Intuilytics process in art-engineering creations: Learning from several great engineer-scientist-philosophers

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Abstract

In previous article we coined a new word: intuilytics. In this article we discuss some examples of intuilytics process in art-engineering creations.

1. **Introduction**

   In line with the rapid development of new branch of foundational mathematics, i.e. Neutrosophic Logic, here we discuss potential application of NL theory in the field of engineering innovations, especially where art and engineering meet. See for recent papers on NL: [2-5].

   In earlier paper, we argue as follows: the distinction between the logic and experience is something related to analytics function of the left brain and intuitive-wholeness function of the right brain. We suppose the healthy way is to optimise both function of left and right brain. And similarly, in order to experience God, we shall feel Him intuitively not rationally.

   So, intuition leads to insights and this is actually the source of true discovery like Tesla etc. Logical analysis can pursue where the intuition leads them, but not the other way around. Using Neutrosophic logic, we propose a new term for this process: *intuilytics*.[1]

2. **Scheme on the role of intuilytics in art-engineering creations**

   In engineering creations, sometimes the demands of clients or the context of the engineering site require an engineer to apply some engineering principles with a novel approach, with certain uniqueness not found in textbooks.

   The proposed scheme that we would introduce here is to use intuilytics process, as follows:

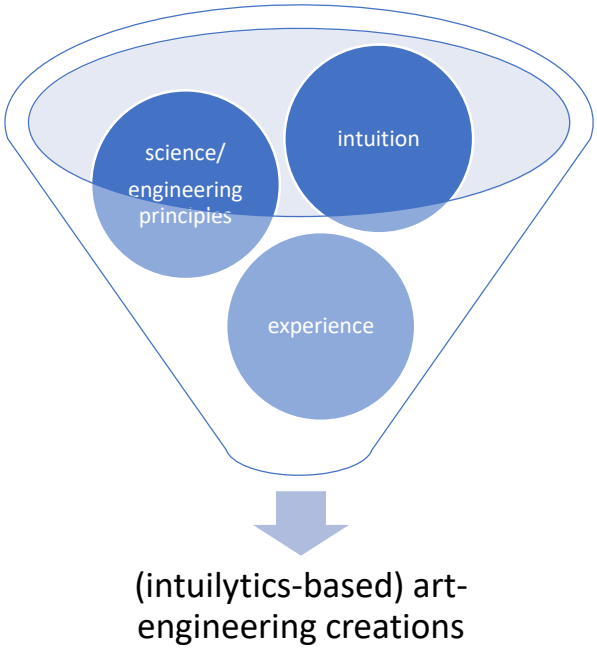

Diagram 1. How intuition can affect art-engineering creations (intuilytics process)

3. Lessons from several great engineers-scientists-philosophers

a. Felix Candela

When it was time for Candela to choose a vocation, he was undecided. After his father's friend, an architect, discussed the profession with Candela, he decided to try out architecture "despite that I had not shown great ability for drawing, which was considered essential to be an architect." He was admitted to La Escuela de Arquitectura de Madrid in 1929. In his sixth year there he begun to study thin shells thanks to their appearance in architectural and engineering magazines, and to Eduardo Torroja's building of a thin-shell concrete vault, Frontón Recoletos, in Madrid. (7)

Although he never took a formal course on thin shells, Candela on his own started to seriously read articles by French and German engineers. A year after completing his course of study at the School of Architecture in 1935, the Civil War broke out and Candela fought for the Republican cause. In 1939 he was exiled to Mexico where he developed experience working as an architect, an engineer, and a builder of traditional beam and column construction. During the first two years in Mexico, Candela subscribed to engineering and architectural

magazines and journals, through which readings he tried to complete his education as a structural engineer, but, he later admitted, “I still did not seriously dedicate myself to study shells.”(7)

Later on he designed and built several remarkable buildings with high architectural values, as such these buildings can be considered as art-engineering creations.

Illustrations 1-3. Several key designs of Felix Candela

b. Henri Vidal

In ref. [1], we discuss a bit on Henri Vidal's invention: reinforced earth. Modern use of soil reinforcing for retaining wall construction was pioneered by French architect and engineer Henri Vidal in the 1960s. The first MSE wall in the United States was built in 1971 on State Route 39 near Los Angeles. It is estimated that since 1997, approximately 23,000 MSE walls have been constructed in the world. How the idea of Reinforced Earth came? It all began like a game, when Henri Vidal, a French highway engineer and architect, was trying to build a sandcastle on the beach. But the sand kept on falling off and this led to the idea of reinforcing the construction with pine needles. That is how the general principle of Reinforced Earth. From that experience, he went on and wrote his dissertation on *La Terre Armee*. (3)

Here we see an example how a direct experience (playing with sand castles) gave an intuition which then leads to a scientific discovery.

c. Alfredo Moser

Alfredo Moser is an inventor of Moser bottle bulb. In 2002, Brazilian engineer Alfredo Moser invented a simple way to bring the sun's **light** indoors: fill a clear plastic 2-liter bottle with water and two capfuls of bleach, then make a hole in the roof and secure it with a waterproof sealant. The result: 40 to 60 watts of free, natural light. (8)

How does it work? The bleach keeps the water from turning green, and the water refracts sunlight. Chilean Miguel Marchand helps to install the bottle lights, or Moser Lamps, in the home of a family that lives in the Andes.

Figure 4. Illustration of Moser lamp (8)

Figure 5. Installation process of Moser lamp (8)

d. Yi Cui

Yi Cui and his colleagues at Stanford did inventive research on water battery. Unlike existing battery design based on lithium and other materials, his model can be scaled-up to become Electric Energy Storage System for grid-scale uses in cheaper cost.

As revealed by the scientists in their research, published in *Nature*, the prototype of the water-based battery is only three inches tall and is able to generate 20 milliwatt hours of electricity. Despite its current small size and generation capabilities, the researchers believe that their device may be expanded, and will reach an industrial scale, thus becoming able to "charge and recharge up to 10,000 times." (9)(10)

"What we've done is thrown a special salt into water, dropped in an electrode, and created a reversible chemical reaction that stores electrons in the form of hydrogen gas," research coordinator, Yi Cui said.

e. E.F. Schumacher

Thinking on inventors like Alfredo Moser and Yi Cui, in comparison with appropriate technology concept as proposed by E.F. Schumacher, lead us to consider a new approach to renewable energy technology, we propose to coin a

new term: Appropriate renewable technology (abbreviation: ART), which means renewable energy designs which keep in mind Small Tech High Touch philosophy (see our previous article). This is in order to maximize the level of connection with the context of renewable design, especially with grassroot people.

Concluding Remark

In the present article we review our previous article, where we proposed a new term: intuilytics. Provided we would like to extend intuilytics process into art-engineering creations, it may lead to many novel creations.

We also consider a new term: Appropriate renewable technologies, stemming from inventions by Moser and Yi Cui team from Stanford.

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