

Summative Evaluation Report

Prepared for

Night Fire Films

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Knight Williams
Research Communications



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Introduction

In 2008 the independent film company, Night Fire Films, released the 2-hour film *Breaking the Maya Code*. As described on the producers' website <http://www.nightfirefilms.org/breakingthemayacode/> the film is based on the 1992 book of the same title by Michael D. Coe and tells the story of the decipherment of the Maya writing system from the sixteenth century to the present. Subsequent to the film's release, the producers distributed the DVD internationally and conducted public screenings, discussions, and workshops in science centers, university programs, art museums and film festivals in a total of 19 different communities in the US and abroad.

A 50-minute adaptation of the film was also produced for U.S. national broadcast on the PBS series NOVA, under the title *Cracking the Maya Code*. Knight Williams Inc. ("Knight Williams"), an independent evaluation firm specializing in the development and evaluation of science education media, conducted a summative evaluation of this 50-minute NOVA version of the program.

This report presents the findings from the summative evaluation. The purpose of the evaluation was to assess the extent to which the television program provided an appealing, engaging, and clear informal science learning experience for a recruited sample of adults and older teens fitting the program's target audience. To address the program's informal science learning value, the evaluation focused on the goals identified in the project's grant proposal to the Informal Science Education (ISE) division of the National Science Foundation (NSF), which provided funding for both the *Cracking the Maya Code* project and this independent evaluation. The goals focused on educating viewers about:

- The basic principles that underlie all writing systems and the importance of writing to culture.
- The fundamentals of the Maya writing system, including the meaning of a small number of Maya glyphs.
- The history and culture of the ancient Maya, as that history and culture is revealed in the Maya texts and inscriptions.
- The process by which scholars tackle and solve problems, and in particular how a dominant paradigm or scholar can encourage or stifle development, and how collaboration between creative people with different expertise and different ways of thinking can lead to breakthroughs that no one could have achieved on their own.
- The idea that the picture people construct of another culture like the Maya says as much about their own assumptions and needs as it does about the Maya themselves.

The evaluation further explored the longer-term impact of the program within a few weeks of viewing, in this case focusing on the extent to which viewers made personal connections with the program and discussed, thought about, or engaged in any program-related activities. Additional details about the evaluation plan are provided below, under Method.

Method

Knight Williams addressed the evaluation questions listed on page 3 by conducting a two-group posttest only randomized study of recruited participants' ("Viewers") experience viewing *Cracking the Maya Code* in an at-home setting, as compared to participants ("Control") who didn't view the program but completed the same set of demographic/background questions and a short "quiz" about the ancient Maya and Maya writing system. The evaluation further explored the longer-term impact of the program within a few weeks of viewing, in this case focusing on the extent to which selected Viewers ("Interviewees") made personal connections with the program and discussed, thought about, or engaged in any program-related activities.

Recruitment

Given that the evaluation occurred after broadcast, the recruiting strategy relied on a planned sample of adults and youth who met specific target audience criteria assessed through a short pre-viewing screening survey. The evaluation selected individuals who: 1) had DVD and internet access; 2) were 16 years or older; 3) were at least somewhat interested in science or history; 4) were not a scientist or science teacher; 5) watched PBS at least occasionally; and 6) had no previous exposure to *Cracking the Maya Code* within the past two years.

Recruiting for the screening survey was conducted by evaluation associates with access to likely participants with the appropriate target audience demographics, background, and media habits.¹ Knight Williams also made requests to individuals within the firm's database of museum visitors, PBS viewers, and viewers of science, nature, and history programming who: had participated in no more than two prior media evaluation projects in the past 2 years, fit the screening criteria, and had expressed interest in participating in other informal science evaluation projects. The recruiters also sought a balance in the participant group with respect to gender as well as diversity in participants' geographic residence, television viewing habits, and race/ethnicity.

As part of the recruiting process, participants were informed that: their participation in the evaluation was voluntary, their responses were confidential, and that they would be randomly assigned to complete one of two different sets of activities, in one case an online survey activity about a PBS program and in the other an online survey and viewing of a PBS program. Honorariums were offered in each case to help ensure timely completion and scaled to reflect the amount of time required to complete each activity.

¹ The evaluators initially explored the possibility of incorporating a recruiting strategy that involved visitors or members of two museums that hosted screening events for the project. The evaluators contacted the screening staff contacts at each institution to inquire about the possibility of informing visitors/members at the institutions (e.g. through a postcard at the museum counter, on the program, or through e-newsletter or email blast) about the opportunity to participate in an evaluation of a PBS program that aired that year. The contact at one institution previously left the organization and was therefore unavailable while the contact at the other indicated full support for the project but noted that it would not be "appropriate" for the museum to participate in the evaluation process. The evaluators thanked the staff contact for considering the opportunity and requested an explanation as to what was considered "inappropriate" so that future ISE projects could learn from the perspective of staff affiliated with an organization that was not typically involved in NSF funded ISE projects. A follow-up explanation was not provided, however.

Design

The evaluation design comprised a two-group posttest only randomized experimental design.² The evaluators randomly assigned eligible respondents from the pre-viewing screening questionnaire to an experimental (“Viewer”) group or a non-exposure (“Control”) group. The Viewer and non-exposure Control groups then performed the following activities:

Viewer group: Participants in this group viewed the *Cracking the Maya Code* program at home and completed an online post-viewing survey. A random sample of 20 Viewers who completed the post-viewing questionnaire also completed a follow-up telephone interview 3-4 weeks after viewing.

Control group: Participants in this group did not view the program but instead only completed a questionnaire containing the same background, demographic, and content questions as completed by the Viewer group, except for those asking for participants’ reactions to the program itself.

The evaluation then compared the results of the Viewer and Control groups as outlined under Analyses.

Questionnaires

The initial screening questionnaire included demographic and background questions about participants’ age, gender, ethnicity/race, educational level, occupation, history and science interest, television viewing habits, and prior exposure to NOVA programs aired since 2008.

The subsequent Viewer and Control group questionnaires included a 28 point knowledge assessment of content covered in the program related to the ancient Maya history and culture, the process of deciphering the Maya writing system, and the workings of the writing system. Viewers also completed questions that asked about the program’s appeal, clarity, density of information, and personal learning value, focusing on the following issues:

- To what extent did the program appeal to the Viewers? How did Viewers rate the program in terms of storytelling, visual engagement, and content interest, and their likelihood of recommending the program to others?
- What did Viewers like and dislike about the program?
- How did Viewers respond to the program’s clarity of presentation and the amount of information and science presented?
- What did Viewers learn from the program that interested them most?
- What new information did Viewers learn about ancient Maya culture and history, the decipherment of the Maya writing system, and the writing system itself?

² Administering a pretest and posttest to the same group of participants in this case was neither a) practical given the challenges of obtaining participant cooperation, nor b) desirable given the specialized nature of the content addressed in the program and the potential for the pretest to sensitize Viewers to the program’s content and affect their posttest performance given the short timeframe allotted to the evaluation period. Typically, the shortcomings with the separate-sample design involve its failure to control for history, maturation, mortality and their interaction. However, in the case of this program treatment, where the Viewer and Control group respondents completed the evaluation activities over a matter of days, group changes of this nature are unlikely. The separate-sample design controls for the main and interactive effects of testing and was deemed in this case a useful and cost-effective strategy for evaluating the program.

- To what extent did the program cause Viewers to think or feel differently about the ancient Maya?
- To what extent did Viewers discuss, think about, or engage in any program-related activities a few weeks subsequent to viewing?

The evaluation team identified the above set of evaluation themes and procedures by: reviewing the project proposal submitted to the NSF, consulting with the project team, and reviewing the *Cracking the Maya Code* transcript and DVD. Although the evaluators typically select or adapt science knowledge, interest, and opinion survey items from nationally validated sources when evaluating informal science education projects, given the unique nature of the historical and science content provided in *Cracking the Maya Code*, this was not feasible. Instead, the evaluators devised questionnaire items with the assistance of the project team and then pilot tested the evaluation instruments with both adults and youths fitting the target audience for readability, length, clarity, and level of difficulty.

Data analysis and reporting

Statistical analyses were conducted on all quantitative data generated from the evaluation. To explore for possible significant differences within and between the Viewing and Control groups, T-tests, Chi-Square, and Mann-Whitney tests were applied as appropriate.³ Statistically significant findings (hereafter referred to as “significant”) at $p \leq .05$ are reported in the text. To help determine whether a significant difference was a difference of practical concern, effect sizes were also computed and reported in the text where appropriate.

^{4 5} As explained by Thalheimer and Cook (2002) “*whereas statistical tests of significance tell us the likelihood that experimental results differ from chance expectations, effect-size measurements tell us the relative magnitude of the experiment treatment. They tell us the size of the experimental effect.*”⁶

Content analyses were performed on the qualitative data generated in the open-ended questions. All analyses were conducted by two independent coders. Each coder independently coded randomly ordered open-ended responses, blind to group assignment. The analysis was both deductive, drawing on the program’s objectives, and inductive, by looking at the participants’ responses for overall themes, keywords and key phrases. Any differences that emerged in coding were resolved with the assistance of a third coder.

³ When examining subgroups with two categories (e.g., gender) using the two-independent-samples *T-test*, Levene’s test was first used to determine whether the separate-variance *t* test or pooled-variance *t* test was appropriate for testing the means of the measured variables. If the test indicated the variances were significantly different, the separate-variance *t* test was used.

⁴ Following Cohen’s (1992) interpretation, for T-tests $d=.2$ indicates a small effect, $.5$ a medium effect, and $.8$ a large effect. For non-parametric tests, $r=.10$ indicates a small effect, $r=.30$ a medium effect, and $r=.50$ a large effect.

⁵ Cohen, J. (1992). A Power Primer. *Psychological Bulletin*, 112 (1), 155-159.

⁶ Thalheimer, W. and Cook, S. (2002). How to Calculate Effect Sizes from Published Research: A simplified methodology, *Work-Learning Research*, p. 2.

Sample Information

A total of 129 participants, including 71 Viewer and 57 Control group participants completed questionnaires that formed the basis for the evaluation findings. The table on the following page summarizes the demographic and background information for each group. The Viewer portion of the sample included:

- Somewhat more males (53%) than females (47%).
- A wide range of ages, spanning 18-53 years, with a mean age of 40.
- A racial/ethnic distribution comprising 89% Whites with 13% of Hispanic origin, 3% African-American, 1% Asian, and 7% mixed-race Viewers.
- A combination of high school through graduate level educated respondents, including: 7% with a high school education or less, 57% with some college education or a college degree, and 37% with some graduate school education or a graduate degree.
- A majority of participants who watch science/nature programs daily or weekly (63%).
- A majority of participants who watch history programs daily or weekly (58%).
- A majority of participants who watch PBS programs daily or weekly (63%).
- A majority of participants who occasionally or regularly watch NOVA (65%).

Group comparability

The evaluation gathered demographic and background information to determine whether the two independent samples (Viewers vs. Control) should be evaluated as having come from the same population. T-test and Chi-square analyses indicated that the two groups did not differ significantly with respect to the measured variables, which included: gender, race/ethnicity, age group, education, and occupation.

Table 1
Sample demographic and background information

Demographic/ background factor	Categories	Control (n=57)	Viewers (n=71)
Gender	Female	56%	47%
	Male	44%	53%
Age Group	Age range	16-58	18-53
	Mean	37	40
Geographic residence	US Northeast	2%	4%
	US North-Central	5%	13%
	US South Atlantic	21%	25%
	US South-Central	12%	20%
	US West	58%	38%
Racial/ethnic background	African-American/Black	6%	3%
	Asian	11%	1%
	Native American Indian or Alaskan Native	2%	0%
	Native Hawaiian or Pacific Islander	0%	0%
	White	75%	89%
	Multiracial	6%	7%
	Hispanic Origin	21%	13%
Highest level of education	Less than high school	4%	1%
	High school degree	0%	6%
	Some college	29%	20%
	College degree	45%	37%
	Some graduate school	4%	6%
	Completed graduate school	20%	31%
Occupational status	Work in science/technology field	18%	7%
	Work in education field	21%	24%
	Work in history field	43%	42%
	Work in field other than sci/tech/education	4%	6%
	Homemaker	0%	3%
	Retired	2%	3%
	Unemployed	13%	16%
Frequency of watching science/nature programs	Daily	7%	11%
	Weekly	49%	52%
	Monthly	28%	25%
	Less than once a month	16%	9%
	Never	0%	3%
Frequency of watching history programs	Daily	11%	14%
	Weekly	37%	44%
	Monthly	14%	27%
	Less than once a month	14%	10%
	Never	0%	6%
Frequency of watching PBS	Daily	18%	29%
	Weekly	39%	34%
	Monthly	23%	17%
	Less than once a month	19%	16%
	Never	2%	4%
Frequency of watching NOVA	Regularly	11%	18%
	Occasionally	47%	47%
	Seldom	33%	21%
	Never	9%	14%

The Viewing Context

With whom Viewers watched the program

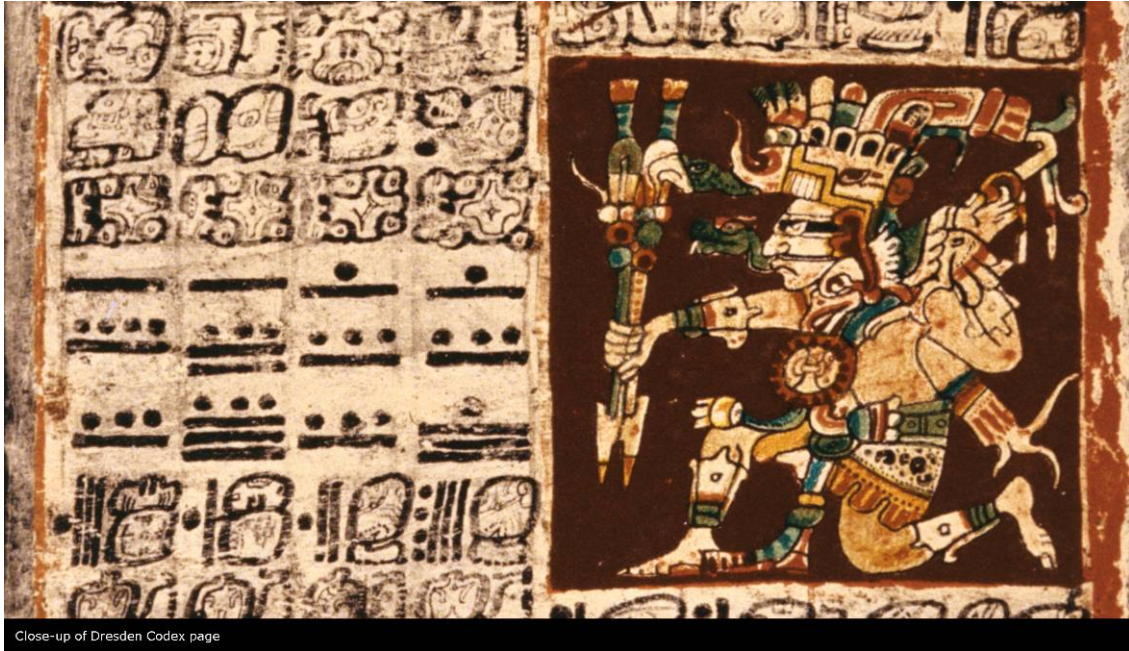
Viewers were asked whether they watched the *Cracking the Maya Code* program alone or with others, choosing from the following response options: alone, spouse/partner, children, friends, and other. As Table 2 shows, most Viewers (77%) watched the program alone. Not quite one-tenth (9%) said they watched the program with a spouse/partner. Smaller percentages reported watching with just friend(s) (4%), some combination of spouse/partner, friends, or children (9%), or just children (3%). A very small percentage (1%) did not answer.

Viewers watched:	Total (n=71)
Alone	77%
With spouse/partner	9%
With spouse/ partner, child(ren), and/or friend	6%
With friend(s)	4%
With child(ren)	3%
No answer	1%

Whether and how viewing was disrupted

Viewers were asked whether and how their viewing of the *Cracking the Maya Code* program was disrupted in some way. Table 3 below summarizes these findings. While three-quarters (76%) of the Viewers said they watched the program without disruption, the remaining Viewers experienced some disruption that briefly interrupted their viewing experience, as they: tended to children (4%), briefly fell asleep/zoned out (4%), or answered phone or door (1%). Other disruptions mentioned by individual Viewers (14%) related to their: making a snack, tending to a family member, getting distracted by a barking dog, or having to fix the DVD.

	Total (n=71)
No disruptions	76%
Some disruption	24%
Fell asleep/zoned out	4%
Had to attend to children	4%
Answered phone or door	1%
Other (<i>made snack, tended to family member, distracted by dog barking, DVD paused or froze</i>)	14%



Close-up of Dresden Codex page

Findings

This section includes findings on the overall appeal, clarity, comprehensibility, learning value, and extended influences of *Cracking the Maya Code* as determined by the recruited Viewer and, in some instances, Control group participants' responses on the questionnaires completed for the evaluation. The evaluation findings are presented in 4 parts as follows:

Part 1: How appealing and engaging did Viewers find Cracking the Maya Code?

Part 2: How successful did Viewers find Cracking the Maya Code in terms of: clarity, amount of information, science, and explanations of scientific principles, and communicating information about the ancient Maya and the Maya writing system?

Part 3: What did Viewers learn from watching Cracking the Maya Code?

Part 4: What was the longer-term impact of Cracking the Maya Code on Interviewees' thoughts, personal connections, and actions one month after viewing?



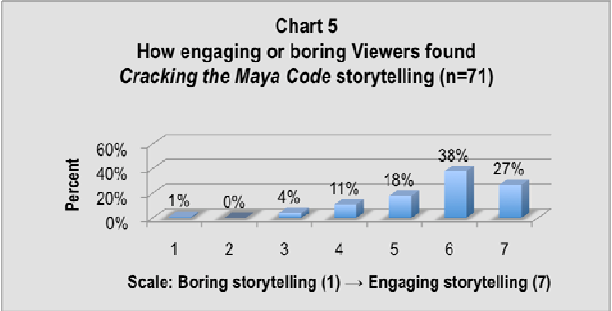
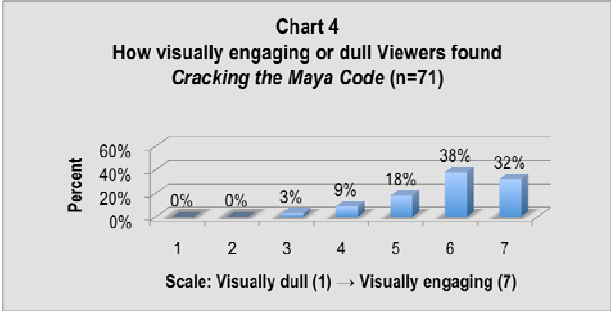
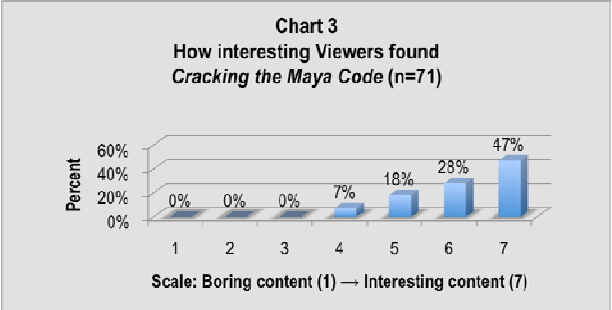
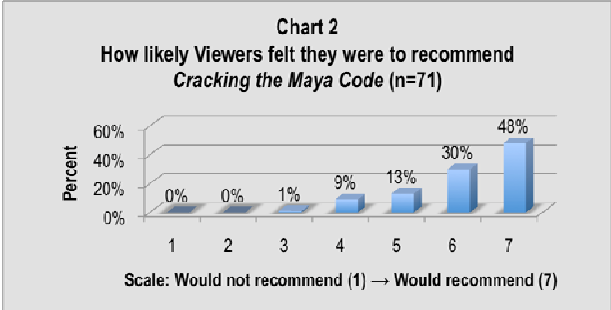
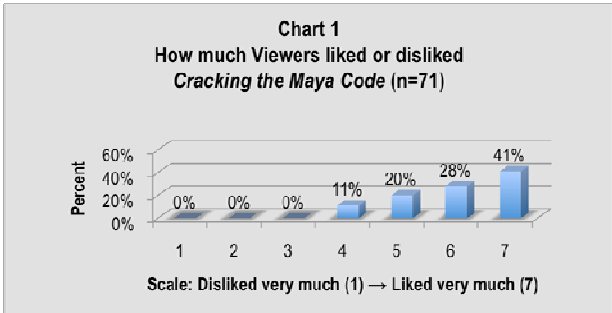
Part 1: How appealing and engaging did Viewers find *Cracking the Maya Code*?

To assess Viewers' reactions to *Cracking the Maya Code* in terms of overall appeal and engagement, Viewers were asked to rate several presentation aspects of the program and describe what they most and least liked about it. These findings are presented in sections 1.1 – 1.3.

1.1 How did Viewers rate *Cracking the Maya Code* in terms of overall appeal, content interest, visual engagement, storytelling, and their likelihood of recommending the program?

Viewers generally liked the program, thought it featured interesting content, and felt it was visually engaging and had engaging storytelling. Viewers also expected that they were likely to recommend the program to others.

Viewers were asked to rate *Cracking the Maya Code* for the extent to which they liked or disliked the program and found: the content boring or interesting, the program visually engaging or dull, and the storytelling boring or engaging. Charts 1 through 5 present the percentage of Viewers that selected each rating using a scale of 1 (rated the lowest) to 7 (rated the highest).



The median ratings in each case indicate that, overall, Viewers liked the program (6.0) and felt they were likely to recommend the program to others (6.0). Viewers also generally agreed that the program was visually engaging to them (6.0), had engaging storytelling (6.0), and contained interesting content (6.0). Mann-Whitney tests indicated that older Viewers (40 years and older) rated their overall liking of the program (⁷Mdn=6.5)⁸ and their interest in the program's content (Mdn=7.0)⁹ significantly higher than did younger Viewers (Mdn=6.0 each). The effect size in each case was .24 and .26 respectively, generally considered a small to medium effect.¹⁰

When Viewers were invited to explain their ratings, all but one was positive about the program's overall appeal, with one Viewer reporting neutrality because the Maya was not a subject of interest. Many Viewers described the program as *interesting*, especially the stories of the scholars and the information provided on Mayan hieroglyphs, while a few felt it was occasionally somewhat *boring* or just not a subject of interest. Viewers were more conflicted about whether they felt the program was visually engaging or visually dull. Some felt that the program was visually engaging throughout, while others felt that the interviews of the scholars was at times visually dull and they would have preferred seeing more things *Mayan*. Viewers were also somewhat conflicted about whether the storytelling was engaging or boring. Some were attracted by the *mystery* approach taken to tell the decipherment story, while others felt that there were too many interviews or that the narration was somewhat *monotone* or too similar to other documentaries they'd seen. Viewers' comments on their ratings follow below.

▪ Would or would not recommend

- *The last rating, would I recommend this to someone to watch, it would depend on the circumstance. If I knew someone that was interested in the topic whether it be for a educational purposes or personal, I would definitely recommend this, but someone that hadn't expressed interest to me first, then no I would not simply because it is not an everyday topic.*
- *I would recommend this to my teaching team. This can be used in a history or math class.*
- *I would recommend it as well, especially to a few friends who have recently brought up the whole 'end of the Mayan calendar' thing.*
- *I would gladly recommend it to certain types of friends. I also have friends that would probably not find it the least bit interesting, so I'd be selective in my recommendations.*
- *I feel that anyone who loves to learn of ancient peoples would love this video.*

▪ Interesting or boring content

- *Excellent overall; but possibly because I have a strong interest in the subject matter as a teacher of American History and cultural anthropology to high school students.*
- *I would have given 7's had the information been more current.*
- *The separate story of each linguist and investigator was interesting. The young Stewart boy's achievement was an amazing addition to the narrative. I would like other kids to see this and be inspired and to be*

⁷ MDn = median.

⁸ ($U=456, p=.045, r=.24$)

⁹ ($U=444, p=.029, r=.26$)

¹⁰ Following Cohen's (1992) interpretation for non-parametric tests, $r=.10$ indicates a small effect, $r=.30$ a medium effect, and $r=.50$ a large effect.

interested in something other than the usual. Of course he was following his father's interests but at such a young age an inspiration nevertheless. The Russian woman was an inspiration too as was Ms. Schele, a good, plain spoken model for other women to emulate.

- *The Mayan writing is interesting to view as it looks different from other writing. I am interested in how they came to draw the faces as they did as those faces do not look particularly Mayan. I'm interested why they cared so much about time and I would have liked a bit more about the Mayan calendar.*
- *I found the whole story very enjoyable, interesting and informative.*
- *All the speakers were very interesting.*
- *I personally knew nothing about the Maya people. I found this very interesting, and actually amazing that the Maya were detailed in their writings.*
- *As I said before, I thought it was fascinating.*
- *I did think that the "Cracking the Maya Code" was interesting, but it was a long program to sit down and watch.*
- *I really did enjoy this program. The content was interesting and clearly presented.*
- *I'm more of a space guy, so I don't think I was that engaged by the content.*
- *The video was decent overall, very visually engaging, but a little boring at times.*
- *This isn't a subject that I would normally be drawn to, but I did find this interesting for what it was.*

▪ Liked or disliked

- *I put a 4 down for whether or not I liked this program. This isn't a subject that I would normally be drawn to.*
- *I liked it very much ... the only thing is that there were, to me, leaps of logic and/or unexplained or explained spots in the program ... they jarred me away from listening to the program temporarily ... that was disconcerting to me as I was very much interested in learning the details.*
- *I think the program stands up to NOVA's overall high standing for their videos.*
- *The program has my head spinning with idea about art and poetry and architecture and the constraints of language.*
- *I greatly enjoyed the program.*
- *It was invigorating. That is perhaps an odd word to use to describe this type of programming, but it really excited me.*
- *I enjoyed it.*
- *I very much enjoyed the program...actually was hoping there was a 2nd show to follow on the DVD...*
- *I don't usually score things as perfect. It spoke well to many different peoples understanding.*

▪ Visually engaging or dull

- *Program was excellent. The numbers flashing on top were very distracting because I am a very visual person. I gave it a 5 for visually engaging because I think that the all of the times they were interviewing people, they could have been showing more Mayan stuff instead of the [nerdy] people who did all of the research. Again, I appreciate the work that they've done, but looking at this from the perspective of a 29 year old male, I would have rather seen more video footage of the hieroglyphs or the villages.*
- *Visuals seemed a bit fast as times as the program was explaining the meaning of each part of the symbols and then linked them to sounds.*
- *While the visual elements of the actual hieroglyphs and the environment were engaging...*
- *I liked all of the visual elements and was happy to see not as many people interviews or watching people talk. I like when people talk about their experiences, but I am visual so hearing and then seeing what they exactly did helps me understand that material better.*
- *The only places I didn't give the highest rating to were storytelling and visual engagement... For visual engagement, everything was really consistent, and the animations and 'morphing' style video montages*

really great, I think the editing with the archival footage was done really well, and perhaps my only issue if you can call it that is in art direction of interviews, sometimes a bit dull. Though I know it can be hard to spice those 'talking head' things up.

- *The video was decent overall, very visually engaging, but a little boring at times.*

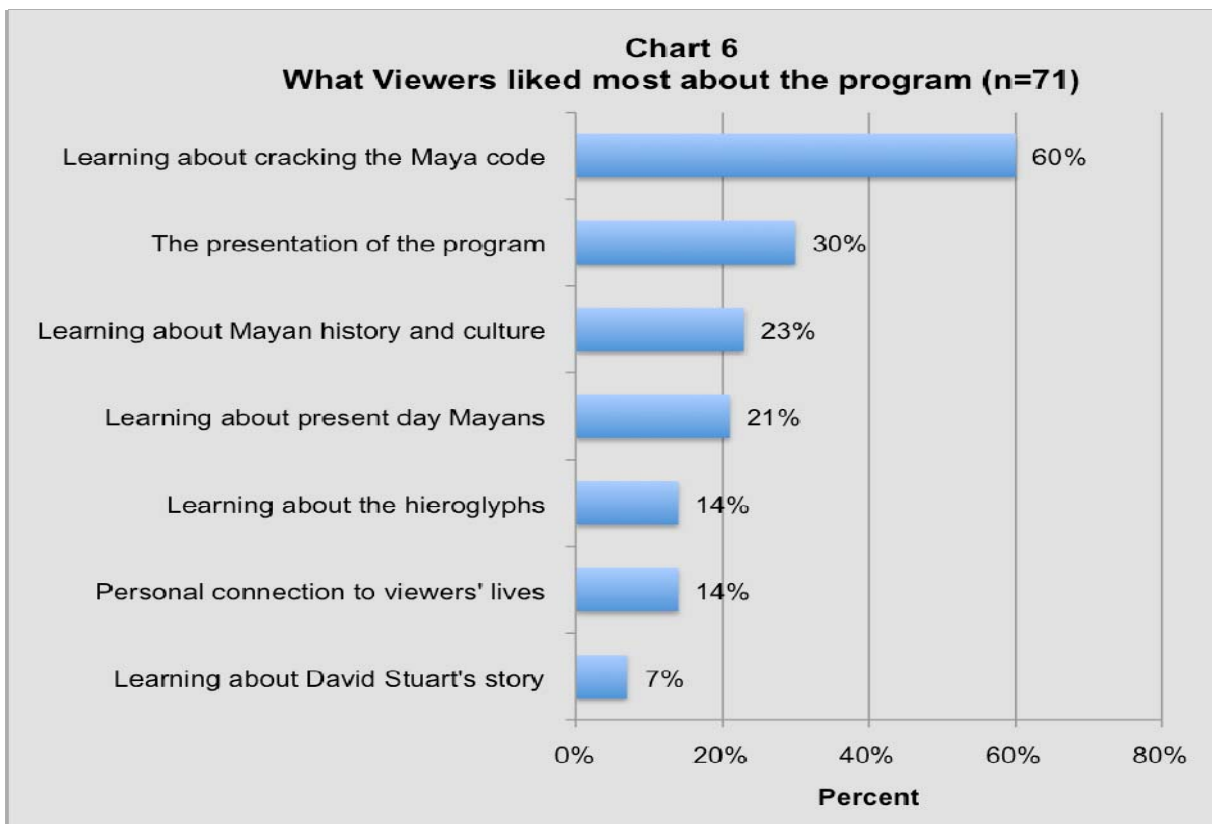
▪ **Engaging or boring storytelling**

- *The story telling was interesting. The interviews were not as informative as I would have liked.*
- *...the story was engaging and interesting,*
- *I had a hard time following the narrator when he was explaining about the different symbols, which ones stood for what, etc. Story telling was too scholarly, often monotone. This is an exciting discovery. The story telling did not connote that. Good story telling relates the story to the listener and I could not connect with anyone in this program. It would have been less boring if more personal stories of the Mayans themselves were tied into some of the findings.*
- *This is a subject I am very interested in, the history of the different peoples of the world. I thought the narrator's voice was wonderful, a good story teller...not a drone*
- *The content was interesting but the way it was narrated was kind of the same as other documentary programs I've seen which tends to get a little boring.*
- *...the face to face interviews could have been briefer and provided by voice over once the speaker was identified. I have been training school teachers to be and the traditional documentary fails to engage today's secondary school students. For example, Wiseman's Danse does not "interview" anyone.*
- *Overall it was interesting to watch, but I would probably fast forward during the storytelling portions. The story also connects to my students because of their age and David Stuart's age.*
- *The only places I didn't give the highest rating to were storytelling and visual engagement -- the narrator's voice is very authoritative, but not necessarily enrapturing as a storyteller.*

1.2 What did Viewers like most about *Cracking the Maya Code*?

All of the Viewers identified at least one aspect of *Cracking the Maya Code* that appealed to them and most mentioned two or more aspects. Viewers were especially enthusiastic about the new information they learned, as five of the seven most appealing aspects of the program that Viewers identified related to new information gained from viewing. Viewers also frequently enjoyed some aspect of how the program was presented or related to their lives.

Viewers were asked to describe what they liked most about *Cracking the Maya Code*. Chart 6 shows the aspects of the program that Viewers said they most frequently liked and the percentage of Viewers citing each aspect.



The majority of the Viewers (60%) were drawn to information they learned about the *process* by which the code was cracked, particularly: how it occurred, the different scholars involved in its deciphering, and the challenges and misinterpretations that occurred over time. Nearly one-quarter (23%) of the Viewers liked

learning about the Mayan history and culture, particularly involving the temples, villages, and ruins discussed and the cities that were discovered and/or nearly decimated. About one-fifth (21%) liked learning about present day Maya, especially the opportunity they now have to learn about their history, language, and culture as a result of the deciphering work on the writing system. Several Viewers pointed to information they learned about the hieroglyphs themselves (14%), and in particular the meaning of the glyphs, the complexity of the language, and/or the artistry of the symbols or they pointed to David Stuart's story (7%).

Beyond the program's learning value, Viewers also frequently enjoyed some aspect of how *Cracking the Maya Code* was presented or related to their lives. Specifically, nearly one-third (30%) were drawn to the program's style of presentation, and in particular the use of a *mystery* approach to convey how the Maya code was cracked, the use of visuals and timelines, the narrator, and/or the pace with which the progression of events unfolded. Several others (14%) liked how the program related to their lives, even noting that it inspired them to do something new, such as traveling to the Yucatan peninsula or use the Mayan numbering system to teach math to youth.

Examples of Viewers' comments on the above themes follow below.

▪ ***Learning about the process by which the code was cracked (60%)***

How it was done and the challenges and misinterpretations over time

- *Liked learning about how the code was cracked and what it took to get to that point.*
- *The uncovering of mysterious, almost impossible, clues to help solve the cracking of the code. It showed the dedication of scientists to get to the bottom of a well known, but little understood culture. It was a challenge.*
- *I really enjoyed learning how scientists deciphered the different pictographs and glyphs. This pulled me into the story and kept me interested in both the unfolding progress of the research and the Mayan people and their culture.*
- *I liked the history of how the cracking of the code happened and how peoples' misperceptions slowed progress down.*
- *That I had no idea if they would figure the language out or not. The program as extremely informative about what it took over the years to put together all of the interpretations for the best understanding of the symbols.*
- *It gave what appeared to be a thorough recitation of the history of the scientific effort to understand the language, and did a good job of depicting errors in interpretation which set the effort back at times.*
- *Gave me an understanding of something I knew little about. Also shows how one person thinking however "right" they think they are, are possible to be proven wrong over time. It's interesting that Thompson was not challenged more during his time.*

Learning about all the different scholars it took to crack the code

- *It was fascinating to watch the many people from all over, each with their own backgrounds and specialties all trying during different eras to solve the same puzzle.*
- *The program portrayed how difficult it is to have all parties involved to collaborate with open minds to get the job done. I like the timeline factor of the persons involved and how the code was broken by the various experts each contributing their own beliefs. The film also pointed out that experts need to be open to others interpretations.*
- *It was also interesting to see the personalities involved and how the breakthroughs actually happened. I didn't know much about the historical study of the language, and really wasn't that aware that the code had been cracked*
- *The program represented very well the complexity of the process of deciphering Mayan hieroglyphics and the important contributions of many different types of experts from around the world. Progress is a dynamic discussion that includes dead ends and endless debates to get to the truth.*

- *I liked how it depicted the people behind the science of cracking the code. All the scientists involved had very interesting stories to tell, and they themselves were interesting as well.*
- *...how people worked together, young and old, male and female, to crack the code is simply amazing.*
- *Covering it from the perspective of researchers who made discoveries was really inspiring -- how until recently most of them worked in relative isolation, or were kind of alone in their fields.*

▪ ***The presentation of the program (30%)***

Overall interesting, informative, engaging

- *I enjoyed the comments from the scholars. The story becomes more interesting when the people involved are the ones telling it.*
- *It was extremely interesting....It kept my attention throughout....on a topic I knew very little about....yet would enjoy learning more....*
- *... it was nice how both the human interest and information on the research topic worked together. It was really enjoyable to watch.*
- *I think the subject matter is fascinating. It was well researched and presented.*

The mystery approach

- *The program was presented as an unfolding mystery.*
- *The program was kind of a mystery which allowed me to try and guess new ideas as it went along.*
- *It was fascinating, and I felt like I was part of the adventure*
- *I liked the unfolding of the mystery of the symbols.*

The visual effects and use of a timeline

- *I also liked how many of the theories and ideas on decipherment were explained visually.*
- *I also liked the visual effects used to help illustrate how the language worked.*
- *...visual imagery, and metaphorical ties to the images in Washington D.C*
- *...following the linear time frame of deciphering the Mayan code.*
- *The time line made it very easy to follow and understand, starting hundreds of years ago all the way up to present day.*
- *I liked how there were a lot pictures and clips to look at as the narrator was speaking.*

The progression and pace of the program

- *I liked how the program progressed. It started with very basic information, and became more complex. It seemed like the viewer was there.*
- *Something about the presentation and its pace made it quite captivating.*
- *I liked the order in which the program was presented. It led me through the process both right and wrong to help illustrate the mistakes which were made along the way.*
- *I liked the way it progressed from the early ideas in cracking the code to the knowledge we currently have about Mayan hieroglyphs.*
- *I liked the that program was sequential and went into depth about different facets of Mayan culture*
- *The way it was presented - watching the progression from the initial discovery to the actual cracking of the code. It was a very interesting puzzle.*

The narrator

- *Narrator has a nice voice.*
- *Also, the narrator did an excellent job pronouncing difficult words and his voice was essential, it really set the mood for the documentary.*

▪ **Learning about Mayan history and culture (23%)**

History and culture in general

- *I love learning about our history and how culture and language have evolved.*
- *The emphasis on the importance of our history. I love the way Linda Schele put it when she said, "One of the most precious gifts that any group of humans on the earth has is history."*
- *The stories that were in the video about some of their history.*
- *...learn what happened to these ancient peoples - and see how their lives compare to ours.*
- *I thought that the glyphs are an amazing glimpse into their culture and our past.*
- *I have been to the Mayan area of Mexico, and was very glad to learn about what the history of the people was.*

The history of the Mayan cities

- *The current videos and photographs of the Mayan villages because I got to see them as how they probably would have looked in their time.*
- *Learning of a unique civilization that had a deep interest in time and astrology. Then discovering they were much more violent than originally thought. It was an interesting culture in its duality and complexities.*
- *I learned a lot about the Mayan culture and the history of how the cities were re-discovered and excavated.*
- *I enjoy this type of program as I am most interested in the history of the various peoples of the earth, especially the ones who are shrouded in mystery. The Mayans left huge and memorable monuments to a civilization that is seldom mentioned in our European centered programming and readings. Here they are, pyramids and huge sculptures and the very people who are descendants living so close to us and there has been very little told to us about them.*

▪ **Learning about present day Mayans (21%)**

- *The Mayans themselves learning about their written language and, more importantly, about their culture that they had been kept in the dark about for many, many years -- how exciting for them!*
- *I also really enjoyed the end when it showed the modern day Maya community and how cracking the code has really made their lives and culture richer. It was a piece of their heritage that was missing. They are now able to pass that on to future generations.*
- *I enjoyed the symbolic nature and the connection at the end to learning about one's own culture by learning the language.*
- *The fact that a culture may now learn its history that was taken away is awesome!*
- *It is fascinating to witness an ancient culture come to life after so many years of being either misunderstood or not understood at all.*
- *...the Mayan descendents themselves have accepted the validity of the sounds and are beginning to recapture their own past with a grander sense of their history and themselves than what they have been led to believe...*
- *It was also interesting to see how the Maya's that are living today are learning about the language of their past and embracing it.*
- *That it showed how this information could be used to help restore a language that was once forgotten and allowing for this information to be accessible to the descendents of the Maya.*
- *I really enjoyed the beginning of the program when it asked the viewer to think about what it would be like to disappear and have some other future people discover our culture and language. The thought that here is this culture that very little was once known about.*
- *The fact that there were programs in place in schools today in Maya villages helping the children and Maya descendants learn about their culture. Cultures need to be preserved through education.*
- *How the Mayas are now learning their ancient language based on the work of these scholars.*
- *I liked this because it showed how closely our current civilization can truly correlate with their ancient society simply because of having established sophisticated languages.*

▪ **Learning about the hieroglyphs (14%)**

- *I really enjoyed understanding the beautiful and sophisticated artwork that went into creating the hieroglyphs. It is astounding to think how our current language is simpler than that of the advanced society of the Mayan people.*
- *Great pictures of the actual writings, hieroglyphs.*
- *I found the pictures and hieroglyphs very interesting.*
- *The analytical explanation of the hieroglyphic interpretation, including the graphic animation. It provided the viewer a visual guide and foundation to support the further investigation of Mayan glyphs.*
- *...and the commentary explaining exactly what some of the symbols meant and why...*
- *I enjoyed the animated glyphs. It really helped me to perceive the similarities between the glyphs.*

▪ **The program in relation to Viewers' lives (14%)**

Personal relevance

- *As an architect I really enjoyed the fact that a major breakthrough was attributable to an unemployable architect.*
- *History - I am Mexican-American and I change when I learned the history of Mexico and realize that I am part Aztec and part Spaniard. Knowing where you came from is important because then you know your history and your values. I am new world and old world. This is why I have studied history, American and Mexican, and Native American.*
- *I thought it was fascinating to look at the Mayan people as regular people...searching for interesting ways of telling their "story." I thought this program showed how similar WE are to this culture.*

Inspired participant to explore new or reflect on personal profession

- *I also like the drawings that the female architect did as I was an architectural student myself before going into computer science.*
- *...got me interested in the profession of archaeology and studying linguistics*

Inspired participant to incorporate what they learned from the program into their curriculum

- *I really liked how you could apply math and algebra to this movie. I am planning on using the number system as a problem solving problem with my 7th grade math students. I like how it is algebraic thinking in an applied and multicultural setting.*
- *I am studying to be an elementary teacher and we had to relearn how to count, but we used letters instead of numbers and I thought that it was interesting to see how the Mayan's used numbers in their language*

Inspired participant to want to travel to the Yucatan

- *The program has sparked in interest in going to visit the Mayan temples that still stand.*
- *Now I would consider it a vast subject to study and would like to go to some Mayan programs. I would like to compare those times and the times of today.*
- *It made me want to add a visit the temples to my travel list.*

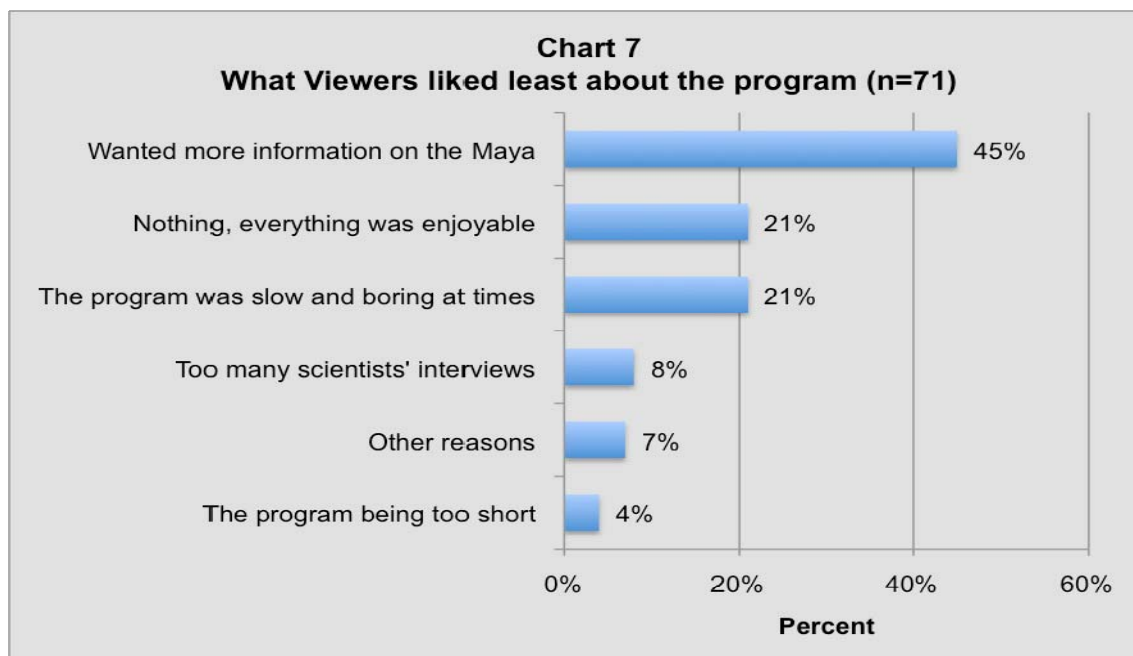
▪ **David Stuart's story (7%)**

- *The story of Dave Stuart and his youthful genius. Amazing.*
- *The fact that the one expert was twelve when he wrote a professional paper points to the fact that exposure and adaptations to history and being allowed to become part of it is still a workable learning process.*
- *The final reveal of the work of the young scholar.*
- *I enjoyed hearing about the boy who studied with this father and has made it his life work.*

1.3 What did Viewers like least about *Cracking the Maya Code*?

Viewers' most often wished for the program to feature even *more* information about the Maya. Some felt the program was *slow* or *boring* at times, while a few indicated too many scientist interviews were included or thought the program was too short.

Viewers were asked to describe what they liked least about the *Cracking the Maya Code* program. Chart 7 shows the main aspects Viewers pointed to and the percentage of respondents citing each aspect.



Not quite half the Viewers (45%) wanted the program to feature even *more* information about the Maya, particularly information on modern Maya culture, the ancient Maya, decoding the Maya code, and/or the Maya language and writing system. Not quite one-fifth of the Viewers (21%) felt that everything about the program was enjoyable. Another one-fifth (21%) felt that the program was at times *slow* and/or *boring*. Smaller groups of Viewers indicated there were too many scientists' interviews (8%) or that the program was *too short* (4%). A few participants cited other reasons (7%) as to what they least liked.

Examples of Viewers' comments on the above themes follow below.

- **Wanted more information on the Maya (45%)**

Modern Mayan culture

- *I would have enjoyed more information on Mayan people of today. I really liked how in the last few minutes, we got to see Mayan students studying and redeveloping the language. I would have liked to learn more about that such as how successful it is, how many people communicate with the spoken or written language, etc...*
- *The series should link the ancient Mayan world to the characteristics and rituals and practices of Mayans today. That would be very interesting and helpful in understanding the people. But it has to be done soon. I hope it can be done. Otherwise I liked it very much.*
- *The last part of the program was hurried and I would have liked more detailed information supporting the political conflict and maybe some ideas from the existing Mayas on why the cities were left behind.*
- *The ending was a bit abrupt. I would have enjoyed learning more examples of how to say simple things or learn what the group of Mayan people were learning at the end of the film.*
- *What is happening to the ruins now? I know some of them are tourist attractions, but are the governments of Mexico/Central America doing anything to preserve them or study them more? How has the Mayan population strengthened their identity - there was not enough of this at the end.*
- *I didn't quite follow the efforts to educate modern day Mayans in the meaning of the texts. It seems as if western scientists are giving their interpretation and the Mayans are simply accepting it. How are the Mayan people themselves participating in the scientific efforts? Are they just receiving information or contributing toward its understanding?*
- *I think there should have been more content depicting the modern-day Maya people and how they're re-connecting with their ancestral roots via the hieroglyphs.*

The Maya language and writing system

- *I would have liked a few more specific translations, possibly similar in content so that the patterns might have been more clearly understood. Some of the substitution options for phonetic glyphs were too rushed.*
- *I would like to see the Aztec writing code. It is similar and it would help people that are Native in Central Mexico. Mexico is an Aztec word = Mejico.*
- *Even though they sought to explain the symbols, I still don't have the first idea of how to do it (beyond the numbers.)It was very technical.*
- *Some of the glyph pictorial explanations I got lost on.*
- *I wish more time had been spent on how they came to know what certain symbols were because it looked like the Maya didn't always use bars and dots to describe time.*
- *They had a chart in which the vowels were divided into the different symbols. The glyphs were lighting up too quickly as they were read. I would have liked to interact more with what the film presented. I would have also liked more of an explanation as to how they deciphered the code on a smaller scale.*
- *They talked a lot about how each animal/human head symbol meant something specific, but I couldn't grasp the concept of how they knew that the picture was of a lizard or of an elephant head and why it had that specific meaning.*

Ancient Mayan history and culture

- *The program seemed primarily focused on the opinion of what the symbols meant and not as much on why they wrote it. --I would have liked a correlation to some events that could be tied to major events recorded in other cultures as explained in other calendar records.*
- *The focus on the specific methodology and history of breaking the code was important, but less interesting than the content on the actual Mayan culture of past.*
- *What else was going on in Central America during the time of the Mayan civilization? Current world history events were brought into the story but there wasn't any mention of how other civilizations in north, Central and South Americas were evolving at the same time - and did I miss this but are Incas Mayan, or how did their existences parallel each other?*

Decoding the Maya code

- *...and a better explanation about time passing and how the scholars were able to decipher how much time had passed in between events*
- *I loved the focus on the researchers, but would have still liked more information ultimately about what the cracking of the code revealed about the topic. That said, I didn't feel like it changed my appreciation of the show, and it just made me want to look up more.*

- **Nothing, everything was enjoyable (21%)**
 - *There was nothing to dislike. The entire program kept my interest and only made me have more questions.*
 - *I did not dislike anything about the program. The pacing, the story, the filming, and the narration all worked together in a way that I thought was very effective.*
 - *I really liked the film. The realization that the culture was deprived of its spoken language and meaning and history and now the people are re-learning their true past is wonderful!*
 - *Not anything, really. It was a very enthralling program.*

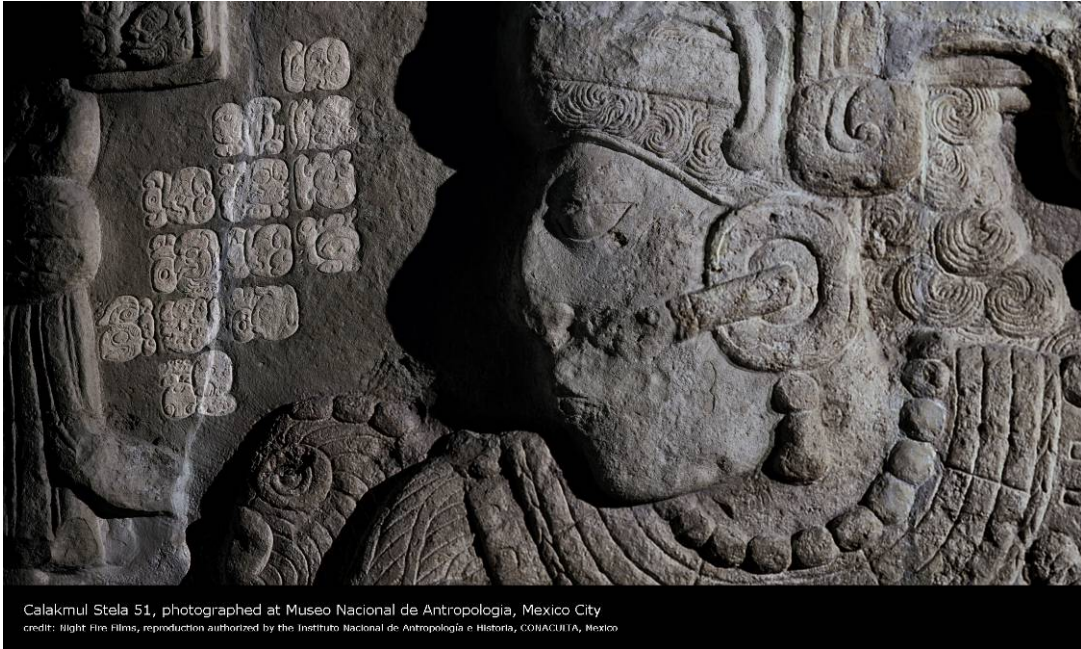
- **Program slow and boring at times (21%)**
 - *A little slow through some points...i.e. the portions about the scholars and the history of how they began to crack the code.*
 - *It seemed just a little slow at the beginning, but then half way through really picked up and had some really interesting facts and information.*
 - *A bit slow and boring at times. The narrator's voice lulled me to nod a few times.*
 - *The long introduction was not inductive to me thinking it would be as good as it was. It seemed to take a while to get to some interesting information.*
 - *It was really long and at times a bit boring. I am thinking in terms of a student. I felt my mind wandering at times...especially with the interview vignettes of the elderly gentleman about 25 minutes into it.*
 - *The program was a little bland at times when it got very descriptive, making it a little hard to pay attention at times.*

- **Too many scientist interviews (8%)**
 - *There may have been too many recorded interviews with some of the scientists.*
 - *It was a little hard to keep track of all of the different experts that were talking on the program. They all had good insight, but at times, it was hard to realize who was who.*
 - *Talking heads. I didn't really understand why the professor from TX was listed as deceased. I wonder how many other people in documentary's I watch are now dead but not "credited" as such.*

- **The program was too short (4%)**
 - *Too short. I was really into the show and suddenly it was over.*
 - *I thought it was too short and ended too abruptly. I would like to see a full blown series that would include many more Mayans speaking.*
 - *By the end, a lot of information had been presented in a very short period of time. The pace was a little fast and intense for casual consumption of new information. It was somewhat difficult to retain a lot of information based on a single viewing of the program.*

- **Other reasons**

- *Unfortunately, I think there may have been a little too much of the writer of the book talking. I appreciate all of his hard work and I think he deserves a lot of credit, but they could have shown other visuals while a narrator did a voice-over with the stuff he was talking about.*
- *I thought it might be leading to comment on the 2012 prediction, but didn't.*
- *While I can agree that Thompson appeared to be arrogant and always assumed he was correct about these Maya theories, the program spends too much time call him basically an "ass". This should be toned down. You don't need to beat the viewer on the head with this idea of arrogance.*



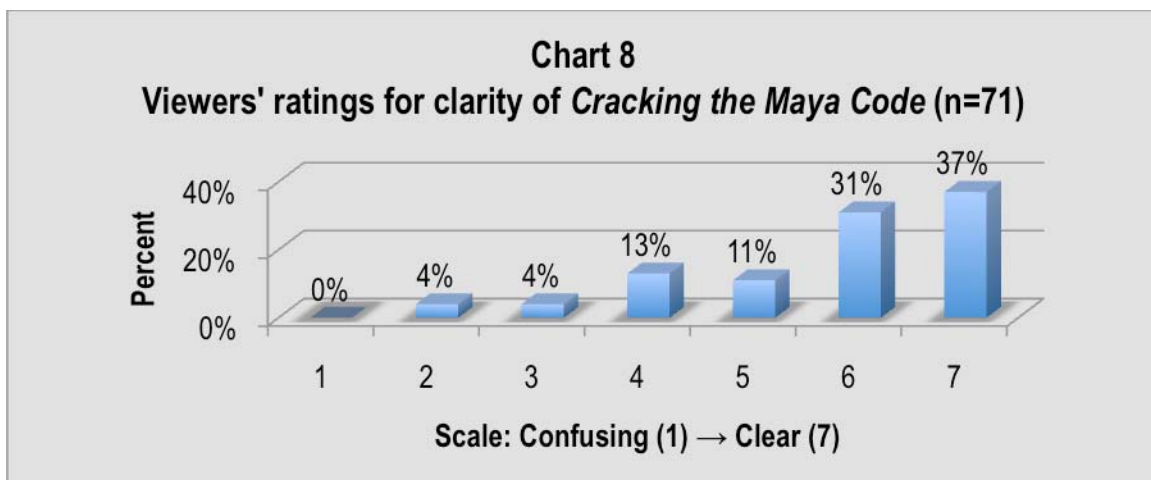
Part 2: How successful did Viewers find *Cracking the Maya Code* in terms of: clarity, amount of information, science, and explanations of scientific principles, and in communicating information about the ancient Maya and Maya writing system?

Viewers were asked to rate the program in terms of clarity of presentation, amount of information, science, and explanations of scientific principles, and the extent to which the program met a series of communication goals developed by the production team on the ancient Maya and Maya writing systems. These findings are presented in sections 2.1 – 2.4 below.

2.1 How clear did Viewers find *Cracking the Maya Code*?

Viewers generally found the program to be clear. In explaining their ratings, some Viewers noted specific points of confusion during the program or indicated they had difficulty following the dates and names presented. A few other Viewers felt that the program provided too much information in a short period of time or indicated that the presentation format *bounced* around and was hard to follow.

Viewers rated *Cracking the Maya Code* for overall clarity using a scale of 1 (confusing) to 7 (clear). Chart 8 shows the percentage of Viewers selecting each rating. The median rating (6.0) in this case indicates that participants generally found the program to be clear.



When Viewers were invited to explain their ratings, some reiterated that the program was easy to comprehend while others noted specific points of confusion or difficulty following dates and names generally throughout the program. A few Viewers felt that the program provided *too much data* in a short period of time or that the format of the presentation seemed to *bounce* around and was hard to follow.

Examples of Viewers' comments on each theme follow below.

- *I really did enjoy this program. The content was interesting and clearly presented.*
- *...and it was told in a clear, concise way that was easy to comprehend.*
- *I very much enjoyed this documentary. Information was clear...*
- *A lot of data in a short period of time. It was hard to follow at times.*
- *I believe the way in which this information is presented is extremely difficult for the average viewer.*
- *When the people say that the Maya were bloody and made sacrifices (something like that). It's a judgment. Bloody and violent compared to what civilization? Maybe scholars believed they were peaceful and now they see*

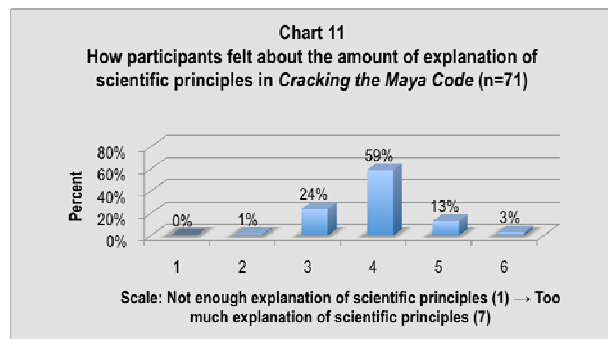
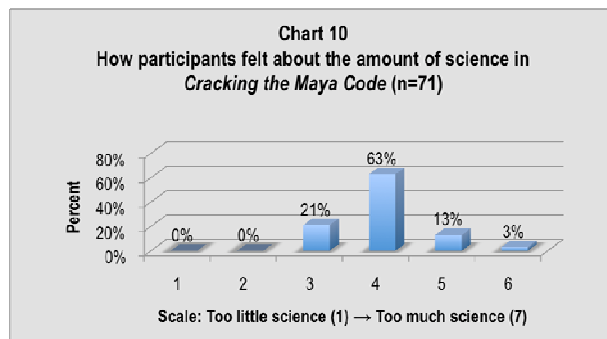
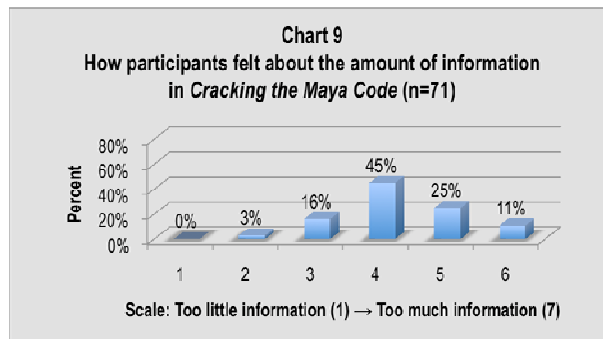
that they had more conflict than they believed, but it is all relative. I had a little problem with that-gut reaction that did not feel good.

- *The presentation bounced around a little. Until I got used to the format it was confusing then I realized that the show was allowing me to try and solve some of the puzzles myself before introducing the next step.*
- *There were a lot of names and dates to keep track of.*
- *I think that the subject matter itself is very confusing, but the program did a pretty good job of simplifying it.*
- *It did get confusing at some points and was hard to follow.*
- *This is such a great story; the fact that it took so many people working independently throughout the world for so many decades, not knowing of each other's interest until in the last 30 years or so it all came together! It would be nice to see more information at the end about how to find out more about the Mayan civilization, what can be visited, how current Mayan people are living, even just websites - I don't remember the ones that were posted throughout the video other than they were somewhere on pbs.org... How are they different from the Incas?*

2.2 How did Viewers feel about the amount of information, science, and explanations of scientific principles in *Cracking the Maya Code*?

Viewers generally found the program struck the right balance in terms of the amount of information, science, and explanations of scientific principles provided. Some Viewers said they would have welcomed the inclusion of even more information about the Maya, while others felt that there was too much information presented in a short amount of time. A few Viewers indicated they didn't see or appreciate the program's focus on science or scientific principles.

Viewers rated *Cracking the Maya Code* for how they felt about the amount of information, science, and explanation of scientific principles in the program using a scale of 1 (too little) to 7 (too much), with 4 being "just right." Charts 9 through 11 show the percentage of Viewers that selected each rating.



The median ratings indicate that Viewers generally felt the program struck the right balance in terms of amount of information (4.0), science (4.0), and scientific principles (4.0). Although as evident in the percentage ratings in Chart 9 – Chart 11, some Viewers would have preferred more of each. A Mann-Whitney test indicated that Viewers not working in an occupation involving science, history, or education fields rated the amount of information in the program significantly higher than did those working in these fields (Mdn=4.0 in each case) .¹¹ The effect size in this case was .30, generally considered a medium effect.

When Viewers were invited to explain their ratings, the majority said they would have welcomed more information on: specific topics such as the Mayan calendar, the current state of the Mayan people and culture, the scientific method used to decipher the writing system, and the hieroglyphs themselves. Several Viewers, however, elaborated that they felt that the amount of information and science provided was just right and offered good explanations. Others felt that there was too much information presented in a short amount of time or indicated they didn't really see or appreciate the focus on science or scientific principles in the program.

Examples of Viewers' comments follow below.

- **Would have liked more information on specific topics**

- More overall information

- *More information would have been great but I understand that you are working with only 50 minutes or so of content. Maybe a 2 or more part series would be better suited to everyone.*
 - *I wish the program had been a little longer and certain things had been described in more detail.*
 - *I wish I had learned a little more, but not much.*

- More information on the hieroglyphs

- *Maybe show more pictures of the actual writing system/symbols and focus a little less on the men who figured it out? Especially if this is being targeted to young people.*
 - *I do not have a good grasp on how the hieroglyphs were initially translated.*
 - *I'd really like to know how the actual words were initially derived. What was the starting point?*
 - *There were a few things that I would have liked to be given more time to think about. The part where they explained the stelae and what the figures meant went a little too fast for me to keep up with.*
 - *...would have only liked a bit more information on how breaking this code is important to us today....How does it benefit me?*
 - *I would have liked to have seen more examples of the hieroglyphic representations of Mayan phonetics. I would also like to have seen a further linguistic explanation of why the Mayan written language used multiple characters for the same phonetic sound.*
 - *...as mentioned previously I could have used a bit more info on the results of cracking the Mayan code, and perhaps even a bit more on cryptology.*

- More information on the scientific method used to decipher the code

- *During the program I starting wondering why no one has used (or why it was not discussed) more innovative technology such as 3d imaging, or infrared scanning to get clearing pictures. I know that the technology was not available when the Maya Code was being deciphered, but has there been any more research done since the 1980's?*

¹¹ ($U = 324, p = .012, r = .30$).

- *A little more background about how scientists go about understanding a new language system would have been helpful...and how they managed to link the symbols to phonetic sounds.*
- *As for the science and math, yes I do believe that there could be more added to this program. The deductive reasoning was there, but the program did little to truly show how the researchers were coming up with these conclusions. It is as though, they just came to these conclusions by staring at the glyphs.*
- *I have a doctoral level education, so I understand that my interests may not represent those of the general public, but for me, I am a data hog. I love to hear more about specifics, whether it's how they broke down raw materials to generate information, etc. In other words, rather than jumping to the findings in one sentence, I'd almost want this to be a longer program, so I could hear how they figured it out, and what methods they used.*

More information on the current state of the Mayan culture

- *More about the city state and warring tribes. And more about crop failure and the myth about the sun, the moon, and the corn gods.*
- *The only topic I really felt I wanted more information on was the current status of the culture. I liked the short portion at the end regarding the reintegration of the language into the culture. As an architect I recognized the constructs of a dirt floor school house, no desks, limited supplies... but I don't think most people would. I wished the camera had been pulled back a little further. Again, I think would speak to the current disposition of the culture. I was also left curious as to the archeological finds that have ended up in museums and libraries around the world... I could not help but feel these were stolen artifacts that coincided with the destruction of a culture. Probably best to keep the politics out of it as you did!*
- *I think that more information was needed to explain the political unrest. I liked the history, but this seemed like part one of a two part series.*
- *...it makes me want to know more, to explore more of this incredible civilization that was not a part of our history books growing up - and to some extent still has to be integrated into the general histories of the world.*

More information on the Mayan calendar

- *I would have liked a bit more about the calendar but not too much as it looks so complicated. I also would have liked more interaction with actual Mayans showing that they are as brilliant as their ancestors. Generally though I liked the program as it was. It is definitely worthy of putting it on the air.*
- *...The Aztec Calendar is much like the Maya calendar. The Sun God is in the Center and you did not touch upon it. The calendar system was invented by the Mayas and it was accurate. What is up with that? The calendar has Gods, numbers, art, etc... A whole program could focus on the calendar or mixed in with this program.*

▪ **The amount of information and science was just right**

- *It was a great balance and just right.*
- *I really liked the pace of the content delivery, and I felt it was said in a way where I could grasp it completely. I was very pleased with the episode.*
- *I thought the program explained the events in real time and with enough information one could further research if one wanted to.*
- *I think the amount of science involved in the program was just right.*
- *It's hard for me to think that the presentation was anything but "just right." I think it effectively conveyed all the information while inviting the viewer to become engaged in the mystery of the hieroglyphics.*
- *Overall, I think explanations were good. But on that note, I do feel I learned a lot, and the visuals were used really well in tandem with the explanations of discovering how certain parts of the code were unlocked, and the patterns in interpreting the symbols.*

- **Too much information**

- *It was a lot of information to retain in an hour program-I would want to watch it again at some point.*
- *I am less interested in the minutia of the science of cracking the Mayan code than the human stories behind it. I'm interested in the Mayans of the past and present.*
- *I think that at times, so much information was thrown at you that it was hard to comprehend each topic discussed in depth.*
- *Sometimes there seemed to be a bit of an information-overload.*

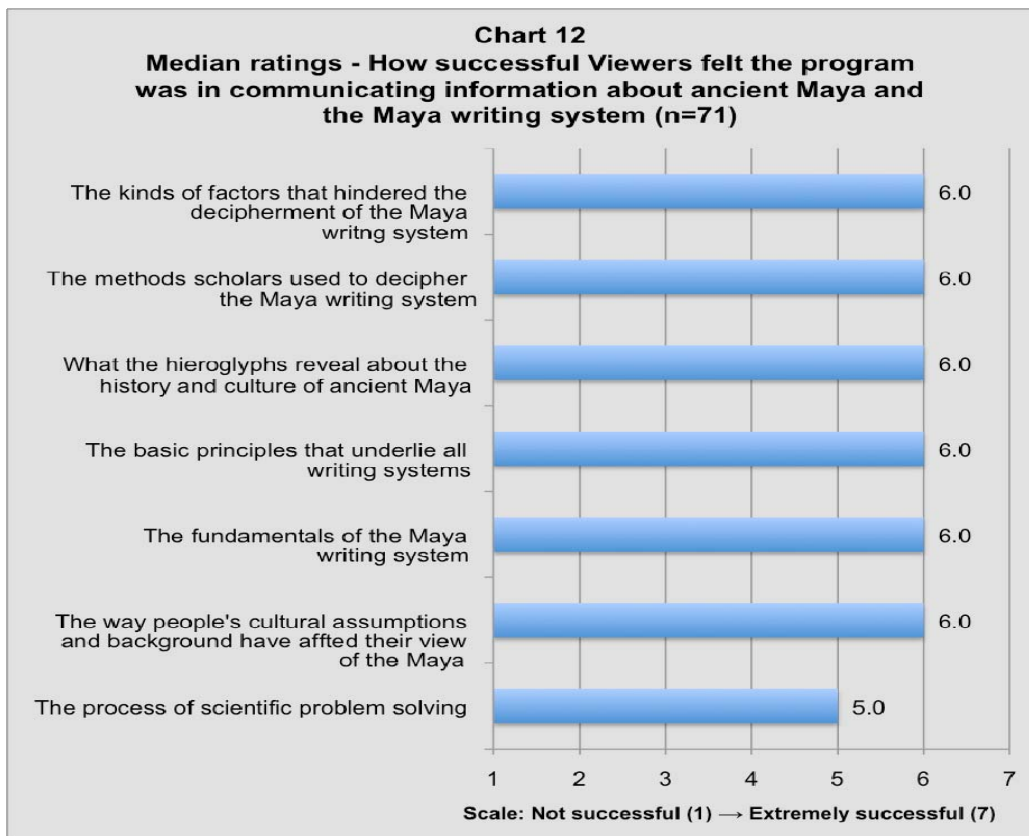
- **Did not see or appreciate the science or scientific principles of the show**

- *Scientific principles were not a necessary focus of the program except for the degree to which certain points of view were either strongly held or shunned by a scientific "establishment"; the opp program of the "scientific approach".*
- *I don't know much about the field of deciphering another cultures "language" so I don't feel I can really appreciate or speak intelligently about the scientific principles behind it. Apart from Archeology, I would not have even thought of the deciphering as much of a science but more of an art or something.*
- *Hard to come up with specifics, but, I will make a stab at it: perhaps give it more "CSI type science," i.e., there is a lot of sequential history and personality and political specifics, but not so much science.*
- *I didn't really notice the scientific explanations. I think it is because I have a science background so I just took it in stride.*
- *It didn't strike me as science as much as archeology. Perhaps that's considered science, I see it more as philosophy.*

2.3 Did Viewers feel that *Cracking the Maya Code* was successful in communicating information about the ancient Maya and the Maya writing system?

Viewers generally found the program was successful in communicating information about the ancient Maya and the Maya writing system.

Viewers were asked to rate how successful they felt *Cracking the Maya Code* was in communicating seven different educational themes, using a scale of 1 (not at all successful) to 7 (extremely successful). The median ratings for each theme are presented in Chart 12 below.



As Chart 12 shows, Viewers felt that the program was successful in communicating all of the intended themes, including: the kinds of factors that hindered the decipherment of the Maya writing system (6.0), the methods scholars used to decipher the Maya writing system (6.0), the way people's cultural assumptions and background have affected their view of the Maya (6.0), the basic principles that underlie all writing systems (6.0), the fundamentals of the Maya writing system (6.0), and what the hieroglyphs revealed about the history and culture of the ancient Maya (6.0). The one theme that received a lower median rating was the process of scientific problem solving (5.0).

Table 4 shows more detailed results for each statement by presenting the percentage of Viewers that selected each rating.

Table 4 How successful Viewers felt <i>Cracking the Maya Code</i> was in communicating information about the ancient Maya and Maya writing system (n=71)							
How successful was the program in communicating....	Not successful		Neutral			Extremely successful	
	1	2	3	4	5	6	7
The kinds of factors that hindered the decipherment of the Maya writing system	--	1%	1%	7%	7%	48%	35%
The methods scholars used to decipher the Maya writing system	1%	--	7%	3%	9%	56%	24%
What the hieroglyphs reveal about the history and culture of the ancient Maya	1%	--	3%	6%	27%	39%	24%
The basic principles that underlie all writing systems	1%	1%	1%	11%	23%	38%	23%
The fundamentals of the Maya writing system	--	3%	1%	9%	23%	49%	16%
The way people's cultural assumptions and background have affected their view of the Maya	--	4%	7%	17%	17%	35%	20%
The process of scientific problem solving	--	1%	9%	21%	20%	35%	14%

When invited to explain their ratings, Viewers most often observed that the program didn't explore the role of cultural assumptions or scientific problem solving as much as they would have liked. Several Viewers' also observed that the program was *too short* to be completely successful in communicating these themes and that more time and programming might be necessary to achieve this. Viewers' comments on these and the other educational goals listed in Table 4 follow.

Peoples' cultural assumptions and background having affected their view of the Maya

- *In terms of how this program communicated how people's cultural assumptions and backgrounds have affected their view of the Maya, I didn't really get any of that from the program.*
- *You need to present more scholars that are Mexican and Central American. It was mostly American scholars.*
- *It was least successful in telling about people's cultural assumptions about the Maya. Of course it showed how the hieroglyphs revealed much about the culture and history but there still is the day to day life that is missing. It is mostly about how kings lived, not the ordinary people. Kings live in a different zone full of nonsense that their underlings feed them*

- *The program did suggest some bias toward the importance of Mayan culture by early 20th century scholars. The fact that so few were interested in the discoveries was not really discussed.*
- *One thing that was really well explained in this program was the intersection of modern culture and politics in the realm of research and the sciences. It was interesting how that became such an important sub theme.*
- *I believe when you talk about "people's cultural assumptions" you are talking about that fellow who saw the Mayans as a peaceful people. The one that served in World War II. I thought that was a bit of a push that "Because he lived through a war he only wanted to see peace." That's quite an unscientific thing to say, given that you can't live in someone's shoes. I guess I felt it was stated too factual, as it was more of the opinion of the person who said it.*
- *I would have liked to hear more about the cultural assumptions.*

The process of scientific problem solving

- *Low scores are either not possible in one hour (history and culture) and possibly because the general theme of problem solving was not repeated, but had to be inferred.*
- *Scientific problem solving was not mentioned directly, that I recall. It was used by the people studying the hieroglyphs, but that was not clear. I say that the show was really about how the code was cracked.*
- *I don't think that this program presented the method of deciphering the Mayan code in a scientific way, but rather in an artistic, logical way.*

Not enough time to explore subjects thoroughly - left wanting more

- *Given the timeframe of the program, only highlights of the important things could be presented, yet, the topic is so complex that much more could be explained ... for example, the only reason I gave lower ratings to some of the above is that highlights did not satisfy my curiosity that was triggered by the good presentation of some of these topics ... that is a mixed complement for the topics were presented well, but just not enough info within the timeframe ... good job ... perhaps this might be part 1 of 2 or 3?*
- *I thought that the program was very successful overall and was primarily limited only by the fact that our knowledge is still very incomplete.*
- *I felt it did a pretty good job in most all the areas described above....very simply it left me wanting to learn more....*
- *Since the documentary tried to communicate all of the aforementioned ideas in one hour, it was challenging to provide in-depth information on any of them.*

What the hieroglyphs reveal about the history and culture of the ancient Maya

- *After reading the statements above, I think there was too much information put into this program. Again, it did not bring out the "people" side or the cultural likes and dislikes of the people the story was about.*
- *I guess I thought it was going to focus more on the cultural side of it.*
- *I didn't really pick up on the cultural aspects too much.*
- *As mentioned before, the only place I found I wished there was more info was on more readings of Mayan texts, more history and culture as revealed through them.*

Basic principles that underlie all writing system

- *I didn't get a feel for any definition of basic principles that underlie all writing systems. Maybe I missed it?*
- *It was most successful in imparting the basic principles that underlie all writing systems.*
- *...the fundamentals of the writing system -- I just found that really interesting and wouldn't have minded more info on that, though it didn't hinder my appreciation of the program.*

Methods scholars used in decipherment of the writing system

- *I like to learn the methods of deciphering but not in minute detail.*
- *I think deciphering the hieroglyphics was such a monumental task, that it is amazing that it was done. Even though it took over a century and different people to do it.*
- *I think the methods used to decipher the system were covered pretty well.*



Close up of Alfred Maudslay photograph of an inscription from the site of Yaxchilán.

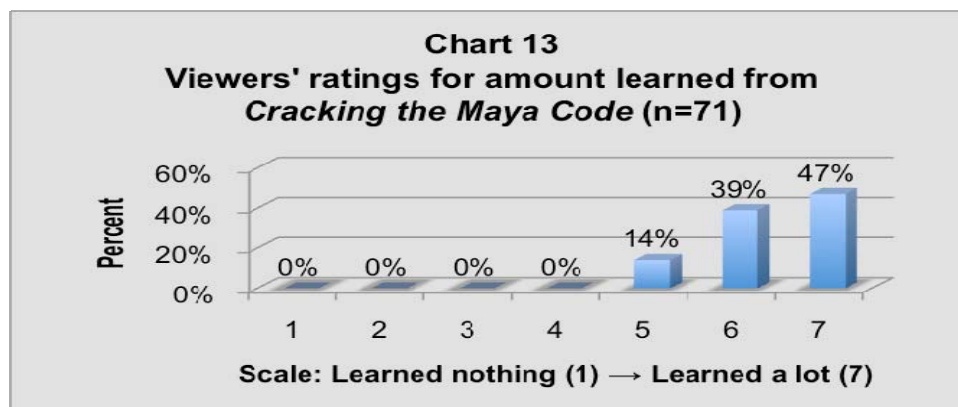
Part 3: What did Viewers learn from *Cracking the Maya Code*?

The program's learning value was evaluated with a combination of self-report, open-ended, and forced-choice objective content-based assessments. To assess knowledge gains relating to the information presented about the ancient Maya and Maya writing system, both Viewer and Control group participants completed a 28-point "quiz" type assessment that included a combination of multiple choice, true-false, and open ended questions. Additionally, Viewers were asked to rate the program for how much they estimated they learned from viewing the program and to describe the most interesting things they felt they learned. The results from the above assessments are reviewed in sections 3.1 – 3.5.

3.1 How much did Viewers estimate they learned from *Cracking the Maya Code*?

Viewers estimated they learned a considerable amount from viewing the program, and tended to describe the content as *informative* and *fascinating*, with some expressing special interest in learning about the Mayan hieroglyphs.

When Viewers were asked to estimate how much they learned from *Cracking the Maya Code* on a scale of 1 (learned nothing) to 7 (learned a lot), they typically reported learning a considerable amount. Chart 13 below shows the percentage of Viewers selecting each rating. The median rating (6.0) indicated that Viewers felt they learned a considerable amount from the program.



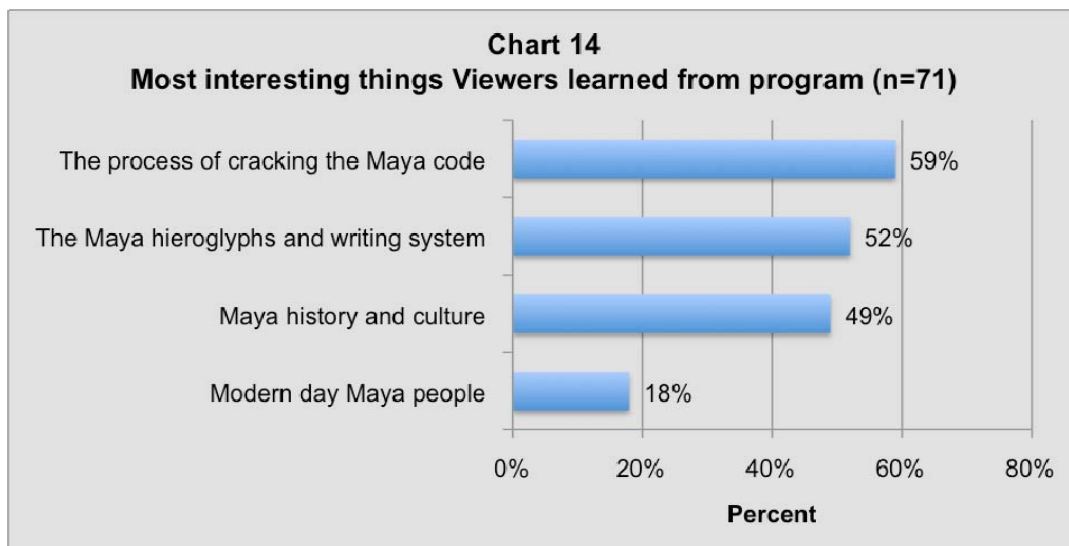
When invited to explain their ratings, Viewers most often indicated that they felt the program was *informative* and *fascinating*, with a few expressing special interest in learning about the Mayan hieroglyphs. Examples of Viewers' comments follow below.

- *Being Mexican-American, all Latinos that are living in United States should know their history. This program was educational. I learned about the Maya when I was in high school. An important thing that I learned in high school was that the Mayas understood the math and the meaning of zero. I would like to see math more explored. I am a School Board Member in a heavily concentrated population of Latinos (96%) and our student body excels in math, but is behind in language arts. We are gifted with the logic of math, but language art, we are behind.*
- *I learned that if there are relatively few symbols it is an alphabetic type writing system. Because there are 800 or so Mayan hieroglyphs, it means they are whole words. I loved learning that!*
- *My knowledge, in this area, is sparse. Thus, I found the show very informative and fascinating. I feel that European culture was what was studied and exalted when I was young. It's great for me to fill in my knowledge gaps of culture in the Americas.*
- *I'm so fascinated by these 'glyphs'. It's a language I truly never knew existed.*

3.2 What did Viewers feel were the most interesting things they learned from *Cracking the Maya Code*?

Viewers were most interested in the information they learned about: the process of cracking the Maya code, the Maya hieroglyphs and writing system, the Maya history and culture, and the life of modern day Maya people.

When asked to describe the most interesting things learned from watching *Cracking the Maya Code*, all of the Viewers identified one or more new things of interest. Chart 14 shows the four topics that Viewers most frequently pointed to and the percentage of Viewers citing each topic.



Nearly two-thirds of the Viewers (59%) said they enjoyed learning about the *process* of cracking the Maya code, and in particular: how long the deciphering took, the number and diversity of scholars involved, the hurdles and dead-ends encountered, the collaborative effort that ensued more recently, and/or the stories about David Stuart and Tatiana Proskouriakoff. About half of the Viewers (52%) expressed interest in information they learned about the Mayan hieroglyphs and writing system, particularly relating to: the complexity and creativity of the glyphs, the ability of the epigraphers to substitute signs for the same word, the graphic elements of the system and/or the workings of number/mathematical system. About half (49%) pointed to information learned about the Mayan history and culture (49%), in this case focusing on the extremely advanced society of the Maya and the horror of their decimation and loss of history. Finally, about one-fifth (18%) discussed information they learned about the modern day Maya people, with these Viewers most often intrigued to learn that people now have the ability to learn about their history, culture, and language.

Viewers' comments on each theme follow:

- ***The process of cracking the code***

- The decoding process in general*

- *The various methods that were used to crack the code.*
 - *While the Maya culture is fascinating, the actual reconstruction done by researchers and all that was involved so many years ago to begin cracking the code is astounding. With only rudimentary equipment, the strides and discoveries without technological assistance were amazing.*
 - *I found it really interesting that it was so hard to crack the code especially considering there are still Mayans around today who speak what seemed like the same language. I was also surprised that more Mayans weren't involved in the whole process. Other than that, I wouldn't say there was a whole lot that I learned from the program except the process by which they deciphered the written language.*
 - *The most interesting part was how new theories, findings and interpretations changed the greater understanding of the subject over time. But do we have it all right yet?*
 - *The process of figuring a system to decipher a language, because I have seen very little on how that process is achieved and because of the uniqueness of the Mayan texts.*
 - *Since I did not know that there had been this effort to decipher the Mayan writing, the whole topic was of great interest to me.*
 - *The most interesting thing I learned was the way the scientists came to their conclusions about how the Maya code worked. It was fascinating to see the progression of the hieroglyphs from "just bunch of symbols" to the actual meaning behind them and their underlying meaning to the ancient day Maya people. Very fascinating stuff.*

- The diversity of the scholars*

- *That so many people from such diverse backgrounds over a century and a half worked so passionately and tirelessly to decipher the glyphs. I'm a sucker for brain-and-heart driven devotion.*
 - *Of course, I was impressed at how the various scholars with different backgrounds found their own interpretations to further the deciphering of the language.*
 - *I was really interested to learn about all of the researchers involved in unlocking the mystery, piece by piece - and interested to see how the images were analyzed from the point of view of epigraphy / cryptology -- I remember as a kid copying down drawings from national geographic magazine of the symbols, wondering about what they could stand for, how people could understand them.*
 - *...the multiplicity of professions involved in the cracking was fascinating. I also appreciated the presentation of the idea that Mr. Thompson had incorrectly interpreted certain facets of the language and everyone got behind that idea and wandered down the wrong road for quite some time... and then not only refused to except the Russian scholars interpretation but deliberately tried to stifle it.*
 - *...how many different people with different ideas were cracking parts of the code around the world totally separate from each other?*

- The collaborative efforts of the scholars*

- *I learned about the way that researchers initially working independently and then, more recently working collaboratively have made progress on deciphering the Maya Code.*
 - *Additionally, the way that academia works collaboratively and also competitively toward a goal such as decoding a language is very interesting to me.*
 - *I loved learning how each "decoder" pursued the work passionately and together they decoded what seemed to be an impossibly difficult language.*
 - *Some of the most interesting things I learned were how scientists were able to decipher the code over many years. It took a collaboration of efforts to get to where we are today, rather than one or two people working on this project.*

The stories of David Stuart and Tatiana Proskouriakoff

- *I thought it was interesting that a child would take interest in an activity his father was doing, and then wind up so involved to make it his life's work. The woman who was without a job, and took the job, and was so immaculate and exact with her measurements in her drawings. She broke the glass ceilings before most knew there was one.*
- *I learned the stories of the groups of steles uncovered by the Russian woman Tatiana. Her drawings were a wonderful revelation of the look of an ancient city.*
- *I found the story of Mr. Stewart fascinating. The fact that this young boy was in the jungle and started to draw the glyphs and interpret them is wondrous.*
- *I was especially captivated by David, the young McArthur winner and his brilliant contributions. I loved that the woman, I think her name was Tatiana, figured out so much by piecing the jade together.*
- *I also thought it was interesting to hear about the 12 year old boy who figured out the same amount of Mayan information as the women did in a 2-3 year period. It was amazing to see how he learned and obtained so much information and then used it at such a young age.*

How long the deciphering took

- *I found it very interesting that it took...such a long time to decipher the code.*
- *It was interesting how the code was finally cracked-the amount of time*

▪ **The Mayan hieroglyphs and writing system**

The Mayan language in general

- *The iguana and the bird head glyphs and how those showed the dates/timeline of the Mayan civilization.*
- *Last night I had a dream about reaching into the water, pulling out a fish, and showing it to the person I was wit. There was a specific reference in the film about a hand holding a fish and the meaning = to conjure. Totally a personal experience, but I will be exploring the "coincidence" as soon as I finish this survey!*
- *How to read the figures. I want to learn more. I found the stories (historical and religious) to be very interesting.*
- *Learning the language of the Mayans was pretty entertaining*
- *I liked knowing how to read some of the Mayan symbols*
- *I really enjoyed learning about the varied pattern of writing which the Mayan's used*
- *It was interesting to see the different glyphs....would have enjoyed seeing more break down on how to read them though.... It was fascinating!*
- *In being able to see the hieroglyphics, I learned how the Mayan used symbols to narrate their history.*
- *I was unaware of the fact that the glyphs were so detailed and contained so much history - so important to us today.*
- *I was also interested to learn about the content of some Mayan writings -- really intrigued by the appearance of 'strange creatures' and other mythological themes that seemed to arise, that is something that I will look up after viewing this program.*

The complexity of the Mayan language

- *I thought the most interesting thing I learned was about the actual Mayan language itself. The way it's written, with such intricate detail and with all of the variations of symbols, makes for one beautiful language.*
- *I also learned so much about the study of language. The difference between concepts, sounds, and syllables pertaining to the number of symbols. I was astounded at how many different symbols were in the Mayan language.*
- *I learned that an 'alphabetic' writing has few symbols, like our alphabet, but a 'word' type writing system will have hundreds of symbols. I learned that the word for west was Chik-in, easy to remember.*
- *I knew very little about Mayan hieroglyphics and no idea that they were made up of phonetic symbols. I find it absolutely fascinating that you can sound out the words to the stories they tell. I would like to know more*

about why the various symbols represent the sounds and words. Why does the hand with closed fingers represent "chi"?

- *I thought that the symbols did represent whole words but now I know they do not.*
- *Maya used symbols that depicted letters and words/ideas rather than just an alphabet or a symbol for every word.*
- *I learned that the figures were kings and queens instead of gods (maybe they were gods to them). That some hieroglyphs represent ideas, some sounds and some combine them.*

The use of substitutions/multiple symbols

- *... the idea of having multiple symbols for the same sound was also very interesting to me.*
- *How scientists are able to decipher the code considering how each glyph or picture can represent a number of different things. It amazes me how a culture can use pictures and carvings to tell the stories of the past.*
- *I found it interesting, the fact that multiple symbols were used to mean the same thing. I don't understand why the creators of this language would do this. In my eyes, it only serves to make the language much more complex and harder to understand.*
- *The actual descriptions of the makeup of the glyphs - the fact that they are a combination and that there are many substitutions for various syllables/sounds.*
- *That the written Mayan language is neither alphabetic nor logographic and that there are sometimes multiple characters for the same phonetic sound.*
- *The fact that multiple glyphs can create one vowel sound. I don't think I've read of a language like that before.*

The creativity of the Mayan writing system

- *I found it interesting that they had multiple pictures that could represent one letter or syllable. Depending who the scribe was, they could put their own special touches on the symbol.*
- *That the Mayans felt free to fool around so cleverly with their language. I'm also a sucker for language acrobatics.*
- *I was fascinated by the ability to communicate through hieroglyphics in a way that involved being creative with art (such as using multiple symbols for one sound and overlapping of symbols).*

The Mayan counting system

- *The most interesting things I learned were the numbers. The symbols definitely looked like a numbering system.*
- *It was really interesting to see the symbols the Maya used for math. It was very simple, less complex than the system we use now.*
- *I enjoyed the Mayan counting system.*

▪ ***Mayan culture and history***

Mayan culture and history generally

- *I learned more about the Maya culture which interested me because I am always interested in world cultures.*
- *The most interesting things were the history of the Mayans and their beliefs of the spiritual side and how it affects us as a people. It was very interesting.*
- *I was happy to learn about the wider context of Mayan culture (geography, dates of existence).*

The Maya as an extremely advanced society

- *That is quite an advanced system of communication and really makes me wish that we learn more about this culture as they were probably much more intelligent than we realize. I found it quite interesting that the Mayan culture accurately predicted the Solar and Lunar eclipses; I wonder what other possible future events their history may predict or tell.*

- *The fact that they made these amazing temples without the convenience of heavy machinery is truly amazing and reflects of how advanced their civilization really was.*
- *The most interesting was the complexity and intelligence of the Mayan people.*
- *Depicted lunar calendar - They were very smart and aware of the world around them in ways it took centuries for modern science to catch up.*
- *I learned that the Maya were intelligent people that recorded events and history of their lives much like we do today.*

The Maya culture decimated and their history lost

- *I am glad people work to uncover lost things from the past. It seems terrible to me that a people's past could be nearly wiped out.*
- *...that a Spanish (European) priest decided that the "pictures" were from the devil and, consequentially, tortured the people, burned perhaps many thousands of writings/books, and, basically, destroyed a culture, stopped its people from writing, and left them without a home-base for many, many generations*
- *I didn't know about the Spanish conquest and how Maya writings and culture were destroyed.*
- *I never knew they had written books most of which, unfortunately, were destroyed by the Spanish. People can change what is known about history.*
- *That the entire language was wiped out by supposedly civilized cultures and it took over 500 years before we have even cracked a small portion of the Maya language*
- *I can't say I'm happy or surprised to learn about the decimation of their culture (I knew they had been wiped out by the Spanish), it was really astonishing to see the archival drawings on how Mayan libraries were destroyed and people tortured and murdered the cultural genocide that took place.*
- *The Spanish conquests that destroyed so much of the culture and language because I was not aware of this, and it's interesting to learn how one leader could so easily destroy an entire history.*

▪ *The Maya of today learning their history and language*

- *I didn't know that Mayan people still existed. I incorrectly thought they were wiped out long ago. It feels good for some reason to know that they survived and are trying to reclaim their past.*
- *I was pleased to see not only the local Mayan's very interested in learning the native language, but the education process was put in place for that discovery. I was expecting this knowledge was strictly for the benefit of the research teams.*
- *...they finally were recently reconnected and again are re-learning about their ancient writings and culture ... they are finding their roots ...*
- *I most enjoyed the fact that hundreds of people today are being able to learn of their history and finally learn to speak the language of their ancestors. I would have liked to have seen more of this aspect of the story.*
- *I learned that the Mayan people of today have little knowledge of their own past but are becoming more interested and I wonder how that will impact them and the rest of the world's attitude towards them.*
- *I learned that the Maya people are interested in learning to read and write in Mayan. I thought it was interesting because it seems that we look to the past to help us understand ourselves and others. That is why this knowledge seems valuable. We are in search of self-knowledge and we think that it is buried in the past. I'm not so sure that is true, though. What if the past just reinforces what we expect of the future and serves to block true change and possibility?*
- *I had no idea that the Maya still existed. That made the quest even more interesting and important.*
- *It was wonderful to see how the Maya people today are now relearning their language based on the work of these scientists. I know that we are losing languages at an astounding rate so it is very gratifying to learn we have restored at least one ancient language.*
- *I was particularly interested at the very end when they talked about how the scientists are sharing the data with the modern day Maya descendants. Would have loved to have heard more about how scientific knowledge is being translated into meaningful cultural development today. But all the same, I liked seeing the Mayan linguist talking about how important the findings were to him and his people.*

3.3 Did Viewers think or feel about the ancient Maya in a new or different way after watching *Cracking the Maya Code*?

Most Viewers felt that the program did cause them to think or feel differently about the ancient Maya as they now had a better understanding of: the Maya civilization, history and culture; how advanced the Maya were; the Maya language and hieroglyphs; and/or the scholars' contributions to cracking the Maya code.

Those who felt that the program didn't cause them to think or feel differently most often indicated this was because they already knew about the Maya and the program did not change their opinion or they didn't know much about the Maya prior to watching.

Viewers were asked whether their experience watching *Cracking the Maya Code* caused them to think or feel about ancient Maya in a new or different way. Table 5 presents the percentage of Viewers saying Yes and No to this question, followed by their reasons in each case.

Table 5 Whether Viewers thought or felt differently about the ancient Maya after watching <i>Cracking the Maya Code</i>	
	(n=71)
Now have better understanding of...	79%
The Maya civilization, their history and culture	31%
How advanced the Maya were	25%
Maya language and hieroglyphs	17%
The near decimation of Maya history and culture	14%
The scholars and their contributions to cracking the code	4%
Other	6%
Didn't cause to think/feel differently	21%
Already knew about the Maya and did not change their opinion	8%
Didn't know much about the Maya and had no opinion about them	7%
Other	3%

The majority of Viewers (79%) felt that the program did cause them to think or feel differently because after viewing they had a better understanding of: the Maya civilization, history and culture (31%); how advanced the Maya were (25%); the Maya language and hieroglyphs (17%); the near decimation of Maya history and culture (14%); and the scholars' contributions to cracking the Maya code (4%). A small percentage of Viewers had other reasons that caused them to think or feel differently (6%)

Just over one-fifth of the Viewers (21%) indicated that the program didn't cause them to think or feel differently because: they already knew about the Maya and the program did not change their opinion (8%), they didn't know much about the Maya prior to watching the program and therefore had no opinion about the Maya (7%), or they had other reasons that didn't cause them to think or feel differently (3%).

Examples of Viewers' comments on the above themes follow below.

- **Caused to think/feel differently**

- A better understanding of the Maya civilization, their history and culture*

- *Up until watching this program, I did not know too much about ancient Maya. I really enjoyed a lot and found it quite fascinating.*
 - *I had never studied the Mayan civilization in depth, so this was all fairly new information to me and was new and somewhat interesting.*
 - *I knew so little about the ancient Maya. I had no idea the people still existed. How could I be so clueless? I feel I'm as bad as those who tried to wipe out their culture so long ago. I want to know more about their history and who they were.*
 - *It provided a different way of looking at the ancient temples and the stories they hold within.*
 - *...from a view of Mayan calendars, prophecies, and spirituality to a more human view (unfortunately) with wars, competition, blood...*
 - *I think I had a better understanding and feel for what their life was really like at that time. There were a lot of battles fought and self sacrificing made. I also had more sympathy for the Maya people still living today, as they were still searching for that missing link to their history. It provided a better understanding.*
 - *I knew that sacrifice was a part of their culture but the elaborate detail showed that it became a forefront in the later years of ancient Mayan civilization. This makes me wonder why they treated other human life with such indifference.*
 - *The program brought me a feeling of more personal connection to the Maya by substantially increasing my knowledge of their history and culture.*
 - *...but very bloody and violent. I want to know how royalty came to be royal in the Mayan civilization. I want to know how they came to record their deeds and myths and their valuables, just like the Egyptians did - and I am seeing a correlation between the peoples although they are different looking. The Mayans more resemble Asians than Egyptians more African. Some of their imagery resembles northwestern tribal stuff. I'd like to learn more about how the Mayans came to be as they were. Why did they eat mainly maize? Why didn't they eat more jungle type foods? I would truly like to see a series about the Mayans so as to show all the elements that went into the life of the Mayan civilization. Why were they so violent? Are today's Mayans that way?*
 - *I love to study other cultures. The film invigorated that desire at so many levels. I wanted to know how they built those pyramids and temples without steel or concrete. I wanted to know more about the idea of human sacrifice to the gods and what they thought they were accomplishing. I wanted to know their interpretation of the cosmos! I wanted to know why they fought their wars.*
 - *...the understanding we have of their culture and history.*
 - *An understanding of how they lived and developed their own civilizations without any outside influence.*
 - *It was an important civilization.*
 - *I loved learning how rich their culture and language were, and now are, thanks to the decoding of their ancient language.*

- *Ever since I first heard of the Mayans and Incas in grade school in the 1970s I have been fascinated with them. The show put a very organized perspective and answered many questions that I have had about them. The show galvanized my fuzzy aura into a more solid knowledge or awareness of their civilization.*
- *I did not realize how the ancient Maya were. I had previously known that they were astronomers and engaged in self sacrifice, but did not realize that they were so violent.*
- *Never knew much about the Mayans. Seemed so far removed from my life. This program really explained details in layman's terms. I look forward to learning more about the Mayans thanks to this show!*
- *I was able to look at the Maya in a new way because I did not know much about the people prior to viewing the program. It gave me a sense of how they lived and what they valued.*
- *It deepened my appreciation for the complexity and most importantly the uniqueness of Mayan civilization in the context of the Americas -- as well as how that fit into what was happening in the western world at the same time.*
- *I had never given a great deal of consideration to Mayan culture. Had vaguely known it was really interesting, but this show capsulated a good bit of recent scholarship into a fascinating overview of its history. I'll look forward to new discoveries going forward.*
- *Very little understanding of them as a culture... Always found them somewhat mysterious.*

A better understanding of how advanced the Maya were

- *The artist's drawings shown with the actual structures of today allowed you to see how advanced architecturally the Mayan people were.*
- *We get to see they had a structured society. That had some rulers in power for many decades.*
- *They appeared highly creative, intelligent, and focused on preserving their histories ... leaves me wondering what more they really were like, i.e., what beyond their writings ... for sometimes what one writes about is not the whole story*
- *It proves that they were very intelligent and also very brutal.*
- *I didn't know about their studies in astronomy and the myths they had. I guess it made me see the Maya as a more complex society and not just warriors sacrificing humans to the gods.*
- *I think of them in a different way. They were sophisticated, very fancy in their costume*
- *I knew they had a bloody history but I didn't know how rich it was and how they contributed a lot more than just warfare and sacrifice. They were scientists who studied the stars and took detailed histories of their culture in a beautiful way. Their carvings on monuments are so beautiful.*
- *I didn't know they were such an advanced culture.*
- *They were much more intelligent and insightful than I once thought.*
- *I really had no idea about how advanced the Mayan people were because schools don't make the effort to teach these things.*
- *The program brought a new view about the complexity of the people which I had not realized before.*
- *I would say I now view them as a much more intelligent culture....and the effort put into the stone carvings in unbelievable...*
- *Before I knew the Mayans were a very intellectual culture, but being able to see exactly how their writing system was created was fascinating.*
- *It made me realize the Maya were the most educated New World civilization.*
- *It's crazy to think that our culture which is so technologically advanced seems so simplistic to those hieroglyphs the Maya created. The Maya carved theirs out of stone.*
- *I didn't realize how cultured they were.*
- *...the development of such a unique and complex culture and civilization, I had no idea that the cities had been so large when they were operational.*
- *I had an impression of them as more of a primitive people, when in fact they were pretty advanced for their time.*

A better understanding of the Maya language and hieroglyphs

- *I did not fully know of the complexities of the writing--it seems that the substitution glyphs are more than merely random and that they might be akin to the use of graphics in illuminated manuscripts of the middle ages that were drawn to enhance meaning or the way that illustrations are used in modern text to provide richer meaning,*
- *The writing system now mostly deciphered, allows us into their past.*
- *The program explained so much about what I merely thought of as simple hieroglyphics. There was/is nothing simple about them.*
- *It provided some information, but it did not make me feel strongly more informed. I found it fascinating that so few people were responsible for bringing this discovery forward.*
- *It opened my mind to gain somewhat of an understanding on how another civilization communicated or communicates their past and culture.*
- *It showed me that Mayans were very artistic with their language and developed a sense of Art.*
- *With this new translation of writing, it would seem that we could develop a better historical record*
- *Yes because I did not really have any background, I am very impressed how very intelligent and descriptive these writings are.*
- *I feel more intrigued by the Maya now, after having seen the show. It makes me wonder, if they were so delighted by the use of different symbols for the same word, what other interesting ideas did they have? I'm not familiar with another writing system that has this flexibility. However, I don't know much about other writing systems. It just makes me wonder about how they viewed the world.*
- *...had such a hard time understanding language.*
- *Yes, because it blows my mind how they thought of such a complicated writing system that they have to carve or print out 2-3 symbols to make a single word is astounding to me.*

A better understanding of the near decimation of the Maya history and culture

- *I don't remember if I learned about the early occupation and the elimination of early Mayan records. So immediately, I felt a sense of sorrow for those that were oppressed, and how unfortunate it was to lose so much valuable history.*
- *My respect for and wonder about them deepened considerably. It's also one more in the seemingly never-ending litany of one people's notion that their god is better than yours and will kill you and destroy your books and culture to prove it.*
- *It also gave me a sense of loss as a result of the destruction of Mayan culture and cultural artifacts.*
- *Their culture and history was stolen from them.*
- *The program made me more curious about Mayan hieroglyphics*
- *I thought the tortured people and burned books were so tragic.*
- *Their story is similar to Native American culture. The way of life and method of communication was nearly wiped off the planet.*
- *I also really liked how it was tied in at the beginning with the destruction of our own civilization -- seeing how the Mayans destroyed themselves first in many ways even before the Spanish invasion, it's always important to remember ourselves in the larger frame of history, the cautionary tales we can learn from the past.*
- *Never really understood how/why they disappeared*
- *... the cause for the loss of information due to materials being destroyed. This places a certain sympathetic importance on finally rediscovering their language, but the revealing of the deep violence shows an interesting duality.*

A better understanding of the scholars and their contributions towards cracking the code

- *I also found it interesting that scholars are at least in part working to reconnect Mayan descendants to their ancestors. It made me feel more positive about the American scholars who are working on Mayan sites - that they are also giving back to the people whose history this is.*

- *I was excited that the researchers triumphed against all odds piecing the words, culture, and stories back together.*
- *I had seen some material, especially about the Mayan ball games in which the losers died, but I was interested to learn how the perception of an early research had influenced the "peaceful Maya" interpretation.*

Other

- *I found myself engaged in the documentary and wanting to learn more because it something that just interested. I like it because it's a newer form of history, it's not like you're reading a text book, there is still ground breaking discoveries that could potentially happen.*
- *...to be more respectful of the culture of the people I know from this area*
- *Watching this refreshed, and built upon a lot of the information I learned about the Maya from grade school. It was fun to see what I could remember.*
- *I learned a lot about them and do have a new-found sense of respect for them.*

▪ **Didn't cause to think/feel differently**

Already knew about the Maya, so the program did not change my opinion

- *From what I knew previously, I already thought it was a bloody and violent society. This show confirmed that thought.*
- *It is great that they can be read now, but the information from the hieroglyphs is much the same as the Egyptian hieroglyphs. The history of the royal people, dates of important events for the kings and queens, wars and conflicts, spiritual beliefs about death, etc. I had already heard about the sacrifices and wars. What really changed in the Mayan people's beliefs that made them abandon the pyramids and leave that way of life?*
- *I respect them as a highly social, intelligent people. This just reinforced that belief.*
- *I have friends involved in church groups working in these villages and they told me about their plight.*
- *I knew quite a bit about them, and what I heard and saw didn't really make a difference.*
- *I read a lot about the Mayan's in High school, and recently read Jared Diamond's Collapse. I felt like I have a pretty solid framework for the Mayan's and this simply filled it in.*

Didn't know much about the Maya, so did not have an opinion about them

- *I never really thought about ancient Maya and really knew nothing about it. That's the only reason I would say that it didn't lead me to think about it in a NEW or DIFFERENT way.*
- *I didn't really know much about Mayan culture before I watched the program.*
- *I had no real opinion of them prior to watching the DVD. I was aware of the culture and knew of their historical importance but held no strong opinion of them.*
- *No, honestly because I had only a passing knowledge of Mayan culture before watching the show.*
- *I already knew a little bit about Mayans. I'd say I deepened my knowledge, but didn't change my opinions.*

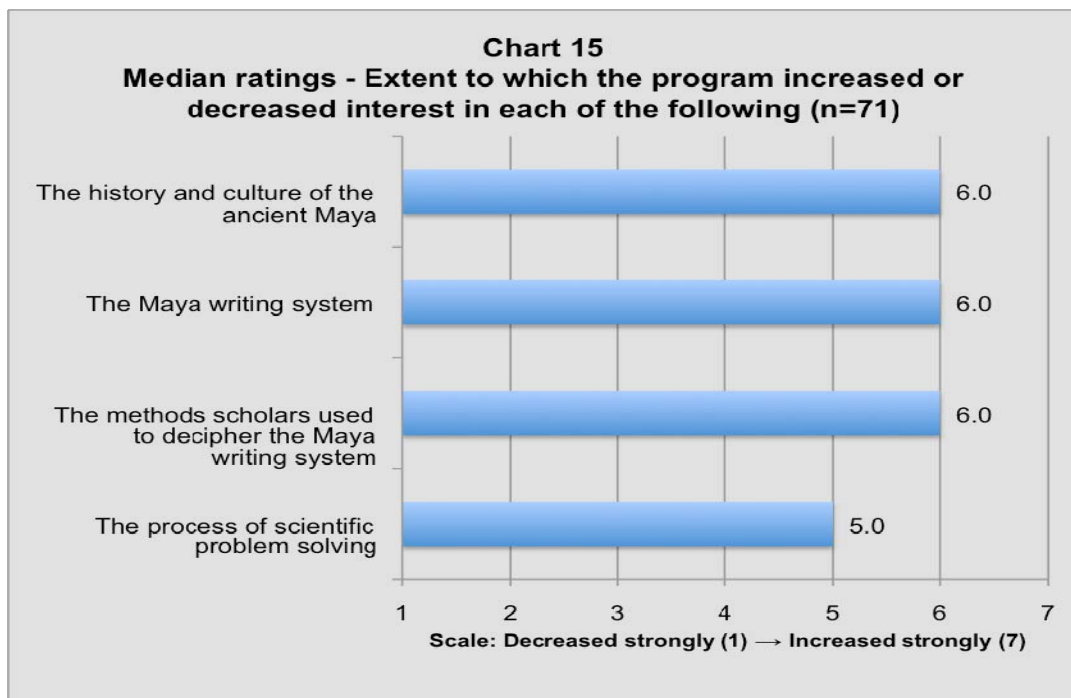
Other

- *It reminded me about Avatar, the movie. The Spanish tried to take over the people, just like Avatar natives. This continues to this day with the Wars in the Middle East.*
- *I didn't really grasp the tie-in to education of modern Mayans. Do they accept the western conclusions? Question them? How are the modern people using this information in their lives?*

3.4 Did *Cracking the Maya Code* increase or decrease Viewers' interest in the ancient Maya, the Maya writing system, and scientific problem solving?

Viewers generally felt the program increased their interest in the ancient Maya, the Maya writing system and the methods scholars used to decipher the writing system. They were somewhat less enthusiastic about the extent to which they program increased their interest in the process of scientific problem solving.

Viewers were asked to rate the extent to which seeing the program increased or decreased their interest in learning more about the ancient Maya, the Maya writing system and the methods scholars used to decipher the system, and the process of scientific problem solving. As indicated by the median ratings in Chart 15 below.



Viewers generally felt that *Cracking the Maya Code* increased their interest in: the history and culture of the ancient Maya (6.0); the Maya writing system (6.0); and the methods scholars used to decipher the Maya

writing system (6.0). The median rating for Viewers' interest in the process of scientific problem solving was one point lower (5.0).

Table 6 shows more detailed results for each statement by presenting the percentage of Viewers that selected each rating.

Table 6 Extent to which the program increased or decreased participants' interest in learning about the program's main topics (n=71)							
Has seeing the program increased or decreased your interest in...	Decreased strongly		Neither increased nor decreased			Increased strongly	
	1	2	3	4	5	6	7
The history and culture of the ancient Maya	--	--	--	3%	14%	37%	47%
The Maya writing system	--	--	--	10%	30%	41%	20%
The methods scholars used to decipher the Maya writing system	--	--	1%	16%	32%	28%	23%
The process of scientific problem solving	--	--	1%	41%	16%	27%	16%

Viewers' comments on their increased interest in these themes follow below.

History and culture of the Maya

- *Again, I knew very little of the Mayan culture before this DVD, so I did learn a great deal of information from it.*
- *when I have read or heard of something to do with the Mayans, my ears have always perked up ... yet not as much as what this program has done to catalyze my interest ... give me more!*
- *I really enjoyed learning about the history and culture through the writing system. The system itself was well documented and I can't imagine studying the writing system in any more detail.*
- *I definitely want to know more.*
- *I never really understood why people wanted to see the ruins. Now I want to go see them!*
- *I was into studying the Mayas and Aztecs in high school. When I was in college, I took a class in Chicano studies, Central American history, and I visited my relatives in Mexico. In addition, I went to the Maya ruins in the Yucatan with my Mother, and met Mayas that live there and talked to them. I feel I am part Maya, part Aztec, part Spaniard and now American.*
- *Although I find the Maya culture very interesting and would at some point like more info at this point in time there are several things that make me jump and say that it increased it strongly. I do not have the time and two other topics of interest are preoccupying my time right now. So given this maybe it didn't affect me as strongly.*
- *This program material was very interesting and I would not mind learning more about the Mayan culture.*
- *The things that increased my interest the most were in history and culture of the ancient Mayans (as mentioned, partly because I was left wanting more -- so it piqued my interest more),*
- *I don't really care much about linguistics and written languages. I like the Mayans, I want to know more.*
- *I am more a culture buff than a scientist.*

The Maya writing system

- *The first scenario is difficult to answer without explanation - while I am more curious about the writing system, my perception is that given its complexity there is no way I could work that into my schedule. In other words, the*

desire might be there, but so is the knowledge of the lack of practicality. I simply have some many things I want to do while here on the little blue planet that I feel I will never get to that - it isn't that the film didn't inspire the desire - perhaps younger viewers would be more so inclined.

- *Yes, I loved how they showed the different ways of writing words and numbers in the Mayan language.*

Methods scholars used in decipherment

- *Although it seemed that much of the deciphering was done before computers really came into popular use, I feel they could have helped in the process in some way or another. (That's why my interest in the methods used increased some.*
- *The processes fascinated me....and I'd love to learn more about them....and how certain conclusions were drawn....*
- *And the stories of how the researchers came up with their findings were inspirational, and made me marvel at the wonders of the human brain, and the process of problem solving.*

Scientific problem solving

- *I didn't feel that the program had too much information on the process of scientific problem solving as a whole. It was more focused around cracking the Maya code and problem solving that particular language. :)*
- *My interest in scientific problem solving is already pretty strong.*
- *And I'm always interested in the process of scientific problem solving.*

3.5 What was the impact of *Cracking the Maya Code* on Viewers' knowledge of The Maya culture, history, and writing system?

To evaluate the impact of *Cracking the Maya Code* on Viewers' knowledge of content covered in the program relating to the Maya culture, history, and writing system, respondents in both the Viewer and Control groups were asked to complete a 28-point quantitative assessment consisting of multiple choice and true/false questions. Participants in each group were also asked three short answer questions to qualitatively explore the nature of the information participants took away from the program.

Summary of findings

The Viewer group significantly outperformed the Control group on the quantitative assessment. Out of a possible score of 28, the Viewer group averaged 22 correct responses, while the Control group averaged 9 correct responses.¹² The effect size in this case was 3.1, generally considered a very large effect.¹³

Detailed results

The quantitative and qualitative assessment consisted of 3 sets of questions covering information presented in the program. The question sets focused on the following areas:

3.5a: Mayan culture and history

3.5b: The process of deciphering the Maya writing system

3.5c: The workings of the Maya writing system

The results from each assessment are reviewed in the following pages.

¹² ($t=17.134$, $df=97.338$, $p<.001$, $r=3.1$); 95% confidence interval of the difference (lower 10.7, upper 13.5)

¹³ As noted under Method, the effect size helps interpret whether the difference observed is a difference of practical significance, in other words, a difference that matters. Following Cohen's (1992) interpretation, for T-tests .2 indicates a small effect, .5 a medium effect, and .8 a large effect. Effect sizes are important to report when presenting group differences, particularly when sample sizes are sufficiently large, as it is possible to produce statistically significant differences between groups when the size of the effect is in fact very small.

3.5a Questions on Mayan culture and history

To assess whether the program influenced Viewers' knowledge of Mayan culture and history, both Viewer and Control group participants were asked the 2 multiple choice and 6 true and false questions in Table 7.

Table 7 Percentage of correct answers to T/F and multiple choice questions about Mayan culture and history		
Control (n=57)		Viewer (n=71)
True/false questions		
19%	The Dresden Codex is a secret vault within the Mayan Temple of the Inscriptions (F)	79%
25%	Only 4 Maya books survived the fall of the Maya civilization (T)	79%
44%	No Maya villages exist today (F)	93%
67%	The Maya built most of their early cities in a vast region of dense jungle (T)	90%
51%	The Maya disappeared long before the Spanish conquest	82%
46%	The Maya began building their cities around 500 BC (T)	41%
Multiple choice questions		
26%	Which of the following cities did the Maya ¹⁴ build? <i>Palenque</i>	89%
65%	The Maya region is located within ___? ¹⁵ <i>Central America</i>	90%
68%		<i>Mexico</i> 68%

Overall findings: Viewers significantly outperformed Control participants on this question set. Out of a possible score of 8, the Viewer group averaged 6 correct responses, while the Control group averaged 3.¹⁶ The effect size in this case was 2.1, generally considered a very large effect.

Item results: Looking across the percentage of Viewer vs. Control participants that correctly answered the questions presented in Table 7, the results show that the differences between the two groups were consistently high for 6 of the 8 questions, with the exception of one True/False question (*The Maya began building their cities around 500 BC*) to which a slightly higher percentage of Control participants answered correctly than did Viewer participants (46% vs. 41%). Also, in response to a question about which areas the Maya region is located in, while a substantially higher percentage of Viewer to Control group participants correctly answered "Central America" (90% vs. 65%), an equal percentage of participants in each group correctly answered "Mexico" as well (68% each group).

¹⁴ Response options included: Caracas, Limón, Palenque, Tijuana, None of the above, and Don't know.

¹⁵ Response options included: Central America, Mexico, South America, The Caribbean, None of the above, and Don't know.

¹⁶ ($t=11.454$, $df=94.328$, $p<.001$, $r=2.1$) 95% confidence interval of the difference (lower 2.3, upper 3.3)

3.5b: Questions on deciphering the Maya writing system

To assess whether the program influenced Viewers' knowledge of the deciphering of the Maya writing system both the Viewer and Control group participants were asked 6 multiple choice questions, 1 true/false question, and 2 open-ended questions as outlined in the sections below.

Multiple-choice and T/F questions about decipherment

The percentages of correct answers to the 7 forced-choice questions are presented in Table 8 on the following page.

Overall findings: Viewers significantly outperformed Control participants on this question set. Out of a possible score of 11, the Viewer group averaged 9 correct responses, while the Control group averaged 3.¹⁷ The effect size in this case was 2.5 generally considered a very large effect.

Item results: Looking across the percentage of Viewer vs. Control group participants that correctly answered the questions presented in Table 8, the differences between the two groups were consistently high for 5 of the 7 questions. For two multiple choice questions featuring multiple correct answers the findings were more mixed, although for the most part though, a higher percentage of Viewers in each case picked correct answers than did Control group participants. The percentage point differences were substantial, with two exceptions:

- Where 54% of the Control group recognized that mathematicians were involved in deciphering the Maya writing system, only 21% of Viewers recognized this to be the case.
- Where 24% of the Control group recognized that paper-mache casts are a method or tool that has been used to help decipher the Maya writing system, only 9% of Viewers recognized this to be the case.

¹⁷ ($t=13.938$, $df=83.169$, $p<.001$, $r=2.5$); 95% confidence interval of the difference (lower 4.3, upper 5.7)

Table 8 Percentage of correct answers to questions about deciphering the Maya writing system		
Control (n=57)		Viewer (n=71)
	True/false question	
16%	At age 12 David Stuart presented his first scholarly paper on Maya hieroglyphs (T) ¹⁸	92%
	Multiple choice questions	
28%	Which of the following most closely describes <u>the overall story</u> of deciphering the Maya writing system? ¹⁹ <i>Lone scholars from different backgrounds and parts of the world each discovered a piece of the puzzle over a period of more than 150 years, leading finally to intense collaborative work over recent decades.</i>	91%
40%	How long have scientists been working to decipher the Maya writing system? ²⁰ <i>More than 150 years</i>	73%
9%	How much of the Maya writing system has been deciphered to date? ²¹ <i>Most of it</i>	55%
65%	Maya hieroglyphs have been found on _____? ²² <i>Public monuments</i> <i>Pottery</i> <i>Jade</i> <i>Bark paper books</i> <i>Bone</i>	95%
67%		85%
12%		75%
23%		75%
25%		24%
39%	Which of the following <u>methods or tools</u> have been used to help decipher the Maya writing system? ²³ <i>Reconstruction drawings</i> <i>Glass-plate camera</i> <i>Bone</i> <i>Paper-mache casts</i>	93%
21%		90%
12%		4%
21%		9%
83%	Which of the following professionals have been involved in deciphering the Maya writing system? ²⁴ <i>Archaeologists</i> <i>Linguists</i> <i>Artists</i> <i>Photographers</i> <i>Anthropologists</i> <i>Epigraphers</i> <i>Mathematicians</i>	99%
79%		99%
49%		87%
33%		85%
72%		80%
35%		68%
54%		21%

¹⁸ Response options: True, False, and Don't know.

¹⁹ Response options: An international team of linguists (anthropologists who study how languages work) worked together to analyze and translate a random sample of hieroglyphs; An archeologist developed a theory of how the system worked by living

1st open-ended question on decipherment

To qualitatively examine the program’s influence on Viewers’ knowledge of the decipherment of the Maya writing system, both Viewer and Control group participants were asked to describe in their own words: *What is it about the Maya writing system that has made it difficult to decipher?* Table 9 shows the factors that the two groups most frequently described and the percentage of participants citing each factor.

Table 9 Viewer and Control groups’ responses to the question: <i>What is it about the Maya writing system that has made it difficult to decipher?</i>		
Control (n=57)		Viewer (n=71)
0%	Use of substitution - different symbols can represent the same sound	64%
0%	Mixed system – combines word signs and phonetic signs	34%
0%	The quantity of different symbols	21%
0%	Overlapping/merging/combining of symbols	17%
0%	Writers had creative license –playfulness/artistry	11%
7%	Maya books destroyed, language suppressed	10%
25%	Graphic/visual/pictorial component – intricate and complicated	6%
19%	There is no codex to help in decipherment – no Rosetta Stone/no key	0%
19%	Other	1%
31%	Don’t know/blank	0%

among the Maya and studying the hieroglyphs, customs, and history for over 50 years; A group of Maya residents compared the oral histories and relics from village elders to develop an explanation of how the writing system worked; Lone scholars from different backgrounds and parts of the world each discovered a piece of the puzzle over a period of more than 150 years, leading finally to intense collaborative work over recent decades; A construction worker found an ancient text in a recently discovered Maya temple that explains the basic workings of the writing system; The few Maya scholars qualified to study the hieroglyphs have continually hit dead ends and are so far unable to decipher the Maya writing system; None of the above; Don't know.

²⁰ Response options: 20 years, 50 years, 100 years, over 150 years, None of the above, and Don't know.

²¹ Response options included: All of it, Most of it, About half of it, Some of it, None of it, and Don't know.

²² Response options included: Bone Pottery, Bark paper books, Jade, Public monuments, None of the above, and Don't know.

²³ Response options included: Bone, Fiber optics, Paper-mache casts, Barometers, Glass-plate camera, Differential calculus, Hydraulics, Reconstruction drawings, None of the above, and Don't know.

²⁴ Response options included: Artists, Anthropologists, Archaeologists, Epigraphers, Linguists, Mathematicians Photographers, None of the above, and Don't know.

The top five factors raised by the Viewer group were not mentioned by the Control group, including: the use of substitution or the fact that different symbols can represent the same sound (64%); the writing system being a mixed system or one that combines word and phonetic signs (34%); the large quantity of different symbols in the system, representing too many to represent an alphabet/too few to have signs for each word of a language (21%); the overlapping/merging/combining of symbols (17%); and the creative license that writers had, resulting in a playfulness/artistry in the system (11%). Two additional factors were mentioned to varying degrees in each group as follows: The destruction of the Maya books and suppression of language (Viewer 10%, Control 7%) and the intricate graphic/visual/pictorial nature of the writing system (Viewer 6%, Control 25%).

One answer mentioned by nearly one-fifth of the Control group (19%) that was not addressed by the Viewer group was the lack of a codex to help in the decipherment, as in a "Rosetta Stone" or "key."²⁵ Finally, a fairly high percentage of Control group participants provided "other" (19%) or don't know (31%) answers where only 1% of the Viewer group provided a response categorized as "other" and none responded don't know.

Sample answers from each group, where appropriate, follow below.

- **Substitution - different symbols can represent the same sound**

Viewer Group

- *What has made the writing system difficult to decipher is that the Mayan's utilized more than one symbol to represent a phonetic sound. For example, the sound "u" or "oo" is represented by 12 symbols.*
- *The greatest difficulty scholars faced seems to be the possible substitution of a single phonetic sound with many different glyphs.*
- *It seemed like a lot of things but that fact that they used so many substitutions seemed to have been what made it really hard to decipher.*
- *The use of multiple symbols for the same word or sound in the language.*
- *Multiple symbols mean the same thing and the Maya was proud of the ability to substitute these symbols making the visual language more difficult to decode.*
- *Symbology is very complex - different symbols can have the same sounds/meanings.*
- *It took some time to figure out that a phonetic sound, like "u" could be depicted in many different ways in symbols. The Mayans would often depict things in different ways, which made cracking the written language difficult.*
- *They used multiple substitutions to generate the same word (so different glyphs had the same meaning).*

²⁵ Although the Dresden Codex did not emerge as a theme in the Viewer group, the following information is provided in the program relating to the Dresden Codex:

NARRATOR: The quest would move to Dresden Germany, when Ernst Forstemann, a librarian, stumbled upon the Dresden Codex. The priceless book had sat in the library, overlooked, for decades.

GEORGE STUART: Can you imagine being able to pull out one of the most important primary sources in the prehistory of the New World and to have it there in front of you and just look at it and work with it?

NARRATOR: Forstemann discovered the Maya had developed a calendar to mark time and even pursued astronomy. In the Dresden Codex, he found precise predictions for the dates of lunar and solar eclipses. And there were tables tracking the cycles of the planet Venus, which was linked with warfare.

But Forstemann's greatest feat came when he figured out that very large numbers in the Dresden Codex were counts back in time to a specific date, to a date the Maya believed the universe was created: 4 Ahau 8 Cumku.

- **Mixed system – combination of word and phonetic signs**

Viewer Group

- *It is both hieroglyphic and phonetic.*
- *It is a combination of sounds and symbols...*
- *No one had definitive knowledge of what the symbols represented. Did they represent letter, syllable, words, or some composite of them.*
- *It combines a system of phonetics and words in symbols. Also--It is a combination of symbols representing letters as well as some representing whole words.*
- *It's a combination of types of linguistic systems...*
- *Assumption that it was word based like Chinese or syllable-based or sound based. It took a long time to realize that it was a combination.*
- *...it was both a phonetic and symbolic language (phonetic like English, symbolic like Chinese).*

- **The quantity of different symbols - too many to represent alphabet/too few to have signs for each word of a language**

Viewer Group

- *The hieroglyphs had about 800 symbols.*
- *It seemed to have too many letters to be an alphabet system like English and not enough characters to be a language like Chinese. Each character was a complete mystery at first glance.*
- *There are about 80 characters, more than an alphabet system but fewer than a word system, so it was difficult to interpret the glyphs.*
- *There were too many symbols to make for a regular alphabet based on letters or syllables, yet there were too few symbols to be like Chinese, where each symbol is a word.*
- *There are more than 800 unique characters.*

- **Writers had creative license –playfulness/artistry**

Viewer Group

- *In addition, some scribes played with their creativity....*
- *...joined and combined in an artistic way which made it hard to decipher in an absolute way.*
- *Symbols were also hard to decipher because the writer could choose different ways to write them.*
- *Also the presentation of the word would change over time. It was almost artistic, how they produced the words.*

- **Overlapping/merging/combining of symbols**

Viewer Group

- *Some of the signs overlapped, joined and combined in an artistic way which made it hard to decipher in an absolute way.*
- *Also, the fact that they combined more than one hieroglyphic into one was confusing at first.*
- *Symbols were sometimes merged in different combinations.*
- *Also the fact that they combined symbols - side by side, one in front of another or merged them entirely - made deciphering difficult.*
- *...even merging many symbols into one in some cases.*

- **Maya books destroyed/language suppressed**

- Viewer Group

- *Most of the written material was destroyed, and the Mayan's weren't allowed to speak or write the language. They were forbidden.*
 - *During the 16th century a Spanish missionary had almost all of the books and writings burned and destroyed.*
 - *Much of the Mayan writings were burned by the Spanish so archeologists didn't have much to work with.*
 - *Lost books and manuscripts due to Spanish conversion attempts as well as the attempt to deconstruct the entire society.*

- Control Group

- *The civilization ended so many centuries ago that there is no one around that can definitively say what certain things are. Also, the Mayan civilization ended.*
 - *The Maya were conquered by the Aztecs many years ago and their culture and language were assimilated into the greater Aztec culture.*

- **Graphic/visual/pictorial component – intricate and complicated**

- Viewer Group

- *The intricacies of the symbols.*
 - *It is composed of complex hieroglyphic images that are difficult to decipher.*
 - *They used pictures.*
 - *There are depictions of people and animals*

- Control Group

- *The Maya writing system was difficult to decipher because most of the writings seemed like pictures and it was hard to find the correlation between the different 'characters'.*
 - *The language is made up of symbolic pictures.*
 - *Pictographic*
 - *Picture symbols*

- **There is no codex to help in decipherment – *no Rosetta Stone/no key***

- Control Group

- *No codex or reference material to compare hieroglyphics.*
 - *They need a key to unlock the syntax like the Rosetta Stone unlocked the ancient Egyptian language.*
 - *There is no saved Maya language code save that of the old traditional Mayan Indians who may still speak it.*
 - *They may not have any Rosetta Stone-type item to compare it's text to another.*
 - *No Rosetta Stone.*
 - *There is not a good key to break the code of their writing.*

2nd open-ended question on decipherment

Viewer and Control group participants were also asked to describe in their own words: *Beyond the writing system itself, what other factors hindered or delayed the writing system from being deciphered?* Table 10 shows the factors that the two groups most frequently described and the percentage of participants citing each factor.

Table 10 Viewer and Control groups' responses to the question: <i>Beyond the writing system itself, what other factors hindered or delayed the writing system from being deciphered?</i>		
Control (n=57)		Viewer (n=71)
9%	Destruction of Maya culture (<i>All but 4 books burned by Spanish conquistadors</i>)	58%
0%	Early misinterpretations (<i>Inaccurate assumptions about writing system/cultural bias</i>)	54%
0%	The contributions from Russian linguist discredited/Cold war politics	38%
2%	Inadequate methods/inaccurate drawings of the glyphs (<i>Before cameras</i>)	24%
0%	Lone scholars/lack of collaboration	15%
16%	Poor accessibility to Maya ruins (<i>Overgrown, jungle, remote</i>)	14%
25%	Deterioration/loss of written examples	0%
9%	No method of translation	0%
5%	Politics/government interference	0%
2%	Other	8%
32%	Don't know/blank	0%

The evaluation findings are summarized below:

- Three factors were raised by the Viewing group that were not mentioned by the Control group, including: early misinterpretations or inaccurate assumptions about the writing system (54%); the contributions from the Russian linguist that was largely discredited due to Cold war politics (38%); and lone scholars working without the mutual collaboration of other scholars (15%).

- Three factors were mentioned to varying degrees in each group, including: the destruction of the Maya culture/suppression of language (Viewer 58%, Control 9%); the use of inadequate methods to help decipher the hieroglyphs (Viewer 24%, Control 2%); and poor accessibility to the Maya ruins due to jungle overgrowth and remote locales (Viewer 14%, Control 16%). A small percentage of both Viewer and Control group participants provided “other” answers to the question (Viewer 8%, Control 2%).
- One answer mentioned by one-quarter of the Control group (25%) that was neither addressed in the NOVA program nor mentioned in the Viewer group was the deterioration or loss of all written Maya examples. A small percentage of participants in the Control group also mentioned there being no method of translating the writing system (9%) and/or mentioned that politics or government interference was a hindrance in deciphering the writing system (5%).
- Finally, a fairly high percentage of Control group participants provided “don’t know” (32%) answers to the question where none of the Viewer group participants provided the response “don’t know”.

Sample answers from each group, where appropriate, follow below.

- Destruction of Maya culture (*All but 4 books burned by Spanish conquistadors*)

Viewer Group

- *The destruction of much of the Mayan culture. Their books were destroyed. They were forced to speak and write Spanish. They were forbidden to live in their old ways.*
- *Delays were caused first by the wholesale destruction of books and conversion of Maya to Spanish language by the conquistadores.*
- *The abolishment of reading, reading or writing the language was a major factor that hindered future understanding. This caused following generations to have the gap in knowledge.*
- *Due to the Spanish conquest, many of the books and Mayan writings were burned and destroyed. This left limited copies of the Mayan writings to be deciphered, studied and compared.*
- *Christianity and the catholic priest who ordered the executions of the Mayan people who wrote in the Mayan language and destruction of the various texts.*
- *Destruction of their culture by the Europeans when first contacted is the main factor. The language was suppressed and most of their books burned.*
- *Most books from the Mayan culture were destroyed during the time of the Inquisition so much of the original source material no longer exists. The hieroglyphs were often worn down.*
- *Also, the Mayan people’s descendants, central Americans of today, centuries ago were forced to speak Spanish by the conquistadors and lost their knowledge of their own history with no residual understanding of the glyphs or the culture that created them, even though they were living among the astounding evidences of a majestic past.*
- *Much of the documentation has disappeared and/or been destroyed. Cultural barriers. Frame of reference (lost and/or destroyed). Suppression of the language for so many years.*
- *The Spanish burned Mayan writings and forced scribes to learn Spanish. Many Mayans were burned at the stake by the Spanish. Only 4 writings remained and each was located far from one another: Paris, Mexico, Germany and Spain.*
- *The Mayan language is not spoken as Mayans were forced to speak Spanish. Most of the Mayan books were destroyed by the Spanish.*
- *So many of the original sources were destroyed as the Europeans sought to erase the Maya culture while converting the Maya to Christianity. Writing or speaking in Mayan was outlawed and punishable by death. Only a handful of texts were saved, and they were spread around the world. The remaining Maya spoke Spanish. Scholars had very few clues to start with ... only the abandoned ruins.*

- *Only four known books of Mayan text are known to exist in the world. Almost all known record was destroyed years ago so that no one would know anything about the language.*
- *Destruction of materials, the fact that the written system is no longer used, the nature of the language itself.*
- *The Spanish attempt to completely change/convert the civilization. The eventual fall of the civilization even prior to European discovery. No code book was readily available. The three remaining "books" were scattered in three distant cities. The books were non-descript so that they went unnoticed for many years.*
- *Spanish inquisition destroyed most extant Mayan material. Remaining material was randomly discovered in Dresden, Paris & Mexico*
- *The conquering of the Mayan areas. The unavailability of pictures or sketches of the symbols. The unavailability of an early document containing the symbols for circulation to others to use.*

Control Group

- *The civilization ended, therefore there is no thread that can be connected based on what we know.*
- *The fact that it is a lost culture and some things will never be able to be answered.*
- *Unacquainted with daily life and culture since it is long dead*
- *The Maya Indian had almost no contact with the colonists or the conquistadors except in having been assimilated into a new culture once they were discovered. Their method of communication was also very occult and secret and most of their religious and cultural traditions have gone underground practically virtually disappearing. When the Spanish colonists and missionaries came, they burned all the Mayan books and tablets they had in their caves believing that they were witchcraft. Almost nothing was left unless it was buried unknown to the Spanish.*
- *Spanish killed them off before learning anything from them.*

▪ **Early misinterpretations (*Inaccurate assumptions about writing system/cultural bias*)**

Viewer Group

- *The confusion of the symbols not showing history but merely just dates/times (later proven to not be true; the symbols were the historical documentation of the Mayan culture). Historians and Scholars having different opinions/beliefs in their interpretations.*
- *Later still were rigid interpretations based on the work of Thompson who argued that they were merely tools for timing celestial events.*
- *Scientists also had a difficult time figuring out whether the symbols represented individual letters, syllables, words, or ideas.*
- *As theories emerged, researchers needed to see things in new ways that they previously had not been aware of.*
- *Thompson's insistence that hieroglyphs represented ideas rather than sounds.*
- *Ego of scholars Western scholars and European scholars.*
- *Eric Thompson believed the characters stood for words and his view was widely accepted but his idea only offered a small glimpse at what the Mayans were really trying to say/depict.*
- *At first they did not believe that the system was for sounds. So no validity was given to them.*
- *...some of the earlier discoveries were thought to be true, but they turned out being incorrect so many researchers were using incorrect information to aid in their studies.*
- *They did not think it told history/made sense. That they were arguing about whether it was a system like the Chinese or phonetics....*
- *I think that people got stuck in just thinking that there was no connection with the symbols and historical context.*
- *The fact that Thompson, the first dubbed expert, projected his desire for peace and peaceful cultures, after WW1, which affected his translations.*

- ...assumptions that the language would be more rigid and less creative than it was, initial pre-dispositions of early translators putting their own ideas (elephants) into the sculptures, assumptions that it would be similar to other languages.
- The interpretations of established scholars being unquestioned and utilized as the false foundation of subsequent interpretations.
- The dates of the calendars. The symbols representing such dates Putting those symbols into a reasonable hypothesis to interpret their history.
- Differences in scientific theories lead researchers down different paths.
- Early theories -- such as the Mayans limited their writings to time and astronomy -- were not adequately challenged for many years. Failure to evaluate the writing system within the context of the oral language upon which it was based.
- Thompson seemed to have a hammerlock on the information--in other words, what he believed tended to be taken as fact, rather than opinion.

▪ **The contributions from Russian linguist discredited/Cold war politics**

Viewer Group

- The Russian's (cannot remember his name) contributions of phonetic meanings were discredited as a result of cold-war anti-communist rhetoric.
- The Russian research was discredited --It was world politics in one case where the cold war prevented the American Mayanist from recognizing the Soviet Mayanist's work.
- Soviet claims that Knorosov's work was Marxist inspired, leading to its dismissal by Western researchers.
- The work of the Russian scholar living behind Iron Curtain, was put down and ignored for many years.
- They were arguing about whether it was a system like the Chinese or phonetics between the scholars in the US and Russia.
- The Russian researcher had a good point that was ignored.
- The fact that the researchers were isolated and didn't combine their efforts.
- Some of the scholars were isolated from each other due to political boundaries (the Russians during the Cold War, for example).
- ...international and domestic politics, scholarly isolation of Russian after his ideas/discoveries were made public--Tensions between the west and east.
- ...communication between western and eastern scholars was weak or non-existent.
- Also, because of the "Iron Curtain," certain linguistic experts weren't able to collaborate with each other.
- Scientists from the west and the east did not share information or trust each other's work.
- The isolation/mistrust of the Russian linguist (forget his name)--no one wanted to take his knowledge, and he was living in Stalinist Russia, so Western researchers didn't work with him.
- Political apprehensiveness to acknowledge the work of the Russian scholar, Yuri.

▪ **Inadequate methods/inaccurate drawings of the glyphs/before cameras**

Viewer Group

- Later, the first attempts to document (draw) the glyphs contained errors based on the assumption that the glyphs were of Mediterranean origin.
- Seems to have taken a long time to get good drawings/pictures of the symbols
- The advent of photography gave scholars a better view of the system as they no longer were limited to artists' drawings.
- In the early stages, limited technology was a hindrance. Scientist had to draw the hieroglyphs and they were not as accurate. Later, a scientist had the ability of taking pictures which gave a clear perspective of what

the carvings actually looked like. Then, scientists were able to have a better understanding of what they meant.

- *Artistic license when documenting the symbols. The lack of accurate documentation prior to the glass plate camera.*
- *Until the advent of the camera, the fact that artists drew the hieroglyphs and their drawings could be incomplete or a little subjective, besides the sheer enormity of the task by hand.*
- *People drawing these petro glyphs did not have the detail. Large format camera technology helped in this respect.*
- *The lack of being able to make accurate drawings resembling the hieroglyphs so it was not until the development of the photograph that accurate decipherment could take place.*
- *Lack of technology. The artists had difficulty getting the detail necessary to decipher the symbols. It wasn't until photographs were taken that they were able to begin to accurately transcribe the symbols.*
- *Before cameras, artists tried to copy down the language but were never able to be accurate enough or able to capture enough of the detail. Then once cameras were developed, more people could study the language.*

Control Group

- *Technology, Mathematical Tools Available, Human Knowledge, History Records*

▪ Lone scholars/lack of collaboration

Viewer Group

- *Lack of cooperation between scholars.*
- *Various theories developed by different people. Independent studies being done rather than collaboration.*
- *Many scholars could not agree on any single interpretation. The Russians wouldn't allow for any collaboration and the idea that a 12 year old boy could have any knowledge was absurd.*
- *...made roadblocks instead of being open to new interpretations. All the people studying it could not communicate openly, and in a timely fashion with open minds about each others' interpretations.*
- *The community of scholars attempting to decipher the Maya system were not unified in their efforts. Breakthroughs would often be debunked by another expert until evidence supported the discovery.*
- *Communication was challenging between different people trying to decipher the language.*

▪ Poor accessibility to Maya ruins (*overgrown, jungle, remote*)

Viewer Group

- *Ruins were overgrown and had to be cleared.*
- *...the jungle was hiding most of the ancient Mayan cities.*
- *Accessibility to locations, simply getting to the sites...*
- *Location of some of the artifacts covered over by the jungle in the lowlands.*
- *The overgrowth of vegetation that covered the Mayan temples for so many years.*
- *...most of their structures are in ruin,*
- *The condition of some of the ruins made it more difficult to access...*

Control Group

- *It was probably hard to recover and receive all of the artifacts. If only parts of symbols were found maybe not all of the information can be accurate.*
- *...access to sites because of dense jungle not all sites have been discovered yet*
- *Buried and only recently unearthed.*
- *There were also a lack of samples available,*
- *...it was hidden away / covered from view / destroyed.*

- *The isolation in which the Mayans lived.*
- *I imagine the inaccessibility of the materials was a challenge.*

- **Deterioration/loss**

- Control Group

- *Weathered objects that made it hard for men to decipher it.*
 - *Weathering of artifacts, loss of artifacts through war and other civilizations.*
 - *Many factors hindered the deciphering of the writing system like natural deterioration, chipped pieces and paint just not lasting throughout the years.*
 - *I believe erosion or deterioration of the ruins.*
 - *Deterioration, weathering of stone (writing surface)...*
 - *Things being destroyed hidden and looted.*

- **No method of translation**

- Control Group

- *I would guess inconsistency in the writing system. Maybe it varied too much from place to place.*
 - *I would say the fact that there is no one around that understands the language hinders the deciphering of the system.*
 - *Having experts in this area who are familiar enough with the Maya culture to interpret the writings, there are not any Maya's around to ask if the translation is correct and scholars not sure if they have seen/studies all the writing system indications that the system changed over time.*
 - *Translators.*
 - *Interpretation Techniques.*

- **Politics/government interference**

- Control Group

- *Political unrest.*
 - *Government interference.*

- **Other**

- Viewer Group

- *The people who wrote on the tablets or columns fancied some of the symbols. The basic symbol might be an iguanas head, but the writer might add their own special flare to the design.*
 - *The number of glyphs were over 800.*
 - *The attention of the world from the colonization of North America until after WWI was not really focused on cultural discovery of the Western Hemisphere.*
 - *Symbols carried more than one meaning, overlapping of symbols.*


- Control Group

- *Origins still aren't clear.*

3.5c Questions on the Maya writing system

Multiple-choice and True/false questions

To assess whether the program influenced Viewers' knowledge of the Maya writing system, both Viewer and Control group participants were asked the 2 multiple choice questions and the 6 true and false questions presented in Table 11 below as well as the open-ended question presented in Table 12 on page 66.

Table 11 Percentage of correct answers to questions about the Maya writing system		
Control (n=57)		Viewer (n=71)
Multiple choice questions		
21%	a. The Maya hieroglyph below represents a ____? ²⁶ <div style="text-align: center;">  </div> Number	93%
14%	b. What specifically does the <u>round dot</u> in the hieroglyph stand for? The number one	80%
32%	Researchers now know that the figures appearing in the art of Maya temples were of ____? ²⁷ All the above (Gods, Monsters and mythological creatures, Kings and queens)	34%
True/false questions		
46%	One sound or syllable can be represented by many different hieroglyphs	94%
16%	Scholars agree that Maya writing is entirely focused on astronomy and mythological events.	92%
61%	The Maya writing system has too many signs to represent an alphabet	87%
9%	Each symbol in a Maya hieroglyph stands for an entire word or idea	72%
16%	Indian elephants sometimes appear in the hieroglyphs	66%
9%	The scribes who wrote Maya hieroglyphic texts were called Stelae	45%

²⁶ Response options included: Burial site, Alphabetic letter, Self-sacrifice ritual, Number, Birth of child, Sunset, None of the above, Don't know.

Overall findings: Viewers significantly outperformed Control participants on this question set. Out of a possible score of 9, the Viewer group averaged 7 correct responses, while the Control group averaged 2.²⁸ The effect size in this case was 2.5, generally considered a very large effect.

Item results: Looking across the percentage of Viewer vs. Control group participants that correctly answered the questions presented in Table 11, the results show that differences between the two groups were consistently high for 7 of the 8 questions. For one multiple choice question, however, the percentage of participants in each group selecting the correct answer was even (34% vs. 32%). In this case the question asked participants to select from several response options as to which figures researchers now know appear in the art of Maya temples and the answer was all of the above.

²⁷ Response options included: Gods, Monsters and mythological creatures, Kings and queens, All of the above, None of the above, Don't know.

²⁸ ($t=13.850$, $df=126$ $p<.000$); 95% confidence interval of the difference (lower 3.6, upper 4.8)

Open-ended question about what the hieroglyphs reveal about ancient Maya

Viewer and Control group participants were also asked to list as many things as they could think of in response to the question: *What have the Maya hieroglyphs revealed about the culture and history of the ancient Maya?* Table 12 shows the factors that the two groups most frequently listed and the percentage of participants citing each factor.

Table 12 Viewer and Control groups' responses to the question: <i>What have the Maya hieroglyphs revealed about the culture and history of the ancient Maya?</i>		
Control (n=57)	The Maya....	Viewer (n=71)
7%	Had conflict/violence/bloodshed, sacrifice	73%
7%	Had a monarchy	68%
7%	Were focused on recording time/historical events/creation of world	42%
16%	Pursued/studied astronomy/calculated lunar and solar eclipses	28%
30%	Were an advanced society	23%
7%	Used astrology to make contact with the spirit world, channel spirits	21%
0%	Had an artistic, creative nature	20%
25%	They were religious/spiritual	10%
19%	Other	18%
30%	Don't know	0%

Almost all the factors raised by the Viewer group were also mentioned by the Control group, including: the Maya were a conflicted and sometimes violent society plagued by war, bloodshed and human sacrifice (Viewer 73%, Control 7%); the Maya were ruled by a monarchy (Viewer 68%, Control 7%); the Maya were focused on recording time, their historical events and the creation of world (Viewer 42%, Control 7%); the Maya pursued and studied astronomy/calculated lunar and solar eclipses (Viewer 28%, Control 16%); the Maya were a very advanced society (Viewer 23%, Control 30%); the Maya used astrology as a way of making contact with the spirit world/channeling spirits (Viewer 21%, Control 7%); and the Maya were a

religious and spiritual society (Viewer 10%, Control 25%). Just under one-fifth of both the Viewer and Control groups provided “other” answers to the question (Viewer 18%, Control 19%). One answer mentioned by one-fifth of the Viewer group (20%) that was not addressed by anyone in the Control group was the artistic and creative nature of the Maya. A fairly high percentage of Control group participants provided “don’t know” (30%) answers to the question compared to 0% of the Viewer group.

Sample answers from each group, where appropriate, follow below.

▪ **Had conflict/violence/war, bloodshed, sacrifice**

Viewer Group

- *The Mayan culture turned into a culture of war; there were many bloody hieroglyphs. Mayan civilization believed in sacrificing human lives to the Gods/Lords.*
- *At first, it had seemed that the Maya were a peaceful civilization but after breaking the code it was later realized that they were like any other civilization and had problems. The most that they wrote about was sacrifice and war.*
- *That not everything was peaceful and there were wars between tribes. They committed sacrifices of others and of themselves for spiritual reasons possibly to their ancestors.*
- *They may have started out peaceful, but ended by wars. They were like a lot of human cultures with good and bad ideas, habits, and policies.*
- *It showed that they were not a peaceful people, putting it mildly. Some of the glyphs and small statuary depicts unbelievably brutal torture of enemies and how they sacrificed their own blood in certain rituals to conjure up ancestors. Beheading was liberally employed.*
- *The hieroglyphs have revealed that the Maya were not peaceful as originally thought. The hieroglyphs have revealed that the Maya had a bloody, turbulent history of warfare and sacrifice.*
- *They were involved in political conflicts. The movie said there was a lot of bloodshed, but what if that was not seen as “bad” like it is now. Maybe they did not believe physical death was the end for any of them.*
- *The Mayan people were not necessarily a peaceful people that they were initially thought as being. They were in fact, people who sacrificed themselves and fought. The glyphs show much bloodshed.*
- *As time elapsed, the Maya’s history became more complicated. They first looked more like a peaceful people, but then there were hieroglyphs depicting bloodshed and rituals of taking their own lives.*
- *Their history was violent, including sacrifice of captured warriors and their own. Blood was a common thematic, with descriptions of scalping and decapitation of captured victims, as well as self-sacrifice, with blood being used in ceremonies to contact spirits of the deceased and gods. The glyphs reveal that Mayan civilization was torn apart by internal political strife and warfare, which ultimately led to the fall of their great cities.*
- *Unlike what was previously believed, the Maya were a violent people; many of the hieroglyphs depict self sacrifice, warfare and blood. The Mayan culture was dominated by different city-states that were in conflict with each other.*
- *There was constant warring among superpowers. It was barbaric and devastating to the landscape. Self-sacrifices were made to Gods.*

Control Group

- *The Maya were (compared to modern day) cruel...*
- *...warriors were respected members of society;*
- *...documented battles*
- *...used sacrifices & rituals, defense.*

- **Had a monarchy/ruled by kings**

- Viewer Group

- *The Mayan people had Lords and traced their history from birth to Ruler of a Land. These Lords were warriors. Most Mayans ruled for a period of 47 years and their life was around 60 years. Lords/Rulers were buried in Jade with hieroglyphs telling their story.*
 - *The columns were the life stories of the kings and queens that ruled. It told of births, battles, passing on of power, and deaths.*
 - *They recorded important events by date, including their interpretation of when life began, all the way to specific events such as marriages, births, deaths, and the rise and fall of leaders.*
 - *That there were kings and queens as rulers. The dates of when events took place in specific rulers lives. That they admired certain possessions and told a story about them.*
 - *They were most centered on the passage of time...of the length of reign and warrior status of their kings. They recorded lists of royal objects owned by kings. Glyphs and steles showed that the reign of a king lasted about 60 years.*
 - *The Maya hieroglyphs reveal the stories that surround the dynasties of the Maya empire. They also tell of the time lines of the different kings and queens of the Maya civilization.*
 - *They preserved their history in stone slabs which showed the dynasty of rulers and the lives they lead during each reign.*
 - *What has been revealed is that the Maya recorded all rulers, much about their lives, when they ruled, when they reign as ruler was over and a new ruler took his place.*
 - *What were once believed to be stories about their gods turned out to be a history of their rulers and ruling government.*
 - *A people who revered their hierarchy in terms of documenting the birth of a king and "writing" his history down.*
 - Control Group
 - *...they were a mostly illiterate society except for civilization's elite or rulers.*
 - *Mayans ruled themselves.*
 - *Their government....*
 - *Rulers.*

- **Focused on recording time/historical events/creation of world**

- Viewer Group

- *They attempted to preserve their history.*
 - *Cultural history of the civilization.*
 - *They used hieroglyphs to record their history.*
 - *They were always recording and creating legends.*
 - *The Maya recorded a long history through the hieroglyphs that detail family history and events.*
 - *They Maya recorded everything from birth, death, dates, basically their entire life.*
 - *...the text revealed things such as the beginning of time to the end of time.*
 - *...they preserved their history by writing.*
 - *...believed the world was created in 3131 B.C. Dated everything in their culture.*
 - *They were a people who wanted to document their history.*
 - *They trace their history to a beginning point of about 3000 BC.*
 - *...complex timekeeping system history was documented in hieroglyphs.*
 - *...employ artists to depict its history.*

Control Group

- ...they closely followed the changing of the seasons.
- They had a calendar.
- ...end of the world in 2012.
- The calendars dated much further past their own existence.
- Evidence showing this are their calendars.

▪ Pursued/studied astronomy/calculated lunar and solar eclipses

Viewer Group

- The Mayans accurately calculated lunar and solar eclipses. The Mayans believed in life on other planets; notably Venus in which they believed to be a war planet.
- The hieroglyphs also referred to astrological events such as eclipses.
- They studied math, astronomy and architecture.
- Hieroglyphs recorded series of historical events, astronomical predictions.
- A complex understanding of astronomy.
- They were interested in celestial events.
- They also saw wars in the stars while looking at changes in Venus. It showed how people were treated.
- They were aware of and studied astronomy.
- The Mayans were very interested in time, history and astrology, and intelligent in their understanding of it.

Control Group

- ...they watched the skies carefully and tracked the sun/moon.
- ...mapped full rotation of galaxy.
- They had an extensive knowledge of astronomy, could make accurate predictions about the solar and terrarean events that impact humans and animals.
- They were very smart with ideas pertaining to Astronomy and Math. They have supposedly been good at predicting future events using astronomical calendars.
- They had a great understanding of the earth and how it related to the rest of the solar system.
- The hieroglyphs tell us that the Maya people were very advanced in the math and the solar system. Evidence showing this are their calendars.

▪ Was an advanced society

Viewer Group

- They had a highly developed society for the Western world at that time.
- They also had a complicated culture with language and rules of law.
- A system of numbers, mathematics and a calendar.
- Maya culture was the only fully literate culture in the western hemisphere.
- ...the culture was extremely advanced, their architecture was phenomenal.
- They were around for 2000 years and were a very sophisticated culture, calendar, fully developed language, and incredible cities, which all together made for a successful lifestyle.
- The Mayan culture during its time was largely successful, in that the culture could sustain the building of temples and employ artists to depict its history.
- They also revealed that they were very advanced in that regard during that period of time.

Control Group

- It most likely showed that the Maya were intelligent and had their own ideas on different things.
- That they were extremely advanced civilization with vast knowledge of astronomy, mathematics, architecture....
- The Mayans were a very literate, intelligent, religious, artistic, analytical and logical culture.

- *The hieroglyphs tell us that the Maya people were very advanced in the math.*
- *They had a complex economy and used monetary units for trade.*
- *...they had an advanced algebraic or calculus mathematical system.*
- *...well traveled people intelligent and interested in other cultures a lot of stories and traditions were passed on orally.*
- *They used highly advanced mathematics.*
- *They were very smart with ideas and Math.*
- *They had a great understanding of the earth....*
- *...their medical methods were more advanced than thought.*

▪ **Used astrology as a way of making contact with the spirit world, of channeling spirit**

Viewer Group

- *The Mayans have a story to explain how we have a sun and moon involving 2 children who were raised to be warriors who fought battles in the Underworld.*
- *The writings also told about astrological events.*
- *There was a complex mythological story system explaining the sun and moon.*
- *Mythology (or what we assume to be mythology!).*
- *...important myths and stories (Ex: twin brothers who became the sun and moon).*
- *Furthermore, the glyphs tell of mythological Gods that the Maya civilization worshiped.*
- *...two brothers went to the underworld and were turned into the sun and the moon after a series of events. It shows ...the change in culture. They were very mythical and agricultural as well.*
- *They revealed their interest in the spiritual side of life, stars, etc. as well as their daily lives, dreams and rituals.*
- *Mayans created what is considered the most important mythological text of the Americas (or Western hemisphere), the Popul Vu, detailing the journey of twins to the underworld, the virgin birth of new twins who liberate their father and become the sun and moon.*

Control Group

- *Also some astrological speculations.*
- *Focus/interest in astrology, i.e. the anchor of the sun stone thing at Machu Picchu.*
- *The writing system was heavily based on astrology.*
- *They could predict and map out astrological events. They often turned to the sky for many answers.*

▪ **Had artistic/creative nature**

Viewer Group

- *They were artistic and seemed to enjoy finding new ways to express themselves in their writing.*
- *They used art in a form of graphic imagination.*
- *An imaginative and whimsical approach to writing and recording history.*
- *Beauty and artistry were important in the language.*
- *The Mayans were clearly artistic and highly intelligent people.*
- *They were a creative, even humorous people. The writing was a creative endeavor which allowed the scribe to create new symbols as they were writing, perhaps to match the mood or give an attitude to a story.*
- *Their playfulness with their symbols shows a love of art and creativity.*
- *That they were very creative with their play of the design of glyphs.*
- *They appreciated art and being able to use variety in expressing their languages.*

- **Was religious/spiritual**

- Viewer Group

- ...they also focused on their inward spirits and that they were spiritual.
 - They also connected with spiritual realms and sought guidance from there.
 - The Maya hieroglyphs reveal that they are committed to their God and pleasing their God.
 - They were violent and spiritual.
 - They had their own Gods.

- Control Group

- The Maya were (compared to modern day) cruel and believe in sacrifices to please the gods. These gods will bring rain and other blessings to their land.
 - They worshipped many gods.
 - ...they respected the dead and prepared them for the afterlife.
 - ...very spiritual beliefs.
 - I believe worshipped the sun....
 - ...burial rituals, sacrifice rituals.
 - The priest was the highest ranking official and the sun god was the most powerful god.
 - ...belief in the afterlife.

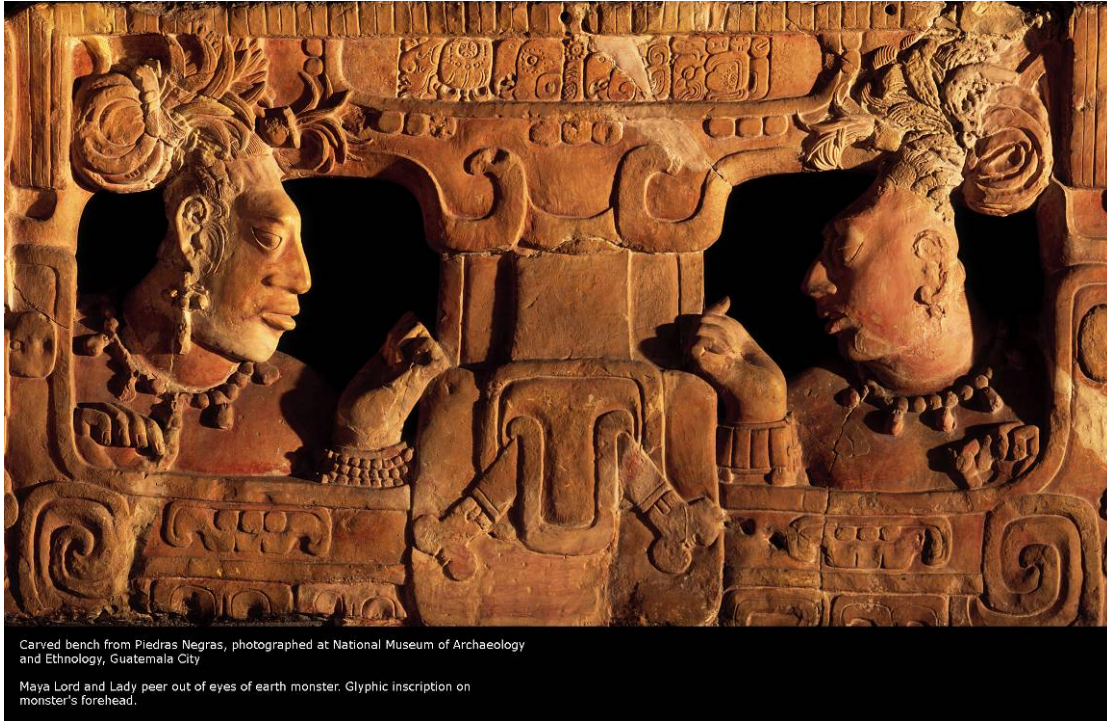
- **Other**

- Viewer Group

- They were skilled farmers.
 - They had a lot of superstitions like most other cultures.
 - Life revolved around the elements. There were some supernatural beliefs.
 - A sudden unexplained departure from their sites.
 - One small hieroglyphic monument was abandoned uncompleted. Standing as evidence of the abrupt end of the culture when the Spanish conquistadors arrived - quickly setting about the task of wiping out all traces of the Mayan civilization.
 - They put a lot of care into word choice and how they told each story.
 - There also was a certain normalcy about the civilization in the writing with some people being better natured, ill-tempered or getting fat as a leader with absolute power might.

- Control Group

- ...they were an agricultural civilization; they were a male-dominated culture.
 - Their civilization became suddenly extinct for some unknown reason. Different sites have been found all over the world.
 - Women played a central role in the culture.
 - ...daily and family life, how their view on the universe, how it began and life beyond it, agriculture values, daily life.
 - ...many syllables can be represented by more than one glyph.



Part 4: What was the impact of *Cracking the Maya Code* on Viewers' thoughts, personal connections, and actions one month after viewing?

Follow-up telephone interviews were conducted with a subset of adult Viewers who watched the program and completed the online questionnaire. The interviews were conducted approximately 3-4 weeks after participants watched the program and completed the post-viewing questionnaire. The interviews explored the longer term impact of the film and whether and how Viewers thought about or took any actions related to their viewing of the program.

Recruitment and procedure

Interview requests were sent to a group of 22 randomly selected participants via electronic mail. Those interested, available, and willing to be contacted confirmed their consent via email and corresponded with the evaluator to set up a time to speak by phone. Among the 22 confirmation emails received back, 20 included contact information and belonged to individuals who could be reached within the 1 week interview

period. All of these participants completed the interviews during the evaluation window. Therefore, 20 of the 22 contacted for the interviews participated, resulting in a response rate of 91%. Twelve (12) Interviewees were women and eight (8) were men.

The findings relating to the following 6 issues are reviewed below.

Issue 1: Did Interviewees discuss Cracking the Maya Code with others?

Issue 2: Did Interviewees encounter anything in various media that brought the show to mind?

Issue 3: Did Interviewees do anything new or different as a result of seeing Cracking the Maya Code?

Issue 4: Did Interviewees think about anything new or different as a result of seeing Cracking the Maya Code?

Issue 5: Did Interviewees visit the Cracking the Maya Code website?

Issue 6: Did Interviewees have additional comments they wanted to share with the producers?

4.1 Did Interviewees discuss *Cracking the Maya Code* with others?

All but one Interviewee said they discussed the program with someone within three-four weeks of viewing. Many said they talked about how much they enjoyed the program and that they recommended it to others. Others said they talked with others about the number of scholars it took to decipher the Maya writing system and the challenges encountered.

A few Interviewees recalled conversations about the program that were either of a more personal nature, involving their own travel experiences, or of an analytical nature, involving the topic of linguistics or the role of language in culture more generally.

All but one Interviewee (n=19) said they discussed the program subsequent to viewing. The one Interviewee who did not discuss the program indicated he was not certain whether discussing the program after completing the post-viewing questionnaire was part of the evaluation process so refrained from discussing it with others. Among those who did discuss the program, their responses follow:

- Nearly half (n=8) said they found the program *interesting* and/or recommended the program's educational content to others, including significant others, family members, friends, children, or colleagues. For example:
 - *I talked to my girlfriend about it because she is interested in Spanish Mayan ruins. She expressed interest in seeing the show, so I'll be watching it again with her.*
 - *I told my partner what a great show it was and that he should watch it, so he did.*
 - *I discussed it with my sister. I just told her how much I enjoyed the show and that I had seen another show about it.*
 - *I discussed it with my wife, who watched it with me. We both found it very interesting and that it would make a great PBS special or show and we wish more programming like that were available.*
 - *Definitely, yes, for I enjoyed the Maya Code (love Nova and PBS anyway!). I talked with perhaps 3-4 friends and my life partner (he watched part of it with me, too, and liked it). My friends are always learning and most of them enjoy PBS. A common denominator we discussed was predictions from other cultures and the way their cultures really were rather than what history writes them to be. This sparked conversation beyond the program, history, and cultures into spirituality and living with integrity, etc.*
 - *I talked with a couple of friends of mine and my impressions on how interesting it was and if they wanted to see the DVD. I explained to them what the show was about.*
 - *I just told a friend of mine I saw an interesting film/documentary, but I didn't go into any detail because we were both in a hurry.*
 - *I spoke to my girlfriend about it and explained what it was about and why it interested me.*

▪ Nearly half (n=8) described discussions about the difficulties scholars had in deciphering the Maya code and the many researchers involved in the process, as in:

- *My husband and two kids saw it with me, and we discussed it. We talked about the parts that were interesting to us, like how the earlier explorers thought some of the glyphs were elephants and how our own perceptions or limitations get in the way of looking at something new. Also, how different people ended up bringing different pieces together. It couldn't have really happened with one person. It was almost like they were all working together on it, but not knowing they were.*
- *I discussed how advanced the Mayan were and the time it took the scientists to crack the code with all the different theories and ideas of how it was, and the pictures. It was very interesting to me.*
- *I talked to my girlfriend about how the Mayan code was cracked by such an unusual cast of characters. How the language has multiple symbols per sound and how that created difficulty in the decipherment. I discussed the destruction of all by four Mayan texts by the Catholic Church. I discussed the fact that the Mayan written language is a combination of logographic and syllabic style. I discussed the negative impact of the Cold War on the collective research of Mayan decipherment.*
- *I discussed it with a good friend of mine that is a filmmaker who's working on a novel right now. We talked about cryptology and how the same character had many different ways of being portrayed.*
- *I discussed it with my little sister. I told her what the Maya Code was about and we started talking about 2012. We ran into a teacher and we started talking about language and about how the scientists were trying to crack the code.*
- *I discussed the history of the Mayan people with two friends.*
- *I asked my daughter if she knew anything about Mayan history.*
- *I discussed it with my best friend and another friend. I told her about how I had heard of the project and was randomly selected to watch the video and share my opinion. I talked to her about Maya culture and their system of communication through hieroglyphics. She didn't know much about it so I shared with her what I had learned about the symbols and how the same symbols could mean different sounds. I'm a first grade teacher and I found it fascinating because it's kind of like phonics where you have certain letters that have different sounds. We talked about how before I saw the program; I was always confused between Aztecs and Mayans because a lot of people mix the two up. Also talked about the system of hierarchy, how there were kings who were worshipped and some historians believed that there were human sacrifices that were made at times.*

▪ A few Interviewees (n=4) had discussions of a more personal nature, such as their past travel experiences or desires to someday travel to Central America, while a couple (n=2) had more analytical discussions about linguistics or the role of language more generally. Comments included:

- *I discussed it with my sister. We talked about traveling to the Yucatan. I had been there before and seen some ruins.*
- *We have dreams of traveling to these places, such as Machu Pichu and other places that have peaked modern curiosity for those intellectually interested (and spiritually for some, too).*
- *I discussed it with my family. We talked about the origin, the discovery of language, and the interpretation of languages that aren't known. Everyone in my family has been to Latin America. Their culture is something we appreciated and are interested in. They love hearing about that aspect of it and also just the whole idea of understanding a language that no one could decipher, and being the first to understand it was fascinating.*
- *I had a conversation with a person I teach with about linguistics. I teach in communication and media studies. We were talking about the linguistics. I think of them as words and for it to be the code was very interesting to me. I don't think I was as knowledgeable as I thought.*
- *I discussed it with my wife and son and we talked about how different my understanding is now by comparison to how it was a couple of years ago. My particular understanding and maybe I wasn't paying as close attention as I should have been, is that we are translating their language, but I didn't realize we had translated so much.*

4.2 Were Interviewees reminded of the program when encountering other print, visual, or audio media?

Most of the Interviewees described having at least one media encounter that led them to think about the program. Most often they recalled connections that occurred through television or film experiences, followed by print media, and then radio.

Interviewees were asked if they had read anything, seen anything on television or in the movies, or heard anything on the radio that reminded them of *Cracking the Maya Code*. All but three (n=17) recalled at least one connection that occurred through television or film experiences, print media, or radio, as follows:

- Almost half (n=9) of the Interviewees said that they had seen something on television or in a movie that reminded them of *Cracking the Maya Code*. Three were reminded from watching previews of the movie 2012 that began to air after the evaluation period or from documentaries focused on the advent of 2012. Two were reminded from watching the film Avatar, as the film's indigenous people reminded the Viewers of the Mayan people and the two cultures' similarities. The remaining Viewers were reminded while watching specific parts of movies they had viewed on DVD, The History Channel, the Create Channel, or on a travel show. Comments included:
 - *I remember seeing something on the History channel regarding the Maya prediction of the end of the world in 2012. It made me think of that because if we can decipher their written language, perhaps we can determine if they are correct or incorrect about their predictions. Also, in Indiana Jones: Kingdom of the Crystal Skull, I was reminded about the Maya because the movie makes references to them and their culture throughout the movie.*
 - *I saw a show on African study on the History channel that discussed language and that reminded me of the show.*
 - *Seeing the previews of the movie 2012 and talking to friends about how bad the movie is, reminded me of the Mayan calendar.*
 - *A week ago, on the history channel, I saw a show about the books that were all destroyed. Recently on National Geographic and history channel, they've been devoting coverage on 2012 and the Mayan calendar.*
 - *Avatar reminds me of the history of Indians, Native American, Mexican indigenous people and their plight.*
 - *The movie Avatar. In the movie the people are so tuned into life and nature and feel so connected with it, and humans come in who aren't tuned to that and find it really easy to destroy it. The comparison to the Maya code would be the Mayan's had this civilization going and according to history, they had a hierarchy, and then, what happened to them? Where did they all go? It was a well organized society and there doesn't seem to be any clue to what happened to them. It ties into the movie in that their cultures were similar and if the hero in Avatar didn't save the indigenous people, they probably would have been wiped out. Why did the Mayans abandon their cities? Was there a threat? Was there a change in consciousness?*
 - *It was a show on the Create channel; it was about Echo travels and tours. The tour went to Belize, to the Banana Lodge. The tourists went on horseback into the jungles and to the Mayan ruins. They described it as the second tallest building in Belize. The gentleman that owns the property said they settled there because it was the best area for agriculture, that is why he bought the property there, and I'm sure that's why the Mayan's chose to settle here so long ago.*

- *To preface, I did not see the beginning nor the end of the movie, so I do not know the name, but it was investigating supposedly disparate clues to discern what happened (sort of an intellectual CSI – not Hollywood-ish at all!).*
 - *I listened/saw something about the Hopi pueblo Indians in the southwestern US and their dying language. That was a little bit a link back the Cracking the Maya Code. They are both very obscure languages. I think the symbolic aspects of the Hopi language is gone already and there are just a handful of people who still speak it. At the Hopi high school in Mesa, AZ, and Mesa pueblos, they are actively teaching the Hopi language and trying to keep it from dying. I drew a parallel between the long dead Mayan language and the dying Hopi language.*
- **Several Interviewees (n=6) reported reading something that reminded them of the film.** A few read material that focused on the year 2012. A few others were reminded of the show from reading books on Native American and Mexican history as well as Early American history. Another cited reading a science article on the Internet as a reminder of the program. Comments included:
- *When I see things about the year 2012 and how the Maya calendar states that the end of the calendar is in 2012 and that will be the end of the world.*
 - *My son is interested in what's going to happen at the end of time, 2012.*
 - *I am a teacher of American history, so I would say I don't remember anything specifically from outside my course material on American history. We've been reviewing Early American history and I talked a bit about the conquistadors and Mayans.*
 - *I work in a residential treatment center for boys and looking through Native American and Mexican history books remind me of the show everyday.*
 - *I saw some science pictures that peaked my interest on the internet and read the articles. Such as finding ancient bones that helped solve questions ... about finding a large sea creature that no one knew about ... about a discovery in space ... and on. These, including the Maya Code, have searching for information, curiosity, truth, etc. in common.*
 - *There was something in the paper the other day about the discovery of an ancient city that made me think of the Maya Code*
- **A couple of Interviewees (n=2) said they were reminded of Cracking the Maya Code while listening to the radio while several (n=7) qualified that they rarely or never listen to radio.** Those who made a connection found it when listening to Spanish music or a radio talk show featuring alternative medicine, as in:
- *Whenever I listen to Spanish music or radio stations, I think of the indigenous people.*
 - *This may seem unrelated, but, to me, it is not. I listened to a local naturopathic/energy doctor who combines homeopathic, naturopathic, and other alternative methods with energy and spirituality to help the person heal holistically. This to me is finding out what is behind the veil, i.e., the truth that is about time gets out to truly help people. The bottom line is to be fully informed (as much as possible) and, then to make our own conscious decisions to help our own health. To me, that is very similar to being peeling the onion of past cultures.*

4.3 Did Interviewees do anything new or different as a result of seeing *Cracking the Maya Code*?

About half of the Interviewees reported that they had done something differently or new as a result of seeing the program, including: seeking out additional information about topics in the program, sharing information they learned with their students, or looking at their life with a new appreciation for humans' capabilities as well as limitations.

Interviewees were asked whether seeing *Cracking the Maya Code* had affected anything that they had done in the weeks since they saw the program. About half (n=9) reported that they had done something new or differently, as follows:

- Several Interviewees (n=5) sought out additional information about topics in the film either at the History Channel, National Geographic Channel, or the Internet, as in:
 - *It made me want to go to the website, but to also look up some of the other content of the Mayans that hasn't been cracked. It has definitely peaked my interest and when I have time, I will definitely look up some more info on the Mayans.*
 - *I've definitely tuned into other shows on the history channel or national geographic that have had anything to do with Mayans.*
 - *I've researched the various writing types--syllabic, logographic, featural.*
 - *Went on the internet to look up some of the Mayan sites.*
 - *I actually went on the internet to look up a little bit more on some of the ruins.*
- A few (n=4) went on to discuss *Cracking the Maya Code* with their students, as in:
 - *I mentioned it to my class, talked about it with my son and wife, next year, I hope to deal more with Maya history in my class.*
 - *I did share with my 1st grade class. We're learning how to do writing with pictures and then make a sentence. I shared with them that there was a culture of people that lived long ago that used symbols and pictures as a form of communication. They found it very interesting. I talked to them about it for about 5 minutes.*
 - *I'm a teacher and when my kids came back after the holidays, I did talk to my class about it, and I wouldn't have if I didn't see the show.*
 - *I work in a residential home for boys and I asked if I could do a presentation in class of the Mayan people.*
- One Interviewee spoke of the program causing her to look at life in a different way, even appreciating human capabilities and limitations in a new way, as in:
 - *It catalyzed me thinking a lot about the capabilities of the human brain – if we only get ourselves out of the way. Because of that, I have been looking at everything in my life, for example: personal projects and goals; work projects and deadlines; family and friend objectives; relationship objectives; and on. AND I have been looking at it consciously with different “eyes” and have been consciously getting myself out of the way. Although I have been thinking about every area in my life, I have applied it so far only to work and to one project at home. I do not mean to diminish this for this is monumental, transformative, and something I have always known, but did not allow myself to kick start myself to see differently again. This is wonderful! Thank you for putting the show together the way you did!*

4.4 Did Interviewees think about anything new or different as a result of seeing *Cracking the Maya Code*?

Most of the Interviewees reported that the program affected something they thought about since viewing. Most often they recalled thinking about: the origin of language and cryptology, previous travel experiences, art and educational projects they were inspired to work on, the capabilities of the human brain, and the impending arrival of 2012 and its potential ramifications.

Interviewees were asked whether seeing *Cracking the Maya Code* had affected anything that they had thought about in the weeks since they saw the program. Three-quarters (n=15) felt that the program affected something they thought about since watching the show, as follows:

- Several Interviewees (n=6) reported thinking more about the Mayan language, cryptology, and the origin of language. Two people were amazed that scientists were able to bring a language back from extinction, another two thought more of cryptology and hieroglyphs and the final two thought about how language developed over time. Comments included:
 - *I thought about how much time it took the scientists to do so much work in bringing back this language that was gone and dead. It just amazes me how people would put so much effort into doing something like this when it was literally so much effort to do.*
 - *The thing I thought about was that it was sad to me that the language is mostly gone already and how hard it is to try to piece it back, tiny morsel, by tiny morsel. I thought about how sad it made me feel that so many indigenous cultures' history is just trampled on and gone.*
 - *I've thought about the hieroglyphics and their differences and similarities, but just in passing.*
 - *Definitely thought about the whole cryptology thing. It tied into a couple of creative conversations I was having in terms of cryptology and how the images become symbols. Also in terms of colonialism, I was shocked how little I knew about the Spanish colonial impact on the Mayans.*
 - *I've been thinking a lot about previous cultures and how our system messes them all up. Being a teacher and having supplemental authorization in English, I'm fascinated with language. It's been on my mind a lot, thinking about how we came to develop our language system today and how much of an influence the Mayan culture had on that.*
 - *Sometimes I do think about how language works. I took an anthropology class and it really made an impact on me because we talked about language a lot and how it keeps changing. I left to go to my aunt's funeral for a little while, and even there, I noticed that the language had changed a little bit and how people were speaking differently.*
- A few (n=3) thought about previous travels to Central America as they had previously visited areas in Central America and longed to travel there again in the near future. One was reminded of a basketball like game the Mayan's played, and said she thought about the logistics of the game whenever she watched sports. Comments included:
 - *I have visited Honduras and seen other ruins in Central America. I thought about getting busy and doing my traveling again. I need to get out of the 9 to 5 grind, expand my mind, and be mentally stimulated again.*

- *I travel a lot and have been to Panama, the Caribbean. Central America is a place that I want to visit in the future.*
- *When I was in the Mayan peninsula, all the ruins that we went to had the ball game similar to basketball. When I watch sports now, I think about how they have to get the ball through the hoops and how the hoops are set up.*
- **A few others (n=4) had thoughts of a more personal nature.** A couple of Interviewees thought of school or art projects they would like to accomplish in the future, while one spoke of the unlimited capabilities of the human brain, and another pondered the meaning of the Mayan calendar ending in 2012. Comments included:
 - *My son did a school project on the Maya and the Inca and we talked about maybe next year he could do projects on the glyphs or cracking the code.*
 - *I was inspired to consider doing an art project for my home, possibly an Aztec art mural with one side the Aztec calendar and on the other, a deity of some sort.*
 - *I have been thinking a lot about how capable the human brain is—if we only use what it is capable of. After all those people tried to crack the code (and no one could for various reasons, including professional bias, ego, etc., i.e. they limited themselves, I feel), the young man did not even let himself be limited. We definitely can do anything. We just have to go for it! The show was not only interesting, it was fulfilling and inspirational on many levels for me.*
 - *Just the question of 2012 still lingers on the back of my mind. The Mayan calendar ended in 2012 and with the new year, now 2010, the whole idea of 2012 being the end of the world. What does it mean? I don't think we have the same interpretation of the world that they're thinking of. I think their world had a physical reality to it, but that they were also tuned into another world, a spiritual world. I think 2012 will be the end of the ego, the world of the ego. I hope it's a leap of consciousness for human kind.*

4.5 Did Interviewees visit the *Cracking the Maya Code* website?

Most of the Interviewees did not visit the website, with the majority of these individuals qualifying that they didn't realize the program had an accompanying web presence. The few who did visit the website liked what they saw, found topics of interest, and either browsed the site or used the interactive features available.

Interviewees were asked if they visited the *Cracking the Maya Code* website and, if so, to describe what they did, what they enjoyed most, if there was anything they disliked, and what they learned that interested them the most. The majority of Interviewees did not visit and was unaware of the site, but some did access the site as follows:

- A few Interviewees (n=4) reported visiting the *Cracking the Maya Code* website. One Interviewee read, listened to the spoken language and viewed maps and timelines, while two others browsed the website, and one looked to see if any of the information could be incorporated into his curriculum. Comments included:
 - *Yes, Read, listened to the language, viewed the map, looked at the timeline*
 - *Just took a look to see what was there and planning on using some of the information in my curriculum for next year. I really didn't look at the website, in depth and just did a cursory search around.*
 - *Just browsed*
 - *I just browsed around. I didn't spend very much time there.*
- One Interviewee enjoyed the audio of the spoken language the most, as follows: *I liked listening to the spoken language.*
- None of the Interviewees found anything to dislike on the website.
- About one-sixth (n=3) of the Interviewees found topics of interest on the website.
 - *I was interested in the correspondence between written and spoken language.*
 - *I learned that the Maya were warring tribes, a violent people. I thought they were gentle.*
 - *I liked looking at the writing/drawing of the hieroglyphs and the way they drew some of the words.*
- Among the 16 Interviewees who did not visit the website, 12 stated that they did not know there was a *Cracking the Maya Code* website. For example:
 - *No –I followed the link to view the show online but was not aware that there was a full blown website dedicated to the show.*
 - *If the show told about the website, I forgot. I would love to see the website. It must be available through Nova/PBS. I will definitely check it out after the survey. Was it listed in black and white on the outside of the DVD case? Something tactile like that is a reminder for me and I almost always go to the websites.*
 - *Now that I know, I will. I'm going to watch the DVD again too. I had actually heard of the Maya Code before I got the DVD.*
 - *Now that you informed me that there is a website, I will.*
 - *No, but I will now!*

- The remaining 4 Interviewees stated that while they did know about the website, they either forgot about it, didn't have questions to pursue, or still planned to look at it, as in:
 - *No I haven't yet but I've been meaning to. I definitely will. I've been busy over the holidays and trying to catch up with a lot of work and haven't had any free time for internet trolling.*
 - *No, I got a lot of information that I did not have before watching the show and I didn't have any questions that were burning a hole in my pocket at that time. I felt like I learned enough and that it was good enough for now.*
 - *No I haven't had time to visit the website.*
 - *It's something that I wrote down, hoping to get to, but right after that, I was inundated with engagements I had to attend, then went to France and just got back 2 days ago.*

4.6 Did Interviewees have additional comments they wanted to share with the producers?

One-half of the Interviewees took the opportunity to give additional praise to the overall program, focusing on its personal relevance, entertainment value, or educational value. Over one-third ended by praising the film, but also pointing out something they wish had been handled differently, such as their desire for additional material about the Maya or more translations of the glyphs featured in the program.

At the conclusion of the interview, participants were offered the opportunity to add any other thoughts or comments that they would like to share with the producers of *Cracking the Maya Code*. Almost all of the Interviewees (n=19) responded with additional comments, as follows:

- One-half (n=10) of the Interviewees took the opportunity to add additional praise for the overall program, focusing on its present relevance, entertainment value, and educational value. Comments included:
 - *I thought it was a classic style PBS documentary on their subject. I found it very interesting and enjoyable and I'd like to see more of this kind of programming.*
 - *We really enjoyed watching the show, even my 14 and 20 year old kids. My husband was a bit angry and upset to learn about the book burning at the beginning of the show.*
 - *I really enjoyed it and I like looking for shows like that on T.V., like Discovery or the History channel, so I hope that they play some more of that.*
 - *It was very interesting, loaded with information, made me want more, was inspirational, and actually catalyzed action on my part. Now I want to see the website!*
 - *It was a very, very interesting program. It was extremely interesting that this 12 year old boy was able to do what so many other scientists couldn't.*
 - *I thought it was great. I feel bad that I haven't gone on the website and looked around because I really was interested. I thought they did a great job. I love the progression of taking us through the whole process in the film. It was really well done. I enjoyed being a part of it, and learning something. I will definitely go on the website. My husband wants to see the DVD now.*
 - *I really did enjoy the show especially because everyone's been talking about 2012. It was nice to have something that gave a really nice historical, factual background on the Mayans. I think it was really timely and a lot of people will be interested in it in a way they might not have been at other times. I'm glad they don't delve in too deeply about 2012. It made me want to know more about the content of the glyphs that have been decoded. It's a good thing the show didn't go more in-depth because now I want to research it more on my own.*
 - *I enjoyed watching the show. Felt enlightened afterwards.*
 - *Nothing at this time. I thought the show was very good the way it was presented.*

- Nearly half (n=8) of the Interviewees ended by praising the film, but also pointing out something they wish had been handled differently, such as their desire for more material on the Maya or more translations of the glyphs from the program. Comments included:
 - *I really enjoyed the animation of the glyphs. I felt like that really demonstrated the differences and similarities of the glyphs. I would have liked to see more of the animation of the glyphs, more detail into the writing, but I usually want to see more with anything I watch. I also didn't catch who uses the Mayan glyphs. Was it the priests or lawmakers of the society? Were the farmers totally illiterate? What was the role that the glyphs played in their society? A brief synopsis of why the Mayan civilization no longer exists, how they lost their dominance as a culture, would be really interesting and influence more people to research the Mayan culture. One thing that bothered me was that one of the historians/scientists said that the reason why one of guys perceived the Mayan were a peaceful culture was because he was in World War I. I felt like that was a fairly presumptuous statement, that that was more of an opinion, unless the guy that was in World War I actually said that. I think there are a lot of reasons why someone could perceive a civilization as being peaceful. I don't think World War I is a direct correlation.*
 - *I thought it would be appropriate to spend more time showing the translations. Maybe being more specific about the translation and maybe showing comparisons between the two phrases and their substitutes (that confused everyone for so long). More examples of the language. For example, choose a common phrase in English and show how it can be phrased a couple of different ways. The mechanics of putting phrases and glyphs together. I didn't realize 2 things about the history: the Russian side and how independent experts made so many wrong conclusions. And how the Englishman, Thompson, seemed to have a death grip on the academics of it and how damaging to progress it is to have a person with a dominant personality that excludes others and how difficult that is to the scientific method.*
 - *The parts that I liked best about the show were when they talked about how it's relevant in modern times, why learning all this information is important to us today. So if I were the producer, but I'm just one person, I would have wanted more time spent on why this is so important to people today, how it's being used today, how it's inspiring the indigenous people today, making people in Mexico think differently about who the Mayans were and why that's relevant.*
 - *It would be interesting if there were in-depth programs made for each of the topics covered in the Nova production. For example, a full documentary on the character codes. Another on the history of the Mayan culture, etc. The Nova production successfully covered a lot of topics in a short time, but couldn't cover any of the topics in-depth.*
 - *I wish there was more emphasis at the schools on these types of subjects. It was a very interesting show, but it was almost like there was too much information on the one DVD. Maybe break it up into 2 shows. I didn't watch the entire show in one sitting. I had to break it up, just because there was too much material and information.*
 - *I would like to see more on their advanced math, their mathematical calculations, how they used math to set up temple, determined the equinox of the moon, the suns rotation, etc. I would also like to see programs on how Aztec culture derived from Mayan culture, how their cultures compared. Also interested in programming about the agriculture of the Mayans. I saw an interesting show about Incan agriculture and was surprised to learn that their food staple was potatoes and not corn. Would like to see comparison between the two cultures.*
 - *I found it very interesting. I think the show gives a lot of information and goes into a lot of detail, and it might not interest as many people as opposed the travel show on Belize, which was a little bit lighter. Even though the travel show wasn't specifically about the Mayan ruins, that show would attract a broader audience. Cracking the Maya Code was more in-depth, and long for one topic. Maybe breaking it up into a two part series.*
 - *My only concern was the voice of the narrator. The visuals and content was wonderful, but there was just something a little "draggy" about the voice of the narrator that made the show kind of drag.*

- Finally, a couple (n=2) of the Interviewees ended by pointing out the parts of the program they found most interesting, focusing on the contributions of various scholars featured in the film, as in:
 - *I was impressed with the one guy who was already helping to crack the code at age 13. There are 13 year olds outside on skateboards and here you have this person who already has such an idea of what he wants and is so brilliant. He had the luck, maybe not luck, because he had his dad who had the connections, but that he had the opportunity is amazing. I know some of these programs sometimes feel futile in producing because there's not that much interest, but even if it only reaches a few people, it may make such a great impact in the future generations on certain things. It's amazing that you guys do that and I am definitely glad to be a part of certain things because I do learn so much.*
 - *I didn't realize 2 things about the history: the Russian side and how independent experts made so many wrong conclusions. And how the Englishman, Thompson, seemed to have a death grip on the academics of it and how damaging to progress it is to have a person with a dominant personality that excludes others and how difficult that is to the scientific method.*

Conclusions

This section reviews the findings from the *Cracking the Maya Code* evaluation as supported by the responses of the adult and teen audience that viewed and gave feedback on the NOVA version of the program when viewed at home. The evaluation examined the appeal, clarity, and educational impact of the program, focusing on the goals identified in the project's grant proposal to the Informal Science Education (ISE) division of the National Science Foundation (NSF), which provided funding for both the *Cracking the Maya Code* project and the independent evaluation. These goals focused on educating Viewers about:

- The basic principles that underlie all writing systems and the importance of writing to culture.
- The fundamentals of the Maya writing system, including the meaning of a small number of Maya glyphs.
- The history and culture of the ancient Maya, as that history and culture is revealed in the Maya texts and inscriptions.
- The process by which scholars tackle and solve problems, and in particular how a dominant paradigm or scholar can encourage or stifle development, and how collaboration between creative people with different expertise and different ways of thinking can lead to breakthroughs that none could have achieved on their own.
- The idea that the picture people construct of another culture like the Maya says as much about their own assumptions and needs as it does about the Maya themselves.

These evaluation questions were addressed through a two-group posttest only randomized study of recruited Viewer participants watching *Cracking the Maya Code* in an at-home setting, as compared to a group of Control participants who didn't watch the program but who completed the same set of demographic/background questions and a "quiz" on the ancient Maya and Maya writing system. The evaluation further explored the longer-term impact of the program within a few weeks of viewing, in this case focusing on the extent to which Viewers made personal connections with the program and discussed, thought about, or engaged in any program-related activities.

The evaluation findings are summarized in 4 parts:

Part 1: How appealing and engaging Viewers found Cracking the Maya Code;

Part 2: How successful Viewers found Cracking the Maya Code in terms of clarity, density of information and science, and communicating information about the ancient Maya and the Maya writing system;

Part 3: What Viewers learned from watching Cracking the Maya Code; and

Part 4: What the longer-term impact was of Cracking the Maya Code on Viewers' thoughts, personal connections, and actions one month after viewing.

Part 1: How appealing and engaging Viewers found *Cracking the Maya Code*

Viewers were asked to rate how much they liked the program, to describe what they liked and didn't like about it, and to rate the program's entertainment value with respect to storytelling, content interest, and visual excitement. The main evaluation findings are summarized below.

- **Viewers rated the program high for overall appeal.** Using 1 to 7 scales, the median ratings in each case indicated that, overall, Viewers liked the program (6.0) and felt they were likely to recommend it to others (6.0). Viewers also generally agreed that the program was visually engaging to them (6.0), had engaging storytelling (6.0), and contained interesting content (6.0). Older Viewers tended to rate the program's overall appeal and their interest in the program's content significantly higher than did younger Viewers.

When Viewers were invited to explain their ratings, all but one was positive about the program's overall appeal, with one Viewer reporting neutrality as the Maya was not a subject of interest. Many described the program as *interesting*, especially the stories of the scholars and the information provided on Mayan hieroglyphs. Viewers were more conflicted about whether they felt the program was visually engaging or visually dull. Some felt that the program was visually engaging throughout, while others felt that the interviews of the scholars were at times visually dull and they would have preferred seeing more things *Mayan*. Viewers were also somewhat conflicted about whether the storytelling was engaging or boring. Some were attracted by the *mystery* approach taken to tell the decipherment story while others felt there were too many interviews or that the narration was somewhat *monotone* or too similar to other documentaries.

- **For a majority of the Viewers (60%) what most stood out about *Cracking the Maya Code* was information they learned about the *process* by which the code was cracked, particularly how it was done, the different scholars involved in its deciphering, and the challenges and misinterpretations that occurred over time.** Smaller groups of Viewers pointed to other aspects of the program. Nearly one-quarter (23%) liked learning about the Mayan history and culture, particularly involving the temples, villages, and ruins discussed, and the cities that were discovered and/or nearly decimated. About one-fifth (21%) liked learning about present day Mayans, especially the opportunity they now have to learn about their history, language, and culture as a result of the deciphering work on the writing system. Several Viewers pointed to information they learned about the hieroglyphs themselves (14%), and in particular the meaning of the glyphs, the complexity of the language, and/or the artistry of the symbols, or they pointed to David Stuart's story (7%).

Beyond the program's learning value, Viewers also frequently enjoyed some aspect of how the program was presented or related to their lives. Nearly one-third (30%) were drawn to the program's style of presentation, and in particular the use of a *mystery* approach to convey how the Maya code was cracked, the use of visuals and timelines, the narrator, and/or the pace with which the progression of events unfolded. Several others (14%) meanwhile liked how the program related to their lives or inspired them to do something new, such as traveling to the Yucatan peninsula or use the Mayan numbering system to teach math to youth.

- When asked to describe what they liked least about the program, not quite one-half of the Viewers (45%) wished the program featured more information about the Maya, particularly information on: modern Maya culture, the ancient Maya, the decoding of the Maya code, and/or the Maya language and writing system. Smaller groups of Viewers pointed to other aspects of the program and one-fifth (21%) indicated liking all aspects of the program. Meanwhile, not quite one-fifth (21%) felt that the program was at times slow and boring. Smaller groups of Viewers indicated there were too many scientists' interviews (8%) or that the program was too short (4%). A few participants cited other reasons (7%) as to what they least liked.

Part 2: How successful Viewers found *Cracking the Maya Code* in terms of: clarity, density of information and science, and communicating information about the Maya and Maya writing system

Viewers were asked to rate the program in terms of clarity of presentation, density of information, science, and science explanations and the extent to which the program met a series of communication goals developed by the production team about the ancient Maya and Maya writing systems. The main evaluation findings are summarized below.

- Viewers found the program offered them a generally clear presentation. On a scale of 1 (confusing) to 7 (clear), the median rating was 6.0. When asked to explain their ratings, some observed that the program was easy to comprehend while several others noted specific points of confusion or difficulty following dates and names generally throughout the program. Some indicated that the program provided too much data in a short period of time and that the format of the program was confusing.
- Viewers felt that the amount of information presented in the program was about right. On a scale of 1 (too little) to 7 (too much), with 4 being just right, the median rating was 4.0, indicating that Viewers generally felt the program struck the right balance in terms of amount of information (4.0), science (4.0), and scientific principles (4.0). Viewers *not* working in an occupation involving science, history, or education fields tended to rate the amount of information in the program significantly higher than did those working in these fields.

When Viewers were invited to explain their ratings, the majority said they would have welcomed more information on: specific topics such as: the Mayan calendar, the current state of the Mayan people and culture, the scientific method used to decipher the writing system, and the hieroglyphs themselves. Several Viewers, however, elaborated that they felt that the amount of information and science provided was just right, well presented, and gave good explanations and visuals. A few of the participants felt that there was too much information presented in a short amount of time or that they didn't really see or appreciate the science or scientific principles addressed.

- Viewers generally felt the program was successful in accomplishing the communication goals the producers set out to address. Using a scale of 1 (not at all successful) to 7 (extremely successful), Viewers indicated that the program was successful in communicating all of the intended educational themes, including: the kinds of factors that hindered the decipherment of the Maya writing system (6.0), the methods scholars used to decipher the Maya writing system (6.0), the way people's

cultural assumptions and background have affected their view of the Maya (6.0), the basic principles that underlie all writing systems (6.0), the fundamentals of the Maya writing system (6.0), and what the hieroglyphs revealed about the history and culture of the ancient Maya (6.0). The one theme that received a lower median rating was the process of scientific problem solving (5.0).

When invited to explain their ratings, Viewers most often commented on these last two themes, observing that the program didn't address the role of cultural assumptions or scientific problem solving as much as they would have liked. Several Viewers' also observed that the program was too short to be completely successful in communicating these themes and that more time and programming might be necessary to achieve this.

Part 3: What Viewers learned from *Cracking the Maya Code*

The program's learning value was evaluated with a combination of self-report, open-ended, and forced-choice objective content-based assessments. To assess knowledge gains relating to the information presented about the ancient Maya and Maya writing system, both Viewer and Control group participants completed a 28-point "quiz" type assessment that included a combination of multiple choice, true-false, and open ended questions. Additionally, Viewers were asked to rate the program for how much they estimated they learned from viewing and to describe the most interesting things they felt they learned. The main evaluation findings are summarized below.

- **Viewers estimated they learned a considerable amount from the program.** When asked to estimate how much they learned from *Cracking the Maya Code* on a scale of 1 (learned nothing) to 7 (learned a lot), Viewers typically reported learning a considerable amount (median rating, 6.0).
- **When asked to describe the most interesting things learned from *Cracking the Maya Code*, all of the Viewers identified one or more new things of interest.** Most often Viewers (59%) said they enjoyed learning about the *process* of cracking the Maya code, and in particular: the extensive length of time involved, the number and diversity of scholars involved, the hurdles and dead-ends encountered, the collaborative effort that ensued more recently, and/or the stories of David Stuart and Tatiana Proskouriakoff. About half the Viewers (52%) expressed interest in information they learned about the Mayan hieroglyphs and writing system, particularly relating to: the complexity and creativity of the glyphs, the ability of the epigraphers to substitute signs for the same word, the graphic elements of the system and/or the workings of number/mathematical system. About half (49%) pointed to information learned about the Mayan history and culture, particularly related to the advanced society of the Maya and the horror of their decimation and loss of history. Finally, about one-fifth (18%) discussed information learned about the modern day Maya people, with these Viewers most often intrigued to learn that people now have the ability to learn about their history, culture and language.
- **The majority of Viewers (79%) indicated that *Cracking the Maya Code* caused them to think or feel about the ancient Maya in a new or different way.** When asked to elaborate, these Viewers indicated that they had a better understanding of: the Maya civilization, history and culture (31%); how advanced the Maya were (25%); the Maya language and hieroglyphs (17%); the near decimation of Maya history and culture (14%); the scholars and their contributions to cracking the code (4%); and/or other reasons that caused Viewers to think or feel differently (6%).

- Viewers generally agreed that the program increased their interest in learning more about the main topics addressed in *Cracking the Maya Code*. As indicated by the median ratings on a 1 to 7 scale, Viewers felt that as a result of viewing the program they were more interested in learning more about: the history and culture of the ancient Maya (6.0); the Maya writing system (6.0); and the methods scholars used to decipher the Maya writing system (6.0). The median rating for the process of scientific problem solving was somewhat lower (5.0), although still indicated as an area of interest for Viewers.

- Viewers significantly out-performed Control group participants on a “quiz” consisting of true/false, check-list, and short answer questions designed to estimate the impact of the program. Out of a possible score of 28, the Viewer group averaged 22 correct responses, while the Control group averaged 9 correct responses. The effect size in this case was 3.1, generally considered a very large effect. Viewers also outperformed Control participants on each of the 3 question sets that made up the assessment covering the main topics presented in the program, including: Mayan culture and history; The process of deciphering the Maya writing system; and The workings of the Maya writing system. The results from each assessment are summarized below.
 - For Mayan culture and history: Out of a possible score of 8, Viewers averaged 6 correct responses, while the Control participants averaged 3. The effect size in this case was 2.1, generally considered a very large effect. Looking across the percentage of Viewer vs. Control participants that correctly answered the questions, the results show that the differences between the two groups were consistently high for 6 of the 8 questions, with the exception of one True/False question *The Maya began building their cities around 500 BC* to which a slightly higher percentage of Control participants answered this correctly than did Viewer participants (46% vs. 41%). Also, in response to a question about which areas the Maya region is located in, while a much higher percentage of Viewers correctly answered “Central America” (90% vs. 65%), the same percentage of participants in each group correctly answered “Mexico” as well (68% each group).

 - The process of deciphering the Maya writing system: Out of a possible score of 11, Viewers averaged 9 correct responses, while the Control participants averaged 3. The effect size in this case was 2.5 generally considered a very large effect. Looking across the percentage of Viewer vs. Control participants that correctly answered the questions the results show that differences between the two groups were consistently high for 5 of the 7 questions. For two multiple choice questions featuring multiple correct answers, however, the findings were more mixed. Although for the most part, a higher percentage of Viewers in each case picked correct answers than did Control participants, and the percentage point differences were substantial, there were two exceptions, as follows: 1) Where 54% of the Control group recognized that mathematicians were involved in deciphering the Maya writing system, only 21% of Viewers recognized this to be the case; 2) Where 24% of the Control group recognized that paper-mache casts are a method or tool that has been used to help decipher the Maya writing system, only 9% of Viewers recognized this to be the case.

To qualitatively examine the program’s influence on Viewers’ knowledge of the decipherment of the Maya writing system, both Viewer and Control participants were asked to describe in their own words: *What is it about the Maya writing system that has made it difficult to decipher?* The top five factors raised by the Viewing group were not mentioned by the Control group, including: the use of

substitution or the fact that different symbols can represent the same sound (64%); the writing system being a mixed system, or one that combines word and phonetic signs (34%); the large quantity of different symbols in the system (21%); the overlapping/merging/ combining of symbols; (17%) and the creative license that writers had – resulting in a playfulness/artistry in the system (17%). Two additional factors were mentioned to varying degrees in each group as follows: The destruction of the Maya books and suppression of language (Viewer 10%, Control 7%) and the intricate graphic/visual/pictorial nature of the writing system (Viewer 6%, Control 25%). One answer mentioned by nearly one-fifth of the Control group (19%) that was not addressed by the Viewer group was the lack of a codex to help in the decipherment, as in a “Rosetta Stone” or “key.” Finally, a fairly high percentage of the Control group provided “other” (19%) or don’t know (31%) answers to the question where only 1% of the Viewer group provided a response categorized as “other” and none responded don’t know.

Viewer and Control participants were also asked to describe in their own words: *Beyond the writing system itself, what other factors hindered or delayed the writing system from being deciphered?* Three factors raised by the Viewing group but were not mentioned by the Control group, included: early misinterpretations or inaccurate assumptions about the writing system (54%); the contributions from the Russian linguist which were largely discredited due to Cold war politics (38%); and lone scholars working without the mutual collaboration of other scholars (15%). Three additional factors were mentioned to varying degrees in each group as follows: The destruction of the Maya culture, (Viewer 58%, Control 9%); the inadequate methods to aid in decipherment of the hieroglyphs (Viewer 24%, Control 2%); and the poor accessibility to the Maya ruins due to jungle overgrowth and remote locales (Viewer 14%, Control 16%). A small percentage of both Viewer and Control groups provided “other” answers to the question (Viewer 8%, Control 2%). One answer that was mentioned by one-fourth of the Control group (25%) but was neither addressed in the NOVA program nor mentioned in the Viewer group was the deterioration or loss of all written Maya examples. A small percentage of the Control group also mentioned there being no method of translating the writing system (9%) and that politics or government interference hindered the deciphering (5%). Finally, a fairly high percentage of Control participants provided “don’t know” (32%) answers to the question where none of the Viewer participants provided the response “don’t know.”

- The workings of the Maya writing system: Out of a possible score of 9, the Viewer group averaged 7 correct responses, while the Control group averaged 2. The effect size in this case was 2.5, generally considered a very large effect. Looking across the percentage of Viewer vs. Control participants that correctly answered the questions, the results show that differences between the two groups were consistently high for 7 of the 8 questions (ranging up to 76%). For one multiple-choice question featuring multiple correct answers, however, the percentage of participants in each group selecting the correct answer was even (34% vs. 32%). In this case the question asked participants to select from several response options as to which figures researchers now know appear in the art of Maya temples and the answer was all of the above.

Viewer and Control participants were also asked to describe what the Maya hieroglyphs revealed about the culture and history of the ancient Maya and to list as many things as they could think of. Almost all the factors raised by the Viewer group were also mentioned by the Control group but generally to a much lesser degree, including: the Maya were a conflicted and sometimes violent society plagued by war, bloodshed and human sacrifice (Viewer 73%, Control 7%); the Maya were

ruled by a monarchy (Viewer 68%, Control 7%); the Maya were focused on recording time, historical events and the creation of world (Viewer 42%, Control 7%); the Maya pursued and studied astronomy/calculated lunar and solar eclipses (Viewer 28%, Control 16%); the Maya were a very advanced society (Viewer 23%, Control 30%); the Maya used astrology as a way of making contact with the spirit world, or of channeling spirits (Viewer 21%, Control 7%); and the Maya were a religious and spiritual society (Viewer 10%, Control 25%). One answer that was mentioned by one-fifth of the Viewer group (20%) but not in the Control group was the artistic and creative nature of the Maya. A fairly high percentage of Control group provided “don’t know” (30%) answers to the question compared to 0% in the Viewer group.

Part 4: The impact of *Cracking the Maya Code* on Viewers’ thoughts, personal connections, and actions one month after viewing

Follow-up telephone interviews were conducted with a subset of adult Viewers to explore the longer term impact of the program and whether and how Viewers thought about or took any actions related to their viewing of the program. The interviews were conducted approximately 3-4 weeks after participants watched the program and completed the post-viewing questionnaire. The interview requests were sent to a group of 22 randomly selected participants via electronic mail. Those interested, available, and willing to be contacted responded via email. Among the 22 confirmations received, 20 included contact information and belonged to individuals who could be reached within the 3-4 week evaluation period. Among this group, all were able to participate in the interviews during the evaluation window, resulting in a 91% response rate. Twelve (12) Interviewees were women and eight (8) were men.

The main evaluation findings are summarized below.

- **All but one Interviewee (n=19) said they had discussed the program subsequent to their viewing.** The one Interviewee who did not discuss the program indicated he was not certain whether discussion of the program following completion of the post-viewing questionnaire was part of the evaluation process so refrained from discussing it with others. Among those who did discuss the program, nearly half said they found the program very *interesting* and/or recommended the educational content to significant others, family members, friends, children, or colleagues. About half (n=8) also recalled discussions about the *difficulties* scholars had in deciphering the Maya code and the many researchers that were involved in the process. A few Interviewees held discussions of a more personal nature, particularly relating to their past travel experiences or desires to someday travel to Central America, while a couple had more analytical discussions about linguistics or the role of language more generally.
- **All but three Interviewees (n=17) recalled at least one connection that occurred for them to the program through television or program experiences, print media, or radio.** Specific connections that occurred across each media type were as follows:
 - Almost half of the Interviewees said that they had seen something on television or in a movie that reminded them of *Cracking the Maya Code*. A few were reminded of the program from watching previews of the movie 2012 that began to air after the evaluation period or from watching documentaries on the advent of 2012. A couple of Interviewees focused on Avatar, as the program’s indigenous people reminded them of the Mayan people and the two cultures’ similarities. The remaining Interviewees pointed to connections they made while watching

specific parts of movies they viewed on DVD, The History Channel, the Create Channel, or on a travel show.

- Several of the Interviewees reported reading something that reminded them of the program. Some read material that focused on the coming year, 2012, while others were reminded of the show from searching through textbooks on Native American and Mexican history as well as Early American history. Another cited reading a science article on the internet as a reminder of the program.
 - Only a couple of Interviewees said they were reminded of *Cracking the Maya Code* while listening to the radio, while several Interviewees qualified that they rarely or never listen to radio. Those who were reminded through radio pointed to Spanish music and a radio talk show featuring alternative medicine.
- ➔ About half the Interviewees (n=9) reported that they had done something new or differently as a result of seeing *Cracking the Maya Code*. Several sought out additional information about topics in the program either at the History Channel, National Geographic Channel, or the Internet. A few others went on to discuss *Cracking the Maya Code* with their students. One Interviewee spoke of the program causing her to look at life in a different way, in particular giving her a greater appreciation of humans' strengths and limitations.
- ➔ Three-quarters (n=15) of the Interviewees indicated that *Cracking the Maya Code* had affected something they had thought about in the weeks since they saw the program. Several Interviewees reported thinking more about the Maya language, cryptology, and the origin of language. A few thought about previous travels to Central America and longed to travel there again in the near future. One was reminded of a basketball like game the Mayan's played, and said she thinks about the logistics of the game whenever she watches sports. A few others had thoughts of a more personal nature, including a couple of Interviewees who thought of school or art projects they would like to accomplish in the future, while one spoke of the unlimited capabilities of the human brain, and another pondered the meaning of the Mayan calendar ending in 2012.
- ➔ The majority of Interviewees did not visit the *Cracking the Maya Code* website. Most were unaware of the site. Among the 16 Interviewees who did not visit the website, 12 stated that they did not know there was a *Cracking the Maya Code* website. The remaining 4 Interviewees stated that while they did know about the website, they either forgot about it, didn't have questions to pursue, or still planned to look at it. Among those who visited, one Interviewee read, listened to the spoken language and viewed maps and timelines, while two others browsed the website, and one looked to see if any of the information could be incorporated into his curriculum. One Interviewee enjoyed the audio of the spoken language the most, as follows: *I liked listening to the spoken language*. None of the Interviewees found anything to dislike on the website.
- ➔ Almost all of the Interviewees (n=19) ended the interviews with additional comments, and especially praise for the program. Half of the Interviewees took the opportunity to add additional praise for the program, focusing on its personal relevance, entertainment value, and educational value. Several also pointed out something they wish had been handled differently, particularly relating

to their desire for more material on the Maya or more translations of the glyphs featured in the program.

Final remarks

The above findings show that *Cracking the Maya Code* appealed to the Viewers recruited for the evaluation and had a significant impact on their knowledge of the ancient Maya and Mayan writing system. Overall, Viewers liked the program, thought the story was interesting, felt the program was visually exciting and clear, judged that the program struck the right balance in terms of the amount of information and science provided, and they expected to recommend it to others. While Viewers were somewhat divided about their use or even awareness of the program website, the follow-up telephone interviews revealed that all those interviewed ultimately made some connection to the program, thought about it further, or pursued a follow-up activity within a few weeks of viewing.

It is notable that relatively few subgroup differences were found across the evaluation findings. Only three differences were found, all related to program ratings as opposed to educational impact. In the first two cases, older Viewers rated the program's overall appeal and their interest in the program's content significantly higher than did younger Viewers. In the third case, Viewers not working in an occupation involving science, history, or education fields rated the amount of information in the program significantly higher than did those working in these fields. Apart from these three findings, the overall lack of subgroup differences indicate that the program was well received by and successful with both males and females and with individuals of varying ages, levels of education, and occupation.

Finally, in reviewing this evaluation report the production team offered a written commentary, copied below, in response to the recurrent evaluation finding that Viewers were at times left wanting to know more. On the one hand, Viewers learned a considerable amount from the program as evidenced by their quiz results. Viewers' responses to the open-ended question about the most interesting things they learned from the program also reflected highly detailed and often impassioned responses about the program's *interesting* and *fascinating* content. Most Viewers also felt that the program further caused them to think or feel differently about the ancient Maya, as they now had a better understanding of the Maya civilization, history, culture, language and hieroglyphs. The salience of the program's personal learning value even emerged as a key part of the program's overall appeal, as the top 5 aspects Viewers pointed to when describing what they most liked about the program involved *new information* they learned. This impact was shown to continue nearly a month later, as Interviewees readily discussed the connections they were still making with the program's content 3-4 weeks after viewing.

At the same time, Viewers were also quick to suggest that they wanted to see some topics covered in *even* greater depth. For example, the main issue Viewers had with the program when asked to describe what they least liked was they wanted it to feature even more information about the Maya, in particular relating to: the Mayan calendar, the meaning of the hieroglyphs, the current state of the Mayan people and culture, and the ways in which the scientific method informed the deciphering of the writing system. In addition, the program's science angle was lost on some Viewers.

To provide another perspective on these findings, the project team writes below on some of the factors they faced in reducing the original 2-hour program to the 50 minute version broadcast on NOVA. The team observed:

Several of the reservations expressed by Viewers arise out the abridgment of the program from two hours to 50 minutes by NOVA to fit their PBS program length requirements. For example, NOVA replaced the narration recorded for the full-length version by award-winning Guyanan actress CHH Pounder with a more generic male narration voice, to which numerous Viewers reacted negatively.

*More importantly, the abridgement required the elimination of critical steps in the decipherment that made the scientific process clear to the viewer. The most important of these was the “key” to the Maya glyphs created in the 16th century by Bishop Diego de Landa and Maya informant Gaspar Chi. This “key”, while compromised by Landa’s misperception of the writing system, was central to the step-by-step problem solving by Knorosov, David Stuart and others illustrated in *Breaking the Maya Code*. Leaving it out of the story is a bit like telling the story of the Egyptian decipherment without mentioning the Rosetta Stone. It is therefore not surprising that some Viewers commented on “leaps of logic” and found the scientific process rushed or confusing.*

We must stress that NOVA did a remarkable job with an almost insoluble problem: condensing a complex 400-year story from 2 hours to 50 minutes. Our difficulty was with PBS scheduling requirements, which at the time leaned almost entirely toward a standardized 50-minute format. (Based on some more recent scheduling decisions, this may be changing). The producers spent years trying to persuade PBS to air a series or two-hour version of the program; at one point National Geographic was eager to air the program as a two-hour National Geographic Special, but PBS insisted that the program be reduced to a standard 50-minute length.

*It has been our experience from numerous live screenings of *Breaking the Maya Code* that audiences age 6 to 80 will eagerly watch a complex 2-hour program that presents a subject in depth and demands a great deal of them as Viewers. We hope that future PBS scheduling policies will allow Viewers more access to such experiences.*

In responding to summative evaluation reports, we’ve found producers seldom provide this kind of formal commentary or reflections on the project history or context that shaped earlier production and subsequent broadcast decisions. In the case of *Cracking the Maya Code*, the producers expressed up-front concerns about the evaluation focusing on the abridged version of the program for the reasons outlined in their commentary. The evaluation and project teams discussed the pros and cons of focusing on the full length vs. abridged version of the program but ultimately focused on the abridged version, given that this version reached the largest audience.

The type of commentary provided by the *Cracking the Maya Code* project team can play a valuable role in helping readers further interpret evaluation findings. The project team hopes that other producers of ISE programs can draw on this experience as they develop their own programs and, in the process, navigate the diverse constraints that can arise related to documentary program formats, learning goals, and scheduling policies.