U-SIT And Think News Letter - 47

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:

. In the mini-lecture of this newsletter the topic of left-brain and right-brain participation in problem solving will be concluded.

. My thanks to you who wrote expressing your appreciation of the mini-lecture on "Abstraction Through Ambiguity" (concluded herein)
"Really cool!" resonated nicely.

3. Mini USIT Lecture – 47

USIT – a Method for Solving Engineering-Design Type Problems

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

Abstraction through ambiguity – an heuristic

The nature of abstraction discussed here is the process of seeding the subconscious to generate quickly fresh associations of a specific problem-statement constituent. The seed is an example of a constituent: object, attribute, or function. The association occurs in one of its two complimentary constituents. For example, abstraction of an attribute into associated objects. The association, however, is not to be forced or even predetermined, but simply limited to one constituent. Associations draw from personal experience and vary among individuals. Examples below illustrate the process as reflected in my experience. They are not exhaustive lists. They resulted from less than one-minute concentration on a specific abstraction.

Abstraction of an attribute as an object

Attribute	Objects
big	boulder
	train engine
	whale
	elephant
	black hole
	universe
	battle ship
	China
	Sumo wrestler

Abstraction of an attribute as an object

Attribute	Objects
size	outer space
	sealed canvas*
	ruler
	go/no-go gauge
	picture frame
	crystal defect
	shoes
	quartz fiber
* homonymic relationship	

(Don't hesitate to try these exercises yourself. Personal experience helps the learning pill to go down easier.)

I noticed a difference in speed of abstraction for *big* versus *size*. Both are attributes. However, size did not as quickly generate concepts of objects in my mind. Apparently, for me, big seemed to be more immediately obvious. In this example, size seemed at first to be too generic. But once started the list grew steadily. Big was closer to a metric and generated a quicker start. There is more on comparable words in the next example.

The difference in initial speed is a clue for improved selection of attributes used in a problem description. I use "improved" simply to mean a quicker start, not a better outcome. The beginner may want to revise attributes used in an initial problem statement and generify them later on during problem analysis.

As objects started coming to mind I noticed that they seemed to be coming from situations in my past where specific size was an issue. For example, at one time I was doing research on metal whiskers and made surrogates using tiny quartz fibers containing microscopic slivers of solidified metal.

Since I wasn't filtering ideas while making the above list I left sealed canvas in the list. It is relevant through a homonymic connection to painting where you "size" canvas before painting on it.

A very interesting exercise in abstraction is to abstract the function of an object. Function can be abstracted as attributes or as objects. What I find interesting is the choice of function to abstract, and especially interesting is the specific wording of that function. Although words are the inspiration of LB, I believe their specific selection can aid or hinder RB's creativeness through RB's conjured images. I'll first expand the realm of function before abstracting a particular example.

It works like this. Pick an object, any object (sounds like magic), and list its functions. For example, I'll select a hose (it came to mind, I guess, because I'm currently rebuilding my underground sprinkling system). A list of functions of hose, in the order they came to mind, is given in the next table. It required more than one minute. Note: tube is included with hose since they differ only in material composition if they differ at all. Inclusion of equivalent words at the start of abstraction may open new paths to abstraction – seeds can sprout in unpredictable ways.

Abstraction of an object as a function

Object	Functions
hose (/tubing)	to direct a fluid from point A to point B
	to allow flexibility of location of point B relative to point A
	to create information (example: color coding of gas-welding hoses; red for acetylene and green for oxygen)
	to reduce the number of plumbing connections required of an equivalent amount of pipe in a network
	to speed delivery of a fluid during assembly of an emergency system
	to store or contain a fluid (example: sections of air conditioning tubing are stored and shipped in a pre-charged condition)
	to conform to an existing passageway being used as a guide for insertion of a hose
	to prevent a vacuum as contents are expended (example: toothpaste tube)
	to support acoustic resonance (example: musical wind instruments)
	to transport and to deliver pellets of solid (example: children's candy)
	to be heat-shrunk for packaging (example: electrical wire wraps)
	to aid the movement of liquid through lymph and blood vessels (example: support hose)
	to react expansion of varicose veins
	to hide skin blemishes in one's legs or feet (i.e., to create information of uniform appearance)
	to sustain a pressure gradient (example: during siphoning of liquids)
	to allow compact storage (example: coiled fire hose)
	to demonstrate Doppler shift in acoustic waves (example: swinging a hose in circles and listening to the sound from outside the circle)
	to support in-plane bending (example: conducting liquid between train cars)
	to support out-of-plane bending (example: conducting fluid through a spiral-winding in an extendable tunnel; e.g., an airplane loading ramp)
	to support controlled delivery of liquid leakage thorough a perforated hose wall (example: a watering system)
	to distribute stress and strain otherwise concentrated in solid components of an articulated system

The LB and RB activity evident in this exercise is amazing (to me anyway; you try it and see what you find). LB can judiciously select words that ignite RB's imagination. To see this effect, compare the functions listed above with their parenthetical examples; notice which words produce RB imagery. We learn from this observation that the care spent in verbalizing a problem builds a basis for thorough investigation (note the length of list above) and establishes multiple opportunities for sparking RB imagination. However, it is not necessary to include all of the resulting details in a problem statement. Once these details have been recognized and judiciously verbalized they have already created their value (the value of awareness). And they are imprinted in memory for quick recall. Hence, one need only select a representative function for incorporation in a problem statement to spark later recall.

Any of the above functions can be abstracted in terms of attributes. (I had my wife pick a number between 0 and 22. She chose 17.) So, I'll examine the function, "to demonstrate Doppler shift in acoustic waves". The attributes that come quickly to mind are listed below.

Abstraction of a function as an attribute

Function	Attributes
to demonstrate Doppler shift in acoustic waves	vibration
	frequency
	relative motion
	flexible
	rotational speed
	reflection
	phase shift
	density
	temperature
	humidity

No, I don't propose carrying this function back into the object domain where it originated as hose. Such circular iteration of complimentary classes is not wrong. I simply feel that it looses effectiveness. However, starting with a fresh unanalyzed function may offer one useful insights. As an example consider the function to create information. A quick abstraction is illustrated in the following list.

Abstraction of a function as an object

Function	Objects
to create information	camera, pencil, microphone, acid, neon gas, typewriter, computer, face, hand, chalk board, cake icing, hand shake, tape recorder, sensor, knots, paint, hair, tattoo, clothing, automobile, perfume, clock, map, …

Since an attribute can be abstracted as an object and vice versa, there are six types of abstractions among the three constituents of a problem statement. Yes, a nice homework assignment. Send your examples in for others to see. Just send the example. No explanations required. However, any new insights would be welcome.

The following heuristic summarizes abstraction through ambiguity.

Problem-statement-constituent abstraction heuristic

	Problem-Statement Constituents		
	Objects	Attributes	Functions
Abstraction via Complimentary Constituents	▼	▼	▼
	attributes	functions	objects
	functions	objects	attributes

Moving on

In the next newsletter I'd like to move from emphasis on discussing LB and RB participation in problem solving to examination of other heuristics. There will be more to say in the next discussion on LB and RB effects but not as the main topic.

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.
Mini-lectures from NL_01 through NL_46	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.

