Choosing Change

I'll never forget that morning even though it happened a quarter of a century ago. I was a programmer helping start up a new factory, and things had been going OK. Not great, but OK. I decided that morning on the way to the factory I was going to stay calm and not let anyone "get to me". Right.

Karla, the process engineer descended with a litany of things that were wrong before I completely cleared the door into the control room. Before Karla could finish, the control room operators started interrupting with needs that had to be addressed before we could start the day's trial production. Did I lose my implacable calm? Faster than a snow ball melts in North Carolina on the Fourth of July.

What I didn't understand at the time is that models governed my behavior. Unlike the models we were using to create the control software, these models were hidden from my view. Later in my career I started finding the tools that would help expose these implicit models, and help me make changes that would amplify my effectiveness.

Manifest Models

Modeling is an integral part of our daily lives and is the way by which we transform the chaotic into the structured.
- Kostere, Malatesta

"Modeling" is the name we give to the activity of organizing events into patterns, and patterns into structures. These structures are referred to as "models".

Some models are based on our physical environment. The model we use for time is based on the earth's motion in space. We call a day one rotation on its axis. A year is one revolution of the earth around the sun. Sir Isaac Newton defined four laws which model motion in the 17th century that remain largely intact today.

Using instruments, we measure the events that form the basis of physical models. As we improve our instruments, we improve our understanding of events, then patterns of events, then what pattern changes mean to the overall model. We soon discover that models that adequately describe events at one level, fail at some other level and need to be replaced. For instance, at a given level we replace the certainty of Newton with the un-certainty of Heisenberg.

Models to automate manufacturing processes or describe work as it flows through an organization are explicitly built. I worked on a project where the engineering firm built a scale model of the electrical cogeneration plant, complete with all the pipes 2" and larger. This model was used in the bidding, construction, and final acceptance of the plant. A different r project didn't correctly model the sample flow through the Quality Laboratory. Actions were occurring at the wrong time or location for where the samples were in the analytical process. The project was a disaster until the software model was corrected to reflect the physical process.

Environmental and expressly built models are manifest models. We build these models by observing events, noticing patterns, and organizing the patterns into models. While a model should account for what has happened, the real power of a model is its ability to predict what will happen given a set of input conditions. A model's prediction ability is based on how well it corresponds to its domain, and its ability to deal with the inputs.

We can play "what if" games. The results of the "what if" games then feed back into our model definition. We can examine the events to verify we understand them correctly. Maybe the model needs adjustments.

Another reason to study manifest models is we use the same actions to create implicit models. Unlike manifest models, we don't explicitly build implicit models. Yet understanding our implicit models provides the opportunities for personal growth, improved inter-personal relationships, and the leverage for creating new realities.

Implicit Models

We start building implicit models when we're born. Take the example of disappointed child and harried parent at the grocery store. The child wails and screams. The parent unwilling to deal with a "scene" acquiesces to the child and gives the child get what they want. After this happens a few times, pattern forms, and eventually a model of "If I scream and yell, I get what I want." Now imagine this child as a manager who's project is late, bug ridden, and over budget. Quess how the manager might respond to the situation?

Like manifest models, implicit models organize our experience. These models guide our behavior. Our new experiences tend to validate the system which in turn is used to predict the result of future experiences, which in turn validates, which in turn predicts ... The difference between manifest and implicit models is we are generally not aware of implicit models.

This suggests that we take actions, have interpersonal relationships, and interact with our reality in an "auto-pilot" mode. This is not necessarily bad. In today's world, it is not possible to deal with every datum, examine every event, and ponder each interaction. Using models allows us to respond with appropriate behavior without the need of exploring all the possibilities available.

While generating behavior that is appropriate, implicit models limit our available responses for a given event. Input events similar to previous evetns will be filtered, processed, and responded to without regard to changes in the experience, changes in ourselves, or changes in the environment. Failing to take these changes into account can create inappropriate behavior and inter-personal interactions that are out of balance.

In extreme cases, implicit models exist as "survival rules" or self-fulfilling prophecies. When these models exist, our behavior becomes incongruent. Valid input is ignored. Our actions are single minded, and the results of our actions are the opposite of what we actually would like to have happen.

How do we build these models we use to interface with the rest of the world?

Building Models[2]

Model – a small copy or imitation of an existing object. Webster's New World Dictionary

We abstract our experience and condense it into a models. The models are simpler than our experience. This reduces the data we need to process. Properly created models are useful for ordering information, understanding events and predicting the future.

There are four basic modeling methods:

1. Deletion
2. Construction
3. Distortion
4. Generalization

Deletion leaves information out of the model. If we don't remove some of the information, we're doing all the processing and work, which defeats the purpose of creating models. We delete information based on our interests, energy level and experience.

Construction is deletion's compliment. We put information into our model that wasn't in the original experience. I once spent an afternoon with a tool that was smart enough to tell me I was doing something wrong, but not smart enough to tell me what. It turned out the problem was a loop index declared as [_i], but used in the code as [i]. I was glad to find it, even though I wasn't sure if my problem was mentally deleting the "_" in the declaration, or adding the "_" to the code.

Distortion is blending experiences, (de)emphasizing some parts, or otherwise altering the original experience. Distortion is the basis of creativity as well as paranoia.[1]

Generalization is creating a model from one experience and using it to represent an entire group of similar experiences. The potential problem is the single instance may not be truly representative of the entire group.

So how do we interact with our world, process the experiences, and end up with implicit models? The process involves input filters, abstracting, and interacting with our environment.

Getting the Experience

… there is an irreducible difference between the world and our experience of it. We as human beings do not operate directly on the world. Each of us creates a representation of the world in which we live that is, we create a map or model which we use to generate our behavior. Our representation of the world determines to a large degree what our experience of the world will be, how we will perceive the world, what choices we will see available to us as we live in the world. Bandler and Grinder, The Structure of Magic.

Input Filters[3]

I know you think you understand what I said, but I'm not sure you understand that what you heard is not what I meant. – Anon.

Let's agree there is a physical world. We can touch, see, hear, smell, and taste things in this world. These senses, which can be very developed, have limits. We only see the "white light" part of the electromagnetic spectrum. Infrared and ultra-violet are beyond our visual limits. Our hearing is limited to 20 – 20,000 Hz. Many animals, including Sarah (my German Shepard) can detect sound beyond this frequency range. So the first type of input filters is neurological based. These filters, are common to Homo sapiens, and start the process of permuting the physical world into a map (or model) of the physical world.

In addition to existing in a physical world, we exist in a social world. Initially our biological family comprises this world. As we get older, our social world expands to include playmates, classroom friends, and work relationships. During this socialization process, we learn language, accepted ways of perceiving, and other socially agreed upon "truths". Language modifies our world mental model based on how we abstract from the sensory experience. Common "truths" might include:

- Boys are better at math.
- Girls are better at cooking.
- Programmers are introverts.

These social filters move our mental models further from the physical world. They are common not to all Homo sapiens, but to a group of Homo sapiens. Unlike neurological filters that are essentially unchangeable, social filters are learned, new filters can be learned, and old filters can be "un"-learned.

Neurological filters define us as a species. Social filters define us as a culture. Our personal history defines us uniquely, and moves our mental model furthest from the physical world. None of us has the exact same set of experiences. Therefore none of us has exactly the same mental world model. The model differences are based on our interests, habits, likes, dislikes, and rules for behavior. Like social filters, we have the ability to change these parts of our models.

Levels of Abstraction

A map *is not* the territory it represents, but, if correct, it has a *similar structure* to the territory, which accounts for its usefulness. – A. Korzybski, *Science & Sanity,* 5th Ed., p 58

Perhaps the most profound cause of differences in our mental models comes from how we abstract information from the physical world. Korzybski identifies "at least three different levels of abstractions: the seen, experienced, lower order abstractions (un-speakable); then the descriptive level, and finally, the inferential levels."[4] It is in the third order abstraction (inferential levels) area that individual characteristics have the most impact. Even though two people see the same event in the physical world, by the time the final abstracting is complete, the mental model of the event may be completely different.

Another way of viewing the abstraction process is looking at the modeling levels that separate us from the physical world.[3] Our sensory experiences, how we individually experience the sensory experience (apply our likes, dislikes, etc), and what expressions are available in our language all affect our mental world model.

Each of these levels is meta- to the modeling level that is the next level below it. Without careful inspection of the nature, assumptions and structure of each level, differences between the physical world and our implicit models of that world aggregate and compound.

Language
Experience of Experience
Sensory Experience
Physical World

By the time we talk about an experience, we're three levels of filtering and abstracting from the actual experience. Some useful techniques to help untangle confusion are the Satir Interaction Model[5] and the Inference Ladder[6].

Interacting With Our Environment

Our interaction with our environment is not a one-way conduit. Our models are built by abstracting information from the environment using modeling methods. These models then form our reality, which is the basis for our actions. Our actions in turn affect our environment. This in turn affects our models. The feedback between our models and our environment can either reinforce (agree with) or balance (disagree with) our mental models. The selection between reinforcing and balancing feedback is determined by how we choose to view the feedback.

Extra special events can have an impact on our mental models. I once gave a presentation that received less than glowing reviews. As I considered the event, how much significance did I place in the data? Was it a statistical "blip" that could be safely ignored? If so, I could keep my model of my presentation as "sterling" and reinforce the model by discounting the input. Or I could choose to accept the input as valid and modify at least the presentation, if not my delivery style. Of course, I could choose to modify both.

The risk in using special events (or data) to build or modify models is the tendency towards using construction, and creating a model that doesn't fit the general class that the event belongs to. This can be avoided by looking at the events (or data) over time. This allows a series of events to regress towards their normal value.

Looking at events over time allows us to consider the time frame. We learn about simple cause and effect in school. In the interests of finishing the labs on time, cause and effect are usually closely coupled in time. For some systems this is a valid time frame. Other systems, especially systems with large numbers of people, the time between cause and effect can be quite long. Consider when events happen, and whether or not that makes sense if you decide to use them to modify your mental models.

Another trap in acquiring information from our environment is one-sided events. This is gathering input in such a way that no matter what happens, it results in reinforcing our mental models. This would be like the person who "misbehaves" in meetings to get attention. When considering using an event, ask yourself, "Does this event reinforce my mental model?", and then "Does the opposite of this event also support my mental model?" If both answers are yes, you are taking a single view of the event.

It usually takes some kind of a crisis to point out that a model is not working. If we continue to use a model that is no longer working, we create incongruent interactions. We do or say things that create negative feelings between us and the people we're interacting with, or generate the opposite results of what we really want. These negative and opposite reactions eventually result in crisisses of varying magnitudes. As Jerry Weinberg says, "A crisis is simply the end of an illusion."

Explicitly Building Implicit Models

"We want a set of mental models that are realistic and useful, and provide ourselves and others with the greatest possible happiness and well-being. We can do this by looking dispassionately at our mental models, seeing them as a system and choosing what models to adopt, rather than holding those we already have regardless." - O'Connor & McDermott

Coming to the end of an illusion offers us a chance to reconsider the events, reorganize the patterns, and reconstruct our models to generate a different outcome. To do this, we need to be aware of the models we use, and how we would like to change existing models or add new ones.

Identifying Models in Action

There are at least three ways to determine when a non-working model is in action:

1. Incongruent interpersonal actions. This is the domain of dysfunctional groups such as software development teams, and dysfunction between groups (development and testing). While in theory all are striving to the same goal, blaming, placating, and super-reasonable acts are the avenue of action.
2. Incongruent intrapersonal feelings. These are the "I'll just sit here and quietly stew" feelings. Coming home from a recent trip, my mental model of when to stop for gas didn't agree with the driver's. I just sat there quietly stewing.
3. Language[7]
    - Judgments are authoritative statements about second order reality, the world of meaning, not physical fact.
    - Absolute words such as "ought", "should", "must", and "cannot".
    - Universal words such "all", "every", "never".

When you notice these events (or words), you can be sure mental models are in play, and have a choice to accept or to change your mental models.

Modifying Mental Models

Our mental models originally made our lives better. They helped organize information, allowed us to explain events, and predict the future results. Therefore the first action to take is to ask yourself, "What does this model get me?" Once you understand the plus side, you can determine if you want to change your mental model.

If you decide that you would like a different outcome than what your current model is providing, continue by determining what sort of an outcome you would like to have. Outcomes should be a positive statement. "Being more centered in my relationships " is an positive outcome that can be expressed in terms of feelings. "Not fighting with my team-mates" is a negative expression. Progress for (not) negative goals is more difficult to verify. Perhaps you can find an outcome that keeps the benefits of the current model and add the benefits of the new model.

Once a new outcome is chosen, destabilize the current model. If incongruence helped identify the model, the energy created may be enough to start the migration to the new model. You can use questions to help with the change. Question your assumptions about the model, the meaning of the model, or for what else you might be able to use the new model.

Once you've started the movement toward a new model, be sure to check the environment for feedback. As you stay aware of regression, time-focus and one-sided events, consider how you use the feedback to reinforce or balance the new model. Our models for a system, and we can modify this system to create more fulfilled lives.

[1] The Art of Systems Thinking, Joseph O'Connor & Ian McDermott ©1997, pg 69
[2] This section draws on The Structure of Magic, Bandler and Grinder, ©1975 pp 8 – 13 Experience As An Active Process
[3] Maps, Models, and the Structure of Reality, Kim Kostere, Linda Malatesta ©1990, pp 6 - 13
[4] In Science And Sanity (5th Ed.), Alfred Korzybski, ©1994, pg 444
[5]For an excellent presentation on the Satir Interaction Model see Quality Software Management, Vol 2, First Order Measurement by Jerry Weinberg.
[6] The Fifth Discipline Fieldbook, Peter Senge et al., ©1994, pg 242
[7] The Art of Systems Thinking, op cit pg 106

Side Bar – from The Art of Systems Thinking

How to have Rigid, Limiting Mental Models

1. Insist that your ideas are how reality 'really' is.
2. Have a narrow set of interests to ensure you delete a lot of experiences.
3. Do not tolerate ambiguity; jump to conclusions as fast as possible.
4. Whenever people and events do not behave as you expect, have a fund of creative explanations.
5. Use lots of modal operators and never question them.
6. Use many universals and do not admit exceptions.
7. Be quick to generalize from one example.
8. Set up plenty of one-sided, unfocused experiences to provide evidence for your ideas.
9. Blame failures on individuals (don't forget yourself).
10. Think in straight lines of cause and effect.
11. Never by curious.
12. Never update your beliefs in the light of experience.

How to have Systemic Mental Models

1. Admit your mental models are your best guess at the moment and be on the lookout for better ones.
2. Have wide interests.
3. Be comfortable with ambiguity.
4. Be curious about, and pay particular attention to, experiences that seem to contradict your mental models.
5. Have a wide time horizon to look for feedback.
6. When confronted with a problem, look at the assumptions you are making about the situation as well as the situation itself.

7. Look for relationships, how events fit together.
8. Look for loops and circles of cause and effect, the effect of one cause being the cause of another effect.