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# Total solar eclipse coverage in Africa: boundary maintenance and the control of 'image' within the African-American scientific community

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Arletha Williams-Livingston

## Abstract

Two total solar eclipses in Africa are the setting for this study of the representations of black scientists in the international media, focusing on newspaper articles, Internet sites and television broadcasts. Careful consideration of the eclipse coverage in 2001 and 2002 led to the decision by these scientists to assume control of their own images during the 2006 eclipse, with some success. The simulcast of the 2006 eclipse was initially a collaboration between National Society of Black Physicist (NSBP) members and their host institutions, the Edward Bouchet Abdus Salam Institute (EBASI), the University of Cape Coast in Ghana and Cable News Network (CNN). During the final weeks before the eclipse event, this collaboration fractured into two independently funded efforts with differing agendas. The second group broadcast images of the Sun exclusively, which was meant to represent 'pure' science, while the first group presented a broader picture of astronomy that included interviews with African and African-American astronomers, interviews with University of Cape Coast students, and Ghanaian cultural astronomers. This latter cohort focused on local Ghanaian fishermen and their use of celestial objects for navigation, horology and weather predictions. That the larger group fractured in two is reflective of the debates of who defines science, who has the authority to speak about science, and who controls the images of science and scientists. This example is unique because it occurred within the ethnic space of African-American astronomers and physicists; it physically takes place in Africa and it captures the physical impact of cross-discipline encounters in this case.

**Keywords:** Africa, African American, mass media, scientist, stereotypes, total solar eclipses

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## Introduction



Figure 1: 2001 total solar eclipse sequence (Esenpak 2001)

Astronomy is defined as ‘the scientific study of matter in outer space, especially the positions, dimensions, distribution, motion, composition, energy, and evolution of celestial bodies and phenomena,’ and as ‘a system of knowledge or beliefs about celestial phenomena’ (*American heritage dictionary* 2004). Although many scientists and non-scientists alike may have the impression that the practice of science in general, and astronomy in particular, is a highly objective affair, the reality is that only certain, subjective voices are commonly accepted as authoritative within the scientific community and by the media (Harding 1991 and 1998; Hetherington 1988). In this article the authors aim to analyse how *who* conducts such ‘scientific studies’ is portrayed in the media, as well as *whose* ‘system of knowledge or beliefs’ dominates the media.

Here, the United States (US) and British media’s coverage of the 2001 total eclipse of the sun is used as a case study for analysis. In both these societies, white males are traditionally viewed as the arbiters of science. The natural phenomenon in this case – the solar eclipse of 2001 – was observable only from southern African countries. The next section briefly outlines the conditions necessary to observe a total eclipse of the sun, and highlights the National Aeronautics and Space Administration’s (NASA) efforts to publicise the event. The section thereafter provides an analysis of the coverage of the 2001 eclipse by NASA and the Exploratorium, CNN news, the British Broadcasting Corporation (BBC) and three websites. Next, the article focuses on how the National Society of Black Physicists (NSBP) and Morehouse College, in conjunction with African scientists, reported on the 2006 total solar eclipse which, as with the 2001 eclipse, was observable from Africa. Next the difference between the NSBP’s coverage of the eclipse and that of the 2001 eclipse is described, and the authors discuss the debate on ‘pure’ and ‘impure’ science and the boundaries related to coverage of the eclipse. The article concludes with suggestions for improved scientific reporting in which Africans, people of African descent and other non-whites are acknowledged as scientists.

## The 2001 total solar eclipse

A total solar eclipse occurs when the Moon passes between the Sun and the Earth and completely covers the disk of the Sun. The path of totality is the shadow cast by the Moon on the surface of the Earth, which is limited to certain locations on the surface of the Earth (Figure 2). The length of time that totality lasts varies from eclipse to eclipse and along the path of totality, but averages about four minutes.

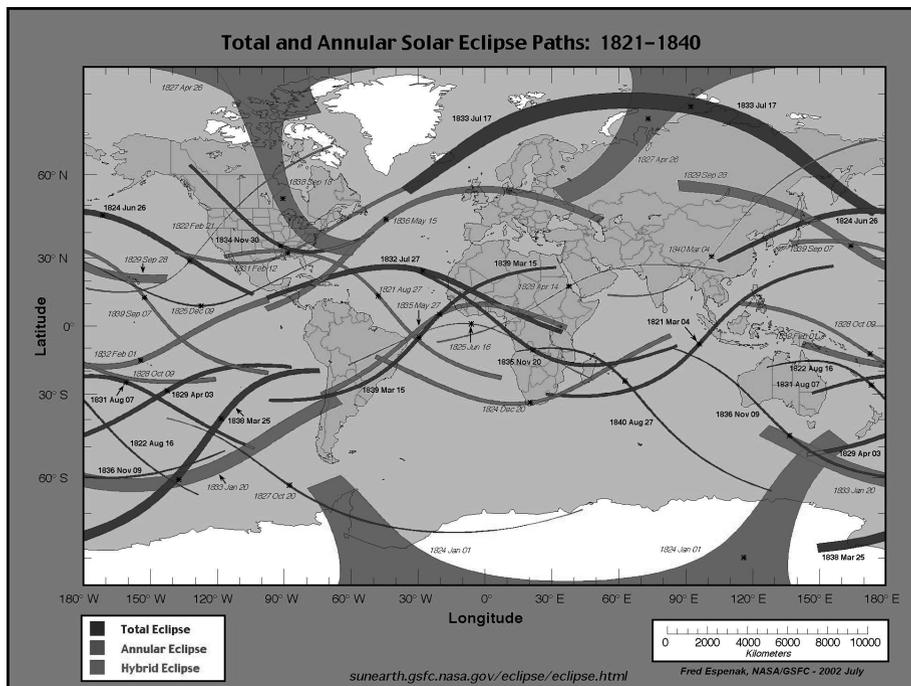


Figure 2: World map of eclipses from 1821–1840 (Esenpak 2002)

On 21 June 2001, the first total solar eclipse of the millennium, and the only one of that year, was visible from the African countries of Angola, Zambia, Zimbabwe, Mozambique and Madagascar. This eclipse was unique in that it occurred on the June solstice, the shortest day of the year in the southern hemisphere, and it was the first total solar eclipse of the new millennium.

The Sun–Earth Connection Education Form (SECEF), one of four national centres of space science education funded by NASA’s Office of Space Science, has an active Education and Public Outreach (EPO) office that includes educating people about NASA missions, celestial bodies and our solar system. They produce educational

posters, video programmes and activities for school children. Though the 2001 total solar eclipse was only visible in Africa, the NASA SECEF planned outreach and educational activities for children in the US, in collaboration with museums and planetaria.

The first NASA planning meeting for the 2001 total solar eclipse occurred in Texas in 2000. To include minority scientists' participation in their activities, NASA invited African-American astronomer, Dr. Charles McGruder, who was then NSBP president and head of the Department of Physics and Astronomy at Western Kentucky University, to attend that initial meeting. During the meeting, the participants decided to place NSBP members in minority and other communities throughout the US to act as local experts during a simulcast from Africa of the eclipse. Other scientists who were approached participated as well, with over 70 scientists taking part in the US-based eclipse activities. Of these, 24 were African American and most of these were NSBP members. NASA funded the travel expenses of about half of these scientists.

The NASA plan sought to capitalise on the total solar eclipse to educate the public about physics and astronomy, to introduce children to professional scientists, and to inspire and encourage children to pursue careers in the sciences and engineering. The NSBP viewed the eclipse as an opportunity to expose more people – particularly the youth – to minority scientists, as part of a broader effort to increase the presence of minorities and women in the science, technology, engineering and mathematical fields. As stated by Dr. McGruder after the event on the Sun–Earth Connection Forum 2001: 'Our members provided information on the eclipse event and generated excitement, wonder, and appreciation for science to underrepresented minorities.'

In Zambia and Zimbabwe the eclipse occurred shortly after one p.m. Universal Time (six a.m. Pacific Coast Time). In total, NASA sponsored live eclipse viewing events, which were largely dominated by gatherings of Girl Scout troops, in over 160 locations throughout the US. The troops and school groups slept in museums, planetaria and community centres, so that they could be present for the eclipse simulcast. The scientists who were present at the museums and planetaria presented the physics of the eclipse, ran demonstrations and answered questions.

## **Analysis of 2001 simulcast, websites and dispatches**

### **The NASA/Exploratorium simulcast**

The Society for Visual Anthropology (2001) states that

film and video, photography, and digital multimedia play increasing roles in research; they are crucial as teaching tools in the discipline's course offerings; and they are often used in applied contexts. Visual representations offer viewers a means to experience and understand ethnographic complexity, richness and depth, which are the distinguishing features of anthropological knowledge.

Using the tools of social science research, visual ethnography and analytic induction, the authors did an analysis of the pictures and video footage dedicated to the 2001 total solar eclipse found on the Internet. For the websites and eclipse simulcast, the number of images that included Africans and African scientists were counted. In particular, the focus was on the discrepancies between how Africans were portrayed, compared to Europeans and Euro-Americans.

NASA planned to simulcast (i.e., broadcast in real time) images of the eclipse via satellite to audiences in the US. The simulcast was scheduled to appear on the NASA TV channel. Led by Fred Espenak, the team of NASA scientists – including a group from the Goddard Space Flight Centre – travelled to Chisamba, north of Lusaka in Zambia, for the eclipse. NASA also supported a second team hosted by Zane Vella and Paul Doherty from the Exploratorium in San Francisco. They broadcast from a game park – as Zane Vella states, ‘in the bush!’ – on the banks of the Zambezi River, near Sausage Tree Camp, Zambia. Both NASA teams carried telescopes, cameras, portable power sources, laptop computers and equipment to broadcast the images to their satellite and to the US.

At the last minute, a decision was taken by NASA TV not to simulcast the eclipse. The Exploratorium simulcast, which was via the Internet, did occur on schedule, however. The groups of school children and scientists in the US simply switched from NASA TV to the Exploratorium simulcast on the Internet. The BBC also simulcast images from its team located in Chisamba, Zambia.

The Exploratorium has archived video footage of the total solar eclipses of 1998 in Aruba and 1999 in Turkey available on its website. From viewing these previous eclipses, the standard content of the Exploratorium eclipse simulcast videos that emerged from an analysis of the two events included (in no particular order), 1) the introduction of the hosts; 2) an introduction to the local setting; 3) a scientific explanation of the physics of eclipses, sometimes including animation or the solar eclipse dance exercise; 4) scientific explanations of other effects of the eclipse, such as shadow bands and a decrease in temperature; 5) warnings about eye damage; 6) videos of the Sun; 7) responses to the eclipse from the crowd; and 8) responses to the eclipse from the hosts and scientists present. Other footage that may/may not be included is of comments from people at other eclipse viewing locations. The simulcast programmes run for about one hour, with the Sun in totality as the climax, occurring roughly a half to three-quarters of the way into the broadcast. Sometimes footage of the audiences gathered at the San Francisco Exploratorium to view the eclipse is included in the simulcast.

The 2001 Exploratorium simulcast was hosted by Zane Vella and Paul Doherty, neither of whom is African or African American. Doherty and Vella hosted the total solar eclipse simulcasts from Turkey in 1999, and Doherty was one of the hosts for the Aruba 1998 eclipse; thus, both have prior eclipse hosting experience. Two videos

for the 2001 eclipse are posted on the Exploratorium's website. One is an hour long and the other about seven minutes.

The shorter movie is video footage of the Sun during totality.<sup>1</sup> The voices of Vella and Doherty dominate, as they talk about the solar corona, the stars, the planet Jupiter, the phases of the eclipse, and make general comments on the beauty of the eclipse. The voice-over includes two Africans who are part of the crowd of observers, neither of whom is named or pictured. Both talk about the change in temperature, the darkness they experience and how the animals are preparing to rest as if night were approaching. Other audible African voices do not speak English, while another talks about what the baboons are doing. The footage after the eclipse shows the crowd of observers with the five non-Africans in the front and the Africans behind them. The non-Africans appear to all be part of the Exploratorium group of about ten people. Included is footage of the river, as well as the camp.

The longer video begins with a map of Africa and African children singing. The hosts introduce themselves, describe their equipment, and briefly acknowledge the Africans who are standing behind their equipment as their 'friends from Sausage Tree Camp'. The video is a finished product which includes pictures of the eclipse as it progresses, interspersed with animations showing various properties and stages of the eclipse, as well as interviews. The people interviewed on camera are all Euro-Americans, except for the final interview, which is with Sean Pinkington, a Sausage Tree Camp staff member who sounds Australian, but whose image is not shown. Jason Mott, an Australian, privately owns Sausage Tree Camp on the Zambezi River. The video closes with the hosts thanking all their staff and the people back home in the US who made the event possible. For these people, most first and last names are provided, though a few are only referred to by their first names, such as Judy, who helped them choose the simulcast locations. NSBP as an organisation is also thanked.

In the opening comments made by the hosts, Vella says: 'And we have set up camp here in what's called "the bush", and they are not kidding – dense, dense undergrowth, very thick tree cover.' The use of the term 'bush' encapsulates how exotic they find their location. Throughout most of the video, Africans appear in the background behind the equipment, occasionally moving into shot. In this, there is a boundary between Africans and everyone else. The equipment is run by a Euro-American crew led by Noel Wanner, the cinematographer. After the hosts acknowledge these Africans at the beginning, several unnamed African voices express their thoughts during the eclipse. Two African men, Sebastian and Simon, are enlisted as volunteers to do the eclipse dance – a kinaesthetic astronomy exercise demonstrating the motions of the Earth, Moon and Sun that create the alignment needed for an eclipse. It is likely that Sebastian and Simon were recruited and taught the demonstration well before filming began. This demonstration is the only time during the simulcast when Africans appear with the hosts rather than behind the equipment; it is the only time they cross the boundary.

After totality, as the simulcast winds down, the hosts open the floor for questions and answers. Three African men ask questions about the eclipse, including the only other African who is named: Rafael, the night guard and scout for the eclipse team. Two of the three men asking questions are shown, including Rafael, whose question is: ‘Why are so many eclipses occurring in Africa?’ His question refers to the fact that during the next year (2002) and in 2006, total solar eclipses were scheduled to occur in Africa, which the hosts mentioned just prior to his question. During the closing section, an African man steps forward to thank the team for educating the assembled crowd. He may have been one of the earlier voices, but he remains unnamed. He claims to be speaking for traditional Africans when he says that they thought the scientists were teaching them lies, but that he believed them now. He goes on about how the calculations for the time of the eclipse were accurate down to the second, and that it was very impressive. In response, the hosts thank him for themselves and on behalf of all the scientists and teachers around the world, and they go on to thank Fred Espenak for his calculations. In summary, of the eight Africans whose voices or images are foregrounded in the video, only three are named. No last names are given, none are shown conducting experiments, and none are identified as scientists.

In brief, the Exploratorium videos do show images of Africans who are active participants when they help with a demonstration, ask questions and make comments. However, they are not shown as being scientists, practising science, or even as knowledgeable about science. They are presented as interested bystanders, rather than producers of science, making it appear as if there were no co-ownership of the event coverage or its preparation on the part of Africans. Thus, there is a knowledge boundary between the Africans and the others who appear in the eclipse broadcast. It is as if science were brought to Africa only because of the eclipse, and if some local Africans were educated during the coverage, then that was a ‘nice’ international gesture. In fact, the Exploratorium team visited Tujatane Primary School near their camp to teach the children about the eclipse. However, as far as the viewer can tell, neither the teachers nor local scientists appear in the eclipse simulcast as either commentators or as part of the African crowd.

Table 1: Number of images on the 2001 eclipse Internet site for the Exploratorium

<b>Subject</b>	<b>Number of images</b>
African scientists	0
Africans	17
Eclipse	9
Landscapes	22
Non-Africans	3
Animals	26

Analysing the Exploratorium 2001 eclipse Internet site beyond the two videos, the index page provides a video image of an interview with Dr. Charles McGruder, who is the only African-American scientist presented on the eclipse pages and whose full name is used. The Exploratorium team's visit to Tujatane School provided many images of African school children, but no images or recognition of their teachers are found in the many web pages. Table 1 presents the photographic images by number and subject. Besides one image and a video of the African-American astronomer, Charles McGruder, there are no images of African scientists, and any Africans pictured, if named, are identified only by their first names, with no occupational information.

Table 1 shows that unlike in the Exploratorium simulcast, the eclipse is not the highlight of the associated web pages – this time it is animals and landscapes. The Exploratorium team chose to simulcast from a game park in Zambia, and the pictures are of the animals they encountered. There are few limits to observing the Sun during a total solar eclipse, other than being within the path of totality. Thus, observations can be made from any location where the Sun can be seen, including a city centre. Simulcasting from a game park probably had the practical benefit of reducing background noises, having a smaller crowd, and perhaps a clear horizon. Personal benefits include experiencing the natural beauty and fauna of an African game park. The Exploratorium website emphasises Africa as a place of natural beauty and wild animals, not one of science.

Table 2: African and African-American scientists interviewed on each eclipse website and notation of the inclusion of negative portrayals of Africans that contribute to the myth of Africa being devoid of science

Source	African	African American	Negative image
Exploratorium	0	1	Yes <sup>1</sup>
CNN	0	1	Yes <sup>2</sup>
BBC	0	0	Yes <sup>3</sup>
Sky & Telescope	0	0	Yes <sup>4</sup>
Muncie Public School	0	1	No

<sup>1</sup>No African experts, Africans kept in background and are ignorant of science, focus on fauna

<sup>2</sup>No African experts, African faith healer quoted

<sup>3</sup>No African experts, Africans shown as background

<sup>4</sup>No African experts, recollection of African tradition

The image of Africa as a place without science and scientists is deeply disappointing for many scientists of African descent worldwide (Rogers & Rubin 2002). More broadly, the negative view of African science is consistent with the general view of indigenous sciences held by many Western scientists, in addition to the particular case of Africa. Documented studies and statements show that many Western scientists have a hard time believing in the possibility that African people practised science before Europeans set foot in Africa (Brecher 1979; Sagan 1979). Though there are many organisations working to counter this image – EBASI, for example – the impact thus far has not saturated the Western scientific community. Thus, for Western scientists there is a boundary between science and indigenous science.

## **Representations of the 2001 eclipse**

### **CNN news and website coverage**

Looking at other representations related to the 2001 eclipse, CNN provided news on the total solar eclipse during much of that actual day. CNN interviewed (the late) Dr. Beth Brown, an NSBP member and a NASA scientist. However, the interview transcript was not available on the Internet archives. Much of the CNN television coverage focused on reporter Charlene Hunter-Gault, an African American who regularly reports from Zimbabwe and South Africa. For the eclipse, she attended an event re-enacting the Ngoni people fleeing Shaka Zulu by crossing the confluence of the Luangwa and Zambezi rivers. A total eclipse occurred during their original flight on 20 November 1835, as shown in Figure 2 (Espenak 2002; Hunter-Gault 2001).

Of the two experts featured in the CNN interviews, Jack Horkheimer and Kenneth Brecher of Boston University, neither is shown; however, a little investigation revealed their ethnicity. Jack Horkheimer is the host of the show *Star Gazer*, a weekly Public Broadcasting Station (PBS) programme that shows what is going on in the sky. His website, which links to videos of his programmes, indicate that he is not African or African American. The Euro-American Kenneth Brecher, in his book *Astronomy of the ancients*, describes indigenous African knowledge as being of ‘pre-scientific’ or ‘proto-scientific’ thought, at best (Brecher & Feirtag 1979). CNN’s decision to invite Brecher to provide expert commentary is disappointing, because it supports the idea that there are still no credible African scientists who could do so. It is as if only non-black scientists could provide the ‘expert’ commentary needed for this event, which harkens back to Brecher’s comment that indigenous African science is not quite science.

Experts who were used in another CNN article (Stenger 2001) were Jay Pasachoff, a Euro-American professor of astronomy at Williams College, and an African faith healer, Peter Sibanda, spokesman for the Zimbabwe National Traditional Healers Association. Sibanda explained (in Stenger 2001): ‘God has some means of showing

his anger to his people. An eclipse takes place when people have sinned. It is an indicator of upcoming problems, death, illness, drought, or incurable diseases.’ The decision not to interview an African physicist or astrophysicist is confusing. In summarising the contrast, Pasachoff discusses the scientific experiments he will be doing during the eclipse, while Sibanda speaks of God and anger, not science. In fact, it is unclear why the CNN reporter, Stenger, decided to interview him at all, since interviewing astronomers seemed appropriate for the feature. One has to ask whether Stenger really thought Sibanda would be knowledgeable about the eclipse, at the same level as astronomers. However, a little investigation points to a loose connection: the Zimbabwe National Traditional Healers Association promotes traditional medicines. Thus, perhaps an indigenous medicine–indigenous science connection was made by the reporter. Equivalently, a Euro-American reporter could have interviewed a medical or homeopathic doctor; in considering this, the loose connection becomes ridiculous, since medical doctors are not considered experts in astronomy. In sum, the CNN transcripts and articles on the Internet include only one African, provide his first and last name, and consider him to be an indigenous scientist although his expertise is in traditional medicine.

### **BBC simulcast**

The BBC’s 2001 simulcast is only a few minutes long. Throughout, the voices of a male and female host, who towards the end of the video are shown to be white, dominate. The dialogue is about the eclipse. The other people shown are all non-African. Another BBC site includes the 2001 eclipse. There are six images: three of the eclipse, one animation of the path of totality, one example of a hastily erected government camp to house the tourists in Zambia, and one of an African child wearing eclipse-viewing glasses among a group of Africans. The image of the government camp is unique – none of the other 2001 eclipse websites mention this Zambian response to the influx of eclipse chasers. In the group image everyone is African, everyone is wearing a hat, men and women are behind the child with the eclipse glasses, another child is helping the first to put on the eclipse glasses, and three people in the background and foreground appear to be looking at the eclipse glasses. The picture and caption do not indicate whether any are scientists or science students.

Another BBC page is dedicated to questions directed at Sir Patrick Moore, the famous author of numerous astronomy books aimed at a popular audience (cf. Moore 1953, 1966, 1984, 1996). Most of the questions pertain to technical details, and how to view and film the eclipse. Sir Patrick is not of African descent.

### **Mr. Eclipse website coverage**

Continuing the exploration of representations surrounding the 2001 eclipse, Fred Espenak's website, Mr. Eclipse, and his eclipse report (Espenak 2001) were examined. The site includes many beautiful images of the eclipse, the equipment, and some crowd shots. None of the latter contains Africans. He writes about hearing cheering Africans in a village he estimated to be about half a mile away.

### **Sky & Telescope website coverage**

The Sky & Telescope Internet site was also examined. *Sky & Telescope*, the leading amateur astronomy magazine, included three articles on the eclipse. The first two were cautionary about viewing the eclipse wearing eye protection (Di Cocco 2001; Sinnott 2001). The third was David Levy's eclipse report (Levy 2001) – Levy is the co-discoverer of Shoemaker-Levy 9, the comet that crashed into Jupiter in 1994 (Cowen 1993; Levy 1995; When worlds collide: comet will hit Jupiter 1993). His eclipse report mentions a picture of ancient Africans that he saw in a book as a child. The picture, he recalls, represented frightened ancient Africans banging drums to get the Sun to return. Poetically, he ends the article by commenting on the animals and their confusion. The only person he cites is an engineer in his eclipse party, but there is no indication that he is African. Thus, the Sky & Telescope articles add nothing to showcase images of African scientists observing and studying the 2001 eclipse.

### **Muncie Public School website coverage of the 2001 eclipse**

Doggedly pursuing this task, finally a website was located which was dedicated to the total solar eclipse that featured an African American as an expert (Solar Eclipse 2001, 2001). The astronomer, Jason Best, is an NSBP member and a professor at Shepard University in West Virginia. Dr. Best travelled to Muncie, Indiana, where he lectured and interacted with students at several schools and centres. The website is hosted by the Muncie Public School District. However, in the end no websites featured African astronomers as experts for the total solar eclipse of 2001.

### **Survey of the 2001 eclipse NSBP participants**

A survey was designed to gain an understanding of NSBP participants' remembrance of the 2001 eclipse, and especially to probe their memories of images of African and African-American scientists who participated. The 22 NSBP members received a survey by mail (see Table 3, Appendix). Five surveys (23%) were returned but only four (18%) had answered the questions. The respondent who returned the blank survey explained that he had not personally participated in the eclipse-day activities. The results of the survey are presented in Table 3.

All of the respondents had PhDs in physics, were African American, and were senior faculty. In response to the question, 'Please describe the images that you remember of Africans in the telecast', one respondent wrote: 'A bunch of excited people.' However, the ethnic composition of the people was not indicated. All respondents indicated that seeing images of African and African-American scientists is 'very important' to 'extremely important'. They considered it more important to see other African and African-American scientists, rather than themselves. Perhaps this suggests modesty or current job security, or likewise that they would derive a greater sense of belonging from seeing such images.

The advice they gave for future NSBP eclipse participation, was to call for an African and African-American scientific presence. Their long answers included: '[NSBP participation] will help to enhance the knowledge of African-American scientists participating in top level science,' and 'These events are important for raising public awareness, both inside and outside of the African American community, of the role of science and scientists of colour.'

The results of this examination of the digital sphere as well as the survey results were sobering. They revealed that the 2001 event, which was specifically designed to positively impact diversity among scientists in the US, and targeted the African-American community in particular, presented few images of African-American scientists and nothing about science in Africa or African scientists. In summary, images of the 2001 total solar eclipse that remain in the digital sphere include two African-American astronomers as expert commentators: Dr. Charles McGruder on the Exploratorium website (Exploratorium 2005), and Dr. Jason Best on the Muncie Public School website (Muncie Community Schools 2001). Those Africans who appear in video footage are referred to only by their first name. The single African who is quoted, along with his full name, makes a theological rather than a scientific statement about the significance of the eclipse.

What emerged from this research was a list of suggestions for future total solar eclipse coverage in Africa. First, an event meant to inspire people of African descent to practise science should include experts from these groups, where possible. In particular, scientists of African descent should be included as hosts at the eclipse site. Second, these events offer opportunities to highlight the scientific investigations of scientists of African descent. There should be interviews with such scientists during the events, focusing on their science. Third, eclipse teams going to Africa and involving non-African hosts should have a pre-event diversity sensitivity workshop to correct any misconceptions or Eurocentric attitudes that may subconsciously exist amongst the hosts. Fourth, these events provide an opportunity to address past and current stereotypes of Africa as a land without science or scientists. Representations of current and past scientific achievements and the astronomical activities of black Africans should be provided to address these myths.

## **Overcoming boundaries during the 2006 total solar eclipse: Cape Coast, Ghana**

During the 2001 eclipse, African and African-American scientists did not have control of the images presented during the simulcast. The 29 March 2006 total solar eclipse passed through West and North Africa from Ghana to Libya. To coincide with the eclipse, Dr. Holbrook, with help from the NSBP and the Edward Bouchet Abdus Salaam Institute (EBASI; an international organisation aimed at fostering collaboration in physics between Africans and African Americans), organised a conference in Ghana focused on African cultural astronomy. In conjunction with the cultural astronomy conference, an eclipse simulcast was planned.

Nicholas Campion (1997: 1–2), an astrology historian, defines cultural astronomy as ‘[t]he study of the use of astronomical knowledge, beliefs, or theories to inspire, inform, or influence social forms and ideologies, or any aspect of human behaviour. Cultural astronomy also includes the modern disciplines of ethnoastronomy and archaeoastronomy’.

The *American heritage dictionary* (2004) defines ethnoastronomy as ‘the study of the knowledge, interpretations, and practices of contemporary cultures regarding celestial objects or phenomena’.

Unlike astronomy, where the focus is on studying the sky, cultural astronomy focuses on people. During the 2006 Ghana conference, the focus was specifically on Africans and their knowledge of the skies. The majority of presentations focused on indigenous astronomy (i.e. astronomy without telescopes), practical astronomy and astronomy folklore. But the day of the total solar eclipse was set aside for African and African-American astronomers to present their astronomy research.

The results of the analysis of the 2001 eclipse coverage were immediately applied to the 2006 event, in that Holbrook and the NSBP put forward the goal of highlighting African and African-American scientists and their work during the 2006 total solar eclipse simulcast, and recruited solar experts from the same group to participate in the outreach simulcast. Unfortunately, although educational outreach collaboration between the NSBP and NASA was desired, it was only minimally possible during the event. NASA chose to send its team to Turkey, where clear skies were forecast, to observe the 2006 eclipse, rather than to Ghana, where rain was predicted. Nonetheless, NASA was able to donate and send 2 000 eclipse-viewing glasses to Ghana with the US team, which were distributed to University of Cape Coast students, locals and conference attendees.



Figure 3: Noel Wanner preparing for the 2006 total solar eclipse broadcast on the University of Cape Coast campus

Morehouse College's Media Arts Department volunteered to lead, organise and fund the 2006 eclipse multimedia programme filmed at Cape Coast, Ghana. They have professional ties to CNN and were able to upload the eclipse broadcast to the CNN website. Dr. Herbert Charles, head of the Media Arts Department, produced a 54-minute broadcast and a 15-minute shortened version focused on totality; both versions remain in the digital sphere.<sup>2</sup> Dr. Charles hired an experienced eclipse cinematographer, Noel Wanner, from the 2001 Exploratorium simulcast (Figure 3). Audra Baleisis, a graduate student at the University of Arizona, brought telescopes with solar filters to be used to feed telescope images of the Sun to video and still cameras for real-time broadcast. Three African Americans, Drs. Charles, Oluseyi and Holbrook, were the hosts. Dr. Hakeem Oluseyi is a solar physicist and an NSBP member, and has previous professional voice-over experience. The broadcast took place from the campus of the University of Cape Coast in Cape Coast, Ghana. The location of the campus furthered the goal of including African scientists as well as African students in the broadcast.

The resulting eclipse broadcast was ground-breaking for eclipse coverage. Given the standard structure of eclipse coverage, there was a very real chance that the broadcast would simply be the same, but only in 'blackface'. Indeed, all the hosts, students, scientists and all but one of the researchers (Dr. Nicholas Campion) who appear in the broadcast were black. Though the hosts were African American, not

African, they all shared the agenda of highlighting the African scientists who formed part of the broadcast, along with their research. There are, however, several other elements of the broadcast that are unique from other coverages of eclipses. There are 1) images of the nearby towns of Cape Coast and Elmina; 2) interviews with local fishermen about their knowledge of the sky and its use in earning their livelihood; 3) interviews with African and African-American physicists, astronomers and cultural astronomy researchers; 4) descriptions of the stages of the eclipse and various eclipse phenomena by an African-American solar physics expert (Oluseyi); and 5) comments by African students in the crowd before, during and after the eclipse.

In the broadcast, Holbrook conducted the first set of interviews with cultural astronomy researchers who are all African. Questions specifically focused on each scholar's current research projects. Dr. Kofi Maison, from the History Department at the University of Cape Coast, described how, among the Akan, each day of the week is perceived to have vibrations effecting people on Earth, thus people are directly connected to the cosmos. He said that astrology and astronomy are combined through the Akan calendar, through the names people are given, and how that connects to their life possibilities. Professor Damian Oyata from the Literature Department at the University of Nigeria, Nsukka, focused on the Igbo, but more generally is interested in why humans enjoy the Sun and the Moon. Dr. Johnson Urama, from the Physics Department at the University of Nigeria, Nsukka, spoke about his efforts to host the African Cultural Astronomy conference in 2002, and how everyone was happy that it finally happened in 2006. These three scholars focus on Africans and their sky knowledge as part of their research, whereas the research expertise of Peter Sibanda, the African expert used in 2001, seems to focus on traditional healing.

Dr. Charles hosted the second set of interviews with the African astronomers, requesting that they describe their astronomy research. Dr. R. Thebe Medupe, from the Astronomy Department at the University of Cape Town, spoke about his studies of non-stable vibrating stars. Dr. Urama explained how Nigeria currently does not have an observatory, so astrophysicists have focused on theoretical cosmology, stellar structure and plasma physics. He went on to say that Nigerian observational astronomers have travelled all over the world to use telescopes in order to collect data. He emphasised that South Africa is leading the way for new world-class telescopes to be built in Africa. Dr. Hakeem Oluseyi, from the Physics Department at the University of Alabama, Huntsville, described his project to measure the solar corona during totality. He mentioned other African and African-American scientists who were in Cape Coast but were off conducting scientific experiments focused on the eclipse. Drs. Charles and Oluseyi hosted the remaining live part of the programme, with Dr. Charles acting as the primary host while Dr. Oluseyi acted as the solar physics expert and described what was happening during the eclipse.

Before and after totality, Dr. Oluseyi conducted numerous interviews with Cape Coast students. During the interviews he started by asking the students' names, what they were studying, and then moved on to discuss various aspects of the eclipse. The African students formed an integral part of the broadcast.<sup>3</sup> They were spontaneous and showed the excitement and awe generated by the eclipse. The interviews with the local fishermen, conducted by Dr. Charles,<sup>4</sup> included fishermen speaking in their local language about asterisms they know and about associated legends. This interview presented new cultural astronomy information, filling in a gap in our knowledge about the relationship between Ghanaians and the sky. Thus, the African images include professors, scientists, students and fishermen. This contrasts starkly with the 2001 eclipse simulcast, which only mentioned the profession of one African present, Rafael, the night guard at Sausage Tree Camp.



Figure 4: A small ship carrying fishermen near the town of Elmina, Ghana

### **Pure and impure 'science wars' and boundary maintenance**

'Science wars' refers to the tension that still exists between physical scientists, social scientists and behavioural scientists, as to what real science is and who the real scientists are. A famous milestone in this debate was the publication of the 1996 issue of the journal *Social Text*, which included an article by physicist Alan Sokal that was a hoax. The text was not identified as such until after its publication, and it prompted a new arena of debate (Beller 1998; Boghossian 1996; Desilet 1999; Fujimura 1998; Sokal 2000; White 2004). The events surrounding the 2006 Ghana

total solar eclipse, cultural astronomy conference and eclipse broadcast included their own science war.



Figure 5: Mwenda Japheiyia and filmmaker Caroline Deeds on the left

Holbrook recruited Dr. Hakeem Oluseyi, an African-American solar physicist, to organise the series of astronomy lectures by African and African-American astronomers to take place on the day of the eclipse. This event was dedicated to informing conference participants about the research interests and opportunities in solar and stellar physics in the US, South Africa, Nigeria, Kenya and Ghana. Scientists who were recruited for the session included Dr. Alphonse Sterling, an African-American solar physicist employed by NASA; Dr. Johnson Urama, a Nigerian astronomer and Professor at the University of Nigeria, Nsukka, who studies neutron stars; Dr. R. Thebe Medupe, a black South African astronomer and Professor at the University of Cape Town who studies stellar pulsations; and Dr. Oluseyi. Also planned to participate in this session was Susan Murabana Oduori from Kenya, an astronomy graduate student representing Cosmos Education, an educational outreach organisation based in Africa, and Mwenda Japheiyia from the University of Cape Coast in Ghana, who was to address educational outreach in Ghana (see Figure 5). Students from the US and Africa also attended the session. One goal of the session was to determine the opportunities for scientific and astronomy education collaboration among participants. The session was to be videotaped by the film crew from Morehouse College, as a unique contribution to the body of multimedia content

that resulted from the week-long conference. As will be explained in detail below, the session was deliberately obstructed by the EBASI splinter group. Ironically, the group self-identified as representing and supporting ‘pure’ science (as opposed to African cultural astronomy content), which was precisely the focus of the astronomy session they subverted.

The splinter EBASI group secured independent funding and created a four-hour simulcast of the Sun during the eclipse. Used telescopes and equipment borrowed from South Africa they took over the entire local Internet and satellite communications of Cape Coast for their simulcast, thus preventing the CNN/Morehouse broadcast from being simulcast. Their video appears on Windows to the Universe, an Internet site maintained by the US National Centre for Atmospheric Research. The splinter group was spearheaded by a senior African-American physicist and used local Ghanaian electronic and satellite expertise. However, the only image presented in their broadcast was that of the Sun, thus, though there was diversity behind the scenes, there is no indication of this in the simulcast. The splinter group therefore created a digital boundary that allowed only their film, representing their image of pure science, to be seen live during the total solar eclipse.

The behaviour of the splinter group while in Ghana was one of avoidance; they refused to discuss their plans for the simulcast before the eclipse, and did not attend the cultural astronomy conference. In addition, on the day of the eclipse they requested that the cultural astronomy speakers that day – who were all physicists and astronomers – combine with their programme, which they claimed was to honour Ghanaian physicist Dr. Francis Allotey. They planned to introduce a commemorative stamp featuring Dr. Allotey, the pioneer of physics in Ghana and someone who is well loved and respected in the black physics and astronomy community. Dr. Oluseyi, who was in charge, graciously agreed to combine the two programmes, but in the end the request from the splinter group appeared to be no more than a ploy to get access to the room which had the latest audiovisual equipment and air conditioning. The second programme presented its lectures first and the participants then left, leaving Dr. Oluseyi’s scheduled speakers to give their presentations hours behind schedule to a nearly empty room. The participants of the second programme congregated outside the lecture hall talking loudly, making the remaining lectures difficult to hear. Thus, another boundary based on behaviour was erected by the splinter group audience who did not stay to listen to the second set of lectures.

This splinter group and their actions speak to the broader issue of how scientists define and value science – in this case, astronomy – and their lack of concern about the social issues of image and representation of African science and scientists. The Ghanaian and other African scientists were extremely receptive to African cultural astronomy, which they see as part of their scientific history and a way to interest students in the physical sciences. However, among physical scientists in the US, as

discussed earlier, there is the perception that social scientific and humanistic research is not real science or 'pure' science; that data collection methods used outside of the physical sciences are suspect, unreliable and not replicable. Thus, in the US there is an intellectual boundary between the physical sciences, the social sciences and the humanities. Though both eclipse broadcasts were spearheaded by African Americans who were both educated in the US as physical scientists, only the senior scientist internalised the physical science lesson of shunning what cannot be empirically proven.

Science among indigenous people manifests itself in ways which are perhaps not obvious to physical scientists. Indigenous science is found in environmental adaptation, agriculture, animal husbandry and timekeeping. In addition, in indigenous epistemology there are other ways of knowing that do not rely on the basic senses, logic or reason. These 'other ways of knowing' can be appreciated by looking at the spiritual systems that allow people to access these other ways of knowing. Science among indigenous people manifests itself in an unexpected way – unexpected for physical scientists. It may not be labelled as 'science' but rather as 'myth', but that label of 'myth' does not, and should not, make it any less of a 'scientific endeavour' (Williams-Livingston 2004). For example, Native-American science is different from the usual definitions of science:

Native science is a way of bringing people to a higher knowledge, and one of its goals is to bring us 'Gii Lai' – the still quiet place. Another thing that can be said is that Native scientists, through the rituals and songs, etc. are working all the time with energies – the energies of the Earth – in a way which is just as precise as the way Western scientists work. (Colorado 1996: 6)

In oral cultures, knowledge that is critical for survival is sometimes made sacred in order for it to be remembered and passed down to future generations. Anthropologists and other social scientists have studied the many ways in which indigenous science can be found in other cultures. Physical scientists often do not keep up with this research.

Such debates between 'pure' and other sciences can appear to be merely academic, but in this case the actions of the splinter group created and maintained a boundary by slighting the conference and forcing the CNN/Morehouse eclipse coverage into secondary status, due to a lack of access to the Internet and thus to the satellite for the simulcast. Though the CNN/Morehouse coverage did appear on the CNN website, it was several hours after the eclipse.

## **Conclusions**

The 2006 total solar eclipse broadcast from Cape Coast, Ghana, was the result of careful study and analysis of previous broadcasts, a collaborative effort with

CNN, several US universities, the National Society of Black Physicists, and the University of Cape Coast. It uniquely shows a cross-section of scientific endeavours in Africa as well as African scientists as experts. A comparison between the 2001 and 2006 eclipse broadcasts points to the differing agendas of the organisers: in 2001 the natural beauty of Africa was emphasised, while in 2006, positive images of Africans as producers of scientific knowledge were emphasised. In 2006, African and African-American scientists came together with the shared agenda of using this rare astronomical phenomenon to create images that are counter to the usual negative images of Africa. There will not be another total solar eclipse in Africa in the next decade, which puts the possibilities of doing another such broadcast with an African focus far in the future.

The second story of the 2006 eclipse coverage from Ghana is one of the struggle against the boundary between ‘pure’ and perhaps ‘impure’ science, where pure became synonymous with an uninterrupted image of the Sun (Figure 6). The tension between the physical sciences and other sciences is longstanding, and the struggle with the splinter group demonstrates that the African-American scientific community is not immune. However, in contrast the same tension was not evident among the African social and physical scientists. Moving forward to other collaborations between African and African-American physical and social scientists, the authors suggest that the lines of communication be such that, if evidence of a scientific divide arises, it should be addressed immediately by presenting the history – this, in order to establish the mutual lines of respect necessary to maintain collaboration.



Figure 6: The roof of the science building where there is a small telescope dome showing the second group simulcasting the image of the Sun

For the 2008 total solar eclipse Exploratorium broadcast from China, the format was noticeably different. They included local experts and footage of industry in the local region. All the other eclipse elements remained, but there was simply more time dedicated to the culture of the place from which they were broadcasting. The authors of this article would like to think that their broadcast, the survey and their discussions with NASA around the 2006 total solar eclipse resulted in this change of format for 2008. The change is a positive move, but again, the next move is to include local scientists!

Finally, this article's focus on boundaries, boundary maintenance and overcoming boundaries includes those found in the international media and the sciences. In Black Studies there is a lack of research on the details of the lives of scientists living today and on indigenous science – the Ghana eclipse broadcast touches on both. The Ghana eclipse broadcast uniquely showcased the scientists – from Africa and the diaspora – and their science. The Ghana eclipse broadcast showed that indigenous astronomy practices, such as navigation by the stars, are living traditions in Africa. The partnership between the NSBP and Morehouse College resulted in a 54-minute total solar eclipse broadcast and a short 15-minute version. Thus, the goal of including images of African and African-American scientists, especially astronomers, in the coverage of a total solar eclipse in Africa was realised in 2006. However, of equal importance is the example of how the 'science wars' are present within the African-American scientific community. The example of the events and behaviours of the scientists on 29 March 2006 provides evidence of how such an academic concept can have negative consequences during a high stakes time-sensitive event such as a total solar eclipse.

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## Notes

1 See the Exploratorium broadcast at <http://www.exploratorium.edu/eclipse/zambia/rm/archive-100.ram>

2 The short version can be found at <http://www.youtube.com/watch?v=dUyENKk-Od8> and the long version at <http://blackcommunityentertainment.com/videos/1326/full-length-ghana-eclipse-broadcast>

3 For example, see <http://www.youtube.com/watch?v=WhBdWQXxG8A>

4 See <http://www.youtube.com/>

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## Appendix

Table 3: 2001 eclipse survey questions and responses

%	Total	Question
		1. I consider myself to be:
0.00%	0	African
100%	4	African American
0.00%	0	Black Hispanic
0.00%	0	Other
		2. My gender is?
25%	1	Female
75%	3	Male
0.00%	0	Decline
		3. The highest degree that I have earned is:
0.00%	0	Secondary / High School Graduate

Total solar eclipse coverage in Africa

0.00%	0	College / University Graduate
0.00%	0	Masters / MBA / MFA / Other Professional Degree
100%	4	Doctorate
0.00%	0	No Response
		4. My position title or equivalent is:
0.00%	0	Student Researcher
0.00%	0	Postdoctoral Researcher
0.00%	0	Assistant Professor / Assistant Scientist
50%	2	Associate Professor / Associate Scientists
50%	2	Professor / Scientist (Full)
0.00%	0	Dean / Provost / University President
		5. Thinking over my experience with the Zimbabwe 2001 eclipse activities
		6. My level of satisfaction with the event as a whole is most closely that I was:
0.00%	0	Not Satisfied
0.00%	0	Somewhat Satisfied
75%	3	Satisfied
25%	1	Very Satisfied
0.00%	0	Extremely Satisfied
		6. My level of satisfaction with NSBPs participation is:
0.00%	0	Not Satisfied
0.00%	0	Somewhat Satisfied
25%	1	Satisfied
75%	3	Very Satisfied
0.00%	0	Extremely Satisfied
		7. In the telecast from Zimbabwe do you remember seeing Africans?
50%	2	Yes
25%	1	No
25%	1	Can't Remember
		8. Do you remember seeing images of African scientists in the telecast from Zimbabwe?
25%	1	Yes

50%	2	No
25%	1	Can't remember
n/a	n/a	9. Please describe the images that you remember of Africans in the telecast:
		10. Would you say that the images of Africans were:
50%	2	Positive
0.00%	0	Negative
0.00%	0	Disappointing
25%	1	There were no images of Africans
n/a	n/a	11. We would like to create a map of the United States that marks the location of each NSBP/NASA participant during the Zimbabwe 2001 Eclipse Event. Please write in the city and state where you were located.
		12. During the Zimbabwe 2001 Eclipse event I was located at:
0.00%	0	Home
0.00%	0	A Museum
50%	2	A Planetarium
0.00%	0	A Community Centre
0.00%	0	An Observatory
0.00%	0	An Academic Lecture Space
25%	1	Other
		13. At your location during the Zimbabwe 2001 Eclipse were the local or national media in attendance?
25%	1	Yes
50%	2	No
25%	1	Don't remember
		14. In the local US broadcasts of the Zimbabwe total eclipse activities
		Did you see images of yourself or other NSBP members? You may choose more than one.
0.00%	0	Yes I saw myself
25%	1	Yes I saw other NSBP member(s)
0.00%	0	No
50%	2	I can't remember

25%	1	I did not see any broadcasts of the event
		15. It is _____ that the American public sees images of African and African American Scientists.
0.00%	0	Not Important
0.00%	0	Somewhat Important
0.00%	0	Important
50%	2	Very Important
50%	2	Extremely Important
		16. It is _____ for other scientists to see images of African and African American scientists.
0.00%	0	Not Important
0.00%	0	Somewhat Important
0.00%	0	Important
75%	3	Very Important
25%	1	Extremely Important
		17. It is _____ to my self image to be known and seen as a scientist.
0.00%	0	Not Important
0.00%	0	Somewhat Important
75%	3	Important
25%	1	Very Important
0.00%	0	Extremely Important
n/a	n/a	18. NSBP will be participating in activities associated with the West Africa 2006 total solar eclipse. Please use this space to comment specifically on things you would like to see in telecasts and broadcasts. Feel free to include any advice that you may have.
n/a	n/a	19. Please use this space to write about why you think the participation of African and African American Scientists are important for events like the 2001 and 2006 eclipses in Africa.
n/a	n/a	20. Please explain the ways in which your participation in the Zimbabwe Eclipse NASA-NSBP collaboration has effected your career.