Tips For Excellent Planetarium Scriptwriting

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Recognition is also given to the late David Hoffman, who edited the original 1983 GLPA publication this CD derives from, and to Dorothy Angeloff, Ruth Haag, David Romanowski, and the late, great Fran Biddy who all contributed material to it.
INTRODUCTION

“Hey, baby, have I got a great deal for you! Just finished reading your first script. Great stuff. Love it, love it, love it. Listen, I think I can get it in with one of the majors. I’m showing it to a friend at Paramount tomorrow. Word is, Spielberg’s looking for a new project, so let’s do lunch…”

Oh, this is a planetarium publication. Sorry, that was my introduction to Hollywood scriptwriting. It deals with stars, too, so I got confused.

Meanwhile, back in the real world...

Who can I ask to comment on the joys of planetarium scriptwriting? Oooh, how about Jim Manning? He’s one of the leading lights in this field. So, Jim, what do you like about writing scripts?

‘...doing the research...with its opportunity to learn about new things, sometimes in disciplines that relate only peripherally to astronomy if you are working on a multi-disciplinary show...engaging in the intellectual and creative process itself, puzzling out the direction for a show, solving the challenges of presenting concepts and using well the audio-visual capabilities you have...having somebody give you positive feedback on the script and the show, which validates the effort. But perhaps the greatest joy is simply in having an avenue for communicating your own love of the stars to somebody else.’

Another scriptwriting luminary, Carolyn Collins Peterson, feels that

‘Planetarians are painting the dome with visuals and filling “space” with the sound that goes with the imagery. The words we write are part of the tapestry we weave in that space. If we embrace the idea of tapestry creation it’s incredibly exciting. Sure, it can look like a daunting, perhaps even frightening, prospect from the outside. But once you get started, you find yourself immersed in weaving, in experiencing the storytelling process, and it can be hugely satisfying, if not enjoyable.’

Yes, strange as it may seem, scriptwriting can be enjoyable. (Shock, horror, probe). That may come as a surprise to you if you share Sheldon Schafer’s views that,

‘I think scriptwriting could only be made easier by slowing the Earth’s rotation, so that a day is more than 24 hours, and by eliminating the barrage of interruptions that are a constant source of distraction in my planetarium life.’

So what we need are a few more El Ninos, then?

But I jest. Yes, indeed, planetarians are jacks of many trades - public speakers, electricians, administrators, researchers, etc. So if you feel you have a skill for writing, we would like to help you produce focused, well-structured scripts, and to view your writing skills as just another dimension to your job, to be nurtured like the rest of your talents. After all, the shows you put on are our profession’s advertising tools. They help pay the bills to keep you in a job so you can continue doing all the other fun stuff.
I was delighted to be asked to compile this publication with the help of other planetarians, as I believe that we ignore the factors above at our peril; scripts lacking a professional approach can leave an audience confused, disappointed and frustrated. What reason do they have to come back to see your next production?

I won’t deceive you and make you think you can be a good writer overnight. It will take the same dedication over a period of time you are accustomed to showing every day in many other areas of your work. Yes, it’s a long and winding road (sorry, no chance of meeting any of the Beatles along the way) and the journey’s length is up to you.

Think of this publication as your literary light saber, designed to hold back the dark forces of weak scripts. (Sorry, there are no tips for finding long-lost fathers). It began life waaaaaay back in 1983 as a 12-page Xeroxed publication held together by a staple (ah, those were the days…) and written by the late David Hoffman for the Great Lakes Planetarium Association (GLPA) in the USA as part of their legendary series of Tips booklets. In 1998 at a GLPA conference I was invited to update and expand it for the modern planetarian, to take account of all the intervening advances that had taken place in technology, educational methods and the constantly shifting place of planetaria in the increasingly competitive education/entertainment field. So, as the contributing editor and with the help of contributions from fellow planetarians, I completely rewrote and expanded it to 50 pages in printed format, and it was released to the GLPA membership alone in 1999 as a benefit of their membership. In 2005 the IPS got permission from GLPA to publish it under their own name and I was asked to update it again, to take account of how the many technological advances that have been made in the preceding six years have affected planetarium scriptwriting. So here it is, the product of your fellow planetarians who want to share with you their literary musings. Scary, huh?

Yes, on the following pages the essence of good writing is distilled in the form of dozens of tips. Put them to good use, and there will be a greater probability that your audiences will leave your dome enchanted with, rather than confused about, the Cosmos. Don’t put them to good use and...well, you’ll be missing out.

But don’t think these tips are aimed solely at planetarians who produce taped shows; many of the ideas are equally valid if you do only live performances. Recorded or live, presentations are presentations, and they all need to be rooted in the professionalism ensconced in these pages.

Before I go any further, I would like to say a big “Thank you” to all the kind souls who contributed material and tips. The time and trouble you took to compile your valuable contributions are much appreciated. It confirms once again that the planetarium profession is filled with generous people, keen to help others and make the profession grow.

I believe planetarians who have not written any shows fall into two categories: a) those who are simply not interested (in which case they aren’t reading this) or b) those who are interested, but lack the confidence...
or the time to start. If you are in the latter group I have this thought for you in relation to the confidence factor: working with the public, you no doubt do live presentations, which in itself is something that many people outside of the profession would not try because they supposedly lack the confidence. (Public speaking is one of the greatest fears of the general public).

You learned by doing, and it’s the same with planetarium scriptwriting. Practice makes perfect, so think of astronomy demystified as just another non-fiction subject.

As a typical planetarian you are comfortable dealing with various aspects of science, because you feel at home in that sphere of knowledge. You are happy with a roll of Kodalith film in one hand and a soldering iron in the other, but replace these with a pen and paper to write a show and suddenly you are filled with dread. So what can we do about that? Hmmm… how about viewing them as merely different sides of the same coin? Each are tools to help you communicate the fun and excitement of astronomy. Don’t think of the writing process as the evil twin of the planetarium family. It compliments the other elements of our profession, and is one of the most important keys to the whole.

I don’t want to gloss over some of the realities of producing worthy prose, so I’ll declare up front that popular science writing can sometimes be a lonely, frustrating labour of love. You snarl at the cat and wonder how my literary hero, Isaac Asimov, could make it look so easy. (The answer? There’s no accounting for genius). But writing is also deeply satisfying when done properly, which more than makes up for the mental dead-ends and stop signs you have to navigate around to get there. All of a sudden you magically forget about those low moments. Life’s great again. And the cat stops looking nervous.

Authors are sculptors of words. We begin with a blank sheet of paper (akin to a block of stone) and after some hard work (and more mugs of coffee than you can shake a percolator at) you produce a piece of work that has structure, form and shape - in theory. The better the writing, the finer the curves carved by your word chisel. If you’re a beginner your first efforts may have all the smoothness of an asteroid, but over time you will produce stuff that is closer and closer to a Venus de Milo.

Pity it won’t fetch as much.

Our public want programs that are as good to listen to as they are to watch. Even more so these days, when there are so many other forms of entertainment vying for their hard-earned money. So if you’ve never tried your hand at writing a planetarium script, I hope this treasury of tips will give you the courage to have a go. If you’re a complete novice you can wade around in the shallow end for a while until you feel comfortable, then inch your way to the deeper waters of the scriptwriting world. By then you will know how to fend off the literary sharks. Remember, knowledge is power. The more you understand about writing for a planetarium audience, the greater will be your success.

As April Whitt says,
‘Jimmy Horn once told me that the secret to a good planetarium program is to (1) bring ‘em in, (2) make ‘em small, (3) make ‘em big, and (4) let ‘em out. We have the ‘wow’ effect to make them small in the star field alone. A good script will send them out feeling smarter. And that will make it easier to bring ‘em in next time.’

You never realized it was so easy, did you? But read on; life ‘ain’t that simple…

Don’t forget, these tips are just that - tips, not laws. Do we expect you to incorporate all of them into every script you write? Yeah, sure we do – no, seriously, we don’t. But if you can find the right mix of a limited number, your well chosen words and images will have a greater chance of generating the desired positive response from what will hopefully become repeat visitors to your dome.

Educational psychologists have found that creativity is split into five successive stages in the human brain: idea, research, incubation, realization and execution. This publication will teach you a little about each of these stages.

Any mistakes left herein are my own. They will be corrected in revisions of this publication that will be made periodically. I encourage you to send in any corrections or new contributions you feel would be of value. Feedback is always greatly appreciated.

Okay, enough of my inane rambling, it’s time to get down to business. So set your memory chip to Record; the game’s afoot…

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CHAPTER ONE
THE ADVANCED PREPARATION

The Big Question
Steady, now. Put the pen and paper down, take a breathe, relax, close your eyes and step…away…from…the…keyboard. I know you’re anxious to get started, but before you let any thought of putting pen to paper even think about the merest possibility of perhaps asking permission to even consider the audacity of crossing your mind any time soon, if that’s okay by you, ask yourself the most important of all questions for a planetarium scriptwriter: ‘What is the purpose and objective of my script?’ If you don’t, you may as well stop reading now and go and do the dishes, because none of the other advice on these pages will matter; a script with no clearly apparent focus or objective is a waste of everybody’s time and effort. It will leave your audience confused, disappointed - perhaps even irritated - and the production will do nothing to enhance your reputation. It will not go down as one of your wiser decisions…

Your answer to the question above will depend partly upon whether or not you are writing a show that will only be seen in your dome, or one that may be marketed to the wider planetarium community. In the latter case, other domes will be different in size than your own, they will have different equipment and may have different educational goals to meet for their local school district. For these reasons, their needs may not match your own. Generally speaking, however, every scriptwriter should want to engage their audience’s attention, acknowledge their intelligence and communicate the excitement of astronomical discovery in such a way that their patrons can have fun while learning. This approach is a key element in education today. Your script’s purpose and objectives should be summed up in a couple of sentences, no more than 25 words. If you can’t shorten yours to this upper limit, you’re tackling too many topics for one program, which, if we’re honest with ourselves, is a downfall of some shows we’ve all seen. Focus, focus, focus. More on that later…

Alan Davenport feels that,

‘All scripts should provide the mortar to hold together the environmental, visual and audio elements of the planetarium, and martial those elements into the most effective educational experience possible. The subject of a show can vary broadly across a spectrum of science and art topics…but the script must be continuously conscious of the synthesis of sensory experience that the planetarium provides. With those elements in mind, the objective can be any of a variety of concepts to be conveyed to the audience for the purpose of providing them with new knowledge or skills, enjoyment and appreciation of the universe around them.’

The Right Mental Approach
Scriptwriting tests your mental reserves, so it’s vital to tackle the task in the right frame of mind. A casual, undisciplined approach will see you about as far as the
end of page one. So bear in mind the following suggestions.

• Don’t think that your script is facing an uphill struggle from the start, having to exist next to many of the great shows you have seen. Remember, those veteran show producers had to learn from scratch, like the rest of us. They had to write weaker stuff before reaching the pinnacles of which you’re thinking. Writing is an evolutionary process, a truism you will appreciate the more of it you do. So set your sights at a realistic level. You aren’t going to write the perfect script. Nobody does. No matter how many years you spend perfecting your writing skills, you will always think you can do better next time. It’s human nature. Your only competition is yourself.

• Choose a specific place to write, a place where you are unlikely to be disturbed. Apart from anything else, the familiarity of that place will settle you sub-consciously and make it easier to concentrate.

• Create a reasonably strict writing schedule. Everybody is different, so you will have to decide for yourself when you can fit the writing in to your daily routine. The aim is to make writing an automatic daily habit, like cleaning your teeth. On this point, Samuel Johnson once wrote, ‘A man may write at any time, if he will set himself doggedly to it.’ After a while, you will agree with him. Just take Dale Smith’s advice:

‘It is essential to find quiet time when you will not be interrupted. This can be difficult to arrange, but your mind needs uncluttered time to work, and you need to compartmentalize your scriptwriting time from whatever else you are doing. It will take a lot of hours and you have to budget them, even if you are busy as we all are.’

The main benefit of having a regular writing schedule in a place where you feel comfortable, is that you will be psychologically better prepared for each session. And you will find you can achieve more in one hour of concentrated effort, than in random 10-minute snatches.

• You must be prepared to let your enthusiasm for your topic come through in your writing, as Bob Bonadurer explains:

‘No matter what writing style or topic you choose, if the show has no enthusiasm do not expect people to come back. Even bland Uranus can be exciting. We are lucky; astronomy is an awesome visual science, so scripts should match the beauty found in the Universe. Imagine being a technical manual writer - now that is a challenge.’

Carolyn Collins Petersen sums up the point above:

‘If YOU don’t have enthusiasm for a show topic, then the show won’t have enthusiasm.’

Yep, it really is that simple.

• There may be times when you are fresh out of ideas. The dreaded
writer’s block looms large in front of you, like an impenetrable wall. So you should approach the script with a quiet resolve not to give up at these times. Essentially, writer’s block is a state of mind. And there are ways around it. Try writing about your frustration with being in that situation. Or write about anything that comes into your head, regardless of its relevance to the script. Sometimes the flow of thoughts on one topic will suddenly release the floodgates on the project you are stuck on, and you soon find yourself back at work again.

On this point Alan Davenport feels that,

‘The process of scriptwriting, to my mind, is a method by which the writer expresses an emotional reaction to whatever material comprises the subject of the show. Conversely, it would seem that writer’s block would occur when there is insufficient emotional connection between the writer and that material. There are a few steps which might not seem like concrete elements that I employ as a planetarium scriptwriter, and which seem to help eliminate writer’s block.

‘One item is the degree to which I analyze, study and research the subject material. Sufficient immersion in the material usually results in enough of an emotional attachment to produce an outflowing of script-worthy material. Within the writer there must be an ownership of the material and an impulse, however small, to share the knowledge or experience.

‘Another emotive catalyst is the theatre itself. As a planetarian working in the theatre on a daily basis, I have an attachment to its ambiance and its experience that incites a need to create a communication link with a future audience.

‘Last, but definitely not least, some of the most stimulating show material that help to motivate the scriptwriting are the visuals and special effects devices that make the planetarium experience unique from other media. Collectively, they define what a planetarium is today, and comprise the brickwork for which the script is but the mortar.

‘When the time comes that writing the script seems arduous some exposure to these elements, plus some additional gestation time, will often raise the veil.’

Carolyn Collins Petersen assures us that,

‘I think sometimes people make scriptwriting out to be tougher than it already is. Think of the script as a story that you’re telling to an audience. You have to have that story clear in your mind before you set out to tell it. In that regard, a scriptwriter is no different from the novelist, the newspaper writer, the poet. The script I write for a show is something that springs from my mind and, through a series of steps, ends up in the mind of the audience member who experiences my show. It has to engage the mind of the audience member. It starts off as a story and stays a story.’
Finally, never forget that you are writing your script to communicate other people’s discoveries and theories. A script is not a vehicle for your opinions. Yes, you can put in some of your favourite ideas, anecdotes etc. - as long as they are strictly relevant - but step over the line into soap-box mode, and you have lost your audience, period.

General Writing Skills

A word of caution before we get our hands dirty dealing with the specific skills needed for writing better than average scripts. We need to put this genre into the context of the wider skills that all writers across the board need. A good planetarium script results from the writer knowing not only a lot about the Cosmos, but also about the craft of writing. You can’t have one without the other, I’m afraid, so there are no easy shortcuts. Sorry, but that’s life. (Didn’t you read the small print in the contract?)

In the print media space is the enemy, so studying newspaper reports and magazine articles will give you invaluable insights into how to write leanly, without using unnecessary words. Journalists have to make every word count, so they write with strict economy. Note how they lay out their facts in a logical fashion, immediately getting to the point and quickly moving on to the next one. Learn from it, because in planetariums time is the enemy. So do not forget the ABC of writing - be Accurate, Brief and Concise. Or, if you prefer, KISS - Keep It Simple and Short.

You can avoid lots of head-scratching at the keyboard by learning how to write in your head. Believe me, you will be thinking about your script even when you are not writing, so take advantage of this by experimenting with different ways of phrasing sentences. The next time you sit down at the keyboard, hey presto, some of the words will already be in place. This mental exercise will improve your productivity. Dale Smith does this a lot, as he explains:

‘I do a good deal of my writing while walking to and from work. Oftentimes, the paragraph that would not write itself at my desk will unfold while I am walking.’

Carolyn Collins Petersen also does it:

‘I write in my head a lot and found it very amusing to find out that all good writers do this. One of my favourites is James Thurber, who wrote, “I never quite know when I’m not writing. Sometimes my wife comes up to me at a party and says, “Damnit, Thurber, stop writing!” She usually catches me in the middle of a paragraph. Or my daughter will look up from her dinner table and ask, “Is he sick?” “No”, my wife says, “he’s writing something.”’

Some of the best writers in any genre are people who love to read. They have a love of and respect for words. Take Isaac Asimov, for instance.

‘Let me tell you,’ he once wrote, ‘reading a good book, losing yourself in the interest of words and thoughts is, for some people (me, for instance) an incredible intensity of happiness.’
Hey, that’s my line!

As a planetarian you already do a fair amount of reading simply to keep up with astronomy news and other developments important to the profession. But if you expose yourself to as much reading as possible across a broad range of literature, the subconscious knowledge and appreciation for words you pick up will show in your own writing. You may not see it immediately, but it will develop over time - trust me. After all, it has been said that reading is to the mind what exercise is to the body.

Carolyn Collins Petersen agrees:

‘I take a break from writing by reading, and I always think of it as letting someone else do the work while I look on and relax.’

This love of words means many writers enjoy not just seeing the finished product, but the process of writing itself. If that describes you (it does me) then great, you’re ahead of the game. (Asimov’s attachment to writing and his desire to educate through the written word, were so deep-seated that when US chat show host Barbara Walters once asked him what he would do if a doctor told him he had only six months to live, he replied, “I would type faster.”)

Attaining this wide vocabulary for your literary toolbox will be made easier with the use of a dictionary and thesaurus. Think of them as your trusty companions, as you hack your way through the literary forest. A thesaurus lists synonyms, alternative words which are close in meaning to the one you want. You will soon find it to be an invaluable resource.

The advantage of knowing more than one way to describe something will manifest itself every time you reach a point in a script when you need to explain an astronomical concept that has been covered in dozens of other shows. You have the choice of using the same tired description (easy) or coming up with a variation of your own (more difficult) using your new-found command of the English language. It may only require an odd word or two to be replaced, but the result could transform that paragraph’s impact. Any new approach you take will increase the chances of your script being both popular with your patrons and noticed and appreciated by the wider planetarium community.

Take these examples. The first is from *Why Is The Night Sky So Dark?*, written by Piyush Pande of the Birla Planetarium in Calcutta. He discusses galaxies, and describes one as ‘a pond of stars.’ In *The Light-Hearted Astronomer*, written by Ken Fulton, Larry Miller and Kris McCall, telescopes are described as ‘strange devices that suck ageless light from the bowl of night.’ Further on, the authors discuss amateur astronomers observing the night sky: ‘While much of the world sleeps, we celebrate the night, embrace the darkness, open wide our light-thirsty eyes and drink deeply the wine of star-stuff!’ That sounds more poetic than just saying amateurs observe the stars. The late, great Carl Sagan often found many new ways to describe old, familiar phenomena. Here are a few examples from his books. In *Comet*, the eponymous objects are
described as ‘the snows of yesteryear,’ and each is an ‘emissary from the kingdom of ice.’ In *Shadows of Forgotten Ancestors*, orbiting planets are paying ‘silent, gravitational homage’ to their parent stars. Great stuff. Love it, love it, love it. (Oh dear, I’m sounding like a Hollywood producer, now). This variety of prose gives a writer more latitude, and ultimately makes a script more interesting.

On that score, you will benefit from buying a book of science quotes. (I recommend *Physically Speaking: A Dictionary of Quotations on Physics and Astronomy*, by C.C. Gathier and A.E. Cavazos-Gathier, London Institute of Physics ISBN 0750304707). This will prevent you spending 20 minutes, head in hands, trying hard to summarize a feeling or concept, then later finding that someone has already put it succinctly into a perfect quote.

Consider joining a local writer’s group (your area libraries or the Internet should have their addresses) attending a weekend writing workshop (again, the Internet and libraries should help here) or simply participate in the many online writers’ courses. (See Appendix A for a list of writing resources on the Web). You may feel more comfortable with the anonymity of this approach, so give it a try. You could also simply contact other planetarians you know who have written shows, raise with them any concerns you have about giving it a go and ask how they got off square one. But whichever route you take, you will benefit from the invaluable camaraderie of other authors across a wide discipline of literature. They offer a place you can turn to for general literary advice and encouragement. And the importance of that can’t be underestimated, as you won’t want the writing process to be any more lonely than it needs to be at times.

**Thinking Digital**
The area of our profession that has changed the most markedly in the six years that have elapsed since the previous edition of this publication appeared, is the remarkable degree to which digital and full-dome technology have spread. Some people would say it’s spread like a virulent virus, so strong are views in some quarters as to the desirability for the profession to go down the digital road, gradually leaving behind (in many of the larger domes, at least) the visually superior opto-mechanical star fields and the aging equipment. Nevertheless, the technology can’t be un-invented and is clearly here to stay, and so scriptwriters are finding themselves having to adopt very different approaches to producing digital shows compared to the old style ones. (But there’s going to be a demand for the old style shows for decades to come, of course, so don’t get disheartened reading this section and mistakenly think that there’s no point reading on if you only want to write the old style shows. The majority of what’s to come after this chapter applies to opto-mechanical and digital shows. Besides, you may find yourself pushed into doing digital shows sooner than you had expected; the production of slide projectors is on the wane, so it may become like the CD v. vinyl argument in the 1980s, as eventually we had no choice but to buy CDs because vinyl records were hard to find. Otherwise known as *a fait accompli*.)*
Ryan Wyatt, writing in *Planetarian*, summed up the importance of the conversion to digital:

‘To be perfectly blunt, a traditional planetarium can teach 19th-century astronomy very well, but our 21st-century audiences want to glimpse the broader horizons that modern astronomy has revealed to us. Modern computer technology allows us to do this, and full-dome video is the conduit by which it can reach planetarium-goers.’

In the same issue of *Planetarian*, Ryan went on to talk about,

‘...the need to consider how a viewer moves from one scene to another: rapid cuts become jarring experiences, because one’s sense of place is disrupted. Also too-swift a motion can either nauseate viewers or distance them from the action; images moving too quickly onscreen lose their coherence as an environment, and instead function merely as wallpaper. And maintaining the sense of dimensionality on the dome demands maintaining a sense of motion – of foreground relative to background – that yields a parallax effect. Continuity and carefully orchestrated movement characterise the most effective full-dome presentations.’

Thomas Kraupe is confident about the advent of the digital age in planetaria:

‘I see a bright future for all-dome shows,’ he says, ‘if we manage to create immersive experiences which will not be just another type of movie. We should not try to imitate a movie, but also not refuse learning from experiences in the field of movie and TV productions. Let us be open to incorporate a variety of elements from the entertainment world to awaken the curiosity and senses for detection. And give our audiences time to breathe, to feel comfortable - and time to play mind games. Introspective learning - “Where am I and what does that mean for me/us?” - that is ultimately what people want to understand.’

Michael Daut, of full-dome digital show producers Evans and Sutherland, feels that,

‘Writing a script for a full-dome show presents many challenges that are unique to the format. A dome is inherently immersive because it completely consumes the audience's field of view above the horizon. No other visual medium demands so much of the audience's attention. There is imagery wherever the audience looks, except down. This massive canvas has an innate ability to transport the audience to new environments and place audience member right in the middle of a given location. It's the closest thing we have to the holodeck from Star Trek - The Next Generation. That power and tendency for the dome to transport the audience should be carefully considered as the storytelling unfolds in the writing process. If the old analogy holds true that, ‘a picture is worth a thousand words’ then a full-dome picture is worth ten thousand words.

‘The pictures truly tell a big part of the story; therefore, the most effective scripts for full-dome shows require far fewer words. In fact, to work well, scripts need to be intentionally sparse, with appropriate pauses built in for music and
sound effects, so that the audience can adequately absorb the experience. This “forced brevity” is one of the biggest challenges to screenwriters, especially when dealing with educational material that is full of facts that beg for explanation upon explanation. We have learned this by experience, and constantly find ourselves thinning out even the sparsest of scripts in the voice-over recording process, and then again in the final mix. Anything that isn't absolutely vital gets chopped.

‘Additionally, the pace of a full-dome show can be somewhat slower than traditional film or television work, although it does not have to be. The size of the images amplifies everything: cuts are more obvious, close-ups are really close, and movement appears exaggerated and somewhat faster. Also, the canvas of the dome is somewhat omni-directional rather than uni-directional, or front-centered, like all other visual media, so imagery that moves dramatically across the screen from side to side or front to back can only be seen by the audience members if they physically turn their heads. Too much of this type of movement and you put your audience through an aerobic exercise! Although placement of objects on screen and image composition is largely the job of the Director and Animator, it is not too soon to consider how and when you will use the screen space (both visual and audio) beyond the front of the dome to add impact to key scenes in the show.’

On this point George Reed has slightly different opinions because he feels that, ‘The challenges in writing a full-dome or half-dome script are less than the challenges in writing the more traditional script.

‘First of all, your audience will be immersed in a seamlessly changing visual, and the visual can be made to “say” what words often say in the traditional script. If “a picture is worth a thousand word”, what should a seamlessly changing visual be worth? As an example, when novels are turned into films, the story of any number of pages is reduced to a screenplay of approximately 120 pages.

‘It must be remembered that a successful script must speak to the minds of the audience even with the power of full-dome and half-dome visuals. If it doesn’t, the program will become just another “gee whiz, wow” series of mindless special effects.

‘Of course the biggest challenge is having graphic artists talented enough to create the visuals required by the script.’

At the Clark Planetarium in Salt Lake City, Director Mike Murray and his team had to quickly learn to adapt their writing style when they opened their new digital dome in 2003, as he explained in The Great Western Observer, published by the Rocky Mountain Planetarium Association:

‘We learned early on that our writing style would have to change. The intensity of constantly moving 3-D immersive animation caused our audiences to get “sucked in” to the scenery a lot more than we’ve been used to. The added level of
visual stimulation means that we needed to lighten up on the technical sophistication of the writing, and also to cut down on the overall word count. Writing that’s more colourful, poetic, broad brush instead of the “dry, stuffy data and statistics” show – people responded really well to the more emotive style. It became more of a cinematic performance, instead of a show that describes each new “freeze frame” scene like you’re taking a tour through a dome-shaped magazine article. We chose instead to focus on just one or two big ideas for the audience to walk away with, and developed our script to support those concepts.’

With his characteristic good sense, Jim Manning reminds us that, ‘…we’ve always written for an all-dome technology. Just because it’s getting fancier doesn’t mean the rules of good writing or storytelling change.’

In a Planetarian article, Don Davis warned, ‘As full-dome media progresses, it should not be allowed to turn into another IMAX in its dominance of “grand but bland” content.’

Kris McCall, too, has a word of warning about the dangers of getting swept away by the possibilities offered by these new technologies: ‘The technology is truly awesome. But unless we make the experience more meaningful, it will be no better than watching the iTunes patterns on my computer monitor at home. The script, whether an astronomer’s personal journey, the latest discoveries from HST, or mythological drama, is the heart, the very foundation, of the planetarium experience. It can be educational, entertaining, or deeply inspirational, touching the visitor and giving them a personal connection to the universe.’

One of the differences in writing a digital show is the possibility of using a storyboard approach when mapping out the show, scene by scene, just like they’ve been doing in the films for many decades.

George Reed again: ‘The storyboard approach is an excellent way, and maybe the only way, to create a successful full-dome or half-dome production because the seamlessly changing visual aspect of such a program is so important. Still, the visual aspects should always be controlled by the demands of the story. Visuals should always compliment the main script, and the script should never be abandoned to compliment the visuals.

‘Storyboards allow the production team to judge when and for how long visuals should totally replace narrative. For instance, suppose the program calls for a journey from Earth to the edge of the visual Universe. The inclusion of a narrative during the journey may be distracting to an audience. Likewise, a summarising narrative statement at the end of the journey could be distracting to the audience if it includes an attention getting visual.’
Michael Daut explains,

‘In an ideal situation, the script is developed when the pictures and scenes begin as a series of sketches, much like a comic book, that depict the visual progression of the story. With this technique, the images stay married to the script, and the two continue to grow together as the show takes shape. In story meetings, the storyboard sketches can provide the visual anchors to the story as it progresses, and the sketches provide a wonderful springboard to new ideas and new ways to trim words or to refine the visualization. One of the most effective tools for evaluating how a show is working is a video “animatic”. This starts as the complete set of storyboard frames edited to a scratch narration timing track. This is a great way to watch the show before it is made, so that you can see and feel how individual scenes will play and how the show works as a whole. This animatic can then be refined and used as a template into which you can substitute finished animated sequences. As more sequences get completed, the animatic becomes more and more like the finished show, until it actually becomes the show itself. Through this process, the visuals get the importance they deserve, and the script is written and tweaked to help the pictures tell the story.’

A storyboard doesn’t necessarily have to be hundreds of drawings (although the convenience of drawing software these days means you can produce dozens of line drawings without having any artistic skill with your hands); it can, instead, be descriptive text of pretty much every second of a scene.

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**Overall Structure**

Planetarium scripts are essentially stories, and so whether or not you’re writing the traditional type of show or a full-dome one, as a scriptwriter you need to be prepared at an early stage to employ the same structure to your text as we find in the movies.

Richard Lavoie, who has worked in both mediums, believes we should use the following structure:

‘**Opening.** The opening consists of the presentation of the central idea, in a very visual, emotional way. The aim here is to cause surprise, interest or curiosity. It is a crucial element, as it will determine to what extent the audience will buy into the story. We sometimes refer to the opening as the “hook”.

‘**Exposition.** Generally following the opening, the exposition presents the initial situation or state of knowledge, as well as the angle of treatment and the basic conflicts or questions. The notion of conflict (or tension) is very important here. A story can only take place if there is an initial conflict or tension. This will trigger the action, the quest for knowledge, the endeavour. Thus, the exposition will end with an insightful moment, introducing the next phase of the story.

‘**Complication.** In what we can call the “complication phase”, the basic conflicts or questions are played out as variations, involving surprise, suspense, and escalating intensity. Here, emphasis is put on confrontation, obstacles, and unanswered questions.'
'Climax. The climax is the final confrontation that will lead to irreversible change. All the conflicts, all the tensions that have been developed in the previous phases must come to an end. This final confrontation is a high point of intensity, with an unexpected twist in the story or, on the contrary, a very emotional account of an otherwise predictable outcome.

'Resolution. The resolution exposes the consequence of the final confrontation, the resulting situation, the answers to questions. The resolution will suggest what interpretation to give to the story as a whole.

'Conclusion. Ideally, the conclusion refers to the opening. This is where we loop the loop, explaining the opening, or referring to the initial situation.'

Script Formats

Decide what script format you want to use at an early stage. This is important because, even if you follow all of our other tips, choosing the wrong format could unravel all of your hard work. Some astronomy topics are more suited to one particular format over another. There are a number to choose from, and each will give your final product a markedly different flavour. Do you prefer a documentary style? No? Okay, what about a story-line, filled with fictional characters (useful for children)? Perhaps you think your topic would benefit from using a current event news reportage style. (The late Fran Biddy took advantage of our TV-influenced modern lifestyle, by using a TV game show format for his Touch The Stars script). Then again, a puzzle-solving approach could work, too. Today there is greater experimentation among scriptwriters, who want to try something other than the tried and tested documentary format. The other formats open up many opportunities to have more fun with your script.

Here is Dale Smith’s advice:

'What narrative style should you use? Voice of God (third person narrator), storyteller, dialogue or first-person? I do not think there is a universal answer. Each style has its strengths, and you should use whichever ones you are most comfortable with. Though it is a style that is often criticised, I usually use voice-of-God, but often with a storytelling feel and almost never with a lecture feel. Sometimes I interject a first-person section. For example, in a show on archaeoastronomy, I had the Sun, Moon, and Venus speak in first-person describing alignments humans had constructed, pointing to their rising and setting places, and interleaved their voices with a standard third person narrator. This gave frequent change in both style and narrator voice that kept the show moving.'

Time spent reading scripts from successful shows will be rewarded. Read as many as you can. Learn from them. Study how those authors solved various problems that you, too, will encounter. Remember, you don’t need to keep reinventing the wheel. If somebody else has already done the spade work, you benefit.

Dave DeRemer does this a lot, as he explains:
‘It is important to read other published scripts. This experience can go both ways. You can read them to identify writing that you think works well, or you can read them to look for writing that you believe does not work well. There are many ways to present the same topic in a show format. Look for techniques of astronomy teaching, different storylines, show flow, audience participation or use of audio or visual effects. Read other scripts when you have writer’s block. You know what you want to teach, but may be stuck on how to present it. Other writers can help to give you ideas to make your presentation clear and concise.’

Visual Design
The words in your script will flow much more easily if you have developed the habit of looking at the world through the eyes of a visual writer, especially if you’re writing a full-dome video show. What do I mean by this? Think about everyday situations. Study them for a moment as a visual experience. How would you explain them to somebody who is seeing them for the first time? This exercise demonstrates the importance of the appropriate use of words. When you switch that talent to describing astronomical phenomena the words will come more easily, and you are off and running.

Hark, I hear Bill Gutsch approaching with advice on this topic,

‘Feel your script in terms of mood, and see it in terms of visuals,’ he says. ‘A good article to read is one by Harlan Ellison in a book called, The Craft of Writing Science Fiction That Sells (Edited by Ben Bova, Digest Books, 1994, ISBN 08987960081).’

Proper Use of Grammar
Good grammar and planetarium scriptwriting aren’t blood relatives, but they should at least be found living in the same neighborhood. To be successful, you should have good knowledge of the rules of grammar for written English. Just ask April Whitt:

‘One point I absolutely demand in a script, no matter who writes it, is the correct use of English grammar,’ she told me. ‘Occasionally someone will send me a script to review or edit. I am appalled by misspellings, subjects and verbs not agreeing in number, sloppy use of plural or possessive forms - all the eighth grade grammar lessons that I believe any intelligent adult should use automatically.’

The June 1991 Scriptorium column in Planetarian stated,

‘A fine script makes the language come alive; it tells a story - a story to inform or to teach, to entertain or to inspire...It is the vision translated into words.’

But that process of translation will be made considerably more difficult if you don’t pay attention to the basic rules of written English. On this point we strongly urge you to look at Appendix C which has details of books, such as The Elements of Style, that will put you straight in many areas where you may otherwise get stuck and end up making the wrong choices.
Conversational Writing
But having said that, you should also know when to bend the rules of grammar for text that will be read aloud. This allows you to write sentences that sound good when read out loud, even though, in a strictly grammatical sense, they may not look right on paper. This is conversational writing, or writing for the ear. It may seem otherwise at times, but this style is not necessarily a modern trend; in the 18th century Laurence Sterne remarked, “Writing, when properly managed...is but a different name for conversation.”

In his *Planetarian* Scriptorium column, Alan Davenport wrote,

‘In order to truly engage the audience and involve them in the planetarium experience the script, like the live host, needs to acknowledge and communicate with the audience.’

You may initially feel uncomfortable with the informality of conversational writing, but as Laura Kyro once observed in *Planetarian,*

‘The risk is in sounding too non-professional. The reward is developing a relationship between our visitors and our planetarium.’

Sheldon Schafer echoes these thoughts:

‘The most successful shows we have presented were straightforward narrative documentaries,’ he says. ‘They all have used a personal narrative style. The narrator makes the visitors feel as if they are sitting in the dome with a close friend, or with their father. This is in sharp contrast to the narrative style used in many shows, where the narrator is a disembodied voice of authority. I think the personal style is so successful and popular because astronomy is an intimidating subject to most people. Anything that makes a person more comfortable with a subject will be popular.’

On this point Dave DeRemer adds,

‘Know the age and type of audience you are writing for, and focus your dialogue on what you believe they are expecting from a planetarium show.’

So adopt the habit of reading aloud what you have written, and study how it sounds. April Whitt concurs:

‘I do that all the time,’ she says, ‘with the idea that the audience will be getting the information mostly through their ears, rather than their eyes.’

Dale Smith adds,

‘If anyone were eavesdropping on me as I write, they would probably think I have gone off the deep end, because I am often talking quietly to myself or am lost in thought (lost in space?) staring at the wall, trying to form the next sentence or two.’

Alan Davenport tells us about his methods:

‘I...tend to use phrases and incomplete sentences. Typical street conversation rarely follows proper grammatical structure. It includes many dangling phrases and incomplete sentences. In a
I see April Whitt riding into town with some sage advice on this topic:

‘I tend to write the way I speak, which tends to be informally,’ she says. ‘When I write a script, I talk to the audience in my head and write down the words I would say if I were there talking with them, face to face (or behind their backs, in a planetarium). I also try to use good teaching techniques. For example, “You probably already knew that____, but did you know that____, as well?” (Make the audience feel smart). Or, “Remember at the beginning of the program when we found____ in the sky? Look where it is now that a few hours have passed.” (Give the audience a few seconds to find it before pointing it out with the arrow, laser or whatever - people love to succeed). “We are going to look at three things today: statement one, statement two, statement three.” (Give them a framework so they will know what to expect).’

Carolyn Collins Petersen says,

‘I make use of tools from my creative process that I think will help me tell a story in my script. Aside from the visuals, which I always have in mind as I write, the words that people will be hearing need to be shaped for their ears. I often end up talking to myself as I write, or having someone read my writing out loud to me. It’s an ear-opening experience. But by far the most useful thing I’ve done to keep my script language fresh and “listenable” is to study voice acting. The voice actor is the person telling my story, and he or she must be “in the moment” with my words so that they can communicate to the
audience. It’s part of my job to help them get to that moment quickly and easily. Seeing my script through the viewpoint of the person who will be giving voice to my words has been absolutely invaluable.’

Another excerpt from *The Light-Hearted Astronomer* shows the skill of conversational writing at its best:

‘Instead of buying a telescope, dust off that pair of binoculars you haven’t used since the last football game, and go back under the stars until the urge passes.

‘Oh, I can almost hear you thinking, “Binoculars! Is he kidding? Hey, Coach! I want to do some heavy-duty observing. I’m a lean, mean observing machine!”

‘No you’re not. Not yet. Be patient.’

**Finding An Angle**

“What’s your angle?” is a question often thrown at writers. This is a key consideration because, apart from anything else, finding an angle helps to focus your script. So when you find one, stick to it. Even better, find a fresh one; successful scripts are those that take a new approach to their subject, rather than using the predictable, tried and tested angles. As a for instance, Dale Smith took the novel approach of writing *I Paint The Sky* - a program about Earth’s atmospheric phenomena - from the point of view of, in turn, the Sun, an ice crystal, a water droplet, a molecule of air and finally the aurora. Here is an excerpt taken from the section written from the point of view of water:

‘My rainbows are a gift of life to you. They follow the storm, when, with rain, I give life to your land. They are an echo of returning sunlight, a sign of peace for all to see. Even at night I can give this sign, using the light of the Moon.’

Targeting your chosen topic from one angle works better than trying to cover the whole subject in a shotgun way. Time is your enemy, remember, and if you try to beat it in a script, well, it usually wins. It’s had plenty of practice.

Here’s David Dundee’s tip:

‘For a fresh angle on old subjects, I try to stay as aware as possible of current media culture, children’s shows and movies. I browse through current children books. Often publishers will let you use parts of books or characters in your script. I look for local history and art angles. Often other local museums are doing neat programs that you can team up with. Tie in the current space program with whatever you are talking about. Are there astronauts from your area? Always look for a local angle to make your show interesting to your visitors. Do not always write shows for sale and export; those shows tend to be sterile and bland, because they lack the local orientation.’

Carolyn Collins Petersen tells us about an occasion when she had to come up with an angle for a new show:

‘Some years ago a planetarium commissioned me to write a show about the Moon for children. I cast about for a while trying to come up with a fresh way to talk about the Moon that would
approach a child’s sensibility. I hit on the idea of a character analogous to a young child with no preconceived ideas about the Moon, and Larry the Cat was born. Of course it helps that I have always lived with cats and have experienced their unique viewpoints for years. Larry came alive and the show built itself around him very easily. He turned out to be the perfect angle for that show.’

Another benefit of choosing a specific angle is that it can help to present the material in a non-traditional way, like Dale’s script above. This is important because you shouldn’t be predictable in the order in which you convey information. For example, if you are doing a Solar System script, dealing with the largest bodies first and progressing down in size will be more interesting for your audience - and less predictable - than starting with the Sun and progressing through the planets in order. If some people in the audience are there to learn about Neptune, they will get fidgety waiting for the latter part of the script in the ‘old’ way of doing it. So mix things up. Surprise them. Keep them on their toes, and don’t let them feel they know what’s coming next.

A related item is the method by which you introduce an image of the subject under discussion. Many full-dome shows introduce a planet by zooming towards it as if the viewer is on a spaceship. That’s fine, but something different from time to time is good, too, and a great example can be found in an Evans & Sutherland show, New Horizons. The narrator is talking about Mars for a few seconds before we see it suddenly appears in dramatic fashion as one of its moons that had been entirely blocking the planet moves out of the way. There’s a musical crescendo at that point, too, and it really makes the viewer sit up, wide-eyed.

Know Your Audience
General writers are always being encouraged to study their market and know their potential readership. This allows them to hit people’s “hot spots” - the areas of greatest interest to them. It’s no different with planetarium scriptwriting; to tailor a script for your regular clientele you’ll need to know the depth (or lack) of their astronomy knowledge, and what their preferred topics are. A targeted script at a specific level of understanding to suit your dome’s average audience, will fare significantly better than one you put together without the appropriate consultation and market research. Stands to reason, you think, but this factor is easily overlooked in the planning stage.

Writing in the Summer, 1979 issue of Planetarian, Ruth Haag had this to say about the topic:

‘A successful public planetarium show is one which pleases the audience it is serving. In order to please your audience, you must know who they are. If your show is designed to please yourself and your staff, there is an even chance that it will not please your audience. After you have a clear idea of who is in your audience and what they want to see, you will be able to decide on the type of show to give them. Your type of show must strike a balance between the needs of your audience and the goals of your organization.’
month, your topic will have to change that often.’

So be prepared to write on many different levels; general purpose scripts have to appeal to the complete age range of audiences, from six year-old children to 90 year-old grandparents. But this need not be as difficult as it sounds. Heed April Whitt’s words:

‘The planetarium profession is lucky to have what I think of as intrinsically interesting subject matter; everyone likes stars.’

I wager she is right.

Planetarium storyteller Lynn Moroney agrees:

‘Ain’t nobody don’t like a good story,’ she says, ‘and ain't nobody don’t like the stars.’

Verily, it is so.

There, you have a large body of subject matter already. (Figuratively and literally).

Finally, let me quote legendary baseball star, Joe DiMaggio, who, when asked how he managed to always play at a consistently high level, replied,

“I always thought that there was at least one person in the stands who had never seen me play, and I didn’t want to let him down.”

So when you’re writing your script remember that your audience have come to be entertained and educated, not to leave feeling that you’ve let them down.

The Education/Entertainment Mix

From the early days of planetaria in the 1920’s, there has been a running debate about what is the “right” mixture of entertainment and education values in a script. The arguments will go on forever, simply because the “right” answer is subjective. We all have different tastes and ideas about how our objectives can be achieved in a dome. So the debate rages on, as educational methods and the technological tools available to planetarians continue to evolve rapidly.

Clearly, modern scripts are taking advantage of these new toys by using an increasing amount of entertainment value to put across the educational message. Your script will be strengthened if you decide at an early stage approximately how much of each you wish to use. If you’re unsure it will show in the finished product, which will suffer and end up a mish-mash, neither one thing nor the other. It will be a waste of your time and effort.

Jim Manning takes the following approach to this conundrum:

‘In the premise that people learn more if they are enjoying themselves - or at least do not learn less - I always try to make shows entertaining as well as educational,’ he says. ‘In our business, these are two sides of the same coin. The approach I take depends on the program, the material, and the audience. Sometimes it means sticking brief comic vignettes into a show to break up masses of information, and to change the pace.
Sometimes it means creating beautiful scenes, or infusing drama. Sometimes it means using characters. Sometimes it means using more than one narrator. It always means coming up with a good music composer to create appropriate music. In all cases, my credo is that there is no reason why learning something should not be fun or enjoyable.’

Here is Sheldon Schafer’s take on the deal:

‘For a show to be entertaining, it does not have to be a domed version of Seinfeld. Scripts which embrace this philosophy usually end up sounding more silly than funny. However, there are other ways to be entertaining than with silly characters and running jokes. Dramatic scenes, memorable moments, and unexpected twists, turns and events can also be entertaining.

‘I sometimes say facetiously that the three most memorable elements of a show are: 1) real rain, 2) a bright strobe flash, and 3) spinning stars. I say this because after years of doing shows for our community, the single most talked about moment was the few seconds of “real rain”, used sparingly in only three shows over the years. Nevertheless, since then kids constantly ask me, “Will it rain?” as they enter the planetarium. Their most memorable experience was the totally unexpected experience of real rain. The fact that it was not the astronomical content may disappoint the purist in me, but they have come back expecting the fun and excitement they experienced before. (Real rain is also one of the cheapest effects to produce; a 69-cent sauirt gun works great).’

I agree about the rain; one of the most memorable events in a planetarium for me, was unexpectedly being sprayed by rain from the dome during a show at a conference.

Alan Davenport tells us about his approach:

‘Without some sense of fun, an audience member who is, for the most part, accepting a passive role in the planetarium program, might perceive the experience of the planetarium as imposing and didactic. Character narrators, such as grandparents and grandchildren, vocal inanimate objects such as stars, planets or the star projector, and fanciful stories that weave science and nature concepts into a fictional narrative are devices for fun in planetarium scripts.

‘...when the opportunity is available, interactive or hands-on learning is a good way to inject fun into the program, and more effectively involve the audience mentally. Truly effective interactive learning takes place when the learner either manipulates physical materials, or interacts socially with other learners/teachers. It should always be possible for the writer to include a section of script for a live presenter to deliver. In facilities where the presentation will be delivered by an experienced, authoritative astronomy specialist I think the audiences appreciate the attention they receive.

‘When audiences are small enough, a favourite approach to introductory constellation study is to equip small groups within the audience with batterv-operated nointers and star charts.'
Each group can use a star chart and locate a constellation on the dome. This effectively involves the audience. They hone their skill using a star chart, and enjoy the social interaction and the manipulation of equipment.’

Carolyn Collins Petersen feels that,

‘If we are engaged in good storytelling (and perhaps we need to be clear about what good storytelling is and means) education and entertainment can and should be one and the same.’

**Script Length**

Decide in advance how long your script will be. The length will depend partly on the available material, and partly on the level of public interest in the topic. Knowing the length from day one will help structure your writing and research. It will also quickly teach you the benefits of finding the best, most time-sensitive way of presenting your material. If you start writing with the belief that you’ll simply let the script find its own length depending on when you run out of material, that unstructured, undisciplined approach will show in the final product and make it considerably weaker.

Well, slap my brow, Phil Groce has just turned up with some advice on this topic:

‘If it takes 30 minutes to represent a subject, do not create “filler” to make it run the magic 45 minutes,’ he says. ‘A good 30-minute show is far better than a mediocre 45-minute program.’

Doggone right. (Whoops, Lynn Moroney’s influence is rubbing off on me)

**Images**

Planetarium scriptwriters have always had to find the right fusion of words with images, but in this new digital age its importance has been increased still further. All-dome video is all about the moving image, sometimes a fast motion but most of the time a gentle drift over a body, so any discontinuity between the words spoken by your narrator and what your audience is seeing become magnified.

Carolyn Collins Petersen recalls a lesson learned early in her planetarium career:

‘One of the first things that we were taught as young planetarium types at Fiske Planetarium, was that both a blind person and a deaf person should come away knowing what the show was about. Your script needs to reflect sensitivity to the very different “sensors” that people bring with them to experience your work.’

David Dundee has this tip for putting the visuals in your script in the right perspective:

‘Thinking about visuals is crucial during the scriptwriting phase of show production. You are not writing an illustrated lecture, but an integrated production of the recorded spoken word, music and visuals. My most successful productions are the ones where I can visualize and hear the beginning and end of the show. The easiest way to include the visual element, is to organize each script page with a wide column to list what is going on visually while the narrator is speaking. Use a vertical arrow to indicate when visuals appear and disappear. If you find gaps where there is
nothing going on, that is a section to re-examine. Be aware of the visual capability of your theatre, and maximize its strengths during your shows.’

Study other programs of the same length to judge how many visuals you will need. You don’t need to include the same number as they did, of course, but it will give you a ball park number. This will better allow you to determine the size of the research effort the script will demand. List them and decide how you want to integrate them into the script.

You also need to be aware of how much information to put in the words and how much in the images. Writing in the September, 1993 Planetarian, Alan Davenport discussed a paper by Jeffrey Hunt presented at a GLPA conference. It was titled, Visual Design In The Planetarium. Alan wrote,

‘...he cited F. M. Dwyer's research in visual literacy, which showed that when a presentation was presented in slide/tape format in 40 minutes, the viewer learned more than in a video presentation of 17 minutes length. Evidently, viewers need more time to assimilate visuals than the cinema- and MTV-driven video media would have us believe. As Mr. Hunt points out, “This is not good news for the planetarian who uses hundreds of slides in a one-hour feature presentation.” Scriptwriters have to consider this if their objective is to teach, share and communicate effectively with their audience.’

On that same score Alan told me,

‘When the narration is cognizant of the visuals and aids in that descriptive explanation or identification, the visitor will find the narration relevant and valuable. On the other hand, the script need not include the proverbial 1,000 words that might describe the visual. I let the image mostly tell its own story, and simply write to motivate the image’s presence and ward off any misconceptions the viewer might be liable to adopt.’

Most NASA and ESA pictures are copyright free, so using them gives you more freedom to pick and choose what visuals you want. This is particularly useful if you have a tight budget. It will make the writing task easier, too. And if you need stock footage of non-astronomical things, again NASA comes to the rescue in one sense; some of their freely available photographs include shots of the wildlife that live on the sanctuary surrounding the Kennedy Space Center. (See Appendix B for details of how to get these images.)

It’s important to have a good idea, visually, of where you want to go, even if you pick out images as you go along. Pick them all out beforehand, and your script may end up as merely a caption-like commentary. (This is known as the banana-banana syndrome, as in showing a picture of a banana and putting the word ‘banana’ beneath it.) If it does nothing but describe in detail every image the audience sees, they may as well be at home reading a book or watching a TV program about the topic. A good script should have a life of its own, independent of the images.
On this topic Dave DeRemer says, ‘There should be a comfortable co-operation between narration and visuals. The script should create a situation that invites an explanation. Either the dialogue, the visual or both can satisfy this need. Since the planetarium is a marvelous visual tool, I often tend to use a variety of visuals to approach a single concept. This works most of the time, except when the concept is difficult and additional visuals are distracting.’

Pick out all the images afterwards and two things will happen: first, many of your words will be cut for lack of accompanying images, and secondly, some of the script will be composed of nothing but generalizations. This will critically weaken its impact. And besides, looking at images during the writing often generates ideas and words you may not otherwise have used.

With the large number of slides and video clips used in shows today, there is nowhere near enough time to explain them all, even if that were desirable. So think of many of your images as vehicles to compliment and expand upon the spoken words. This skill of not explaining something when you don’t need to develops with experience. You will learn that it enhances the audience’s enjoyment of a program and makes you a better writer.

The other side of this coin is guarding against not giving your audience enough information to understand the visuals. Subconsciously, you may decide not to include much information because you and other planetarians are so familiar with the images. But your public is not. So always view the subject matter from the point of view of your typical audience member. They may have little or no knowledge of your chosen topic. The script could be full of things you learned years ago, and now take for granted. But unless you explain them properly, you may unwittingly reinforce some of the misconceptions your audiences bring to the dome.

Book and magazine authors are encouraged to, ‘Show, don’t tell’. This also applies to planetarium scriptwriting; if something is worth mentioning in the script, you should have an appropriate visual to go with the words. So don’t write sentence after sentence if you can’t think of images to accompany them. It’s a waste of your time and will appear out of place in the finished product. Remember, the planetarium is ultimately a visual medium, so you should always be looking for the most appropriate fusion of words with images. Ensuring the pictures you choose compliment and expand upon your well chosen words in a meaningful way is the means to achieve this goal.

Carolyn Collins Petersen reminds us, ‘There’s a great saying in theatre and screenwriting that we should keep in mind: “If it ain’t on the page it ain’t on the stage.” This is absolutely true in planetarium shows, too!’

Today there is greater opportunity to create your own custom graphics and images, if you can’t find anything appropriate already on the market. PC and Mac graphics
software has become so sophisticated, you can afford to let your imagination run free and dream up all kinds of concepts. This gives you greater flexibility in choosing what ground to cover in your script. So use your imagination and invent useful images that can realistically be created using software. But don’t place too much emphasis on this, because if your expectations are not realistic you will lose many vital images and effectively tear the heart out of your script.

And finally, wherever possible compare and contrast images. This makes them useful parts of a whole, rather than images put up on the dome just to keep the audience’s eyes occupied. “Eye candy,” as somebody once memorably defined it.

Ideas
Okay, this detailed preparation is all very well, you are thinking, but a script needs a theme, so where do authors get their ideas from? Funny you should ask. Household name authors are constantly being asked this question. Science fiction author and legend, Harlan Ellison, has a classic, stock answer. He replies,

‘I get mine from Schenectady. They have an ideas factory and I subscribe to it, so every month they ship me a new idea.’

Laughed? I screamed.

Until that factory really gets built, you will just have to come by your ideas the same way that everybody else does. (Sigh!). Like the late Fran Biddy, for instance, who wrote in Planetarian:

‘...a year-end synopsis of astronomy stories in Science News triggered a show about recent discoveries in astronomy (several disparate stories united by the common theme of 1984’s Hot Topics). Other ideas come from a sort of free-floating musing over my “ideas file” (stuffed with clippings, photocopies and handwritten notes), or an attempt to see or feel connections between apparently unrelated items. These musings may generate such themes as, “things we still don’t understand” or, “periodic, cyclic events in astronomy.”’

Sometimes ideas leap out from the news headlines, such as, perhaps, updating the standard comet show in preparation for a bright one like Hyakutake or Hale-Bopp, or updating a Mars show when the latest probe to the red planet sends back more stunning pictures. Other times, people simply study the market for a topic that hasn’t been covered in detail.

Add to your clippings folder notes you take from radio and TV programmes that cover space and astronomy. In a short space of time you will have a wide range of topics which could trigger ideas.

Bob Bonadurer suggests you ask yourself,

‘What is currently hot in astronomy? What is hot in popular culture that relates to the stars? What is coming down the road? For example, when is the next sunspot maximum? Maybe it is time for a northern lights show?’

‘We as educators often have the mindset that we know what the audiences should want - what we feel is of the utmost
importance in astronomy. While we are the experts and this is an excellent place to start, it can blind us sometimes. A simple poll of your audience can reveal what they want to see and hear. Do it. The results may surprise you.’

Alan Davenport gets inspiration from the media, as he explains:

‘From the media world there are many inspirations for planetarium programs. But producers and writers have to be selective and choose only program themes with objectives that play best in the planetarium medium.

‘...one of the best sources of good planetarium material is in a good old print medium - children’s books. The treatments, length and visual style are frequently identical to that of a planetarium show. Most publishers are conservative, so if a subject has been made into a book, it may be targeted toward school curriculum objectives...

‘An interesting author will have provided numerous details that the scriptwriter can elect to include in a planetarium program. In these instances, always get permission to use any material that is original to the text. Copyright protection extends to themes, characters, and hypotheses as well as to pure textual citations. (Editors note: Refer to Appendix A for the address of a Web site that gives advise about copyright issues). Developing a program that coordinates with a local exhibit, complimenting the objectives of the curriculum in the area schools, offering commentary and insight into an upcoming eclipse or newly discovered comet, or celebrating the anniversary of a major astronomical or space event should give you plenty of script ideas.’

**North American v. International Writing Style**

It’s safe to say that the majority of prerecorded shows in planetaria across the world originate from North America, and so we are accustomed to their particular style of writing. But it’s easy to forget that there’s a different international style of scriptwriting, and so I asked Swedes Lars and Per Broman to explain those differences from a Scandanavian perspective:

‘What is similar with the American shows is that quite frequently, a story forms the basis of a pre-recorded planetarium show,’ they told me. ‘This applies both to shows for the family audience (like Lars’ Nils Holgersson's Astronomic Travel, for the Kosmorama Space Theater from 1986) and to shows for children (like his The Bear Girl Can't Sleep, for the Stella Nova Planetarium from 1992). One good example is Hans Lundström's Gaspra from 1995 for the Kosmorama, which mixes science fiction with real astronomy in an exciting and dramatic way without making it too difficult for the public to distinguish between fact and fiction.

‘What differ are basically three things: Firstly, a typical Scandinavian show contains less amounts of facts per minute than the typical American show. A good example is Per's A Journey in Space. This journey in imagination visits just four planets, one comet, one nebula, and a few more astronomical objects such as a
look at our Galaxy from outside before returning to our home planet.

‘Secondly, the pace is usually slower, especially the narration. As an example, this was very obvious when Lars translated Loch Ness Production's Larry, Cat in Space into Swedish. He had to omit parts of the show to make it not exceed 45 minutes, and when adding the American narration simultaneously for the benefit of non-Swedes, several extra quiet pauses had to be added after every second sentence or so.

‘Thirdly, the length of the prerecorded program is usually shorter, maybe down to 15 minutes, to give time for interaction between the planetarian and the audience.

‘At Dalarna University, in Borlänge, Sweden, we have both undergraduate courses and a master's program in science communication, geared at informal learning, science centres and planetariums. Undergraduate students do exam work, and master students a thesis. An important conclusion in three different papers is that young children, contrary to common belief, are more interested in astronomical facts than in fictional storytelling. A probable explanation is that children are constantly exposed to fiction in TV, and maybe overfed by animated figures. They anticipate that in the planetarium, they will meet planets, stars, and other wonders of the Universe. Boys, especially, want to know more about man in space and true space journeys.

‘Still, we believe that whatever is presented in a planetarium show should be done so in a catching way. They are taught how to use dramaturgy in a planetarium show manuscript. Almost all of our students have to make a planetarium show, complete with sound, pictures - possibly with animations, and other effects. Basically, they record their shows as a number of files on a CD, shown in the planetarium using a computer and a video projector. The canned show is typically 15 min long. We also train our students to use the starry sky of the planetarium projector and the program Starry Night®, making the complete show 20-30 minutes long. Our training planetarium at Dalarna University has this equipment plus 5-channel audio and a Starlab FiberArc® Projector under a 5 m (17 ft) diameter Eurodome® from Broman Planetarium, (www.planetarium.se) More information about science communication at Dalarna University is found at the www.sciencecommunication.se web site. From this web page, you can find and download both master theses and undergraduate project papers. If you follow the link, The Master in Science Communication 2004-5 course homepage, you can find Per's compendiums on planetarium show making. The compendiums and the theses are in English, but the project papers are in Swedish.’

Northern Hemisphere Bias
The following link, www.lochness.com/pltref/pltmaps/pltmaps.html#world shows the startling contrast between the number of planetaria in the northern hemisphere, compared to those in the southern hemisphere. This weight in favour of northern latitudes is considerably
greater than I had realised, and is reflected in the majority of shows that have been circulated to other domes over the last few decades that have been written by northern hemisphere planetarians. Many of them, therefore, have a distinctly northern hemisphere bias in certain places. Sometimes this is deliberate (which it has to be, of course, when discussing what patrons can see in the sky from their locations, although it’s been said more than once that the southern hemisphere skies are the more attractive) but sometimes it’s a subconscious thing. As an example of the latter, when you’re covering in a show things that happen during certain times of the year, make it clear that while the phenomena may be occurring in the northern hemisphere summer, for example, in the southern hemisphere they’re seeing it happen in their winter. And don’t make your audience think that March 21st marks the spring equinox for the whole planet; it only covers the northern hemisphere, of course, so let people know that the two equinoxes and the two solstices are the mirror images of each other across the planet. Be aware, too, that the Moon and constellations looks different in the southern hemisphere, and that the Moon rises in the north below the equator.
CHAPTER TWO

GETTING STARTED

Procrastination
Procrastination is the constant enemy of writers. Come to think of it I don’t have to write the next bit just yet, so I think I’ll join my friends down at the local pub...

[Hiccup]. Oh dear. See what I mean? Many people get good ideas, but instead of putting them on paper they just talk about them to friends and colleagues. Or they make excuses for why they can’t start writing today. Perhaps tomorrow they will fit it in. Soon enough it becomes easier to think of reasons why you should not start the project, and it never gets done. Sounds familiar? It should do; most of us go through those stages in varying degrees. But the good ones get past them. So be strict with yourself, and take that first big leap by putting some words on paper while your lazy side is out to lunch. Show it you’re the boss!

Digital Timeline
When writing a traditional show we’re accustomed to thinking, “Okay, I need to set aside three to four months to write my next public/school show.” But in this new digital world that timeframe has just flown out the window, so wave it goodbye; even if you have a full-time staff of four dedicated animators and video editing specialists, producing a top quality 35-minute all-dome digital show will still eat up…ooh, approximately eight months out of your precious calendar. And that timeframe may be even longer, depending on the speed and number of computers you use to process the data. (The dome master file for *Oasis In Space*, produced by Spitz, eats up over 500 gigabytes of memory).

Mike Murray has found from long experience that the time frame below approximates the breakdown of digital show production at the Clark Planetarium in Salt Lake City:

‘Month One: conceptualization, research, outlines.

‘Month Two: rough drafts, reviews by various professionals (content specialists, editors, other producers, etc).

‘Month Three: final scripting, narration recording, storyboarding into “Acts” and “Scene”, establish first draft of production calendar.

‘Month Four: production meetings begin (about every two weeks) to hand out assignments and review progress. First rough cut of the audio tracks (sound effects and 5.1 mix to come later). Begin some low-resolution ‘test scenes’.

‘Month Five: begin testing some sequences on the dome (judging qualities such as complexity, textures, shading, movements, camera angles, colour depth, brightness/contrast levels, etc.) Develop a 60-90 second trailer for the dome and for distribution.

‘Month Six: continue production meetings. Cross-checking of animation sequences for consistency; reviews not only by the production team but by marketing and education specialists as well.
‘Month Seven: make adjustments to assignments if needed. Lead Producer should maintain a handle on how the scenes are connecting, and that timings are accurate. Iteration and testing of content on the dome are critical. Sound effects and surround sound mix take place here. Timings are reviewed.

‘Month Eight: final scenes assembled and encoded at least two weeks before opening. Schedule enough time to implement two or three “fixit lists” and re-encodes.’

Put in a slightly more succinct form, the seven elements of digital show production are: scripting, storyboarding, animatic (a very rough and basic animation of the story in black and white), final animation, rendering, compositing and editing.

So in your early planning stages make sure you’ve allocated a realistic amount of time for producing the show, especially if it’s going to be digital. You could always start off by doing 15-minute digital shows to get your feet wet, as these will take about half the time stated above, thereby falling into the timeframe you’re more accustomed to dealing with.

Research
Be resolved to research your topic thoroughly. Ensure that you have the most up to date and accurate data in your script, Double-check information from more than one source for inaccuracies. If this sounds laborious, remember any mistakes left in the script will be on public display several times a day for many months.

That should keep your mind focused.

Writing in Planetarian about misconceptions in Star of Bethlehem shows, John Mosley stated,

‘Unfortunately, we have copied each other’s errors along with everything else, and these errors have been repeated in lectures and in print to the point where they have become planetarium folklore and myth. Yet, despite their time-honored status of respectability they are still errors, and if we represent ourselves as trusted sources of information, we have an obligation to be as accurate as possible, even on minor points.’

But don’t get carried away with your ferreting, and end up with the persistent problem of information overload in your script. Yes, I know you want to justify all your research effort by putting in as much of it as possible, but think for a moment, people – it’s self defeating; shows packed to the gills with everything but your grandmother’s recipe for chili demand way too much of an audience, so these productions have a short half-life in the memory.

On this point April Whitt observes,

‘Maintaining a light touch is important. Information can be introduced by the spoonful or the shovelful. Guess which is easier to swallow?’

Hmmm. Let me think about that one for a moment, April…

In the March, 1999 Planetarian David Menke commented,
‘I fear today we often try to engulf our visitors with so much information, they feel no need to come back for ten more years.’

In the same issue Gary Sampson stated,

‘...if a planetarium’s main function is to entertain, the crammed full of information, multimedia programs eventually have a numbing effect. The public get bored, only to be aroused if a new high-tech gizmo appears on the scene. But these high-tech fixes are just temporary, and eventually the ennui returns.’

In a previous issue of *Planetarian* Ray Villard had commented,

‘Much more detail would be as much at odds with the medium, as would be the sight of Dan Rather reading the *New York Times* on television every evening.’

Sheldon Schafer suggests,

‘Watch a Nova show, or other quality science documentaries on TV. Listen to how they present information, and to the “information load”. Although I remember only a portion of the information conveyed, I rarely feel overloaded. The information is used to paint a picture of the scientific achievement, not to be memorized.’

April Whitt again:

‘Information overload, ah yes. Writing a script for a 45-minute program that describes the entire known Universe, in every wavelength of electromagnetic radiation. Or something like that.

‘I think it is really important to decide who your audience will be, and what you are trying to accomplish for that audience with the script you are writing. If your audience is a third grade school class studying the Solar System, you will produce a different script than for a Friday night public audience of mostly adults. Determine your audience first.

‘At the end of the program, what do you want to have happened? Do you want them to have memorized three current seasonal constellations? Be able to repeat Newton’s Laws? Stop bringing you rocks that they think are meteorites? Have enjoyed themselves so that they will come again next month? Choose the intended outcome next. If you choose one or two specific objectives to accomplish, there will be less tendency to write in too much other information.’

Francine Jackson finds that a consistent weakness in many scripts is that,

‘...to discuss a black hole, we have to first visit each and every planet to get to one. A trip to a comet must include superstrings.’

So be prepared to trim everything down to the essentials. This takes a lot of self-discipline, I know, but it will immeasurably improve your show’s impact. A 30-40 minute script should have no more than a handful of big ideas for your audience to grapple with. Decide in advance what they will be, then use them as the show’s cornerstones.'
Don’t be afraid to steal presentational ideas from other scripts; it’s acceptable common practice for writers to borrow ideas from each other when they are stuck for ways of presenting material. Just make sure you use them skillfully. (Someone once said that if you steal from one author it’s called plagiarism, but if you steal from several it’s research).

Er, yes. Quite. Go figure.

Francine Jackson finds that, ‘...if something comes along that strikes a chord, I find the originator is happy to be copied. I have borrowed a line from Ed Frederick (Ecotarium's Planetarium, Worcester, Massachusetts) in which he compares Polaris to either movie stars or politicians (depending on the crowd): “Very famous, but not too bright.”’

Bob Bonadurer advises, ‘There are not many original thoughts left out there in the Cosmos, so try the next best thing - combine or steal other styles and topics and paste them together. This is the fun part. It is never easy, but we need to try. Bounce ideas around the office. How does that big world out there want their astronomy?’

Titles
Deciding on a catchy title for your script at this early stage, will help breathe life into the project. There’s nothing like seeing in your minds’ eye the title on the outside of a dome to spur you on. Good titles are invaluable for catching your potential audience’s attention before they have entered the dome. Take these, for example, all lifted from published scripts:

- Sky Puzzles
- Fire and Ice
- Touch The Stars
- Voyages
- Cosmic Fireworks
- Collision Course: Earth
- World Winds
- Ladies of the Night
- Space Birds
- Bear Tales
- The Xtra Terrestrial Files
- Zip! Zoom! Whiz!
- Geysers and the Galaxy
- Flying Blue Marble
- Oasis In Space
- Cosmic Safari
- The Cowboy Astronomer
- Light-Years From Andromeda

Writing about the importance of titles in the original 1983 version of this publication, the late David Hoffman commented, ‘Which program would you be most interested in seeing: Meteoroids, Meteors and Meteorites or Firefall!? Is your interest and curiosity sparked by The Solar System or Wings of Fire/Eyes of Glass?’

Style
Good writing can be summed up in one word: style. In the 19th century Matthew Arnold, commenting on what is style, wrote,

‘Have something to say, and say it as clearly as you can. That is the only secret of style.’
Writing in *Planetarian*, John Kenny eloquently described style as,

‘...the muse whispering in your ear that lets more than ink flow from the pen to the page. It is the key which lets that disembodied voice in the dark star theatre pass the audience’s ears and enter into their minds and hearts.’

Everybody’s style is, or should be, different because it’s a reflection of your inner self. Yes, your style is linked to your psyche, which is a good reason why you should not attempt to copy somebody else’s. Going that route is self-defeating. We already have everybody else. We want to see your style. **Ultimately, it is the one and only marketable asset you have as a writer.** You can’t alter the facts you put into the script, but you can develop a way of presenting them which is unique to you. It sets your product apart from the competition, and that puts you ahead of the game. You may not see your style growing day by day, but over a period of time it will emerge. Covet it.

Dale Smith has this tip for developing your own style:

‘Writing is a very individual activity, and style and how-to will vary a lot from person to person. Do not be afraid to be dramatic in your writing. You may think that dramatic writing is artificial or is better left to stage dialogue, but we are excited about the material we are presenting, and our writing can convey that excitement. I worry a good deal about creating a boring show, and we have all seen shows that we privately thought were somewhat boring, though we are generally too polite to say so. Remember that the audience is not likely to be as intrinsically interested in the topic as you are, so you have to bring them up to your level of excitement. Though you may see the audience as a group, remember that it is individuals who see your show, and in your writing you are talking to one individual at a time, and trying to bring him or her up to your level of engagement (in the sense of excitement, not content mastery) with the material.

‘Your planetarium is distinctive from any other one, and you look at the material you are presenting in a slightly different way from the rest of us. Let that distinctive viewpoint show in your writing.’

Little qualifiers do nothing but dilute your style. So you can do without things like, ‘It should be pointed out,’ ‘It is interesting to note,’ ‘basically’, ‘a bit’, ‘sort of’, ‘rather’, ‘very’, etc. I doubt you can write a sentence that is improved by adding the word ‘actually’. (Go on, try it). It’s probably the most useless word in the English language. All of these words belong in a file labeled, About As Useless As A Chocolate Tea Pot.

Carolyn Collins Petersen points reminds us,

‘We aren’t writing astronomy textbooks or research papers here, so the conventions of those forms shouldn’t be in the script, either. Nothing kills a good story faster than the use of passive voice.’
Remember the C in the ABC of writing, we discussed earlier? It stood for concise. That old enemy, time, is continually nibbling at your toes when you are trying to squeeze into a script all the relevant research, so concise writing is vital. It improves your style, too. To highlight how imprecision can take up valuable seconds, look at this example from a non-planetarium environment of how a sentence can get cluttered with words that obstruct the message and ruin the style. Former US politician, Elliot Richardson, once said, “And yet, on balance, affirmative action has, I think, been a qualified success.” There are 13 words in that sentence, but it could easily be slashed to six without diluting the meaning: “Affirmative action has been a success.” The rest is fluff. Show it the door.

Again, the military is famous for saying in many words what can be said with just a few. For example, they describe an invasion as, “A reinforced protective reaction strike.” Five words, where one would do.

To take two extreme astronomical examples, you don’t want to describe a gas cloud as “an amorphous assortment of cold molecules,” or a crater as “a geographically depressed hollow.” So look for examples of literary flab in your script and nuke them. What remains will be so sharp, you will be able to slice bread with it.

In this regard, you will come to think of dense words as your friends. A dense word is one that takes the place of two or three. For example, something impossible to imagine is ‘inconceivable’, once a month is ‘monthly’, something new is ‘novel’ and to put something together is to ‘assemble’ it. So tune your radar to spot places where several words can be swapped out for one dense word. You will be surprised how many sentences this applies to.

Many inexperienced writers have a tendency to use long words they wouldn’t use in conversation. Sometimes this is a sub-conscious thing, other times not, but it reflects a feeling that they need to be literary because now they are a writer. It’s expected, right?

Er, no.

But it does happen to the best of us; at the beginning of Asimov’s stellar career (which was destined to rival the Triassic Era in length) the Good Doctor could not sell anything he wrote in a fancy, put-upon style. His successes only started to mount when he learned to describe things in everyday, plain language. Fast forward, and 463 books later I think there’s a message there somewhere. Just give me a minute to find it...

So always choose familiar words over fancy sounding ones; you don’t want your audience to feel you are showing off your command of the English language. That would leave them trying to fathom the meaning of certain words, when they should be listening to the program. The key here is simplify, simplify, simplify.

But don’t go too far with this advice and end up patronizing your audience. Easily said, yes, and you feel you would never do that. But as planetarians often need to simplify astronomical concepts to make
them understandable, there is always the danger of inadvertently over-simplifying. You have to show respect for your audience before you can expect to get it back. It’s a fine line, I know. You want your audience to be on your side, but they won’t be if your script’s tone is superior.

An extension of this topic is favouring short words over longer ones, even though the longer ones may be commonly used words. Short words have more bite and urgency, and will roll off your narrator’s tongue more easily. For example, favour ‘stop’ over ‘discontinue’, ‘fall’ over ‘descend’, ‘car’ over ‘convertible’, ‘get’ over ‘obtain’, ‘change’ over ‘modification’, ‘task’ over ‘assignment’, etc. But having said this, sometimes the longer words should be favoured, because they better convey the precise meaning in your message. However, most times the shorter word will do. Use your judgment. We trust you.

Use specific nouns that add information to a sentence. Specific nouns are precise words, densely packed with information. For example, write ‘an astronomer’ rather than ‘a scientist’. The former is specific, the latter general. Again, ‘asteroid’ over ‘rocky objects’, ‘telescope’ over ‘optical instrument’, ‘university’ over ‘place of learning’, ‘prism’ over ‘angled piece of glass’ etc.

You get the idea.

Avoid using unnecessary adverbs. Most adverbs are adjectives with ‘ly’ attached to the end. For example, does a star ‘move quickly through space’, or does it ‘speed through space’? The latter. I hope: it conjures in the mind a more evocative image. Again, I would rather hear that Andromeda’s mother ‘paced along the shoreline’ than ‘walked nervously along the shoreline’ as her daughter was tied to the rocks, awaiting her fate.

Also, use lively, active verbs to bring a sentence to life. Active verbs do something, describing motion and action. Inactive verbs are something, merely describing things in static terms. As an example, look at this excerpt from Dale Smith’s *To Shine Almost Forever: The Incredible Lives of Stars*, in which I have underlined the active verbs:

‘The life of a star is a tug-of-war. Gravity pulls on one side. Energy pulls on the other. The light of a star is always pushing outward. It wants to make the star expand.’

‘Bridge’ words or sentences link paragraphs discussing different topics in a manner that maintains the script’s flow. This piece from *Sky Puzzles*, written by ex-planetarian Joe Kelch who was working at the Davis Planetarium in Baltimore at the time, shows you how:

‘Many centuries passed before human understanding of Earth’s motion around the Sun explained the heavenly cycles.

‘Today’s puzzles concerning the Universe are mostly beyond the reach of eyes alone.’

One word, ‘puzzles’, is used to link paragraphs discussing different problems from different centuries. This saves
valuable show time by not having to use lots of words to link the two topics

There may be occasions when you are tempted to be clever and play word games, insert puns, inside jokes or adopt other literary parlor tricks. Avoid the temptation, as it will alienate your audience. They will begin to see too much form over content. And that is when style crosses the line. We are accustomed to politicians doing it, but there is no room for it in a planetarium show.

Alan Davenport wraps up this segment with a humorous list to guide your style’s development:

‘Verbs HAS to agree with their subjects.

Prepositions are not words to end sentences with.

And do not start a sentence with a conjunction.

It is wrong to ever split an infinitive.

Avoid clichés like the plague. (They are old hat).

Also, always avoid annoying alliteration.

Be more or less specific.

Parenthetical remarks (however relevant) are (usually) unnecessary.

Also too, never, ever use repetitive redundancies.

No sentence fragments.

Contractions aren’t necessary, and shouldn’t be used.

Foreign words and phrases are not apropos.

Do not be redundant; do not use more words than necessary; it is highly superfluous.

One should never generalize.

Comparisons are as bad as clichés.

Do not use no double negatives.

Eschew ampersands & abbreviations, etc.

One-word sentences? Eliminate.

Analogies in writing are like feathers on a snake.

The passive voice is to be ignored.

Eliminate commas, that are, not necessary. Parenthetical words however should be enclosed in commas.

Never use a big word when a diminutive one would suffice.

Kill all exclamation points!!!

Use words correctly, irregardless of how others use them.

Use the apostrophe in it’s proper place and omit it when it’s not needed.

Eliminate quotations. As Ralph Waldo Emerson said, “I hate quotations. Tell me what you know.”
If you have heard it once, you have heard it a thousand times: resist hyperbole. Not one writer in a million can use it correctly.

Puns are for children, not groan readers.

Go around the barn at high noon to avoid colloquialisms.

Even if a mixed metaphor sings, it should be derailed.

Who needs rhetorical questions?

Exaggeration is a billion times worse than understatement.

And finally...

Proofread carefully to see if you any words out.’

Thinking Time
One of the economic realities facing modern planetarium facilities is that we fight to maintain our position in the public eye. We do this in the face of stiff competition for people’s leisure money from television, movies, computer games, the Internet etc. There is an increasing trend among planetarians to compete with these other media on their terms, throwing images at people at a rapid pace. It looks slick, but remember you need to give people enough time to assimilate the image’s information. That is not always done, so audiences are sometimes left with just a blurred memory of shows which come off looking like picture parades. You do not want people leaving your dome thinking scriptwriters are in competition to see how many images can be crammed into a given time, now do you?

This is an important point to dwell on, because there are key points in a script when crucial facts or theories are introduced. **These should be your show’s cornerstones.** At these moments, **you should give your audience thinking time to absorb the information.** This usually means bringing up the background music for five to ten seconds, and leaving the dome displaying just a star field. Without this consideration, your audience will become frustrated at not being able to keep pace with the script. Eventually their concentration will lapse completely, and the following chain of events occur: Frustration = lack of concentration = boredom = a waste of your valuable time.

Wow, all that work for nothing…

Here’s April Whitt’s advice:

‘It is possible to break up information into aurally digestible packets by using different narrators, by stating the concept and following it with an example or two, or by carefully timing segments so that the listeners can reflect on what they have just heard, before the next information comes at them.’

Phil Groce likes to write his scripts in segments because in doing so,

‘You give your audience a chance to separate and reflect upon each concept presented in each segment. Vehicles for segmenting scripts are time, place or people. Sometimes it can be segmented and organized around questions. The
question/answer approach is an efficient way to discuss a wide range of subjects in one show.’

Bill Gutsch says,

‘A good planetarium script needs to know when to ‘speak’ and when not to speak, and when to let the visuals and music carry the experience and also inspire the audience.’

And, finally, Thomas Kraupe advises us,

‘Do not lose the audience by using audio or visual clues which are in conflict or competing with the story-line. Less is more, and this is sometimes also true for the visual, but mainly this is true for the narration. Yes, there need to be enough places where we should step back and let the brains of our audience do the magic!’

Dealing With The Science

Decide at an early stage what percentage of the script will be spent talking about the science behind the topic. The general experience of planetarians suggest a rule of thumb target is approximately 25%. If you think this is surprisingly low, bear in mind that while planetariums are places of learning, for a general audience we only need to give them a flavour of the science behind the facts. Giving them the full recipe will a) make them reel back in the face of information overload, and b) force you to be too superficial in the treatment of important concepts, because of the limited time. So keep the hard science and technical terms down to a bare minimum. You and I may be able to recite them in our sleep, but many take a lot of explaining. And that uses up valuable show time.

Besides, we are not trying to turn the audience into Astronomy PhDs. A deeper appreciation for the beauty of the night sky is an easier goal. This comes back to our earlier advice, which bears repeating: don’t set your sights too high.

The science can be presented in verbally interesting information nuggets. As the director Billy Wilder once said, “If you have a message, cover it with chocolate.” In planetarium terms, disguise the essential science information in packets of other easier to swallow concepts. Take as an example this excerpt from Dale Smith’s *I Paint The Sky*, in which the aurora itself is explaining how it is formed:

‘I paint the sky with life. I give it hue and form and motion. I am the child of Sun and air. The breath of the Sun - streams of broken gases from storms on its face - race across the void to Earth and strike the top of the blanket of air you call the atmosphere. The streams of solar gases infuse the gases of your air with energy and make them glow. They shine with red and green and crimson, a hundred miles or more above you. In this way I am born.’

Dale has managed to explain in beautiful, simple language a complex, scientific process without mentioning the deep stuff like magnetic fields (on the Sun and surrounding the Earth) ions, coronal holes etc.

Or how about this example from *The Light-Hearted Astronomer*:

‘Take the Great Nebula in Orion. Awesome, isn’t she? There’s no doubt,
this lovely star lady has a stunning hairdo, and she photographs so well. She’s astronomy’s centerfold, for sure.’

That is a fine artistic description - and it didn’t entail having to talk one word of science.

Alan Davenport explains his approach:

‘The planetarium is a vehicle for informal science education,’ he says, ‘and the science in the script is only as complex as the scriptwriter wants it to be. It is often difficult for experts to disassociate the details from the concepts, so it may help those writers to think in terms of two audiences. While planning the text, think of how the science can be explained to the target audience member - and then how it might be explained to a kindergarten child.

‘When children ask how stars are made, my explanation begins with the bottom of a snowman. Roll a ball around in a field of snow and it collects more snow and grows. Stars begin as loose clumps of dust moving around a big open field of gas and dust in space, collecting more and more material. Gravity pulls all that stuff towards the middle of the star, just like it pulls you towards the center of the Earth. Down inside, there is so much dust and gas pushing into the middle that it gets hot. So let us squeeze our hands together really fast...

‘As a rule of thumb, if there is not enough time in the show to produce understanding in the mind of a middle school student, it is too much information. And if the concept is that essential, perhaps it should be the show’s main theme. Real education and mastery is the province of formal educators, or it can be included in supplementary materials, such as the activities in pre- and post-lesson packets.’

Interactivity

Gone are the days when audiences were content with the didactic approach to presenting shows. This involved a presenter giving the dreaded, dry lecture under the stars. No feedback from the audience was encouraged or expected. Today, however, people like and even expect to be involved with the show. Hence the popularity of interactive handsets, which are now to be seen in more and more domes. (It could be argued, of course, that the ultimate interactive show that’s guaranteed to be popular is a technology-free, simple two way conversation with your audience, which is always popular.) There are educational pros and cons that come with handsets, but essentially they are a good development for scriptwriters; they make it more likely an audience will maintain their attention to your words. And they also give authors more options for being creative and taking a non-linear approach to designing scripts. However, the counter-argument is that control of the show’s main thrust is abrogated to the audience. That’s true, but this isn’t necessarily a bad development, if people leave having enjoyed the experience and taken in the show’s key points. And the scriptwriter has control over that, at least.

Who do I spy, yonder? Why, it’s Jim Manning with some thoughts on this topic:
'The benefit is that it gives you another tool to use in presenting your programs and to work into the mix; it can help to make programs more interactive for the audience in both the cognitive and psychomotor realms. The drawback is that it can be the tail that wags the dog. Once facilities have it, many feel compelled or obligated to use it, and it is not always easy, it seems to me, to come up with legitimate uses in every show. There is also the danger that audiences (especially young ones) become fixated on the buttons, and focus more on them than on what you want them to be focusing. It is a challenge to avoid this.'

Indeed it is.

Phil Groce is concerned because,

'[A] worrisome trend is the amount of audience multi-tasking taking place in the name of ‘participatory’ programs. Before I offend all of the purveyors of this technology, I will admit that for many student classes, this audience response system has value, especially as a game show device. In many programs, however, it is often another opportunity for an audience to get sidetracked or derailed by the distracting process of pushing buttons or participating in a survey.

‘When the majority of the audience vote to go to Mars and I vote to go to Jupiter, I can’t help but feel, at least momentarily, disenfranchised from the program process. In some planetariums the audience seems to be constantly aware of the audience response system, forcing them to multi-task throughout the program...in a movie theatre we are free of distractions and multi-tasking. We are free to concentrate on one task, and to get completely immersed in the story at hand. So it should be with planetariums.’

My compatriot, Martin Ratcliffe, was one of the first people, along with Terence Murtagh, to pioneer electronic interactive systems in planetaria at the Armagh Planetarium in Northern Ireland back in the 1980s. I asked him for his advice on the approach a scriptwriter has to take when writing an electronic interactive show. He told me:

‘An interactive show requires a different mode of thinking when it comes to writing a script. Most scriptwriters are brought up with the traditional beginning, middle and end mode of storytelling. It is a powerful mode of conveying a message. It is not, however, the only mode. For sure, if the only mode a writer can operate in is the beginning, middle, end mode, then the obvious arguments against interactivity are easy to support. However, if you can step outside of that box, and think about interesting and compelling interactive sequences that re-enforce, or even better, become a key part, of a story-line, and they are well designed, then interactivity becomes a natural part of the story. The story must then include interactivity as a natural process - such as a decision tree, or as a tool for re-enforcing concepts. The easiest idea is tree branching in the story. Think about, for example, how you might go about visiting the planets in the solar system. You, as the story-teller, must decide which planet to go to. How about handing that decision to your audience, following a sequence of material that is set up to require the audience to make a
group decision. It is hard for a scriptwriter to let go of the reins of the story, but in an interactive show this is a necessity. Now your audience become the storyteller, not the author - and younger audiences find this empowering.

‘How about re-enforcing concepts. My favourite was developed in collaboration with Evans & Sutherland for a show called Crack the Cosmic Code. In the show, some simple visual elements displayed the idea of parallax. Using digital graphics, a transition from a vehicle going around a traffic circle (roundabout) showing near and far trees moving back and forth to a great cross fade to the Earth going around the Sun and displaying an exaggerated stellar parallax really drove the point home. However, the audience will not carry away a deeper understanding until they have to apply the concept themselves. This is a great place for an interactive sequence. The interactive section shows a number of coloured stars moving back and forth to varying degrees, and the audience has to pick the star colours in order of increasing distance, keying the colours in order into the keypad in their armrest. The sequence is repeated three times, and the number of people getting the correct answer is displayed each time. It is gratifying to the scriptwriter seeing the number of correct answers increase, indicating an improving awareness, minus natural statistical flukes, that more of the audience are understanding the concept of parallax the more they practice its application in a visually dramatic example. (I should add that electronic interactivity is not required for this to work). If part of your goal is to increase understanding of parallax, there are obvious arguments for using interactivity.

‘It's a well-known fact in teaching that improved understanding does not come from a lecturer telling a story, but comes from the student actually experimenting and confronting their own ideas. (If you doubt this, attend one of Dr Tim Slater's educational seminars frequently attached to the front end of a January meeting of the American Astronomical Society). It is well known, however, from the experimenters with interactivity, that audience enjoyment of the interactive sequences is inversely proportional to age. The older audiences, brought up with traditional storytelling in movies and on television, find interactivity annoying, and this group includes scriptwriters (me included!). However, the younger audiences enjoy the interactivity and, if it is done well, not for reasons of gimmickry but involving a conscientious attempt to make the interactive sections meaningful in the show, this young generation take more away from the show. The reason for this is that a passive storytelling show does not engage the brains of as many kids as it would if they are having to interpret something on the screen and do something actively. The downside of all this is the continued complex programming required to develop interactive elements of a show for the modern digital planetarium systems and, consequently, a higher cost. Until the available systems develop a user-friendly production system for interactive elements of the show, they will remain under-utilised. Here's a challenge to the developers. Develop an easy to use programming system for interactive
shows, allowing the user to select from ‘Q&A’, ‘flying an object’, ‘gaming/scoring’ elements with user-defined CG elements without having to dive into C+ programming languages. This is non-trivial, but it's the equivalent of having Windows instead of a C> prompt on your PC.'

If you’re now prepared to give it a go, you may be confused about which elements of a show to make interactive, so Martin Ratcliffe has this advice:

‘The approach to take is that once you have a basic outline for your script, the next stage, before writing the story, is to select pieces of your story that will work with some interactive graphical element that will illustrate and improve understanding of your entire story. The interactivity should begin with simple uses first - such as answering a multiple choice question, then moving to more complex interactivity as the audience becomes familiar with using the buttons (or other non-electronic interactive devices, such as the wonderfully effective ‘photon emitters’ used by Sheldon Schafer in Peoria, Illinois). The electronic buttons, when combined with a computer-graphic planetarium system, allows the audience to control objects on the screen. This allows exciting and more complex interactive elements such as ‘challenges’ (e.g. landing a plane on Mars or building Tetris-like pyramids) and games (using medical lasers inside the bloodstream to remove plaque from vein walls as you fly by in a miniaturized ‘Fantastic Voyage’ submarine, or fighting off serpents in the Egyptian underworld so the Sun can rise the next day). Decide to engage the brains of your audience in meaningful ways, not trivial ways. Games are not trivial when well-designed, they can convey important concepts. Multiple choice questions are not trivial when they are well framed; the multiple answers can confront misconceptions in a non-embarrassing environment.’
CHAPTER THREE
THE MECHANICS OF SCRIPTWRITING

Okay, stop giggling at the back, please; we’ve got to the part where we need to learn how to string the words together into a script.

We discussed earlier the peril of only talking about your script idea, and never putting words on paper. But once you have started the writing proper, it will help if you talk to people as much as possible about the project; this keeps it alive in your head, especially at times when you may lose heart. Like all projects, writing scripts is a task prone to peaks and troughs.

But before writing the script’s line by line detail, lay out its bare bones in a rough running order. List the key points you will want to highlight, and the lesser points that come in between. You will then know where everything fits in, and the script will already have a broad shape on paper.

At this stage you’ll also need in your head an idea about what order in which you should do certain key things to get the script turned into a decent show.


‘Imagine science writing as an upside-down pyramid. Start at the bottom with the one fact a reader must know before they can learn more. The second sentence broadens what was stated first, making the pyramid wider, and the third sentence broadens the second…how a new discovery alters what was known…there’s no limit to how wide the pyramid can become, but your readers will understand the broad implications only if they start with one narrow fact.’

Thomas Kraupe has been frustrated to find on occasions that,

‘There have been shows where, in a tedious process, every word was discussed at length, whereas the choreography did not get the same attention. I believe that a script should not be the work of a committee, you need the artistic freedom and vision of a good writer-producer (or at least a writer who is able to understand/co-operate with the choreographer/producer). So the key scriptwriting steps as I see them are:

1. Idea and Theming
2. Visual storyboard
3. Raw Script
4. Flightpath (general story direction)
5. Pace
6. Adapted Script
7. Visuals
8. Iterations
9. Final Script’

Top And Tail
With so much research material gathered in front of you your first thought will probably be, *What part of the script do I start writing first?* Phil Groce likes to start at the end because,

‘By writing the ending first, you have fixed your goal for the program,’ he says. ‘Now you can write towards that ending...”
In doing so, each word will lead your audience to that final statement. Chances are the ending will be the last words remembered by your audience. By writing them first, you can put your greatest creativity into these words.’

To prove the point, here’s the last paragraph of a show Phil wrote for the grand opening of the Irene W. Pennington Planetarium in Baton Rouge, Louisiana:

‘Just as the Mississippi River divides the land, the Milky Way divides the sky. Like Twain’s Huckleberry Finn, we are adrift in this River of Light on a raft called the Earth, sailing in a whirlpool of stars through a Universe more vast and beautiful than we can ever imagine. And like Huck, we are all very young and only beginning our great adventure, not knowing what new discovery awaits us around the bend.’

Carolyn Collins Petersen gives us an example of how the advice above has worked for her:

‘When I set out to write a show about Mars (that ultimately became MarsQuest) I carried the ending around in my head long before I knew what the rest of the show would cover. I wanted the audience to leave the show thinking and feeling as future human Mars inhabitants would feel. The final line was, “Now, we are the Martians.” Everything else in the show built up to that line, and gave the audience a satisfying experience and ending. That’s what storytelling is all about!’

Here’s another good example of a fine ending. It comes from Universe, a full-dome show from Evans & Sutherland. Over an image of meteors falling on a countryside scene the narrator says,

“While we can’t touch the stars, they can touch us in ways our ancestors never imagined. Our monuments to the stars are the spacecraft and observatories which bring the Cosmos to us, and allow us to understand our place in this beautiful and endless Universe.”

Or how about the closing scene from Stars of the Pharaohs, another E&S show. Against a backdrop of a dramatic sunset behind an Egyptian temple the narrator begins,

“So next time you look up at a shimmering, star-lit sky just think, these are the stars that Tutankhamun hunted under, that Nefertiti sang under and that the army of Ramases marched under. To us the stars are no longer a place of religious mystery, they are instead the doorway into a magic Universe that is much more wondrous than the ancient Egyptians could have ever imagined. A Universe whose secrets we have only now begun to understand. The Pharaohs imagined that they could travel to the stars. Now, 5,000 years later, we’ve embarked on the first steps of the journey that may make that dream come true.”

In his autobiography, I. Asimov, the Good Doctor writes, ‘Know your ending, or the river of your story may finally sink into the desert sands and never reach the sea.’
Writing in *Planetarian* Ray Villard advised,

‘**Ideally, the show should build up to an easily recognized climax which neatly wraps everything together, rather than just running out of steam and leaving the audience staring at a blank dome (until they finally catch sight of the exit sign).**’

Here’s an example of a powerful ending, taken from *Collision Course: Earth*, written by the staff of Boston’s Charles Hayden Planetarium. The show deals with the likelihood of an asteroid colliding with our planet. Against a backdrop of a musical crescendo, the narrator finishes by informing the audience:

‘**Although all of the facts presented in today’s Skyfile Special Report are based on current scientific evidence…the events and persons depicted are purely fictitious. There is no large asteroid headed toward Earth - as far as we know.**’

Those last five words are guaranteed to send a shiver down the spine of each patron. And the whole sentence is probably the one line they will always remember from the show.

Every good artist should know when to stop. So we hope you’ve enjoyed reading this publication…

Seriously, though, remember the old adage of leaving your audience wanting more. The importance of this can’t be overstated, so when your script has covered all the relevant information look for the nearest literary exit and run in that direction. Your audience will sense when the script has come to its natural end, and so if it doesn’t finish about that time they will become restless and loose concentration. You will have lost your captive audience, and the material that follows will be wasted.

Having said this, however, you could think about inserting an epilogue, contentious as it may be in some quarters. At a conference I saw a show that used an epilogue which confused the audience of planetarians, because the apparent ending prompted us to applaud and then we stopped abruptly when it was clear there was more of the show to come. One could sense the puzzlement sweeping round the room, because there was approximately another five minutes of script after the crescendo that had looked like the natural end. So the impact of what came afterwards was perhaps lessened, as we were all wondering why that structure was used.

However, on this point Carolyn Collins Petersen argues that,

‘**A false ending can be used successfully if it’s made clear in the soundtrack that there’s an epilogue to come. It’s a device that needs to be managed well if used.**’

So the choice is yours…

Tying in the script’s ending with the beginning neatly bookends the production (known as ‘looping the loop’) and adds a nice, extra professional touch. It lends your show an air of a story told, with a natural beginning, middle and end that all hang together, rather than an odd assortment of loosely-strung facts. And, apart from anything else, this is a good way of reminding yourself and your
audience that you have met the show’s key objectives that will have been stated at the beginning.

At the other end of the scale, book authors are encouraged to think of a snappy opening paragraph, to hook the interest of the browsing reader who picks up their tome in a shop. The same principle can liven up the opening of your show. In some respects, the opening few moments are the most important part of a script; lose your audience’s attention at this point, and it will be difficult to regain later without doing something blatant and probably out of character with the show, such as inserting explosions or other unnecessary sound effects. So your introduction should arouse people’s curiosity. It should have energy, and indicate that information of interest to them will be revealed later.

A marvelous example of this is the opening scene from Mars, a full-dome video show from the National Space Centre in Leicester, England. We see the early solar system as the planets are still being regularly bombarded by cosmic debris. The camera is close on one of the bodies, but we don’t know which one yet. Over a rapidly rising musical crescendo the narrator begins,

“This is the beginning. Not of the Universe, but of our own tiny corner of it. This is our solar system, where planet-size rocks are taking shape nearby. This is the story of the fourth rock.”

At that moment the music reaches a peak and a huge meteorite slams in to Mars, the screen fades to black and the show title, Mars, appears in threatening red letters. Believe me, it works, big time…

Be honest with the tease, and don’t make a promise you can’t deliver. Getting the audience expectant, only to let them down later in the show, will leave them feeling cheated and resentful. Taken on its own merits the rest of the show may be good, but their long-term memory of it may be one of disappointment. Who knows, they may not come back again.

When you are running through the opening scenes in your head, don’t feel you have to arrange things so the narrator starts speaking the moment the house lights are dimmed. Many good shows have a pictorial opening lasting a moment or two, with appropriate moody music. This helps set the scene for your all important opening few lines of dialogue.

April Whitt suggests,

‘If you can introduce what your topic is at the beginning of the program and give the audience an idea of what they will be seeing/hearing, they will have a framework of the show. New information will be easier to connect with information they already know well.’

As an example of a good introduction, let’s study Collision Course: Earth again. It uses dramatic license to study the threat (small though it may be) of an asteroid striking our planet. An old-fashioned - and not very exciting - way of introducing the subject matter would be to immediately launch into a dry historical account of asteroid-Earth impacts. All factually correct and worthv. of course. but
yawn-inducing in a presentational sense. Instead, the authors adopt a fictitious news broadcast format that allows them to use emotive, exciting language. In a presentational sense, this immediately grabs each member of the audience by the throat. See for yourself:

‘It is the ultimate doomsday scenario: killer asteroid on the loose! Now headed on a direct collision course with Earth!’

‘Sounds like just another tabloid headline?’

‘Before today, maybe.

‘But suddenly, the unthinkable has become a very real possibility.

[SFX explosion]

‘In an emergency news conference at noon, the North American Space Agency stunned the world with the announcement that a runaway asteroid has been discovered - and appears to be headed on a direct collision course with Earth.

‘As our planet faces this threat from outer space, people around the globe want to know:

‘Where did this asteroid come from?

‘What would happen if it did collide with the Earth?

‘After all, if a cosmic collision destroyed the dinosaurs, as we now believe, it could happen to us.

[MUSIC up for title].’

Words like ‘ultimate’, ‘doomsday’, ‘killer’, ‘emergency’ and ‘threat’ instantly grab the audience’s imagination, and probably produce a tingle of fear running down the spine. (I was scared just typing the words!). Their collective concern should make them pay particular attention to the rest of the show, to find out more about the source of this worldwide catastrophe in the making.

This next example of a good opening line has a different type of drama than the above. When done properly, with the stars fading up at exactly the right moment, it can be a marvellous start to a show for an expectant audience. From Gary Lazich’s Castillo del Cielo (Castle of the Sky):

‘Of all the hours of the day I love best the hour after sunset, as an unseen hand draws aside a bright blue veil to show us the stars!’

So openings aren’t difficult. They just require some thought and a little flair, as they set the tone for the whole show. Look on them as your opportunity to make a statement about your subject. Just make sure it’s a good one.

Use The Star Field!
This argument is as old as dirt, I know, but one should not forget that planetaria have the unique ability to simulate the night sky for a large audience. A star field will always elicit gasps of wonder from people of all ages, so remember this when scripting your show’s detail. Don’t relegate the star field to the roll of pretty background wallpaper! Remember the
best special effect in your planetarium is turning on the stars. No matter how good all-dome video gets that will always be the case, and a star field is at the top of the list of things that everybody who walks through the doors of your dome will expect to see. They’ll be happy to see the stars if only for 30 seconds during a transition point in your show. Television and movie companies have bigger budgets than any dome, so accept your facility’s place in the scheme of things and concentrate on taking advantage of its unique strengths. As my compatriot, Harry Ford, retired Producer at the Caird Planetarium at the Greenwich Observatory, London, once told me,

‘Let Steven Spielberg be Steven Spielberg. With his larger budgets, he will always be able to do better special effects than us. But he cannot recreate, as we can, the magic and atmosphere of being in your garden looking at the stars.’

Commenting on the desirability of using a star field Francine Jackson says,

‘There have been programs made that did not turn on the stars. Yes, I realize that in some productions stars are not needed, or, at best, are only a minor background for other, more spectacular, special effects. But in many such programs in which I have been in the audience, other customers around me have stated they thought they were going to see the ‘star pictures’. Perhaps this could not be considered a weakness per se, but for audience members apparently it was.’

Hey, that’s what I said earlier!

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**Edit Now Or Later?**

Some authors (like myself) prefer to edit their work as they write, but others leave it all until the end. Here, Dale Smith tells us about the pros and cons of both approaches:

‘Advantages of editing on the fly: the one time you probably have all aspects of the topic in your mind is while you are writing the first draft, so this is when you are most likely to include all the nuances. This may also be the time when your creative juices are flowing the best, and you should take advantage of that and try to get the script as close as possible to its final form.

‘Another major advantage of editing as you go involves continuity and transitions between successive sections. While I have an occasional cold break, I usually try to have a logical flow between sections, though I often do not know ahead precisely how I will link them. How will the last sentence of one section flow into the first sentence of the next section? But as the sentences of the first section write themselves, the detailed flow of explanation is created and this often shows me how to make the transition. For example, in my current show I tell the story of the Norman conquest of England as shown in the Bayeux Tapestry, and then have a section about Halley’s and other comets. How to connect them? As follows:

“... His brothers were killed, and an arrow shot to the eye took out Harold. And the comet – it was not yet named Halley - watched William become king of England.
“The comet that told Harold he would die was an ice-ball. An ice-ball with the shape...of a potato! Nine miles by six, and covered with a dark crust of dirt.

“Harold’s comet returned again and again, and 900 years later it was met by a spacecraft ...”

‘The structure of the last sentence in the tapestry section guided the construction of the first sentence of the comet section, and that first sentence in turn guided how the whole paragraph would unfold. Had that last sentence (which is the only place I say the word Halley) not been in place and edited right away, the next section might have been quite different.

‘Disadvantages: writing the first draft is harder than editing. It is a great relief to have it done; you are released from hard labour and you get your time budget back - and editing as you go slows you down, postponing the day you can attend to other work that piles up while you give priority to writing the first draft

‘Another obvious disadvantage is that your creative energy varies during the days you are writing, and some days you simply cannot write as well, or encounter harder sections to do, or are preoccupied with something else that impedes your ability to write. So there are some sections you simply cannot get completely right immediately. In those cases it is better to get something written, even knowing it is not the final version, and then come back later and make it right. Usually, it is just a matter of judgment, knowing when to stop and edit and when to forge ahead.’

Sentence Sense
Try to begin each paragraph with a topic sentence, one that contains the thought that is developed throughout the rest of the paragraph. Take this example from April Whitt’s Day Star, in which she uses the star projector itself as a character guiding pre-school children through the sky:

‘Girls and boys, would you help make the clouds disappear? In the real sky outside, wind pushes the clouds. In here, we can push the clouds. Everyone take a big, deep breath and hold it. When I say “Go,” everyone blow up at the clouds. Ready? Take a deep breath...hold it...Go! Good job!’

(I’ve used this method in live shows with the particularly young ones, and it works real well.)

The paragraph’s first sentence introduces us to the topic, and we’re done by the end of the paragraph. The next one can introduce a fresh topic. Splitting up the flow of information like this gives your script more structure. (April’s example also demonstrates that each paragraph should not have more than one idea for an audience to comprehend).

There will be certain words vital to the overall theme of your show, to which you will want your audience to pay particular attention. These will have a better chance of sinking in if placed at the end of a sentence or paragraph, especially if the sentence is long. Dale Smith knows this, as indicated by the following excerpt from
To Shine Almost Forever: The Incredible Lives of Stars:

‘Gravity is the sculptor of stars. It takes the interstellar gas that stretches for trillions of miles. It pulls it in, it squeezes it down, it rounds it out, it heats it up, and it turns it into a sphere of gas just a million miles across. As the sphere heats up, it begins to shine. It has almost become a star. Astronomers call it a protostar.’

The key word that the audience need to hang on to here is ‘protostar’, and it is placed at the paragraph’s end for maximum impact and memory-retention. If it were placed near the beginning, it may have been forgotten later by the audience as they tried to picture the scene developing in the words.

Parallel construction can lend sentences a lyrical, rhythmic air. For example: “I came, I saw, I conquered,” “When you’ve seen one, you’ve seen them all,” “Fish gotta swim, birds gotta fly,” and, “No bucks, no Buck Rogers.” The repetition of certain words in those sentences highlight the similarity of information they contain. In a typical script there may not be many opportunities to put parallel construction into practice (indeed, it’s wise to use this style sparingly) but if you only do it once, that makes your show more memorable.

Here is an example from The Light-Hearted Astronomer:

‘People who are interested in astronomy come in all shapes, sizes and ages. Some are fat. Some are tall. Some are short. Some are small.’

Science Fiction Themes

For many years now it has been increasingly popular to use science fiction themes as vehicles to carry the astronomy education message in planetaria. This is fun for the writer, as you have an opportunity to play with your favourite characters from a beloved TV show or film. However, this style of presentation, if not done with skill, can turn out to be confusing for your audience; if they are not as knowledgeable as yourself about the show and its characters, they may not know where the science fiction ends and the astronomy begins. Discussing this topic in Planetarian, John Kenny advised,

‘Another problem with science fiction shows is the danger of trying to do a Star Wars-type whiz-bang extravaganza. It cannot be done. At least, not as well as Hollywood can do it. It leaves the planetarium open to unfair comparisons.’

Francine Jackson warns us about another danger in using this approach:

‘Orion Rendezvous, the story incorporating the Star Trek: The Next Generation gang, with Geordi La Forge as the primary character, involved several trips through wormholes. Although I thought the show was a little long, and could not believe there could be that many tunnels in the Universe, the show seemed to have some good points to it. However, imagine my surprise at seeing a section of the book Dumbing Down (Washburn, Thornton, editors, 1997, ISBN 0393317234) devoted to this program.’
If that didn’t put you off experimenting, here are some tips from Jim Manning:

‘Science fiction and astronomy/space have a natural connection and always have, and so it is easy to shuttle between the two. I use science fiction motifs or settings quite a bit, because they can create nice visuals and can boost both the entertainment factor and education factor at the same time. It can also help to turn a documentary into a story. It can add some concreteness when speculating about the future, which we do a lot. I have written programs with science content within a science fiction story or framework, and I have used little science fiction vignettes to illustrate points within a more standard educational approach.

‘Some of the cons are that, like anything else, you can overuse and overdo, and you need to be careful that the science fiction scenarios are plausible, and do not send your audience into the realms of bad science. In short, the primary guiding factor is whether you think it works for your show, and if you think it helps you present what it is you want to present.’

Carolyn Collins Petersen’s advice is that,

‘Science fiction is good storytelling with a science theme. It can take your viewers to the future in a great way. Whether you choose characters from an existing science fiction universe or try to write your own, it is a great way to open up creative ways to bring science to the audience in an engaging way. I have never tried a specific theme (i.e. Star Trek), but have written my own science fiction stories under the dome.’

Using Characters
Another vehicle for carrying the message is the use of characters. But beware - this issue is thorny. Think long and hard before going down that road, as there are significant pros and cons. On the positive side, an audience can empathize with a character who is written to have about the same knowledge of the night sky as them, so everybody learns together. It can be a pleasant change from the traditional, lone voice of God narration. And characters give you, the author, more license to include fun elements.

However, on the negative side unless they are written with skill and care, characters can be unintentionally patronizing. You have to be a good storyteller to handle characters appropriately, so experience outside of the planetarium field writing fiction is desirable. You already have it? Good. So you know the basic rules of characterization. Feel free to make yourself a sandwich, while the rest of us huddle round to look at a brief outline of the rules. The late Fran Biddy suggested in Planetarian,

‘Do not plan to use visuals of the characters. If visuals are shown, the audience will expect to see the lips move in synchronization and the limbs move, etc. Write as if for radio. Bring out characterization by what the characters say and how they say it.’

(Some planetarians feel it can be disappointing not to see images of a show’s characters. So this is a matter of personal taste).
Discussing the use of characters to bolster the drawbacks of a taped show, the late David Hoffman asked in the original 1983 version of this publication,

‘How can they ask questions? They cannot, so have someone else do it for them. Use dialogue and develop one character who will be doing the questioning, and with whom they can identify...and another to give the answers.’

Jim Manning has his hand raised, so let’s hear what he has to say:

‘It depends on what one’s goals and objectives are for a show. If I think using characters is an appropriate way to advance the concepts and aims, I use them. Sometimes I will use a primary narrator to carry the show, and break up that narration with comic, serious, or historical vignettes which use characters or characterizations to illustrate points or advance concepts. It helps to break up the show for the audience, gives them a chance to mentally shift gears a little, and helps to keep them more alert. On occasion, I will use characters for an entire show, which can create a more coherent storytelling approach.’

Not including some of these factors will make your characters boring, one-dimensional people. This will detract from the impact of the message you are using them to convey. And you know what? Boring characters make for a bored audience.

Dave DeRemer explains here his approach to choosing specific characters:

‘I believe that show characters act as teachers. They are the ones who communicate with and educate the audience. I take a critical look at the topics being covered in the show, then choose characters which will be best suited to teach this material to this particular type of audience. For example, younger audiences often relate well to animals which come alive and tell a story while they teach. Older audiences might like to see Copernicus, or Galileo appear to talk about previous viewpoints of the universe.’

Your script will be improved with the insertion of a little suspense here and there. Characters can be used to achieve this, although they are not essential. Simply lay down some markers in the script which intrigue your audience about specific mysteries, the answers to which you don’t immediately reveal. They come later, but not too much later, otherwise people may have forgotten what the mystery was.

Unless it is part of an interactive feedback session with electronic handsets, an audience will get nervous and fidgety if the script keeps asking direct questions of them, such as, “Do you know why stars twinkle?”, or “What causes the Moon’s phases?”. You can avoid this difficulty by having your characters ask rhetorical, thought-provoking questions. The two I just mentioned could be changed to, “I wonder why stars twinkle,” and, “I wonder what causes the Moon’s phases.” This still allows you to launch into explanations without intimidating your audience.
Once you have posed these questions, Alan Davenport had this advise in his Scriptorium column:

‘Take the audience up to the point where they deduce a reasonable answer for themselves, before you lay out the answer as a conclusion. If the majority do not have a clue prior to the conclusion, then either the question was too ambitious or the explanation was inadequate.’

Finally, David Dundee’s been waiting patiently in the wings, so let’s hear his advice:

‘The most important rule of creating characters in your shows is sensitivity to your audience. If you have mostly African-Americans or Hispanic visitors, then your show characters should reflect this when appropriate. I try not to use too many characters in a show, so the storyline will not get too complicated. I usually use two to four characters in a show. Children’s shows and elementary school shows character development is crucial for story-oriented shows. Story-oriented shows continue to be most popular among our young visitors.’

Okay, you can come out of the kitchen now; we’ve finished.

Maintaining The Script’s Focus
As you progress from paragraph to paragraph ask yourself, “Is the script sticking to the show’s basic theme?” Many topics in astronomy are so intertwined, it is easy to unwittingly get side-tracked. Before you know it, you have ended up spending a high proportion of the script discussing related, interesting but not essential issues. So here are some tips to keep a script focused.

Jim Manning first:

‘Before the first word is written, I sit down and come up with a short (25 words or less) description of the show - what it is I want people to take away from it, what the point of the show is. Some people refer to this as the Big Idea. Once I have it, I keep it always in mind as I prepare the outline, decide what I will present and what I will not, and write the script. By focusing on the Big Idea, I can keep the script focused as well.’

In this regard, the range of technology in a modern dome can be a distraction; a star projector and all the associated special effects projectors (or the sophisticated video projectors in digital planetaria) offer so many bells and whistles, there is a natural temptation for a writer to show off their every function in a script. **Don’t give in to their charms.** Show some mettle! Throwing them all into the mix will produce a show without any focus. It will end up being a confusing mish-mash, nothing more than a sales pitch for the equipment manufacturers. Remember, the special effects you leave out of this show may have a place in the next one. That will give future audiences something new to see.

Be on the lookout for simple beginner’s mistakes like, for instance, focusing one element of your show on constellations that will not be visible when your audience visits the dome. Sounds obvious, I know, but you would be surprised how these little
errors can creep in when you get too close to your material.

**Using Analogies To Deal With Large Numbers**

One of the problems with explaining the Universe to a lay audience, is figuring out how to put all those large cosmic figures into terms to which the public can relate. The answer? Wherever possible, look for Earth-bound analogies. For example, you can explain the difficulty ground controllers at JPL had in targeting Pathfinder from the Earth to a specific site on Mars, by saying it was equivalent to throwing a pebble from Los Angeles and having it fly through a specific window in New York’s Empire State Building several thousand miles away.

People should be impressed by that; it converts an astronomical distance into terms they can visualize.

Ray Villard has a good analogy for discussing the relative thinness of Earth’s atmosphere:

‘If the Earth were the size of a baseball, its atmosphere would be no thicker than a postage stamp.’

Alan Davenport tells his visitors that as the Moon is 224,000 miles away, if they rode a bicycle continuously at 30 mph, it would take them 311 days to get there.

No pizza deliveries to the Moon, then…

In Dale Smith’s *To Shine Almost Forever: The Incredible Lives of Stars*, he tackles the problem of imagining five billion years, when discussing the Sun’s age:

‘Look around this room...for the dome is pierced by tiny holes,’ the narrator begins, ‘All told there are ten million holes. Just ten million. To reach five billion holes, you would need five hundred domes the size of this one.’

In the original version of this publication, David Hoffman had this suggestion for bringing the word ‘billions’ down to Earth:

‘If you were to be born this very moment, with the ability to count off the seconds of your life without stopping for any reason whatsoever, you would be 34 years of age when you reach a billion. Or, to put it another way, Christ lived a billion seconds and it has been a billion minutes since He died.’

A related issue is avoiding overuse of superlatives and numbers. An audience will only remember a tiny fraction of the numbers you throw at them, so ensure the ones you use are worthy, and not just put in to fill time or space on the dome. And yes, many of the phenomena astronomers study are huge, but try to reserve superlatives for things that really deserve the monikers. Describing everything as ‘huge’ and ‘enormous’ soon make the words meaningless. They quickly become wearing, and will make your audience skeptical every time they hear them. So remember to keep a sense of proportion.

In this excerpt from *The Light-Hearted Astronomer*, the authors cleverly avoid the need to use numbers:

‘The very first astronomy enthusiast was none other than a cave-dweller born
way, waaaaayyyyy back when...back before taxes, even.’

So always look for a user-friendly way of putting over large numbers, and only use numbers when there is no alternative. If you have to quote numbers, round them off and simplify them for clarity.

**Pace**

An occasional change of pace in the delivery of your script’s information is important, because if the pace is slow from the beginning and plods along at the same rate throughout the show, it will not keep your audience’s attention for long. But at the other end of the scale, a script that is fast-paced from beginning to end will demand too much of your audience. So look for opportunities to find a happy medium by either quickening your show’s pace or slowing it down.

April Whitt says it comes down to one thing:

> ‘Timing. Short sentences speed it up. Long, drawn out statements with lots of clauses slow the pace of the program and let the audience breathe a little.

> ‘Music and sound effects can change the tempo of a program, as well. Melodic classics can be soothing and slowing. Up-beat, martial tunes speed up the pace. A loud thunderclap, followed by several seconds of silence, can change a show’s tempo entirely.’

Thomas Kraupe is convinced that,

> ‘Selecting a “flight path” - you may call it a story line in the more classical theatres - and pacing the show properly is what I see as the cornerstones for creating a good script and show.’

There may also be room in your script to insert taped quotes from astronomers that, apart from adding variety and colour to your story, can also vary the pace. Just make sure the quotes are not too long.

And finally, don’t allow a script to get bogged down on one aspect of your show’s theme for too long. It’s easily done, but is avoided by following Alan Davenport’s tip:

> ‘A successful, enjoyable script will offer a series of beginnings as it moves from one subject to another, and not be reluctant to let go of a subject that has run beyond its sell-by date.’

**Making A Narrator’s Life Easier**

Your narrator is the channel through which your words are conveyed to the public, so think of that person as your friend. If you gave your script to a friend to narrate, you would not want to make their task any harder than it need be, would you? So the more consideration you give to making your narrator’s job easier and more interesting, the better it will be for you and the success of your script in the long term. This brings us back to the importance of a conversational style of writing. It’s worth devoting time to these points, because a bored or confused narrator will effectively kill your show. And that will neutralize all your hard work.

One way of helping your narrator while you write is to read each paragraph aloud as it’s finished. Be your own narrator. Do
any sentences leave you breathless at the end? Shorten them. Do some of the words sound too formal? Loosen the style. You will eventually get used to reading your words aloud.

April Whitt says,

‘Keeping the narrators I would like to use in mind as I write the script, I will often change wording that I know will be difficult. Sibilance can be minimized by word choice. Punctuation can be added or subtracted to make a sentence easier for the listener to understand. Dialectic or regional pronunciations should be factored into the script as well.’

April mentioned sibilance, the back to back use of too many words beginning with the same hissing letter, such as ‘s’. These pose narrators needless difficulties. Here is Babylon 5’s scriptwriter, J. Michael Straczynski’s, exaggerated example of this innocent problem:

‘Sometimes sibilance seems sensible; still, saying sentences steeped in S’s simply staggers some stars.’

Try saying that after you’ve had a few at the next Taurus session…

Dale Smith has many years of experience making a narrator’s life easier, and here he shares his thoughts with us:

‘The narrator’s mind, eyes, and voice are all critical components in bringing your script alive to your audience. If the narrator does not deliver your words effectively, your script will not work.

‘We take several simple mechanical steps to help the narrator. We use a large font (New York 12) and double-space for the printed script. We use wide margins - the text is only four and a half inches wide. We make sure no paragraph spills over from one page to the next, so the narrator can move pages between reading paragraphs, and this makes our editing easier. We number all the sentences for easy reference.

‘When recording, we have the narrator stand up; this helps his or her breath control, and draws out more energy. The pages are spread out on a music stand, so the narrator can see more than one page at a time for continuity of thought.

‘I use multiple narrators, up to four per show, two male and two female. This lets me assign each narrator sections of the script that are matched to their strengths, and lets me change voices relatively frequently. As the show progresses, the audience becomes familiar with each of the voices and their different personalities. The frequent change of voice adds variety and helps keep the show fresh to the audience. Voice changes can accentuate topic changes, or can occur when the script asks a question and the next sentence begins an answer. For example, in one of my shows I tell the story of the race between Amundsen and Scott to be first to the South Pole. As Amundsen approaches the Pole:

“...At last the weather relented and now they could race to the south. Would they be first to the Pole, or would the end of the world be blue with a British flag?”
“The end of the world was white. Featureless snow lay all around them. There was no sign of any other life ...”

‘One narrator asks the question, another answers it. The first narrator has told about the travel to the Pole; the second tells about the time at the Pole, including a demonstration of the Sun’s diurnal motion a few sentences later. So in this case the change of voice also signals a change of topic.

‘As a scriptwriter/visual designer, I have an internal sense of how a given section of the script should read, and have read it in my own mind many times. Now the narrator must grab and internalize that same sense, and interpret it through his or her own point of view. There is no easy way to communicate this sense from me to the narrator, but some of my narrators have been with me for a over a decade, and we know each other well, and this makes it easier. I usually give the entire script to the narrator with their sections marked, and we talk for a while about their parts and I pronounce words (usually proper nouns) that they might not know. Then we meet twice for rehearsal.

‘The first rehearsal can be quite difficult, as the narrator gradually loosens up and gets a feel for the section. As they read, I am usually quite specific in suggestions for given sentences - faster, slower (usually slower), pause here, emphasize that word, more drama, and the like. This first rehearsal is rather hard on both the narrator and me, but it is the critical session. At a certain point that we are both trying to reach it clicks in the narrator’s mind, and it is easy after that. The narrators all tell me that I am demanding in these sessions, but they like it (no kidding!) because it helps them internalize their sections and get them right.

‘I encourage the narrators to read with drama and energy. After all, we are telling a story, not doing a science information dump, and I write the words with that in mind. The narration should reach out and grab the listener, and not just bear the predictable cadence of a TV documentary. I also direct the narrator to read slowly, about 100 words a minute, which is slower than the majority of other planetarium narration, and considerably slower than conversation or broadcast TV. Reading slowly but with energy is not easy for the narrator, and requires practice to develop the skill.

‘We usually meet about a week later for a second rehearsal. The narrator has now practiced several times at home, and has internalized his or her section. The second rehearsal is usually easy; it confirms to both the narrator and me that we have it right, and we usually have to make only a few minor tweaks.

‘A few days later we record the narration. We schedule these sessions at the time of day when the narrator’s energy is at a peak; usually this means in the morning, but for some the afternoon is best. During the recording sessions, I try to be very conscious of the narrator’s energy level, flow, and continuity, and of whether the narrator is normally best on the first take or second take. I generally try not to interrupt the narrator here unless they
have made a mispronunciation or omitted or inserted a word, because once interrupted it is difficult to re-establish the intangible feel that builds from sentence to sentence. When I do have to interrupt, I have the narrator back up two or three sentences to rebuild the flow. I am also conscious that the recording is very demanding on the narrator’s energy. Generally, the verve that characterizes the best narration is exhausted after the second take and it is uncommon for a subsequent take to be better, though sometimes we have to do them and sometimes they work. Usually there is one small section for each narrator that requires multiple takes. After recording, or at intervals during the session, the narrator and I listen to the reading and usually concur on whether a given take has it right.

‘The recording session is demanding on the narrator’s energy, but since the show is divided among up to four narrators each one has only 10-15 minutes of script, and is able to sustain energy throughout in a way that would not be possible with a half hour or more of narration to read.’

Mark and Carolyn Collins Petersen of Loch Ness Productions have written a handy publication, *I’m Your Narrator, Give Me A Break!*, in which they give the following advice:

- Be kind to your narrator by not writing long, complex sentences. They are hard to read out loud, let alone understand.

- Shorter sentences are more user-friendly. Better still mix their average length, as this is more kind to the ear and more interesting to read.

- Cutting each paragraph down to three or four sentences splits the text into nice bite-size pieces, which look more attractive on paper.

- Don’t let sentences run from one page to the next, so that your narrator doesn’t have to turn a page while speaking.

Don’t use parenthesis, as your narrator will have difficulty reading the sentence with the right cadence. With time and practice, you will learn to incorporate the parenthetic material into the open text.

Your narrator will be more comfortable reading contractions, because they are used in everyday colloquial English. So write ‘isn’t’ rather than ‘is not’, ‘didn’t’, rather than ‘did not’, etc. *That’s a trivial thing*, you think, but little changes like this make a surprising difference for the person who effectively has to sell your script to an audience.

Dale raised a good point earlier about the use of multiple narrators in one show; if you are writing a particularly complex 40-minute show, the variety of two or more voices is good for maintaining the audience’s attention, especially if male and female voices swap passages of text. Even the keenest listener’s attention can sometimes wander when listening to the same voice for 40 minutes - unless, of course, that voice happens to be Patrick Stewart’s. But not all of us can afford The Voice.
Carolyn Collins Petersen cautions that,

‘... there needs to be a good reason for those voices, and each voice should be associated with a different topic. Switching narrators willy-nilly through a show can confuse an audience further.’

**Using Humour**

The insertion of humour into a script is contentious. It’s worth considering, however, simply because it relaxes your audience and puts them in a receptive mood. That is, as long as the humour works. When it does, you look good, but when it falls flat you are embarrassed. You end up with an audience of Queen Victorias saying to themselves, “We are not amused.” We all have different mirth-meters, and what works for you is not necessarily going to work for me. However, some things are intrinsically funny, and so you should realize the importance of not forcing the humour. On this score George Bernard Shaw wrote, ‘My way of joking is to tell the truth. It’s the funniest joke in the world.’

The lesson here is: you don’t have to dress up the humour as humour. It will advertise itself. What example can I use? Ahh... how about this quote from Fred Hoyle: ‘Space is not remote at all. It’s only an hour’s drive away, if your car could go straight upwards.’ That has a humorous element, but it’s also a statement of fact that stands on its own independent of the humour. If people find it funny they will laugh, and it will be a bonus for you, but it does not matter if they don’t because it need not necessarily be put into a script for its humorous value alone.

But don’t get carried away and turn your show into a joke-fest; humour used sparingly is the way to go. If you’ve written a script for a live show, putting the humour in at the beginning will relax you and the audience, and then you’ll be well away. And it’s best to try the humour on friends, colleagues and family first before using it in the dome, then if everybody laughs you know you’re on to a winner.

A nice example of appropriate humour not overused is a scene from **SETI**, a video show from the National Space Centre (NSC) in Leicester, England. We see Joe, a funny, dopey-looking alien. His body becomes distorted in amusing ways to indicate the different shapes and sizes that aliens may come in. He’s shown growing amazingly tall, shrinking incredibly small, he falls over, grows multiple eyes, etc. All good stuff and well targeted.

Another example is the end of **Mars**, also an NSC show. As the credits roll, we see a Martian standing next to a lander and holding up to its camera large pictures of barren landscapes that completely fill the camera’s field of view, giving us silly humans the impression that Mars doesn’t have any life. But all the time behind the Martian there’s a thriving metropolis going about its daily business!

Most amusing.

There’s a nice moment in the Loch Ness Productions show, **The Cowboy Astronomer**, when the narrator is discussing the relative temperature of stars of different colours, and on the dome we see blue, yellow and orange stars with
different numbers of red hot chillis next to them to indicate their relative temperature!

Sheldon Schafer finds that,

‘Zingy one-liners for transitions seem to be the most effective, while humour in general does not seem to be appreciated unless used sparingly. As an example, the single funniest line in a planetarium show that we have written and produced was in a show titled, You Asked For It. We answered the most asked questions that were asked of us during the last year. A question was presented by one narrator, and a straightforward answer was presented by another narrator. This led up to the final question. The narrator announced: ‘And finally, the most asked question of the last year was...’ At this point a child’s voice interjected, ‘Where’s the bathroom?’ That line brought down the house every time. It was the only humorous line in the show, and it was totally unexpected. It also represented a life situation common to all of the audience.’

My compatriot, Teresa Grafton, finds that,

‘At the end of a school show, whilst children and I are looking up at a star-filled sky, I have posed the question of whether there may be intelligent life elsewhere in the Universe, and whether there may be other eyes out there somewhere looking back at us. We then project onto the dome a pair of winking “demon eyes”. Always well received!’

Jon Bell has a long track record of inserting humour (often in the form of terrible puns) into his scripts. and so I thought it would be appropriate to show you a good example of this. The excerpt below is from Bear Tales, where we find a family discussing the shape of Ursa Major and Ursa Minor:

‘Skye: So how come they got long tails, Grandpa?

‘Grandpa: Oh, well that’s the easy part. Both these bears were pretty heavy, and Zeus had to use a lot of strength to lift them up off the earth. So when he picked them up by their tails, he stretched them out and that’s why these bears have such long tails, even to this day.

‘Mom: Oh, daddy, that was terrible.

‘Grandpa: Kinda unbearable, huh?

‘Dad: You should be embarrassed to tell that tale.

‘Grandpa: Trying to beary me in puns, eh? Well, bear with me – it gets much grizzlier from here on out.’

There’s not too much humour there, it’s appropriate and in the context of the whole show it’s used sparingly as Jon puts all the groans into this short part of the show. And having played this show to many audiences, I know the humour works.

So if you are now set on including a little humour in your script, consult the GLPA publication Tips #19: Humor In The Planetarium. Alternatively, look up two of Patrick Moore’s books, Fireside Astronomy and Armchair Astronomy, both of which contain a treasure trove of
anecdotes. These publications should at least produce a spike on your mirth meter.

**Using Music And Audio Sound Effects**

Background music and sound effects can compliment and enhance the general other-worldly atmosphere inside a planetarium. But their inappropriate use can have the opposite effect, leaving your audience cringing. So think carefully about your selection, and whether or not you really need that cheesy sound effect. And does that musical segment not sound a little outdated now? (If you decide to update your sound library, consult Appendix B, where you will find a list of retailers supplying modern music and sound effects).

Thomas Kraupe kicks us off with a left field idea that perhaps isn’t as odd as it first sounds:

‘In the early stages of the project of the new Hayden Planetarium, when we discussed how much narration is necessary, I tried to stir discussions by claiming that - given this stunning potential of immersing the audience in 3D digital model of the entire universe and taking the audience for a show which works like an all-dome version of the acclaimed Powers of Ten film, from the Earth to the edge of the observable Universe and back - we may not even need any narration, because the continuous flight without any miraculous cuts through the Universe and back is strong enough when a good musical score kicks in.’

April Whitt says,

‘Hurtling gracelessly through middle age, I find it more difficult to hear spoken words over loud background music. Keep the music in the background, and bring its volume up for transitions. Timing is important here, too. Narrations edited so tightly together that the listener’s brain has to work at hearing as well as listening are annoying. Sound effects that induce temporary deafness are annoying.’

On this point Francine Jackson remarks,

‘In many cases it often seems that the writer does not believe s/he can create an interesting product, so s/he will be sure to include at least a half dozen explosions. There almost seems to be an inverse proportion of program interest to the number of blowups. I believe my highest recollection has been 11 explosions in a half-hour program.’

Mark Petersen of Loch Ness Productions has produced more than 50 soundtracks over the years. Here’s his insight:

‘I’ve offered soundtrack advice for years because it’s so important to the show. The soundtrack provides the timeline for the entire show, and contains the narration, music and sound effects. These provide aural cues for the show’s visuals. Music carries the essential currents of emotion and atmosphere through a show, setting scenes, creating a feeling, opening a listener’s mind to new ideas and forging associations with the story.’

A nice example of how music can enhance one’s enjoyment of a show is the Spitz laser show, *Legends of the Night Sky*: 
**Orion.** The music score is radically different from the norm one hears in planetaria, as much of it sounds like the music on the soundtrack of a *Tom and Jerry* cartoon. Which is fine, because it often reflects the action on the dome by using appropriate musical notes in the same way that cartoons do. Some of the sound effects are therefore familiar to us, so the viewer feels the show producers are in tune with the medium and there's a nice sense of familiarity with what we’re hearing. That’s comforting for your patrons.

A very different type of show using no narration, but simply a musical score, can be quickly put together and used almost as a short introductory piece to your main public show. An example of this appears on a CD that was circulated with the September, 2005 issue of *Planetarian*. The staff at JPL in Pasadena, California have put together a six minute piece consisting of nothing but stunning pictures of Saturn and its moons, taken by Cassini, with a descriptive graphic for each picture and a classical music score. The overall effect is pleasant and soothing, but it works because it doesn’t go on for too long, so remember this if you want to try it yourself.

Jeff Bowen has a fine track record of producing soundtracks and audio special effects for planetaria, so I asked him what advice he would like to give people to help him do his job better.

“Make it sound more…well…red. Yeah, that’s it...”

“Could it sound a little less organic?”

“Faster. but not too fast. just kind of...”


“Darn, this music cue doesn’t last long enough for me to reset the zoom-slew...”

‘These are some of the typical kinds of direction composer and soundtrack designers are used to hearing when working with show producers. Hmmm, maybe there is a way to establish a more meaningful way to communicate ideas with composers. Let’s see...

‘Oh, by the way, the underlined words below are terms you may want to remember.

**Design The Soundtrack In Advance**

‘The best way to produce a meaningful soundtrack, is to create at an early stage a vision for how the music and sound effects (SFX) segment will fit with the narrative/dialogue and visual images. This should begin at the scripting or treatment stage, and a composer should be involved from the treatment phase onwards. The composer can contribute ideas as to how transitions between topics (segments) might be constructed, and how a master theme can be composed with sections extracted for various sub-themes. Ideas for little stingers or short musical ideas can enhance the explanation of difficult subject matter.

‘An example, if I may. Perhaps the scriptwriter is trying to find verbiage that will explain the action of sub-atomic particulate motion. Good luck. But this idea is easily illustrated by a swarm of diffuse, fast moving staccato notes.

‘Early scripting meetings provide good times to discuss whether the soundtrack will lean toward a symphonic structure...
and sound, or a techno, hi-tech feel, or something with a ‘live instrument’ tone. If classical in nature, does the music sound ‘big’, or does it have a small, ensemble character? The same is true for a pop-orientated score. Does it part your hair, or is it on the edge of ethereal? A properly designed soundtrack has room for moments that feature all of these elements, but it is wise to come to a consensus on the overall sound of the show.

**Timings Are Important**

‘Timings should be noted in the script. I cannot stress strongly enough the need to read your script aloud and time it. The best place to do this is in the dome, with perhaps your technician running some of the effects live along with you. You will catch all sorts of timing, flow and pacing problems by taking the time to do this. Timings for visual effects should be tested thoroughly and included in the script. Usually, one of the first questions I have for a producer is, “How long do we need for this video clip?” (or pan dissolve, or whatever). Do not forget the reset time required for special effect and star projection sequences.

**Leave Some Space**

‘Most shows I work on are edited/written too tightly between sections. Composers need space at the front of a topical segment to establish a new feel or idea - a new sub-theme. Even if it is just four seconds of a single note pad and a sound effect. Similarly, you need some time at the end of a section for a nice concluding phrase. You can rarely leave too much time, but can easily leave not enough. When in doubt, I always suggest that producers err on the side of providing more than they think is right. And keep those video fades long on animation and footage.

**Effects As Ideas As Effects**

‘Audio special effects should be discussed in the early stages of script design. Again, early on the composer may have a good idea for a special musical treatment or sound effect that will just knock the socks off an audience. The script author might adjust the verbiage to work better with such an idea. The producer may then direct the verbal talent in a special way to work with the composer’s idea. If the composer is brought in after the script is written, or the talent recorded and edited, it may be too late for the composer’s ideas to work. When I am (rarely) working on well-budgeted productions, we often compose a sketch score up against a rough cut of the director’s video. (Sometimes the director will play this music at the video shoot to help with timings for the talent). The director will then perform the final edit up against the sketch score or a temp piece. This provides an inspiration for the final work. The final edit then comes back to me for my final score, mix and sweetening. The idea is that sometimes the scripting and production style and methodology should be driven by the composer’s ideas.

**Technical Stuff**

‘The producer should discuss the technical aspects of the final mix and presentation systems early in meetings with the composer/designer. Do not wait until the recording has begun.
‘What do you use as source audio? Will the presentation’s audio slave to SMPTE time-code from a video master? Will the soundtrack time-code to the master? Will you present the show in stereo, mono, or multi-channel surround sound? If multi-channel, what are your channel assignments? Do you have a separate sub or dialogue channel? Are there auxiliary speaker systems seats in the pit? If the composer has a good idea of how the presentation system is configured, he/she may have great ideas as to new ways to use these technologies.

‘Another example? A while back, we designed a soundtrack for a site that built a really nice robot who became the ‘live’ show presenter. We suggested that a small sound system be added to the robot so its voice and mechanical sounds emanated from its own body, as opposed to coming from the dome’s audio system. The effect worked marvelously - at least I really liked it. So did all the audiences that I watched attend the show. If the robot had been built before we sat in on the scripting meetings, the opportunity might have been blown.

The Business of Music

‘Always have a contract. Spell out a clear production schedule. It does not work well to use dates for production contracts, as this does not allow for problems the producer may encounter. It is better to word things more like as follows. This is an excerpt from a Bowen Productions contract:

‘Talent auditions begin within five working days of receipt of purchase order and deposit cheque.

Begin to ship audio tapes to__ within 10 working days of receipt of purchase order and deposit.

Begin to record talent as selected by__ within three working days of written approval of talent by__.

Complete edit of talent recordings within eight working days of above mentioned written approval of talent by__ Assemble show elements. Mix show to stereo, called Mix #1. Ship to__ for tests.

__ receives stereo Mix #1. __ will respond with changes to Mix #1 within three working days.

Within five days of receiving changes to Mix #1, Bowen Productions will mix to stereo Mix #2 and ship to__

__ will review Mix #2 and will respond with changes within three working days.

Within five days of written approval of Mix #2, Bowen Productions will mix a Multi Channel Master and ship to__

‘You should also spell out the schedule of payment. This schedule, too, should be based on a ‘day count’ from the composer’s delivery of certain recordings, edits or mixes. Make sure you agree in advance as to the number of revisions the producer is entitled to.

More Business of Music

‘Do you plan to release the show as a show kit? You will want to make this clear up front. Most composers will
grant you a buyout license for your in-house use of the soundtrack, but will request a small royalty fee for each show you might sell. The composer should also grant you a free license for use of sections of the soundtrack for promotional purposes as well.

I Could Go On Forever, But...

‘Well, you get the idea. Discuss...discuss often...and discuss early in the production process. Constructing the above described master production plan can contribute to your program possessing a continuity and cohesiveness, that will keep your message from getting lost in the mix.’
CHAPTER FOUR
EDITING AND POLISHING

Still with us? Good. We’ve not scared you off, then. A lot of ground has been covered, but there’s a bit more to go over, so fill up your mug of coffee for another session...

Ready? Okay, let’s go...

**Cutting To The Bone**

So, you’ve gotten this far, and you’re feeling good about having produced a script that follows the guidelines we have already discussed. But now comes the really hard part: if you have thoroughly researched your topic, included all your favourite pictures, anecdotes, facts and figures etc., that’s great, but hold on - you have far too much material for the available show time. Steel yourself to get rid of...ooh, up to 90% of it.

I’ll pause for a moment while you read that sentence again...

It didn’t sound any better with the second reading, did it? Get used to it. This is where the serious culling starts. And don’t take it lightly, because the best scripts are made and lost in the editing. Just ask Ray Villard:

‘No matter how skilled and talented the writer, every script needs to go through several editing reviews,’ he wrote in *Planetarian*. ‘Many a mediocre show could have been trimmed into shape by unloading the extra weight of excessive verbiage.’

On this point, Bill Gutsch wrote in the original 1983 version of this publication,

‘*As Doris Forror once said, “It is like chopping the arms off your baby. Although the hardest thing for a writer to do, it must be done to keep the show tight.”*’

Carolyn Collins Petersen assures us that,

‘*Every writer needs an editor. No matter how good a writer you think you are (and you probably are one) you need a sanity check, a second pair of eyes that can look over your work and give you new insight. When you’re writing for mass audiences in the planetarium, you can’t afford “word love”, especially if it interferes with the flow of the story and the effectiveness of the presentation.’*

Jim Manning has some observations to put all this into perspective.

‘*In an important sense all of my research ends up in a script,*’ he says, ‘*because a lot of what research is about is giving yourself enough depth and breadth of knowledge in a topic to know what to put in and what to leave out, and to be able to interpret, paraphrase, and summarize information accurately for your audience. In terms of actual facts, numbers, and concepts, perhaps ten percent end up in the script. Over the years, I have learned that what you leave out is just as important - perhaps more - as what you leave in. Spare and vivid wins the day, and never use a fifty-cent word where a twenty-five-center will do.*’
Commenting on the need for general authors to learn the art of strict self-editing, William Zinsser says in his book, *On Writing Well*,

‘Nobody has shown them how much excess or murkiness has crept into their style, and how it obstructs what they are trying to say. If you give me an eight-page article and I tell you to cut it to four, you will howl and say it can’t be done. Then you will go home and do it, and it will be much better. After that comes the hard part: cutting it to three.’

Ouch! Sounds serious. And you know what? It is. But this is an invaluable lesson for turning what you have at this point into tight work that conveys your message, without beating about the bush. George Orwell compared good prose to a window pane: it should be crystal clear.

**Take A Break**

So what’s the first step in this process? Ah, let’s see, now...would you believe, do nothing? Put the script away for up to a couple of weeks. Immerse yourself in other, unrelated work, and try to forget about your literary masterpiece.

After you have brushed up your gardening skills, put up shelves in the kitchen and re-decorated your kid’s bedroom, pull out the script again - or spend 30 minutes trying to find the file on your computer. (You will swear you did not leave it where you find it). The break will have allowed you to get some distance from the script, so now you can look at it reasonably fresh.

Dale Smith tells us of the advantages of such a break:

‘You can more readily spot sections that need work, as your subconscious has had time to work on them. You will often see the solution that you could not find before. You are also now free from the burden of having to create sections yet unwritten, and can focus your full attention on the limited parts that really need work. The freshness of a few days later lets you do the fine-tuning that is simply impossible to perfect while you are still embroiled with the creation from scratch of the first draft. You are much more willing to delete the whole paragraph you spent so much time trying to get right, but that still needs to be removed or rewritten again.’

Carolyn Collins Petersen gives us an Internet example of the above:

‘One of the best pieces of advice about writing I ever read was aimed at posting material on the Internet and avoiding “flame wars”. It goes like this: whenever you are writing a contribution to an online conversation, set it aside in a saved document and go for a walk. Go to the bathroom. Do anything. But don’t post that file until you’ve got a sense of perspective on it.’

The first thought that will cross your furrowed brow as you peruse the script is that while you were being domestic, someone has sneakily re-typed your script - and done a bad job of it, too; surely all those little errors and style problems you are suddenly noticing were not there two weeks ago? Sorry, bad news - they were. Just as you fear they have been breeding, you recall before the break you had been in the habit of working on
the script up to 2 a.m. most nights. Some writers claim to produce their best work in the wee hours of the morning, but for most of us by that time the creative juices have put up the closed sign and refused to come out to play until we have had some sleep. So when your body is telling you it has had enough for the day, listen to it, because it knows what it’s talking about. If you carry on bleary-eyed, you are battling the law of diminishing returns. And you will hate yourself the next day, when you read the mess you had written the night before. It won’t read any better after a stiff drink, either...

**Asking The Tough Questions**

Now that you are settled comfortably with the script, read it slowly. There are many questions that need to be addressed, and they will require honest answers. Don’t be gentle on yourself Remember, others who will need to read it will do so with a critical eye, and will not hesitate to point out its weaknesses. And that is the way it should be.

Let’s start with the basics:

- Overall structure first. Does it have a clear beginning, middle and end? Or does it have what the poet Philip Larkin referred to as, “A beginning, a muddle, and an end”? Sometimes this simple consideration is easy to forget when you can’t see the forest for the trees.

- Does the script meet the objectives you set out before you wrote the first word? Congratulations if it does; you didn’t lose sight of your original vision. If it doesn’t, you probably skimmed over our tips on keeping a script focused, and forgot to read it later. You may have to look again at your original objectives and see if they were realistic in light of the research you have done on the subject. If they were not, judge if there is an opportunity here to re-focus the script from a different angle.

- Allow as many other planetarians as possible the opportunity to study the draft at this point. Ask one of them, or a friend, to read the script aloud. (You could also think about having it read into a tape recorder). Somehow, hearing your words spoken by somebody else mysteriously reveals weaknesses you missed when you read it aloud as you wrote. Squirming in your seat as they read is optional, but listen for areas where sentences sound stilted, or jarring on the ears. You will need to swallow some pride in accepting advice from your peers about the script’s weak points. Remember, it will only strengthen the final product.

Bob Bonadurer says,

*Step out of your shoes. All feedback is positive, no matter how negative. Go beyond other astronomy or science teachers. Have English teachers edit your script. Seek out previous customers you know who can give you good ideas. Even have administrators take a look at it - make them a part of your show development.*

Now you have covered the broad elements of editing. You need to focus deeper and
look at the line by line detail. But don’t assume you have to begin at the start and do it in a linear fashion; you can begin anywhere and do it in blocks. For long scripts especially, this will make the task appear less daunting.

Scriptwriters may not always be consciously aware of this, but there is sometimes a subconscious desire to produce a script that will primarily please the author and others in the profession, rather than the public.

On this point Carolyn Collins Petersen believes,

‘It is absolutely imperative that you know the physical requirements of the theatre you’re writing for. But when it comes to putting words on paper, you have to remember that it’s not the instrument or the dome or the administrators or the city you’re writing for, it’s the people who paid money to get in and are settling down into a seat, gazing expectantly at the dome, and waiting to be entertained, educated, amazed, and awed. They’re who you’re doing it for, and this is true no matter what you’re writing.’

So look critically at everything in the script. Does it belong there, or are you unintentionally showing off to your peers? Bear in mind the words of Blaise Pascal from the 17th century: ‘Anything that is written to please the author is worthless.’

Here are the main points you should look at to decide what revisions are needed:

• Have you stuck to your original purpose and objective in writing the script?

• Does it follow the old adage of telling people what you are going to say, saying it, then, at the show’s conclusion, telling them what you have said?

• Is it lopsided, going into too much detail in some areas at the expense of others?

• Is the pace too fast or too slow, or simply uneven?

• Can it be understood the first time it’s read? The explanations need to be crystal clear, because your audience will only have one opportunity to understand the concepts; they can’t run the program back like a videotape, if they don’t catch on the first time.

• If you’ve written a script that requires an audience to use an electronic interactive response system, have you put too much reliance on it and thus given away more control over the show’s direction than you need to?

• Does it show an understanding of the visual experience?

• Does it have a natural, easy flow? Or is it more like wading through porridge - without a map?

• Are there any instances of unnecessary bias toward your hemisphere?
• Is there a logical progression of ideas? Each has to evolve from the one before, and not rely on the audience knowing something that is not revealed until later in the show.

• Every word should be doing something to advance the sentence so if some are not, introduce them to the Delete key.

• While you are in that mode of thought, trim or remove paragraphs that are not advancing the subject matter. It’s easy to unintentionally stall a script by spending several paragraphs explaining the same thing different ways, or going off on a tangent to discuss less important, but related material.

• Are there any facts and figures, anecdotes, or general information which are still in the script simply because you are attached to them, rather than because they are necessary to tell the story? If so, bite the bullet and take them out. (Then see your dentist).

• Have you inserted a few vital seconds of thinking time for your audience at key moments?

• Does the tone sound relaxed, or is it as stiff as a packet of frozen peas? Remember the earlier advice about converting the formal ‘one’ to the more friendly ‘you’, ‘we’ or ‘us’.

• If you’ve used a science fiction theme, are there any points in the script where the audience may become confused about where the science fiction ends and the science begins?

• Is the tone consistent? For example, there may be only patchy parts of the script where the tone is cheerful or vibrant. If so, the other parts will need livening up.

• Is the overall science content significantly more than the rough guideline of 25% you should be aiming for?

• Are there sweeping statements that need to be supported? If you write, ‘All department store telescopes are junk’, you need to justify that statement.

• Have you used Earth-bound analogies to put across large numbers?

• Are any of the words vague, or have you left in little qualifiers and needlessly long words?

• Are there punctuation or spelling errors, or instances of bad grammar? Even minor ones will make the script unnecessarily difficult for your narrator to read.

• If you’ve used a conversational writing technique, has it crossed the line and become too much like a spoken conversation?

• Is there any padding? Remember the need to keep your script focused.
• If you’ve inserted humour is there too much of it, or is it inappropriate for the intended audience?

• Are all the visuals appropriate? If you have a visual, the suitability of which is marginal, err on the side of caution and leave it out.

• Have you followed all of Jeff Bowen’s advice about how to insert music and sound effects?

• Are there places in the show where one image alone will be on the dome for perhaps 30 seconds or more? If so, that is too long. Try to shorten that paragraph, or find more visuals to give the audience’s eyes some variety.

• Have you double-checked all the facts and figures to make sure they’re up to date?

• Is there a copyright problem with any of the visuals?

• Is it immediately clear which visuals are linked to specific paragraphs? If you are confused, the audience will be, too.

• If you have used characters, do they serve their purpose, helping the audience to understand difficult concepts in a user-friendly way? Or are they patronizing? Have you given too much dialogue to one character at the expense of another? If you have used more than one character, are they all distinct, or could there be confusion at times about the identity of the person speaking?

• Have you made good use of word imagery? It is more of a challenge (and more satisfying) to paint an image with skillful words than to pick out a convenient image. Sometimes words last longer in the memory than pictures. For example, in his book, *Beyond The Blue Horizon*, Dr. E. C. Krupp, Director of Los Angeles’ Griffith Observatory, writes, ‘The sky speaks in celestial objects; the Sun, the Moon, the planets, and the stars are its vocabulary. The sky’s grammar is what these objects do.’ Those words are worth a thousand images.

• Are some concept explanations overdone, repetitive or redundant?

• Is there an unnecessary northern hemisphere bias in the script?

• And last, but by no means least, have you inserted a moment when your audience can simply appreciate the beauty of a star field?

Once your script has been through this crucible of strict, uncompromising editing you should be left with a lean, mean piece of work with about as much fat on it as an Olympic sprinter. But perhaps you are still not Haile Selassie delighted with it. You feel it still has problems, but you are not sure what they are. Okay, take another break from the project for a while, for the reasons stated earlier. It usually does the trick.

And that’s about it for the editing. You’re now ready to tweak the nose of
scriptwriting fear and laugh in its face; you have successfully tip-toed through the minefields of bad writing and scaled the heights of good grammar. Now you have to place your script upon the altar of public acceptance. Only time will tell if your hard work was worthwhile.

Oh, just one final quote. I didn’t want to put this in at the beginning and scare you, but now you have got this far you can put it into perspective. From Jim Manning:

‘To me, one of the great joys of planetarium scriptwriting is having it over with. Scriptwriting is hard. That, and passing a kidney stone, are probably the closest I’ll ever come to childbirth. Some days you beat the hell out of your muse, and some days your muse beats the hell out of you. But it does get easier with practice, age, and perhaps drink. And so long as you’re never completely satisfied (which means you can still get better), it can be immensely satisfying, both in the process and the result.’

I agree, absotively and posilutely.
CHAPTER FIVE
WRITING FOR SCHOOLCHILDREN

A staple of many domes is the school show. When designing scripts for these types of shows, there are special considerations you have to be aware of, in light of the young age of your audience.

David Dundee finds that,

‘Using a plot is a big asset in writing shows for young people (ages up to eight or nine). The plot keeps their attention, and they are more engaged in learning if they can easily follow along with the show. High school students in general regard a show with a plot beneath them and childish, which is one of the many reasons why a high school audience is the toughest to write for.’

Children love to be active participants in the learning process, so watch for the many opportunities to give pupils handouts they can refer to either before, during or after the show. In Dave DeRemer’s Solar System Adventure Tour, before the show begins children are handed data cards which they have to slot into a make-believe ‘computer’ at odd intervals throughout the show, so that data about various planets can appear on the dome.

April Whitt advises,

‘Specialized vocabulary can be a stumbling block. Children tend to have higher-level “listening vocabularies” than “reading vocabularies”, and using the specialized vocabulary followed by an explanation can be helpful for the whole audience. The kids learn something new, and the adults get positive reinforcement for knowing something already.’

On this point my compatriot, Teresa Grafton, finds that,

‘In astronomy shows we continually have to try to communicate the size of the Universe and the distance between objects. It makes little sense to talk in terms of millions and billions - of light years, miles, kilometers or whatever. Such numbers are meaningless, particularly to young children.

‘As an example: How far away is the Moon, or the planets of the solar system? Light travels faster than anything else, so ask children to clap their hands on the count of three. Then tell them that a beam of light can travel round the Earth about seven times in the time it took them to clap their hands. This is about the same as the distance between Earth and the Moon. So the Moon is about a handclap away as light travels, which is about one second. The Sun is a lot further away from us. It takes just over eight minutes for our star’s light to reach us.

‘As another way of illustrating the idea of distances in space, ask children to imagine what would it be like to have a telephone conversation with a friend somewhere else in the solar system?

‘Imagine they are talking to (or texting) someone on the Moon – messages would take about one second to travel there and another for a reply to travel back. If their
friend was on Mars the delay each way could be up to 21 minutes (or as little as three minutes – depending on where Mars is in its orbit).

‘From far away Pluto you would be looking at a delay of some 5 hours each way – as for someone in a spaceship somewhere in the neighbourhood of the nearer stars (after the Sun) we are talking about delays lasting years.

‘To help children appreciate how far away the stars are, try relating the time taken for light to travel to us from particular locations in space to historical events on Earth – e.g., the Andromeda Galaxy is the furthest object we can see with our own eyes. It is around 2½ million light years away which means that light we see it by now, started its journey through space towards us 2½ million light years ago, before there were people like us living on Earth.

‘And the light with which we see a constellation like the Seven Sisters, or Pleiades, started out around 400 years ago, when Elizabeth I was on the English throne and Shakespeare was writing plays, etc.

‘Black holes can be described as gigantic plugholes, swallowing everything that comes near them, including light. Remind children what it feels like to put their toes anywhere near one in the bath.’

Kathy Michaels, the retired Director of Buffalo’s Maryvale Schools Planetarium, recalls that one of her most memorable moments in a planetarium was seeing a show in which the young children were encouraged to wave and cry, “Goodbye, Saturn” as the planet disappeared from view on the dome. (Ahh). In her own presentations, Kathy has her students snap their fingers and the stars magically appear. She says that participation is the key to a successful planetarium program for kids.

Try not to place too much reliance on the use of a pointer to highlight stars, planets or other images on the dome with a young audience; a dancing red dot can be an easy distraction for them. And watch carefully the show’s length; pre-school and kindergarten programs should be about 20 minutes long, followed by a ‘live’ section.

In one of her Focus on Education columns in Planetarian, Jeanne Bishop wrote:

‘If we tell very young students that the Earth is a spaceship, the children may conjure up ideas of the Earth being fired, having fuel, etc. We need to take the time to point out the non-transferable elements of the analogy. Otherwise, individuals may take away wrong ideas about the astronomical phenomenon.

‘Also, our familiarity with a particular concept makes us careless in the selection of analogies appropriate for a particular age level or group with a particular history...to speak to students in the lower grades of compressing time into a cosmic calendar extending back to the Big Bang or to the formation of the Earth, pointing out the months and hours in which different events occurred, is meaningless. Children up to the age of about seven think of all events as long ago, which happened before their grandparents were
born. Better by far to discuss times of day with young children, and in this connection apply analogies such as “after breakfast”, “time you come to school”, “lunchtime” etc.’

In the original version of this publication the late Fran Biddy suggested,

‘If you write for pre-schoolers, work with their teachers. They know this special age group the best. The major concepts you will probably be asked to present are shapes, colours, size relationships (larger/smaller) and distance relationships (nearer/farther).’

Children of a particularly young age respond well to lovable characters guiding them through a show. To give you a few examples, Spitz have produced two laser shows in their marvelous Legends of the Night Sky series, the first one about the legend of Perseus and the second about Orion. In each show an owl, narrated with a kindly old grandfather voice, guides the kids through the show, assisted by a cute little mouse called Socrates. And in Sunshine, a show by the National Space Centre in Leicester, England, the Sun itself is the character explaining to the kids a few of the basics of what it does every day. The show’s animators have given the Sun eyes, a nose and a mouth and so it’s like watching a disembodied head talking to you. The narrator hits the bulls-eye with following his brief, as he puts into his marvelous delivery the Father Christmas-like exaggerated happiness that really young kids love. There’s a particularly good moment in the show when the Sun encourages the kids to blow at him to make him disappear and the stars come out.

After the kids have tried this, the Sun rolls around laughing and says, “You didn’t think it would be that easy, did you?” It’s a really cute moment, so if you get a chance to see the show you’ll learn some valuable things about writing for young kids.

Finally, in the Clark Planetarium’s (Salt Lake City) show, The Secret of the Cardboard Rocket, the narrator is an astronomy book that leaps to life in the shape of a white-haired professor’s head. It bobs around inside the cardboard spaceship explaining the sights of the solar system to the two kids onboard.
CHAPTER SIX
WRITING FOR PORTABLES

There was a time when 99% of planetariums were of the fixed variety. But today, hundreds of portable, inflatable domes are found all over the world. Planetarians have to adopt a rather different mindset to work effectively inside them, and writing shows is no exception.

Susan Reynolds-Button has presented literally thousands of shows in portables, and is tireless in her efforts to help others in the profession. I began by asking her, “What are the benefits and drawbacks for writers who want to produce shows for portables, compared to larger, fixed domes?”

“You can produce passive shows using many special effects, music and even taped and synchronized scripts in a portable, if one wishes,” she told me. “The drawbacks for this type of show in a portable dome are the lack of space, the need for miniaturized special effects equipment, and the need to use less sophisticated (so far) special effects and the lack of comfortable seats. However, the forte of the mini-dome/portable dome is the rapport and intimacy you can achieve with audiences while having them participate in the lesson/show. Hands-on and minds-on experiences keep the participants awake and moving around, to record and analyze information. Special effects can be used judiciously, to educate as well as entertain students and create an atmosphere. Music is especially effective.”

Commenting on whether certain types of program work better than others in portables, Susan states,

“I feel that interactive lessons/shows work best in portable domes. The audiences’ minds can be stimulated and disciplined to observe everything closely, examine sequences of events, compare and contrast objects and events observed, make predictions and justify them, and then adjust conclusions based on recorded observations.”

Susan goes on to describe the stages she goes through in developing a show for a portable.

“I am sure many of these steps are similar to the steps taken by any planetarian,” she says. ‘My focus, however, is on education and participatory techniques:

• Target the age/grade level and then pick a topic that is exciting and aligns with the school, state or national standards/curriculum.

• Analyze what you can do in a planetarium that cannot be duplicated in the classroom. Use that as another purpose to develop the script/lesson.

• Define and write a list of objectives and important vocabulary. Keep them simple and precise.

• Research, design and list age-appropriate activities that can be done in the planetarium, to promote your students’ discoveries that lead to acquisition of the above objectives."
• Develop a time-line for all questions/activities, and choose any special effects that will fit into the length of lesson that you desire. Most of my lessons are designed to fit into 30 to 40 minute blocks of time.

• Make an outline or storyboard of the final sequence of events and demonstrations. Write a full script, word for word, even if you never use that exact script. This process clarifies your thoughts and helps you practice the lesson. I never follow my script word for word. I like flexibility because each class is unique and can drive the lesson in a slightly different direction, depending on student questions and abilities. I make sure I have a full bag of tricks to fall back on and, if it is a new lesson, I keep an outline and a list of important related facts on top of my stand as a reference to keep me on track. The same topic may be presented in many different ways. This is dependent on the class attitudes and experiences.

• Research, design, collect and print pre-and post-planetarium visit activities, or comments to be distributed to the teachers and/or participants.

• Design and print lesson evaluation sheets for the teachers and/or participants.

• Collect materials needed for the show/lesson. Design a way to carry these items in the most compact container you can find. Save your back by keeping the weight down.

• Remember that less is more. Do not try to cram a list of facts into the lesson. It is better to aim for student understanding and mastering of one to four concepts in 30 minutes. They can memorize facts in the classroom.

• Limit the number of special effects to maintain their dramatic impact.

• Remember that the steps and process of discovery are extremely important and fun for the student. Teaching people to focus, observe, and record observations accurately is a challenge. Sound bites are too easy and much less entertaining!

• Ask people to verbalize thoughts as much as possible. People remember better if they have thought through and learned a concept well enough to verbalize it. You can also keep tabs on what is being understood, and know when to challenge misconceptions in this way.

• Keep the humour age-appropriate and positive. Nothing is more deadly than adult humour used inappropriately. Negative humour and sarcasm set a tone that is not conducive to learning, and promotes misbehavior.

Paul Krupinski owns and directs a roving mobile planetarium in Buffalo, New York. Here he tells us of his approach:
‘After years of experience under the dome, a show presenter will know whether to ask for questions during a show. Pre-kindergarten, kindergarten and some first grade students (five to six year-olds) will, in most cases, give you stories when you ask for questions during or at the end of your program. Remember that is not the case in all shows, however; in the majority of my experiences four-, five-, and six year-olds love to tell you stories about their families, how they went camping last summer and so on. If you fall into this trap, you as a planetarian have an opportunity to teach these young minds the difference between a story and a real question.

‘Further, 13- and 14 year-olds (grades eight or nine) under the planetarium dome can be a challenge as well. Most who work with teenagers know they are full of energy, to say the least. A presenter must treat them with respect, and for the most part teens will treat you the same. If you as a planetarian can hook them in, this age group can be rewarding with their fascination and excellent questions about astronomical topics.

‘Keep it simple. Do not get caught up in too many hi-tech gadgets in your planetarium. If you feel you need the arms of an octopus in order to juggle all the devices you would like to use, cut back. Even in a major planetarium setting, showing our audience the stars under both city/suburb conditions, then the stars and Milky Way Galaxy (most students never have seen the real one) under a pristine jet black sky is a must. I hope you are making the most of your star machine and not wowing your audience just with special effects. Do not get me wrong, an occasional special effect projector can indeed enhance a presentation or clarify a difficult abstract astronomical concept, but do not overdo it. Remember, we can do something in a planetarium that no other medium can do: reproduce the night sky in a truly awesome way, and at the same time inspire minds to know more about the Universe in which they live.

‘Interaction is a must. In my opinion we should not herd our students in and out of the planetarium like cattle. Are your school audiences simply listening to a narrated show for an hour? Asking questions (at an appropriate grade level) about the topic at hand works well, whether in a small or large dome setting. Get a feel for what your audience knows by asking a few warm-up questions. If your topic is Solar System for grade three, start by asking how many planets are in our family of planets. Then ask a more difficult question like, ‘How many planets have no moons? Can you name them?’ Again, this will give you some notion whether they have a handle on the material. Let the students participate during the show. I have no problem getting students of any grade to open up to the topic at hand. This makes the show more enjoyable for them because they have direct participation during their visit. At the end of the program always allow at least five minutes for general questions about the show or your planetarium facility. Elementary or intermediate student (grades three to six) are curious and ask some of the best
thought-provoking questions. I try never to squelch their enthusiasm.

‘Know your material and never underestimate your audience. I personally find it difficult to keep up with all the new discoveries and current missions in the world of astronomy and space science. Knowledge is growing at an exponential rate and we must keep up as best we can. Read, read, and may I say again, read. Astronomy and Sky & Telescope magazines are outstanding monthly resources, and if you are on the World Wide Web NASA has great Web pages with news about current discoveries and missions posted almost instantly.

‘As planetarians, we must be accurate in our facts and astronomical information presented during live or canned programs. Remember, our students are like sponges, soaking up everything we say. Know your astronomy and be ready for any possible question or hypothetical situation. Be ready for questions about aliens (I wish I had $1.00 for every time a student asked me if aliens were real) and have a logical answer prepared. I always say the research astronomers on the top of mountains have never published a professional article about seeing little green men landing their spaceships. Try reminding the students that aliens are only pretend (to most people) and are seen only in movies and on television. If you do not have a good answer at that point do not be afraid to say, ‘I will get back to you with an answer after I do a little research.’ Make sure, however, you get back to the teacher with the answer or correspond directly to the student with a letter.

‘Remember, we have the greatest job in the world.’

He’s right, of course. It’s what keeps us going through the tough times…
CHAPTER SEVEN

WRITING FOR PEOPLE WITH DISABILITIES

Scriptwriting is not always about scripting the spoken word. Sometimes planetarians are faced with the challenge of producing shows which are accessible to patrons with disabilities.

If you have casually thought about writing scripts for a visually- or hearing-disabled audience, but have been frightened off by the ostensible difficulties of communicating effectively with them, you may be surprised to learn of some technological advances in recent years which help writers. So, to give you a heads-up on this aspect of scriptwriting I have enlisted the assistance of Noreen Grice from Boston’s Charles Hayden Planetarium. She has a fine track record of using aids which help people with disabilities enjoy shows in her dome. Here she describes her setup:

‘We make our shows accessible to as many disabilities as possible, using as many resources as possible. This is important because people who have disabilities are an important part of society and as we all age, there are more opportunities for all of us to benefit from increased access.

‘The Charles Hayden Planetarium houses a modular, closed-captioning system, an assistive listening system, a sign-language interpreter booth (for hearing-impaired visitors), removable seats, and tactile astronomy illustrations to accompany planetarium shows for visually-impaired visitors.

‘Captioning is displayed on modular vacuum fluorescent display (VFD) monitors which affix to posts near certain seats. Stickers on the seats identify these areas as equipped for captioning. With brief notice (even one minute before show time) we can quickly install a unit for the visitor. We have eight units which can serve up to 30 individuals. Two units are located near wheelchair spaces.

‘The monitors are wired under the floor to the back control room and to a PC. The computer also receives a SMPTE time code from the SPICE system. Special software (developed from the Access Group at WGBH access.wgbh.org) and a disk with the text of the shows are loaded onto the computer. When the show starts and SMPTE code begins, the unit displays the recorded text to the visitors in the theatre. Captioning can only be seen by people sitting behind those units. (At this time, the units can only display pre-recorded text, rather than narration from our live star shows. I am hopeful that improvements in voice recognition software will solve this problem in the near future. For the interim, companies such as Caption First Inc., offer on-demand real-time captioning which allow live programs and lectures to be captioned and displayed over the internet on portable monitors or screens.)

‘The words that appear on our planetarium captioning units are the exact words spoken in the narration. If a song is part of the show, the words to the
song are also displayed on the unit along with a musical note symbol. Since we usually tweak our shows up to two weeks after they open to the public, captioning may not be available during the first month.

‘The captioning system has also become a resource for an unexpected audience. We have noticed that visitors whose native language is not English and who are not hearing-impaired, have requested captioning. In talking with many of these individuals, they have told me they can understand English better if they can see the words as they are spoken.

‘Whenever possible, we try to include non-obtrusive “identifiers” on the dome. For example, instead of just showing a montage of the planets, we include labels identifying each planet. And if we are presenting a program that has a live update at the end, for example on the Cassini mission, we will use PowerPoint to create a quick slideshow of late-breaking news and add labels to caption each image to make it accessible.

‘In addition to captioning for visitors who are deaf, we offer an assistive listening system that allows hearing-impaired visitors the ability to adjust the volume to their individual needs. A transmitter above the SPICE rack sends an FM signal into the theatre, where it is received by a special headset. If a visitor uses a hearing aid, we have a device called a telecoil loop conductor that plugs into the assistive listening system and will help amplify the signal to their hearing aid.

‘We also have available a portable, three-sided booth for sign-language interpreters. The interpreter sits inside the booth with the open side facing the audience. A gooseneck lamp, with a 10-watt red bulb, provides illumination for the interpreter. Although we no longer offer sign-language interpretation, the booth is always available in case a school group has a sign-language interpreter, who needs to interpret for those students.

‘Planetarium shows are very visual but can be made more accessible to people who are blind. Before a show opens to the public, I talk with the production staff and ask for a list of the four or five strongest visuals from the show. I then reproduce those visuals into line drawings with a graphics program like Adobe PhotoShop or Illustrator. Once the images are created, I use a regular photocopy machine to transfer the image onto thermal expansion paper (called Swell Form paper). When the Swell Form page is run through a Swell Form machine, anything that is black on the paper will come out of the machine raised up. The cost of the paper is about one dollar per sheet. Finally, I use a Braille slate and stylus or a Perkins Brailler to add in Braille labels for each image. (I took an intensive Braille Communications class from the Perkins School for the Blind.)

‘If you don’t have access to tactile images, you can still make a planetarium more accessible to people who are blind or visually impaired by speaking pictorially. Imagine yourself sitting in a darkened room and hearing a narrator say, “So here is the Big Dinner. and that’s the
“North Star.” Now imagine the narrator says instead, “I am going to show you how to find the Big Dipper. The Big Dipper pattern is made of seven stars and resembles the outline of a spoon with a curved handle. Four stars trace the open spoon part, and three stars trace out the curved handle.” Which version helped you to imagine the Big Dipper?

‘Sometimes you’ll encounter multiple challenges. Several years ago, I recall modifying a show for a special group of students from the Perkins School for the Blind. We were requested to give a program for students who had multiple disabilities, in some cases both visual and hearing impairments. A co-worker and I learned to say, among other things, “Hello”, “Welcome to the planetarium”, and, “This is the star projector” in sign language. We brought out as many models, meteorites and hands-on items as possible. We presented a modified version of our musical pre-school show, Song of the Skies, and signed the songs. I recall that one student did not appear attentive at all. However, two days later I received a letter from the teacher. Inside the envelope was an extremely detailed floor plan of the planetarium, including the position of rows and the correct number of seats. This autistic student was attentive, but in a different way than I expected.

‘People who have disabilities are just regular people, who might have to touch something or hear a description or see a caption to understand. If you begin writing your scripts with these people in mind, you will discover that your shows become more accessible to everyone!’
APPENDIX A

ONLINE RESOURCES FOR WRITERS

For the general collection and dissemination of information the Internet has become so dominant and all-encompassing in the last decade, that all we can do here is give you a few jumping off points. If you use the Web regularly, you may have already come across by accident over the years many good sources for helping with the writing of scripts, but here are some that you should find useful in getting you started:

General Writing Reference Search
http://www.wga.org/tools/WGAlinks.html

Science Search Engine
http://www.scirius.com/srsapp/

General Writing Guidance
www.inkspot.com/~ohi/inkspot/

Science Jokes
http://www.xs4all.nl/~jcdverha/scijokes/

Writing Forum
http://www.mw-land.com/

Copyright Free Images
http://gimp-savvy.com/PHOTO-ARCHIVE/

Correct English Usage
http://alt-usage-english.org/

Online Writers Classes
http://www.writers.com/

Copyright Advice
www.benedict.com/

Music in the public domain
www.pdinfo.com/
APPENDIX B
IMAGES AND MUSIC RESOURCES

MUSIC
Alternate Records, P0 Box 470993, San Francisco, California, 94147, USA. Tel. 415 440 3449. Alternate@earthlink.net

Bowen Technovation, 748 East Bates Street, Suite 300, Indianapolis, Indiana, 46202, USA. Tel. 317 536 1283. http://www.bowentechnovation.com

Castle Lane Productions, 2903 Madison Terrace, Fair Lawn, New Jersey, 07410, USA. Tel. 201 703 5515. www.afilm.com/4/02/57/

Loch Ness Productions, P0 Box 1159, Groton, Massachusetts, USA. Tel. 978 448 3666. http://www.lochness.com

Orbian Music, P0 Box 45131, Westlake, Ohio, 44145, USA. Tel. 440-835-3743. www.lochness.com/dwane.html

PLANETARIUM SHOWS AND ASTRONOMY IMAGES

Adler Planetarium, 1300 South Lake Shore Drive, Chicago, Illinois, 60605, USA. Tel. 312 322 0301 SHOWKITS@ADLERNET.ORG

Astronomical Society of the Pacific, 390 Ashton Avenue, San Francisco, California, USA, 94112. Tel. 415 337 1100, www.astrosociety.org


Autumnstar, 9789 South Autumnwood Place, Highlands Ranch, Colorado, 80126, USA. Tel. 303 470 9133. TWKartis@aol.com

Calgary Science Centre, P.O. Box 2100, Station M, #73, Calgary, Alberta, T2P 2M5, Canada. Tel. 403 268-8300 www.calgaryscience.ca

Clark Planetarium, 110 South 400 West, Salt Lake City, Utah 84101, USA. Tel. 801 456 4949. www.clarkplanetarium.org

Detroit Science Center, 5020 John R Street, Detroit, Michigan, 48202, USA. Tel. 313 577 8400 www.detroitsciencecenter.org

Evans & Sutherland, 600 Komas Drive, Salt Lake City, Utah, 84108, USA. Tel. 801 588 7500. www.es.com

Finley-Holiday Film Corporation, 12607 East Philadelphia Street, Whittier, California, 90601, USA. Tel. 562 945 3325. finleyholiday@finley–holiday.com

Loch Ness Productions, P0 Box 1159, Groton, Massachusetts, 01450, USA. Tel. 978 448 3666. http://www.lochness.com

Mirage 3D, The Hague, The Netherlands. Tel. 070 3457500, info@mirage3D.nl

MMI Corporation, 2950 Wyman Parkway, P0 Box 19907, Baltimore, Maryland, 21211, USA. Tel. 410 366 1222. mail@mmicorporation.com
National Space Centre, Exploration Drive, Leicester, LE4 5NS, England. Tel. 0116 261 0261. info@spacecentre.co.uk

Sky-Skan, 51 Lake Street, Nashua, New Hampshire, 03060, USA. Tel. 603 880 8500, office@skyskan.com

Spitz Creative Media, US Route 1, Chadds Ford, Pennsylvania, 19317, USA. Tel. 610 459 5200, www.spitzinc.com
APPENDIX C

GREAT LAKES PLANETARIUM ASSOCIATION PUBLICATIONS

For details of other GLPA publications of the type that this CD originated from, contact: Geoffrey Holt, James Madison Memorial High School Planetarium, 201 South Gammon Road, Madison, Wisconsin, 53717, USA.
gholt@madison.k12.wi.us

For GLPA slides and video clips, contact David Leake, Staerkel Planetarium, Parkland College, 2400 West Bradley Avenue, Champaign, Illinois, 61821, USA
Tel. 217 351 2567
dleake@parkland.edu
APPENDIX D

FURTHER READING


*Scriptorium* column in the International Planetarium Society’s journal, *Planetarian*. For back copies contact IPS Treasurer and Membership Chair, Shawn Laatsch, PO Box 1812, Greenville, North Carolina, 27835, USA. 102424.1032@compuserve.com