The autoSocratic Chronicles

Random Thoughts on the Philosophies of the Arete Academy

Board of Directors

Issue # 1: The Theory of Constraints

Ayn Rand

W. Edwards Deming

Maria Montessori

an *auto* SOCRATIC PRESS publication
Michael Lee Round

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and the Pursuit of Happiness.

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auto SOCRATIC EXCELLENCE

The TOC Chronicles

THE PRIVATIZATION OF (LOGICAL) TREES

context: How should one analyze the work of another? Be careful when you say "I'm wrong".

January 3, 2008

Trees
Joyce Kilmer

I think that I shall never see
A poem lovely as a tree.

A tree whose hungry mouth is pressed
Against the earth's sweet flowing breast;

A tree that looks at God all day,
And lifts her leafy arms to pray;

A tree that may in summer wear
A nest of robins in her hair;

Upon whose bosom snow has lain;
Who intimately lives with rain.

Poems are made by fools like me,
But only God can make a tree.

Private Trees
Michael Round

I hope that I shall one day see
The Privitization of a TOC-tree.

A tree that grows from a seed that's me -
Reflecting what my own eyes see.

And if you view my tree erect
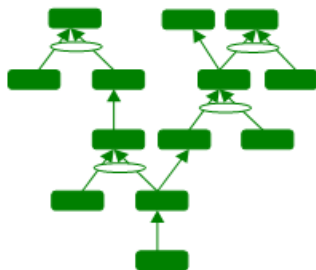Pause to say my tree's incorrect.

Question, yes, but with this tone:
"I don't understand this here zone."

I'll gladly explain, perhaps rearrange -
I might hold my ground - I might change.

Privitization can personalize a tree,
So Forests Grow From Sea to Sea

TOC-Trees
Michael Round

I think that I shall never see
A poem lovely as a TOC-tree.

A tree affording joy in learning,
Compatible with children's yearning!

A tree that feeds off validity
And lifts all up - Socratically!

A tree that does withstand assault,
By clarifying without a fault.

It does not matter: who, what, when?
The mighty power of "if-then"!

Poems are made by fools like me,
But EVERYBODY can make a TOC-Tree!

IS A PUZZLEMENT!

January 23, 2008

The King and I. One of my favorite musicals. "Puzzlement". One of my favorite words. The lyrics of this song highlight many timeless dilemmas – of person and country. First, the relevant elements of the lyrics:

When I was a boy
World was better spot.
What was so was so,
What was not was not.
Now I am a man;
World have changed a lot.
Some things nearly so,
Others nearly not.

There are times I almost think
I am not sure of what I absolutely know.
Very often find confusion
In conclusion I concluded long ago
In my head are many facts
That, as a student, I have studied to procure,
In my head are many facts..
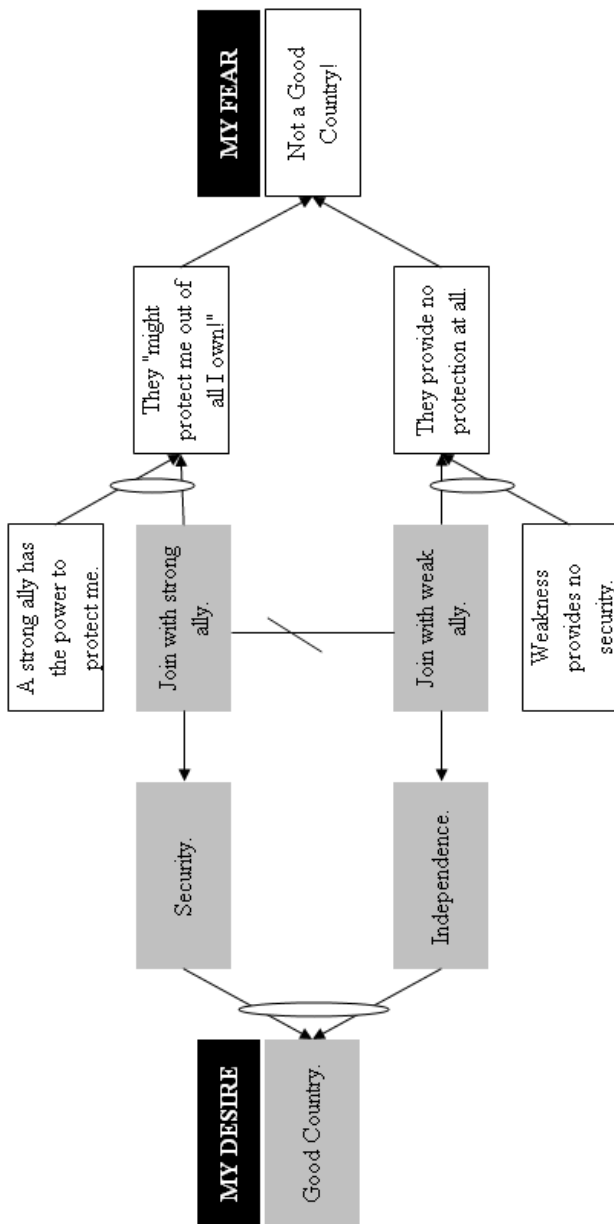Of which I wish I was more certain I was sure!

Is a puzzlement...

What to tell growing son
What for instance, shall I say to him of women?
Shall I educate him on the ancient lines?
Shall I tell the boy as far as he is able,
To respect his wives and love his concubines?
Shall I tell him everyone is like the other,
And the better of the two is really neither?
If I tell him this I think he won't believe it-
And I nearly think that I don't believe it either!-

When my father was a king
He was a king who knew exactly what he knew,
And his brain was not a thing
Forever swinging to and fro and fro and to.
Shall I, then be like my father
And be willfully unmovable and strong?
Or is it better to be right?...
Or am I right when I believe I may be wrong?

Shall I join with other nations in alliance?
If allies are weak, am I not best alone?
If allies are strong with power to protect me,
Might they not protect me out of all I own?

Is a danger to be trusting one another,
One will seldom want to do what other wishes;
But unless someday somebody trust somebody
There'll be nothing left on earth excepting fishes!

There are times I almost think
Nobody sure of what he absolutely know.
Everybody find confusion
In conclusion he concluded long ago
And it puzzle me to learn
That tho' a man may be in doubt of what he know,
Very quickly he will fight...
He'll fight to prove that what he does not know is so!

Ohhhhh! Sometimes I think that people going mad!
Ahhhhh! Sometimes I think that people not so bad!
But not matter what I think
I must go on living life.
As leader of my kingdom I must go forth,
Be father to my children and husband to each wife
Etcetera, etcetera, and so forth.
If my Lord in Heaven Buddha, show the way,
Everyday I try to live another day.
If my Lord in Heaven Buddha, show the way,
Everyday I do my best for one-more day!

But...Is a puzzlement!

MY FEAR — Not a Good Country!

They "might protect me out of all I own!"

They provide no protection at all.

A strong ally has the power to protect me.

Join with strong ally.

Join with weak ally.

Weakness provides no security.

Security.

Independence.

MY DESIRE — Good Country.

THE ANT AND THE GRASSHOPPER

Arriving at "Win-Win" Solutions
January 16, 2008

THE ANT AND THE GRASSHOPPER

In a field one summer's day a Grasshopper was hopping about, chirping and singing to its heart's content. An Ant passed by, bearing along with great toil an ear of corn he was taking to the nest.
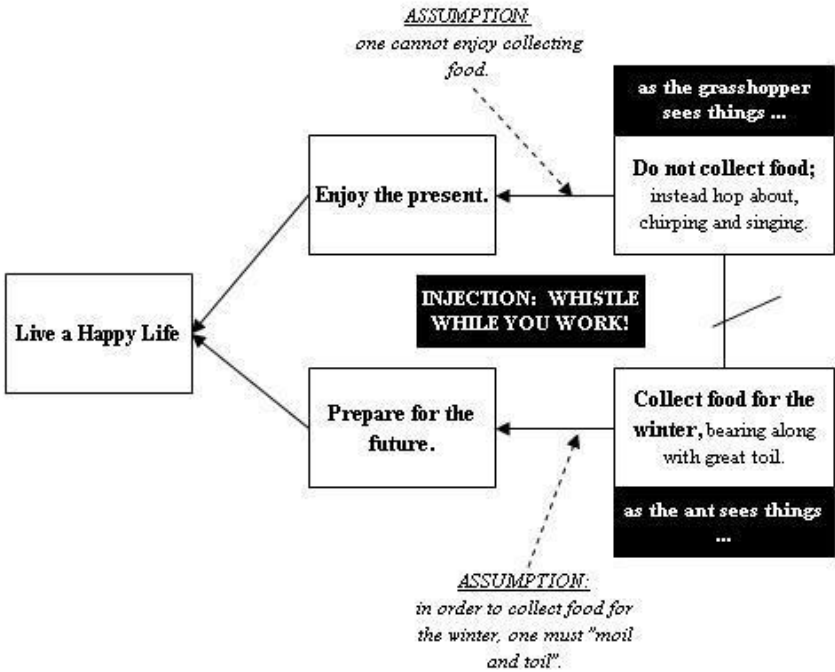
"Why not come and chat with me," said the Grasshopper, "instead of toiling and moiling in that way?"

"I am helping to lay up food for the winter," said the Ant, "and recommend you to do the same."

Why bother about winter? said the Grasshopper; we have got plenty of food at present." But the Ant went on its way and continued its toil. When the winter came the Grasshopper had no food and found itself dying of hunger, while it saw the ants distributing every day corn and grain from the stores they had collected in the summer. Then the Grasshopper knew:

the lesson
It is best to prepare for the days of necessity.

ASSUMPTION
one cannot enjoy collecting food.

as the grasshopper sees things ...

Do not collect food; instead hop about, chirping and singing.

Enjoy the present.

INJECTION: WHISTLE WHILE YOU WORK!

Live a Happy Life

Prepare for the future.

Collect food for the winter, bearing along with great toil.

as the ant sees things ...

ASSUMPTION:
in order to collect food for the winter, one must "moil and toil".

THE JONAH-ANT AND THE GRASSHOPPER
A New Future Reality

In a field one summer's day a Grasshopper was hopping about, chirping and singing to its heart's content. An Ant passed by, bearing along with great toil an ear of corn he was taking to the nest.

"Why not come and chat with me," said the Grasshopper, "instead of toiling and moiling in that way?"

"You hop about, enjoying the moment," said the Ant, "and surely enjoyment of the moment is necessary for a happy life! However, you see us working and call it 'toiling and moiling'. Are you sure we're not having more fun than you, while also preparing for the future?"

The perplexed Grasshopper squinted and said softly, "I don't see how … work is work, and you have to admit: 'You're working!' I can see the sweat."

"Sweat? Yes. Work? Yes. I'll admit both. You believe, though, if one works and sweats, one has no enjoyment. Do you not hear us as we 'toil and moil'? Do you not hear us singing, "The ants go marching one by one, hurrah, hurrah?"

"Chirp, sing, and work at the same time? 'Present Enjoyment' and 'Future Preparation' simultaneously – while having fun? I hadn't thought of this! I won't have to steal from you this winter like I always do!"

the lesson: Whistle while you work.

More on fables later, because "life's little lessons", with careful inspection, provide little in the way of concrete suggestions on what specifically to do. One "looking before they leap" is beat to the punch by one recognizing "he who hesitates is lost". Every "lesson" seems met with a "counter-lesson". What to make of this?

The Ultimate Occupational Dilemma

February 14, 2008

George Johnson was a happy man. He was an energetic man. This was going to be a new year, and he greeted it with the enthusiasm of a 3-year old facing three burning candles atop his birthday cake.

For Christmas, George had received a copy of ***The Goal***, a wonderful business novel by Eli Goldratt. Christmas Day – night – George found himself reading the book – nonstop.

This was describing his company, he thought, and he could not wait to get to work to start the new year! Why was he off until then? The company had mandated he take his vacation time or lose it. Fine. It gave him all the more time to think.

George's company, Widgets Inc., made widgets (of course), the manufacturing of which was a simple two-step process: assembly (4-parts) and packing (which he was in charge of). Of course, there was a small administrative office in charge of miscellaneous items and the purchasing of materials, in addition to a small sales force (of 1), who took orders.

Having a few days to think about Widgets, Inc., before the new year started, he thought about the ramifications of *The Goal*. What was the goal of his company? They certainly make a lot of widgets, and he, in charge of packing, had always assumed his goal was good packing. Now he knew this was ridiculous. What was the goal of the company? To make money?

He thought about how he had been ordered to work overtime Christmas Eve to pack the extra widgets assembled earlier in the day so the morning shift on December 26th could start with a clear floor. He had praised himself for his good work, but now he was certain the work wasn't so good. Nobody was going to buy these widgets – at least not for a couple weeks. Why waste the money on overtime?

He couldn't wait to get into the office January 1st.

George eagerly approached Henry Marshall, in charge of manufacturing, to tell Henry about The Goal. Henry wasn't in the mood for New Year's resolutions. "Happy New Year, George. Did you see what our quota is for the month? They've made our bonus contingent on a 10% production increase over last year! 10%! Do you remember how many hours of overtime we clocked just to hit last year's goal? By the way: Happy New Year!"

George thought twice about talking with Henry, and instead went to Janice in administration, to talk about purchasing. After all, thought Henry, they made far more pieces the last year than they sold – why are they buying so many? Janice welcomed George with a tepid smile, and explained her job was to get the best discounts. Buying lower quantities meant lower discounts, which meant she would show a negative change (from the prior year) to start the new year.

Hurt only slightly, George decided he could at least improve *his* work station. He'd been giving the packing process much thought

over the last week, and had come up with a number of ways of improving the speed in which packing took place.

Packing, of course, simply meant placing the plastic wrapping in the mold, inserting the assembled widget, placing the cardboard backing on top, and lowering the machine, creating a solid seal. Sounds easy. It *is* easy! But sometimes things go wrong.

Many times, for example, the assembled piece would come with the widget top at an angle. George had always fixed this before the seal. How much time was wasted he didn't know. He experimented with accumulating these pieces in a box to the side, and by fixing them all at the same time, he found he could increase his speed 10%!

Also, as silly as it sounds, the monotony of the job often led to the compression seal machine being depressed with no cardboard backing in place. It usually took about 10 minutes to clean the machine, and he cursed himself every time this happened. It would keep happening, he thought, unless he did something different.

The solution was simplistically brilliant! Rather than place the mold, the piece, and the backing separately into the mold, he completed the assembly first, and then placed the total unit into the mold. It was now impossible to damage the machine! Speed again increased, this time 20%!

As other measures were implemented, George's unit became an efficiency machine. Everyone marveled at the speed at which packing now progressed.

They also noticed the amount of free time George's unit seemed to have.

You see, last year both processes took approximately 2:00 minutes to process a unit (4 complete widgets). George could now pack a unit in slightly under 1:15 minutes, but assembly still took 2:00 per widget. This meant, though George was moving faster and faster, he could not do more, because assembly was stuck on 2:00.

The call came unexpectedly the evening of January 28th. It was Jack, the division manager. George wasn't expecting this call for four days. The company usually announced the monthly bonus the first of the next month.

Jack had different ideas.

George was being let go. The storage costs of widgets had doubled, sales were stagnant, and it was determined – seeing George's station frequently without work – George's department was overstaffed.

George hung up.

He thought back to the excitement of his Christmas present. He thought of making things better! He thought of having fun at his job again! Sure, nobody else had shared his enthusiasm, but he thought, in time, they'd see what was going on – ask him how it was happening! He'd be his own "pilot program".

But where had it led him? To getting fired? How had it come to this? He retraced the steps of the new year. He had tried getting others to buy in to the new overall improvement strategy. Not surprisingly, they had demurred. Did it have to end there? Of course not. He could still work to improve his department, couldn't he? But what had happened? The more he improved, the more "free time" his department had! Why was that?

He thought about Henry and his department. They weren't doing anything new this year, and their assembly times had not changed at all. And George could only pack widgets that were assembled. George, therefore, was dependent on the work of Henry. But it was more than a dependency – his unit was faster than Henry's department.

Assembly was the limiting factor – *the constraint* – in the system. Regardless of how fast George went – regardless of how much George improved – he was dependent on assembly. The implications hit him squarely between the eyes: if packing is not the constraint, then packing will have more (and more) excess capacity – in a never-ending loop.
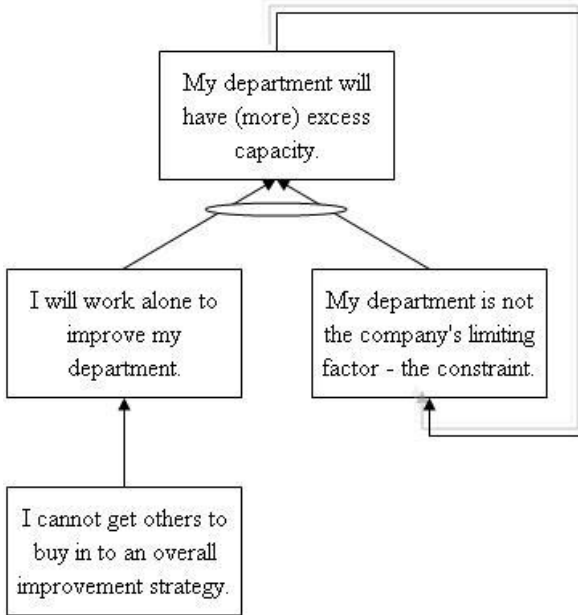
That wasn't correct, of course. No loop is "never-ending", and the exit strategy in this system was his firing. But why? "I will work alone" was the clear cause.

What could he have done differently? He had tried to get the others to listen to him! *Do nothing? Maintain the status quo?* Is that what the company was rewarding? But why would he have done this? In retrospect, the answer was obvious: job security.

Why had the company put him in this dilemma? What did they want of him? What did they want of themselves?

He felt like Jonathan Livingston Seagull. He had been soaring high, and yet, here he was, "Being Called to Center – for shame – in the sight of his fellow gulls!"

The Occupational Dilemma

Between a Rock and a Hard Place!
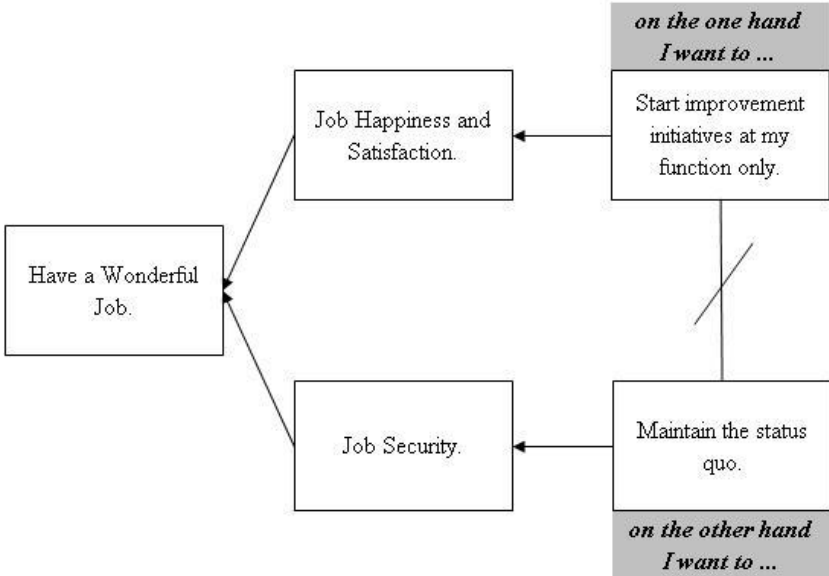
What should *George* have done? He wanted both "Job Happiness" and "Job Security" at the same time. Was that asking too much? The company apparently thought so! What should the *Company* have done?

Counter-Intuition

Revisiting the TOC P-Q Game

March 25, 2008

I'm the new manager of a company selling only two products: Product P and Product Q. I've recently been hired to make this company profitable – or else. The last manager couldn't do it, despite promises to the Board profitability was possible.

My first Board meeting is minutes away, and I'm excited about the possibilities – and challenges – for this company.

We make two products, and employ four willing workers to manufacture the products. The production work-flow is as follows:

P		Q
$90	Sales Price	$100
$45	Cost	$40
$45	Profit	$60
100	Demand	50
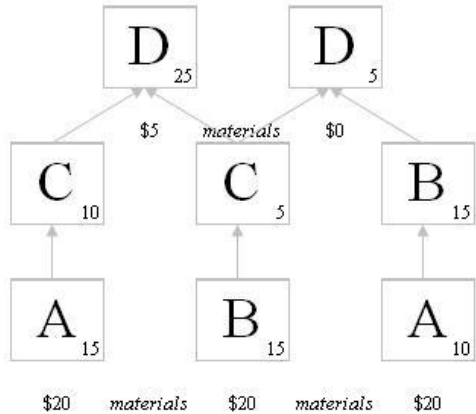
For example: to build Product P, workers A and B start the process, and then hand their work to worker C. Worker C then passes on the results of their work to worker D.

The numbers in each box represent minutes at each work-station.

Note also there are materials' costs involved. Product P starts with $40 materials, assembly follows, $5 of materials are added, and the product is ready to ship. The selling price of Product P: $90. The cost of materials is $45. Therefore, the profit/piece (Product P) is $45.

Similarly, for Product Q, the cost of materials is $40, and we sell this product for $100/piece, thus clearing $60/piece.

The demand for the products is P = 100; Q = 50.

The real issue, to me, for the meeting is to what level of detail should I explain the operation of the plant?

Salary costs, the building, utilities – overhead – is $6000 / week, and these are the only overhead costs. This is important. What else? How about I promise no more overtime. Overtime was killing the previous manager, but he had left himself no choice. He made unrealistic delivery promises, and then had to pay workers time-and-a-half to produce them. Of course, this meant he was losing money on every part produced. What a ruthless spiral that was!

How am I going to explain expected profit? That should be easy enough: do it visually ...

	Product P		Product Q		
	Profit = (100)($45) = $4,500		Profit = (50)($60) = $3,000		

Total Profit = $7,500 - Overhead ($6,000) = $1,500
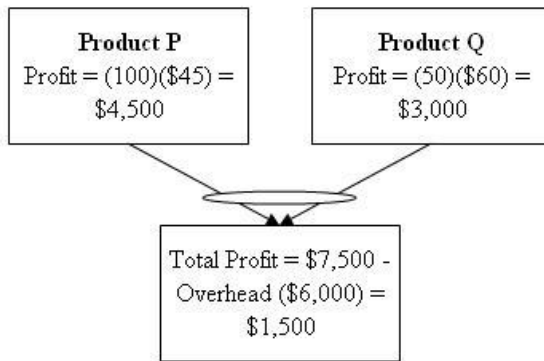
A stab of uncertainty runs through my spine. Is my promise realistic? There's no magic in this calculation, but it's too easy. Likely my predecessor did the same thing, and look where he is now. *Is this right?*

I've got a few minutes: build a quick model and see:

	Product P		Product Q		Total
	Unit	Total	Unit	Total	
Demand		100		50	
Sales Price	$90	$9,000	$100	$5,000	$14,000
Variable Cost	$45	$4,500	$40	$2,000	$6,500
Throughput	$45	$4,500	$60	$3,000	$7,500
Overhead					$6,000
Net Profit					$1,500
Resource Utilization					
A	15	1,500	10	500	2,000
B	15	1,500	30	1,500	3,000
C	15	1,500	5	250	1,750
D	25	2,500	5	250	2,750
Totals	70	7,000	50	2,500	9,500

Applying the minutes of each work-station against the production of 100 Ps and 50 Qs, I see Worker B is being asked to work 3,000 minutes. Poor Worker B. Moreover, poor *me*! I was about to promise the Board a profit of $1,500, and now I see it's not even possible – at least not with the production schedule I'm recommending (no overtime)! It's no wonder there was so much overtime previously. They, whether they knew it or not, had predicted it!

No need to panic – at least not yet. Have some composure and think! The board meeting is in 10 minutes, and I've just discovered the error. *How to correct it?*

Start with the obvious: if our profit is $60 / piece on Q, and only $45 / piece on P, we've got to build all 50 Qs first. That's $3,000 in profit. Because worker B was the over-worked worker above, let's keep track of his time. At 30 minutes / piece, we've used 1,500 minutes from his work-week in building 50 Qs. Therefore, he has 900 minutes left, and if it takes 15 minutes of his time in building Product P, then we can only make 60 of these. At a profit of $45 / piece, this yields a profit of $2,700. I frown, doubting my numbers I know are correct. Taking into account the overhead, I'm about to go into the Board meeting forecasting a loss of $300 / week!

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┌─────────────────────┐        ┌─────────────────────┐
│ Build 50 Qs, with a │        │ Worker B, the "time-│
│ profit of (50)($60) =│       │ intensive" worker, takes│
│        $3,000.      │        │   30 minutes / piece on│
│                     │        │        Product Q.    │
└─────────────────────┘        └─────────────────────┘
```

Build 50 Qs, with a profit of $(50)(\$60) = \$3,000$.

Worker B, the "time-intensive" worker, takes 30 minutes / piece on Product Q.

Worker B spends a total of 1,500 minutes building Product Q.

Worker B has 900 minutes left to build Product P (which takes 15 minutes / piece).

$900 / 15 = 60$ Product P pieces can be built, at a profit of $(60)(\$45) = \$2,700$.

Total Profit = $\$5,700$ − overhead $(\$6,000)$ = loss of $300.

I begin to feel weak, hoping this "illness" will allow me to skip the meeting. OK, I think, if building as many Qs as possible, and then determining how many Ps can be built leads to a horrible bottom-line, how about reversing the strategy: build as many Ps as

possible, and then figure out how many Qs can be built. I pound away at the keyboard to "run the numbers":

	Product P		Product Q		
	Unit	Total	Unit	Total	Total
Demand		100		30	
Sales Price	$90	$9,000	$100	$3,000	$12,000
Variable Cost	$45	$4,500	$40	$1,200	$5,700
Throughput	$45	$4,500	$60	$1,800	$6,300
Overhead					$6,000
Net Profit					$300
Resource Utilization					
A	15	1,500	10	300	1,800
B	15	1,500	30	900	2,400
C	15	1,500	5	150	1,650
D	25	2,500	5	150	2,650
Totals	70	7,000	50	1,500	8,500

I breathe a sigh of relief: I can report a forecasted profit of $300 / week. I hope I won't be asked how this will be accomplished, because I'll have to say we're going to build all 100 of the less profitable pieces first, and then spend time building only 30 of those pieces MOST profitable.
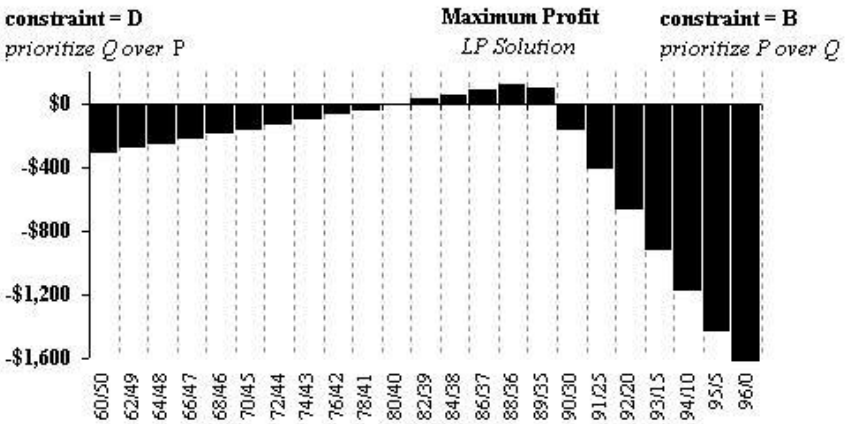
I dread explaining that recommendation.

But at least I can recommend a profit!

Five minutes to meeting time, I'm at least recovering from my temporary illness when my eyes fall upon the number "2,650", for "minutes worked by Worker D"! What's this? Now I've got *him* working overtime?

The upset stomach returns, this time literally. Feeling the need to excuse myself, I change my mind: I might as well resign now. This company cannot be profitable. OK: give it a couple minutes. Is there *any* combination of products generating a profit?

I'm proficient in writing quick programs, so I decide to simply simulate every conceivable combination of products to be built. Maybe it's not even possible to make a profit in this company. Why did I sign on to this dog? OK. First things first. Get my program written. Let's capture only those combinations where worker hours are all under 2,400 minutes for the week. Those are the realistic combinations. Let's also eliminate "trivial" results (like building only 1 of each). Graph the combination of products, and the resulting profits.

Go!

constraint = D
prioritize Q over P

Maximum Profit
LP Solution

constraint = B
prioritize P over Q

88 Ps and 36 Qs. A new profit of $120. No workers working overtime. I again breathe a sigh of relief. A huge one. It's not much of a profit, but at least it's a profit. I still hope I won't be asked why we're not building to the demand of the extremely profitable Product Q. On second thought, I hope I *will* be asked this. I'm not sure why the results lead to a gain of $120; I'm just sure they do, and there's no greater proof than the one "in the pudding"!

I also realize the danger of "common sense". "Common sense" had me running into the Board meeting initially recommending a $1,500 gain, followed by a $300 loss – both the result of "common sense", and finally advocating a $120 profit, created only by brute-force initially, substantiated by logic only later. This answer was far from common sense!

Walking into the Board room, I decide on another tactic: tell the Board the obvious strategy – and wrong one. Get them to actually realize the job of the foreman – of the company – is not merely one

of pushing buttons and barking orders. To do it right requires thinking! "What order to bark?" is much different than "Barking orders". Get them to see me not merely as a "% increase in profit" statistic, but a person using his mind to solve problems in the company!

It's weeks later, when I've been given time to consider constraints, interactive constraints, linear programming, profit per constraint minute, etc., I'm able to make sense of it all.

And there is sense here – a lot of it!

	Product P		Product Q			Constraint Metrics	
	Unit	Total	Unit	Total	Total	Resource	Profit
Demand		88		36			
Sales Price	$90	$7,920	$100	$3,600	$11,520		
Variable Cost	$45	$3,960	$40	$1,440	$5,400		
Throughput	$45	$3,960	$60	$2,160	$6,120		
Overhead					$6,000		
Net Profit					$120		
Resource Utilization							
A	15	1,320	10	360	1,680	70%	$1,275
B	15	1,320	30	1,080	2,400	100%	$2,475
C	15	1,320	5	180	1,500	63%	$975
D	25	2,200	5	180	2,380	99%	$1,425
Totals	70	6,160	50	1,800	7,960		

Constraint = B	$3.00		$2.00		
Constraint = D	$1.80		$12.00		
Interactive Constraints (B and D)				$15P + 30Q = 2400$	$P = 88$
System of Linear Equations with Solution				$25P + 5Q = 2400$	$Q = 36$

A Bright Future

But is this structure complete? Have I taken into account the variables properly? Has my theory taken into account the constraint, the constraint dollar / minute, and other considerations properly? In all instances?

And not only this, but other considerations come to mind. Here, I'm trying to maximize profit in this system. Why is the plant layout as it is? Why is Worker C working so little, while we fight to manage the times of Workers B and D? Is it possible to use the excess time of C to help B and D? Maybe. There's got a market out there of 100 Ps and 50 Qs, with a profit of $1,500. Wouldn't it be sweet to tap into known demand!

Instead of fighting for the 10% and 15% profit increases that make Boards happy, think of the future when I could report a 1,150% increase!

But how to manage the plant to get there – that's the question.

That's *a* question.

Suppose I do "produce to market", and show this remarkable increase. *What then?* That then becomes the new benchmark, and the Board will be demanding increases from that point. Ugh.

Maybe it's best to temper increases and show a "mere" 20-25% increase, and I alone will know the truth of what's possible. I'd be a hero in their eyes. But not my own.

"Be true to thyself", I say to myself. I'm not going to temper anything. If I can produce a $1,500 profit, I will! The new question becomes: *how can I create more demand for my product?* The constraint is no longer the time of Worker B or Worker D – *it is the market!*

The work has just begun.

My new message to the Board, bought into by the Board, is one of no longer setting arbitrarily mindless and repetitious single-digit profit objectives. Rather, it is in the spirit of Jonathan Livingston Seagull: *"For a thousand years we have scrabbled after fish heads, but now we have a reason to live – to learn, to discover, to be free!"*

"IT MAY BE MERE FACE PAINT TO YOU"

October 24, 2008

With the Halloween season upon us, it's time to revisit a study in productivity heroism. As Abraham Lincoln, "it's altogether fitting and proper that we should do this."

The plant, Tiro Industries, is not relevant to this story.

Making face paint for Halloween costumes is not relevant to this story.

What is their story?

Face paint – and any product that you pick from a shelf – has a unique history. It has a story. *They* had a story.

They worked the midnight shift at a factor in downtown St. Paul, Minnesota. It was early 80s. They were kids. They worked on an assembly line. They made face paint.

How does one do that?

> *The lead person takes the mold and loads the slim paint holders.*

The second person crimps the bottom of the tube so the paint will not fall out the bottom.

The third person places the mold under the paint filling machine, and puts the template in – and takes it out of – the refrigerator.

The fourth person crimps the top of the tubes – so the paint would not come out the top, checks to make sure the tubes are all clean, and empties the now full tubes into a box.

Sounds pretty easy – and pretty boring.

It was both.

They decided they were going to set a plant record. Every day, they would shoot for a new record.

How?

They saw lots of things wrong. For example, after the tubes were complete, there were still a lot of dirty tubes. They'd go through the whole process, and then get rejected. What a waste.

They also went on breaks together. That was down time. When everybody went on breaks together, no product was produced. But what was the alternative?

The filler noticed something about the machine. It was a foot-operated machine, where the mold was placed under the machine, the pedal would start the machine, eight sprays would engage to a certain height, and they would automatically shut off.

The problem was it took a while seconds to restart each time. Why? Who knows! Remember, these were mere *kids*! The next mold goes under the sprays, engage foot, wait a few seconds, and the process repeats.

Frustrating.

How they found this out, I don't know. Perhaps by accident, perhaps by frustration. However, when the foot was *kept* on the pedal, the process moved rapidly, never stopping. It was set to automatic! The sprayers would fire for about 5 seconds, and there was about a 5 second delay, and they would fire again – regardless of whether you had a mold in place!

This meant they could do many more face-paint tubes, but it also meant the filler always had to have a mold ready to put in the machine. No mold, the machine fires, paint everywhere. What a mess!

So this became the key point they focused on in the process: if you have to go to the bathroom, for example, you had to make sure you had enough work built up so the next person had work to do to keep the machine running.

It was sweet.

They produced no defects, because their work area was spotless. Defects don't make it to end pallet. They get discarded. So the most important quality person in this regard wasn't the quality-checker at the *end* of the process, it was the quality checker at the *beginning* of the process! Many times, the initial tubes were already dirty! Get rid of them right there!

How long did all this take to figure out?

My recollection this group of brave assembly-line soldiers did it in one day.

Work was going to be fun.

Could they keep this up all day? Surprisingly, close to "yes". They took quick lunch breaks, and they also could monitor the progress at the work area. Remember, the machine could be set to automatic. That's where the real work was done. But it also could be switched to manual. A chance to "catch their breaths", and perform "resets", as they came to call them, which simply meant "Everybody take a moment and get organized."

But they also knew *any* moment that filler machine was not set to automatic they were losing time they could never recapture.

That was the key.

Everything was focused on keeping that one machine, set to automatic, busy!

And there were mistakes, of course. You fill a mold with eight tubes with paint, put it into the freezer, and it gets caught on the lip of the shelf. It tips. Spills everywhere. Not often, but what a mess! What they realized was this: get it absolutely clean. If it's the least bit dirty, the errant paint now on the mold gets passed to every work station.

If this workstation is clean, everything stays clean.

They also realized, when this happened, it was a great chance to take a break. You couldn't help the cleaner because there's only so much room for a person at a freezer. Get your work done, build an inventory in front of the filler, and take a quick break.

Genius?

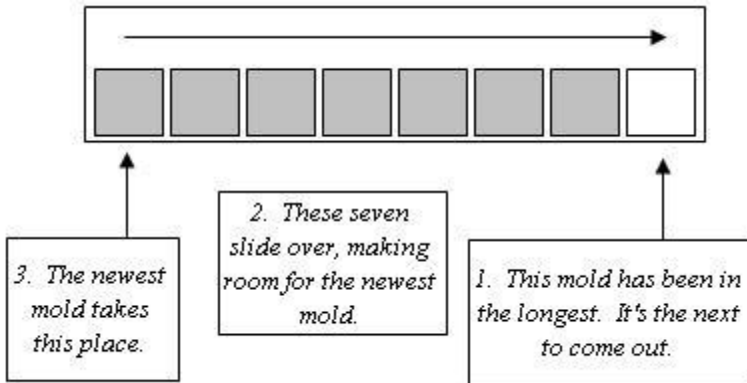Of course not. Mere common sense.

They discovered common sense ways to improve their movements to ensure speed. The paint-filler, for example, had always put the molds in the freezer, taken them out, but sometimes been confused about which one had been in the longest. The team had about 16 molds in motion, about half always in the freezer. There was a certain time a mold had to be in the freezer for optimal storage and packing. He was often taking out the wrong one, and then realized he was taking them from the wrong end. What a mess – leading to frustration, inconsistency of product, and slowdowns.

What to do?

The simple thing was to keep them aligned ...

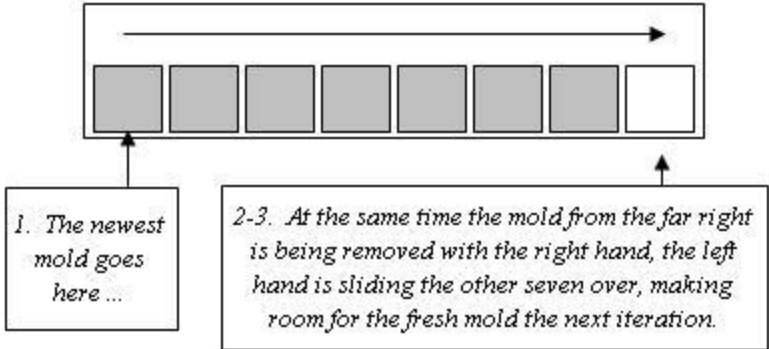*This mold has been in the longest. It's the next to come out.*
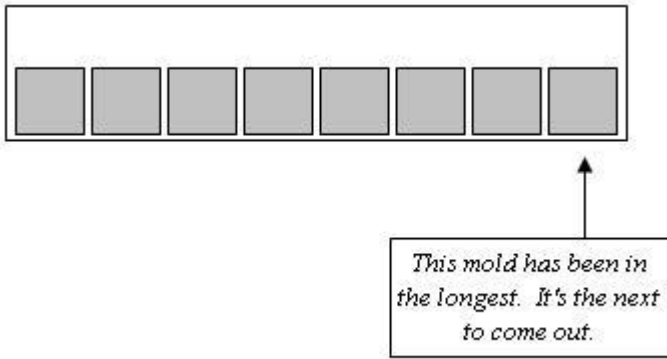
But it wasn't enough to merely line them up, because it's still easy to lose track of which one is the "next to come out". The solution is easy enough, right? Take the mold from the far-right out, slide the remaining seven over, and insert the newest mold.

3. The newest mold takes this place.

2. These seven slide over, making room for the newest mold.

1. This mold has been in the longest. It's the next to come out.

Easy enough, right?

Of course, when you actually do this, you see the folly in it. It's hard to slide them over when you're holding a full mold full of fluid!

The key was always making sure there was immediately room for the newest mold. That meant simply reversing a couple of the steps above. The newest one goes in first. The oldest one comes out second – with the right hand. You see what happens, right? It takes but a couple tries to realize, while the right hand is removing the oldest mold, the left hand is sliding the remaining seven over, making room for the next new mold!

1. The newest mold goes here ...

2-3. At the same time the mold from the far right is being removed with the right hand, the left hand is sliding the other seven over, making room for the fresh mold the next iteration.

The key was ensuring the freezer always looked like this:

Perfect consistency of product. Pure common sense.

How many other slight modifications did they make as a team resulting not just in improved quantity, but a general work environment more good? They are uncountable.

The psychology of the work place came into the game. They worked the midnight to 8:00 shift, and when they were done, you never had a full pallet at the end, which means they never got a full pallet when we started their shift.

So what?

The crew who *finished* a pallet got credit for the whole pallet!

Of course, it didn't take long for the 4-midnight shift to see the folly in letting the midnight crew "get a running start". Likely they tired quickly of hearing how good the midnight shift was doing! They would provide our midnight shift with a fresh pallet, nothing on it. How did they do this? It meant they were shutting down their line 15 minutes early! What a waste!

So our heroic band of assembly-line warriors went day-to-day, always trying to break their records, dashing to the bathroom, taking quick lunches, producing near perfect product, and having one hell-of-a-fun-time doing it!

The most product produced – with uniform consistency – with zero defects – with the cleanest work area with the greatest fun. What a team!

So, when you buy your Halloween costumes for your kids, and the kit contains face paint, stop, if you will, and try to imagine the scene described above.

Smile.

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