Cast* provides on its website the following content: links to mp3 audio files and a web-based audio player, show notes which include summaries of show content with extras such as definitions, expanded explanations, and links, as well as transcripts with embedded images. This content is provided regularly, but the formatting and richness of the content is very ad hoc, and is based on what

we find interesting. In order to better meet our users' needs, we asked them the open-ended question, 'What online materials do you want to see with each show?'

Of the 1239 responses, the vast majority fell into two categories: 'Everything is all right as is' (23%) and 'I don't visit the website' (19%). Those not visiting the website consistently stated they listen to our podcast while away from their computer. The remaining 713 respondents (58%) listed specific online content as needed (see appendix). While the majority of their needs, such as images, links and show notes, were expected, three results caught us completely off guard. Specifically 4% of those stating specific needs requested references to original journal articles, 3% wanted us to

Table 5. Top 25 podcasts in iTunes Science and Medicine on Sept 12, 2007.

Rank	Podcast Name	# Hosts	Host(s)	Producer
1	60-second Psych	1	Christie Nicholson	Scientific American
2	Science Friday	1	Ira Flatow	NPR
3	Radio Lab	2	Jay Abrumrad & Robert Krulwich	WNYC
4	BrainStuff: The HowStuffWorks Podcast	1	Marshall Brain	HowStuffWorks
5	Wild Chronicles	1	Boyd Matson	National Geographic
6	Science Talk	1	Steve Mirsky	Scientific American
7	Hidden Universe HD		Dr. Robert Hurt	NASA/SSC
8	Hubblecast HD	1	Dr. Joe Liske	ESA/Hubble
9	60-second Science	1	Karen Hopkin	Scientific American
10	NPR: Hmmm…. Krulwich on Science	1	Robert Krulwich	NPR
11	The Skeptic's Guide to the Universe	1	Dr. Steven Novella	NESS
12	NPR: Environment	1	Varies	NPR
13	NOVA	PBS	1	Varies	WGBH
14	HD NASA's JPL		N/A	NASA
15	Green.tv		N/A	green.tv
16	Science Times	1	David Corcoran	New York Times
17	NASACast Video		N/A	NASA
18	The Naked Scientists	1	Dr. Chris Smith	Cambridge University
19	Food Science	1	Dr. Kiki	ON Networks
20	Astronomy Cast	2	Fraser Cain & Dr. Pamela Gay	Astronomy Cast
21	TERRA: The Nature of our World		Varies 1-2 filmmakers	Montana State University
22	Quirks & Quarks - Segmented Show	1	Bob McDonald	CBC Radio One
23	Skepticality	2	Derek Colanduno & Swoopy	Skeptic Magazine
24	Nature Podcast	1	Chris Smith	Nature
25	National Geographic World Talk	1	Patty Kim	National Geographic

explain the equations behind the concepts, and 3% wanted educational materials or slide shows to accompany the audio. Additionally, eight people asked for quizzes to accompany the shows so they could test their learning. We believe these requests indicate that people want to use these shows to obtain a high level of astronomy understanding and wish to make sure their understanding is correct.

Another unexpected result was that seven respondents indicated they do not listen to the show, but rather read our transcripts to access our content. Reasons stated included being hearing impaired (one person), not understanding English well enough to understand the spoken podcast (one person), and not being able to download large audio files (five people). While these seven people represented less than 1% of those responding, it should be noted that we did not specifically ask if people listen to our show or read our transcripts, so we do not know how large a population these people represent. This is a question that will need to be asked in a follow-up survey. We believe this result indicates that the simple act of providing transcripts to audio and video shows can allow the content to reach into underserved communities, including the hearing-impaired and those with limited Internet access.

Listener survey responses also addressed show format. Currently, *Astronomy Cast*, is an audio-only show processed to 64 kilobytes per second (kbs), and the typical show is 12-15 megabytes in size. Of those listing specific needs, 12% requested enhanced or video podcasts that would show images and/or video of topics being discussed. An additional 1% of those responding requested low-bandwidth versions of shows.

As with many surveys with open-ended questions, this survey did log several responses that were silly or social rather than intellectual in nature. On the reasonable side, nine people requested pictures of the *Astronomy Cast* hosts so they could know what the people they were listening to look like. On the unreasonable side, one person requested email addresses for all scientists mentioned in the show, three people requested images of naked women, one person requested a live band (other information shows, such as *Geologic*, do have this), and one person requested more cowbell. While we now intend to include pictures of the hosts online, the other needs in the area will go unmet.

Discussion

From our survey respondents, we can begin to envision a formula for an ideal show. Specifically, the perfect show should be under one hour, feature two hosts, and include interviews with real scientists, five-minute news updates, and information on any celestial events of interest to amateur astronomers. These shows should, ideally, be available in multiple formats (high-quality 64 kbs audio, low-quality 16 kbs audio, and possible video/enhanced mp4 format). Accompanying shows should be transcripts, links to supplementary materials including educational resources and original journal articles, and as many images and videos as possible. This formula is actually fairly close to the audio format of the existing and highly popular *Skepticality* podcast, although they do not have the requested online content.

In designing shows, our survey seems to indicate that there is a need for high-level content that requires listeners to intellectually reach. *Astronomy Cast* is pitched at a college-level that assumes the listener has had introductory science courses. In fan mail letters (not quantified due to lack of IRB approval to use them in research), listeners often comment that they cannot listen while doing other things because they must concentrate on our show. They also often comment that they must listen to shows multiple times and read the online content to feel confident that they fully understand the content of the shows. In future studies we feel there is a need to address the question how much effort listeners put into learning through the *Astronomy Cast* podcast.

This study allowed us to get an initial, quantified understanding of our listeners' demographics and needs. In also raised some interesting questions. In future studies we wish to ask further questions. What brings passive seekers of astronomy content to an astronomy podcast? How many "listeners" are actually reading our transcripts rather than listening to the show (and why)? And also, what about *Astronomy Cast* do people like most and least? We also need to ask the people who are now interested in astronomy classes why they did not take astronomy before and what created their interest.

After working to make our online content better reflect the needs of our listeners outlined in this paper, we will do a second listener survey to address the questions and to learn what new needs our listeners have discovered they cannot live without.

Conclusion

It's a cliché, but it's true. The Internet really is a revolutionary tool for reaching a highly targeted audience and delivering a comprehensive collection of multimedia resources: audio, video, animation and text. And this road goes both ways, allowing audiences to give nearly instant feedback to educators, allowing them to fine-tune their presentation to the needs of the audience.

The hunger for astronomy information is enormous, and is exemplified by the popularity of photographs from the *Hubble Space Telescope*. Listeners told us they can handle complex subjects as long as they are made understandable. Over time, their understanding and capabilities grow, as they learn to digest more and more complex information.

Perhaps what surprised us most during this survey process is the enthusiasm of the audience. They are learning about astronomy because they enjoy it, not because they have to. They find it intellectually stimulating, and want to know more. Time and time again we hear how our audience appreciates that we do not 'dumb things down.'

Podcasts like *Astronomy Cast* allow educators to deliver on the public enthusiasm for science information; inexpensively and quickly, and bypassing the traditional media gatekeepers that assumed the public is too ignorant or vacuous to handle the wonders of the Universe that nature reveals to anyone who cares to go searching for it.

Through podcasting, initially passive content non-seekers can be transformed into individuals who actively seek public lectures, classes and other astronomy activities. This introduces podcasts as a new tool to bring people into amateur astronomy. Podcasts appeal to a large range of ages, with our show appealing equally to people in their late twenties and early fifties. While the people who interact with podcasts tend to be college educated and affluent, and tend to have a lot of technological gadgets in their households, they are not just people employed in computer-related fields. Our audience includes people from all career fields. The audience is also global, with a podcast being produced in the US by a Canadian — US collaboration reaching 72 nations on six continents. This simple-to-produce communications media is a way to produce globally accessible content that can change attitudes and inspire learning.

Bios

Dr. Pamela L. Gay is an assistant research professor at Southern Illinois University Edwardsville. Her research interests include variable stars and assessing the impact of new media astronomy content on informal audiences. When not in the classroom or doing research, she co-hosts *Astronomy Cast* and writes the blog StarStryder.com.

Rebecca Bemrose-Fetter is an undergraduate majoring in physics at Southern Illinois University Edwardsville. In her free time, she has given volunteer astronomy presentations to Girl Scout groups and run astronomy-based sessions at conferences for gifted and talented children. Rebecca is the assistant producer of *Astronomy Cast*.

Georgia Bracey is a graduate student in Physics & Astronomy Education Research at Southern Illinois University Edwardsville, an experienced elementary school teacher and an amateur astronomer. She is currently interested in science education and public outreach, including the development and evaluation of science curricula and science teaching methods.

Fraser Cain is the publisher of *Universe Today*, a space and astronomy news website. He's also a freelance writer, with several published books, and articles in periodicals such as Wired. Fraser has also held executive positions in software and technology companies in Vancouver, BC. He's also co-host of *Astronomy Cast*.

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Note

1. To view the appendix please refer to the *CAP Journal* online at http://www.capjournal.org

Table 2. A list of all podcasts listed by more than 20 people in the Astronomy Cast listener survey as being regularly listened to. Listeners could listen up to 10 shows and no one listed the same show more than once.

Podcast Name	Avg Length (hh:mm)	# Hosts	Topic	Presentation
60 Second Science (Scientific American)	< 0:05	1	Science & Medicine	Lecture
ABC NewsRadio: StarStuff (Australia)	0:15 - 0:30	1	Science & Medicine	News
ABC Radio National: All in the Mind	0:15 - 0:30	1	Science & Medicine	Interviews
ABC Radio National: Ockham's Razor	0:05 - 0:15	1	Science & Medicine	Interviews
ABC Radio National: The Science Show	0:45 - 1:00	1	Science & Medicine	News
APM: A Prairie Home Companion News from Lake Woebegon	0:05 - 0:15	1	Comedy	Talk Show
Archaeology Channel	0:05 - 0:15	1	Science & Medicine	News
Ask a Ninja	< 0:05	1	Comedy	Video
Astronomy 161	0:30 - 0:45	1	Science & Medicine	Lecture
Astronomy a Go-Go!	0:45 - 1:00	1	Education	Lecture
Astronomy Cast	0:15 - 0:30	2	Science & Medicine	Discussion
Astronomy Magazine Podcast	0:05 - 0:15	1	Science & Medicine	News
Bad Astronomy: Q & BA Vodcast	0:05 - 0:15	1	Science & Medicine	Lecture
BBC NewsPod	0:30 - 0:45	1	News & Politics	News
BBC World Service: Digital Planet	0:15 - 0:30	1	Technology	News
BBC: From Our Own Correspondent	0:15 - 0:30	1	News & Politics	News
BBC: In Our Time	0:30 - 0:45	4	Society & Culture	Panel
BBC: Mark Kermode Film Reviews	0:15 - 0:30	2	TV & Film	Reviews
BBC: The Naked Scientists	0:45 - 1:00	1	Science & Medicine	Interviews
Berkeley Groks Science	0:30 - 0:45	2	Science & Medicine	Interviews
CBC Radio: Quirks and Quarks	0:45 - 1:00	1	Science & Medicine	Interviews
CNET: Buzz Out Loud	0:30 - 0:45	2	Technology	News
Cranky Geeks	0:30 - 0:45	1	Tech News	Panel
Dan Carlin's Hardcore History	0:45 - 1:00	1	History	Lecture
Democracy Now	0:45 - 1:00	1	News & Politics	News
Diggnation	0:45 - 1:00	2	Tech News	News
DL.TV	0:30 - 0:45	1	Tech News	News
Dogma Free America	0:45 - 1:00	2	Other	Interviews
Dr Karl on Triple J	0:30 - 0:45	1	Science & Medicine	Discussion
Escape Pod	0:30 - 0:45	1	Literature	Commentary
FreeThought Radio	0:45 - 1:00	2	Other	Discussion
Futures in Biotech	0:45 - 1:00	2	Science & Medicine	News
GeekBrief	< 0:05	1	Gadgets	Video
Grammar Girl	0:05 - 0:15	1	Language Courses	Lecture
Guardian Unlimited: Science Weekly	0:15 - 0:30	1	Science & Medicine	News
Infidel Guy	1:00 - 1:15	1	Other	Discussion
KCRW: Left, Right & Center	0:15 - 0:30	4	News & Politics	Discussion
Logically Critical	0:30 - 0:45	1	Science & Medicine	Discussion
MacBreak Weekly	1:00 - 1:15	4	Tech News	Discussion
MacCast	0:45 - 1:00	1	Tech News	News & Reviews
MSNBC: Meet the Press	0:45 - 1:00	1	News & Politics	Interviews
Mysterious Universe	0:45 - 1:00	1	Science & Medicine	Discussion
NASA	varies	varies	varies	varies
NASA: Hidden Universe	< 0:05	varies	Science & Medicine	Video
NASA/ESA: HubbleCast	< 0:05	varies	Science & Medicine	Video
NASA: JPL	< 0:05	varies	Science & Medicine	News
NASACast	< 0:05	varies	Science & Medicine	News
NASACast Video	< 0:05	varies	Science & Medicine	Video
National Geographic	varies	varies	varies	varies
Nature	0:15 - 0:30	1	Science & Medicine	Interviews
Net @ Nite	0:45 - 1:00	2	Tech News	News
New Scientist	0:15 - 0:30	1	Science & Medicine	News
New York Times: Science Times	0:15 - 0:30	1	Science & Medicine	Lecture
NOVA	< 0:05	1	Science & Medicine	News
NOVA Science Now	< 0:05	1	Science & Medicine	News
NPR	varies	varies	varies	varies
NPR: Car Talk	0:45 - 1:00	2	Performing Arts	Interviews
NPR: Fresh Air	0:30 - 0:45	1	Society & Culture	Interviews
NPR: Radio Lab	0:45 - 1:00	2	Science & Medicine	Discussion
NPR: Science Friday	1:45 - 2:00	1	Science & Medicine	Interviews
NPR: This American Life	0:45 - 1:00	1	Society & Culture	Talk Show
NPR: Wait, wait... Don't tell me!	0:45 - 1:00	1	News	Game show
Planetary Radio	0:15 - 0:30	1	Science & Medicine	Interviews
Point of Inquiry	0:30 - 0:45	1	Science & Medicine	Interviews
PseudoPod	0:15 - 0:30	2	Literature	Magazine
QuackCast	0:15 - 0:30	1	Science & Medicine	Discussion
Real Time with Bill Maher	0:45 - 1:00	1	News & Politics	Talk Show
Science @ NASA	< 0:05	1	Science & Medicine	News
Science Magazine Podcast	0:30 - 0:45	1	Science & Medicine	News
Science Talk	0:15 - 0:30	1	Science & Medicine	Interviews
Security Now	0:45 - 1:00	2	Tech News	Discussion
SETI: Are We Alone?	0:45 - 1:00	1	Science & Medicine	Discussion
Skepticality	0:45 - 1:00	2	Science & Medicine	Talk Show
Skeptoid	0:05 - 0:15	1	Science & Medicine	Lecture
Slacker Astronomy	0:05 - 0:15	2	Science & Medicine	Discussion
Slackerpedia Galactica	0:30 - 0:45	3	Science & Medicine	News
Slate Daily Podcast	0:05 - 0:15	1	News & Politics	News
Slice of SciFi	0:30 - 0:45	2	TV & Film	Reviews
StarDate	< 0:05	1	Science & Medicine	Lecture
STScI: Sky Watch	< 0:05	2	Science & Medicine	News
TEDTalks	0:15 - 0:30	N/A	Education	Lecture
The Economist Podcast	0:05 - 0:15	2	News & Politics	Magazine
The Jodcast	0:30 - 0:45	4	Science & Medicine	News
The Onion Radio	< 0:05	1	Comedy	News Parody
The Skeptic's Guide to the Universe	1:15 - 1:30	6	Science & Medicine	Panel
This Week in Science	0:45 - 1:00	2	Science & Medicine	News
This Week in Tech	1:00 - 1:15	4	Tech News	Panel
Tiki Bar TV (video)	< 0:05	varies	Comedy	Video
TWiT: The Daily Giz Wiz	0:05 - 0:15	2	Tech News	Reviews
Universe Today	0:05 - 0:15	1	Science & Medicine	Lecture
Windows Weekly	0:45 - 1:00	1	Tech News	Lecture