



## The Scientific Method

By JOHN BICKART, Ph.D. | **Science Education and Spiritual Transformation** / Chapter 10: The Scientific Method

### The Townspeople

I like to think that I am open minded and fair. I like to think that I'm honest. A good man. Good to my fellow beings. Not biased. I see myself as a walking version of



**The Scientific Method** - willing to be proven right or wrong, based on evidence. I'm a regular guy in town - one of the townspeople.

It's not that I think I don't need any improvement. I don't think that I'm perfect. It's just that I picture myself as a pretty good, pretty decent, honest sort of guy. Sure, we all could use some transformation to the next version of ourselves. Sure, we all could stand a little personal growth and development. And if you think about it, don't a lot of us feel this way?

So, I came up with this lesson about the points of views of **the townspeople**. I have taught it for about half a century. It is openly and transparently designed to challenge you to transform into yet a more developed version of yourself. It uses a story that takes place circa 1600, at the birth of the scientific method. It shows how the father of science,

Aristotle, is challenged by the father of physics, Galileo. The challenge I faced was deciding how a teacher of science could handle this controversy without losing respect for Aristotle or Galileo. And further, how to respect the process of science. It's a really amusing lesson - one of my favorites. It usually ends up helping students get inspired to be willing and ready to change their point of view, simply by listening to another one of the townspeople.

Here is Chapter 12, "Points of View" from the book *The Next Version of You* (Bickart, 2018) that deals with this issue.

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### ***Points of View***

*Chris was about six foot three or four. He was handsome. He had the look of confidence before he spoke. When he spoke you were sure. He was deliberate, calm, and quite definite. Some of the other incarcerated individuals in my class called him 'the preacher'. He was always giving sermons or lectures. Even when he was asking a question, you knew there was a point coming - one you had to be quite careful to consider, before answering. Chris was religious, as he described it, born into a black, preaching kind of family. He had been taught the Bible since he was a boy. He had a very good singing voice, a fact that I found out one day when he showed me by breaking into loud song - an original he had written - right there in the yard. The yard is the walkable outdoor area that the prisoners were allowed to walk in by day, marked by red painted lines. Our classroom building was a converted truck garage, outside the lines. I guess the prison was going to adjust the lines, but meanwhile, the*

*16 incarcerated students for my class were allowed to cross the red line about fifty feet from the class/garage from 8:30 to 11:30 and 12:30 to 3:30, five days a week from mid-September to mid-December.*

*The purpose of the class was to get the students ready for college. They had been selected as candidates for a prototype - an experiment. If you looked at some statistics, you might conclude that getting into a college class after imprisonment, reduced your chances of going back to prison. All of my students were scheduled for release within the next year, barring no further infractions while incarcerated - a condition that was not met by all of my students, by the way. The experiment was to give them classes in life skills, math, and English, then see if they could pass a college placement exam. Then the experiment was included in a longitudinal study that helped them get housing and courses, following their progress for the next two years. I can't report any details past my course, because the experiment is still in progress. So, I taught Chris and 15 other male incarcerated individuals the life skills and math for three of the five days a week, and another instructor taught them English. The other two days a week I taught at the neighboring women's prison, about 25 minutes away.*

*Since the life skills course was going well and all of the men were ahead of schedule to pass the math exam, the prison allowed me to introduce some of my own lessons. I integrated STEM topics (science, technology, engineering, and mathematics) into the life skills portion of the course, in an effort to transform students while informing them. This was great fun for me. It allowed me to bring the men up to date with cutting edge advances in the science world that they had basically missed while in prison. It also permitted me to teach in a way that I had done with many other groups in the past from corporate technology departments to secondary school students at*

*risk. I liked to blend factual information with inspiration. Each lesson had a moral to the story. My rationale was that maybe I could help the men integrate back into the world by transforming themselves. For example, when citing genetics advances, we explored how there are new studies (B. H. Lipton, 2005, 2006; B. H. Lipton, Bhaerman, S., 2009) that question whether your genes that came from your parents really dictate your character, or whether you are the master of your destiny. Or, for another example, we reviewed and discussed quantum physics advances – called ‘the observer effect’ - that increasingly suggest the possibility that the human being's presence as an observer of a physical event can affect the matter, itself (Greenstein & Zajonc, 1997; Horodecki, Horodecki, Horodecki, & Horodecki, 2009). Basically, we would discuss scientific and engineering findings in this philosophical way, then we would have conversations about turning a corner in meeting one's own personal life challenges.*

*Chris was on top of every point that was made. He scrutinized the science and technology fairly well; but even moreso, he tested every moral suggestion against his own beliefs. He was clearly a wounded soul. He had been hurt badly by life and was not about to walk into a state of vulnerability without checking out the terrain. I loved having a student like this in class. He was not easily swayed. I remember thinking, “If I can win someone like Chris over, much of the class will also go with the flow.”*

*Chris had challenged me on several occasions (as had many other of my inmate students). They were not an easy group when it came to giving over their hearts. Sure, they were obedient, attentive, and willing to talk about making a better life. But all this could easily remain superficial, a perfunctory exercise in showing the authorities that they were 'good boys' who did not want to make trouble. Nevertheless, early on, they sensed that I*

*was not going to stand for a superficial level of engagement.*

*It was a couple of weeks into the course that I brought out the Galileo lesson. It's one of my favorites. I have used this lesson to enlist a deeper level of student engagement in many previous situations. So, I remember deciding that the next day would be THE DAY. As so often happens when I am preparing a lesson while I am at home, I ended up aiming the lesson primarily at one student. This was not pre-meditated. It just happened. This time, it was Chris. I thought through the Galileo lesson with my virtual eyes on Chris. I had a feeling or intuition this was something he, especially, would benefit from. I went to bed, then woke up and went to the prison for class.*

*"Good morning, class", I said.*

*They sat there. You have to visit a prison to see - and feel - the sadness. Even if we had reached true heights of inspiration or hope the day before, each next morning started out with a heaviness that was palpable.*

*"Today, I want to tell you a story about Galileo. You may have heard that Galileo was imprisoned for presenting his scientific findings. Prepare yourself however, for today you may hear about Galileo from a whole new point of view. I wish to show you a new point of view, so that you may take this lesson personally, and use it for your own transformation. That's the business we are engaged in, isn't it? I bring lessons to let you stretch outside of your current self toward becoming a new self. And further, isn't it my job to do this transparently, so that you participate in the transformation by consciously owning the process? You want to own a newly transformed self that can jump out into the world and have a better time than before, don't you? You didn't think I was here to transmit information, did you?"*

*Chris spoke up for the class, "Of course not. We know you by now, Dr. B. Go on, let us have it, this transformational lesson."*

*"Thank you, Mr. Carter, for the vote of confidence." The rules for teachers in the prison did not allow me to call him by his first name, 'Chris'. "Ok. Let's first cover the background facts. Galileo thought that what he found by his own experimental observations and by those of Copernicus, confirmed Copernicus' theory that the earth went around the sun. The problem was that the church disagreed. They contended that the sun went around the earth. And in the 1600's, it was very dangerous to contradict the church. The church was the group in power. Biblical translations were interpreted at that time to indicate that the earth did not move. And translations of Aristotle, whom the church believed religiously, also seemed to corroborate this view. These are the facts. Any questions?"*

*No questions.*

*"So the church required Galileo to come before the inquisition. This, of course, was like a trial. At the inquisition, the authorities told Galileo to cease lecturing or writing that he believed that the earth was moving around the sun. But in the next several years, Galileo did a great number of experiments and research, recording what he considered to be the most sensible conclusions anyone could draw from the experimental evidence he had gathered. Galileo's method of performing many experiments to confirm or disavow knowledge is the reason he has so many fans to this day, Einstein among them. He is called by many, 'the father of physics.' Before him, even the most intellectual people discussed scientific beliefs based on who said them as opposed to observing experimental evidence. So, some of Galileo's next publications presented scientific evidence that could lead to the conclusion that the earth was perhaps not central*

*and not still. The church arrested Galileo and imprisoned him for the rest of his life under house arrest."*

*Here I made a dramatic shift of my speech. I paused, looked into Chris's eyes, scanned the class, and said with great emphasis, "But as many times as this story is told, most historians fail to report that it was not only the church that disbelieved and disrespected Galileo! Oh no! It was also the people of Pisa! Did you know that he held public lectures to tell of his experiments? Oh, yes!" Now, I was practically shouting. "Even though scientific evidence disagreed with the church and with Aristotle, people had such biases that they did not want to hear of the experiment; they just wanted to keep their old beliefs. Galileo also disagreed with interpretations of Aristotle that seemed to say that a heavier object will fall faster than a lighter object. You've probably heard that Galileo dropped objects of different weights off of the leaning tower of Pisa to test this out. Well, this may not be true, either. No records have been found among Galileo's notes saying he did this. But records do say that his students performed this experiment. But the point is that we know that in public lectures, Galileo offered experimental proof to refute the common belief that heavy falling objects fall faster than lighter ones. But no. Galileo was persecuted not only by the church. He was persecuted by the public, also. People did not just disagree with the facts of his point of view, they looked down on the way he did experiments instead of going along with the beliefs of the society - even if they could be shown to be biased."*

*At this point, Chris, and actually many of the prisoners were shifting in their seats and many were showing an intensely riveted form of attention. I continued, "So, you see, the more complete story of Galileo doesn't just blame the church, it shows that society at large was also responsible. I tell you this, because children in science classes all over our country are told the first part*

*of this story in order to say that we - the public today - should follow scientific evidence and should not be like the people who persecuted Galileo. Science teachers all over the U.S. are saying, 'We would never doubt Galileo's experiments, would we, children?' But, they are missing something. I think they are missing the bigger story. I think they miss that just like most of the people of that time who had the biases that limited Galileo, we probably have new biases in our time that are rejecting someone right in front of us - right now. Oh yes! We humans have not become perfect since Galileo."*

*At this point, I stopped talking as if I had just been interrupted by a voice behind me. I then turned to the cement wall behind me and said, "What's that? Oh. Ok, I hear you." Then, I turned back to the class.*

*Chris looked confused. He had been totally in the story, but now I had broken the mood. He had a look that seemed to say, "What is going on?"*

*I explained, "Oh, I'm sorry. I just wanted to answer a question the stones in the cement wall just asked me." I paused and waited. Chris began to break a smile; a few other smirks began to appear around the room. Then I went on, "What's the matter? I was talking to the rock. Do you have a problem with that?" More smirks. "Oh, I see. Rocks can't talk. They don't have consciousness. They're not alive. We're alive, animals are alive, plants are alive, but rocks aren't. And even if they were - they don't have enough consciousness to communicate. And even if they did, I couldn't have the ability to hear them. Or answer them."*

*I paused with a dramatic, careful look into each student's eyes. Then, I smiled, too. "You see, I just wanted you to be able to identify with the townsfolk in Galileo's town. I wanted you to know that we are human. We have biases. If we are pushed to the boundary of what we believe and don't believe, what then? What if I told you*



*that there is a growing number of people who claim they can communicate on a spiritual level with rocks? What if I said that so far our current science does not have a way to measure whether or not this is true? And what if the majority of us seem not to have this ability? Does this make it true or untrue?"*

*Now, Chris spoke up, "Dr. B., are you saying that I should believe that the cement just spoke to you?"*

*"No. I'm saying that I can see that it is a ridiculous idea to consider; but so was the idea of the sun being the center of our solar system and the earth moving around it. And the same for little rocks falling as fast as big rocks. And also the whole idea of checking facts by experiment instead of listening to authority. I'm saying that I'll bet you laugh and disrespect some new ideas, just because they are new to YOU. The day may come when we have irrefutable, repeatable evidence that rocks are conscious and communicate in ways we don't now generally understand. And that evidence may be experiential for all people, not just a small number of people who claim they have the ability to talk to the rocks and water and trees. And when that time comes, they will tell stories about you, Chris. They will tell how you laughed at the idea, because you held to your own point of view. You will be the townsfolk."*

*"But, I can entertain that idea. I can believe that it might be true that 'the very stones' could cry out," Chris retorted, making a Biblical reference - a skill at which he was most proficient.*

*"Yes," I agreed, "you may be able to entertain this idea; but it did take you a moment. At first, your slight disrespect of the idea made it seem silly, didn't it?"*

*"Yes," he admitted.*

*"Then, allow me to push you a little further. This point of view thing isn't over. If you really want to transform yourself, you need to explore the Galileo story a*

*bit more. I think that we can all agree that we are human. And from Galileo's time right up to our time, we can see that there are beliefs and societal ideas that hold sway among the great majority of humans in any given geographical region. So, can we imagine that different, unbelievable ideas, that the majority of society just could not entertain, probably existed throughout history? Guys, if you want to read an awesome book on this subject, check out Thomas Kuhn's, *The Structure of Scientific Revolutions* (2004) - he outlines how humans keep shifting what they believe to be true."*

*"What is that book?" Chris jumped in.*

*"I'll bring a copy tomorrow. Even if you just pick a section to read, you may love it. So, to transform ourselves, we forgive our biases as natural and inevitable. But we watch for chances to grow into more open-minded positions where we include more and more points of view as worthy of our respect, right? Well, get ready. You need to take one more step. Will you follow me?"*

*"Ok, Dr. B., we're a'comin'. Go for it."*

*"Ok, strap your seat belts on, we're going on a ride. First, I'll set you up like sitting ducks, then I'll take you down - this will be fun. Ok. Let me see a show of hands for those of you who believe the earth is the center and the sun goes around it."*

*No hands.*

*"Now, let me see a show of hands for the sun at the center and the earth going around it."*

*Everyone raised his hand. Some were tentative because they knew I was setting them up for something; but the hands were up.*

*"Good. Now come with me on a little trip. We'll start right here in the prison yard. In your minds, go out into the yard and stand there for a day and watch the sun rise, watch it go all of the way through the sky, and set. Did you do it? Is everyone with me?"*

*All acknowledged they were.*

*"You just took the ancient point of view. You can see why they thought the earth was still and the sun went around it. Ok. Now let's do some rocket ship travel or some astral travel and ride out to a point on the sun. I know, it's hot. Somehow we don't burn up from the heat, ok? Now watch the earth and the other planets going around us. Now, who looks to be at the center? The sun, right?"*

*Again, all agreed.*

*"You have just witnessed the modern point of view. But now ... it starts to get good. Come with me to a new point of view. Let's pick a point a good distance from our sun. Go out into our galaxy. Whoa look at that! Our whole solar system looks small. But we can still make out each of the planets and our sun. Look at them. Each planet is turning and they are all circling the sun. But check this out. The whole solar system is turning and it's moving through space! In fact, the more we look around us, lots of solar systems are turning and moving through space. Can you see them? See all of the solar systems turning like planets and moving on their own lines through space. Are you with me?"*

*Many nods.*

*"Now, here comes the best part. Come with me to a special point of view. Let's move over here where we can see our solar system coming straight toward us. Now, focus on the earth. I wonder if there is a position we can take where the earth is coming straight toward us and the sun and the rest of the solar system is on a corkscrew path. Can you see that? Now, look at our sun. Do you see it? From this point in space, the sun can be seen to be going around the earth!"*

*Silence.*

*"So, you see, in a certain way, Aristotle, and by the way, Ptolemy ... have a point, as do Copernicus and*

*Galileo. It depends on the point from which you view things. And who is to say that any one of the positions from which we viewed earth are more correct than any other? ... What about points outside our galaxy? Would larger views include all of the ones we've seen so far? ... long pause ...*

*So, what is my point? I have two. One. Don't put each other in the prison of disrespect because of an alternate point of view. Second, remember that there is probably a larger view than the last one, that includes the more narrow ones."*

*There was a definite effect of the lesson on the whole class. There was clearly a new level of tolerance and good will during our life lesson discussions. The men were consciously giving attention because they wanted to. Without further reference to this lesson, you could sense a desire to hear each other; and I think I even detected that some men were feeling a warm amusement toward some others in a respectful way. But most rewarding to me was a noticeable shift in their respect for themselves, as if some forgiving had taken place. You could see this in posture, in the way they held their heads, and most definitely in stronger voice projections.*

*And Chris? You should have seen Chris. He didn't speak any more that day, but his reaction was palpable. It was as if a load had been lifted from his shoulders. In subsequent discussions in the next months he revealed that he had been brought up with strict interpretations of life - stiff positions that caused him to be 'inflexible in dealing with his fellow man', as he put it. Had this attitude contributed to his landing in jail? What did he realize it had cost him? I don't know. But, there was a shift in him all of us could subsequently observe, a willingness to listen to others, a softness where before there was rigidity. He told me that these lessons were letting him consider that it is not weak to allow alternate views. Maybe it is strong.*

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So, there you have it. I have personally witnessed students change in front of me - in real time - from this lesson. Maybe it could be useful to you.

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