What's wrong with behavior-based safety?

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Introduction

It is not at all unusual these days to pick up a copy of any current safety magazine and find articles and advertisements celebrating the principles, methods and application of behavior-based safety. There are obviously a large number of advocates of behavior-based safety. Indeed, the only thing that seems to be larger than the number of BBS advocates is the number of articles and advertisements in print.

There comes a time when an idea is so prevalent it is accepted and applied without question. When this happens we are so conditioned to the correctness of it we fail to examine its basic premise. I believe we are at that point when it comes to behavior-based safety. At the risk of invoking the wrath of those safety professionals who advocate its use I am going to suggest it's time to re-examine the behavior-based safety (BBS) model. I will also propose that in the present and future workplace BBS is not just partially but a totally wrong solution to preventing accidents at work.

The Behavior Based Safety Model

First let's examine the basic theory advocated by the behavior-based proponents. The goal of behavior-based safety is to change the behavior of employees from "at risk" behaviors to "safe" behaviors. They use what is called the ABC model to change human behavior. Most of today's behavioral safety efforts are based on this theory that says all behaviors are a result of antecedents and consequences. This theory, promoted by B.F. Skinner, is that Antecedents serve as triggers to observable Behaviors. Consequences either enforce or discourage repetition of the behaviors.

The basic behavior-based process consists of identifying observable safe behaviors upstream in the process. Then you need to identify the antecedents (activators) that encourage these safe behaviors and encourage them. You should also identify those antecedents that discourage safe behaviors and remove them. Behaviorist theory says those consequences (reinforcement) that are positive, immediate and certain (rewards) will keep employees working safely. Negative consequences which are immediate and certain (punishment) discourage unsafe behaviors. The goal for management is to set up a system to control the antecedents and consequences so workers will increase their safe behaviors. The theory being that by setting up a system of well-planned antecedents and consequences you can control the unsafe behaviors of employees thus accidents and injuries will be reduced. [1]

Furthermore the behaviorists believe that consequences are the driving force to changing people's behavior. The tools of positive and negative reinforcement are what is needed to make people behave in the prescribed manner. Consequences are those events that occur as a result of behavior. Positive reinforcement rewards a person for behaving in a certain way. Negative reinforcement provides unwanted or unpleasant consequences. The theory is punishment decreases the probability a behavior will be repeated. Some behaviorist believe that negative reinforcement prompts only a minimal level of compliance. However, positive reinforcement encourages employees to exceed the minimum.

What's in a theory?

At this point I think we should review the concept of theories. To start with all theories are correct. Some are just more useful than others. The fact is you can never really prove a theory. You can test it to see if it is valid. The more times the theory works the more confidence you have in it. However, no number of examples proves the theory. The next test of the theory could provide an exception. One exception to your theory and you must either abandon or adjust it so it you can explain and account for the exception.

The psychological theory of behaviorism

The behavior-based safety depends on the psychological theory of behaviorism. This theory attempted to explain all human behavior in terms of being driven by external consequences.

B. F. Skinner was one of the most famous psychologists of all times and he contributed the concept of operant conditioning (shaping the behavior of an organism using positive and negative reinforcement) as an explanation of why people behave the way they do. His concept of re-enforcers as a learning technique developed into "programmed learning."

What does the research on behaviorism reveal?

Many of the articles that defend and advocate behavior-based safety point out the enormous amount of research substantiating it. They do not mention the large amount of scientific research that refutes it.

 A major problem with behavior-based safety is the fact that when behaviorism was held up to the scrutiny of the scientific method it failed. "As behavior research accumulated it was apparent to even the most ardent followers of the theory that the animals being studied frequently acted in ways the theory couldn't explain. [2] One major problem was different animals failed to conform to supposedly universal principles of conditioning. Skinner said "Pigeon, rat, monkey, which is which? It doesn't matter," but it did matter. The researchers found they could easily train a pigeon to peck at a disc for food but it was next to impossible to get it to flap its wings for the same reward. They could also get rats to press a bar for food but to get a cat to do it was quite a different matter. There were just too many comparable findings in their research that forced behaviorists to admit that each species had its own built-in processes that made it learn some things easier than others and some things not at all. Their own research showed the laws of learning could not be applied universally.

Behaviorism denies internal processing that goes on in human beings. The behaviorist research could not explain for example the behavior in rats when at the beginning of an extinction trial an animal would respond to the stimulus with more vigor than it had during a long series of reinforcements. If a rat that had been getting a food pellet each time it pressed a bar was deprived of the pellet, it would press the bar with more force repetitively. The strict behaviorist theory predicted that the absence of the reward should have weakened the response, not strengthened it.

Behaviorism failed other tests of scientific method. For instance it could not provide an adequate explanation of memory. Reward and repetition provided only a partial explanation of rat behavior and an even less satisfactory one for human behavior. The internal workings of the mind were more or less ignored by behaviorist and explained away as insignificant. Their use of the stimulus-response bond for example did not account for memory and how it works. Even the behaviorist realized that memory was more than a chain of mathematical terms. Memory has different forms such as short term and long term that behaviorism could not address.

There were many other things that psychologists needed to explore such as motivation, perception, creativity, problem-solving, experience and interpersonal relations. Eventually, new data was gathered on these subjects and raised questions that behaviorism couldn't explain. This brought about a paradigm shift and led the way to a new theory of psychology - known as "cognitive science", in the 1960's. [3]

The field of psychology may have advanced beyond behaviorism but in the field of management it is quite a different story. Behaviorism is still applied with a vengeance by managers. The fact is it is very useful in a command and control management system. We have applied it with such force and magnitude we now accept its premise without question. Behavior-based safety is a perfect example of this blanket application of behaviorism to the workers.

From the start behaviorism tried to make use of positive reinforcement as the tool to shape workers behavior. Obviously it would not have been a very good idea to stress negative reinforcement as the tool. (No doubt behaviorism would not have enjoyed the acceptance it has if negative reinforcement was its method of choice.)

However, if you examine it carefully you soon realize that positive and negative reinforcement are different sides of the same coin. And that coin doesn't buy much that's worthwhile for motivating people. Both are really saying to employees do this and you'll get that. In the case of BBS the consequence is positive reinforcement handed out by managers or peers. In actuality the purpose of the reward or punishment is to control or manipulate behavior of the

employee. All this takes place while management ignores or doesn't comprehend the real reason safety problems exist.

Research has shown that positive reinforcement does very little to alter the attitudes that underlie behaviors. You may get a short term change but over time employees come to realize they are being manipulated while the safety system stays the same. Using positive reinforcement, no matter what the intentions are by the person administering it, can and does cause resentment between management and the workers. A bad situation is only made worse when workers realize management is ignoring real safety issues while trying to appease employees by getting them to change their behavior using positive reinforcement - carrots or bribes.

Let's look at just a few of the problems with the positive reinforcement approach. There is a basic assumption that positive reinforcement is an enjoyable and greatly appreciated consequence handed out by management. It is believed passing out positive reinforcement will change the at risk behavior and replace with one that is safe therefore no possible harm could result from its use. Hence we should use it to motivate workers to do a good job or to work safely. This sounds good but it has some real drawbacks.

Research has shown using rewards on people to get them to do what you want them to is not such a clear cut solution to the question of "How do you change people's behavior?" As early as the 1960's research projects were revealing that rewards (positive reinforcement) were not all that effective when used to try and improve skills or work performance. Some examples were:

1. A researcher asked 128 undergraduates to solve a problem in a lab setting. They were given matches, thumbtacks, and the boxes they came in and asked to mount a candle on a wall using only these materials. Some students were offered from $5 to $20 if they succeeded; others weren't promised anything. Those who were working for the financial incentive took 50% longer to solve the problem.
2. In another project a researcher asked undergraduates to "select a pattern on each page that was least like the two other patterns on that page. "The students "who were not offered money performed significantly better than those who were paid."

Obviously, these two simple examples aren't enough to negate the system of behavior-based safety. But they expose a major flaw in the theory that people in general will do what you want if you use the tool of positive reinforcement. In fact it can have just the opposite effect.

I invite all proponents of behavior-based safety to do their own research on the psychology of behaviorism as they staunchly advocate in their writings. You will find an enormous amount of research refutes the behaviorist ABC theory. Their first step should be to read the research on the other side of the coin such as Alfie Kohn's thoroughly researched book, Punished by Rewards. [4]

The basic problem with BBS approach

The cornerstone of behavior-based safety is the principle that the majority of work related accidents are caused by the unsafe actions of the workers. The traditional safety management theory (Developed by Heinrich with no real scientific proof) is you should focus on unsafe actions since they are believed to be the majority (85-95%) of the reason accidents occur. If you accept this premise then it is just a small step to the assumption to improve safety you must concentrate on changing the behavior of the worker.

The fact is accidents are like most bacteria. They are all around us, and most aren't harmful. You can be involved in many kinds of accidents and there is no real harm. For example you pick up your clothes from the dry cleaners and find the button you requested to be replaced is still missing. This is an accident but there is really no harm done. You mention it to the manager and he blames it on the lazy workers who did not follow instructions. He says he will follow - up with the worker to make certain it doesn't happen the next time. But is this the workers fault? Or are there other things that could have affected why the task wasn't performed. The basic assumption on the manager's part is someone messed up and making them pay is the proper corrective action.

A similar simplistic view was held by American managers about quality problems in the 1970's and 80's. Their lament was if only employees would follow management's specifications the products workers made would have no defects, scrap, rework or production problems. They really believed all that was necessary to achieve high quality was for the workers to "do it right the first time." This same logic is applied when using behavior-based safety. Since accidents/incidents are caused by unsafe actions on the part of the worker the key to preventing accidents is to change their "at risk behavior."

Using this logic behavior-based safety misses the mark much the same as managers did for quality in the 1970's. A quality management system requires action on the system, not the workers, by management, to solve quality problems. Quality management knows the problems of output from the system are built into it. You cannot achieve more quality then what the system was designed to deliver. This is also true for safety. Most quality and safety problems are not created by the individual worker. If your goal is to reduce defects and improve quality blaming the worker for problems built into the system will not get you any improvement. If you want to improve the outcomes of a system you must focus on how you manage the system, Enormous gains have been made to reduce the defects, scrap and rework inherent in work systems using quality management theories.

What does cause accidents?

A basic shift is necessary in your understanding of why things go wrong that lead to accidents, scrap, rework and defects in a work system. New knowledge of why accidents/incidents happen must be applied. In a quality management system managers understand accidents result from common causes and special causes. Common causes are faults in the elements of a system. Special causes are causes that are unusual and not normally found in the system. They can come and go without any warning. In a quality management system common causes account for 85-95% of your problems and special causes are responsible for remaining 5-15%. This is the theory of what causes accidents in a quality management system. It is much more useful as it will help everyone understand how to fix the system instead of fixing the blame for accidents.

This requires a major shift in the accident causation model. The simple explanation that the unsafe actions and unsafe conditions cause accidents will not suffice. The quality theory again can be used to provide a much better understanding of why do accidents happen at work? Quality theory has taught us that defects, mistakes, scrap and rework are caused by the way we manage the work system. Not the miscues of the workers. This same knowledge must be applied in safety. Accidents are caused by how we manage the work system.

The Power Shift

Quality systems created a major shift in how companies manage their work processes. W. Edwards Deming taught us all work is a system and a system has to be managed. (He would often say the shouting slogans or putting up posters encouraging workers to "do it right the first time or "safety is your (the employee's) job" were a waste of time.) Companies have learned that in order to improve productivity and customer satisfaction they must improve quality - period. Improving quality requires a new management theory. Until recently, the management system of choice was to manage for quantity using the command and control model. In today's world managing for quantity will not succeed.

Quantity methods used from the 1950's - 70's relied on building the product, inspecting and selling it. Companies were more concerned with production than quality. They could sell anything they made. Now they are faced with the reality that competition may come from anywhere in the world. To compete their products and services must have value and lower costs than their competitors. They must also anticipate the needs of their customers and fulfill these needs even though the customer often doesn't know what they want.

Quality management methods also require the Voice of the Customers be integrated into your system. If you don't do this your competitors will and you will lose customers. To understand and incorporate the Voice of the Customer in your system you have to continually research their needs and reinvent products and services to meet these needs. Customers are people who benefit from your product and service.

In the command and control method there is a division of labor. Managers do all the thinking and workers do the work. They just punch in, catch hell and punch out. Good parts are separated from the bad by inspecting them at the end of the production line. They are reworked or scraped. Emphasis is placed on inspections for achieve quality. Catch the bad stuff and ship the good stuff. This is a very inefficient way to make things but it worked and it paid off handsomely.

Quality management systems

In the 1970's a quality revolution was started in the US by the imports of products from Japan. This included but was not limited to products previously manufactured in the US. (Television sets, radios, calculators and automobiles). This

revolution focused on how to manage a work system to improve quality instead of concentrating on mass quantity as the goal.

The revolutionary idea in this management system is everyone who works in the system is needed to study the problems in it and then make improvements. The goal of this system is to reduce waste, scrap, rework and accidents so you can make good products. In this system workers are hired for their mental labor as well as their manual labor. It does not require command and control of the workers. The goal is to get control of the system. Control is not the goal but the effect of good management.

In a quality management system the mental labor of all employees is needed to fix the system. Everyone must learn the tools to identify system problems and take the proper action to fix the system instead of fixing the blame. (Fixing the blame is very costly and destroys teamwork.) In this work setting the role of managers is changed. Workers "on the line" now learn how to record data about their processes. They work in teams instead of for the boss. In some companies there is no boss. The teams study their operations and look for better ways to do the job, eliminate waste, scrap and rework before it happens - not after. In short, teams replace the old front line supervisor whose job it was to make workers do their jobs correctly.

This management system is slowly evolving. The new model of how we will manage in the 21st century is not complete and will probably continue to evolve over the next decade. One thing for certain, it will not look anything like the command and control model we have used and are presently dismantling.

The point is all workers roles change in a quality management system. In the command and control model the line workers ideas, creativity and motivation were not required. Management took care of these things. The new management model will require that everyone's ideas, creativity, ingenuity and motivation is paramount to the success of the organization.

Problems for BBS in the new quality management system

We seem to be moving away from the roots of behaviorism in the new quality management models being used by companies. The following are just some of the problems the BBS model creates when applied in the new quality management system:

- A major problem for behavior-based safety is it requires and relies on external motivators (antecedents and consequences) to change people's behavior. As explained earlier, these techniques did not work all that well on rats and other animals let alone human beings. The reality is they are more likely to be de-motivators in the new quality management system described above. Studies have shown that the largest factors to cause dissatisfaction on the job are "company policy and administration." [5] These are the very things BBS tries to enforce when trying to change employee behaviors.

- Which leads to the next problem for behavior-based safety and that is extrinsic motivators destroy the intrinsic motivation which is inherent in people to do good work and work safely. The antecedent-behavior-consequences model assumes an extrinsic motivator is required to make the employee behave a certain way. I have yet to meet an employee that sets out in the morning with a goal of trying to get injured on the job. Yet, the basic premise of behavior-based safety is employees need to be motivated to exercise "safe behaviors." A system of re-enforcement and incentives is applied to accomplish this motivational goal. The re-enforcement ranges from the negative (reprimands) to the positive (rewards -compliments, bribes) with the goal of having the individual see the error of his ways and then changing the at risk behavior so accidents will be avoided. (It also begs the question, if behaviorism works so well for safety, why don't why isn't it used in the quality arena? All one has to do is read any serious work on quality by any of the quality gurus and you will realize that the workers weren't responsible for quality problems - it was management.)

- As mentioned earlier there is a large body of research that contradicts the widely held common sense belief that carrots and sticks will result in a permanent attitudinal change. Research has shown positive reinforcement, no matter what form it is administered by BBS methods, will only provide a temporary change. There is even a greater danger due to the fact that a short term success will result in a perception the real safety problem has been solved. In the long run positive reinforcement may cause more harm than good. When workers eventually have to face the safety problems after their heroic efforts to avoid an injury are defeated by the hazards built into the system an ever deeper chasm is created between them and management.

- There is little thought given to another problem with behavior-based safety. That is the managers who use it look upon employees only as a suppliers of manual labor in the production system. One behaviorist points out companies are only renting the behavior of the employee. Therefore all that is required by management is to control the behavior through the use of positive and negative re-enforcement. It is the major conceit of command and control managers that they must motivate the workers since they are not already motivated to do a good job or control their own unsafe actions. [6]

- The problem is in a quality management system, employees are both a customer and a supplier in the work system. If safety management is going to achieve the awesome levels of improvement seen in quality it will have to treat workers as customers first and suppliers second. If you look at safety as a system used to manage the work system you must first examine who are the people that will benefit from the activities and processes of safety? The obvious answer is the workers doing the work. They are the first customers of safety management and should be handled as you would any customer.

- To satisfy customers you must answer the following questions: Who are your customers? What do they want and need? How do you know they are satisfied? The BBS model pays no attention to this exercise. Indeed the workers are treated as though they don't know anything about what they want or need when it comes to safety. They should just do what they're told and accept the safety situation as it is. The best employees are ones who comply with the prescribed methods already designed by management. In the world of quality the customer defines quality. The same is true for safety. Since employees know the job and hazards associated with it better than anyone else they should be the ones telling safety management about the problems with the methods. Now some will think I'm advocating the inmates should take control of the asylum. This is not at all what I'm saying. Workers will gladly help management when it comes to making the job safer. Given the opportunity they often provide solutions less costly then the injuries built into the system. Ergonomic problems come to mind immediately but other less obvious safety problems are equally attacked and results attained.

- Another problem with behavior-based safety is the assumption there is one "safe" way to do the job and it can be applied to all workers. BBS assumes you can observe the employee's behaviors, compare them to the prescribed safe behavior and correct the employees at risk behavior using activators and consequences. This means the "at risk behavior" must be changed. No thought or attempt is made to get any input into whether or not worker, the main safety customer, defines the job as "safe."

This approach is in direct conflict with the theory of a quality system in which the employees are given much more respect. The individual employee knows more about the issues of quality than management because they are closest to the job. That is why quality management systems make use of operational definitions. Workers control the process and must have a voice in what specifications mean. The only way a specification can have real meaning is to develop an operational definition. When the BBS observation teams pass judgment on the workers being observed they typically use safety specifications provided by non-elective suppliers such as OSHA, consultants, or management created job safety analysis.. What does "at risk behavior" mean. At risk because it doesn't met OSHA regulations? or Corporate Job Safety Analysis? or for the comfort of the worker doing the job? Each one of these definitions would be different and produce different results. Without an operational definition of what is "safe." a safety specification is meaningless.

In the past if a quality problem existed management was prone to blame the workers for not following safety instructions. This mistake is repeated in behavior-based safety. The fact is, the workers know more about safety problems on the job than anyone else in the system. They do not create them. Most safety problems are built into work systems and it will take action by management with the help of the workers to reduce or eliminate them.

- The BBS approach sees cooperation as workers meeting the instructions for safety create by management and regulators. Cooperation therefore equals compliance by the workers with prescribed management activities. That is not the type of cooperation we are talking about. Cooperation desired in a quality management system is to have management and hourly people work together to change the system so it meets the needs of both external and internal customers. I think everyone has experienced the anxiety and confusion of having someone watch you to see if you are doing your job properly. It's not a very pleasant way to learn and the long term consequences are usually negative. First the anxiety created from the

process can be really upsetting to the person being monitored. Second, it perpetuates the myth that people must be managed or they will mess up.

- And finally, the BBS process is what the Japanese call a form of "muda" - waste. Paying supervision and peers to watch others work and then applying an outmoded theory to the outcome is wasteful and contradicts continual improvement methods. [7] Focusing on the unsafe actions of the individual has nothing to do with the real upstream factors that create them - the command and control methods prevalent in the BBS management system. Managers who truly understand quality management systems have much better ways of spending their time. Mainly studying, improving and fixing the safety system with the help of the workers. Not by asking them to comply with safety rules but by setting up a system in which their critical thinking can be applied to their work environment to change the system.

Systems thinking applied to safety

The way in which employees are interviewed, trained, treated by management on the job, the design of work methods, materials, machinery and equipment (the system) have a great deal more to do with why accidents happen at work than "unsafe actions". The simple idea that unsafe actions by workers are the driving force that create incidents and accidents is now outdated. This technique of focusing on the event (the unsafe action) in the hope that it will lead to understanding why it happened is doomed to failure. The reality is, the system creates the behavior of both mangers and workers. We know you can replace an entire workforce with new people and they will produce the same results. This is true for quality and safety. Systems can be very complex. It is the complexity and variation inherent in all components of the system that generate the defects, scrap, rework, incidents and accidents. [8]

When you attain the knowledge that the system itself causes accidents BBS is no longer useful. It is even detrimental because workers have already learned about quality management techniques. You create a situation of organizational schizophrenia. On one hand management freely engages and accepts the assistance of line workers to study and improve quality in their work systems. With the other hand management enlists behaviorist principles to manipulate employees actions instead of using quality management methods to fix safety problems built into the work system. Employees now know and understand systems thinking. They've applied it in quality. Once you've learned a new and better way of doing something you aren't going back to the inferior system.

The key is to apply systems thinking to safety management. With quality systems we learned that work is a system. A system is a series of events that must have an aim. When you know the aim of the system everyone must work together in a cooperative manner to achieve the aim. Businesses must have an aim of satisfying and taking care of the customer. If you don't someone else will and you will lose business. This principle must be applied in safety management.

How you manage a system is a system in itself. I've described earlier the command and control system. Behavior-based safety fits well with this model. It does not fit at all with a quality management model. The reason being the employees are considered both customers and then suppliers in the quality system. It is true employees do get paid to do their jobs. However in a quality management system work previously reserved for managers is now assigned to line employees. They solve problems of quality on the line. They have the authority to make changes and spend money to improve the system. This changes everything. Workers are required to think on the job. They can come up with solutions using their own ideas about what should be changed to improve quality and productivity. BBS all but eliminates any intrinsic motivation employees have and for this reason it will fail in the new quality management systems. When it comes to how you manage a work system what is true for quality is also true for safety. For the reasons pointed out in this article I believe quality management systems, not behavior based safety, will drive the new safety management model we will be using in the 21st century and beyond.

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