REFLECTIONS, THOUGHTS, AND EPISODES

Highlights from the Opening Address

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My first memory of a congress was when the rebuilt Matematicum in Lund had been finished. A congress of mathematicians celebrated this event. I was amused when professor Riesz, in his opening speech, said, "Congresses are said to be for young strebers and old fools." (The present congress, however, could not be for young strebers, I suppose.)

1. MISUSE OF STATISTICS

With the advent of computers, a new era was beginning. To make forecasts about it, based upon historic data, should be expected to be misleading. Yet surprisingly, people have made many forecasts on such a basis – without careful thinking.

2. SAAB

When Saab had begun to develop and apply finite element methods, we experienced a vast increase in need for computations, and our punched-card equipment was not enough. The market for electronic computers was still very scarce and difficult to understand. I visited the Swedish Board for Computing Machinery to ask for advice. I got the answer that they had made a survey (without asking us) of the need for computing and had concluded

that when BESC would be finished a year later, it would be able to care for all computing in Sweden, with one third of a shift. (We soon found out that top experts in the USA had made similar estimates). I regarded this as a big mistake. When BESC became operational in 1953, SAAB immediately used one full shift. In 1954, SAAB decided to build the computer SARA. In the 1960s, computer systems enter the market and data systems projects start. They seem to have underestimated systems projects ever since.

3. LEARN TO MULTIPLY BY TWO

I had always found that my jobs took twice the time I had thought — and had promised. Later I began to realize that I was not alone. Surveys in the USA had found that it was normal that projects took twice the estimated time and cost. Therefore, I formulated the *theorem of underestimation.*

One day when I was to lecture on this, my morning newspaper happened to present big headings, saying that the cost for renovation of the Stockholm Opera Cellar restaurant had run up to twice the estimate and so the name *Opera Cellar theorem* appeared. Later, they had to rename it as the *Huddinge Hospital theorem.*

Multiplication by two is simple, but psychology, it is very, very hard! So, here are some questions?

- What would have happened if decision-makers had been able to multiply?
- Many investments rejected? Slower project development? Delays?
- Or, saved time and avoided backlashes?
- No IT-balloon, or not yet?

4. FROM DATA TO INFORMATION = KNOWLEDGE

"Everything that can be put in words can be put clearly"

- *Wittgenstein (famous among philosophers for being impossible to understand)*

"I find it Impossible to express myself in a way that cannot be misunderstood by those who want to misunderstand"

- *Karl Popper*

5. THE INFOLOGICAL EQUATION

The Infological Equation (IE)[a] may be shocking, but it does in fact merely combine available knowledge, in a concise way:

> The information *I* that can be obtained from some data *D*, depends upon the data and upon the "pre-knowledge" *S* available to the data user and upon the time *t* allowed for the interpretation; that is,
>
> $I = i(D, S, t)$

The basis for the Infological Equation is obvious: To be able to send or receive the information *I*, one must know the language used to form the message as a minimum. The point is that once one reflects further, there turns out to be an endless continuation of factors (not all of them of a clearly knowledge character) that influence upon the creation of the data by the sender, and upon the interpretation by the receiver/user.

The time interval *t* allowed to the interpretation process, is no less important. It reminds you to be short – and clear – in reporting to a busy CEO (not because he is stupid). It could also, however, suggest to the decision-maker to involve more people in the decision process (delegate), to gain time and make more pre-knowledge available.

It may take time to recall relevant pre-knowledge, in creative moments it may take away a night's sleep. Because of the Infological Equation, we have to conclude that the above statement by Wittgenstein is mistaken while we get the intuition that the Infological Equation supports Popper.

The Infological Equation indicates many consequences:

- Perceived, non-linguistic patterns are also data D.
- IE refutes positivistic ambitions.
- Data do not *contain* information.
- Words do not have unique meaning.
- User involvement in data design is necessary.
- The time symbol in IE has important consequences.
- Language translation is impossible to computerize. [b]
- Knowledge atoms do not exist.

5.1 Application of the Infological Equation

In practice, is the IE important? Does S indeed vary among persons? It would have been interesting to see empiric studies published on this.

5.2 Lorca Infologico

Strangely enough, the first illustration I found of the IE appeared in a poem by Garcia Lorca called *Canción de Jinete* (Song of the Rider), where he first describes how the man prepares carefully for his ride to Córdoba, and then says:

Aunque sepa los caminos
Nunca llegaréa Córdoba

Although I know the roads
Never shall I arrive in Córdoba.

The inherent logical contradiction is resolved if we remember – infologically – that a word can have different meanings: "Córdoba" may refer to the "vision or dream of Córdoba", in addition to referring to the house collection with that name, and to which the roads lead.

5.3 Clarity or time

I often receive books or papers in which people discuss my work. Of course, I always find myself misunderstood in various details. Perhaps I should have been more explicit. This, however, would have taken more time of me but also of my readers. It might well have exceeded the t of the infological equation. However, of course, I may have misunderstood.

6. CONCLUSION

Now, of course, people will understand or misunderstand what I have said. I finish now with a wish to all of you for a fascinating conference with many creative misunderstandings.

-- Börje Langefors

ENDNOTES

a. See Langefors, Börje: *Essays on Infology* (ed Bo Dahlbom), Studentlitteratur, Lund 1995.

b. Failure of machine translation – An example
(Published by Daniel Ryden, daniel.ryden@sydsvenskan.se)

Input:

"God save our gracious Queen,
Long live our noble Queen!
God save the Queen!
Send her victorious,
Happy and glorious,
Long to reign over us;
God save the Queen!"

This text, after several passes through translation programs became:

"Our expensive hour of value Queen
of long of phase our noble God
of the God in good health of the Queen!
In order to save the Queen!
Victoriously you send longer to its lucky
it and him gloreich he,
In order to prevail over us;
God save the Queen!"