U-SIT And Think News Letter - 46

Updates and Commentary

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.

Dear Readers:

. The mini-lecture in this newsletter is devoted to a condensed overview of USIT that identifies where left-brain and right-brain contributions can be expected, should be accommodated, and may be encouraged.

. Spanish translation of NL_45 is now available (go to www.u-sit.net and click on Registration). Registration for automatic mailings is also available. Register twice if you want both English and Spanish versions.

3. Mini USIT Lecture – 46

USIT – a Method for Solving Engineering-Design Type Problems

II. Continuation of Left-brain Right-brain Participation in Solving Technical Problems Using Plastic Heuristics

In NL_38 LB and RB characteristics were tabulated. The first items listed LB as being verbal while RB is nonverbal. My understanding of this difference is that the LB works best with words – words imagined, written and voiced. By comparison, RB works best with mental images and physical sketches. I use the phrase “works best” to mean being conducive to discovery of new ideas. (An example is given at the end of this discussion.)

Occasionally I hear people referring to their style of mental problem solving as being either abstract or graphic. I think being abstract refers to logical reasoning with deft use of symbols and equations. The role of symbols and equations is to encode logical starting points and track subsequent developments while allowing reference to previous steps and symbolic testing of new ones. The symbols are metaphors for physical realities. They allow abstraction within limits allowed by the guiding and developing equations. Equations aid in preventing whimsy, they imply compliance with physical fundamentals, they can speed the route to conclusions by disallowing illogical thinking, they often uncover counterintuitive insights, and they give assurance of credibility to the problem solver.

Graphic thinking uses images and begins naturally with metaphorical representation of objects. Components of sketches can be reorganized, reshaped, resized, and even rerendered. Just as the original sketch is rendered with constraints that give it meaning, so subsequent testing of potential alterations may be constrained.

Fortunately, both equation-bounded and graphic-bounded metaphors allow mental investigation of areas broader than described in a starting system. They support abstraction. Unfortunately, both equation-bounded and graphic-bounded metaphors support rigorous thinking also. This can subdue metaphorical abstraction.

It would be interesting to know if inventors have ever been classified as abstract or graphic thinkers, and if so, whether one group is seen as being more creative than the other. Such differences might be related to our genes.

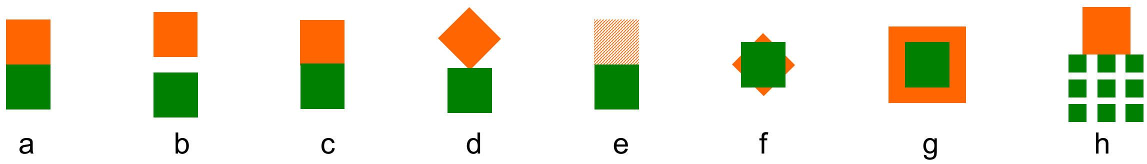
From my own experience, I suspect that, if not both, we are sometimes abstract and sometimes graphic thinkers depending on how we begin to understand a given problem. Perhaps we are more successful with one mode of thinking than the other. I have always had the feeling that mental images play a strong role in all problem solving. However, some people take an opposite stand. A life-long friend assures me that he never deals with mental images when problem solving. I do not understand how that can be. Although unsettled, the question has no bearing on how to improve our creative results in problem solving. Which, I think, is the whole purpose of studying and testing new methods of analysis and new heuristics.

Ambiguity
In the ebook, "Heuristics for Solving Technical Problems – Theory, Derivation, Application", ambiguity was discussed and demonstrated as a tool for initiating abstraction. It is another heuristic. Ambiguity was demonstrated for objects, attributes, and functions. The three examples are repeated here for recall and comparison.

Object ambiguity
Ambiguity was applied to an object by identify its function and then abstracting function. (From p. 9 of Heuristics): "For example, a mechanical screw might be named a clamp, a fastener, a marker, an adjuster, a pivot, a support, a pump, a balance weight, a point of reference, a hole filler, or a propeller, according to its main use in a given problem."

Function ambiguity
Ambiguity was applied to a function by identifying a related object and then abstracting object. (From p.9 of Heuristics): "As an example, consider one of the above generifications of a mechanical screw; say, a "fastener". In quick succession (without filtering), these ideas came to my mind: a gate latch, a staple, a railway spike, a Cleco button, a safety pin, a straight pin, a tack, a ratchet, Velcro, a belt buckle, a mechanical detent, a cog, a knot, a welded joint, a bottle cap, a shoe string, a skewer, a shoe stuck in mud, a rivet, a friction joint, a differential thermal-expansion joint, and … (I quit when the rate of ideas slowed)."

Attribute ambiguity
Ambiguity was applied to two-attribute interaction by representing an interaction as geometrical shapes and then abstracting the geometrical configurations. (From p. 64 of Heuristics): "Consider two attributes of contacting objects supporting an unwanted effect. Suppose we opt to use elimination to solve this problem. We will try to decouple, weaken, or modify the interaction of the two supporting attributes. And, contrarily, we will consider strengthening the coupling. This can be tested graphically, to see what ideas come to mind, by finding new representations of two squares. Some possible arrangements and modifications are illustrated in Fig. (21)."



"Figure 21. A small sample of some graphic ways to arrange or modify two attributes represented initially as contacting squares in (a)."

These three examples of applying ambiguity illustrate both abstract and graphical thinking. In this way they also illustrate LB and RB thinking. According to the identified characteristics of LB thinking we can assign all verbalized thinking to LB activity. Whereas nonverbal thinking, such as used in graphic metaphors, can be assigned to RB thinking. The above three examples of applying ambiguity in USIT illustrate how to encourage one or the other of LB and RB thinking.

--------- LB/RB Participation in Solving Technical Problems Using Plastic Heuristics will be continued. -------------

Brain-Hemisphere Participation Encouraged in USIT

	USIT strategy	Right-brain vs. Left-brain emphasis (R vs. L)
0	On first encounter with and initial analysis of a problem situation our natural impulse is to exercise rapidly our intuitive insights and discover as many solution concepts as possible. Once this activity has waned it is recommended to record the results and then begin USIT.	
	Constructing a Well-Defined Problem	
1	Verbal and graphical description	**L**. Use words to name, describe, and define objects, attributes, and functions. Use symbolic notations to simply descriptions. Words and their variants play useful and unpredictable roles in sparking ideas. Verbal metaphors are formed here. **R**. Investigate spatial arrangements of objects and interaction of their attributes. Examine connection of parts to form the whole. Sketches and the thoughtful rational used to justify the meanings and importance of their components can awaken insight. Graphic metaphors are formed here.
2	Unwanted effects	**L**. A logical exercise of reducing convoluted problem descriptions to multiple, simpler effects. **R**. Intuitive recognition of subtle interactions of attributes in space. Identifying spatial conflicts and unused space.
3	Selection of one unwanted effect.	**L**. A logical exercise of identifying pertinent filters and their relevant values for ranking the unwanted effects. **R**. A holistic view of a problem is important at this point.
4	List objects	**L**. Enumeration of objects with relevance to the problem situation establishes the potential scope of a problem. **R**. **R**'s holistic view keeps check on **L**'s detailed analysis.
5	Minimize number of objects	**L**. Enumeration of objects with relevance to the unwanted effect establishes mental focus. **R**. Minimization challenges metaphorical thinking to assure that all active attributes in the unwanted effect are maintained.
6	Identify plausible root causes	**L**. Identification of root causes establishes technical credibility for the ensuing analysis and resulting concepts. This is the key point for logical identification of attributes. **R**. "Plausibility" softens rigor allowing **R**'s investigation of hunches without

		the restrictions of rationality.
7	Remove filters	**L**. Filters are more readily recognized by their verbal descriptions, which give them left-brain access. **R**. Filters are a form of rational of little concern to **R**.
8	Simplification of problem description	**L**. Simplification of verbal description requires technical rational to test opportunities and check for completeness. **R**. Ready adoption of **R**'s metaphorical thinking can identify new opportunities for simplification.
The Closed-World Method		
9	Closed-world diagram of the problem	**L**. Logical analysis of object-function relationships is straightforward for **L** as it strives to clarify and define an unwanted effect. **R**. This activity of **L** gives **R** opportunity to exercise intuitive leaps of insight into spatial interactions and point-of-contact simplifications.
10	Object-attribute-function statements	**L**. By trial-and-error OAF connectivity is identified and tested against technological plausibility – an exercise designed to aid identification of active attributes. **R**. Relaxation of technical rational allows rapid grasp of generic variants of attributes including whimsical ones.
11	Qualitative-change graphs	**L**. Functional relations of each object's attributes are characterized for the unwanted effect in a logical manner. **R**. Holistic views and metaphorical thinking can uncover previously unrecognized interactions of attributes. Testing of random associations (even irrational ones) is also recommended for potential metaphorical value.
The Particles Method		
12	Problem sketch	**L**. This sketch is usually acquired by **L**'s thinking as the original sketch from (1) but modified by results in (5). **R**. The holistic view in this sketch can be simpler than in (1) and allow more thorough view of attribute interactions.
13	Solution sketch	**L**. **L** will tend to grasp the most obvious solution state and be satisfied with the resulting speed. **R**. Dwelling intentionally on attributes implied in this sketch allows new perspectives to arise. **R** has little concern for time.
14	Intermediates states	**L**. Morphing of objects naturally follows **L**'s logic. **R**. While **L** proceeds, **R**-thinking can be encouraged with thoughts of morphing an attribute into another state. Though not as logical as **L** might like it allows **R** a new degree of freedom.
15	Apply particles	**L**. Placement of particles is usually done with a degree of rational that satisfies the problem solver. **R**. However, purely random placement may also be interesting.
16	And / Or Tree	**L**. Identification of and/or branches is a very rational procedure. **R**.
Solution Techniques		
17	Uniqueness	**L**. Identification of temporal uniqueness is befitting of **L**'s interests. **R**. Identification of spatial uniqueness is befitting of **R**'s interests.
18	Generification	**L**. Identification of attributes that make a known concept successful can follow technical logic. **R**. Generification of known concepts makes heavy use of metaphors.
19	Dimensionality	**L**. Time spent in identifying and ranking active attributes expends logical reasoning. **R**. Time spent synthesizing effects from attributes and searching new metaphorical interpretations is aided with graphics.
20	Pluralization	**L**. Multiplication and division of objects to support new effects is a logical process.

		R. Recognizing opportunities to activate new attributes in the new objects can benefit from a holistic view of how the parts interact. Taking the parts to extremes in number and size may benefit from whimsical insights.
21	Distribution	**L**. Moving functions to different objects may stumble on logical challenges (interference of filters to one's thinking). **R**. Suspension of judgment can allow **R** to experiment with this exercise more freely.
22	Transduction	**L**. The mechanics of A-F-A linking is a logical exercise. **R**. Recognizing the metaphor of changing energy from one form to another (transduction) can spark leaps of insight.

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/
"**Pensamiento Inventivo Estructurado Unificado – Una Apreciación Global**"	Spanish	Juan Carlos Nishiyama y Carlos Eduardo Requena	www.u-sit.net
3. eBook "**Heuristics for Solving Techncial 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.
	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.