U-SIT And Think News Letter - 59

Unified **S**tructured **I**nventive **T**hinking is a problem-solving methodology for creating unconventional perspectives of a problem, and discovering innovative solution concepts, when conventional methodology has waned.

Updates and Commentary

Dear Readers:

. This newsletter's mini-lecture visits some common tricks-of-the-trade. They are examples of heuristics we learned to use before we heard of the word heuristic.

. The next newsletter will be delayed until I return from a visit to India.

3. Mini USIT Lecture – 59
5. Heuristics for Solving Technical Problems

Tricks-of-the-Trade

When explaining what heuristics are I usually include "tricks-of-the-trade" without specifying a particular trade. I imagine that every trade has numerous examples of heuristics specific to the trade.

One of the earliest tricks-of-the-trade that I learned was from my father who taught me fundamentals of carpentry. He made a point of reminding me to "always measure twice and cut once". This reminds me of a friend who likes to say, "I cut it twice and it's still too short!"

Specialized heuristics are rife in mathematics. They are as well in many other fields. They all aid in solving problems. Have you ever been stymied in a project and wished for an inspiration to resolve the situation? Structured problem solving was developed to address such situations in creative thinking about technical problems. What about stymies in other fields? Do you know of any?

Three years ago, while working on poetry, I found myself suddenly without any inspiration. I was studying a picture of a beautiful bird, a Seychelles Fody that I had photographed on Picard Island in the Seychelles, and trying to write a poem to go with the picture. It seemed to me that this must be a common situation for poets – it is for other kinds of writers – although at the time I didn't know how any of them resolved an inspiration stymie. So I telephoned a friend in Denver who is a poet and asked him if he had learned how to address this situation. He had. A professor in one of his courses gave the assignment of writing a poem that began with, "Once I was …", and finished with, "… but now I am …" Perfect! Just the heuristic I needed.

If you will allow me …

Like You

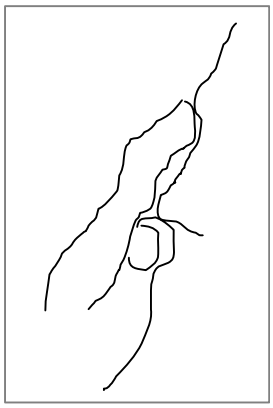
once **I**
was a bird
not any bird
a spring bird
first on the scene
staked out my pad
preened up a prince
decked out a dude
sat on an exposed limb
sang an aria to a princess
… verse after verse after …
heard rustling in the brush
glimpsed a fleeting eye
turned up the volume
stopped the rustling
softened a swoon
lost my breath as
she fluttered over
sat by my side
but now **I** am
spellbound
dumb

Ed Sickafus

I listened to the beautiful singing of this Fody for over half an hour as I worked my way thought the island growth trying to find him. When we met, he posed for this shot.

Many tricks-of-the-trade are valuable as fresh viewpoints. “Measure twice, cut once.” “Saw on the outside of the line.” “Momentarily steer toward the rock you want your bicycle to miss.” (Your natural reaction will then take you away from it.) “A pint’s a pound the world around.” “Fill your brush with paint.” Advice given to me to avoid stomach problems, during a six-week stay in Spain, and deal with the ubiquitous olive oil: “Take a little wine with every meal.” It worked! “Add acid to water.” (Rather than pour water into acid.) Remembered for a high school chemistry exam: “CC’s times normality is equal to cc’s times normality.” “Wear Polaroid lenses when fly fishing.” “A full camera f/stop changes the amount of light by a factor of 2 (2x or ½x; also for a full shutter speed).” “To quiet a constrictor snake, cover its eyes.” “The hottest part of an acetylene-torch’s flame is the end of the blue plume.” “To set an oxy-acetylene flame (to stoichiometry), adjust the oxygen pressure until the yellow plume just disappears into the blue plume.” “Slice brisket across its grain.” “To yell at someone in a boat, put your head near the water’s surface.” “Your wingspan (middle-finger tip to middle-finger tip) is your height.”

A dinner-table joke is to tell someone you know how long his or her nose is. When they ask how you tell them to extend their index finger and their thumb next to it. Then place the tip of the thumb on the end of their nose and their index finger will just fit at the bridge of their nose.



It is evident that tricks-of-the-trade are highly specialized to each trade. They seem to lack cues for generalization – at least not among the limited sample cited above. A continuing interest of mine is the search for a hierarchical association of heuristics that organizes more specific heuristics as instantiations of general ones. The goal of this

search is to enable personal management of a larger repertoire of heuristics tools. Perhaps one of the easiest types of heuristic that might fit a hierarchical scheme is "simplify". This heuristic is a favorite, partly because of its many ramifications.

An especially powerful application of simplify is found in "back-of-the-envelope" calculations that technologists like to do. An example is the use of π. What is the value of π that you have memorized?

Of course the value of π that one uses will depend on the application. For this discussion I'm interested in back-of-the-envelope type calculations, or simple mental approximations. For π, I favor the value 3. The error in using this number rather than its value to, say, 400 decimal places for example, is less than 5% too small.

Approximations to 5% accuracy are very useful. Calculations that are linear in π – like area and circumference – can be quickly corrected by mentally adding 5% (½ of 10%) of the estimation (i.e., of the π = 3 estimation), should such accuracy be needed. Adding 5% of the estimation is still an approximation, but now the error is less than 0.3% too large. Using π = 3 is usually good enough when buying lumber and other materials for construction.

Among the tricks-of-the-trade cited above an obvious common characteristic is their simplicity. In just a few words, and without explanation, they convey useful information. Each is justifiable with special knowledge but you can use the heuristic without knowing its justification.

Five of the heuristics mentioned are mathematical: A pint's a pound …; The 2X rule for camera exposure; CC's times normality (is a constant); Pi = 3; and your height is your wingspan. I find mathematically based heuristics easier to memorize and recall than non-mathematical ones. I'm not sure why, but I have wondered if they somehow join both brain hemispheres in their recall. (Two heads are better than one.) It might be that the LH notes the mathematical connotation and RH associates an image. In any case they are good examples of simplification at work.

Approximation is a particular example of simplification. Approximation is hierarchical to some of the above examples.

If we start with approximation as a heuristic an interesting form of simplification becomes evident in tackling a difficult problem. Don't solve the problem solve an approximation to the problem. This is especially useful when dealing with multiple unwanted effects. An approximate problem, for this situation, could be one with only one of the unwanted effects present. Should this still be too difficult to tackle, try weakening the unwanted effect as a form of approximation.

Solving an approximation to a given problem is a well-known heuristic in mathematics.

Although an approximate problem is not the real problem and therefore cannot produce the exact answer it is, nonetheless, a powerful tool for creative thinking. The process of constructing an approximate problem and the rational that goes into the exercise gives birth to new insights. Ideas do come to mind relevant to the more difficult problem.

Can you recall using this heuristic successfully?

6. Feedback

7. Papers and essays

The following materials can be read by clicking on their titles. Links are also available on the USIT website (www.u-sit.net/Publications)

1. "Injecting Creative Thinking Into Product Flow"
2. "Problem Statement"
3. "Metaphorical Observations"

8. Other Interests

1. Have a look at the USIT textbook, "Unified Structured Inventive Thinking – How to Invent", details may be found at the Ntelleck website: www.u-sit.net (*Note*; not at www.ic.net)
2. USIT Resources Visit www.u-sit.net and click on Registration.

Publications	Language	Translators	Available at …
1. Textbook: **Unified Structured Inventive Thinking – How to Invent**	English	Ed Sickafus (author)	www.u-sit.net
2. eBook: **Unified Structured Inventive Thinking – an Overview**	English	Ed Sickafus (author)	www.u-sit.net
	Japanese	Keishi Kawamo, Shigeomi Koshimizu and Toru Nakagawa	www.osaka-gu.ac.jp/php/nakagawa/TRIZ/
	Korean	Yong-Taek Park	www.ktriza.com/www/usit/register_form.htm
"**Pensamiento Inventivo Estructurado Unificado – Una Apreciación Global**"	Spanish	Juan Carlos Nishiyama y Carlos Eduardo Requena	www.u-sit.net
3. eBook "**Heuristics for Solving Technical Problems – Theory, Derivation, Application**" -- **HSTP**	English	Ed Sickafus (author)	www.u-sit.net
"**Heurísticas para Resolver Problemas técnicos – Teoría Deducción Aplicación**"	Spanish	Juan Carlos Nishiyama y Carlos Eduardo Requena	www.u-sit.net
4. **U-SIT and Think Newsletter**	English	Ed Sickafus (Editor)	www.u-sit.net
	Japanese	Toru Nakagawa and Hideaki Kosha	www.osaka-gu.ac.jp/php/nakagawa/TRIZ/
	Korean	Yong-Taek Park	www.ktriza.com.
Mini-lectures from NL_01 through NL_58	Spanish	Juan Carlos Nishiyama y Carlos Eduardo Requena	www.u-sit.net click on Registration

Please send your feedback and suggestions to Ntelleck@u-sit.net and visit www.u-sit.net

To be creative, U-SIT and think.