

PODCAST 280: THE RED BEAD EXPERIMENT

By Mark Graban



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In the 280th episode of the Lean Blog Podcast, I welcomed back John Dyer, president of the JD&A – Process Innovation Co. John started his career with General Electric and then worked for Ingersoll-Rand before starting his own consulting company about 11 years ago, working with a variety of organizations on Lean and Six Sigma methodologies.

The first time I interviewed John was back in episode 229, where he talked about getting to meet Dr. Deming and working with him at GE. This time, we took a deeper dive into Dr. Deming's Red Bead

Experiment, which we have each facilitated many times.

"I actually got a chance to see Dr. Deming do the Red Bead Experiment twice in person, and the second time I took very thorough notes because I was fascinated by the words Dr. Deming used," John said. "Every word he used had a purpose to set up this experiment." I'll forever be jealous of John and those who got to work with Dr. Deming directly.

Day One

John noted that, to start off the

experiment, Dr. Deming would tell the audience they were now unemployed, and projected onto a screen a series of help wanted ads. The first ad was for six "willing workers," with minimal education required. From this, he would find six volunteers.

"I also spent some time with Dr. Deming, back when he was still teaching and I've got a very fond set of memories from my time with Dr. Deming during those days."

“My opinion is that he knew that, in the audience, there were a lot of CEOs, and COOs, and company executives that had come to see him, and I think he wanted to make it clear to all of them right up front that these were the equivalent of the employees that come to work every day in their organizations, their factories,” John said. “I think he planted that seed right up front, that these are willing workers, people who want to come and work and do a good job.”

Regarding the minimal education requirement, John believes Dr. Deming’s intent was to make it clear to volunteers up front that they weren’t going to come up onto the stage in front of hundreds of people to do some sort of complicated, statistical analysis.

“Once you start to go through Dr. Deming’s 14 points of management, you start to realize that many of these points play out in the Red Bead Experiment.”

After finding the six willing worker volunteers Dr. Deming then found two volunteers to act as quality inspectors and one to act as a quality supervisor.

“You have six willing workers, they’re going to sample 50 beads from a bowl that’s mixed of white and red beads, then they take it to the quality inspection department and have the two inspectors count the number of red beads, which represent defects,” John explained.

Dr. Deming gives the willing workers detailed instructions on how to go about taking a sample

of the beads in such a way as to not get any “defects” (red beads).

“He’s establishing a standardized, well thought out, methodical process, but it’s the wrong process when you think about the overall system. The system is broken because of the bead mixture, it has nothing to do with the worker,” John explained. “In a typical system, you might have a hundred processes that are part of that system. All it takes is for one of those processes to have flaws, and the entire system is going to have flaws. Here in this case, you have all of these willing workers, they’re competent people, you have your quality inspectors, they’re competent people, you have all these methodologies put in place to make sure that the samples are done correctly, yet, in this case, the flaw is that the red beads are mixed with the white, they came from supposedly a supplier or somewhere in the supply chain, and that one flaw is causing the system to fail no matter how hard the workers try. So, I think that’s one of the key learnings.”

Even though the system, the 20/80 mix of red and white beads, is the problem, after the volunteers fail Dr. Deming tells them they are causing the defects.

“Dr. Deming, he’s trying in a very tongue-in-cheek way to get the workers to think all along that it is their fault, again trying to paint this picture for the executives in the audience that you keep blaming your employees when in fact they really don’t have any impact,” John said. “Think about all the workers out there that would say the same thing about their job. They’re trying to do a good job, trying to follow the methodology, they don’t want to let their company down, they

don’t want to let their team down if they’re on a team, yet there’s a flaw in the system that they really don’t have any control over and it’s causing tremendous frustration and moral issues”

“This is what I love about Dr. Deming, he was a statistician, a professor in statistics and you would think he would be one of the last people to really emphasize the role that culture and leadership and understanding human behavior would have on the system.”

Frustrating the Red Bead Experiment volunteers, Dr. Deming would ask what happened and then yell out, “Halt the line. Stop production; we have defects!” After asking the first worker what happened John noted a particularly powerful question Dr. Deming would use which was, “Variation is uncalled for. We’re using a very rigid procedure, so how could there be variation?”

Statistically speaking, in most presentations, there is a volunteer who gets lower than the average number of defects, and another volunteer who gets well more than average. When this happened in Dr. Deming’s experiments, John noted that he would turn to the volunteer that pulled a low number of defects and make big deal of the “achievement,” saying that this is one of their best employees, and that they deserve all kinds of praise, then suggesting they make him employee of the day and give him a nice bonus in his paycheck.

Dr. Deming then scolded the person who pulled the most defects out of the bin of beads, asserting they clearly don't care about their job and in fact they are now on probation and if they don't improve he will have to let them go.

"When someone gets on the low end of the curve, the next time they do it there's a high probability they're going to get something much higher. And someone who's at the high end of the curve, the next time they do it there's a very high probability they're going to get something lower," John said. "So what Dr. Deming did in that case, is that he said OK, what does this teach me if I don't really understand the whole concept of variability and histograms and control charts? Well, if I just look at the raw data and I'm a manager not a leader, then what this would conclude is that the person who got four I praised and they got worse, so clearly praise does not have much of an impact."

Similarly, the person who first got a high number of defects before being put on probation got better, reinforcing that fear works. This view leads to the belief that fear of repercussions may be an effective way to make them perform better, when it doesn't have any impact on the results.

Day Two

"This addresses one of his 14 points that's the most controversial—every time I share these 14 with a group of executives, this is the one they have the most heartburn with—which is basically abolishing the whole idea of management by objective. And again, Dr. Deming was talking about how if you set an arbitrary goal, then that's going

to drive behavior toward that goal when in fact maybe you could do significantly better than that goal, or maybe that's going to drive [employees] to do stupid things."

"When I was at GE making refrigerators, production output was the number one goal and we would routinely put refrigerators into boxes without doors."

John and I could think of a number of examples where employees given arbitrary goals just makes good employees cut corners, cheat, or distort the system to avoid punishment. Dr. Deming and others like Brian Joiner, and Don Wheeler always make the point that three things can happen: people can distort the numbers, they can distort the system, or they can improve the system. The two distortion options are usually easier and more within people's control than improving the system, so of course that cheating happens.

"When I was at GE making refrigerators, production output was the number one goal and we would routinely put refrigerators into boxes without doors, and put them onto trucks just so we could get credit for shipping them; and then take them off the trucks and unbox them and put the doors back on, on overtime the next month just so that we could hit that production number," John said.

On the other side of the issue, setting goals sets limits.

"It's amazing how human behavior is very constant. Every action has a reaction and you've got to understand what those reactions

are going to be," John said. "Setting a goal is a limiting factor. Dr. Deming talked a lot about the difference between managing and leading, a leader would say, 'Hey, let's try to implement as many ideas as we can and work together as a team.'"

When no one came close to the arbitrary target Dr. Deming set in his Red Bead Experiment, he started asking why, telling the volunteers that management is deeply concerned with these figures and wants a complete report on what happened. John explained that Dr. Deming even told the volunteers management will close the place down if they do not improve, adding, "Enjoy your workday because this might be your last day."

Day Three

On the following workday of the experiment, Dr. Deming told the willing worker volunteers that since they were clearly not even coming close to the objective, management decided to help the workers out.

"It is designed for the managers, but the workers that are also participating in this, you can see a bit of relief."

"Of course, the willing workers are thinking oh good, they'll let us sort the beads, or they're going to let us do something to help out here. Then, all of a sudden, he put up on the overhead screen, we've decided to go out and purchase \$100,000 worth of quality posters and put them up all over the factory," John explained. "One was 'Do it right the first time,' another one was 'Be a quality

worker,' another one 'Take pride in your work.' So, again, all of these posters are implying that it's all the workers' fault, if they just tried a little harder, the system would improve. But, the system's flaw has nothing to do with the workers. And again, this gets back to his point number ten, which is eliminate slogans or targets for the workforce asking for zero defects, instead institute leadership."

Day Four

At this point in the Red Bead Experiment, John said that he does things a little differently than Dr. Deming.

"On Dr. Deming's last day, he basically takes the three best performing workers and fires the other three (or just tells them to leave), taking the three best and has them do it twice," John said. "I said, okay, this time if any worker goes above zero everyone

is fired, including the quality department and the inspectors. It's fascinating, because by putting that one change in, and then I'll purposely kind of turn my back to them, and all of a sudden the data comes up zeros all the way down the column. And I'll turn back around and I'll look at that and say, 'Wow! Look how much better we've gotten! This was amazing, so clearly we can do it. Clearly we can hit zero every time.' And of course everybody's laughing because they know what happened, but it really emphasizes this whole point about if you don't drive out fear then it's going to cause people to do really stupid, bad stuff, including fudging the numbers. And again at that point there is no hope for making improvement happen."

John went on to warn that we talk a lot about the importance of teams when doing improvement, but one thing about teams to be careful about is people not

wanting to let the team down. When faced with the potential to make the team look bad, not just themselves, people that are really heavily connected to a team can also do things to distort results.

"If it's my job, well that's my own fault, but if I make the team look bad, now all of a sudden it's all of my peers and friends that I've got a connection to because I'm part of this team, and we're all in trouble."

John has been doing the Red Bead Experiment for several years now.

"I've now done this myself many many times and a lot of eyes get opened, especially in the management ranks," John said.



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