

The Pettibon Institute Learning Guide™

Maximizing Your Learning

BY CAROL L. REMZ, PH.D.

Learning—which is a lifelong process—is about expanding our ability to produce the results we truly want in life. Life doesn't stand still; so, to keep getting better, we acquire new knowledge and skills. Sometimes, those conflict with our current beliefs and methods. And anxiety or defensiveness creeps into our mind. This may be your experience as you learn The Pettibon System. What can you do to make your learning as positive and effective as possible? You'll find our ideas and techniques for that in this Learning Guide.

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Getting Your Attention

What do these two people have in common?

What does that have to do with maximizing your learning?



Mihaly Csikszentmihalyi

His name is difficult to pronounce.



His research and life work are about what makes people truly happy, satisfied, and fulfilled.

Mihaly Csikszentmihalyi (pronounced 'Mee-high Chick-sent-me-high-ee') knows what gives people—from all walks of life, from all over the world, and in all cultures—their happiest moments.

It's a condition that enables us to build our brainpower and become more self-confident and sensitive at the same time.

It's a condition that Arthur Winston enjoyed for most of his life.

Arthur Winston

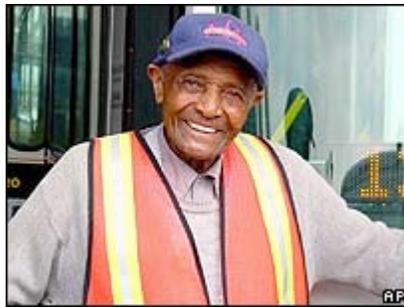
Arthur Winston cleaned buses for the Los Angeles Metropolitan Transport Authority and only missed a single day in 72 years of work. The shift he missed was in 1988 when he buried his wife of 65 years, Frances.

He retired one day after his 100th birthday on March 23, 2006. He died 22 days later on April 14th.

Mr. Winston loved his job. When he retired, he said, “I’m going to miss it.” Though he outlived his wife and their four children, Winston celebrated life.

“I’ve had a lovely life.”

Arthur Winston



March 22, 1906–April 14, 2006

This photo was taken when Mr. Winston was 99.

[Appendix I has a copy of Mr. Winston’s Obituary in The Los Angeles Times]

Arthur Winston lived his life with focus, productivity, and happiness.

Giving him the condition that Mihaly Csikszentmihalyi says is “the closest thing to heaven on earth.”

Continue reading to find out what this condition of heightened focus, productivity, and happiness is, as well as other ways to expand your ability to produce the results you truly want in life—which is what learning is all about!

The Closest Thing to Heaven on Earth

For 25 years, psychologist Mihaly Csikszentmihalyi (pronounced ‘Mee-high Chick-sent-me-high-ee’) resolved to find out why so many people were unhappy, despite having comforts, luxuries, and opportunities. “Why did people end up feeling that their lives have been wasted, that instead of being filled with happiness their years were spent in anxiety and boredom?”

But instead of another study on human pathology and dysfunction—the almost-exclusive focus of the field of psychology—Csikszentmihalyi decided to seek the answer by examining the positive proposition: What are people’s happiest moments and what brings these moments about?

Interviews with hundreds of people from all over the world, from all walks of life—artists to janitors—and from data collected from thousands of individuals all resulted in the same answer.

“The best moments usually occur when a person’s body or mind is stretched to its limit in a voluntary effort to accomplish something difficult and worthwhile.”

We are so absorbed that we lose our sense of time. Time flies.

Our whole being is involved. We’re using our skills to the utmost.

We have feelings of peace and harmony and fulfillment.

Mihaly Csikszentmihalyi called this condition of heightened focus, productivity, and happiness ‘a state of flow.’

Flow = a mental state where we’re fully engaged in what we’re doing, stretching our body or mind to its limit, focused on accomplishing a goal that is challenging and worthwhile.

The world was introduced to Dr. Csikszentmihalyi’s work in 1990 with his book, *Flow: The Psychology of Optimal Experience*, published by Harper Perennial.

At that time, he was a professor and Chairman of the Department of Psychology at the University of Chicago. Currently, Dr. Csikszentmihalyi is the director of the Quality of Life Research Center (QLRC) at the Drucker School, Claremont Graduate University. The QLRC is a nonprofit research institute that studies “positive psychology,” that is, human strengths such as optimism, creativity, intrinsic motivation, and responsibility.

Dr. Csikszentmihalyi has devoted his life’s work to the study of what makes us truly happy, satisfied, and fulfilled.

Flow

We can be in a state of flow at play, at work, and when learning. A team can be in a state of flow. “Without flow,” says Dr. Csikszentmihalyi, “there’s no creativity.”

How do we get into flow? Dr. Csikszentmihalyi hasn’t written a step-by-step guide. He has, however, described eight components of an experience of flow. Not all are needed for you to experience it.

1. Clear goals (expectations and rules are discernable).
2. Concentrating and focusing, a high degree of concentration on a limited field of attention (a person engaged in the activity will have the opportunity to focus and to delve deeply into it).
3. A loss of the feeling of self-consciousness, the merging of action and awareness.
4. Distorted sense of time—our subjective experience of time is altered.
5. Direct and immediate feedback (successes and failures in the course of the activity are apparent so that behavior can be adjusted as needed).
6. Balance between ability level and challenge (the activity is not too easy or too difficult).
7. A sense of personal control over the situation or activity.
8. The activity is intrinsically rewarding, so there is an effortlessness of action.

<http://en.wikipedia.org/wiki/Csikszentmihalyi>

Getting into flow

When you take a closer look at flow’s components, the setting up of some as preconditions makes sense. And it’s what Dr. Csikszentmihalyi advocates. In a work or learning situation, there should be clear goals and a reasonable expectation for completing the task at hand. People need the ability to concentrate and receive regular feedback on their progress. Ensuring that the activity is not too easy or too difficult requires assessing the skills people need.

In designing and developing the learning environment for The Pettibon System, we considered the preconditions for flow. We also examined the preconditions in the context of what you need to be directly responsible for!

Have a powerful goal

When people say, “I wish...” they usually mean, “I’d like to, but it’s too much trouble.”

When people say, “I’ll try...” they’re not whole-hearted and are warning you that they may fail. And most times, they do.

People who indulge in wishful thinking and make half-hearted efforts don’t have powerful goals. A powerful goal has to be something we really want.

When we have a powerful goal, what we say we want is the same as what we subconsciously feel.

When we have a powerful goal, we are less likely to give up when obstacles get in our way.

When we have a powerful goal, expressing it as an affirmation—a positive statement that declares we’ve already attained what we want—programs our subconscious to find ways for our actions to match our belief.

Brain research has found that we can give the equivalent of up to 126 bits per second of conscious attention to a task. If an activity fully absorbs all 126 bits, negative thoughts and distractions are blocked.

If a task is too hard, anxiety, insecurity, worry, in other words ‘negative noise,’ creeps into our mind.

If a task is too easy, boredom makes our mind wander.

A powerful goal acts as a gatekeeper for negative thoughts and distractions. A powerful goal gives us a motivating vision.

So what’s your goal for learning? Earning Continuing Education Credits. Satisfying your curiosity. Picking up a few new tricks of-the-trade. Do any of those give you a motivating vision?

Is your goal: Be the best chiropractor you can be? Does that mean providing care that fixes the cause of your patients’ problems? If that’s the case, are you willing to unlearn some of what you know first?

Learning & unlearning

THE PURPOSE & PROCESS OF LEARNING

Learning—which is a lifelong process—is about expanding our ability to produce the results we truly want in life. Life doesn't stand still; so, to keep getting better, we acquire new knowledge and skills.

In the learning process, as we delve into what's new, we try and make sense of it in terms of what we already know.

But how do we make sense of what's new in terms of what we already know when the new knowledge and skills are very different? When you can't easily find ways to connect the new know-how with your current beliefs and methods?

When the two are contradictory?

The Pettibon System is very different from conventional chiropractic. You're going to have to resolve conflicts with your current methods and beliefs. You have to do some unlearning—or letting go—first.

WHAT UNLEARNING MEANS

'Unlearning' is letting go of current beliefs and methods. If we're going to learn something new, we may have to unlearn what we already know. Why? The answer to that can be found in the story that follows.

A story: Sweden's hunt for Soviet submarines.

From the mid-1970s until 1992, Sweden was convinced that Soviet submarines were lurking off the Swedish coast. The Soviets always denied that their submarines had been anywhere near Sweden. But the Swedes kept mounting large-scale hunts, dropping grenades and depth charges, and detonating remote-control mines.

Here's an example of the intensity of Sweden's search: In May and June of 1988, the Swedish Anti-Submarine Warfare unit had nine live-fire attacks aimed at the suspected foreign submarines. The Swedes were sure that one had been detected and trapped. "But contact was lost," according to a Swedish Defense Ministry spokesperson, "because of the noise from exploding depth charges and underwater grenades, and the submarine apparently slipped away in the turbulence."

The spokesperson continued, "When we played back the tapes, we saw that the submarine was exactly where we thought it was. It's probable that we hit and damaged it although a search had failed to produce evidence of damage."

In October 1981, the Swedes captured a Soviet submarine. It hadn't been hunted but had made a navigational error and grounded on rocks along Sweden's southern coast. Of course, that reinforced the Swedes' suspicions.

In July, 1987, Tero Harkonen, a Swedish seal expert, speculated that what appeared to be submarines may have been seals at play, gushing through the water and even creating foam on the surface.

Swedish navy officials didn't change their minds. They declared their sightings of submarines reliable and claimed to have seen air bubbles from a diver.

In February 1995, Sweden's defense chief Owe Wiktorin told a news conference that the Swedish navy had acquired new hydrophonic instruments in 1992, and these had shown that minks (mink whales) give off sounds similar to submarines. So if, since 1992, the supposed intruding submarines were sea mammals, what about before 1992?

Those were checked and eventually Wiktorin reported: "There is overwhelming evidence (technical, acoustical, and visual) that there have been five foreign submarine operations on Swedish territory since 1981, including the Soviet submarine that ran aground in 1981."

In 1995, four years after the collapse of the Soviet Union, Russian anti-submarine experts continued to deny that the supposed foreign submarines sighted by the Swedish navy were Soviet ones.

WE SEE WHAT WE BELIEVE TO BE TRUE

The story's source is the article, "Unlearning Ineffective or Obsolete Technologies," by Dr. William H. Starbuck, a professor at University of Oregon. Dr. Starbuck's article was published in the *International Journal of Technology Management*, 1996, 11: 725-737.

Dr. Starbuck used the story to show how our beliefs and what we understand to be true filter our perceptions. The Swedish sailors were trained to hear and see things as evidence of a submarine. Within that learning, there wasn't a way to accommodate Tero Harkonen's information.

According to Dr. Starbuck, "Experts may be among the most resistant to new ideas and to evidence that contradicts their current beliefs and methods."

When what you've built your status and livelihood on is threatened, does such resistance really seem that surprising?

What about scientists? Are they more open to accepting findings that turn their 'world view' upside down?

Not always, according to Thomas Kuhn, professor of philosophy and history of science at MIT until his death in 1996, and his most renowned work, *The Structure of Scientific Revolutions*.

PARADIGM SHIFTS

Kuhn popularized the term ‘paradigm.’ He described a paradigm as a collection of beliefs shared by scientists—a set of agreements about how problems are to be understood. When research findings can’t be explained with the existing paradigm and trigger the development of a new and competing paradigm, battles can ensue. Some scientists will choose to ignore the threat, and others will reject it as spurious or fallacious.

In time, a new paradigm can replace in whole or in part an existing paradigm, but the process is one of ‘intellectual violent revolution.’

[*The Structure of Scientific Revolutions* generated a lot of controversy. And critics. Dr. Pettibon obviously agrees with Kuhn’s ideas about paradigm shifts. You can decide for yourself by reading his work.]

A NEW PARADIGM FOR THE CHIROPRACTIC PROFESSION

No, we’re not asking you to join a revolution. Rather, we’re inviting you to scrutinize the existing chiropractic paradigm and be open about doing some ‘unlearning’ so you can maximize your learning of The Pettibon System.

Over the years, there have been doctors who let go of the conventional chiropractic paradigm in an instant. Others, feeling threatened, put up protective guards. Some of those guards were impenetrable and a few had cracks caused by doubts and dissatisfaction. Those doubts and dissatisfaction enable one way to unlearn.

HOW YOU UNLEARN

Dr. Starbuck’s article suggests ways to facilitate unlearning. A few of those follow.

“It isn’t good enough.”

Dissatisfaction is the most common reason for doubting current beliefs and methods. Any doubt—no matter how small—can be the start of unlearning.

“It’s only an experiment.”

Treat the new paradigm—The Pettibon System—as an experiment. When we see ourselves experimenting, we tend to be more willing to deviate from our standard practices. Run ‘tests’ and look at the results as feedback instead of measures of success or failure.

“Surprises should be question marks.”

Events that don’t turn out the way we expect—whether positive or negative—are opportunities for unlearning. The pleasant surprise or the unpleasant disruption can be used to reveal weaknesses in our current beliefs and methods.

“All dissent and warnings have some validity.”

We really like this one! Dr. Pettibon has been a dissenter for a long time. But he backs up

his dissent with evidence. Keep an open mind and, most importantly, consider what the benefits are to you, your patients, and the chiropractic profession if Dr. Pettibon is right!

“Collaborators who disagree are both right.”

The operative word here is ‘collaborators.’ Collaborators have working relationships and mutual respect. When there’s disagreement, they don’t set out to prove who’s wrong or right but to reconcile “apparent contradictions,” with the result being “new conceptualizations” and sometimes “strange inversions.” This latter situation is where the collaborating experts each agree that the other is right—switching their beliefs.

Within the family of Pettibon practitioners, there’s disagreement and lots of back-and-forth discussion. It’s done in the spirit of mutual respect. And there have been a number of occasions when practitioners ‘flipped’ to each other’s argument, including Dr. Pettibon!

“What does a stranger think strange?”

New people don’t have biases. Newcomers may be able to see ‘peculiarities’ that the indoctrinated cannot. Fresh perspectives are important. It’s one of the reasons why Dr. Pettibon continues to teach chiropractic students and cherishes working with new doctors.

Dr. Starbuck proposes two other ways to facilitate unlearning: “All causal arrows have two heads.” “The converse of every proposition is equally valid.” These can’t easily be summarized, so refer to Appendix II for their complete explanations from his article.

Now let’s shift to specific techniques for making learning easier.

Techniques to make learning easier

The easier it is for you to learn new skills and knowledge, the faster you'll be able to apply them.

USE ALL YOUR SENSES

It's through our senses of seeing, hearing, and doing—visual, auditory, and kinesthetic—that we take in new knowledge and skills. Each of us also has a preference. Educators categorize people according to their preferences as being visual learners, auditory learners, or physical (kinesthetic) learners.

If you want to take some free tests to help you identify your learning preference, go to: <http://www.berghuis.co.nz/abiator/Isi/Isiframe.html>. This is the website of Tony Berghuis, a teacher from New Zealand. There are others. But you don't have to take a test. Your language gives you some clear/loud/strong clues:

A visual learner tends to use phrases like:

- **I can't quite picture it.**
- **I'd like to get a different perspective.**
- **See how this works for you.**

An auditory learner tends to use phrases like:

- **It's coming through loud and clear.**
- **Tune in to what I'm saying.**
- **That sounds about right.**

A physical learner tends to use phrases like:

- **That feels right to me.**
- **That doesn't sit right with me.**
- **I can get my hands around that.**

Whatever your preference, the research on memory strongly supports the importance of focusing all your senses in the learning process. We remember:

- **20% of what we read**
- **30% of what we hear**
- **40% of what we see**
- **50% of what we say**
- **60% of what we do**
- **90% of what we see, say, hear, and do**

On Tony Berghuis' website, you'll also find lists of different learning strategies that work for specific preferences. We encourage you to mix them up. The list below describes some of the most common strategies that educators recommend:

- **Visualize what you've read, seen, or heard. Make a mental movie.**
- **Read out loud to yourself.**
- **Ask yourself questions and answer them—out loud or in writing.**
- **Go back with colored highlighter pens after you've read something for the first time, and highlight the new knowledge.**
- **Write out key ideas on 3M Post-it™ Notes or 3 x 5 cards.**
- **Make notes listening to a lecture that reflect your thoughts and opinion—don't waste your time trying to transcribe what's being said.**
- **Walk about as you think, review, or summarize. Talk to yourself too!**
- **Make a check, in pencil, along side each paragraph or page you understand when reading a lot of material.**
- **Put a question mark, in pencil, along side each paragraph or page that you don't understand when reading a lot of material. Go back to each question mark and change it to a check when you understand the paragraph or page.**

CALM YOUR MIND; GET INSPIRED

Doing deep breathing—also called diaphragmatic breathing—helps us to relax. When we're relaxed, our mind is calm and receptive.

Sitting in a chair with your back straight:

- **Imagine a balloon in your stomach.**
- **Put your hand over your navel and breathe in deeply through your nose, feeling the balloon in your stomach inflate and your hand moving outwards.**
- **Hold your breath for two to four seconds.**
- **Breathe out with a slight sigh and feel the balloon in your stomach deflating and your abdomen falling. (Your breathing out will take longer than breathing in.)**
- **Hold your breath for two to four seconds.**
- **Continue this pattern for 5 to 10 breaths.**

KEEP YOUR LEARNING SESSIONS TO 30 MINUTES

... unless you get into the flow!

Maybe it's easy for you to concentrate for more than 20 minutes at a time. You're unusual. Taking frequent breaks is okay. More importantly ...

REVIEW OFTEN

Review after you've taken a break. Review an hour after you've learned something new. Review it a day later, a week later, a month later, and review it again after six months.

Studies have shown that we forget 70% of what we've learned after 24 hours. Using a

systematic review cycle can boost your long-term memory up to 80%.

Your review sessions can be short—a few minutes. And make them multi-sensory—look over highlighted sections and notes you wrote, draw diagrams, visualize, talk out loud, etc.

Sleep on it! There are studies* that advance theories about sleep boosting our learning performance. An application of those theories would be your briefly reviewing new learning material just before you go to bed. Intrigued? You can't lose any sleep by experimenting!

*(http://en.wikipedia.org/wiki/Sleep_and_learning)

LISTEN TO MUSIC THAT MAKES YOU LEARN BETTER

In 1979, the book, *Superlearning*, by Sheila Ostrander and Lynn Schroder, popularized the work of the Bulgarian psychologist, Dr. Georgi Lozanov, and his colleague, Dr. Aleko Novakov.

Lozanov and Novakov showed that Baroque music accelerated learning. Baroque music has 60 beats per minute. These Soviet researchers were not aware that U.S. researchers Lynn Cooper and Milton Erickson reported a similar finding using metronomes set at 60 beats per minute. It induced in listeners a profound Alpha State, ideal for learning and memory.

Following the methods advocated by Lozanov and Novakov, researchers at Iowa State University succeeded in increasing memory retention in test subjects by 26% and speed of learning by 24% using 60-beat-per-minute Baroque music.

Dr. Alfred Tomatis (January 1, 1920–January 25, 2001), a member of the French Academy of Medicine and Academy of Science, also contributed to understanding how music enhances brainpower.

According to Dr. Tomatis, when the electrical potential of brain cells starts to fade, we experience dullness and fatigue. We can recharge our brain cells like batteries by listening to high-frequency sounds, between 5,000 and 8,000 hertz. How does this happen? Through the ear and the vibration of Corti cells, which line the fluid-filled cochleas of the ear.

The music of Mozart contains the highest number of high-frequency sounds. Hard rock contains the fewest!

Our closing 'note' to you is on the next page.

Some questions to reflect on

- What are some of your dissatisfactions with your current treatment protocols?
- What surprise—either pleasant or unpleasant—have you had in your practice that caused you to question your treatment protocols?
- Has there been a situation in your life when you realized that your beliefs had filtered your perception? What happened?
- Have you experienced ‘being in the flow’? When? What were you doing?
- What results do you truly want in your practice? Can you see them and feel them?

To exist is to change, to change is to mature; to mature is to go on creating oneself endlessly.

—Henri Bergson

To raise new questions, new possibilities, to regard old problems from a new angle, requires creative imagination and marks real advance in science.

—Albert Einstein

Appendix I

The Los Angeles Times Obituary for Arthur Winston:

MTA LEGEND ARTHUR WINSTON, 100, DIES AFTER BRIEF RETIREMENT

By Kurt Streeter, Times Staff Writer

1:40 PM, PDT, April 14, 2006

Arthur Winston, who set a remarkable personal record by missing only a single day in 72 years of work, died of congestive heart failure Thursday as he slept in his South Los Angeles home. He was 100.

Many of his colleagues and friends honored him by calling him Mr. Winston. He cleaned Los Angeles buses and trains for the Metropolitan Transportation Authority. The only shift he missed was the day in 1988 that his wife died.

Otherwise, said his bosses at the MTA, they had never known him to arrive for work late or to leave work early. He didn't retire until March 23, one day after he turned 100.

Why then?

"Oh," he said with a shrug, "100 years seemed like enough. "

Mr. Winston's great-granddaughter, Brandii Wright, 29, said today that working until he had lived to be 100 was a long-sought milestone. "He accomplished his goal," she said. "After reaching that he felt like he did what he had to do in life. It was okay to move on. I'm just really proud of him."

Mr. Winston was slender and well groomed, a tan-skinned man, who liked to step out of his house each morning with his shirt freshly pressed.

Even in his last years, he walked with the upright dignity of a man utterly confident in himself and what he stood for. His chin rose, and his almond-shaped eyes sparkled when he ticked off what he considered his greatest accomplishments.

They were confronting the racism he experienced as a black man, living long enough to see his great-great grandchildren, and being a witness to so much history.

Still, he did not consider himself particularly special. "I'm just a working man," he said in a 2005 interview, five months before he died. "Nothing more, nothing less. My Daddy taught me the right way to do things. I just tried to follow what Daddy said."

Never shy about making his feelings known, Mr. Winston was something of an urban storyteller. At work, at home and in his neighborhood, youngsters, including people in their 60s and 70s, hovered around when he gave advice. He spoke on everything from politics to finances to the importance of work.

Foremost among his beliefs was that a person should stay active as long as possible. “Stop in one place too long, you freeze up, ” he would say. “Freeze up, you’re done for!” The best way to keep from freezing up? That was simple, he said. “Keep working. Work and work some more. That’s all there is to this live a long life thing.”

There were other nuggets. In his bluesy, scratchy voice, Mr. Winston often opined on the dangers of racking up debt and buying unnecessary things, “fancy cars and such.” And he warned about the dangers that came with too much alcohol, too much fried food, too much exercise, or too many pills.

At work on a winter day in 2005, he told a group of colleagues that one of the reasons he had lived so long was that he opted for a few tablespoons of castor oil whenever he felt sick. Over-the-counter medication, he said, was something to avoid.

“Pills are one of the biggest problems people face today, especially these old people you see out there,” he said. “I’ve never in all my life seen so many people taking so many pills. And at the same time it seems like people are nothing but sicker than ever. It’s a shame, all these old people dying over the pills they take.”

No matter what contributed to his spunk and longevity—good genes, an aversion to modern medicine, or just sheer determination—the results were evident. A spokesman for the U.S. Department of Labor said that he had never heard of anyone who had worked as long and as continuously as Mr. Winston. In 1997, MTA officials named the bus yard where he worked after him.

Even as he neared 100, Mr. Winston kept at it. Like clockwork, 15 minutes before each shift, he pulled his 1978 Cutlass into the Arthur Winston Bus Division. He parked in a spot reserved for him, checked to be sure his blue uniform was tidy and marched off to punch off another hole in his timecard.

He did slow down. In recent years, he took longer breaks. He sat in the warmth of the second-floor break room, watched CNN and offered up a steady stream of commentary on current issues. He grew angry with the Bush Administration, the war in Iraq and the state of Black America, which he considered to be in a shambles.

Nonetheless, he kept doing what he was asked. “Puts in his eight-hour days,” said his boss, Alex DiNuzzo. “He never complains. He’s always willing to adjust to do what is needed. Works faster than a lot of guys. And does it with the best attitude out there.”

Each morning, he eagerly walked the sprawling South Los Angeles bus yard. He cleaned grime off bus floors, wiped down bus windows and supervised a small crew of workers.

Following his lead was easy, his co-workers said. They held him in too much awe to question him. “You see him and you think to yourself, ‘That man, after all he had seen and done—why, he’s better than a history book—look, he’s still at it,’” said Roy Turner, a bus mechanic. “I think about him when I get tired. It’s like how can I be tired. Look at this man, almost 100, and he’s not tired. “

Mr. Winston grew up on a farm in Oklahoma, the son of a sharecropper, who lived until he was 99.

In 1924, when Mr. Winston was 17 and fresh from the Midwest, he took a job cleaning trolley cars for the Los Angeles Railway Co., a predecessor to today's MTA. He worked for a short spell and then quit, partly because he was frustrated. He wanted to be a driver. But the company did not allow black drivers.

On Jan. 24, 1934, he decided to come back to work. When the transit agency finally let blacks drive he was well into adulthood—he and his wife, Frances, were busy raising kids. “It just seemed too late to change,” he said.

He stayed a transit janitor. From the vantage point of his bus yard, he witnessed the city's growing pains. He saw whites leave South Los Angeles, saw blacks become a majority, then saw blacks begin to leave as Latinos came in larger numbers. He witnessed periods when people got along and moments when the city exploded in riots.

To his chagrin, he watched the destruction of the dense network of trolleys that connected parts of Los Angeles. Then, over the last two decades, he saw the slow rebirth of commuter trains as the city began to rebuild its network of rail lines.

Mr. Winston took constant change in stride. He said he tried hard to be sure that bitter times did not defeat him. He used moments in history as touchstones, reminders of his good fortune to live so long.

From the 1940s until the day he died, he lived in a small, white house just south of the Santa Monica Freeway. In his last years, he shared the home with his great-granddaughter and his great-great grandson.

“I guess, if you live long enough you'll see everything,” he said one day in 2004, as he sat on the steps of his house and looked out at his street. “Sometimes you see things come around twice. I don't mind. I like it.

“My Daddy taught me how to work and he also taught me that no matter what's going on around you, just stay strong on the inside. Don't bother nobody. Don't let nothin' destroy you. No matter how things are going in the outside world, just keep going. Keep going, and learn from what you see in front of you.”

Mr. Winston is survived by his brother, North Winston, 98, his great-granddaughter, Brandii Wright, 29, and his great-great grandson, Kenny, age 4.

Appendix II

UNLEARNING INEFFECTIVE OR OBSOLETE TECHNOLOGIES BY WILLIAM H. STARBUCK

Published in the *International Journal of Technology Management*, 1996, 11: 725-737.

“All causal arrows have two heads.”

People can use thought processes that tend to disclose and challenge their tacit assumptions. One useful heuristic is to insist that all causal paths carry influence in both directions: Whenever one perceives that A affects B, one should also look for ways in which B feeds back and affects A. There are some causal paths that do not carry influence in both directions. However, one-directional causation is rare because systems that can converge toward equilibrium have to entail feedback. Searching carefully for these feedback paths can lead one to see previously overlooked causal paths.

For example, Toyota developed the concept of a Just-In-Time inventory system by inverting the causal flow. In the traditional view, production converts raw materials into finished goods. A plant turns raw materials into components that feed into in-process inventories, and the plant produces finished products by drawing components from inventories. The finished products go into finished-goods inventories, not directly to customers. Customers must buy from the finished-goods inventories. Thus, analysts view production as flows of materials through stages of conversion; inventories uncouple these consecutive stages.

According to Toyota's Taiichi Ohno, “... we reversed our thinking and considered the production process in terms of backward flow” (Nayak and Ketteringham, 1986: 210). What flows backward is information about customers' desires. When customers select finished products, they create vacancies in the finished-goods inventory. As finished products fill these vacancies, they remove components from the in-process inventories. The inventory vacancies created by withdrawn components convey information about the finished products that customers want. The inventory vacancies cascading through the production process automatically decompose customers' desires into components and ultimately raw materials.

Inverting the causal flow led Ohno to see production as the conversion of customers' preferences into demands for components and raw materials. In this view, in-process inventories become barriers that delay the flows of information. To speed this information flow, Toyota set out to minimize its in-process inventories.

“The converse of every proposition is equally valid.”

Dialectic reasoning is a generalization of two-directional causation. Starting from a proposition (A affects B), one states the converse proposition (B affects A) and then one insists that both the original proposition and its converse are valid. The philosopher Georg Hegel, who advocated this mode of reasoning, called the original proposition the thesis, its converse the antithesis, and their union, the synthesis. As with causal paths,

not every thesis has a valid antithesis and not every thesis can be synthesized with its antithesis. But it is possible to apply dialectic reasoning to almost all situations and the process of applying it helps one to break free of tacit assumptions.

One can see dialectic reasoning in the work of Gideon Sundback, who invented the zipper (Friedel, 1994). During the latter part of the nineteenth century, the most common method of fastening shoes was hooks and eyes. These were also used to fasten women's skirts and men's trousers. But fastening them was slow work and they did not stay fastened very well. The first zipper-like patents, which emerged in 1893, proposed that a sliding "guide" could mate hooks and eyes. These devices were rather complex and they required precise assembly, so around 1904, their inventors began attaching them to cloth tape that could be sewn into shoes or clothing. The design, however, did not work well in that the hooks and eyes tended to separate when the fastener was bent or twisted.

The company that manufactured these devices hired Gideon Sundback to improve their design. His first effort, although better than its predecessors, had similar deficiencies and it was a commercial failure. Around 1912, after pursuing improvements in the prior design for six years, Sundback came up with a radically different design. In it, a slide forced the beaded edge of a cloth tape between two rows of metal clamps—somewhat like a Ziploc fastener. Thus, Sundback had replaced the proposition 'a fastener involves hooks and eyes' with its antithesis 'a fastener has neither hooks nor eyes.'

The antithetical design also had serious deficiencies—the cloth tape wore out after only a few uses. But optimistic backers formed a new Hookless Fastener Company, and Sundback continued his experiments. In 1913, he produced a design very like the modern zipper. In it, the hooks had shrunk to small protrusions and the eyes had closed until they were indentations. It synthesized hooks and eyes with their absence, and it synthesized hooks with eyes. The two sides of the fastener were composed of identical elements.