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Information and understanding

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Abstract

Reflections on the paradox — and very uncomfortable situation — of being informed but not understanding.

1 Introduction

Living in an 'information era' makes us potentially rich in that matter. But do we really understand the world any better? For instance, is it easy — or even possible — to tell from the market trends as shown in the *NYSE composite index* and similar sources how the US or the global economy can go from boom to bust?

The relatively recent information wave takes us from rags to riches: from scarce information to an overload. Sometimes, though, too much information is as useful as too little information (Figure 1). The situation is similar to having only one book to study from, and all of a sudden having access to the entire Bodleian Library. So, are we really better off with the information boom?

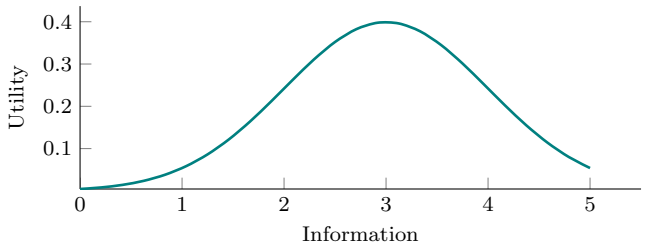

FIGURE 1 Too much information can be as useful as too little information (arbitrary units); the prime utility should be understanding

The relative value of information and understanding has been captured in the popular wisdom. People say, for instance, that 'offering fish (equivalent to information) to someone is not as good — that is, valuable in the long run — as *teaching* one how to fish (equivalent to understanding)'. As an aside, relating to Figure 1, having no fish to eat, or having five tonnes in one's back yard produce extreme preoccupations, albeit of different nature.

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2 Fact and Form

In simple, uni-dimensional (e.g. single-stock) systems, we may rightly ask questions of *fact and form*: 'what?', 'how much', or 'when?' For instance, anecdotes — that is, 'unpublished' information — suggest that Thales of Miletos once speculated through his astronomical forecasts that olive production would be early that particular year, so he created a monopoly in the region by buying or renting all the olive presses for a period that was apparently out of season; this way he would hold all the means for producing olive oil when the olives were ripe, so he managed to make a remarkable profit. Such simple systems are 'obvious' or 'intuitive' to understand how they are constructed and function, so it is easy to work with them.

Practically any complex, multi-dimensional system, where 'everything relates to everything', is subject to simplification by various means, including monopoly — for instance, by sectorisation, abstraction, or generalisation. This way, the popular *fact and form* questions can be applied again in the usual manner. However, simplification involves risks, so it must be done methodically: all knowledge and assumptions must be recorded in explicit mental models — be those mathematical equations, text, or diagrams.

Fact and form information typically comes as raw data, statistically processed data, simple indicators and complex indices, factually (or objectively) documented events, and subjective statements coming from judgements such as assessments and opinions — when one's opinion counts as a fact. It is strange, but all this richness of information constitutes 'loose points' (Perdicoúlis and Glasson, 2011), even if we can see patterns in the information across time or space. This is not to say that 'point information' is not appreciable: the Thales case showed that it can be quite interesting.

3 Structure and Function

The brave act in complex systems is try to understand their *structure and function*, which involves questions of 'how?' and 'why?'. Such questions are one level of complexity higher than the *fact and form* questions. Their answers may not make one rich through clever application, like Thales is said to have done, but rich through understanding — something valued only by appreciators. Solid understanding implies mental models: it goes beyond 'what there is' (system elements) or 'how much it is' (measurement), to fields such as 'how it is put together' (structure) and 'how it works' (function) (Perdicoúlis, 2010).

It is often said that 'decision-makers must be informed', and this seems to be a requirement for 'better decisions'. But do we ever check the assumptions of the decision-makers? Do decision-makers themselves do that? Do we actually know what mental models they are using — that is, how they think the 'world works'? Or, do we ever check the proposals *per se*? On which mental models are they based? This becomes important considering that a decision is as good as the best option available (Perdicoúlis, 2011, p.142). Such subjects are rarely (if ever) discussed, except in speciality (academic or, less likely, journalistic) research. But even so, these mental constructs are in essence hypotheses and thus must remain either (a) under the 'ashamed to share' status — because they are not proven yet, or impossible to prove at all — or (b) under lock and key because they are business secrets. At least in 'safe environments', mental models should be opened, shared, and discussed for the sake of sound reasoning and decision-making.

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4 Understanding Systems

Understanding complex systems (such as the global economy, for instance) is likely to require much information. Unless the understanding is attempted by pattern analysis or other 'black box' approaches (Perdicoúlis, 2011, p.146), the essential information is about system elements and relationships, which is a *structure and function* type of information. The richness of the *fact and form* kind of information is not of much help in understanding systems — it would be more for registering their behaviour patterns. Consequently, the accompanying skills for understanding systems are not much about statistics or pattern analysis, but discovering cause-and-effect relationships. In essence, this is 'detective work': formulating hypotheses by inductive reasoning. Quite surprisingly, though, this is not on the current scientific agenda, which is interested almost exclusively in *testing* hypotheses rather than formulating them.

5 Challenges

Understanding the structure and function of complex systems is the great challenge. Science is undertaking this in a variety of fields, with a notable dedication to measurement that produces an overwhelming wealth of *fact and form* type of information. Facing the challenge directly with *structure and function* type of information implies exposing the mental models of various scientists, which could be risky for their own personal or professional reputation — after all, getting a mental model 'wrong' in public is more severe than getting a data forecast wrong. We could be making leaps of progress with a bit of courage to explore and discuss structure and function rather than 'points' of facts and form — and information would be much more concise, as well.

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