Ode to Hubble: Inspiring Science through Art

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In early 2015 ESA and NASA invited participants of all ages to create an art piece that would celebrate Hubble's 25th anniversary in space. Contestants could use any form of art, with the final presentation being in video format. Throughout the competition animators, photographers, painters, songwriters, and many more shared their art and appreciation for Hubble. Martin and I had a special interest in stop-motion animation and we used this in our film, *Hubble's Universe*, to illustrate some of the discoveries that had enhanced people's interest in, and knowledge of, the Universe. Over a year later, reflecting on the contest and its effect on our lives, we will expand on our creative process, what inspired us, how we continue to inspire others, and how future competitions can continue to engage people from different fields and backgrounds with science.



Figure 1. Promotional image from the Ode to Hubble competition. Credit: ESA/Hubble

Introduction

When I first heard about Hubble's 25th anniversary competition, Ode to Hubble, I was immediately excited about making a short film^{1, 2}. It was an opportunity to use my skill set in photography and filmmaking to express my appreciation for a telescope that has given us a world-changing view of what lies above and beyond the sky. However, I didn't know what more to say beyond that. I had a filmmaking degree, I had spent plenty of time working and volunteering on films, I had made my own films; but what did I know about Hubble? Although I knew of Hubble, I had not taken the time in my day-to-day life to learn more. So I did not have the level of understand-

ing or expertise to write a script that would direct my creative output. Luckily, my friend Martin had also been thinking about the contest. He was originally also a filmmaker, but is now in the process of making the transition to a science career. We realised that we were both thinking of creating an animation and that we needed to collaborate and combine each other's skills and interests to pull it off. Martin was drawn to the competition through his love of space and, after years of absorbing all the information he could, it was the right time to share that accumulation of ideas. I knew that I could collaborate with Martin to create a short film that would be historically and scientifically correct.

To our delight, our hard work and the amazing support from everyone during the voting process paid off and we won first place for the 25s and under category. With the prize in hand (a piece of Hubble's solar panel) I went to a local school to share my passion for film and educating through film. The children, who were aged nine to eleven years old, were drawn into my talk either through their interest in filmmaking, or their interest in science, or both. Because Martin and I had created a film that is interesting on two levels, both arts and science, I was able to capture their interest for well over an hour! Building on that success, I looked for more ways to inspire children to challenge what they see, to expand what they know, and to be courageous about what



they feel. The direction and excitement that the Hubble contest gave me, and I'm sure other participants like me, meant that I could share the passion of space not just on the internet, but back in our local community. Not everyone who participated in the Hubble contest had a science background. Many, like myself, were artists who saw the opportunity to ignite a passion for the world around us. The strength of the contest was that it allowed collaboration. Science has big topics that can be intimidating, but, with the help of friends and colleagues, we can overcome the overwhelming feeling of just how much there is to learn and learn to share the parts we do know.

The spark of interest

Although I did not study science past the age of eighteen, it was a subject that I always enjoyed as it teaches us about ourselves and our world. However, like many interests, it became dormant as I focused on my arts studies and my career. Two simple events two years ago challenged



Figure 2. The top image shows drawings by Martin that would be used to clarify ideas about how the shots would work. The bottom image is what Halley would create from these drawings. Rather than words on a page the creators used this storyboard as a working script in order to visualise as much as possible before shooting of the animation, where reshoots can mean losing a great deal of time.

this. The first was when my friend Martin introduced me to a television series from the 1980s called Cosmos: A Personal Voyage. This beautiful series talked about the history of astronomy, and its importance. Before watching this series, my appreciation for the sky was much simpler. I would take the time to look up at the night sky and admire the distant lights, and then continue on without further thought. With the influence of Cosmos, I now take the time to read science articles, seek a deeper understanding and join sky-gazing events so that I can learn more from other astronomers. Now, the Royal Astronomy Society of Canada (RASC), has even generously made me an honorary member because of our Hubble film.

The second event that brought my interest in science back to the fore perhaps inspired similar feelings in me to those that astronomers felt when they first observed the sky through a telescope. I had just begun to observe through telescopes and Martin and I chose a particularly dark and high point in Nova Scotia. He set his telescope towards the Hercules Cluster and as I looked through the evepiece I gasped at what I saw: fireworks frozen in time! I had never seen such clear detail of something in space in such an intimate way. This is the kind of special moment that is key to stimulating that spark of inspiration which makes science become so important to us. At that time, Martin had been deeply invested in learning about space for about five years and it was the same television series and the experience of sky gazing that had also been part of what inspired him.



Figure 4. Props from the animation. Credit: Halley Davies and Martin Hellmich



Figure 3: This image shows the set of the animation. Inside the giant black box is our stage so we could shoot at any time of day and shine in controlled light. One person would move each object a tiny bit and then when they were satisfied would call out to the other person who would take a picture. The process requires a great deal of patience as a single shot can take hours! We listened to an audiobook to help with focus. Credit: Halley Davies and Martin Hellmich

Following these events Martin and I spent a great deal of time discussing what it would be like to see a planet or nebula in detail for the first time, and to not understand what it was. This would lead to the starting point for our film; thinking about how the sky was perceived before our knowledge had reached today's level, and in understanding that mindset we found a new appreciation for Hubble. We took imagery that denoted seeing and knowing very little about the Universe and compared it to Hubble's well-known photographs. We did so to show the progress that has been made, as we believed that audiences would enjoy reflecting on the steps taken to create this window onto other worlds; hopefully creating sparks of interest.

Developing the idea

The idea for our Ode to Hubble video would never have developed if we had not seen an email from our friend Dave Chapman from the RASC. Dave had known Martin for several years through the RASC and had seen him do astrophotography and make videos for the astronomy community. Dave knew me from a star party and was aware that I was making a career in filmmaking. However, the contest had already been running for some time. We had roughly two weeks to write, prep, shoot and edit a short film! Martin and I discussed many ideas as we worked on the script and developed the vision of the film. Both of us felt that a stop motion would create a theatrical and storytelling feel that would best express the awe that learning about space inspires. However, it was difficult deciding whose voice the film should follow. We thought it could be told through the eyes of a young child, or perhaps from the perspective of a famous scientist as he or she teaches the audience about Hubble. The solution was to take a more abstract approach and make the main character human thought itself. We would focus on how humanity's perspective has grown as scientific

discoveries have been made. Each new discovery inspires new art and new questions, creating a kaleidoscope of historic imagery that leads us to the achievements of Hubble. In striving to convey these feelings as visually as possible our original plan to include a narration was not necessary anymore. The film is stronger when interpreted by the individual.

We wanted Hubble's Universe to be so easy to understand that a young child could enjoy watching it, whilst also including some of the rich history of Hubble and a contemplation of the Hubble Deep Field. Like the Hercules Cluster that first took my breath away, understanding what the Hubble Deep Field is and what it means for the scale of the Universe are beautiful thoughts. This iconic image shows like nothing else the awe-inspiring fact that in every speck of sky there are billions of planets and stars. This would be the grounding image that would represent the awe of the Universe. As we continued with the idea, we realised that many of our audience members would already have some knowledge of science and of Hubble's history, which is why many of the historic images and references we chose to use are ones that audiences without a science background may not recognise. This was not intended to alienate less science-literate audiences and the video was given a complementary playfulness to draw viewers in and encourage them to ask more questions.

We used drawings, diagrams and photographs of scientists to visually express how those scientists are or were connected to the Hubble Space Telescope. We also included Vincent Van Gogh's work The Starry Night because, before astrophotography was invented, interpretation of the sky was left to those who could draw or paint. Although The Starry Night was painted at the dawn of astrophotography³, we wanted to open the film with this painting as it is perhaps the most familiar from our selection to the majority of audience members. The film would then continue on through stop-motion planets, scientists' drawings and direct planetary imaging to further show how, as understanding has progressed, so has the visualisation of planets and stars. We chose historical images based on discoveries that have drastically changed humanity's view of the Universe: Galileo's discovery that the Moon was solid and tangible (Drake, 1957); Kepler's speculation about the boundaries of the Universe (Murdin, 2011); and Edwin Hubble's discovery of galaxies outside our own, known at the time as Island Universes⁴. With our vision on paper we knew that we were going to



Figure 5. Halley presenting the Ode to Hubble prize at a class presentation to young children. Credit: Halley Davies and Martin Hellmich

need to use some difficult tricks to bring it to life, but we were ready to begin the focused work of animation.

The filmmaking

We researched the historical images and space photos for about two days. The plan was to print out certain images, paste them on a Styrofoam backing and insert a stick and a base. This created a sort of "puppet" effect for the planets, stars and galaxies to move across our set. We used this same technique for the opening shot with The Starry Night. Keeping our background black by creating a large black box, also made of Styrofoam, we cut a slit in the top of this same black box. Then we set up a light that would point down into the black void from the top of the box. Using this effect, we created stage-like lighting, where our "puppets" of planets and stars could be in the spotlight. The theatrical energy that the lighting and stop motion created was essential to our idea of creating that wonder and awe of space.

By attaching a dense black cloth to the front of the black box facing the "stage" area, we were able to make an accessible place for the camera. In this way, we had full control of our lighting within the



Halifax space enthusiasts create winning Hubble tribute video

The contest, called Ode to Hubble, was put on by the Hubble and European Space Agency



Figure 6. Local news coverage on the winners and the competition.



Figure 7. Halley and Martin preparing to speak to the Ode to Hubble team as part of a 25th anniversary Hubble Hangout event.

black box, so we could shoot without daylight interfering with our lighting setup. It took around a week to create the drawings, cut-outs and the stage where we filmed, although this did overlap with some of our filming days. Martin shot several of the sequences while I was still putting the final touches on puppets or drawings for the next scene to be shot!

One of our most exciting stop motion sequences explained the Ultra Deep Field image5. We expressed the vastness of space by reversing an animated video of the Ultra Deep Field image, zooming out until the image shrank into a tiny dot surrounded by black. The video continues to sweep backwards to reveal that the black background to this dot is in fact a black sphere. This sequence expresses how, although Hubble's Ultra Deep Field image may show thousands of galaxies, it is only a tiny section on the sky. We wanted to demonstrate the vastness of the Universe and also show how astronomers estimate just how many galaxies there might be in the visible Universe. To achieve the latter, and ensure that we were doing so accurately, Martin met with Professor Rob Thacker at the Astronomy and Physics Department at Saint Mary's University to go over this sequence and make sure that our representation was correct.

The black ball used to represent the Universe in this scene is a papier-mâchéd balloon that was painted black. The dots of light that appear during the sequence and represent the many galaxies are created using a torch shining through holes that were poked into the papier-mâchéd ball.

After the filming process was complete, the final step was to edit it all together and submit it for the first phase of voting in the competition. During the editing process we were incredibly lucky to find the perfect music to fit with the timing and emotions for our scenes⁶. With the video as complete as possible, and with not a minute to spare, we entered it into the contest. We were quite happy at this stage just to have submitted a project into this worldwide competition, but as the voting started, we realised that we might have a chance not just to participate, but to make it onto

the shortlist. The anticipation grew until we were checking our votes every couple of minutes! As we received so much support from our friends and astronomy communities around the world, we started thinking about what we would do if we won. The prize — a piece of Hubble's decommissioned solar array and a signed photograph of the Hubble 25th anniversary image - was an amazing item to have on display in your house, but we thought it would be most effective if people could see it and be inspired by it. It would be the perfect opportunity to share our interests, and hopefully encourage other people to share our love of space.

Sharing the prize

Before even receiving the prizes, Martin and I looked forward to sharing our excitement at having a little bit of space and history in our hands. Martin's plan to share the piece of Hubble was to have it on display at the Saint Mary's University Observatory. The observatory hosts public observation nights where members of the public of all ages come to learn about the stars and look through their telescope. The piece of Hubble, which powered Hubble's instruments for three years, would be an inspiring addition to such an event. We have also made plans so that the prize will to travel to RASC events and presentations in Toronto and around Nova Scotia. Closer to home, I am visiting schools to share the video and prize with children.

In the Nova Scotian curriculum students learn about space at around age 12. I have done artist's visits to schools before and I was excited to share my new inspirations from science, astronomy and Hubble. My presentation is about the excitement of learning about space through the process of filmmaking. During the presentation, I learned that a number of the children had not even heard of Hubble! It made me realise how important my artist's talk was in educating some of our younger generation.

I was very happy to see that my presentation kept the children's interest for over an hour and that it was followed by many questions. Some asked questions about space and what they saw in the video, whilst other students were more interested in the filmmaking aspect. The combination of these two components to the video - filmmaking and science — was the key to holding the students' interest for so long. Both are exciting and popular subjects and students could either connect because of their own filmmaking experience, or because of their passion for space. I had done presentations in the past, but the combination of these subjects notably drew great interest. In turn, I realised this is what drew me to creating a film about Hubble: I had a passion (filmmaking) and I was curious about something real but that I did not know much about (space). It was important for me to share this with the children and emphasise that learning can take many forms. I will be going back to the school to show the children various animation techniques that they can use in their own films to explore a subject that inspires them.

An appreciation of the different ways in which you can learn about a subject was one of the strengths of the Ode to Hubble competition. It reached out not just to those interested in, or already involved with science, but to artists. Artists are inspired by the application of the creation process and this can motivate collaboration with a scientist to encourage research for their art project. We are challenged by a modern world saturated by media, a world that demands a level of entertainment or visual "reward" in order to be captivated, but by allowing artists of all backgrounds to find different ways to create an eye-catching educational piece the competition found a way to captivate the minds of distracted viewers. Bit by bit, new audience members can learn about science through short and simple pieces presented in various media. Variety is important as all art forms contribute to educating and creating discussions among viewers and scientists in their own way, and there was no lack of variety in the competition entries, which included painting, song, poetry, animation, dance, and much more.

Conclusion

The Ode to Hubble competition made a difference to participants across the world. Every participant had taken time to think, either alone, or with friends, about what Hubble meant to them. It created conversations, which would promote contemplation about great accomplishments, but also great mysteries. I was drawn to join the competition by my love of art and curiosity about space. Martin was drawn to it for the excitement of sharing his passion for, and knowledge of, space. Together we strived to make a short video that would be educational, inspirational and accessible, much like Hubble has been.

The film, along with all the other entries, was shared across the world and has also reached the public through the RASC and my school events. The reach is wide, but the individual effect is also wonderfully personal. My confidence was boosted when I could approach science with a familiar background and this background for me was filmmaking, but there was amazing variety among the other participants.

Competitions like these present a great opportunity for scientists and artists to collaborate and together embark on creative adventures that tackle the challenges of communicating astronomy in a fun and effective way. Tapping into people's personal interests is another way to allow science to be an active part of our lives, and not a distant acknowledgement. The challenge and deadline of the the competition format gave participants direction and a destination whilst the prize is certainly part of the motivation. I believe people have more tools to be creative than ever before and this provides the perfect opportunity to invite the public into astronomy and other sciences.

Notes

- ¹ More information on the Ode to Hubble competition: http://www.spacetelescope. org/projects/Hubble25/odetohubble/
- ² The Ode to Hubble animation that we produced can be viewed here; the video has now been viewed over 7500 times: https:// www.youtube.com/watch?v=iuvG8LaJDy8
- ³ More information on the timeline of astrophotography in Pedro Ré's *History of Astrophotography*: http://www.astrosurf.com/re/ history_astrophotography_timeline.pdf (accessed 28th December 2015).
- ⁴ More information in the Shapley-Curtis Debate, 1920, http://apod.nasa.gov/ diamond_jubilee/debate_1920.html (Accessed 3 January 2016)
- ⁵ More information on the Hubble Deep Fields: http://www.spacetelescope.org/ science/deep_fields/
- ⁶ The music used was La Madeline Au Truffe (composed by Jeris) by basematic: http://dig.ccmixter.org/files/basematic/ 33580 (accessed 6 January 2016)

References

- Galileo Galilei, Starry Messenger, 1957, in ed. Drake, S. *Discoveries and Opinions* of *Galileo*, (New York: Anchor Books), 43
- Murdin, P. 2011, *Mapping The Universe*, (London: Carlton Books), 34

Biography

Halley Davies is a filmmaker and camera assistant. She studied at the Nova Scotia College of Art and Design (NSCAD), Canada, and continues to share her love of learning through film presentations in her community.

Martin Hellmich is an astrophysics student at Saint Mary's University, Canada. He enjoys studying and sharing the beauty of science through film and photography.