
InterpNEWS
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The International Heritage Interpretation e-Magazine.
A John Veverka & Associates Publication.

JVA InterpNews

Volume 8, #6 Nov/Dec. 2018

The international heritage interpretation e-magazine.

King Kong and JV.

Here we are for the holidays again and our Nov/Dec issue. So many really great articles, including articles from Thailand, Korea, and the UK. Also several really outstanding research articles. A big thank you to our Regional Editors and all the folks who sent in articles for this issue. I am getting ready for our new 2019 issues and looking for articles for our Jan/Feb 2019 issue. The **Heritage Interpretation Training Center** is constantly adding new courses and we are up to 43 introductory and advanced interpretation courses. Check some of our available courses in the **Interpretation Marketplace** at the back of this issue.

Advertising with us? We reach over 300k in 60 countries, so if you're interested in letting folks know about your work – interpretive panels, exhibits, Audio, etc. to so many, including 150K in the US alone, our advertising costs are very reasonable. I can send you details. So have a great holiday season and feel free to get in touch with me about being a Regional Editor, a contributor or advertising in InterpNEWS. Cheers, John V. jvainterp@aol.com.

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InterpNEWS is published six times a year as a **FREE** John Veverka & Associates publication and published as a service to the interpretive profession. If you would like to be added to our mailing list just send an e-mail to **jvainterp@aol.com** and we'll add you to our growing mailing list.

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Meet Our Regional Editors

Regional Editors are professional interpreters with a mission to help advance the interpretive profession and make connections with other interpreters, agencies and organizations to encourage folks to share knowledge and ideas about heritage interpretation. They may represent InterpNEWS at conferences or other interpretive gatherings to help generate articles about new technologies, approaches, exhibits or other innovative advancements in interpretation. Want to be one of our Regional Editors? Let's chat. **jvainterp@aol.com.**

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Dr. Martha Benn Macdonald, Professor in the English department at York Technical College, Rock Hill, SC, published author, and heritage performer. She is a dedicated supporter of InterpNEWS and contributor to each issue. She has authored several wonderful books (check her work out at Amazon.com) You can reach her at: **doctorbenn@gmail.com**

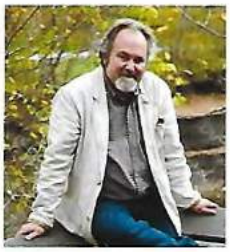
Rod Burns - CPHI - (Certified Professional Heritage Interpreter - **Canada)**. Rods long career in interpretation includes being the Education Supervisor, Salmonier Nature Park, Newfoundland, Canada, and currently being the owner of Bold Point Centre EcoTourism Training and Services. He also has 22 years of experience as co-owner /operator of Bold Point Farmstay, www.farmstay-ca.com. He will be working to generate articles on innovative interpretation for IN from Canada. He can be contacted at: **bpc@connected.bc.ca**

Brian C. Westfall Corps of Engineers Community Relations Ranger/NRM Specialist. Brian brings over 35 years of experience in interpretation with the US Army Corps of Engineers. Brian coordinated the interpretive outreach program at DeGray Lake for 19 years, promoting Corps of Engineers missions locally, regionally and nationally. Brian was also recognized as the 2006 Mississippi Valley Division **Hiram Chittenden Interpreter of the Year.** He also serves an as instructor for the COE National Interpretive Services Course. You can reach him at: **Brian.C.Westfall@usace.army.mil**,

Heidi de Maine - South Africa International Editor. Heidi is a Marine Biologist who, after working in the public aquarium industry as an aquarist, now consults to aquariums, zoos, museums and other natural heritage facilities specializing in interpretation and staff training. She has contributed to traditional and online magazines and has written a series of children's books called "Abby's Aquarium Adventures". When she's not working, she's studying to complete her MSc in Interpretation or she's in the sea. You can contact Heidi at, sunfishconsulting@gmail.com, www.abby.co.za

Amanda Sedlak-Hevener is a freelance writer and public historian. She has a B.A. in Journalism and English in Ashland University and an M.A. in History from the University of Akron. She is currently working on an M.L.I.S. in Museum Studies at Kent State University. She believes in promoting local history through creative interpretation in museums, historic houses, and historical societies. You can contact her at: mandyhevener@gmail.com

Ethan Rotman - As prinçiple of ***iSpeakEasy,*** Ethan has been speaking to groups for 30 years and training presenters for more than 25 years. He began his career as a park ranger in 1980. He quickly learned that Park Rangers must engage their audience or people will simply walk away. *iSpeakEASY* was founded in 2006 to bring a new approach of communication into the business world as well. He offers workshops and individualized coaching to help speakers improve their effectiveness and profitability. A frequent contributor to **InterpNEWS**, you can contact Ethan at: **ethan@ispeakeasy.net**



Stephen W. Madewell has an extensive back ground with outdoor education and recreation. **He has served as Executive Director for three Ohio park districts: Metroparks of the Toledo Area, Lake Metroparks and Geauga Park District.** He has managed design and development for several environmental education and interpretive visitor centers, web based communication systems as well as way-finding and interpretive sign systems. Mr. Madewell's involvement with conservation-based initiatives has included policy development, operations, natural resource stewardship, land acquisition, grant development and advocacy. He has written and recorded two conservation-themed musical CD's: ***Arrow Creek*** and ***Rivers and Trails***. steve@madewellmusic.com madewellmusic.com

Cecelia Ottenweller, *Ottenweller Consulting*. Cecelia is an independent communication strategist, interpretive planner and exhibit developer focused on nontraditional educational environments, particularly zoological gardens and museums. She has over 20 years of experience, with projects that include her latest for the McNair Asian Elephant Habitat at the Houston Zoo, the audio tour for the Virgin of Guadalupe exhibit at the Houston Museum of Natural Science, *You Are the Exhibit* at the John P. McGovern Museum of Health and Medical Science, the Dallas Federal Reserve (both their exhibits and wrote their commemorative history) and the Texas Independence Trail. She lives and works in Houston, Texas. To contact Cecelia, email her at ceottenweller@me.com or give her a ring at 713-302-2793.

Chris Brusatte MA Museum Studies, BA History - Interpretive Planner at Taylor Studios, Inc. Chris Brusatte has had the honor of working at Gettysburg National Military Park, the Library of Congress, Ford's Theatre, and Go For Broke National Education Center, and currently is an Interpretive Planner at Taylor Studios, Inc. in Rantoul, IL. You can contact Chris at cbrusatte@taylorstudios.com.

Angie Albright, Director - Clinton House Museum. Angie Albright is the Director of the Clinton House Museum in Fayetteville, Arkansas. She loves books, writing, history, craft beer, and museums. Once upon a time she was an academic in the humanities. You can reach me at: Clinton House Museum: 479.444.0066, aalbright@clintonhousemuseum.org. You can visit the Clinton House Museum at: http://www.clintonhousemuseum.org/

Rocio Carvajal is the editor of SABOR! This is a Mexican food magazine and producer of Pass the Chipotle Podcast. She has a degree in Communication, an MA in International Aid and studies in cultural management and medieval history. Rocio is passionate about the culture gastronomic heritage and traditions of Mexico which she explores through her projects.
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Sydney Johnson is the Curator of Exhibits at the Missouri State Museum and a scholar of Black woman's social activism in the early 20th century. As a historian, she is interested in both the theory and praxis of community ownership as a means towards inclusive cultural spaces and transformative experiences.

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Nicole Hoffmann is currently the Museum Officer at the University of Pretoria Museums in the Department of UP Arts at the University of Pretoria. She completed her Bachelor degree in Heritage and Cultural Tourism in 2008, her Honours in 2009 (both *cum laude*) and was conferred a Master's degree *cum laude* (MHCS Heritage and Cultural Tourism) in 2015. She has also served from 2014 to 2016 as a part-time lecturer in the Department of Anthropology and Archaeology and in 2016 in the Department of Historical and Heritage Studies at the University of Pretoria. She is presently enrolled at the University of South Africa (UNISA) for a BA Honours degree in Archaeology in order to broaden her heritage knowledgebase. Following from her MA thesis title, "*On-Location Film-Induced Tourism: Success and Sustainability*", she has also published on the subject of heritage and tourism and presented a conference paper in 2016 at the 1st Tourism Educators South Africa (TESA) International Conference in Cape Town. Nicole is an accredited Gauteng tourist guide (cultural guide) at national level and speaks and writes multiple languages fluently, including Afrikaans, English and German.
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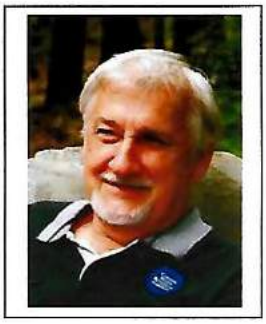
J. Patrick Barry spent 35 years as an interpreter with the NPS and US Army Corps of Engineers. For 27 years he supervised the Bonneville Lock and Dam Visitor Center on the Columbia River. He was the lead interpretive trainer for the Corps for 14 years. Pat is now the owner of **J. Patrick Barry Interpretive Training and Retired Ranger and Associates LLC.** He serves on the Board of Directors as Communications Chair for the Corps Foundation. He served as Regional Director, Pacific Northwest Region 10, National Association for Interpretation 2016 -2017, member since 1988, and Certified Interpretive Trainer since 2002. He is the author of the newly published book: *Bonneville Lock and Dam: A Gift from the People of the Great Depression.* You can reach Pat at: jpatbarry@hotmail.com



Ron Kley. Ron's undergraduate and graduate training was in geology, but he has worked in museums since the 1960s, first as a curatorial/registrarial staff member and, since 1988, as an independent consultant/contractor in collection management/research/interpretation. He has worked with large governmental institutions on four continents as well as with small all-volunteer organizations from Eastern Canada to Southern Africa and Western Australia. The development of low-cost/no-cost interpretive initiatives has been one of his abiding professional interests. He welcomes the submission (to ronkley@juno.com) of papers for InterpNEWS, or informal exploration of embryonic ideas for such submissions.

Ed Clifton is a geologist with strong ties to the ocean. He spent 25 years with the U.S. Geological Survey's Branch of Pacific Marine Geology, which he led from 1978-1981. Much of his research at the USGS focused on using SCUBA to explore geological processes in the coastal waters of the western U. S. As an aquanaut in the Tektite 1 Man-in-the-Sea Project in 1969, Ed spent 58 continuous days living in and working from an undersea habitat in the Caribbean, where he studied sediment/animal interaction. He continued these studies in 1970 for an additional 20 days of underwater living in the Tektite 2 habitat. After his retirement from the USGS in 1991, Ed spent another 8 years as an internal consultant to Conoco, Inc.

Ed taught numerous courses at UCSC and Stanford, where he served as Adjunct Professor before his retirement from the USGS. His nearly 200 published papers and abstracts are largely directed toward open coast, estuarine and deep-sea environments. In 2004, the Society for Sedimentary Geology awarded him the Francis J. Pettijohn Medal for "Excellence in Sedimentology". Ed volunteers at the Monterey Bay Aquarium, as a Docent at Point Lobos and at the Pacific Grove Museum of Natural History. A regular contributor on geologic subjects to InterpNEWS, he also is a yearly lecturer in the Osher Lifelong Learning Institute (OLL)I at the California State University at Monterey Bay.
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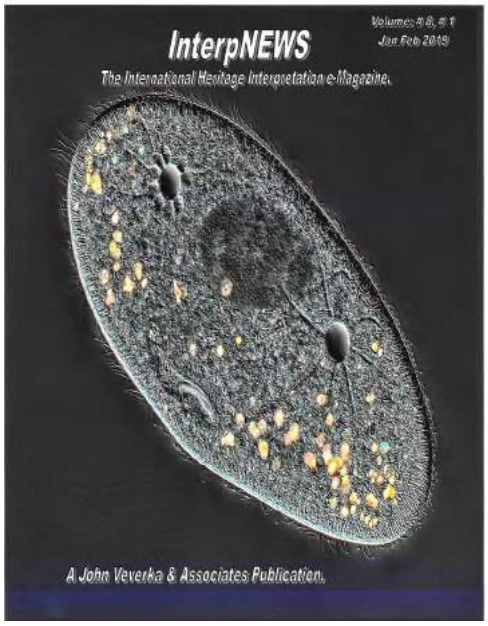
John Veverka is the editor and publisher of InterpNEWS. John has spent 40 years working as an interpretive planner and trainer. He had developed and taught a course on Interpretive Master Planning at Ohio State University where he received his B.S. and M.S. degrees majoring in interpretation. After two years working as an interpretive planning consultant in Alberta, Canada, John was recruited to return to Michigan State University to teach introductory and advanced courses in interpretation while working on a Ph.D. majoring in Heritage Interpretation. He is the author of several textbooks on heritage interpretation and is the Director of the **Heritage Interpretation Training Center** which offers 40 different courses in heritage interpretation. He is also an Associate Editor for the National Association for Interpretation's Journal of Interpretation Research, and a NAI Fellow.

You can visit John's website at: www.heritageinterp.com, or contact John directly at jvainterp@aol.com.

Our newest Regional IN Editor - Patricia Grimshaw. Having enjoyed museums and history for as long as I can remember, I am a self-professed museum nerd, with an equal interest in both medieval and military history. I received a BA (Hons) from Queen's University in Medieval History, and an MA in War Studies from the Royal Military College of Canada. Finally, I completed a Master of Museum Studies at the University of Toronto before beginning my museum career. I have lived and travelled all over Canada an Europe, and any chance I get to visit a local museum, I take, whether the institution is national or niche. I am always looking for new and interesting ways to interpret and display history. "I also run my own museum consultin business, **museologik**."You can contact Patricia at: grimshawp@msn.com.



Call for articles for our Jan/Feb 2019 Issue.

Have you completed some interesting interpretive research or developed an innovative interpretive program or exhibit? IN is the place for you to share what you do and what you've learned. IN reaches over 300K in 60 countries.

Deadline for our Jan/Feb 2019 issue is the 15th of November, 2018. If you're interested in contributing an article to this issue, or like to advertise in InterpNEWS, please feel free to contact me. We are also always interested in adding Regional Editors to our team too.

Want to be one of our regional or specialist editors. This space is reserved for you. Your photo and bio will appear in every issue. Great way to advertise yourself if you're a interpretive consultant too. Any questions, send me an e-mail. John Veverka, IN Editor/Publisher, jvainterp@aol.com.

Interactives – They Don't Need to be Complicated

Patricia Grimshaw
museologik

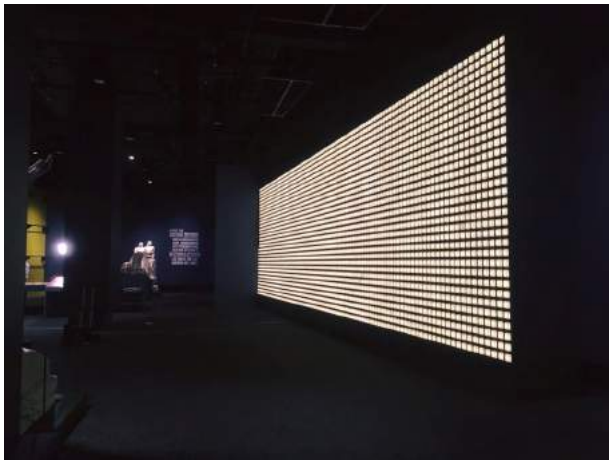
Growing up, one of my favourite things about visiting museums was touching stuff. I'm a tactile learner, and, I'll admit it, button pusher. When I stroll through a museum, I'm hard pressed *not* to push a button if there is one. For this reason, and a few others, I love interactives! If done well, they add so much to any museum experience. And they don't have to be complicated.

What is an Interactive?

In essence, a museum interactive is any way that a visitor can interact with the exhibit or the host institution, either passively or actively. Are they being asked a question? Is there a button to press for an audio or video to play? Are there knobs to turn? Is there puzzle to solve? When developing exhibitions, one of my favourite parts is coming up with interactive ideas. In the early stages of "blue sky thinking" (when we pretend we have all the money and time in the world!), these visitor connection ideas can get quite complex. But then reality sinks in and we realize that (a) we have limited time to develop, create and install the interactive; and (b) we have little (if any) money. Fortunately, however, interactives do not have to be complicated to be successful. They just have to connect the visitor with the exhibition in a clear and meaningful way.

Passive Interactives

I have been fortunate enough to visit some really great, top-notch museums, both since and before becoming a museologist. Some of these institutions have had incredible interactives – triggered by visitor movement, they turn on automatically. You don't even realize you're the "on" switch until you're in the moment, as it is a passive interactive. One such interactive was actually a part of the last exhibition I worked on, at the Canadian War Museum. Visitors would walk in front of a large wall panel of plastic semi-opaque squares. Their movements would trigger what was essentially a game system, which would then light up the squares in their immediate presence. The more visitors in front of the wall, the more lights would turn on. The purpose, as part of an exhibition on remembrance, was to invoke the idea of collective as well as individual memory, and it was extremely effective. The idea, and the visual execution were very simple, but the physical execution was really quite complicated. The interactive, as a result, was more of an art piece, but was a critical component of the overall exhibition.



The light wall, Vimy: Beyond the Battle, Canadian War Museum (photo by Patricia Grimshaw).

Active, or Physical Interactives

Other interactives I've both used and worked on have been incredibly simple, in design and installation, as they were merely pieces of paper. In my experience, visitors *love* to be asked for their opinions or thoughts on any given topic, whether political, historical, or even sentimental. One of the easiest ways to do this is through a sticky note wall. The question can be part of a text panel, with blank sticky notes and pencils placed on a table or writing surface, or you can have sticky-notes pre-printed with a question. Visitors respond and post their comments on the wall for others to see. It's like Twitter, only much simpler! These comments need to be monitored and curated, essentially, every day to remove inappropriate notes, and to make room for the next day's visitors. However, I have found this method to be both cost-effective and easy.

Post-it wall! Stock photo

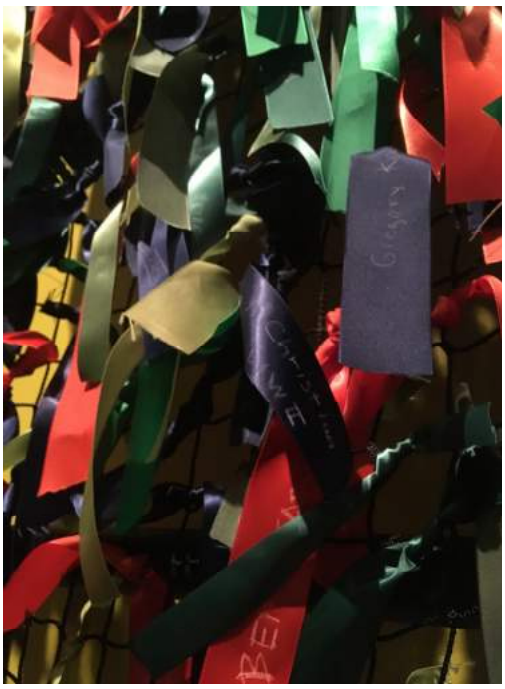
Other ideas that I've seen work well are magnet word boards, much like magnetic poetry (they can be customized and purchased in bulk from several online sources), as well as buttons and stickers (although these often cause issues for collections, as visitors like to put them all over the place). Any search for "museum interactive" on Pinterest will bring up a stunning array of ideas (believe me, I'm on there all the time!).

Whatever You Do, Engage the Visitor

I'm particularly proud of the physical interactives we developed for the remembrance exhibition, *Vimy: Beyond the Battle* (Canadian War Museum, April – Nov 2017). They were really quite simple. There were no electronics; we used pencils, paper, ribbon and modeling clay.

The first was a twist on the sticky-note idea. Instead of asking visitors to comment and post their note for all to see, we asked them to write a note *to* or *about* someone, as a tribute, or memory. They then folded it and put it in a box. Others could see how many notes were in the clear acrylic box, but could not read them. What made this particularly special was that the notes were written on paper that had been embedded with poppy seeds. These sheets were subsequently planted on the green roof of the museum, to sprout as poppies, just like those see in the fields of Flanders during the First World War.

Next, and in a similar way, we asked visitors to write a tribute or name of someone to be remembered on a piece of coloured ribbon, which they would then tie to a mesh structure. As the exhibition went on, so the mesh ribbon wall would grow. It was impossible to read the names of those who were being remembered, but that was not the point. Rather, it was to see just how many of us remember, as an act of collective memory using individuals (sort of like the light wall). It was extremely effective, and one of my favourite installations to date.



Ribbon interactive, and close-up, Vimy: Beyond the Battle, Canadian War Museum (photo by Patricia Grimshaw).

Lastly, we invited visitors to use white modeling clay (which we had cleared with our conservation and collections team), to sculpt their own memorial, which they could take with them or leave behind on display, inspired by the maquettes from the Vimy Memorial which were on exhibit in the room. I was astonished each and every day by the creativity of our visitors. They really took to this activity. Some made simple memorials; others used pens, keys, and what they had on hand to create elaborate and intricate carvings. One of my favourite daily activities was going in to the gallery to see the new sculptures that had been left behind. I was never disappointed.

No matter what you do for your exhibition, whether it is big or small, the trick is to make sure that your interactive is something that relates directly to the story you are telling in your exhibition, and one that visitors will enjoy using, and preferably learn from. It does not have to be complicated or expensive; it just has to be a good fit.

I, and my consulting company, museologik, can be reached via email at grimshawp@msn.com, or via facebook at www.facebook.com/patriciagrimshaw01

Visitor sculpture, Vimy: Beyond the Battle, Canadian War Museum (photo by Patricia Grimshaw)

What the Holiday Season Can Teach Us About Interpretation and Exhibit Design.

Chris Brusatte,
Interpretive Planner
Taylor Studios, Inc.

A Christmas tree outside the Overseas Museum in Bremen, Germany.
Photo courtesy of Joachim Kohler Bremen / WikiMedia Commons.

If you're like me, you probably get sick of the constant barrage of holiday ads, songs, displays, and themes that make our lives a hue of red-and-green beginning well before November. It seems that our televisions, radios, and department stores have all been taken hostage until the New Year! Although it might be counterintuitive, I want to play the devil's advocate. Rather than bemoaning this constant barrage of holiday-themed, multi-sensory overload, I want to posit that we in the fields of interpretation and exhibit design can actually learn from it.

We Hate to Admit It, But They're Successful!

I think that we'd all admit that those who market the holidays do a pretty great job of it! When was the last time that you spent two to three months thinking about any other time of the year, or any other holiday?

When was the last time that you sung a "Father's Day carol" or baked "Constitution Day cookies"? Whether we like to admit it or not, those who market the winter holidays do a fantastic job of grabbing our attention, immersing us into their world of holiday excitement, and engaging us in their holiday activities (*i.e.* usually buying one thing or another!).

So what can we – the exhibit designers and interpreters of the world – learn from them?

- **First of all, the importance of relevance:**
  As all good interpreters know, a successful exhibit or program must be relevant to the lives of those who visit the site. People become engaged only when they can relate to something personally. Those who market the winter holidays know this all too well. The classic example is the luxury car commercial that somehow makes every viewer feel that they want to buy a new expensive vehicle with a big red bow on top. For most of us, buying a new $50,000 Lexus as a gift for someone is the *furthest* thing from our minds. But the commercials always make the scenario feel relevant to us – for example, who hasn't had that experience of standing forlornly in a store trying to find the right gift for someone? The lesson: figure out how to make our content relevant, even if visitors might not think that it relates to their own lives.

- **Next, the importance of immersive environments:**
  Another thing that holiday marketers do well – creating wholly immersive environments in order to evoke feelings, emotions, and desired actions. Visit a Macy's ten months out of the year, and it looks pretty much the same. But come November, it is decked out in Christmas trees, red ribbons and bows, and even life-size nutcrackers! Why? Because they know that immersing shoppers in this environment creates an emotion-laden mood, one which will make them more receptive to certain actions. In exhibit design, we should also utilize fully-immersive, multi-sensory physical spaces – not to get people to "shop" for some type of gift, but rather to "consume" the important content that we're presenting.

- **Finally, the importance of a shared social experience:**
  The best marketers realize that the holidays are not merely about getting presents – rather, it is the communal and social experience of both giving and receiving. Interpreters and exhibit designers would be wise to realize this too – visitors to museums and interpretive centers do not only want to passively receive information (not matter how rich the information is), but they also want the opportunity to *give* something of themselves to the exhibit or program. That is why co-curatorial exhibitions are becoming ever more popular. Twenty-first century visitors still want (and need) to receive something valuable from a cultural institution, but they also desire to create part of the experience themselves, to leave part of their own experience in the space, and to help "curate" the exhibit space or the program for other visitors. As with the holidays, the best social experience is one where they both give and receive, and where they get to share an experience with many others communally.

So there you go – perhaps the next time that you see a giant Santa or get handed yet another stale candy cane, you might remember that the constant buzz of holiday immersion is not all that bad. As exhibit designers and interpreters, there is much that we can learn from these long two months. However, rest assured, I will be the first to celebrate when my local Wal-Mart takes down their Christmas aisles!

Chris Brusatte
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Production Process for a free-access Audio Guide for Manor Farm Heritage Site, Hillingdon, UK

Pamela Glintenkamp
Freelance Media Producer

This article describes the production process for the new 40-minute audio guide for the Manor Farm Heritage site, in the London borough of Hillingdon. The outline of this process may be of interest to interpretation professionals who are considering producing an audio guide, but are unfamiliar with the steps involved in creating this sort of interpretation project.

Manor Farm houses a unique collection of historic buildings, archeological remains and landscape features, set in 22 acres of beautiful grounds. It is Hillingdon's flagship heritage and cultural site.

Manor Farm House

Visitors who experience the audio guide explore more than 1,000 years of history, in eight different locations, both indoors and outdoors.

Hillingdon posted a Request for Quotation (RFQ) / Invitation to Tender on the council's Capital E-Sourcing procurement website. I responded to the RFQ via this system, in a competitive process, and was awarded this production contract. In my role as a producer of interpretive video and audio projects, I've previously created audio guides for a range of clients including an exploration of the architecture of Frank Gehry's Walt Disney Concert Hall in Los Angeles, the History Gallery at the Nevada State Museum, and the Berkshire Botanical Garden.

Once the contract was awarded, the main client point of contact for the project was Manor Farm's Community Activity and Heritage Officer, Claire FitzGerald. The brief for the audio guide was to offer visitors an increased experience of the site, on a self-guided basis. Audio delivery would improve the inclusivity of the site's already existing text-based interpretation package. The audio guide made it possible to bring the history of the site to life, via the use of engaging narration voices, character voices reflecting various periods in the history of the site, archival recordings, sound effects, and music.

The Manor Farm team had already written a draft script for the audio guide, prior to posting the RFQ. Once the production contract was awarded, the first task I had to undertake was to review the script, and suggest revisions, additions, clarifications and omits. I worked collaboratively with the client to arrive at a final script, ready for recording.

One of the most important aspects of an audio guide script is to ensure that the writing is appropriate for the ear (listening). This style of writing can be quite different to content developed for text (reading). For an audio guide, the most effective approach is typically to establish a somewhat casual and conversational tone, which successfully maintains listener engagement. Here's a simple example: Whereas printed text might start a sentence with "thus", or "therefore", an audio guide script might begin the sentence with "So…", as one would say in conversation. Similarly, it's helpful to use contractions, such as "it's" instead of "it is", or "that's" instead of "that is". This, too, makes the narration delivery more conversational, and encourages the flow of content.

One of the important considerations in the development of the Manor Farm audio guide script was to ensure that the content supported the other interpretive text content in the displays, but did not replicate it. In other words, the audio guide should supplement the on-site experience, rather than being an alternative way to present the same content that is already available to visitors in text panels.

It was decided that the narration voice would be recorded by two different actors. The alternation of a narration voice in an audio guide has two positive effects. The first is that the attention of the visitor is more effectively held, when the voice they are listening to changes. This might involve alternating narration voices. It can also be accomplished by the inclusion of excerpts from archival audio recordings of dramatic readings of archival or documentary material.

I provided the client with three casting options for each of the two narrators (which we referred to as Narrator A and Narrator B). Each of the proposed actors recorded a short section of the audio guide script. To present the voice options to the client I cut the samples together, juxtaposing the different options for Narrator A and Narrator B, in all possible combinations of the 6 potential actors. It was important for the client to judge each voice option not only for the quality of the voice on its own, but also to experience how the two voices would work adjacent to each other, since this is how the two narrators would be heard within each audio guide stop.

There are a number of character voices in the Manor Farm audio guide. For example, when the visitor explores Manor Farm House, they can see what remains of the 18th century wallpaper that used to decorate the interior of this impressive building. It's the oldest known domestic wallpaper in England to still remain on its original wall. The audio guide stop that discusses the wallpaper includes the voices of salesmen from the "Blew Paper Warehouse", where the wallpaper was originally designed and sold, as well as supporting sound effects such as the bell that rings when the warehouse door opens, and the hushed voices of customers in the background. If you'd like to listen to this content, select stop 5 on this page: https://www.hillingdon.gov.uk/mfaudio

Wallpaper in Manor Farm House

Farm Tools in the Pram Shed

Another audio guide stop in the Farm House provides a glimpse into the building's function as a Manorial Court. Following the narrator's introduction, the visitor hears a short scene of the court in session; the voices of three court officials are heard in an echoing hall, and are punctuated with a court gavel, and the scratching of the clerk's pen. The history of the space is brought to life with sound effects and character voices such as these. If you'd like to listen to this content, select stop 7 on this page: https://www.hillingdon.gov.uk/mfaudio

Incorporating excerpts from archival recordings is another way to enliven audio guide content. The old Pram Shed at Manor Farm contains a collection of 18th and 19th century farming tools. The audio guide stop for this location includes an excerpt from an archival recording of reminiscences of a local resident, who recalls using an old milk churn, similar to the one that's exhibited at Manor Farm.

Once the narration and character voices were recorded, and the archival material was selected, I created the first audio edit for review by the client. The edit included proposed sound effects, and where appropriate, music, to set the mood for certain stops. The client provided feedback on each audio guide stop, and I implemented the requested minor revisions. The audio guide is available to visitors as a free download from the Manor Farm website: https://www.hillingdon.gov.uk/mfaudio

Users can "right click" each audio file on this page, to download individual MP3 files. They can then preload the guide onto their smartphones or tablets, in advance of their visit. They can also play the audio guide stops on the web page directly from their mobile device while they are at Manor Farm.

Additionally, a limited number of MP3 players and headphones are offered, for free loan, from the Manor Farm Library. This way, individuals who don't have smartphones also have the opportunity to take the audio guide.

The scope of work for the commission also included adapting a pre-existing map of the Manor Farm site, to include the locations of the audio guide stops. The map is available as a free download from the Manor Farm website. It's also available as a paper handout, when a visitor borrows a free MP3 player from the Manor Farm Library, if they use this facility to take the guide.

Audio Guide Map

A launch event for the audio guide took place this past Spring. The community gathering included an afternoon of family activities.

In addition to being a resource for visitors to Manor Farm, the audio guide is also used by school groups who visit this heritage site.

Interestingly, in our digital age, I work with many of my audio guide clients remotely. The client provides photographs of what is seen at each audio stop, and this reference imagery is used to support script development and production. This approach allows the production to avoid travel expenses to visit the location, where budgets are limited; the budget is used exclusively to support the creation of high production value content. In the case of the Manor Farm project, it was a pleasure to work with the team in Hillingdon directly, and have an opportunity to visit the extraordinary structures that have survived at Manor Farm. It was extremely gratifying to bring the history of this unique heritage site to life with the production of an interpretive audio guide.

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Treasure Hunt! An augmented reality app for enhanced exhibit engagement.

by
Dr Eleanor Yeld Hutchings

Save Our Seas Foundation Shark Education Centre

The Save Our Seas Foundation Shark Education Centre in Kalk Bay is ideally situated at the edge of False Bay in Cape Town, South Africa, overlooking the ocean and the distant Hottentots Holland Mountains and right on the doorstep of the incredible Dalebrook Marine Protected Area, forming part of the greater Table Mountain National Park Marine Protected Area. This beautiful environmental education centre was recently redeveloped in collaboration with Sunfish Consulting, designing interpretation exhibits around the theme "Sharks are awesome, not fearsome". This enabled those who are afraid of sharks to realize that while being afraid is completely acceptable, you can be afraid of something and still find it fascinating, and appreciate the awesomeness! Taking nothing away from the very real fear of sharks that many people have, but at the same time showcasing the wonderful creatures that they are. It also left room to expand on the context in which sharks occur, so bringing in the rest of the oceans and marine ecosystem focus. "Sharks are awesome, not fearsome" was then further interrogated to develop into a storyline, highlighting what we wanted people to learn and incorporating the information that we have been teaching here, to allow is to use the Centre as a teaching tool that supplements our lessons.

Once the Centre's interpretive exhibits were completed, there was one challenge remaining, and that was how to ensure that the children (and others) visiting the Centre really engaged with every aspect of the new exhibits and signage, and that they connected the storyline theming that links each area of the exhibits to each other. We also wanted a way to incorporate the floor space of the Centre with all the elements into the formal taught programming that we do, rather than just free time to look around. With that in mind, Sunfish Consulting approached a company called RetroEpic with a brief from the Shark Education Centre to develop a "Treasure Hunt" app, utilising Augmented Reality, that would lead players around the Centre with mandatory explorations of every exhibit - from the signage to the detailed information within the exhibit itself - in order to earn a "reward".

The app development took a long time, and many very detailed sessions with the Education team and the RetroEpic team, in order to ensure that everything was perfect from the wording of the questions to the pictures used as clues.

Because we have a wide range of ages and abilities visiting us here, we developed four different levels, known as “Adventures”: Shy Shark (foundation phase, grades R-3), Guitar Shark (intermediate phase, grades 4-6), Great White Shark (senior phase, grades 7-9), and Whale Shark (FET phase grades 10-12, and adults), each with an increasing level of difficulty and complexity. Each Adventure consists of 6 “Quests”, which are the different areas or themes found within the Centre. These are Kelp Forest, Rocky Shore, Sandy Shore, Shark Central, Sharks & People, and Caring for our Planet. To unlock your Quest, you need to locate a picture with a clue prompt, and this presents you with an augmented reality treasure chest that springs open to reveal your tasks. There are 5 or 6 tasks within each Quest. After successfully completing all the Quests, you are given a SOSF Shark Education Centre bumper sticker, and this in turn unlocks an augmented reality version of that Adventure’s name shark, which displays a characteristic behaviour when tickled (e.g. the shyshark curls into a ball and covers its eyes with its tail).

We have finally managed to get the App functioning exactly as we want it, and have tested it on a number of our Holiday Club and teacher groups, with great success and huge enthusiasm from the testers! The Treasure Hunt app, we believe, is a huge and exciting step forward in our mission to engage people, in order “To connect the public to the marine environment through experiential education programmes that focus on sharks and local marine ecosystems in order to nurture ocean awareness and environmentally responsible actions”.

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Augmented Reality: what has changed in six years?

Dan Boys
AT Creative Ltd

Everyone will have their opinion of Augmented Reality (AR). It has been around for more years than most people will realise. It also means different things to different people. We define it as adding a digital layer over the real world. There was quite a big fad a few years ago of bringing magazines to life with AR, and the heritage sector has also been experimenting with this technology too. Here is a brief analysis of our first hand experience of developing two AR apps, six years apart.

Mission:Butterfly

Our first foray into AR was back in 2012, but we certainly weren't the first. We created a Pokemon Go style game (well ahead of Nintendo, I might add) whereby app users had to find virtual butterflies in a nature reserve and then see how many they could catch by tapping the screen when a butterfly came into view. It required a bit of moving and twisting around.

That might seem a bit lame, but the idea was visitors used the app to explore the reserve and find a different species in each area. After playing the game at each new location a new species would appear in your 'collection jar', where you could learn about its habitat and habits. The app also contained a simple interactive about the four stages of the butterfly life cycle. Fun and educational.

The impetus behind the app was to celebrate the nature reserve as one of the few places in the UK where the marsh fritillary could be found. However, because this butterfly is only 'on the wing' for a few weeks each year, the app allowed you to 'see' it all year round. The app was of course aimed primarily at children and proved very popular with the visiting school groups, but it was only compatible with a limited number of mobile devices - on some devices the experience was very slow and unresponsive ('laggy'). Fortunately, the visitor centre on site had several suitable tablets visitors could use on the reserve. However, the council we worked with let their App Store license lapse and the iOS version disappeared with it. They also weren't in a position to fund updates required to maintain the app - this technology has moved on quite a bit from those early days - and the android app is also no longer available. All that remains is the promo video we put together - https://youtu.be/lZDOmRfaqJE

So we had mixed emotions about this project. On the plus side the concept we developed worked really well but the technology really wasn't up to scratch. In this instance we were definitely ahead of the curve, and thought more apps of this type would follow in time. Even today AR only works on a small, but growing, number of android devices, and Apple have only relatively recently launched their own code (AR Kit) for developers to use in iOS apps.

Minehead Maritime Mile

Earlier this year West Somerset Council commissioned us to develop an AR app for one of their premier seaside towns. Using the resulting Minehead Maritime Mile app visitors can unlock bonus content as they walk along the mile-long seafront. 3D models of some of Minehead's iconic maritime history are brought to life with AR, and archive videos reveal how the town used to look in yesteryear. The app also features a quiz, with a prize for those who complete it, and souvenir selfie frames to share with friends, family and followers.

The 3D models include a Victorian bathing machine and a 19th century boat. Using AR visitors can place the very realistic models on the sand and harbour respectively, and explore them in detail (at-creative.co.uk/project/minehead-maritime-mile-app).

At the time of this project there were only about 10 android devices (out of 1000+) that supported AR Core (Android's official software for enabling AR on their Operating Software). This figure is now rapidly growing - see https://developers.google.com/ar/discover/supported-devices - but to make the 3D models as accessible to as many devices as possible we included short animated videos of the models and also uploaded them to sketchfab.com. Sketchfab allows you to interact with the models in a web browser.

In summary

It may be interesting to note that in both instances we did not propose the idea of AR to the client. We were invited to tender for these projects once the use of this technology had been agreed internally and the funding secured. But we were certainly excited to see how we could make it work as an interpretive experience.

So what has changed in those intervening years between Mission:Butterfly and Minehead Maritime Mile? Firstly, mobile devices have much faster processors these days so we no longer see the laggy behaviour of yore. Secondly, the software is now natively supported; app developers no longer have to work with third-party AR software (SDKs), and all the perils that brings e.g. changing how it works without warning, or dramatically upping their price plans. This was a massive issue that led to use staying well away from the technology.

In my opinion, prior to the introduction of AR Kit and AR Core it was a real minefield working with this technology, for both developers like us and clients. Looking forward I see more stability and this will help reduce costs and broaden the type of organisations that can use it. Currently, in our sector the majority of AR apps have been developed for the 'big' museums, who have needed large sums of money to enable these projects.

I am most excited about the opportunities AR offers for the outdoors, but of course the key thing, as with any technology, is to only chose AR when it is the best tool for the job. This requires careful planning and ensuring the story and the experience leads the technology, not the other way round. I now believe we are entering a period where developing AR apps, and more importantly supporting them to be futureproof, will be far more stable as we enter 2019. It is up to creative minds to create experiences that really show off how powerful this technology can be.

I hope this insight will prove helpful if you are considering such a project. Feel free to get in touch to discuss this or other topics related at outdoor digital visitor experiences - hello@at-creative.co.uk.

*Audio Trails have changed their name to **AT Creative**.*
Why? To reflect the wider range of creative services we offer.
Read more at at-creative.co.uk/about.

"A Look at Culinary Delights from the Old South during Holidays in the 18th and 19th Centuries"

Dr. Martha Benn Macdonald

When you think of the holidays during the 18th and 19th centuries, you may recall enjoying, or reading about, the delicious creamy peanut soup served at the King's Arms Tavern in Colonial Williamsburg. Or you may remember Sally Lunn bread. What about she-crab soup? Perhaps you wonder what other dishes were served.

When families gather around the table at Thanksgiving or during Christmastide, they often enjoy special dishes which have been served through the years. Someone bastes that ham with brown sugar and punctures it with whole cloves or dusts it with nutmeg or mace. Another fills it with greens, spices, and Tabasco sauce. Some families enjoy escalloped oysters, others a crab casserole, still others a shrimp dish. Some insist on turkey, pheasant, goose, or duck, to name a few. And then there are various salads, vegetables, breads, desserts, and usually an assortment of wines.

Some individuals are fortunate to have an ancestor's diary, others simply oral tales passed down from one generation to the next, someone having remembered the time Great Aunt Constance accidentally put pepper in the sweet potato pie. Oh no! And there we go. A friend recently told me that ever since she was a child, she recalls having sweet corn on the cob on Christmas Day. No doubt, that custom began long ago.

What do cookbooks tell us? A great deal! Reading cookbooks offers stories, traditions, and a host of "receipts." Some especially fascinating ones are *Maryland's Way* (1963), *Charleston Receipts* (1950), *Virginia Hospitality* (1975), and *Carolina Low-Country Cookbook of Georgetown, South Carolina* (1963). Other cookbooks certainly trailed or led the way. When we read the ingredients, we wonder about calories and allergies☺. Adapting the "receipts," however, for certain lifestyles is easy enough. What makes these cookbooks especially engaging is that some include pictures of historic homes, taverns, churches, old inns, along with scenes of fishermen, boats, and images of bowls, silver, and crystal. Some cookbooks feature floral or fruit arrangements. In addition to showing decorations which often featured ivy, holly, magnolia, and bayberry, others mentioned music being played.

Of course, Thanksgiving and Christmas were the primary feasts, but many colonists celebrated occasions throughout the year---Twelfth-Night, Robert Burns Day, St. Valentine's Day, St. David's Day, St. Patrick's Day, Easter, Easter Monday, May-tide, summer events, Holy-Cross Day in September, St. Michaelmas, All-Hallows' Eve, All Saints' Day, St. Cecilia's Day, St. Andrew's Day, and a host of others.

For example, General George H. Steuart who lived in Baltimore wrote to his son in Londontowne, Maryland, about an event sponsored by the society known as The South River Club in May of 1852:

You must remember that I am to serve at the Club on Thursday, the 2nd of June and you must have the cart ready at the Ferry on arriving of the boat at 10. . . .A fine lamb to be killed on Wednesday, the forequarter roasted and the hindquarter boiled, the other two quarters can be put in ice in a cloth and sent to Baltimore the next day, Thursday, in a large basket, with strawberries, etc., etc.

Several dozen crabs must be caught crabs must be caught and immediately boiled, picked and partially baked so that they can be warmed up the next day, to be seasoned with salt, pepper, and butter. You must have some asparagus ready to be boiled and I will bring potatoes and peas. . . .Of course I shall bring bread, sugar, lemons, brandy, whiskey, pepper, mustard, salt, etc. . . . . Let the ice be sent down by Mr. Purdy early in the morning and also the fresh butter. . . .Instead of pone, Lucy may prepare two or three nice Johnny cakes. I forgot to mention that I shall bring a boiled ham, and a fine piece of beef (*Maryland's Way,* 328).

Celebrants met on a country lane in a one-room building between All Hallows Church and Londontowne, and the deed for the South River Club was drawn up on July 3, 1740 (Ibid.). All celebrations included a round of spirits, to be sure, and pipes with tobacco. What a celebration this must have been!

The pictures in this book, the ones in *Virginia Hospitality*, and in *Charleston Receipts* are especially lovely. In the Charleston cookery, we enjoy words from Gullah: ". . . .Crab got tuh walk een duh pot demself or dey ain' wut," or "'She-Crab' is much more of a delicacy than 'he-crab,' as the eggs add a special flavor to the soup. The street vendors make a point of calling 'she-crab' loudly and of charging extra for them'" (37). And that she-crab soup with generous tablespoons of sherry is "to die for," as the contemporary expression goes, even if you are dairy intolerant.

You may be able to purchase these books online or find them in a used bookstore. Even if you cannot find one of these, others are to be had. Besides, rummaging around in used bookstores makes for an afternoon of entertainment, especially over a cup of tea or a glass of wine. Even though you may awaken the next day with a stuffy nose from the dust and the cobwebs, hopefully you won't regret your time. The bookstore just below the old inn in Little Switzerland always beckons me. "Olde" always invites me, whatever.

Recently studying Charles Frazier's *Varina* (a very engaging, beautifully written novel) to review at the oldest book club in Rock Hill, South Carolina (oh, wow!), I found myself rereading Mary Chesnut's *Diary from Dixie.* Why? Varina, Jefferson Davis' wife, and Mary Chesnut were extremely close friends. For all of their differences, they were very much alike. Mary Chesnut shares with her readers various meals which she enjoyed with friends. Food, parties, and friends were important to her. On Christmas Day in 1863, when friends gathered in Richmond, Mrs. Chesnut wrote, "We had for dinner oyster soup, besides roast mutton, ham, boned turkey, wild duck, partridge, plum pudding, sauterne, burgundy, sherry, and Madeira" (*A Diary from Dixie,* 268).

And William Gilmore Simms in *The Golden Christmas,* which I described in an article for this online journal last year, described the "Boar's Head, with a mammoth lemon in his huge jaws, and enveloped in bay leaves and rosemary" (149).

Like General Steuart, I am already planning what delights I'll serve with tea in November when I am hostess for our book club. Reviewing *Varina,* I will find "receipts" for sandwiches, cookies, and cakes referenced in the novel and in *A Diary from Dixie).* Wherever you live, dig into your regional culinary pleasures of the past, and enjoy.

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Exploring Nine Mile Canyon

Cindy Maynard, photography by Bob Maynard

There were very few other visitors exploring Nine Mile Canyon in northeastern Utah, west of Green River when we visited in mid-February. It was cold but snow-free, and the road was dry, perfect conditions for unhampered inspection of the thousands of petroglyphs we would find. Despite the frenzied development of oil and gas resources throughout the West, this valley retains the uncluttered feel of previous decades. John Wesley Powel called this area a "region of wildest desolation."

If you never knew the rock art panels that abound in Nine Mile Canyon existed, you would still be impressed by its beauty. Finely-bedded Green River sandstone deposits create delicate winding fins that catch the setting sunlight above the valley floor. During the spring and summer months the perennial stream, fed by springs, is one of the few that does not run dry, keeping the valley lush and green.

Nine Mile Canyon is close to sixty miles long. And no one seems to agree on how it got its name, though there are many explanations. The most-repeated explanation is that the cartographer of John Wesley Powell's 1871 expedition used a nine-mile transect to map the canyon. The explanation I like the best asserts that a man named Miles settled in the canyon. Miles, his wife and seven daughters made up a family of the "nine Miles," giving rise to the name. The canyon stretches from its confluence with the Green River in Desolation Canyon to its westward headwaters high up on the Tavaputs Plateau.

The first European Americans to identify Nine Mile river and canyon were members of John Wesley Powell's 1871 expedition. The canyon was home to the Paiute people who lived there at the time of European contact. Whether the Paiutes replaced, displaced, or assimilated with the previous Fremont culture is still a matter of hot debate.

Archeologists agree that the rock art in Nine Mile Canyon was produced by the Fremont Indians. The Fremont culture was a northern variant of the Puebloan culture that dominated the Southwest for many centuries before the Paiutes appeared.

"Fremont people generally wore moccasins like their Great Basin ancestors rather than sandals like the Ancestral Puebloans. They were part-time farmers who lived in scattered semi-sedentary farmsteads and small villages, never entirely giving up traditional hunting and gathering for more risky full-time farming. They made pottery, built houses and food storage facilities and raised corn, but overall they must have looked like poor cousins to the major traditions of the Greater Southwest, while at the same time seeming like aspiring copy-cats to the hunter-gatherers still living around them." (Snow, Dean R. (2009). Archaeology of Native North America. Prentice Hall)

If a proliferation of rock art is any indication of appreciation, the Fremonts must have loved this place above all others. The valley has been called the "Longest Art Gallery" in the world. Density of rock art creations ranges from thirty per mile in the upper reaches of the canyon to eighty or more in the middle portion. This is the greatest proliferation of rock art anywhere in Utah.

A majority of the images are fully filled in with thousands of tiny pecks so they look like solid figures. Some are "stippled," filled in with fewer pecks, and some are simply outlined. Some pictographs are painted red or white. Red pigment probably came from hematite or iron oxide, and the rarer yellow paint from limonite. The petroglyphs depict both familiar and very distinctive figures. Many of the motifs found throughout the Southwest, like the ubiquitous "sheep" figures, hunting scenes, and spirals, also abound. But there are also images unlike those we've seen elsewhere, including horned snakes, and sheep-like figures with heads on both front and rear ends, and one with a bizarrely elongated neck. The many images consist of long strings

of dots, dots arranged in orderly rows, and grids hint of counting systems. Most of the panels teem with dozens of mysterious, fantastical images. European settlers have given them fanciful names, like "balloon man," who appears to be juggling balloons, and "four-armed man" who seems to have long curving arms growing out of his head. The images are fodder for the imagination. Since we can't know their actual significance, they feed the impulse to sit around the campfire and dream up explanations as fantastic as the images themselves.

There are more than 150 prehistoric man-made structures, storage facilities and pit houses scattered throughout the canyon as well. Archeologists believe that the Fremonts who called this place home moved from place to place within the canyon. The population may not have been very great, but since each family group moved camp frequently, they could decorate their rocky environment wherever they went.

Only a few Europeans settled the canyon before 1886 when the Buffalo Soldiers of the U.S. army built a road through the canyon to connect the Uintah Basin to Price, Utah. One of these early visitors left a permanent mark, the inscription: S. Groesbeck, August 19, 1867.

The road brought more people into the area and pioneer cabins began popping up. Ben and Myrna Mead, long-time Nine Mile Canyon residents and historians, have painstakingly restored three historic cabins built by original settlers, Al Thompson, Housekeeper Cabin, and the Edwards Cabin.

If you want to stay overnight, the only option within the canyon itself is Nine Mile Ranch, a "Bunk n Breakfast" with eighteen camp sites, three guest rooms, and four cabins. Three of them are the are Ben and Myrna's restored historic structures. Ben and Myrna Mead have operated a working ranch here for twenty-one years. They epitomize the grit and determination of the early settlers, and the open friendliness of perfect hosts. They are remarkable people who, like the wondrous canyon that surrounds them, should be named national treasures. They have deep roots in the area and may fill your ear with the wonderful lore and history of this stunning place.

Nine Mile Canyon has not been developed into a Disneyland of archeology. Signs, if they exist at all, are small and hard to spot. The sites, like all archeological treasures in the Southwest, are vulnerable to defacement and desecration by thoughtless people, both visitors and locals alike.

Text by Cindy Maynard, photography by Bob Maynard. Bob is a full-time professional photographer and has operated Colorado Plateau Photo Tours since 2008. His photography has been exhibits in galleries and museums throughout Colorado and Utah. Cindy has published 3 books, two in conjunction with Bob's photography and an historical novel. She is currently working on a fourth book. Both have taught classes in interpretation.

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The nature interpretive design of Teelorsu Nature Trail for an ecotourism of Umphang Wildlife Sanctuary, Thailand.

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The following presents applied research in social science of technological applications for the interpretative planning of natural resources. The objective for the interpretative plan and facilities design of an intensive use zone was to assess the potential resources of the area and to establish an interpretative pattern as well as appreciation, understanding, and protection of the consumptive use of visitors or people who have an ultimate goal of increasing environmental impacts. This study was applied using the Recreation Opportunity Spectrum (ROS) theory, which is concentrated to receive recreational experience and carrying capacity of the area and integrates with natural landscape planning. Primary data was used—tools such as questionnaires and interview schedules, and secondary data included collection of bio-physical, social, cultural and reported research relating resources with users of the area. Site surveying, used the GPS and total station instruments of area mapping for interpretative planning followed by the result of ROS assessment.

The result showed that planning theory was conflicted by administrative management area; this area has the highest potential resource 80.5 % of visitors (Thai and Foreign) recommended that the uniqueness was naturalness, and also 74.7 % was motivation of this visit for a closer nature and nature education, including ROS assessment was the primitive non- motorized area. On the other hand, this area as intensive use zone; it could be built for full-scale facilities. However, this study focus was to educate all users at the visitor center and build the necessary facilities such as a canteen, unit campgrounds and interpretative signs of the nature trail for ecotourism. The conceptual design focused on the environment; material concerns are based on sustainable design principles to maintain unique characteristics of the local people's lifestyle and respected nature. The amount of use was based on the capability of resources for implementation and the public.

Keywords; Interpretative Design, Nature rail, Ecotourism

1.Introduction

This was Interpretative panel of nature education of Umphang Wildlife Sanctuary Tak province research project. The objectives of the project were to establish the site plan and draw detail design, to facilitate visitors who come to participate in the activities which involve interpretation and education on nature and to concentrate on protecting natural resources, and to set nature leaning for the visitors who have entered to this project. Interpretation used was tools or media services in the area. In the development of ecotourism areas, site managers have to consider the overall resource potential of area, to identify suitable activities and levels of development that should be permitted that will not detract from the quality of the area, nor the quality of recreation experience. Facilities development will be consider the appropriate design of essential facilities within the tourism sites. The significance facilities was based on sustainable design principles following the conditions such as support the efficient and sustainable use of resources, Emphasize the harmonious relationship between physical structures and nature and avoid negative impacts on the natural environment of the tourism site, Utilize local materials in the development of facilities.[1], [3]

The concept of sustainable design was developed two decades ago with the growing concerns over resource utilization to minimize environmental destruction and ensure the sustainability of resource. Sustainable design point to future technologies that appropriate and in harmony with bioregional pattern and scale, and to maintain the biodiversity and sustainability of environment (maintaining the quality of the air, soil, water etc) at the same time the specified designs for natural and cultural resources at local, regional and global level.

2. Interpretation Philosophy

Interpretation must be setting knowledge and understanding to visitors *(Through interpretation, understanding)* and then they are appreciation *(through understanding, appreciation)* and protection of natural resources *(through appreciation, protection*)The objective of interpretation to aim of awareness and understanding of visitors to encourage the value of experience for visitors, and also to use as land management and promotion of organization.[3] Interpretation planning is preparing for the future to set activity programs and media guidelines for implementing (fig.1)

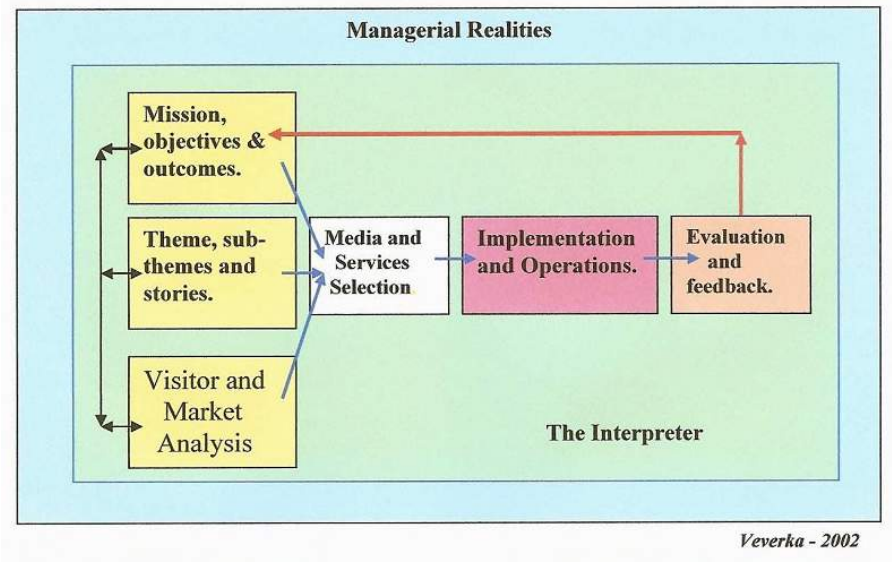

Fig. 1 Model of Interpretation[2]

Take a look at the interpretation model the block of **site or subject matter**—the story to be interpreted (what we want to interpret and main theme) the next block of the **objective**—the goal that we have expected to accomplish, the block of **techniques and service** signifies a number of option for presenting this program or service(live program, self-guided materials, exhibits, etc). The **visitors** portion of the model indicates that we need to have an accurate understanding of who our visitors are, their backgrounds, motives and expectations for participating in an interpretive program or event. A **feedback** is loop leaves for evaluation for sure if program, plan, or service was successful (accomplished its objectives) unless evaluate the program or services and visitor response. The **interpreter** is you because of every interpreter bring to the planning, design, and presentation of interpretive massages or own unique background, experiences, personality, and communication style. The block that surrounds everything is Managerial Realities. These are all of the events or circumstances that may have an impact on the planning, design, or development of any given program or service.

3. Methodology

In setting up the design for interpretation, the researchers will use the following methods of primary data

1) Survey and gather data about tourists, their activities, their opinions, and their desires for nature interpretation by the use of observation and the questionnaires are used for officials in the area and for nature interpretation, the development of current facilities by the use of observation while the officials are asked questions with the survey form to assess the suitability of the facilities according to the sustainable design.
2) Survey and gather data for resource potential of the area, and the impacts by using the observation, asking questions to the local area officials as well as looking into the acquisition and/or suggestion from visitors in order to systemize nature interpretation.
3) Survey the area and do the site analysis like visual, space, slope, the location of the buildings, river, water drainage, soil, vegetation, and wild animals according to the principles of landscape architecture by the use of observation. The area officials are asked questions with the use of maps derived from the survey and GPS.
4) Measure the length of nature trail with the use of compass and GPS to locate and find this trail in order to map them on the territory map of the study site and bring all the field data to write as a base plan by using the drawing programs

For the secondary data; Examine all the relevant documents such as the policy in administering the wildlife sanctuary and other aspects of protected areas, the data to communicate the nature interpretation as well as the model guideline in managing the site, then analyze and assess the resource potential, its strength, its weakness, opportunity, and threat (SWOT) and the development of recreation opportunity spectrum (ROS) of the recreation resource and the tourist data on activities, opinions, and needs in communicating and nature education by using social science aspect and the use of statistical program and also, synthesize the data of resource potential, tourist data/ user data in order to set up the overall perspective and theme, nature interpretation and nature education in the area. After that design propose for the facilities by the application of sustainable design concept.

5. Study Site

This area is a wildlife sanctuary of Umphang which is an important protected area of the country. It is situated in Umphang district, Tak province on the west side of the country. The area is connected to other wildlife sanctuary like Huay Kha Khang, and Tung Yai Naresuan. It is the only one left in this part of the country. This project requires diverse areas of researchers like forest ecology researcher, wildlife researcher, economic-social researcher, recreation planning researcher, landscape architecture and environmental sciences to assess the environmental impacts on the project. This will allow the researcher to achieve the goals in planning. The site for the project study is an important protected area for wildlife sanctuary in Tak province which is connected to Huay Kha Khang wildlife sanctuary.

Fig. 2 Accessibility to Teelorsu Waterfall

6. Potential Resource of an Interpretation

Recreation resource potential refers to the area, the place, and the natural and cultural sites which attract people to relaxation—especially natural areas such as waterfalls, caves, hot springs, natural monuments, and forests. The objectives of the Interpretative resource potential include the needs of users in each area and how to set up a plan, followed by the media design concerning nature education at Teelorsu waterfall. The attractive recreation resources include six sites, such as Teelorjor/Rainy waterfall, Hot spring, Pha lued nature trail, Intensive use zones (administration area or service area), Teelorsu nature trail, and Teelorsu waterfall.

Fig.3 (Left) Teelorsu nature trail surface in the rainy season (Right) Teelorsu Waterfall

Teelorsu nature trail is the focal point of Umphang wildlife sanctuary, the biggest waterfall destination in this region. Every visitor would come here. The trailhead starts on the west of the service shop in the administrative area. The trail length was 1,500 m (1.5 km), and takes thirty minutes to walk to the waterfall. It has no convenience facilities and the forest ecology was complete.

The trail contains important forest ecology and must be protected from recreational use. Developed facilities are the focus for environmental/ecological protection and are dependent on the carrying capacity of the trail and the area. The suitable interpretive media was SGT (Self Guided Trail) for limiting amount of use and protecting natural resources. Recreational experience would be received of the primitive non-motorized area.

7. Recreation Resource Assessment

The purpose for the recreation / tourism resource assessment in Umphang wildlife sanctuary is to assess the site potential of the five attraction sites that link to the administration area or intensive use zone (table 1). Therefore, it is required to set the term of reference and to determine the time constraints of this project. The considered factors of the attractive recreation resource are ecological abundance, physical situation of activities, accessibility and evidence of human activities observed in each area. The next step is to determine the weighted score (W)of the potential factors. After that we will get the analyzed results of each site to be taken into consideration in order to determine the rated score (R) of each factor, and to calculate the site potential with the weighting score equation [7],[8]

$$RRP = \frac{W_1R_1 + W_2R_2 + W_3R_3 \ldots W_nR_n}{W_1 + W_2 + W_3 \ldots W_n}$$

RRP = The level of the Recreation Resource Potential

$W_{1\ldots n}$ = Weighting score of indicators 1 to n

$R_{1\ldots n}$ = Rating score of indicators 1 to n

Indication of potential ratings divided into 3 levels

Low potential	Level 1.00 -1.66
Moderate potential	Level 1.67 - 2.33
High potential	Level 2.34 - 3.00

Table 1. Level of Potential Resources and ROS assessment of Recreation site Umphang Wildlife Sanctuary

Number	Recreation Resources	Potential Level	ROS Class
1	Teelorjor Waterfall	High	P
2	Hot spring	High	P
3	Pha leud Nature trail	Moderate	SP-2
4	Teelorsu Intensive Use Zone	Moderate	SP-2
5	Teelorsu Nature trail	High	SP-1

Notes: Teelojor Waterfall accessed by boats (Canoe) in rainy season (July-August)

8. Visitor Analysis

In collecting the user data to survey the users' attitudes, the researcher group used questionnaires written by the researchers. The population was from the tourist statistics in a six-year period from 1996-2001[7] with 81,215 tourists. (The calculated sample group was 400) However, due to the restriction of time in conducting this survey, the researcher group adapted the number of sample study to 200. (This constituted 50 percent of the calculated sample) This group was divided into 100 Thai tourists and 89 of these completed the questionnaires (44.5%) and the other group was 42 foreign tourists (21.0%). The last group was 15 officers working in the area (10.41% from the total number of officers).

The data analysis on Thai visitors shows that majority of these visitors (86.5) never visited the site and 11.2% used to visit the intensive use zone and Teelorsu nature trail. For the group that used to visit the site, 4.4% of them stated that they visited the site more than once. For the attitudes on the identity which needs to be preserved in Umphang area, most people at 47.2% said that the identities were nature, forest, wild animals while 20.2% said that the identities were the difficulty of accessibility, fame, trekking and rafting. 9.0% thought that identity was the grand size of Teelorsu waterfall. For the travel group of visitors that visited the site, 48.3% as the group friends while 32.6% as a travel agency group and 1.1% was family group. 2.2% was the mixture of family and friends and 4.4% came alone. There were other groups of visitors such as office friends and the mixture of friends and the travel agency. For the number of members visiting the site, it was found that the majority (14.6%) had 1-4 people in their groups. 44.0% had 5-9 members, 12.4% had 10-16 members, and 29.0% had more than 20 members. The average number of people visiting Umphang area was 17.25 people per group.

For the motivation of visitors visited Umphang area, the study found that the majority of visitors (34.8%) said that they wanted to be close to nature while 4.5% came to study nature. 6.6% came for meeting new people, to get away from congested environment and to relax with their friends/family members. The opinions on the useful media to visit the site, 14.6% stated that they learned from personal media (local guide, officers) while 11.2% learned from media posted on the nature trail. 6.6% learned from brochures/leaflets, information center and signs. 51.7% stated that they learned from video/slides and 15.7% said they got information from other sources like internet/different websites. The question on their opinions on the experiences of walking through the Teelorsu nature trail, the majority of visitors said that they had never used it before at 74.2% while 14.6% said that they used to come to the trail.

For the expectation that visitors had when visiting the site, the majority (83.1%) said that they would like to view the waterfall/scenery while 56.2% wanted to do rafting/boat cruise, 23.6% was on bird-watching and 37.1% was for nature walking study. The activities which visitors got to do was natural walking study at 37.1% while 46.1% said they were able to raft/boat cruise. For the opinions on the possibility of returning to the site in the future, 75.3% Thai visitors said they would return here again.

For the kinds of foreign visitors visiting the site, it was found that 100% of them never visited the place at all and most of them came for the first time. For the question on the identity which should be conserved at Umphang area, majority of foreign visitors listed its most natural setting at 33.3%. The second most identity was waterfall at 28.5%. The local people's helpfulness was at 4.8% and the mud was 2.4%. For the travel groups of foreign visitors, 45.3% said that they came with the travel agency while 14.3% said that they came with their family members. 11.9% of foreign visitors came alone or with other groups such as school group, colleague group. The most attractive aspect which foreign visitors wanted to come here was to be as close to nature as much as possible and this was 33.3%. The second attractive aspect was to get away from the congested area and other aspects like to study wild animals, enjoy the waterfall, to have an adventure, to hike in a long distance and to enjoy the elephant ride in natural environment The majority of visitors (90.5%) never had experiences in staying overnight at the site and this was why they didn't indicate the type of lodging. For the experiences in using Teelorsu nature trail, the majority of visitors never walked in the trail at 95.2% and most of them were very satisfied with the trail at 45.2%. and also, For the question about the comprehensibility of the media presented to the visitors, majority of the foreign (57.1%) said they learned from the brochures/leaflets the most. The second useful media was from personal media such as local guides and officers at 42.9%. 38.1% of the visitors said they learned from the Teelorsu nature trail.

The results of the analysis of officers' needs relating to interpretation by using questionnaire were that there were 15 officers from the total of 144 who respondent the questionnaires. For this study of Interpretative planning of natural resources for ecotourism development based on sustainable design concept of an Intensive use zone in Umphang Wildlife Sanctuary. Using resource assessment of theory application that shown on the first part. After that, bring resulted to set physical development priority of each site. For this case would be shown detail design of facilities design development on Teelorsu nature trail as followed on the master plan and interpretative panel of each station shown on figure 4-5

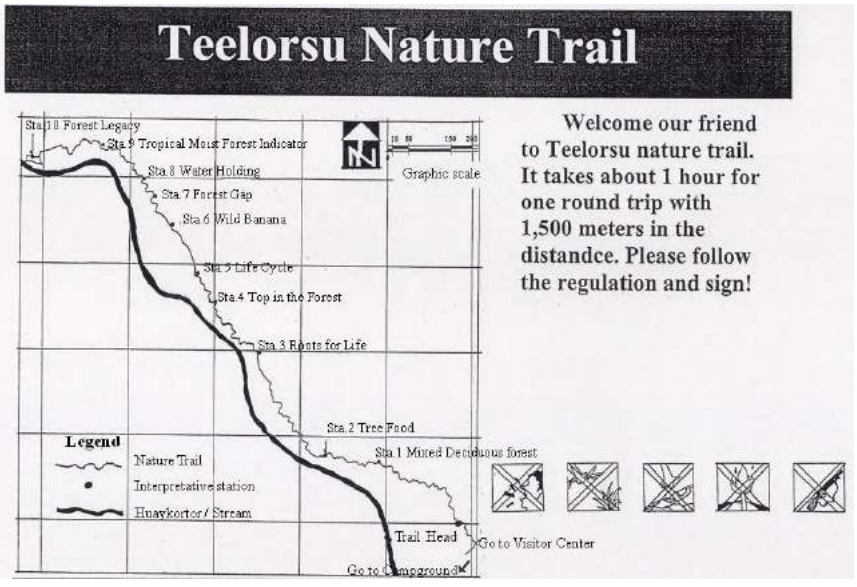

Fig. 4 Trail Head

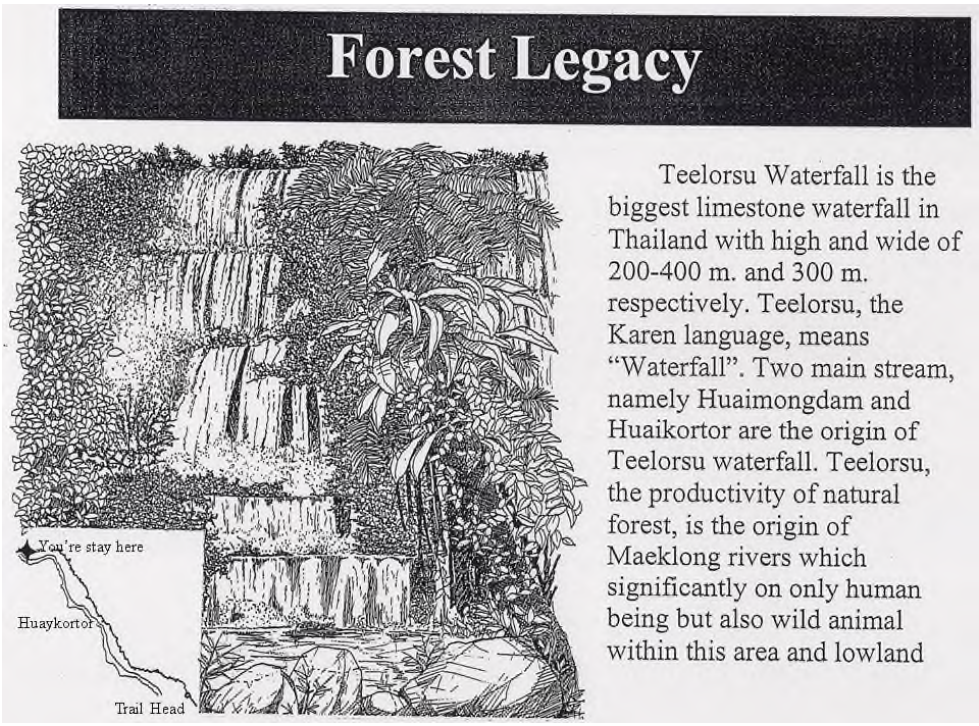

Fig. 5 Trai End ; Interpretive sta.10 Teelorsu Waterfall.

Conclusion

For using the technological application for the interpretative design and planning of natural resources for eco-tourism based on the principle of sustainable design for this study, it was found that the application of Recreation Opportunity Spectrum (ROS) which emphasizes on experience-based recreation planning approach depended on three important elements which have impacts on the planning level and the level of developing touristic sites. Such as the characteristic areas are physical setting, social setting and managerial setting [8] and these are the ones which control the factors in analyzing and assessing the conditions of the recreation sites. This will help categorize what to do according to the set criteria. The seven set criteria are accessibility of recreation sites, its natural condition and area development, chance of meeting people, visitors control and the system of enforcing regulations, the traces of inappropriate behaviors which tourists leave behind, the area management and to see tourists do inappropriate behaviors. It was found that the managing area of Umphang wildlife sanctuary was ROS class as a semi- primitive non-motorized (SP-1) area. This might be because such area has two accesses like by boat and by car in the summer time. Thus, this might have effects on the rate scores depending on the accessibility of the evaluators. On the other hand, it might be possible that this area has its natural setting which might make people think that they could access the place only by walking. This is a positive aspect of eco-tourism. However, the downside is in the future its ecology and environment area will deteriorate as it is easily accessible which will result in the higher amount of use and all other factors will be affected too.

The planning of interpretative system on natural resources can be adapted to all areas especially natural recreation areas, cultural, and historic site are tools or media to build understanding and increase knowledge about nature, and ecology system to visitors. [2],[6] This is to stimulate awareness in conserving natural resources, ecology system, the planning of landscape and the development of convenient facilities and it's adapted from sustainable design. There are nine factors: 1) the suitability of size and the ability to facilitate people of the area, 2) the harmony with nature, 3) safety, 4) usefulness, 5) the convenience in maintenance, 6) the vulnerability to destructive behaviors, 7) the use of local materials, 8) maintain or preserving local identity and its culture and 9) the maintenance area. [5] These were valued by using three levels of suitability like very suitable, moderate suitable and little suitable. From the assessment based on sustainable design, it was found that the managing area of Umphang had low suitability. The suggestion is to consider the significance of size, the number of convenience facilities which can facilitate visitors without having impacts on the area or having the least impact. Another consideration is to think about the patterns of convenience facilities which should be simple and harmonize with local identity and local people's way of life. The materials used should be biodegradable after use. The color of the buildings should harmonize with natural environment to maintain the ecological system to its perfect condition as much as possible. Therefore, the management team should understand the theory in planning the physical development of natural recreation and adapt it to use with the context or the geo-social of the area to preserve natural environment as much as possible.

Recreation area in Umphang wildlife sanctuary is suitable for eco-tourism because visitors can learn about nature/ecology system and local culture. This is because of its natural setting and there are quite a few convenience facilities. Tourists should be careful when they want to study nature and make sure that there won't be effects on natural resources and ecology system. This means that people are non-consumptive users or appreciative users. By doing this, visitors are the ones who visit natural attractive places which have their uniqueness and attractiveness rather than adapting/changing nature and developing convenience facilities. [1] The interpretative planning of natural resources in Umphang wildlife sanctuary is to emphasize tourists to get the experience of natural study or feel satisfied with natural environment. This will enhance good awareness on environment. Thus, there has been a plan to develop the interpretative panel in Teelorsu nature trail as well as necessary facilities to prevent the impacts of tourism on these attractive sites. There is also a plan to prevent danger which might occur to tourists by having interpretative signs, boardwalk and terrace to view the waterfall. The design patterns use harmonious with nature based on carrying capacity of the area.

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Project Management 101

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I'm very lucky to work in an institution that employs project managers. On the teams with which I work there are a variety of people from artifact handlers and interpretive planners to lighting designers and facilities gurus.

But not everyone is fortunate enough to have these kind of diverse teams. Many museums – even larger ones – are often held together by a combination of skeleton staff and volunteers, so you might be it: the artifact handler, the interpretive planner, the facilities manager and the project manager, not to mention media coordinator, tour guide and curator. What is more, project management isn't necessarily taught in museum programs as an individual course. It might be covered, insofar as the things that it entails, but as part of another class. Quite simply, the key to project management is dedicated organization, so, as a refresher, or in case you could use it, I give you a very basic Project Management 101.

The Schedule

The first thing I do when I'm assigned a new project is look at the schedule if there is one, or make one if there isn't. I work backwards from opening day, as is the Great Unmovable Date. There are several components to factor in, of which many overlap. Just some of them are:

- Creative development
- Text writing, including time required for editing, translation, more editing, and proofing
- Image selection and securing of copyright
- Acquisition, restoration, and/or preparation of artifacts
- Design
- Fabrication
- Installation
- Media
- The actual display dates of the exhibition
- Closing & take down

I use MS Project, but I've also used software called Merlin, which is good if you have a Mac, and it is compatible with MS Project. But if you don't have access to project management software, MS Excel works well, or even a simple calendar. I love to use different colours to denote the various aspects of an exhibition as it develops (ideation, creative development, fabrication, installation, opening etc.), but use whatever system works best for you. I just happen to colour code everything.

And my big tip: Pad. Your. Schedule. I always, always, always factor in unforeseeable circumstances, or, as a French colleague beautifully called them, *les imponderables* – literally the unthinkable. For example, I'll add 5 extra days (or as many as I can squeeze in) for things that I know from experience are probably going to take longer or have a tendency to go over schedule. But I'll still give a due date of 5 days earlier. It's ok to have a bit of extra padding near the end to make sure that everything is just so; it's much harder to catch up later, however.

It's also important to remember that the schedule is not set in stone. It will change, sometimes daily. And other things will have to move to accommodate these changes. But as long as you keep on top of it and make sure that all players know what they're supposed to be doing and when, you should manage to open that exhibition on time.

The Budget

The next thing I do is build my budget for the exhibition, using MS Excel. My budgets also include a heavy amount of colour coding. If you don't already have a budget template that you're happy with, there are tons of excellent template examples on the internet, or even supplied by MS Excel itself. You can customize each exhibition budget to suit your needs (is it travelling? Temporary? Part of your permanent galleries?), but I find it helpful to use a previous budget for an exhibition of similar size to start.

Like the schedule, you need to stick to your budget as best you can. Budgets are less easy to pad – we have a very specific amount of money to spend, and stakeholders don't really appreciate you going over that limit. Of course, there are always *les imponderables*, but these can be factored in to your budget as an actual line item.

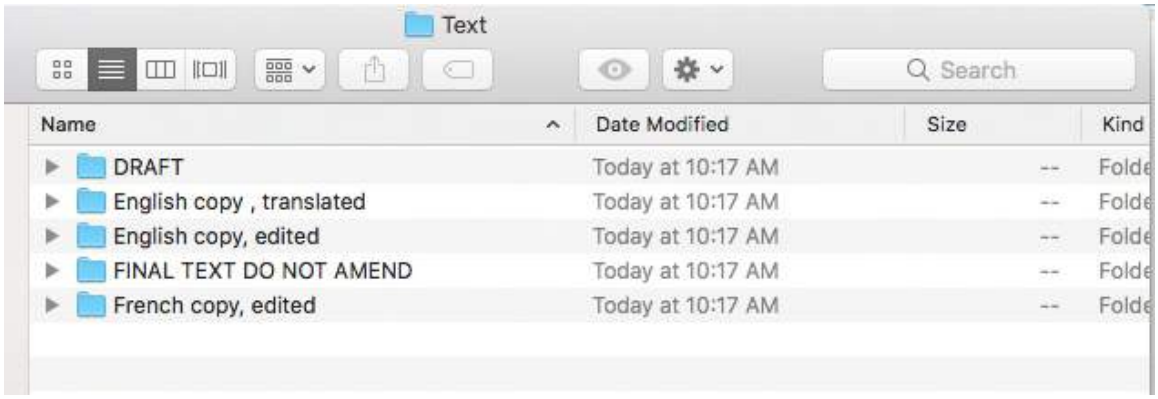
One of the reasons I like to use MS Excel is that it allows me to add comments without visually cluttering up my budget. I also document everything in these comments – what money was spent on, by whom (if not myself) and when. I look at my budget and update it at least once a day, to make sure that I know how much I have spent, how much I have left, and that I'm not getting behind in entering invoices etc. It doesn't take long to do it each day (literally a few minutes), but it can take hours if you leave it too long, and by then it's often too late to realize you've overspent.

I also love MS Excel for its formulas. Use these to your advantage, and you won't have to worry about miscalculating your bottom line (just make sure your formulae are correct). The formulas are built in to the software. If you're not sure how to use them, there are excellent tutorials available online.

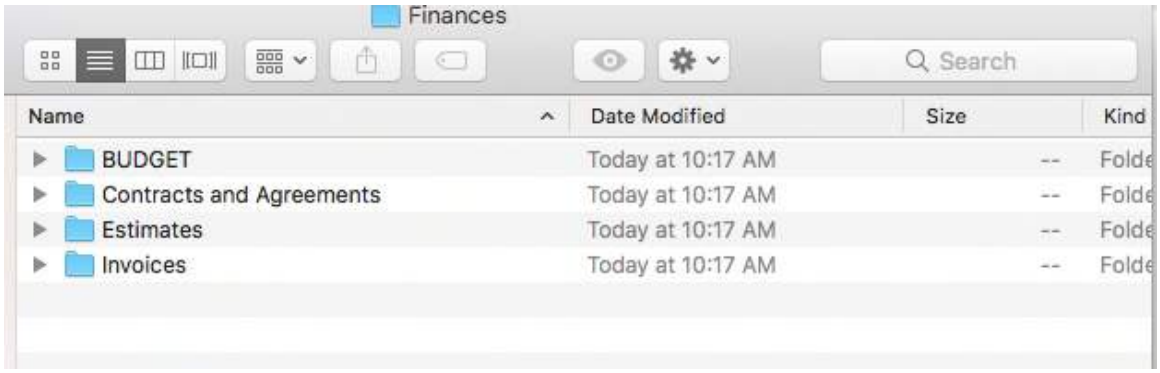
Folder Organization

Related to budgeting: where do you keep your receipts? These days, I only sometimes have paper receipts and invoices. Most of my statements come in the form of PDF attachments. Like actual paper, these electronic files can quickly become disorganized and hard to manage, creating a time-consuming and confusing problem when it comes time to reconcile your budget at the end of an exhibition, or end of the fiscal year. As such, it's important to keep your exhibition files extremely well organized. This takes a bit of planning at first, but you'll appreciate it when you know exactly where to find things, and can find them quickly.

I make a folder for the entire exhibition as a whole, and subdivide it into things like design, fabrication, text, and finances – everything that goes in to making an exhibition happen. Those folders are themselves subdivided again. For example, I might do something like this for text:



And for finances:



Do whatever works for you; just make sure that you keep it organized by taking a few minutes each day to file documents and emails where they need to go. Like your schedule, catching up later on takes much longer, and is a colossal pain in the neck.

Team Management

If you're fortunate enough to not be the sole employee of your institution, you're likely part of a team of individuals. These may be made of up of both full- and part-time employees, as well as volunteers, contract staff, stakeholders, and representatives from private companies. As a project manager, it is your responsibility to make sure that everyone on the exhibition team knows what they are required to do, and when. You don't necessarily manage the individuals, but you do manage the team as a whole.

This can be tricky sometimes (diplomacy and tact are key!) and group dynamics will change with every exhibition. However, like the other components I've already mentioned, if you stay on top of it, it'll be a lot easier. Keep people informed of developments and issues that might impact their work (such as delays in development or budget changes), and make sure that the lines of communication work well in both directions. I like to hold regular meetings with the main "players", and less frequent (but still consistent) meetings with fabricators, etc., to make sure that they can factor my needs into their own busy schedules. Surprises can be fun, just not when planning an exhibition.

Project management can be complicated; it's a bit of a dance sometimes. But if you take the time to make sure that you stay on top of all of the various aspects that make up the development of an exhibition, you won't fall behind. Good organization is crucial – without it, you'll have confusion, and disorder. Even if you're the only person working on the exhibition, it'll save you a lot of time, and a great deal of stress if you make the effort to be methodical and organized. And we could all do with more time, and less stress!

Interpretive Program Contents Development at Sunchon Bay, S.Korea

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Abstracts

The purpose of this study was to establish the contents of interpretative program for the Suncheon Bay, S. Korea. To achieve this goal, it is analyzed that secondary data and field observation were obtained through the Suncheon Bay, in 2018. The results as follows: Suncheon Bay‘s natural resources and historical resources that they have more than average knowledge about the park's resources. The level of desire and curiosity for learning about natural resources and historical resources was high. So, it is necessary for the environmental interpretation program to be introduced.

This research shows that visitors have strong willingness to learn the park resources and are positive to the performance and participation of interpretive program. Interpretive program must be established after due consideration of visitor expectations including their feedback and further research.

Key words: *Key words: natural resources, historical resources, interpretation, intellectual curiosity, knowledge*

Introduction

The global community recognizes the importance of ecosystems along mud flats in Korea. The tidal flat extending on Suncheon Bay is famous for it being registered on the Marine Protected Area in 2003 and on Ramsar site in 2006. The place provides great scenery of salt marsh plants, such as reeds and *Suaeda japonica* on the tidal flat. Reed fields in the bay, almost 25 million sq.ft., are very a rare natural environment. Many people in Suncheon sincerely love visiting the Bay. Watching the sunset on the bay allows visitors to enjoy some cozy rests. It also provides a good place for a number of endangered species including Grus monacha, Egretta eulophotes and for shellfish. Many waterbirds choose to come to the Bay as it has well protected tidal flat areas, mountains, rice fields.
It is very difficult for local government to conserve nature alone. Thus, I think it is very important for local groups to be supported by the central government and to cooperate with environmental Non-governmental Organizations. When we work for conservation of the tidal flat, we also work to save other species. We work to save a critical habitat and work for international/national cooperation because at Suncheon Bay we can feel the, "bright and beautiful future where human and nature coexist."
The book should be useful to field interpreters, researchers, and managers at protected areas, parks, wildlife refuges, wetlands, historic areas, nature centers, and ecotourism sits.

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* This paper is modified from Dr. K.J. Cho’s research on Interpretive Program Development at Suncheon Bay.

Introduction of Suncheon Bay

Suncheon Bay is on the Southern tip of Korean peninsula and has been enjoying a burst of popularity of late, with nearly 3 million people coming from across the country and around the world to visit the Suncheon Bay Ecological Park last year. Suncheon Bay is a calm lake because it's surrounded by Goheung Bay and Yeoja Bay. Registered as one of five coastal wetlands protected by the Ramsar Convention in 2006, Suncheon Bay is famous for having the largest field of reeds and tidal flats in Korea and also for being on the migration path of various kinds of birds, such as Hooded cranes, Common shelduck, Saunders's gull, Dunlin, Greenshank, Curlew, and others from throughout world. The field of reeds in Suncheon Bay is thickly covered with reeds taller than a full grown man. It is the biggest colony of reeds in Korea. Also, the tidal flats of the beaches preserve diverse ecosystems for environmentally study.

Importance

200 Hooded Cranes *Grus monacha* (2%), 549 Sauders' Gulls *Larus saundersi* (6%), 7,501 Common Shelducks *Tadorna tadorna* (3%)

Wetland Environment

Suncheon Bay is a coastal wetland and has various geographical features, salt marshes, tidal flat, reed beds, and islands. It neighbors rice fields (in reclaimed land), salt pans, seaside villages, fish and shrimp ponds (which used to be salt pans), low hills and mountains. It is not a very wide area but you can find both ecosystem diversity and habitat diversity at the same time in one place. Especially, the reed beds on the tidal flat make circular shapes and grow wider every year.
The living organisms of the tidal flat are fed by the organic matters from the rivers that run through the land. The natural environment of the river estuary is well preserved with brackish zone, salt marshes, wide reed beds, and tidal flats. More than 230 species of migratory birds use the Suncheon Bay. Every winter, thousands of water birds, such as Hooded Cranes *Grus monacha*, Eurasian Cranes *Grus grus*, Eurasian Spoonbilsl *Platalea leucorodia*, Sauders' Gulls *Larus saundersi*, Dunlins *Calidris alpin*a, Whopper Swans *Cygus cygus*, and Common Shelducks *Tadorna tadorna* spend winter there. It's also a stopover and staging site for shorebirds, Black-faced Spoonbills *Platalea minor*, and Chinese Egrets *Egretta eulophotes* in spring and autumn.
The most frequent shells in the upper region of the tidal flat are *Sinonovacula constricta*. In the sea area with shallow sea, within the lower region of tidal flat, there are fish ponds of *Scapharca subcrenata*. The inhabiting species in other areas are *Atrina(Servatrina) pectinata japonica*, *Rapana venosa*, *Fulvia mutica*, S*capharca broughtonii*.

Here is the home of shrimps, *Portunus trituberculatus*,

Hemicentrotus pulcherrimus.

In most Suncheon Bay interpretive activities it is best to give the visitor a broad, general idea of Suncheon Bay in which he finds himself, allowing him to supplement the general but inclusive story with details according to his personal impressions of the facts which he himself gathers out-of-doors. He may gather these perhaps with your(interpreter) assistance, but he must be stimulated first to *want* to discover things for himself, and second, to *see and understand* the things at which he looks.

Ⅰ. Interpretive Programs Classified by Time Zone

Time Zone	Name of Program	Contents	Place
Dawn	Sea fog of Daedae Port	Observation of sea fog at Mujin bridge and Daedae Port	Daedae Port
Morning	Organism of Suncheon Bay	Observation of tidalflat organism	Reed fields
Afternoon	Understand -ing the circular reed beds	Explore the mystery of the ecosystem, Creating the heavenly S-shaped curves and peaceful scenery of harmony between nature and humans	On the ship, Yongsan Observatory
Evening	Night of Suncheon Bay	The beauty of starry nights(including slide program),	Suncheon Bay Observatory

1. Dawn 『Sea fog of Daedae Port』

Photo: Mujin Bridge

Early morning, the well-known Mujin fog begins to enshroud the bay.

Sightseeing, walking, and hiking helped us relieve our stress and some burdens from our life. The perfect beauty of nature untouched since ancient times always offers humans an endless source of hope and dreams. People can take one step back in time by visiting the foreshore and reed fields of Suncheon Bay in Korea. Suncheon Bay represents a coastal wetland with spacious tidal flat, reed beds, and salt marshes adjoining rivers and mountains in natural harmony.

The costal wetland is filled with reeds that create golden waves when the wind bellows, turning anyone who sets foot in the area into a poet. Reeds growing up to the sky and ports full of fogs are described beautifully in a popular Korean novel, "A Travel to Mujin" by Seung-Ok Kim. In Autumn, you can see a splendid array of colors with the red *Suaeda japonicas*, the golden wave of reeds and black tidal flat.

2. Morning 『Organism of Suncheon Bay』

Observation about tidalflat organism

At Suncheon Bay, there's an interconnection of bridges that run through the reeds. There are many interpretive signs on the deck that name and describe the various plant and animal species you will see. The mud throughout the area is home to lots of crabs and mudskippers. The mud is teeming with crab species and skippers and the occasional crane or waterfowl will fly overhead.

The Suncheon bay tidal flat is preserved well and it will be able to observe the various tidal flat living things and the migratory birds. One of the halophyte, *Suaeda japonica* is said to change its color 7 times a year. The *Suaeda japonica* is green as it begins to growing spring then changes to various shades of red in autumn. In autumn it is white with red. With the reeds it harmonizes and truth fashionable it wears out.


Photo : Take advantage of Reeds.

The residents of the bay area make a living in the wide tidal flats, coast and farmlands. Residents of the coastal areas fish and collect *Tegillarce granosa* in the mud flats. Some residents process seafood or run restaurants / accommodation facilities for the tourists. Fresh seafood is produced in the Suncheoon Bay area. Shuttles hoppfish and common eel for fish dishes and shellfish are especially abundant in this area. Oysters and *Tegillarce granosa* are a special product of this area, also. At the bay area, special seafood dishes using these fresh products can be enjoyed.

Mud tidal flat

The region where there is a gentle sea slope and a tidal flat is exposed widely at the time of ebb flow which is called Mud tidal flat or "tideland". Tidal flat sediments are formed with sediments flowing from land and sediments moving with high and ebb tide. Places where water current is fast, big and heavy grains deposit first and places where water current is slow, small and fine particles deposits later. Tideland is protected from a wave of open sea so it is formed where current is at its minimum and organic materials are deposited to make better tideland. Tideland sediments become finer nearer to the land but when it is nearer to the sea, particles of sediment become bigger. There are abundant organic materials in tideland so it provides food for inhabiting marine organisms.

Halophyte

Some salt tolerant plants grow at Suncheon Bay despite the salinity of the tidal flats which we call salt marshes. The salt tolerant plants are different shapes and colours than other land plants. Korea's representative halophyte, such as Suaeda japonica, Salicornia herbacea, sea-blite including reed have beautiful names.
These halophytes purify contaminants which flows to the sea, prevents soil erosion and their leaves and stems are tidal flat organisms' food. It also becomes a habitat of living creatures including birds. Therefore, salt marsh plays an important role for interpretive and research purposes.

A Treasure House of Internationally Endangered Migratory Birds

Among all of the world's wetlands, Suncheon Bay is widely known for attracting the largest number of rare birds. Watching the migratory birds at the bay is especially interesting. Around 230 species of birds have been recorded in the bay. Among the 230 species visiting and living in the bay, 25 are reported to be in danger of becoming extinct. Such internationally rare birds as the hooded crane, Eurasian cranes, Eurasian spoonbills, Saunders' Gulls, Dunlins, Whooper swans and Common shelducks as well as birds designated as natural treasures, are spotted here.

Beak of water bird

Photo : Eagle Mallard Jungle Nightjar Sparrow Water birds have efficient beaks.

Tidal flat is a place where the most living organism inhabit on Earth in a unit area. Therefore, this place is very important for water birds as they feed themselves with these tidal flat organisms. However, the shape of these birds beaks are closely examined, their beaks are differently shaped. The reason behind this is their beaks' shapes differ according to their food. Generally water birds' beaks, which feed on crabs, are long and curved at the end. Water birds' beaks, which feed on shellfish or small creatures living between rocks, are stumpy. Birds' beaks, which feed on lugworm, are long and curved upwards. Because of this water birds have efficient beaks according to the prey they hunt.

How can birds float on the air?
Birds can float easily because they can hold a lot of air in their air sacs. Air is lighter than water. The birds hold air in their lungs. But they also have a system of air sacs attached to their lungs. These extra air sacs help the birds float. The sacs are spread throughout the birds' bodies. But some birds need to be able to go underwater to fish. They have to dive to get their food. Air sacs could make it hard for them to dive. But the birds can empty the air sacs when they want to dive. All they have to do is breathe out.

Benthos
Shellfish and mollusca in the tidal flats and other species of fish of the western coast are found here in Suncheon Bay. Characteristic organisms of this area are prawns, *Helice tridens*, sand crab, common octopus, and ark shell. Fish and shellfish can be observed in the bay area of the Deadae port, Hwapo, and Waon. Many people visit this area for academic reasons, such as the study and observation of marine biology, benthology, and etc.

Characteristics of Mudskipper(*Boleophthalmus pectinirostris)*
In the flat of Suncheon Bay, there are many crabs such as fiddler crabs, Esturine Grapsid Crabs Helice Triden, Philrya pisum, Macrophthalmus japonicus. There are other creatures that also feed in the mud like, lugworms, razor clams, and Bullacta exarata. Mudskippers are fish found in wetlands which feed on plankton. They may be funny to look at, but it lives on very clean and healthy tidal flats. Mudskippers walk around the surface of the tidal flat by moving the pectoral fins like feet and by jumping when they move with their dorsal fin spread. Mudskippers sift the surface of the tidal flat and eat tiny organism in the mud, such as the larva, worms and small crabs. They dig holes into the tidal flat and live deep inside the tidal flat.

Intertidal species are actively shuttling back and forth between rock pools and air. They breathe air when out of water. They can stay out of the water for up to 22-60 hours if kept moist. Found in estuaries, swamps, marshy areas and tidal mud flats these species move around briskly on land preying on small animals. This fish hibernates from November to April. They are also used in Chinese medicine. The Mudskipper(*Boleophthalmus pectinirostris*) has bulging eyes, dark skin and bluish fluorescent coloured doys, so it also has the nick name Silky Mudskipper.

Characteristics of Crabs
Most crabs live in mud flats, because there is more organic matter in mud for crabs to feed on than in sand. True crabs are decapod crustaceans of the infraorder Brachyura, which typically have a very short projecting tail, or where the reduced abdomen is entirely hidden under the thorax. Many other crabs with similar names, such as Sesarma (*Holometopus*) haematocheir Sesarma(*Holometopus*) dehaani fiddler crabs(*Uca arcuata, Uca lactea*), Estuarine Grapsid Crabs *Helice tridens*, *Macrophthalmus japonicus*, and *Philrya pisum* live widely in Suncheon Bay, but mostly in mud flats.

Crabs can easily be found on the way from Daedae port through to Mujin bridge and the reed bed. The Fiddler Crab(*Uca arcuata*), is the most famous crab of Suncheon Bay. Males have one big, red claw, and many of them live in the salt marshes near the river mouth. *Uca lactea* dwell in waon tidal flat, the *Uca lactea* are similar to the fiddler crabs(*Uca arcuata*) but they have white claws.

Helice tridens is a species of crab which lives on mudflats around the coasts of Japan and the Korean Peninsula. We can find sesarma intermedium, Helice tridens in reed beds. It is semi-terrestrial, returning to the sea to spawn. Smaller individuals shelter in burrows in reed marshes, apparently in order to avoid cannibalism; this may also be the reason for the migration of larger individuals to brackish water lagoons in summer, when the crabs exceed their carrying capacity. In addition, there are Philyra which do not dig holes and *Macrophalmus japonicus* living in Suncheon Bay.

Uca arcuata *Hlice tridens tridens*

3. Afternoon, Understanding the Circular Reed Beds

Reed and Mud Flat of Suncheon Bay

Suncheon Bay is famous for migratory bird and the foreshore but the sunset in late afternoon is priceless. Many professional photographers visit just to get some photos of this beautiful scenery.

This beautiful place has views of wonderful mountain trails, sea, mud flat, and enormous foreshore. A reed community is one of the largest, and contains one of the most precious views of flower blossoms and migratory birds. The reed beds not only provide shelter for small birds like reed warblers, but act as a natural filter removing organic pollutants, such as nitrates and phosphates, from the water, as well as providing food for the birds and other life forms. When you look at the reed beds of Suncheon Bay from Yongsan Observatory, you can see their distinctive circular shape, as if someone has made them in circles on purpose. In general, the seeds and some parts of the root of reeds float on the surface of the water at Suncheon Bay from Dong-cheon and Isa-cheon. They are deposited on the tidal flat where they take root and grow forming small circles. The circles become larger as the reeds grow, eventually connecting with neighboring circular reed beds, now we can see the groups of circles made by reeds(see above picture). The continuously flowing water from Dong-cheon and Isa-cheon, spacious tidal fat at the river mouth and the brackish area help to create the wide reed beds.

This place also has over five thousand years of history, and is known as a mud flat with rare bird species so that many environmental researches are done here as well.

In the field of interpretation, whether of the National Park System or Suncheon Bay, the activity is not instruction so much as what we may call provocation. It is true that the visitors to these preserves frequently desire straight information, which may be called interpretation, and a good interpreter will always be able to provoke when called upon. But the purpose of Interpretation is to stimulate the participant toward a desire to widen his horizon of interests and knowledge, and to gain an understanding of the greater truths that lie behind any statements of facts.
The national park or Suncheon Bay, the historic restoration, the nature center in a public recreation area, are exactly the places where interpretation finds its ideal opportunity. For these are the places where first-hand experience with the objects of Nature's and Man's handiwork can be had.

Sunset and the "S" shaped road : Creating the heavenly S-shaped curves and a peaceful scenery of harmony between nature and humans.

Suncheon Bay is famous for migratory birds and the tidal flats but the sunset in late afternoon is priceless. Many professional photographers visit just to get some photos of this beautiful scenery.
This beautiful place has views of wonderful mountain trails, sea, mud flat, and enormous foreshore. A reed community is one of the largest, and contains one of the most precious views of flower blossoms and migratory birds. This place also has over five thousand years of history and is known as a mud flat with rare bird species so that many environmental researches are done here as well.

Sunset of Suncheon Bay

Discussion

Most visitors to experience a new culture including Eco-tour. For people who want a valuable experience countryside, there are exciting opportunities to interpretation or volunteer. There is marine biology, benthology, ornithology, and algology in Suncheon Bay. Scientists in Suncheon Bay need volunteers to help count migratory birds and check their health.

From the late 1990s, because of efforts from local residents and environmental groups, Suncheon city made it possible to discover the ecological value of Suncheon Bay and protect it until today.

Remember always that visitors come to see the Suncheon Bay itself and its superb natural phenomena more throughly. A few believe it is our duty to tell as many facts as possible, and therefore take pains to identify almost every plant, flower and bird encountered. Others have taken their motto as "to be nature minded is more important than to be nature wise", and feel that it is more important that the visitor carry away with him an intense enjoyment of what he/she has seen, even though he has not accumulated many fact.

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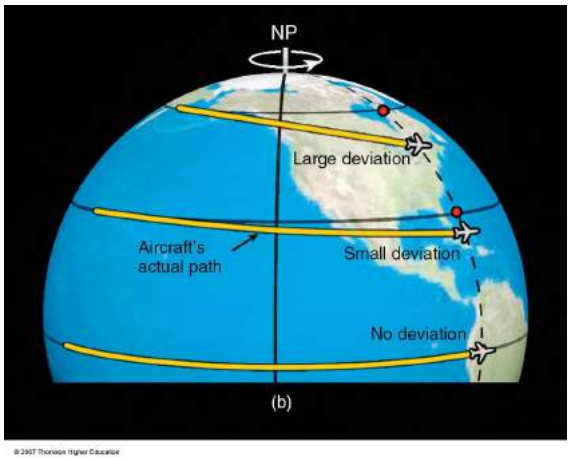
* This paper is modified from Dr. K.J. Cho's research on Interpretive Program Development at Suncheon Bay.



Explaining Coriolis Force

H. Edward Clifton
Geologist
InterpNEWS Regional Editor

As the cruise ship crossed the equator, its naturalist demonstrated that water draining from a tub in a clockwise spiral south of the equator changed to a counter-clockwise spiral as the ship crossed into the northern hemisphere, thereby demonstrating the mysterious Coriolis force. All but one of the passengers were all dutifully impressed. The scientist in the back of the crowd just smiled. He knew that the demonstration was a well-executed sham that reinforced a common misconception: water basins and toilets in the southern hemisphere drain with a clockwise spiral in contrast to those in the northern hemisphere that drain counterclockwise.

But although the demonstration was bogus, the Coriolis effect is real: large scale fluid movements deviate to the right in the northern hemisphere and to the left in the southern hemisphere. Recognizing this is critical to understanding our weather patterns, atmospheric and oceanic circulation, coastal upwelling, oceanic tides and the distribution of life in the ocean.

Over the years I have found the Coriolis effect frightfully difficult to explain to a non-scientist (and even to some scientists). On-line and text book interpretations are, for the most part, difficult to follow and some are patently wrong. At one point, I could derive the equation:

$$F_c = 2\ m\ v\ X\ \square$$

Today, I struggle with remembering the terms in the equation, and even if I could explain it, it would not in most cases facilitate understanding. But over the years I have derived an explanation that I believe works and is readily understood. I am pleased to share it with anyone who is interested.

It is not the full story of the Coriolis effect: for one thing it doesn't consider the mass of the moving body, which is essential to interpreting it as a force. Nor does it consider the curvature of the earth's surface. But I believe the approach can help others to understand this peculiar and pervasive phenomenon.

We begin with a static situation: a round table with a grid on its surface and a ball that rolls across its surface from the edge toward the center at a rate of 2 squares a second **(Figure 1).**
Very simplistic — however, it is the basis for the experiments to follow, in which the table will rotate.

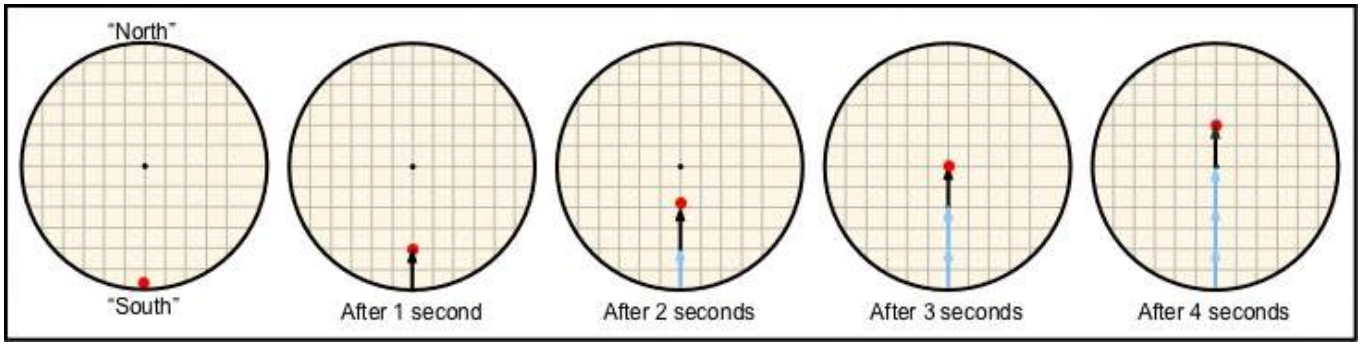


Figure 1. The basis for many of the ensuing figures in this article: a gridded table across which a red ball is rolled, in this case with a velocity of 2 squares/second. For convenience, the lowermost part of the illustration (and those that follow) will be considered "south" and the uppermost part as "north".

Figure 2 shows a rotating table with a ball situated its edge. The ball is moving in the same direction and velocity as the table edge. If the rotation abruptly stops, the ball will fly off the table in the in the direction it was moving when the rotation ceased. It was moving at the velocity imparted by the rotating table beneath it. And since it was not fastened to the table, it continued to move when the table stopped.

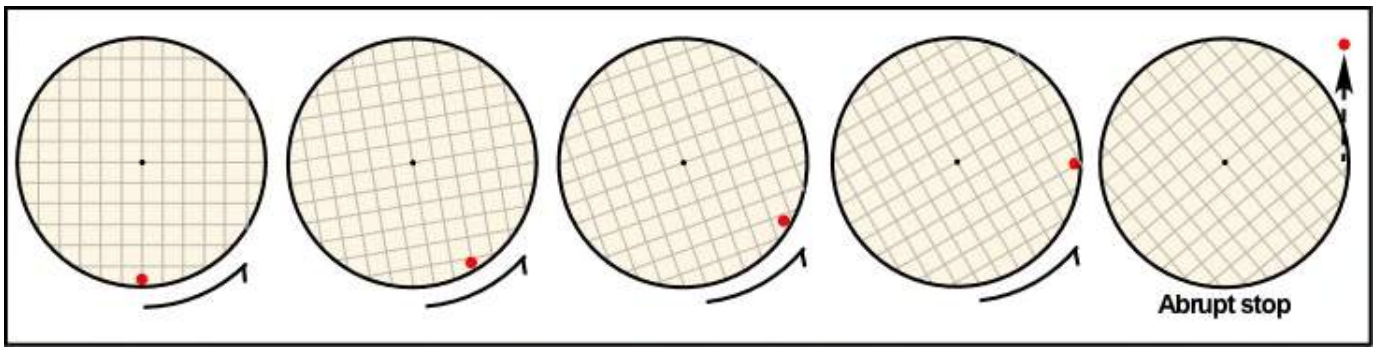


Figure 2. A rotating table with a red ball sitting at its edge. If the table abruptly stops the ball will continue on in the direction it was moving when the rotation stopped, owing to the velocity imparted by the moving table.

In **Figure 3**, the table is rotating counterclockwise at a rate of 10°/second, which in this example is one square/second to the right at the edge of the table, where the ball is situated. As it rotates the ball is impelled toward the table center ("northward") at a speed of 2 squares/second. During each second, the ball simultaneously travels to the "north" at a rate of 2 squares/second and to the right ("east") at a rate of one square/second. The ball, which was impelled to the north rolls diagonally northeastward across the table top owing to the eastward velocity imparted by the rotating table. This deviation is part of the Coriolis effect, but not the full story.

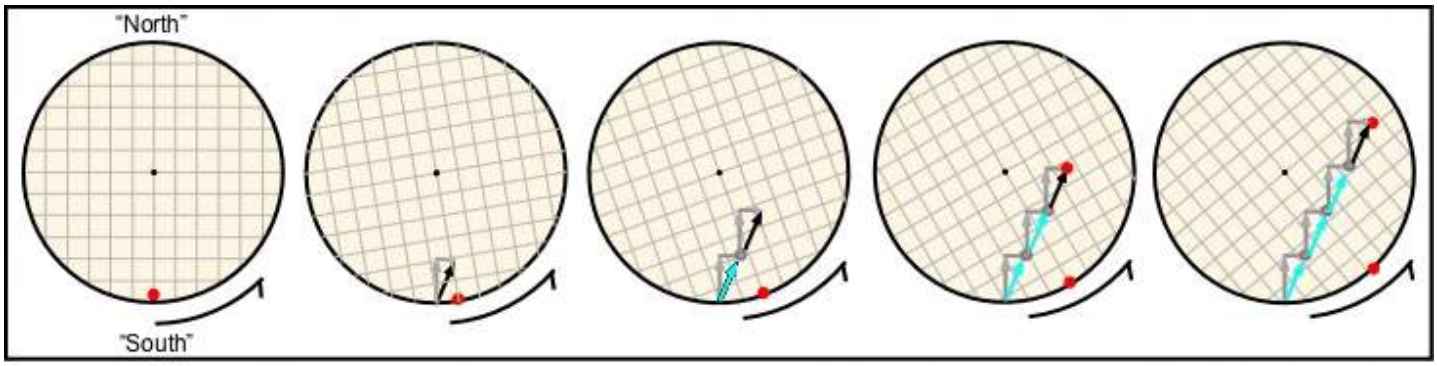


Figure 3. Table is rotating counterclockwise at a rate of 10°/second, which in this example is one square/second to the right at the spot on which the ball is situated. Ball is impelled toward the table center ("northward") at a speed of 2 squares/second. During each second, the ball simultaneously travels to the "north" at a rate of 2 squares/second and to the right ("east") at a rate of one square/second. The result, as we see it from the outside the ball, which was impelled to the north tracks diagonally northeastward across the table top owing to the eastward velocity imparted by the rotating table.

We next enclose the rotating table inside a room that rotates with it. **(A, Fig. 4**). We put a little man, an observer. on the "south side" of the table (**B, Fig.4**), and hang a couple of pictures on the wall (**C, Fig. 4**) for reference. We then spin the room, table, man and all, a full circle **(Fig. 5** A). The man seated at the table, however, is unaware that the room has rotated 360° because his frame of reference: the table and the pictures, remained unchanged **(Fig. 5B).** Could we, as residents on the surface of planet Earth be similarly unaware of its rotation? Absolutely!

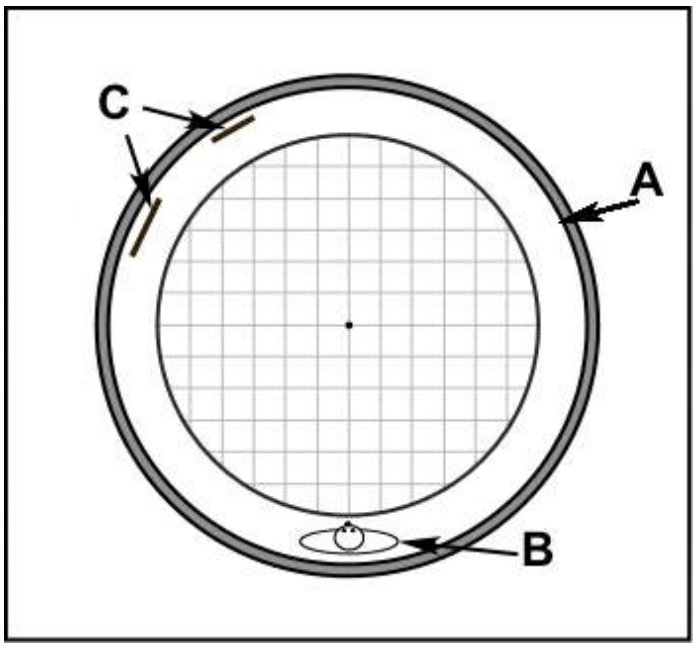


Figure 4. We next enclose out rotating table in a room (A) that rotates with it. We put an observer on the "south side" of the table (B), and hang a couple of pictures on the wall (C) for reference.

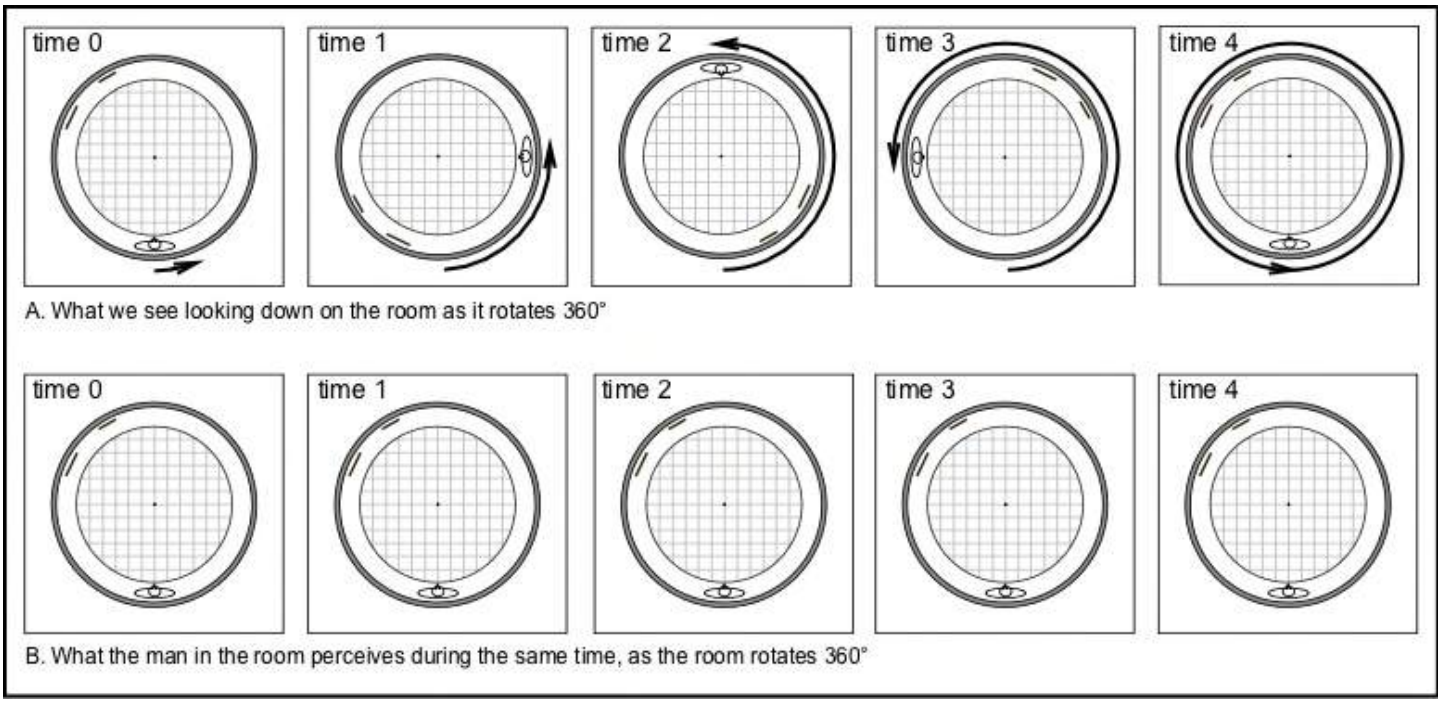


Figure 5. A. We spin the room a full circle—round it goes. Whee! B. How the rotation is perceived by the man sitting at the table. Nothing happens. Boring!

The equatorial circumference of Earth is nearly 25,000 miles (±40,000 km). The rotation of the earth requires that this distance be transited every 24 hours, requiring a linear velocity of the surface of the earth at the equator of 460 meters per second—± 1,000 miles per hour. This speed diminishes north and south of the equator as the circumference of the earth shrinks toward the poles. As I write this from my home on the central California coast, I am hurtling to the east at a speed of about 750 miles per hour (1200 km/hr). In 12 hours, I will be in the space currently occupied by Afghanistan. Yet I remain blissfully unaware of this pace because everything in my world: the clutter in my office, the air outside, the water in Monterey Bay, is locked in place by gravity. Everything here follows the same rotational path. We are very much like the little man in the experimental room.

So, what does the little man see when the ball is rolled across the room as shown in Figure 3? Not only does the ball track to the right, but his perception of *where the ball was at any one moment* rotates with the room (**Fig. 6**).

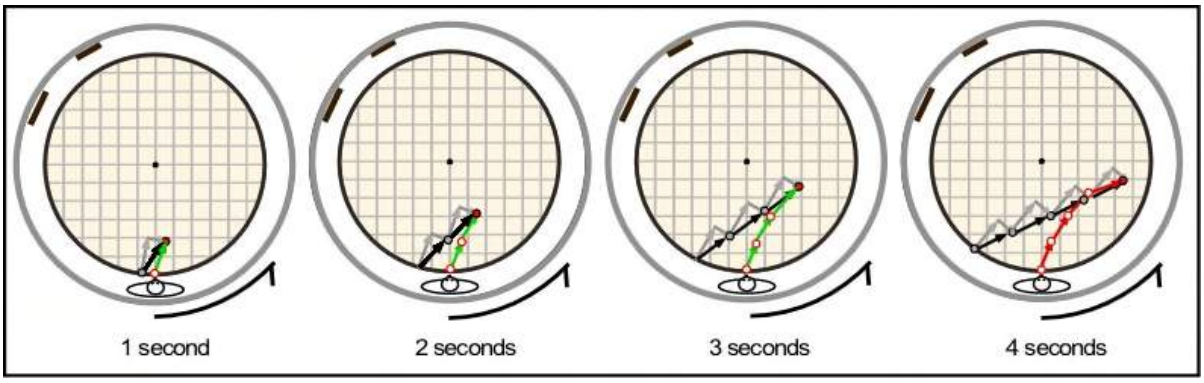


Figure 6. Movement of a ball across a table in a rotating room (same parameters as in Figure 3) as seen by someone in the room. Note that from the perception of the man at the side of the table, not only does the ball deviate from its initially projected course, but its pathway forms an arc rather than the straight line observed from a position independent of the rotation (Fig. 3).

As a consequence, he perceives the movement as a curved arc to the right, as would observers at any other position in the rotating room (including its center). From the perspective of observers rotating with the room, the ball was directed toward the center but mysteriously curved to the right as it moved **(Fig. 7)**. This is the essence of the Coriolis effect.

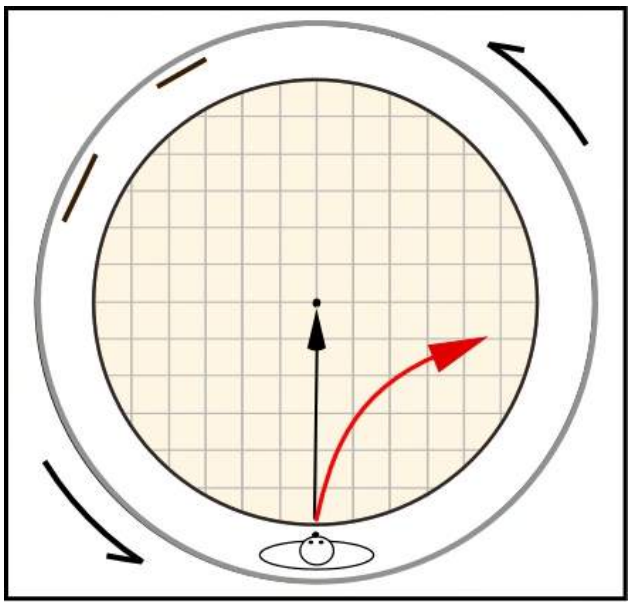


Figure 7. From the perception of an observer in the rotating room, a ball on the table directed toward the center of the table ("north") deviates in an arc to the right ("east"). This is the essence of the Coriolis effect.

Perceived curvature to the right will occur regardless of the initial position of the ball or the direction in which it was impelled **(Figs. 8, 9).**

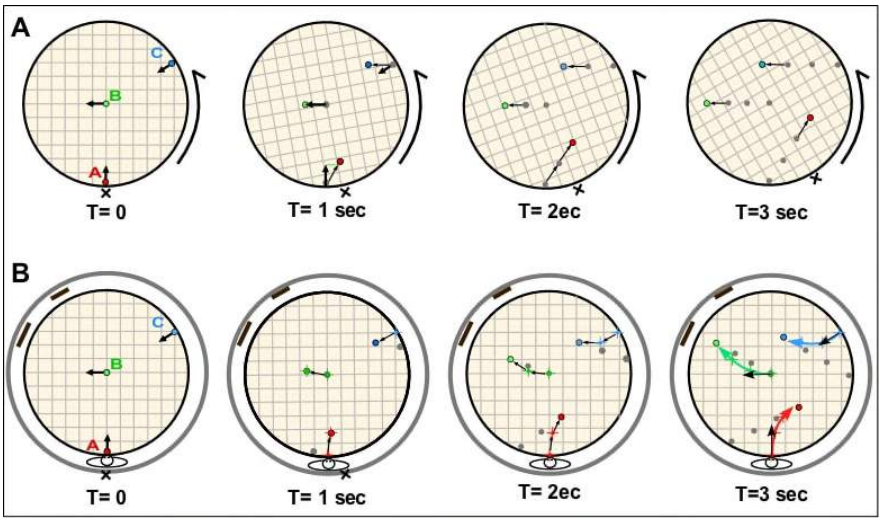


Figure 8. Directions of movement of balls rolling across a rotating table from different locations as seen from above (A) and at the table (B).

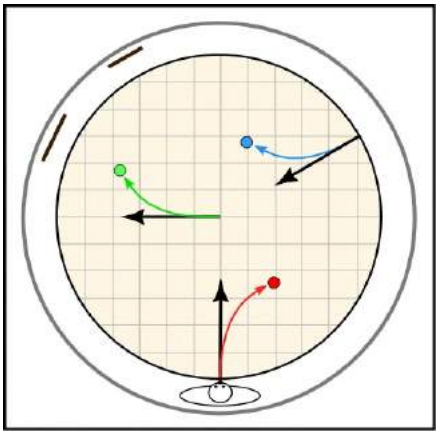


Figure 9. Perceived directions of movement of balls rolling across a rotating table from different locations as seen by an observer rotating with the table.

The shape of the curve, however, depends on the velocity at which the ball rolls. The faster it moves, the greater the deviation from its initial direction (**Fig. 10**). This phenomenon directs much of the large-scale flow of air or water on the planet **(Figures 11. 12**).

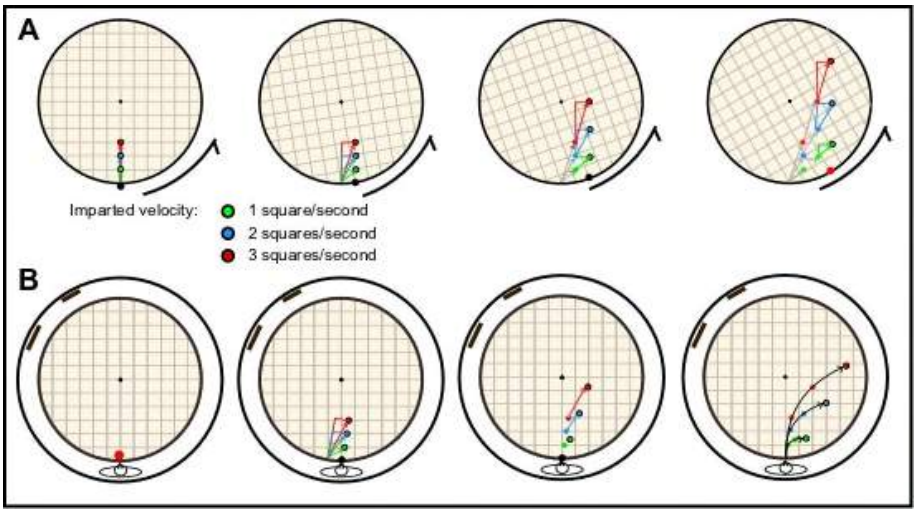


Figure 10. Perceived directions of movement of balls rolling across a rotating table at different velocities as seen (A) by a stationary observer above the table and B by an observer rotating with the table. The greater the velocity, the more the trajectory departs from the initial direction.

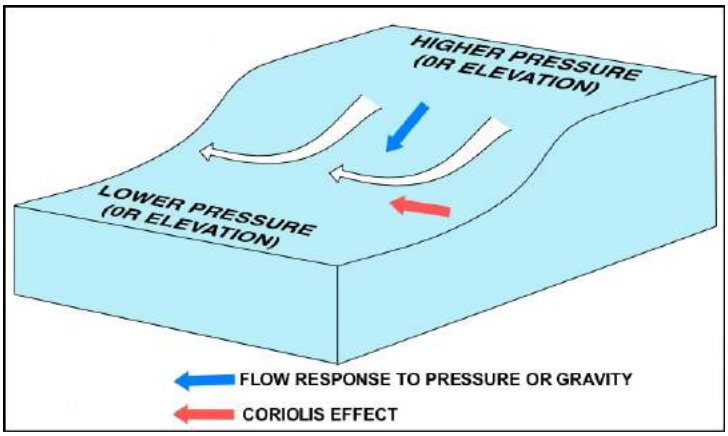


Figure 11. Geostrophic flow results where the pressure gradient driving the flow (blue arrow) is balanced by the Coriolis effect (red arrow). Any flow deviation toward the upslope direction decreases the velocity, slowing the flow and decreasing the Coriolis effect. Deviation in the downslope direction increases the velocity and with it, the Coriolis effect. The result is a balance is maintained whereby the general direction of flow is at a right angle to the flow gradient (to the right in the northern hemisphere, to the left in the southern hemisphere).

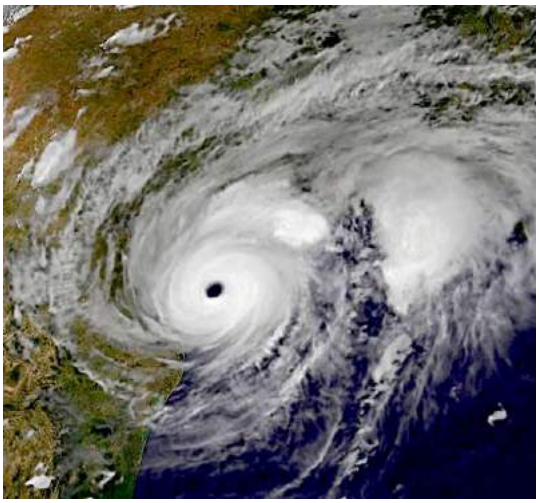


Figure 12. Hurricane Harvey as seen from space approaching the Gulf Coast of the U. S. in 2017. The counterclockwise circulation of the storm results from the geostrophic air flow around the center of low pressure at the hurricane's eye (NASA/NOAA GOES Project Photo).

To this point we have considered only rotation to the right. If we reverse the direction of rotation of our experimental table, a person rotating with the table would perceive the balls to curve to the left **(Fig. 13**). Intuitively it would seem obvious that a solid object cannot simultaneously rotate clockwise and clockwise **(Fig. 14)** without shearing in two.

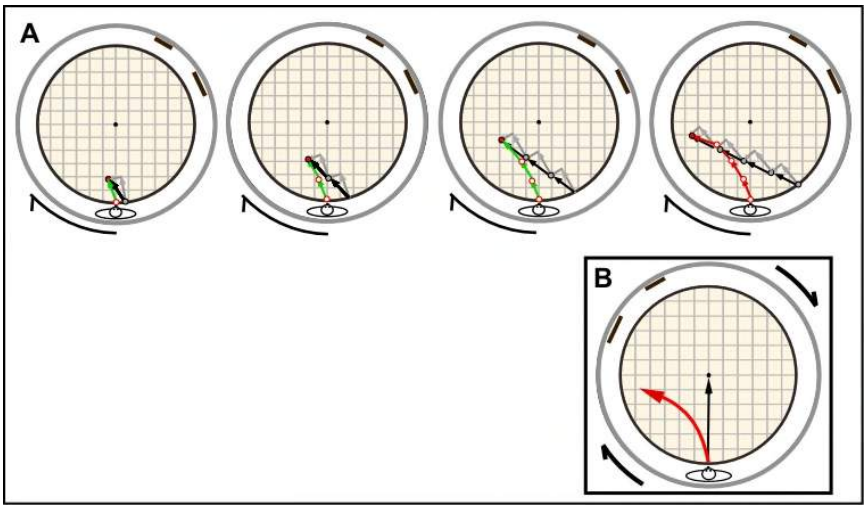


Figure 13. Clockwise rotation, using the same parameters otherwise that were employed in Figures 6 and 7 creates a perceived deviation to the left.

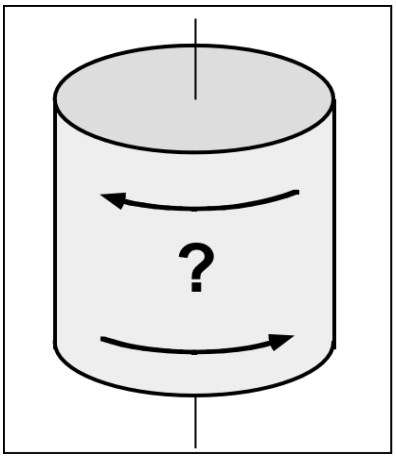


Figure 14. Can a solid object simultaneously rotate in both clockwise and counterclockwise directions without shearing in two?

The following experiment shows how it is possible: hold a sheet of paper vertically in front of you and rotate it in a clockwise direction. Then, ask a person facing you which way you are rotating the paper. They will respond "counterclockwise" until you turn around so your back is toward them and they also will see a clockwise rotation. The direction of rotation depends on which side you are seeing. Those of us in the northern hemisphere see the earth's rotation as counterclockwise; those in the southern hemisphere see it as clockwise (**Fig. 15**). The Coriolis effect directs moving bodies to the right in the northern hemisphere and to the left in the southern hemisphere.

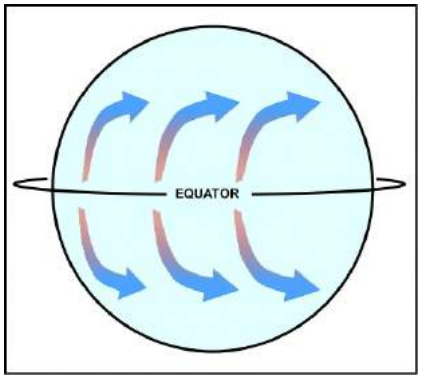


Figure 15 (left) and figure 16 (right).

The magnitude of the Coriolis effect within a hemisphere depends on its distance to the equator. Our experiments all were conducted on a rotating planar surface: the table top. On our planet, the Coriolis effect occurs because the surface rotates as the earth spins and the rate of rotation depends on latitude or distance from the equator. Imagine that you are the earth. The poles are at the top of your head and the soles of your feet, and your belt line represents the equator. Hold a piece of paper horizontally above your head and rotate 360°. The paper you are holding rotates 360° as well. Now hold the paper vertically at your waste and again turn around through a 360° rotation. The paper revolved with you but it did not rotate—the side pointing up when you began remained so through your rotation. The same is true for the earth: a planar surface at the equator revolves around the earth but does not rotate during this revolution. As a result, the Coriolis effect is greatest in high latitudes and diminishes to zero at the equator **(Fig. 16).**

So, you can see why the scientist was smiling at the little ploy on the cruise ship. He knew that the direction that water flows out of sinks and toilets are determined by initial movements of the water or by irregularities of the basin shape or surface, and not by the hemisphere. He also knew that the Coriolis effect diminished very gradually to zero at the equator. Differences over a few miles or tens of miles would be negligible.

The Coriolis effect is why the trade winds blow toward the west and weather systems in the mid-latitudes travel toward the east. It is part of the reason why oceanic tides differ so much from place to place. It is why hurricanes in the northern hemisphere rotate in a counterclockwise direction and cyclones in the southern hemisphere rotate clockwise. It bears heavily on the distribution and direction of oceanic currents such as the Gulf Stream or the Kuroshio Current as well as the phenomenon of coastal upwelling. It is why water moved by wind actually moves at right angles to the wind direction and why oceanic biologic productivity is high in equatorial waters. In short, it influences all large-scale fluid movements on the planet and their biological and human consequences.

Ed Clifton

"Awakening the Sleeping Story"

By

Dr. Martha Benn Macdonald

"Wake, awake the night is flying" came to mind, though the context is totally different, when I reread one of Dr. John A. Veverka's definitions for interpreters---"to release the sleeping story that's a part of each and every artifact, landscape, artwork, plant or item they interpret at every museum, park or organization they work for---" ("Interpreting the 'rest of the story' hidden in your artifacts" 1).

The idea of awakening something which is sleeping should delight every interpreter. In fact, when I began taking John's courses in interpretation several years ago, a new world of interpretation opened for me. His writing, his insights, and his creativity never cease to amaze me. Too many interpreters want to label an artifact, whatever it is, with a date. That is not exciting. Audiences at historical sites have never been engaged by rote; neither have students

We can awaken the sleeping story as we read a poem in a dusty collection, explore an abandoned playhouse, study a grave, and more. As John has noted, we need to find the story, shape it, and tell it in creative writing or interpretation. Although I have not been to Rock Creek Cemetery in several years, I do remember Rosalie Mackenzie Poe's grave. It was so plain.

What do you notice about the marker? If you are touring that cemetery and see that grave, what might you like to know? What sleeping story do you think your interpreter could awaken and share with you? If I were interpreting at Rock Creek Cemetery, I would share something about Rosalie. Her brother was, after all, the renowned Edgar Allan Poe beloved by many, scorned by others, and praised abroad by Charles Baudelaire and his circles in France. Edgar was born in 1809 and Rosalie in 1810. Their mother died in 1811. I quote these dates only to show their closeness as babies. Their older brother moved to Baltimore after Elizabeth Poe died, and Edgar and Rosalie were taken in by families in Richmond. . Although Edgar married his much younger first cousin, Virginia Clemm, and moved away, he often returned to Richmond. He and Rosalie were close and compatible (*The Poe Log* has been a valuable source).

A musician, teacher, and poet, Rosalie accompanied her brother to his poetry readings in Richmond, visited with him and Virginia in Baltimore and Philadelphia, and exchanged letters. But even if she had not been that Gothic writer's sister, might you not want to know more?

Edgar Allan Poe died in Baltimore in 1849 (again, I reference the date only because I want you to know how much longer Rosalie lived following her brother's death---25 years---that must have been hard. That date is a key for me to release the sleeping story. Life in Richmond during the Civil War was difficult for a number of reasons. It was the capital of the Confederacy, and Jefferson Davis, the President of the Confederacy, lived there. It was the scene of conflict. Trains carrying prisoners and the wounded stopped in the city, home of a number of hospitals and prisons. If you are interested in knowing more about the war, you might enjoy reading that beautifully written essay entitled "Grant and Lee, a Study in Contrasts," by Bruce Catton. This is obviously a short read. Volumes await you about the Civil War.

The Mackenzies, along with thousands and thousands of others, suffered in Richmond. Even though her brother had little money when he died (and there was no will), Edgar's mother-in-law saw to it that Rosalie received only copies of his poems and stories and a few pictures of the man with the broad forehead, dark hair, haunting eyes, and troubled spirit. A pauper, Rosalie tried to earn a little money selling her brother's artifacts. Confederate money was useless, so few could afford what she offered. Rosalie gradually made her way to Washington, D.C. where she was accepted as a charity case at the Epiphany Episcopal Church Home.

Because Rosalie speaks to my heart, I wanted to create something. I wrote an original dramatic monologue wherein I became Rosalie for an audience at the Edgar Allan Poe Museum in Richmond in June of 2018. In costume, I portrayed her as an older woman on Trinity Sunday afternoon in 1874, a few weeks before she died. She is talking to a visitor and reflecting on her life. She's not bitter, just lonely. I imagine that she longed to lie in the cemetery beside her brother, even though he was buried in a remote spot at Westminster Church in Baltimore.

Rosalie never knew that his grave was moved a year after she died---1875. It would have been nice if her remains might have been moved to Richmond, perhaps near her mother's marker at historic St. John's Episcopal Church. Perhaps if we are interpreting cemeteries, we might choose to awaken the sleeping story of several tombstones. What do you think?

Is it my interest in Rosalie that caused me to recall her grave? Perhaps. But, then, there's something we should all ask ourselves if we interpret at cemeteries. What is it about the grave? On children's graves, we often see a carved baby lamb, a little angel. Sometimes, there are verses of scripture or sayings from a family member. It's our job to wonder, ask, and dig. That's exciting. To do less is not to interpret.

As I have written and revised, I have found myself very engaged with the notion of awakening the sleeping story. One day this fall, for example, when someone sees sunflowers blooming from the tiny crevices of one of the oaks on my front lawn (ivy unfortunately destroyed those old trees), he/she will discover a sleeping story. One lingers there. When I see, to cite another case, an old Presbyterian church without windows, only brick markings where windows may have been placed, I wonder. I am compelled to awaken the sleeping story. Could members not afford glass, or did they have an aversion to light. Why was the pediment so steep?

It is, indeed, up to us to answer these questions. It seems as if we are awakening or stirring something within ourselves. So as you explore cemeteries in the early fall, round about All Hallows' Eve, imagine you're an interpreter there. Find at least five to seven graves whose stories you want to awaken. Look for clues, ask a few questions, and you'll know. That's a fun challenge.

Thanks to my friend, colleague, and mentor, Dr. Veverka, for always encouraging and engaging, awakening and challenging, listening and responding.

The closing verses of one of Rosalie's poems are simple and hauntingly beautiful.

Fare thee well, may peace attend thee,

Hope each cheering influence lend thee,

And heaven from every ill defend thee

And bless the home that holds my friend.

Though we may never meet again

Thy image I will long retain

And whilst thy goodness I commend

My heart with pride shall call thee Friend.

Dr. Martha Benn Macdonald
College English instructor, published author,
and performer.
Associate Editor for InterpNEWS
*(*doctorbenn@gmail.com)

Should you use questions in your wayside panel?
Professionals weigh in on how to write interpretive text.

By: Forest Eidbo

In August, 45 professional interpretive writers responded to a survey asking how they write panels, signs and labels. The aim of the survey was to see where professionals landed on issues in interpretive writing, such as the use of questions and whether humor has a place in interpretive text.

The survey was sent to 135 certified interpretive planners, with one third sending back a completed survey. Respondents answered nine main questions[1]:

1. **Do you favor or oppose posing questions directly to the reader in interpretive text?**
2. **Do you favor or oppose the use of personal pronouns (You, We, Us, Our, etc.) in interpretive text?**
3. **Do you favor or oppose the use comparative figures of speech (metaphors, analogies, antitheses) in interpretive text?**
4. **Do you favor or oppose the use of humor in interpretive text?**
5. **When writing interpretive labels do you write to a specific audience segment or do you write to the broadest audience possible?**
6. **If you use a word limit, what is the maximum number of words that should be used for (introductory panels, sing object labels, and wayside panels)?**
7. **What is the highest reading level that should be used when writing interpretive text for general audiences?**
8. **What kinds of evaluation, if any, do you normally conduct with visitors when developing interpretive text?**
9. **What do you believe is the single most important guideline that should be followed when writing interpretive text?**

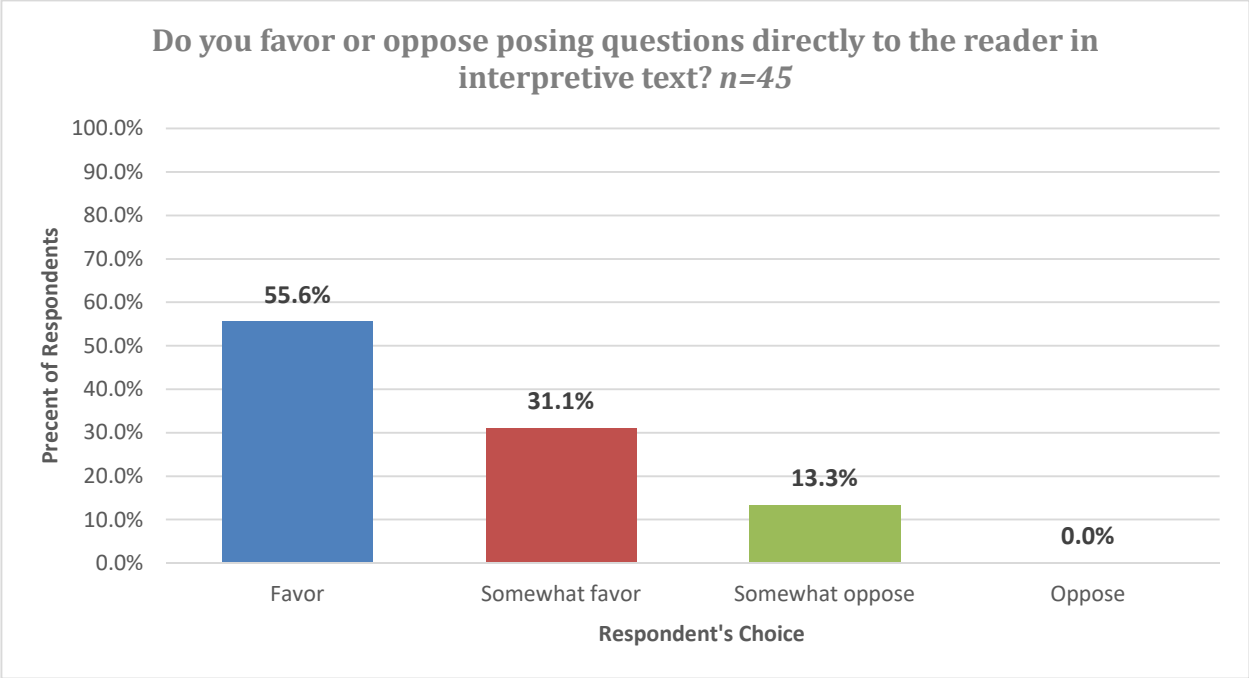
For each question there was an opportunity for the respondent to leave an open-ended comment. Over 141 comments were provided, the majority of which were guidelines and recommendations related to the close-ended question. For example: “Chunking words into small paragraphs is just as important as the overall word count”

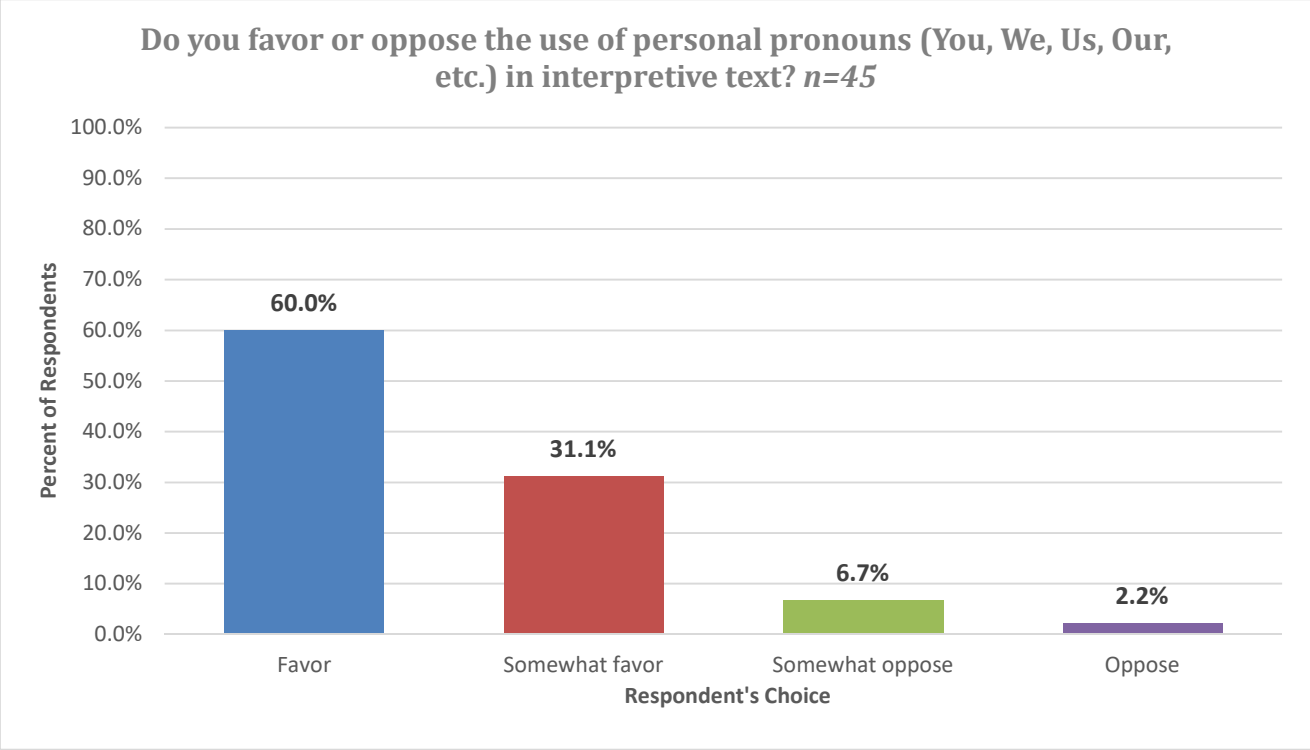
To determine what to questions to ask, we referenced a combination of 39 guidelines and how-to books for interpretive writing, noting where there were disagreements between authors. The points of divergence became the questions.

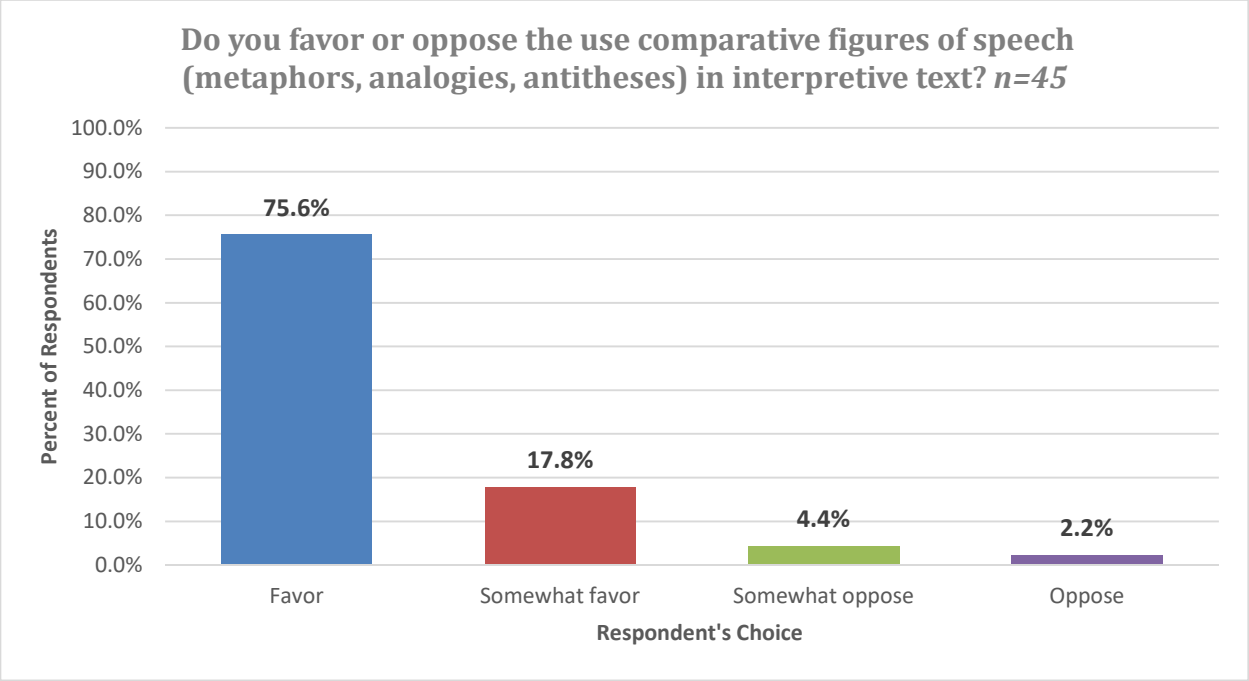
An example of such a disagreement between authors was related to the use of questions. Some authors caution against the overuse of questions. Certain texts suggest that questions should be ones that visitors are already asking and not a statement in disguise (Perry 2012) (Serrell 2015). Whereas, others encourage the use of questions unilaterally, even when it is something that visitors are not likely asking – for example, “Did you know that limestone is and ingredient in cement, paper, plastics, paint, tiles, toothpaste and bread?” (Hughs and Ballantyne 2010, 189) (Moscardo, Ballantyne and Hughes 2007). This disagreement became the basis for the survey question, “Do you favor or oppose posing questions directly to the reader in interpretive text?”

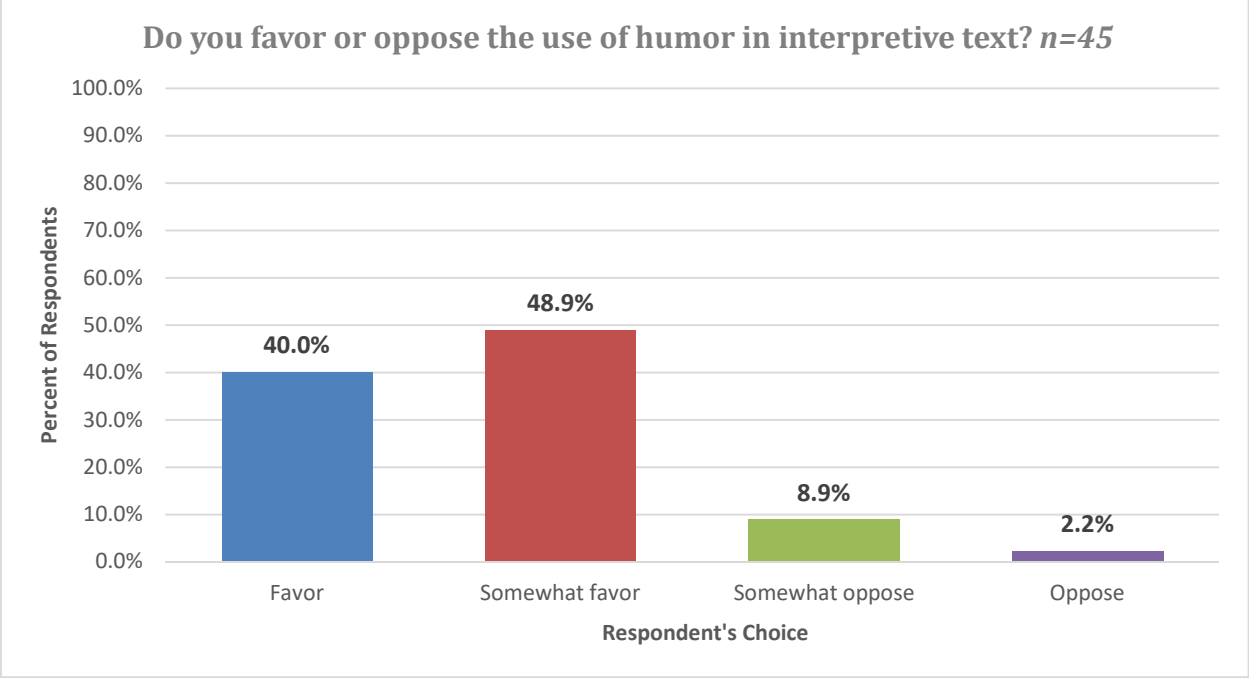
[1] There was an additional question regarding whether interpretive text should only interpret observable resources however it was removed because of measurement error.

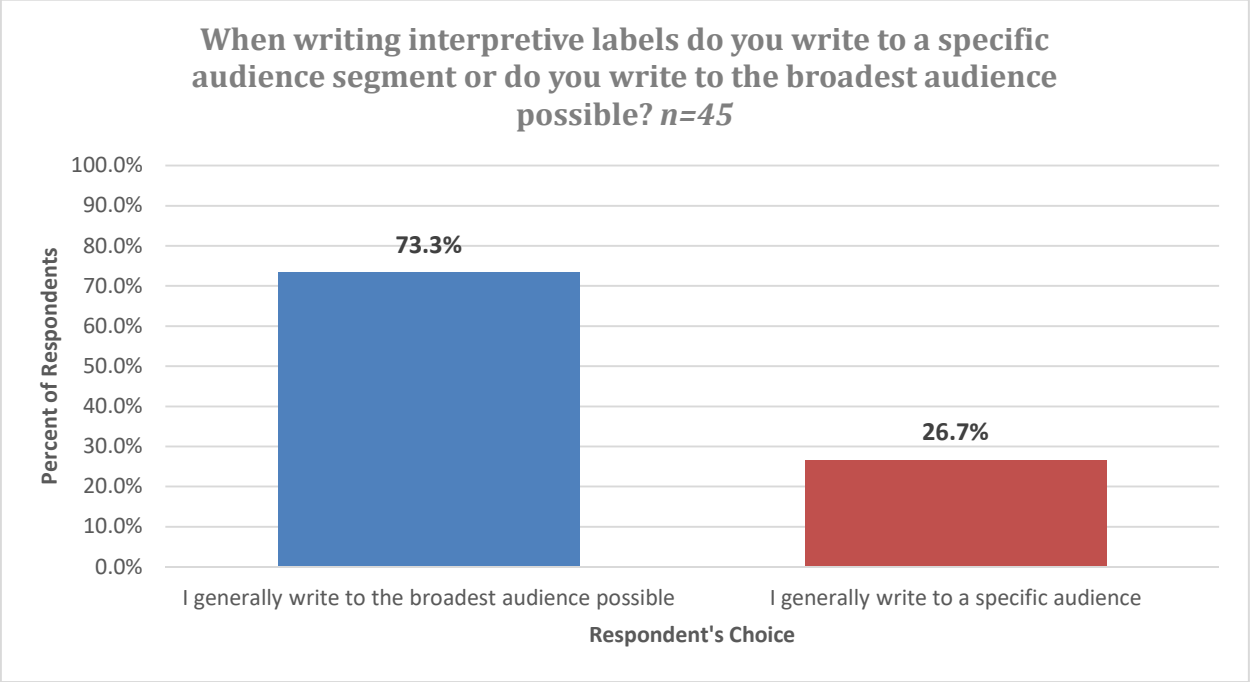
The following pages contain the results of the survey that 45 interpretive professionals responded to.

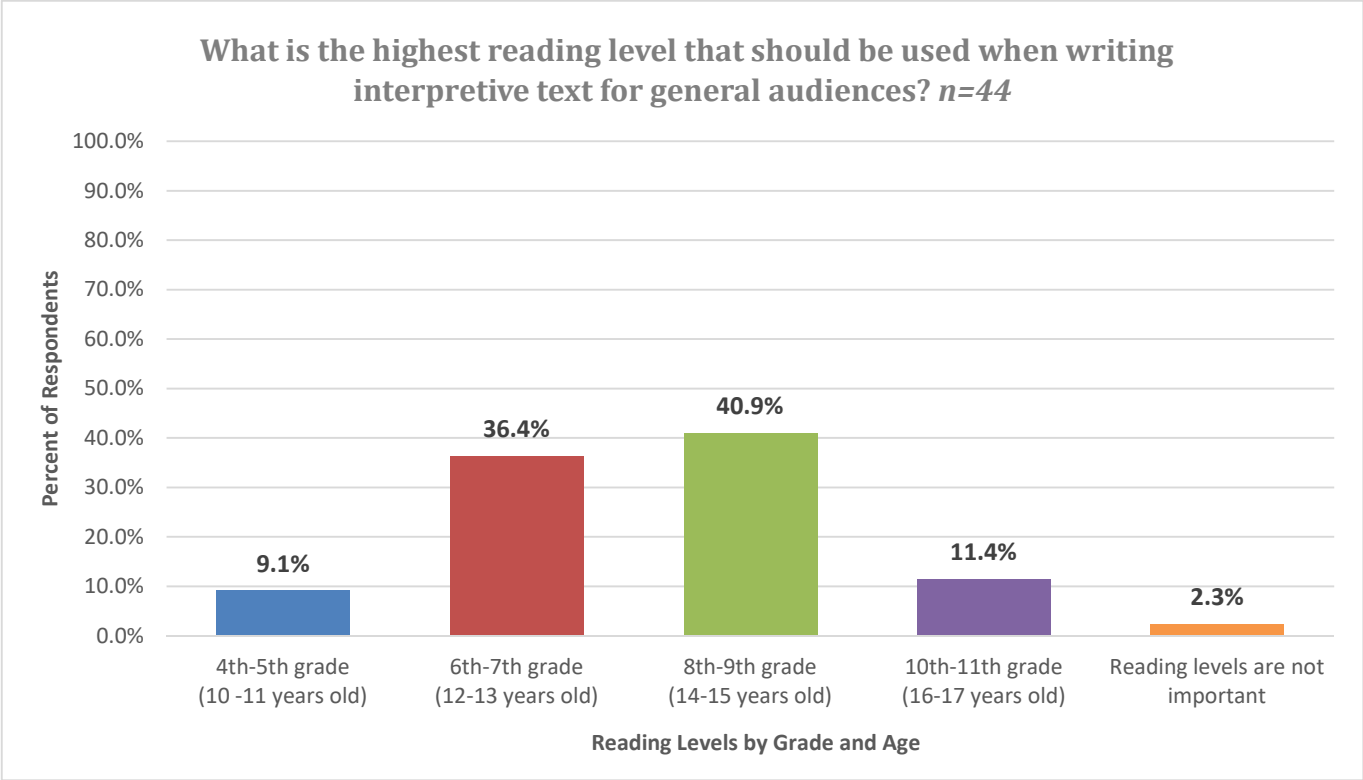


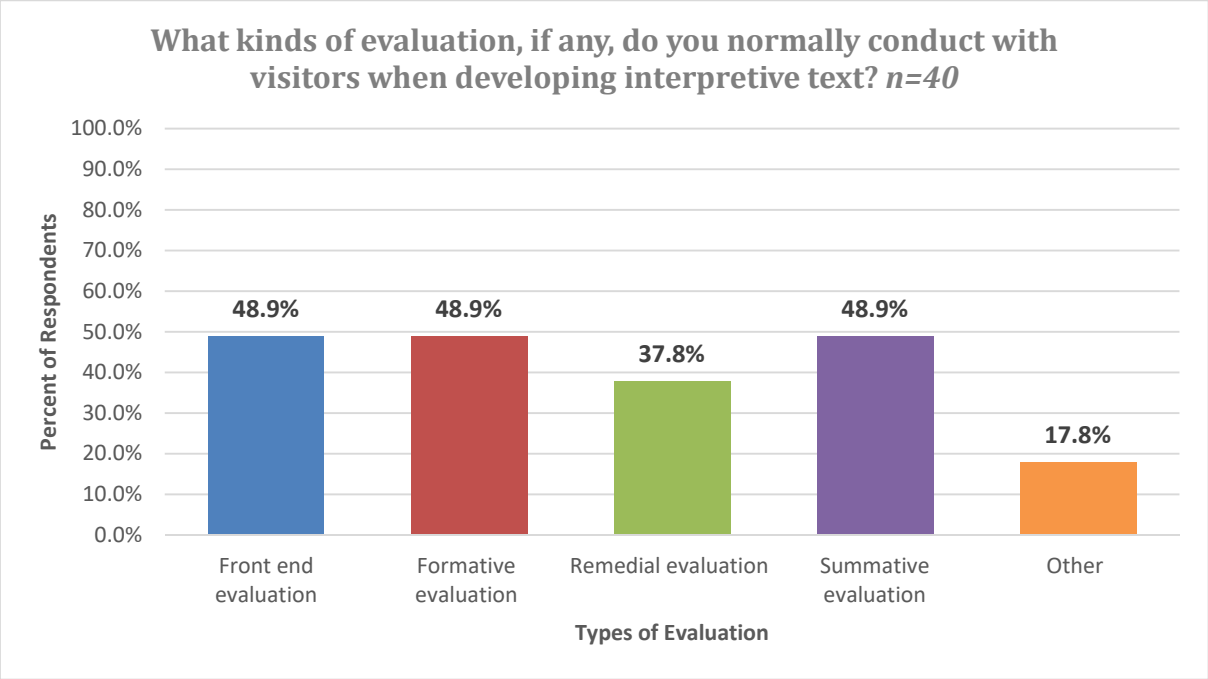



Do you favor or oppose the use comparative figures of speech (metaphors, analogies, antitheses) in interpretive text? n=45
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Percent of Respondents
75.6%
17.8%
4.4%
2.2%
Favor
Somewhat favor
Somewhat oppose
Oppose
Respondent's Choice


Do you favor or oppose the use of humor in interpretive text? n=45
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Percent of Respondents
40.0%
48.9%
8.9%
2.2%
Favor
Somewhat favor
Somewhat oppose
Oppose
Respondent's Choice


When writing interpretive labels do you write to a specific audience segment or do you write to the broadest audience possible? n=45
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Percent of Respondents
73.3%
26.7%
I generally write to the broadest audience possible
I generally write to a specific audience
Respondent's Choice


What is the highest reading level that should be used when writing interpretive text for general audiences? n=44
100.0%
90.0%
80.0%
70.0%
60.0%
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
Percent of Respondents
9.1%
36.4%
40.9%
11.4%
2.3%
4th-5th grade (10 -11 years old)
6th-7th grade (12-13 years old)
8th-9th grade (14-15 years old)
10th-11th grade (16-17 years old)
Reading levels are not important
Reading Levels by Grade and Age



What is the maximum number of words that should be used on the different forms of interpretive text?			
	Introductory Panels	*Single Object Labels*	*Wayside Panels*
n	31	29	33
Average	*104.03*	*39.83*	*158.03*
Median	80.00	35.00	150.00
Std Dev	71.85	19.20	110.94
Quartile 1	50	25	100
Quartile 3	125	50	175
Minimum Value	15	10	50
Maximum Value	300	100	500

While results of the close-ended survey questions present a clear picture of the professional's preferences towards many of the topics, comments provide a deeper look at their opinions, as many respondents gave recommendations or added caveats to their responses.

For example, while 90% of respondents either favored or somewhat favored using personal pronouns one of the common comments left was how using "we" or "us" can be presumptive or offensive as it can box people into a group. Additionally, multiple respondents left comments saying that they preferred the use of personal pronouns to firsthand accounts – like journal entries. Throughout the survey, themes found in the comments added a better understanding of how professionals actually applied interpretive writing techniques.

The final question of the survey asked respondents what they believed was the single most important guideline for writing interpretive text. From the 45 responses there were twelve concepts that were mentioned more than once. The list below represents these twelve "most important guidelines" in no specific order.

- Make sure your text provokes, relates, reveals and has a theme
- The text should have a real benefit for the agency
- Text must connect the resource to universals
- Keep your text short - less is more
- Write so that it relates to the visitor's experience
- Have fun, interpretive text should not be dry or dull
- Write using active voice
- Write in a conversational tone
- Do not let an academic write or edit your text
- Meet your audience where they are cognitively
- Communicate as much as possible with graphics
- Panels must be visually attractive

Do you agree or disagree with any of the recommendations above? If so, you can be part of the study by going here: z.umn.edu/Interp and anonymously voting on the recommendations.

The results of this survey are still being analyzed and we hope that by the end of the year some conclusions about how interpretive planners write can be shared. If you have any questions or comments about this project, please contact Forest Eidbo at eidbo003@umn.edu.

A Working Demonstration Model of the *Hydraulus*, the Roman Water-Organ

Richard Ellam, BSc, AMA

1.Introduction

The classical Graeco-Roman hydraulus, the prototype pipe-organ, is well known from authors such as Heron of Alexandria and Vitruvius, but it is poorly represented in the archaeological record, despite literary evidence suggesting that these instruments were a reasonably familiar part of Roman cultural life. The paucity of archaeological remains has lead to the hydraulus being largely overlooked in museum displays, and consequently being almost totally unknown to lay audiences.

This paper describes a project to build a working representation of an hydraulus for use in educational and outreach programmes by the Roman Baths Museum, in Bath, England. This instrument was constructed early in 2014 and has been continuously in use since that date at the Roman Baths Museum.

2. Outline and Scope of the Project

Late in 2013 the author was approached by the Education Dept of the Roman Baths Museum who were looking for a contractor to take on the task of researching designing and building a working model of the hydraulus. I have been designing and making hands-on exhibits and demonstration equipment for science centres and museums since 1994, trading as 'L M Interactive'. I have a background in museum curatorship and an interest in the Roman period so I was delighted to accept the challenge offered by the museum. Initial discussions quickly established the parameters for the project.

The museum wanted a working model of a hydraulus, as described by Vitruvius. The instrument was required for use in workshops, primarily with school children and it was of paramount importance that it should be robust enough to withstand the unskilled but enthusiastic attentions of workshop participants. It was also important that all the workings of the instrument should be, as far as possible, visible. The museum understood that this meant that the instrument could not be either a replica or a reconstruction - these terms imply a degree of fidelity to the original, or at least to the use of Roman-era materials and techniques, which would be incompatible with the museum's requirements for robustness and transparency. So it was agreed that modern materials and techniques would be used to make the instrument, and that (subject to final approval by the museum) I would have a free hand in its design. So, for example extensive use is made of plastic materials in the construction of the organ, and where expedient components are screwed together. Neither of these technologies, of course, were available 2000 years ago.

3. Research and Development

The museum was unable to provide much detailed research material. They have no specialism in archeo-musicology, nor in Roman technology. So I had to start pretty much from scratch, and began with the description of the instrument in Vitruvius. This author provided details of the key and valve mechanism which controls the flow of air to the pipes, and also explained the principle of the hydraulus but provided few details of what the instruments looked like. The bulk of the

research effort to develop the model was done on-line, and fairly extensive internet searches, particularly for still and moving images were undertaken. In the course of this intensive browsing effort I came across the replica of the Aqcuincum organ, which is located in Budapest, and this served as an inspiration for the final design of the Bath hydraulus.
I also referred to on-line material about the Dion Hydraulus, discovered in Greece in 1992. Other replica hydraulae, particularly the one belonging to the German ancient music group Musica Romana were also referenced.

The final design of the instrument that emerged from these investigations and discussions with the Roman Baths Museum is shown in figure 1, below.

Fig 1: general view of the hydraulus, taken in the museum's workshop.

4. Details of the Instrument

4.1 Structure

The base and case of the instrument are constructed throughout from 12 mm birch plywood, heavily varnished to waterproof it. The case contains supports for the keys and a windchest to supply air to the pipes. The back wall of the windchest is made of transparent acrylic sheet to show that the windchest is essentially an empty box.

The base also carries the support structure for the single rank of 16 pipes. The bell of the hydraulus, the hydraulic pressure regulating system, hangs from the underside of the case, whilst the water tank for the hydraulus sits on the instrument's base. The case is made to be easily removable from the base so that the hydraulus tank can be filled with water.

4.2 The Hydraulus

The hydraulic water pressure regulator, the hydraulus, and its associated water tank are both made from transparent acrylic (PMMA) sheet so that the action of the hydraulus can be seen and studied. This is of course totally inauthentic, as is the shape of the hydraulus. It seems that in antiquity these devices were bell or cone shaped and that they were made from bronze either by casting or fabrication from sheet. Copying this shape in acrylic would have been possible, but considerably more difficult than making a rectangular box fabricated from flat sheet, which is how the instrument's hydraulus bell is actually made. This construction allowed the internal volume of the hydraulus bell to be maximised, allowing the storage of a greater volume of air. This probably makes the instrument easier to play than one with a correctly-shaped air-bell.

4.3 Wind Supply

'Wind' is the term traditionally use by organ builders for the very low pressure, say 100 mm water gauge, compressed air used in organs. The wind for classical hydraulae seems to have been provided by piston pumps, rather than the bellows used to supply organ wind from mediaeval times onwards. Like the later bellows, though, the pumps were worked by human power with one or two people working the pistons up and down through some kind of lever system.
In the Bath organ I opted not to use this system, but to use bellows instead. This reduced the complexity, cost and size of the instrument as it proved possible to adapt modern plastic bellows, made for inflating camping air-beds, to the task of blowing the organ. Two sets of these bellows are used, mounted on wooden bases for stability and connected by a tee-piece to an air inlet on the back of the organ by the flexible plastic hoses intended to connect them to the air-beds they are blowing up. These bellows are probably the most highly stressed components of the organ, and the ones most likely to break. Using air-bed bellows, cheaply bought from a high-street camping shop simplifies the problem of replacing these components when they fail.

The tee-piece and all the other pipe and fittings used in the organ are standard domestic plumbing fittings. The pipes are thin wall copper, and the fittings are brass.

4.4 Keyboard (Fig. 2, Below)

There are sixteen L- shape wooden keys. These are made from plywood laminations, and are heavily varnished. Each key has a brass bush pressed in which work on a stainless steel rod that runs the length of the keyboard. The rod has two intermediate supports, and the keys are spaced apart by stainless steel washers.

4.5 Valve Chest

Classical organs seem to have used slide-valves to control air supply to the pipes, not the poppet valve pallets universally used in modern organ building. In Roman times the valves and valve chest would have been made of metal, probably with bronze slides running in a cast-lead valve chest. With a suitably sophisticated foundry technique it should be possible to cast such a valve chest around its sliders in such a way that the sliders can be freed from the casting to provide very accurately fitted and free-moving valves.

By contrast the valve slides and valve chest of the Bath organ are all machined from grey engineering grade PVC sheet. The valve chest is made in two parts, a flat lid and a base containing the slots for the slides to work in. The two parts are fixed together by numerous set-screws fitted through the lid into tapped holes in the base. The lid contains a row of counterbored holes to locate the bases of the organ pipes, and there are through holes, blocked by the slides in their closed position, connecting each pipe to the interior of the windchest.

The sixteen slide valves work horizontally in slots in the valve chest. Each valve is connected to its corresponding key by a short length of nylon monofilament fishing line tied into a hole in the end of the valve and wrapped around a screw driven into the end of the upright leg of the key. The knots in the nylon line were sealed with low viscosity cyanoacrylate adhesive (superglue). The valves are returned to their closed position by flat brass springs pressing on the keyboard ends of the slides. Each slide has a hole about 6 mm diameter drilled in it it such a position that its key has to be depressed about 20 mm to bring the hole into line with the corresponding holes in the valve chest base and lid.

The valve mechanisms are quite delicate and might be prone to damage from inquisitive young fingers, so the whole of the upper part of this mechanism is covered by a transparent cover, made from polycarbonate for maximum toughness.

4.7 Pipes (Fig. 4 Below)

The Aqcuincum organ had four ranks of thirteen pipes, 52 in total. These pipes seem to have been controlled by stops allowing different ranks of pipes to be silenced at will. It seems that the pipes were tuned to play in different musical modes or scales, and so it is probable that only one rank of pies would have been sounded at any one time. The Bath organ by contrast has a single rank of 16 pipes. Early on in planning the project it was agreed that no attempt would be made to give the instrument an authentic modal tuning. Instead, the pipes would be tuned to a single modern major scale, and they would be tuned to modern concert pitch (A=440 Hz). Practical considerations around the length and diameter of the pipes resulted in the instrument being tuned in the key of G, and having a compass from DD (the D above middle C) to E1 (the E two octaves higher).

Surviving ancient organ pipes are made of bronze. The pipes for the Bath organ are made of copper as this is the closest easily available material, and the pipes for the organ are actually made from copper plumbing tube. This is readily available in the UK in three standard outside diameters, 15, 22, and 28 mm. The corresponding bores are 13.2, 20.2 and 26 mm. Using copper plumbing pipe also allowed the use of standard (and cheaply available) plumbing fittings, such as fitting reducers, to complete the pipes.

Modern metal organ pipes are a highly sophisticated design which has evolved over several centuries to optimise the acoustic properties. They are also made of a pewter-like alloy. Such pipes would be inappropriate in a model of an ancient organ, as well as being challenging for a nonspecialist to fabricate. Fortunately examination of photographs of the replica of the Dion hydraulus revealed that its pipes seemed to be made much more like steam-whistles than modern organ pipes. This construction is much simpler and it proved to be possible, with modern workshop machinery, to manufacture serviceable pipes from scratch in about 20 minutes each.

There is a definite relationship between the length and the bore of an organ pipe if it is to work properly. Making pipes either too long and thin or too short and fat results in pipes that are temperamental, and which will not sound reliably. The longest pipe on the Bath organ, playing the note DD and 28 mm outside diameter has a sounding length of about 560 mm. The shortest, playing E1 and 15 mm outside diameter has a sounding length of about 120 mm. Making pipes significantly longer or shorter than these, with the 'steam whistle' mouth design adopted would require larger or smaller diameter material which would not be so readily available.

Formulae for establishing the theoretically correct length of organ pipes, with proper allowance for the height of the pipe mouth and corrections for diameter were found on the internet and a spreadsheet was used to calculate the major dimensions of the pipes. Each pipe was made slightly longer than the calculated length, so that it would definitely play flat. Once the pipe's mouth had been finished and it sounded a clear note when blown by mouth the pipe was soldered together. Final tuning was done with the pipes installed in the organ and playing at their final playing pressure, because the pitch that a pipe sounds at is influenced by the pressure of the wind blowing it.

Pitch was measured with a Korg electronic tuning meter and the length of the pipes was reduced by taking facing cuts in a lathe until the pitch had been sharpened to the correct value. The finished pipes were polished before final installation in the organ. They proved to produce a pleasant, surprisingly harmonious and well-balanced sound which is gratifyingly similar in quality to recorded samples of music played on other replica Roman organs where perhaps the pipes are of a more sophisticated design.

5. Conclusions

This project demonstrates that it is possible to construct a satisfactory working model of a hydraulus from modern materials at reasonable cost.

The instrument produced is not a perfect replica or reconstruction of its ancient Roman prototype, but this was never the project's intention. The purpose of the project was to create a robust and reliable exhibit, suitable for use under supervision by the general public and school-children which would introduce them to the idea that ancient Roman music was a sophisticated art-form performed in part on complex and ingeniously made instruments.

The project also allows museum visitors to get some idea at least about what a Roman water-organ would sound like and possibly helps to transport them back in time to the Roman heyday of the baths of Aqua Sulis. We can't know for certain, but it seems highly probable that 1,800 years ago bathers in the famous hot springs would have been entertained on occasions by the clear tones of the hydraulus filling the steamy air with beautiful music.

One surprising discovery was that the instrument is quite agile, and can be played almost as fast as a modern small pipe-organ. At an early public showing of the Bath hydraulus members of the public were invited to play the instrument and one player gave a spirited and up-tempo performance of 'When the Saints Go Marching In'.

Unfortunately it was not possible to record this remarkable performance. It is possible that the lighter weight and so lower inertia of the PVC valve slides, compared with the bronze items used in ancient instruments makes the modern instrument more responsive, but there seems to be scope for considerable experimentation to discover just what these ancient pipe organs were trulycapable of doing.

The instrument can be seen and heard being played by Alexander Henshaw, a talented young organist, on this video: www.youtube.com/watch?v=VesLeVMK5aE. The author can also be glimpsed in the background working the bellows!

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Surveying & Mapping Basics for Grade School Students (or Others)

By Ron Kley

The following is an outline for interpretive activities intended for outdoor use, but they can easily be adapted for indoor presentation.

Surveying is the process of measuring the distance and direction between selected points.

Mapping is the process of combining survey measurements into a visual format that accurately shows the size and shape of an area at a convenient scale.

==========

Distance

Use rulers or tape measures to introduce concepts of commonly used distance units (inches/centimeters, yards/meters, miles/kilometers. Relate those units of measure to common body-related measurements (e.g. handspans, steps or paces) which vary from person to person but are quite consistent for any given individual.

Note that a person's handspan, once its equivalent in inches or centimeters has been established, is a handy measuring device that's always within the individual's easy reach, and the conversion of handspans to inches or centimeters can provide useful practice in multiplication. (How wide, in handspans, is a classroom desk or window? How many inches or centimeters is that?)

Scale

Using a map depicting a familiar area (e.g., community, state, province, country, continent) – or a floor plan showing the arrangement of classrooms and hallways in your school, have children verbally express the map's "scale" (i.e., the relationship of "real world" distance to distance as shown on the map (e.g., "one inch on the map equals 100 miles on the ground."

Have children express the same scale graphically, by drawing a line on paper, marking it off in inch or centimeter increments, and then relating those increments to the real world distances represented, e.g.,

Inches	0	1	2	3	4	5
Miles	0	100	200	300	400	500

Directions

Introduce the concept of "Cardinal" or principal directions (North, South, East and West) and intermediate directions (Northeast, Southeast, Southwest, Northwest).
Using a compass (outdoors) demonstrate that the needle points North, regardless of which way you face while holding it.
(Mention and/or demonstrate that the nearby presence of iron or steel, such as a car or a steel-framed building can influence the compass and cause its directional reading to be inaccurate.)

Inrtroduce the concept of a 360 degree circle and its relationship to cardinal and intermediate directions as measured clockwise from North (North=0°; East=90°; South=180°; West=270°.

Note, with reference to the compass, or to a map of the world, that if you face North, East is always to the right, West is always to the left, and South is directly behind.

Introduce the use of a compass to find and follow directions, and use of a protractor to represent directions on paper in terms of degrees from North, using the conventional orientation where "up" (i.e., the top of the sheet) represents North.

Generate a pace and compass map (Note – One "pace" equals two steps)
Choose a starting point on the ground, mark it with an "X" and put a small "x" on a sheet of paper to represent that same point. Then choose a scale (1" = 10 paces might be a good choice for this exercise).

From the starting point, and using the compass, proceed North 30 paces; mark that point on the ground with "#1" then draw a line northward from the "x" on the paper to represent this same distance and direction, using a ruler to draw a line of the proper length (according to the chosen scale) and in the proper direction (directly toward the top of the paper).

From point "#1 on the ground, using the compass, proceed East 30 paces, mark the new point on the ground as "#2" and then draw a line on the paper from #1 to represent the distance and the direction traveled from point #1, using a protractor to draw this line in a direction that is 90° clockwise from North.

From point #2 on the ground, using the compass, proceed South 20 paces. Mark the point on the ground as "#3"and draw a line on the paper from #2 to represent the distance and direction traveled, using the protractor to draw that line in a direction that is 180° clockwise from North.

From point "#3, using the compass, proceed West 30 paces, mark that point on the ground as "#4"and draw a line from #3 on the paper to represent the distance and direction traveled, using the.protractor to draw that line in a direction that is 270° clockwise (or 90° counter-clockwise) from North.

Ideally, this procedure would have brought the path or "traverse" on the ground back to the original starting point, and would have generated a square "box" on the paper as a "map" representing the distances and directions traveled, and outlining the area within the traverse line.

In practice, point #4 will probably not correspond exactly to the starting point because of inaccuracies that are inherent in this process – e.g., the difficulty of following a compass direction or "bearing" precisely while walking; and the difficulty of maintaining a uniform length of pace (especially over uneven ground, or if different pacers have performed different segments of the traverse). Discussion might be invited regarding ways of performing the traverse more precisely.

Even with the inaccuracy, however, participants will have seen how distances and directions in the "real world," whether outdoors or indoors, can be translated into a scaled representation on paper – the most basic process of map making (or architectural drawing, industrial design, civil engineering, etc.)

As a follow-on activity, participants might be invited to create pace and compass maps of their classroom, their school building or their home. For fun, some object of interest (e.g., a small unopened bag of potato chips or cookies) might be hidden out of sight, and children might be provided with a map showing the "treasure" location in terms of compass bearings and paces from a fixed starting point such as a school doorway or a tree in the schoolyard. This process could be progressively elaborated upon – beginning with a single bearing and distance, and gradually becoming more complex with one, two or more intermediate "turning points" that each require a new compass bearing to be established.

To carry this introduction still farther, you might invite a local surveyor, or perhaps someone from a municipal public works department to bring an alidade or transit and a stadia rod to demonstrate more precise methods and equipment for measuring and mapping distances and directions.

It's possible, of course, to elaborate on the basics that I've outlined here, and to get into such topics as why a compass needle points north, the nature and origins of earth's magnetic field, the distinction between true north and magnetic north, the need to compensate for differences in elevation when measuring the distance between points, the use of laser-based survey equipment, astronomical and other non-compass-based means of finding directions, the problems that arise when a traverse line is obstructed by trees or a body of water. I would encourage pursuing such add-ons insofar as individual or group curiosity may warrant, but not beyond the point where it has been satiated. Where a single individual or a just few may thirst for more information, they can be directed to published (including on-line) sources. Two that I would recommend are *All About Mapmaking* by Susan Sherry Marsh (Random House, 1963) and *Mapmaking with Children – Sense of Place Education for the Elementary Years* by David Sobel (Heinemann Publishers, 1998).

Happy mapping!

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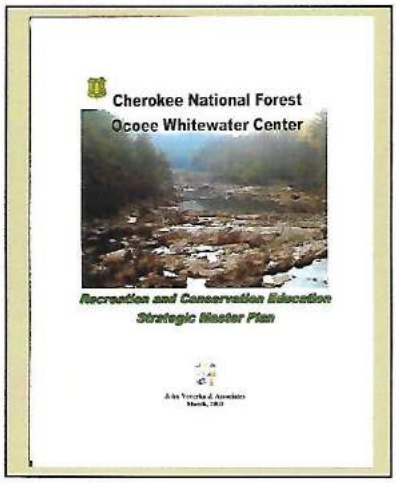

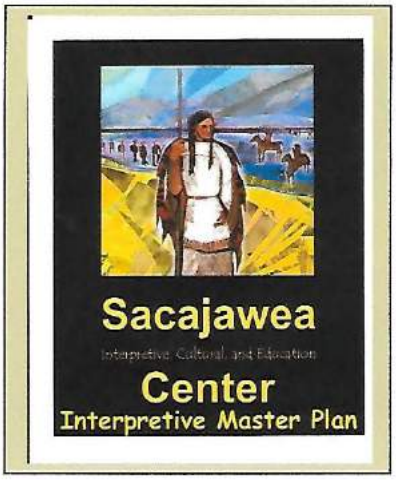

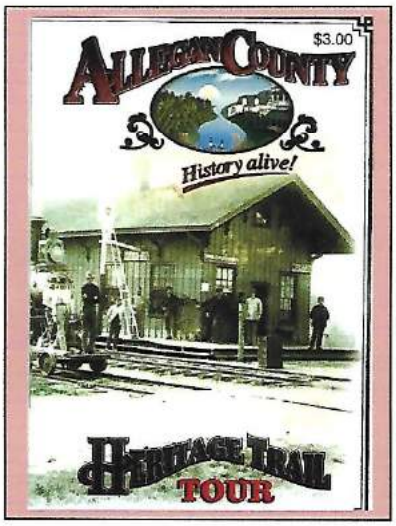

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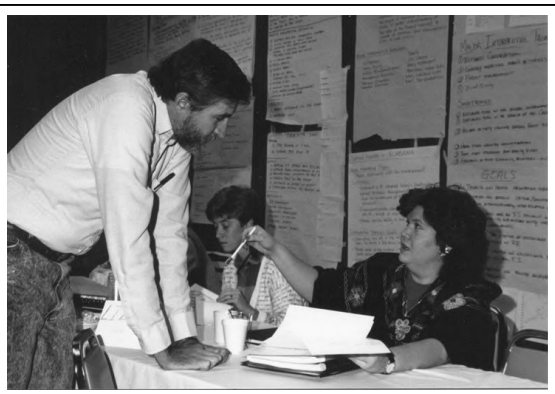

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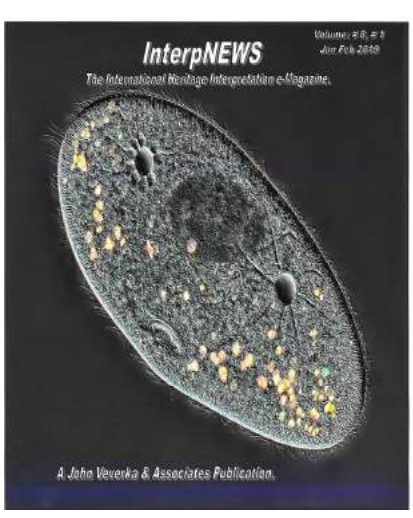

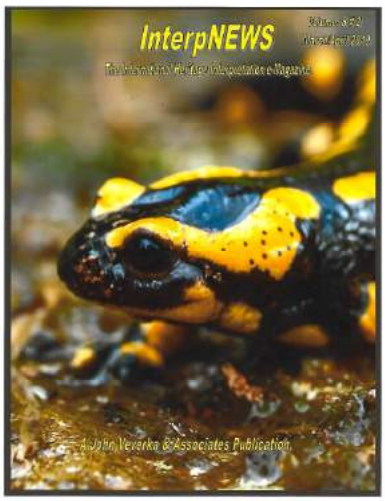

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