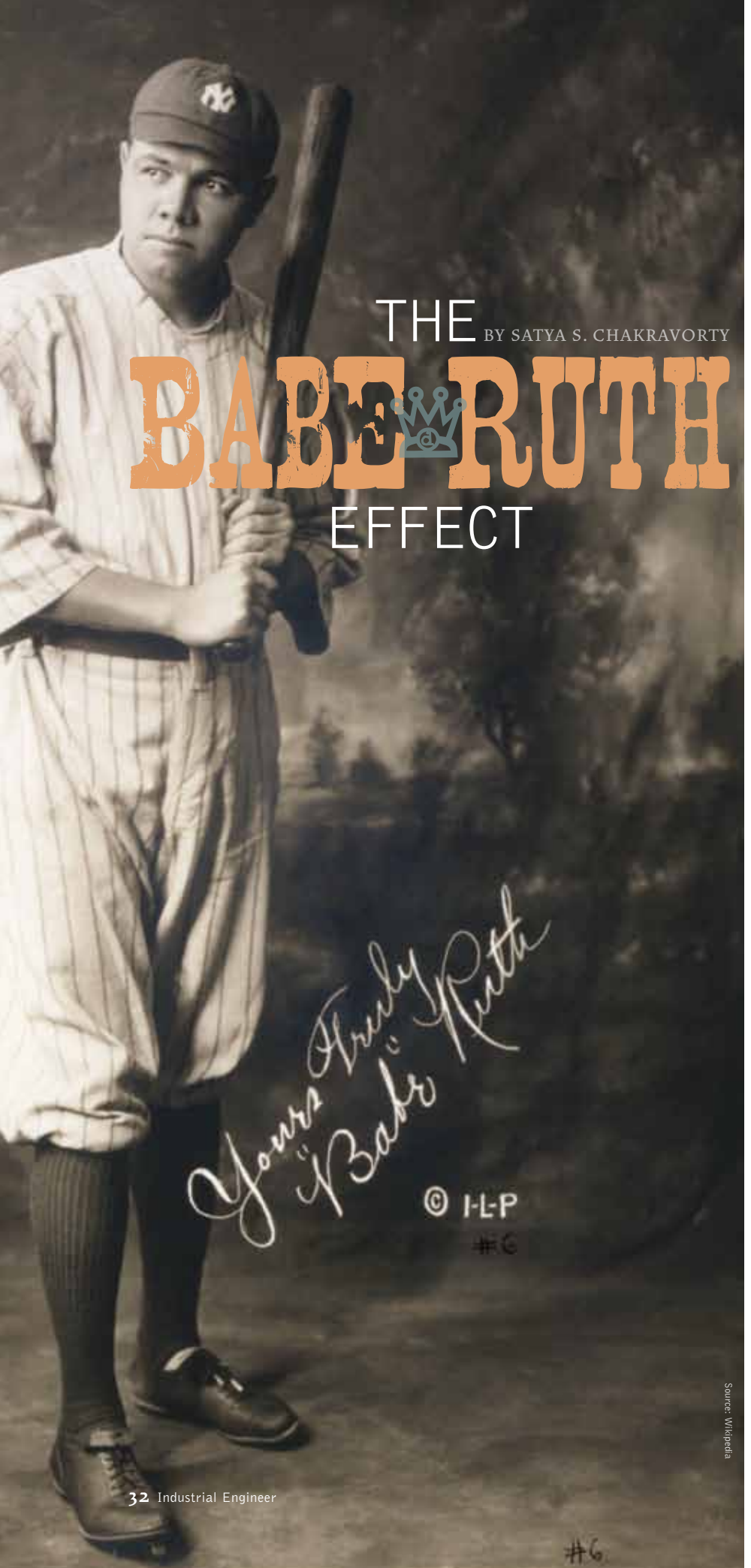
THE BABE RUTH EFFECT

BY SATYA S. CHAKRAVORTY



Source: Wikipedia

An overwhelming number of improvement programs fail because executives consider the magnitude of improvement successes more important than the frequency of improvement failures. Call it the "Babe Ruth effect." Ruth, who struck out a lot, still is considered one of baseball's greatest hitters because

Don't let the magnitude of improvement successes mask the frequency of project failures

of 714 career home runs. Putting it differently, if three stocks in a portfolio of four slightly lose value, but the fourth one substantially gains value, the total portfolio is considered to have performed well, even when the majority of the stocks did not. Executives often approach improvement programs the same way; they highlight successes of a few improvement projects but overlook many failed improvement projects.

Unfortunately, this mindset may cause improvement failures. Consider weight loss programs. These programs may start well, but they often fail to have a lasting impact. With a personal trainer, people set a high weight loss target. They exercise and burn calories, eat healthy foods and get enthusiastic as weight loss increases. But once they achieve their target weight, with the trainer gone, they slow down on exercise, burn fewer calories, gradually include junk foods, and become progressively unsatisfied as weight loss flattens. They continue down this path because they focus on the magnitude of improvement success — or the target weight rather than the frequency of improvement failures. Over time, they gain all that weight back.

Like weight loss failures, improvement failures and material failures show many similarities. Studies describe how materials, such as mild steel, under an

increasing load go through stretching and yielding stages before failure.

In the study described in this article, we found that Six Sigma improvement projects go through similar stages. In the stretching stage, improvement teams were willing to tackle all improvement tasks, and the system's performance showed an upward trend. In the yielding stage, as the experts moved on to different projects, improvement teams struggled to tackle improvement tasks, and the system's performance flattened. In the failing stage, improvement teams were unable or unwilling to tackle improvement tasks, and the system's performance trended downward.

Executives exhibited the Babe Ruth effect by considering the magnitude of improvement successes more important then the frequency of improvement failures. Recognizing this effect will help avoid improvement failures.

Stages

In materials science and engineering, the "stress-strain curve" primarily has three stages: stretching, yielding and failing, shown in Figure 1. There is a lot of variation possible with different materials, from mild steel to cast iron, and each stage will not always be clearly delineated. The length of each stage on the stress-strain curve depends on the type of material. Not all materials (concrete, for example) exhibit all stages. The same is true of improvement efforts.

Our study tracked the system performance (first-pass inspection) of Six Sigma programs in an aerospace company for five years. Implementation followed a classical model. Implementation activities were coordinated by a steering team that consisted of the director of quality and improvement experts (black belts and green belts), all having proven track records. With support from managers and supervisors, the objective was to drive improvements from the bottom through formation and participation of improvement teams from all functional areas. The team established a database, disseminated the status of all improvements efforts, and maintained high visibility throughout the implementation.

Within two years, the executives analyzed all improvement projects. The analysis of more than 79 projects revealed that more than 75 percent of them were failing, or the system's performance regressed to the pre-implementation level. In other words, early gains in operational efficiencies simply disappeared over time.

Consequently, a longitudinal analysis was performed on improvement projects from different departments. The system performance (again, first-pass inspection) for improvement projects from department X was tracked for nine months after the initial implementation. Figure 2 shows the system's performance for these projects in the stretching, yielding and failing stages. Some projects were discontinued as these teams were unwilling or unable to continue improvement efforts.

As stress is applied, material follows Hook's Law to a reasonable approximation, with stress linearly proportional to strain. Elastic deformation takes place, which involves stretching, rather than breaking, the bonds between atoms. The outward appearance of the material shows no visible cracks. Consequently, when the load is removed, the material returns to its original condition; no permanent deformation remains.

Similarly, in the early stage with the help of an improvement expert, teams found themselves stretching and willing to tackle all improvement tasks. The improvement expert, black belt or green belt provided Six Sigma training, which included sophisticated tools, such as analysis of variance (ANOVA) or statistical process control (SPC). Outward appearance of the improvement implementation was smooth, and there were no signs of cracks. In order to understand the existing state, the improvement teams developed a process map, and data were collected objectively through a variety of sources such as interviews,

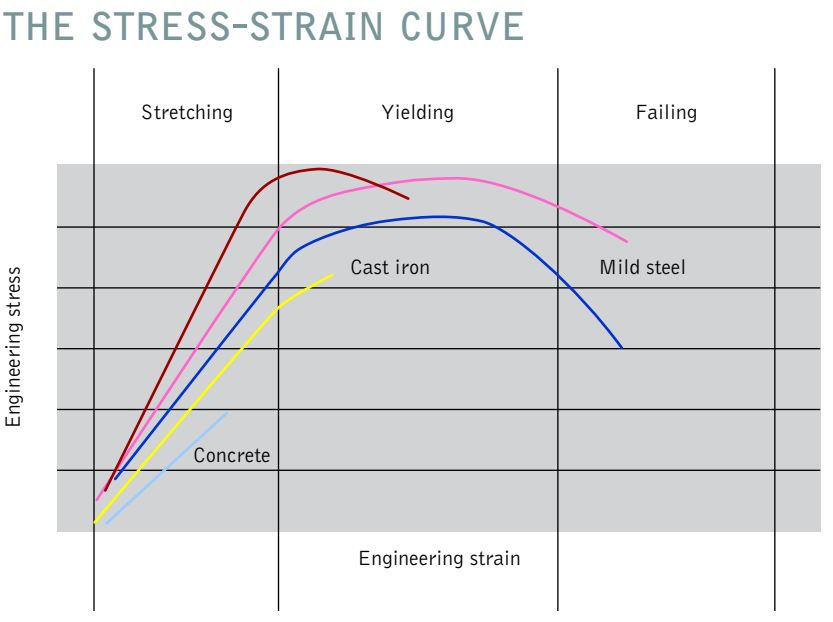


Figure 1. Materials that encounter stress and strain stretch and yield before failing. Performance improvement projects often undergo a similar process.

observations and measurements.

The teams performed simple analysis, such as histograms, and the improvement experts used ANOVA or SPC if needed. With objectivity from the improvement expert, the teams defined improvement scopes and their targets. Managers emphasized the importance of improvements as opposed to daily production commitments and their deadlines. The teams were enthusiastic, their achievements were reported correctly, and many people quickly heard about the successes. Learning to use the improvement strategies increased, and the system's performance showed an upward trend.

Yielding

As stress continues to be applied, material does not follow Hook's Law, and stress is not linearly proportional to strain. Plastic deformation takes place, which involves breaking the bonds and making new ones between atoms (a.k.a. strain hardening). The outward appearance of the material is not smooth and there are visible cracks. Consequently, when the load is removed, the material does not return to its original condition and endures permanent deformation.

Similarly, in the middle stage of an improvement project, implementation wobbled as the experts moved on. While some managers provided training, learning of improvement concepts slowed down. Generally, a senior team member stepped in and held limited discussions with the team. Functional interests of team members started to surface as they talked during breaks or during lunch periods. Managers supported functional areas and started to emphasize daily production commitments and deadlines as opposed to process improvements. The teams yielded and struggled to tackle improvement tasks.

Outward appearances of improvement implementation began to show signs of cracks; teams were unsatisfied, and dissemination of results was slow. Learning of improvement strategies slowed, and although some changes were implemented, the system's performance reached a plateau.

IMPROVEMENT PROJECT PERFORMANCE

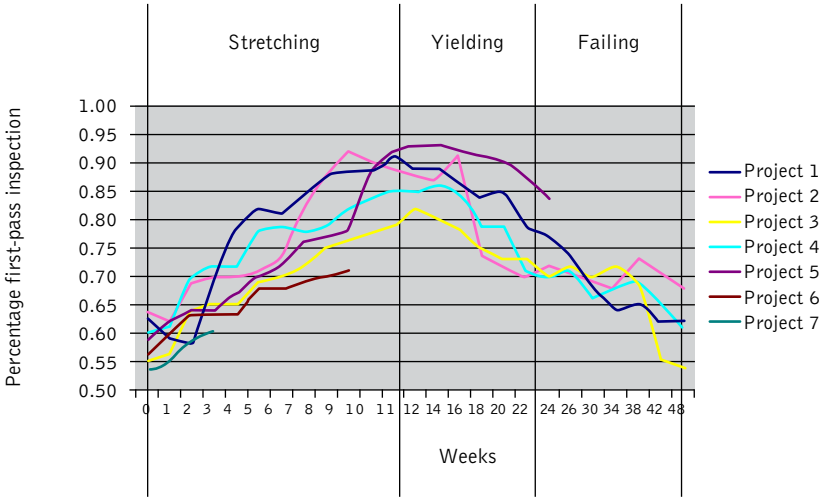


Figure 2: Data was manipulated for weekly (40 hours) representation. Improvement projects involved Six Sigma tools and are completed in 12 weeks.

Failing

As stress continues to be applied, material in one area narrows because no additional strain hardening is possible. This creates a "neck." Outward appearance of material is rough, with visible gaps and voids. The neck becomes smaller and smaller, with local stress increasing until the material fails.

Similarly, in the final stage of improvement, the implementation faltered, and improvement teams found themselves failing, unable and often unwilling to tackle improvement tasks. With the improvement expert long gone, there was no additional training on improvement strategies. No team member stepped in and held improvement discussions. Almost all teams discontinued informal discussions of improvements and functional interests dominated. The teams could not continue process improvements, therefore, no data was collected, and consequently, no analysis was performed.

Managers supported functional needs and emphasized what pays the bills — the daily production commitments and their deadlines. Outward appearance of improvement implementation was rough; there were gaps and voids — teams were frustrated, achievements were reported inaccurately, only a few people knew about them, and they often learned belatedly. Learning of improvement strategies virtually stopped. Few or no changes were implemented, and the system's performance trended down.

Babe Ruth effect

Multiple Six Sigma improvement projects were identified and run simultaneously in different departments. Typically, once projects were completed in one department, the focus shifted to another department for implementation. In this manner, the company was not overwhelmed with improvement

efforts and Six Sigma resources were used effectively.

As shown in Figure 3, the first seven (one to seven) projects were implemented in department X, and then five (eight to 12) projects were implemented in department Y. As described before, projects from department X went through the stretching and the yielding stages and were in the failing stage. In comparison, projects from department Y were in the stretching stage and had not reached the other stages. Specifically, three projects were doing very well, but five projects were failing miserably. While evaluating their improvements portfolio, the executives considered the magnitude of improvement successes more important than the frequency of improvement failures and continued to give these improvement programs a go-ahead, thus exhibiting the Babe Ruth effect.

Lessons

There are three major lessons from Six Sigma improvement failures.

1. The frequency of improvements is more important than the magnitude of improvements. This is demonstrated in the childhood story of "The Tortoise and the Hare," which stresses the importance of steady progress toward the goal by doing a little bit every day and not giving up. Simple examples from everyday life, such as maintaining relationships or raising children, all illustrate the importance of the frequency of improvements versus the magnitude of improvements.

In world class operations, this practice of performing small improvements frequently is known as kaizen. Technically, the word translates into two parts. "Kia" means "change," and "Zen" means "for the better." This strict definition is more loosely translated into what we typically refer to as "continuous improvement." The objective of continuous improvement is to involve everyone, managers and workers, who each take small steps in reducing or eliminating seven basic types of waste. These wastes are waste from overproduction, waste from inventory, waste from motion, waste from processing, waste from waiting, waste from transportation and waste from defects. Continuous improvement is a powerful concept that significantly

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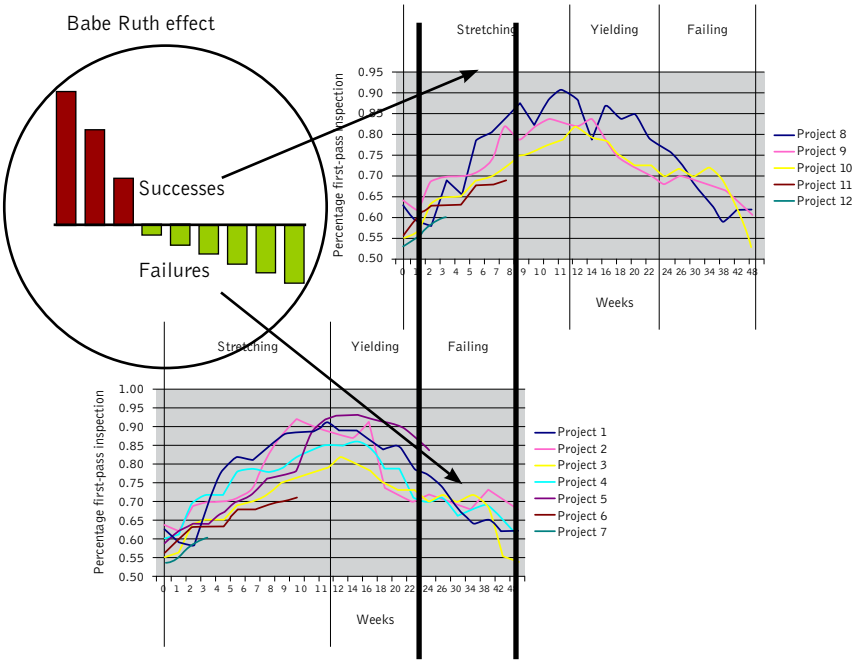

Figure 3. The overall success of improvement projects can mask the number of projects that fail.

EXPERTS BOOST IMPROVEMENT

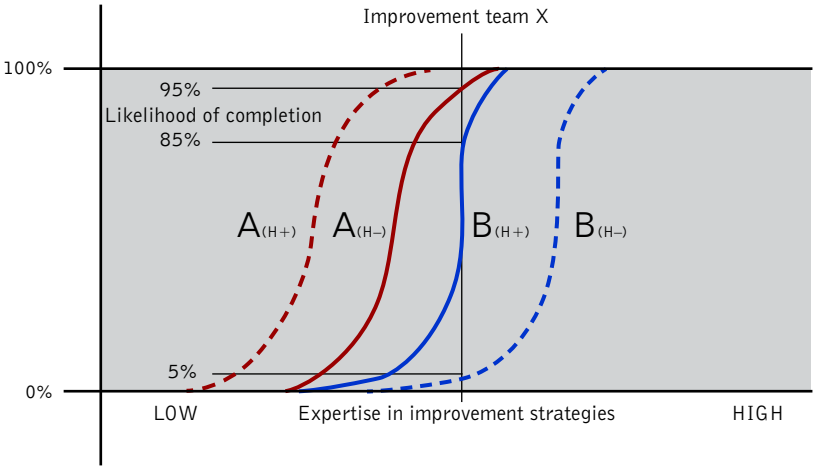

Figure 4: The x-axis shows improvement expertise from low level to high level. Low level implies some knowledge of improvement methodologies and high level implies extensive knowledge, such as the know-how possessed by a Six Sigma black belt.

ZPD AND IE

Soviet psychologist Lev Vygotsky used zones of proximal development (ZPD) in his studies of the development of children. The theory is that learning is more achievable in a child's ZPD.

Vygotsky defines ZPD as "the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under guidance."

Six Sigma specialists can look at Figure 4 for an example of a ZPD in process improvement.

For improvement team X, the area between easy task A, which is performed without help from an expert (A(H-)), and difficult task B, which is performed with help from an expert (B(H+)) represents the team's ZPD.

improves operations, generates pride of workmanship and notably enhances the ability to compete in the marketplace.

2. Simple tools work better than sophisticated tools, such as ANOVA or SPC, in learning improvement skills. One learns to swim faster by being in a pool, floating and kicking legs, rather than sitting and watching Michael Phelps' Olympic gold-medal-winning tapes for hours. It is not a coincidence that in Toyota there is relentless pursuit of excellence through simple tools of problem solving or scientific thinking, such as A3 reports.

The A3 report focuses on problems and their solutions. While the exact format may vary, it has four sections. In the first section, a statement defines the problems associated with the target area. In the second section, in order to understand existing conditions, a current state analysis is performed to document data collection and verify data analysis. The third section introduces possible solutions after improvements are introduced, and the future state is shown. The fourth section highlights improvement, including results and follow-up activities.

3. Extended involvement of improvement experts (or coaches is required to sustain improvements. No one doubts the role of Vince Lombardi, a legendary NFL coach, in demanding and receiving a higher level of performance from his football teams. His teams delivered the goods year after year.

In order to facilitate improvement activities in Toyota, improvement experts known as "sensei" routinely are engaged to lead improvement teams. Extended involvement of improvement experts is necessary as they create achievable challenges — zone of proximal development (ZPD) — for improvement teams to perform at a higher level. For more on ZPD, see the sidebar on this page.

If extended involvement of experts is not available, it may be difficult, if not impossible, to sustain improvements. In Figure 4, the horizontal axis shows the level of improvement expertise, which ranges from low to high. A low level implies an ability to tackle easy tasks, and a high level of improvement expertise implies an ability to tackle difficult tasks. The vertical axis depicts the likelihood of completing a task, which ranges from zero percent to 100 percent.

The figure shows two, A and B, arbitrary improvement tasks. Task B is more difficult than task A. If help is available from an improvement expert to complete these tasks, it is indicated with the subscript "H+." If help is not available, it is indicated with the subscript "H-." For improvement team X, improvement task A is easy. With an improvement expert (A(H+)), the team is able to complete this task easily. As shown in the figure, the likelihood of completing this task is 100 percent. Without help (A(H-)), the improvement team's performance is very good (95 percent).

For the same team, task B is difficult. With help (B(H+)), the team has to stretch but has a pretty good chance (85 percent) to complete the improvement task. Without help (B(H-)), however, the improvement team yields, eventually fails, and has little (5 percent) or no chance to complete the task.

Conclusion

Avoid the Babe Ruth effect. Don't let the magnitude of improvement successes mask how many improvement projects are failing. It would be wise for executives to go back, cancel or adjust some projects, and give others the Six Sigma experts needed for success.

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