

Beauty In Numbers!

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“No number tallies nature up,” writes Ralph Waldo Emerson, the Oracle of Concord. Yet we recently discovered that we have in our midst, in our little town of Chatham, the father of digital photography, Michael Tompsett. Moreover, he is the husband of Margaret, one of the beloved members of this congregation, and she was the subject of the world’s first digital photograph, in 1973. Here it is, next to a film photograph of her, as it appears on the cover of a magazine of the time. Our own digital cover girl. Who knew?

And we know now because Michael is getting recognition for his work almost half-century later. One of you phoned me when I was on vacation in St. Croix in February, brimming with excitement: “turn on the BBC right now, Michael Tompsett is getting an award from the Queen of England.” We all like to bask in someone else’s reflected glory, but Margaret is our member, so the most that I can claim in relation to Michael is the relation of parishioner-in-law, but we still want to honor his achievement, and as photographic subject, she was part of it.

Since 1973, digital photography has just about driven out film photography; it’s entrenched in our lives. It leads us to many of our most profound experiences of beauty. But it’s also just numbers.

My son in England has a wonderful eye, and he just posted a picture of my darling grandson playing in some sort of tunnel or tube at a playground in Oxfordshire, which makes a kind of white aurora around his face and draws the viewer’s attention into that face. To look at that photo is a moving experience, at least for the granddad. But if I sent you that photo, what I would be sending is a computer file which consists of numbers. If you printed it out as numbers, it would take up several pages, and since the numbers are written in base-two, binary code, it would just be a long and random-seeming string of ones and zeroes. You couldn’t find his cute face or the pleasing composition of the piece anywhere in that pile.

We’ve come a long way in my lifetime in crunching numbers. One of my earliest memories is of going downtown to my father’s law offices in the early 1950s – I remember the feel of the adding machines. Adding machines in those days were large things which stood on their own stands and rolled around. They had an array of numbers; each vertical row was one decimal place and the horizontal rows contained the digits 0 to 9. Once you had entered a number, you pulled the big black lever on the side and the machine registered the number with a satisfying ka-chunk!

This was an advance on the abacus as a counting device. And they got smaller. Think about other counting devices. I once visited an island community in Maine where there was a person who met the ferry with a little clicker in his hand, so they could keep track of how many people got off the boat and how many got back on. People taking inventory in a grocery store used to use those hand clickers to count the number of shampoo bottles left on the shelf. Now I think they do it with a bar-code reader.

But think about someone going over an image with a clicker, and counting each fleck of

light or dark and its location in relation to the other flecks. It would take all day to digitize even a small picture using a hand clicker and would you lose something of the picture's soul in doing so?

Last week I talked about how the Enlightenment was under attack. This week I'll give you another huge societal trend to worry about – the digitization of everything.

The Latin root of the word “digit” meant our fingers and toes, but the word in English came to mean the numbers under ten we count with fingers and toes. The most common system we have of writing numbers comes from the Arabs, and assigns one numeral for each power of ten. But this decimal system, base ten, is not the only one, and electronic data processing for a long time has preferred a binary system, where each place is powers of two, and there are only two numerals, one and zero. This is handy in electronic calculating because a tiny piece of matter in a chip can have two states of charge, either on or off, and that can represent the ones and zeroes in a binary number.

Digitizing is based on this technology, it means converting any information – written text, audio track, photographs, video – to numbers in order to record it, store it, send it to someone else or publish it.

Here in 2017, we are deep in the digital age, and the devices which store and manipulate most information used to be called computers. Because originally we thought of them as descendants from the mechanical adding machine and the abacus. They are still dealing with numbers, and we have made more and more of the things that count in our lives into numbers so they can be fed into the data-crunching devices we call computers. Unless we call them smartphones. Or automobiles. Or Smart TV sets.

Indeed, we have come to realize that there are bits of computers stored in so many of the devices we use. In popular sci-fi imagination, these will all one day attain consciousness and rise up against us. Your toaster oven, your programmable thermostat, your Roomba will one day report you to the FBI or murder you in your sleep.

That paranoid thought is part of a trend. The digital revolution has spawned its own counter-revolutions. In the world of audiophiles, most of the music produced in the last two decades has been stored on CD or directly in digital databases, but there are some purists who insist that digital sound is not as good as the best analog sound. The record player is making a comeback, and some stores are selling music on vinyl.

And in photography, most of the world has converted to digital cameras, but there are a few holdouts who still use film. I have talked to a bunch of good photographers for this sermon, and almost all of them say you can do more good photography with digital than you can with film.

It was not always thus. The picture of Margaret which Michael took, the first digital photograph in the world, is quite fuzzy. On the magazine cover, it is paired with a film picture of Margaret which is much clearer. The fuzziness has its own beauty, of course. I had a friend post on Facebook the other day that women should beware of high-definition cameras because they emphasize every wrinkle and blemish. When I told this to a good photographer here in the Meeting House, she replied, well, you can now manipulate the photograph in the computer to make it as fuzzy as you want. Effectively you can make it look like you were shooting through a scrim.

Michael Tompsett got his patents for the digital camera and did most of his technical work while he was an engineer at Bell Labs in New Jersey. Many technical advances came out of there. After all, historically the Bell system operated a lot of telephone systems, and the better they could get those systems to work, the more money they made.

A big part of the concern with any communications equipment is noise; how much of what you hear when you pick up your telephone is noise and how much is the voice of the person you're calling? One of the first things most of us noticed when we listened to our first digital recordings was that the noise was gone. You didn't hear the pop and scrape of the needle, all you heard was the music.

If you're interested, you can go online and read Michael Tompsett's patent application for use of the Charged Couple Device in digital imaging, and it appears that he was concerned with the visual equivalent of noise, that is the spillover of light from one pixel to another. That's why he was interested in the Charged Couple Device, or CCD, a type of semiconductor chip which received charges and moved them along in an orderly way. I am no engineer, but as I read about the CCD, I have come to think of it as like an ice cube tray when you fill it from the tap. You fill one cube, and then that cube spills over into the next and fills that one and so on. The CCD was first cousin to a device called a Bucket Brigade device, and I like that name because it suggests a lot of teamwork in moving charges along a grid to a place where they can be converted into numbers and stored.

Michael didn't invent the CCD, but he was the first to realize its potential for digitizing images.

I gather that he and other scientists building on his work eventually brought the noise level down, or, to put it another way, increased the resolution of the digital image.

How much noise is there in your life? Is there any signal at all. We are trying to get out the good news about this Meeting House, are we putting out a clear signal or is it all noise? Does beauty consist in the noise or in the signal or both?

Specifically how do we feel about this digital revolution in photography? Are there any downsides? Well, yes, there is the proliferation of cameras and images. You can't go to any public event without encountering a sea of smartphones recording it. Big Brother government has surveillance cameras everywhere, and each corporation has their own. Very little happens off camera nowadays.

Then there is the compulsion some people have to take a picture of a fine meal and send it to their friends around the world. On the darker side, there is revenge porn, where an ex-spouse or lover sends intimate pictures of you to your boss or mother.

But these abuses are just the result of the fact that taking photos has become so easy and cheap. Can this really be said to be a downside of digital photography itself?

I sense a more serious drawback in Emerson's claim, "no number tallies nature up." Emerson embraced science, but he also held nature up as a mystical entity which was not fully accounted for by science.

But I think this phrase is unfair to science and to nature. A digital photograph, like a film photograph, doesn't *try* to capture all of nature. It tries to capture the visual appearance of one bit of nature at one point in time.

There is a beautiful picture in the Fleck room currently by Geri Appleyard showing a Baltimore Oriole on a tree branch. She didn't set out to tell you all you need to know about the Baltimore Oriole, its migration and mating habits, how it rears its young. She only set out to grab what it looked like in that moment.

Science would be nothing without numbers; one description of science is the attempt to quantify nature. After Galileo removed the earth from the center of the universe, Newton demonstrated that the planets were not moved by God or gods, but rather obeyed impersonal laws which could be described mathematically. This ushered in the Enlightenment, and relieved God of a big part of the job which had been assigned to him in the theologies of earlier epochs.

Number is not missing from nature, number is interwoven in nature and in our appreciation of nature, in our experience of beauty. On the front of the order of service is a diagram of the chambered nautilus, surely one of the most beautiful designs in nature, showing its proportion in the Fibonacci number series. Each new number after the second in the Fibonacci series is generated by adding the previous two numbers, so its 1, 2, 3, 5, 8, 13 ... If this series is conceded as proportions, it is found frequently in nature and generates Golden Ratios pleasing to the eye in buildings such as the Parthenon in Athens.

The camera on my smartphone can project lines on the screen before you take a picture, dividing it into thirds. Why? To help you frame the subject before you take the picture, because the intersection of those lines is where the eye is naturally drawn in looking at a picture.

This is not number "tallying" nature up, Mr. Emerson. There is no profit or loss figures which have to be totaled for Nature, there is no accounting that has to be done for Nature's shareholders and investors. Maybe there should be, but what we're talking about here is numbers in nature.

More basically, when we are talking about computers and data, we're talking about numbers as a means of recording audio signals and visual arrays in nature, and of storing and using those recordings.

Sure, I have a nostalgia for the old days, the old darkrooms. I remember the smell of the stop bath, the thrill of watching an image emerge on paper in the developer. I had a lot of fun with photography.

But that was then. Today I'm not about to invest thousands of dollars in film cameras or any stand-alone cameras at all. The camera on my smartphone is all I expect to need, and for that I have to thank Dr. Tompsett.

And we need to get out of our digital devices and see nature from time to time. Leave them in your pocket or at home and take a walk in the woods. Be fully in the present moment and resist the urge to record it. Go out and see the sunset tonight and once it is over, let it go.

There is the danger of beauty overload. We have many more pictures available to our attention than we have time or attention to pay.

"No number tallies nature up." Yes Waldo, you might be right about that, but the technology of making pictures out of numbers has opened a new world. In fact, I think the problem with this line is more with the word nature than the word number. Nature, from Rousseau through Emerson and Thoreau and down to John Muir, Henry Beston, is supposed to be that part of the world unaffected by human activity. The ultimate Other we encounter, that which is not human. As heirs of the romantics, we have been conditioned to regard as good that

which we see as natural as opposed to artificial. But the great paradox is that the word nature is itself an artifice. It is a category of human thinking. The chickadee lighting on my feeder doesn't stop to think, "wait a minute, I'm supposed to be part of nature, why am I taking this seed from this human?" The chickadee takes the seed wherever she can find it, only keeping an eye out for any dangers that may lurk around the feeder.

Yesterday two digital pictures popped up on Facebook which made me laugh out loud. Someone had photoshopped a pair of human hands onto the front paws of a big fluffy cat. It was so weird I had to repost it, and most reactions from my family and friends were that it was so gross they couldn't look at it, but couldn't get it out of their minds once they had. It was so unnatural, its emotional impact came from its messing with our natural categories.

I'm confident that no real cats or humans were harmed in the making of that Internet meme. Indeed, our ethical obligation to the natural world in the present age is to do all we can to keep from destroying it. In that endeavor, we have to talk to one another, and we talk with all the language at our command. Numbers are part of that language. We can manage our natural resources through tallying up numbers like the size of the wolf population in a national park or the number of trees dying from blight. But we can also share information through photographs, digitized or not. And don't forget other digital imaging used in science such as x-rays, CAT scans, MRIs, the Hubble telescope.

Number is not the enemy of nature, it is a tool of our understanding of nature, and it is integral to our appreciation of beauty in nature.

We understand that beauty is in the eye of the beholder, and that the quest for beauty is one of the strongest enterprises of the heart. It is the way we make love to our world. It in no way diminishes our appreciation of beauty for images to be generated by numbers, though it may numb us when they are generated in such great quantity. Thank you to both Doctors Tompsett for the door you have opened for humanity.
Amen.