U-SIT And Think News Letter - 36

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:

In this newsletter:

- Flexibility as an attribute is examined for drinking-vessel inventions;
- The complementary roles of left- and right-brain hemispheres to solving the hand-shaking problem are discussed. You are encouraged to do some introspection of your thinking process in solving the problem and compare it with the example presented. Are left- and right-brain influences evident to you?

3. Mini USIT Lecture – 36

"USIT – an Alternative Method for Solving Engineering-Design Problems"

I. Continuation of How to Invent a Better Drinking Vessel

Transparency as an attribute (SCF-11) was treated in the last mini-lecture, NL_35. This lecture addresses the attribute *flexibility* and its associated unwanted effect, *distractive noise generation*, SCF-12 (NL_23).

SCF-12		flexible	▪ consequence of thin wall that produces distractive buckling noise when an empty container is handled roughly

It was noted in the NATO Summer School that the ever-present thin, plastic, drinking vessels too often became disruptive noisemakers in nervous hands. When first we began to identify unwanted effects to be associated with these vessels, noise was mentioned early. Noise generation, in this case, is an inadvertent effect caused by buckling or crinkling, and crushing of hand-held vessels. Flexibility was not identified as a designed attribute. Our strategy for invention at this point should be to eliminate the unwanted effect for one opportunity and develop it into a useful function for another.

Some quick brainstorming ideas: An obvious attribute change for elimination of crinkling noise is shape: use a thicker wall and/or wall stiffeners. The existing design already has multiple, circumferential, raised ridges. These act somewhat as stiffeners but obviously are inadequate. Another attribute change is material. Use material having a high coefficient of internal friction. This would allow crinkling while dampening noise producing vibrations.

Let's pause to consider uniqueness in this problem. Where and when does noise occur? One unique feature is that crinkling doesn't occur when a vessel is full of liquid. Either it is too stiff to be

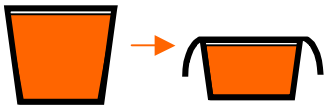

Fig. 1 **SC36**

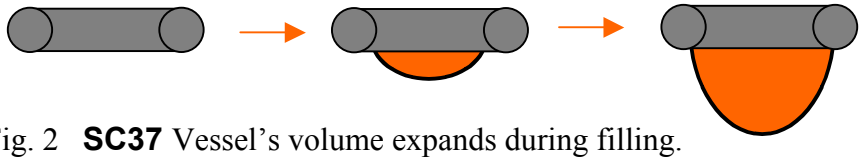

Fig. 2 **SC37** Vessel's volume expands during filling.

squeezed sufficiently or the person holding the vessel realizes the risk of spilling and intentionally avoids squeezing too hard. Another unique feature is that a partially empty vessel does not crinkle in the region where liquid is present but may crinkle where there is no liquid. **SC36** This suggests a vessel designed to be always full no matter how much liquid has been extracted – a vessel having an automatically adjusting volume. A thin-walled vessel is designed for its wall, in the unoccupied region, to contract automatically by rolling or sliding as the vessel is emptied.

SC37 This might be accomplished with a stiff lip having sufficient width for grasping and an elastic interior that expands to sufficient volume to contain the liquid poured into it.

A use for the noise might be to signal a waitperson that a new drink is desired. This is similar to a practice I've seen in Japan. When a sake decanter is laid on its side it signals the waitperson that a refill is desired.

II. Brain hemisphere participation in problem solving.

The first mini-lecture on brain hemispheres (NL_34) cautioned about the verbal, logical, analytical left-brain thinking dominating the nonverbal, metaphorical, synthetic thinking of the right brain. For encouraging creative thinking, this caution leads one to look for means to suppress the left-brain dominance. In the last mini-lecture (NL_35) we saw that both brain hemispheres participate in problem solving. Furthermore, some problems are more appropriate for one or the other hemisphere. A conflict of logic seems to be building; how can we know when to suppress and when not to suppress left-brain dominance?

One answer to this question can be seen in the USIT flowchart. USIT problem solving, in essence, is a process one begins by systematically analyzing the problem situation down to the level of basic components: a minimal set of objects, attributes, and an unwanted effect. From there one builds back to the problem level by synthesizing solution concepts from the found elemental components. Hence, we should begin USIT problem solving by allowing more left-brain influence during analysis and end by suppressing it for creative results when synthesizing solution concepts. Of course, throughout the process there are opportunities for both rigorous logic and creative metaphor – neither hemisphere is to be totally suppressed.

Solving the hand-shaking problem

Now, let's examine solutions to a problem posed in the last newsletter and suggest brain-hemisphere contributions to the process of solving the problem. If you haven't already, please take a few minutes to solve the problem before continuing. The problem is …

> "Ten people (five married couples) attend a party. People who don't know each other shake each other's hand. At the end of the party Bob asked everyone there, including his spouse, how many people they shook hands with. He got the answers, 0,1,2,3,4,5,6,7 and 8. How many people did Bob's spouse shake hands with?"

DON'T CONTINUE IF YOU WISH TO SOLVE THIS PROBLEM BEFORE READING ITS DISCUSSION.

This hand-shaking problem starts off sounding like a straightforward combinatorial problem. As they read, left brain is trying to recall a mathematical expression for computing combinations. Right brain is instantly busy inventing a party setting with five couples and visualizing the handshaking event. Then they hear the last sentence. It all had sounded logical until reaching the non sequitur, namely, the mention of "Bob".

> If you have not worked the problem because you think there is insufficient information to determine who Bob is, then here's a hint. Ignore Bob and solve the problem.

At this point right brain readily accepts Bob as the host and assumes the event to be a home-hosted dinner party. But the left brain says, "Wait a minute! This problem isn't well defined. There needs to be more information to determine which couple is Bob and his spouse." Left brain rethinks the problem to clarify its first verbalization and check for hidden clues. In this process, it notices that there are 9 numbers mentioned but 10 people are present. Suddenly it dawns on left brain that "Bob" is probably a red herring put in the problem as a distraction, because without Bob there is a problem of the missing number.

Right brain continues on, now testing graphic sketches to represent the group doing handshaking. Left brain reasons that maybe there are two problems here and decides to treat them separately. It then proceeds to solve the mathematical problem first; namely, how can the given numbers occur? By now it has looked over its shoulder to see what right brain is doing and begins to kibitz.

Right brain has already started working on a graphic representation of the problem. It is testing ways of representing 10 people who have to be joined by handshakes. In one or two tries it settles on 10 icons grouped in pairs where handshaking will not occur. It proceeds to draw possible links for the handshakes.

Now, left brain butts in and begins a systematic placement of links to produce the desired number terminating on each person. Several trial sketches have been made from which it has been found that icons should be spaced evenly on a circle in order to minimize overlap of links making them hard to see. Right brain already tried this idea.

Then left brain has another idea. "We could put numbers beside each person and try to draw that number of lines for each. However, since one number is missing two people must have the same number. But we have no information about which two people have the same number or which number is repeated. So let's proceed systematically and see if something sensible results." Right brain has silently begun moving clockwise and drawing connections beginning with the next clockwise person.

Left brain overrules and requires a restart with numbers in place. "I'll put in 0 for one person and 8 for the spouse and then work to smaller numbers to see more easily what is developing," says left brain. Right brain acquiesces.

As the trial continues, both brains recognize that in the 6^{th} and 7^{th} positions only 4 connections can be drawn. This causes left brain some hesitation and it asks, "Why is 4 repeated – why not some

other number?" But right brain moves on without criticism and discovers the solution on noting that no further construction is possible.

Meanwhile, left brain is revisiting the assumptions made so far to see if they are logical and proceeds to create a list:

A) 10 objects in 5 pairs.
B) Pairs have no joining lines.
C) When starting to add lines at a new node, count the already existing lines at that node.
D) Start with 8.
E) Join this node to 7 and work toward sequentially smaller numbers.

Finding no fault, left brain checks on right brain's results (see Fig. 3).

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To Be Continued in the next USIT Newsletter

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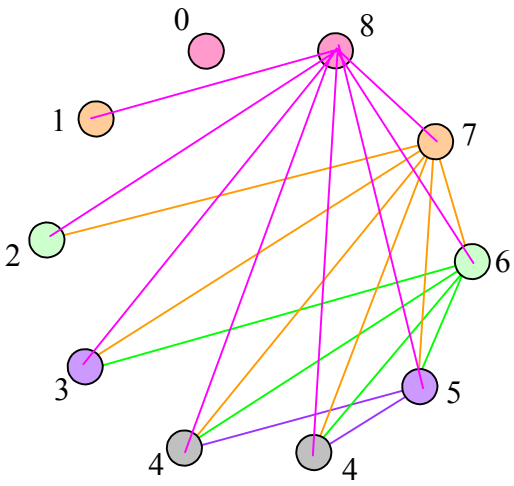

Fig. 3 The mathematical part of the hand-shaking problem is illustrated.

8. Other Interests

1. Regarding inquiries about ordering the textbook, "Unified Structured Inventive Thinking – How to Invent", details may be found at the Ntelleck website: www.u-sit.net. The cost of the book is US$44.50 plus shipping and handling. See the website for S/H charges. Send a check made out to **Ntelleck, LLC** for the proper amount, drawn on a US bank, to
   Ntelleck, LLC, P.O. Box 193, Grosse Ile, MI 48138 USA

2. A **Public USIT Course**. If you are interested in a public 3-day USIT course to be taught in Novi, Michigan (convenient to Detroit Metro Airport) please send an email. (Recent courses have been taught as on-site events in private corporations.)

USIT Resources

Publication	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"	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.

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

To be creative, U-SIT and think.