

Abstraction, Integration, and Organization of information for Display: Approach and Emerging Methodologies

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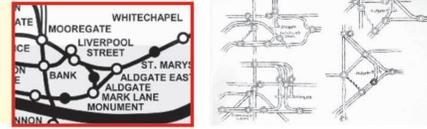
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The word information, in this theory, is used in a special sense that must not be confused with its ordinary usage. In particular, information must not be confused with meaning. In fact, two messages, one of which is heavily loaded with meaning and the other of which is purely nonsense, can be exactly equivalent, from the present viewpoint, as regards to information. It is this, undoubtedly, that Shannon [16] means when he says that the semantic aspects of communication are irrelevant to the engineering aspects. But this does not mean that the engineering aspects are necessarily irrelevant to the semantic aspects.

Warren Weaver, 1949, *Recent Contributions to the Mathematical Theory of Communication*, p. 99

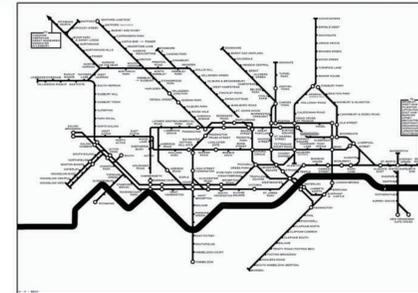


Data. Geographical map of the London Underground (circa 1932)



Integration.

The "Aldgate Triangle", a complex of several stations, including the Bank and Monument stations that are connected through an escalator. The figure is a sketch by Harry Beck from 1965, showing four different solutions for this difficult integration problem.



Abstraction. The Diagram of the London Underground (circa 1933).



The current (2006) Underground Diagram. Beck's organization scheme for the London Underground turned to be flexible enough to accommodate all the new stations and lines that were added since the diagram's inception. It currently supports the prototype of the future diagram which includes several additional lines.



NON-SEPARATENESS (CONNECTEDNESS)



LEVELS OF SCALE



STRONG CENTERS



BOUNDARIES



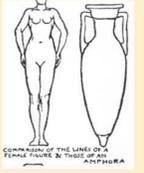
ALTERNATING REPETITIONS



POSITIVE SPACE



INTERLOCKS



GOOD SHAPE



LOCAL (RELAXED) SYMMETRY



CONTRAST



GRADIENTS



INNER CALM & SIMPLICITY



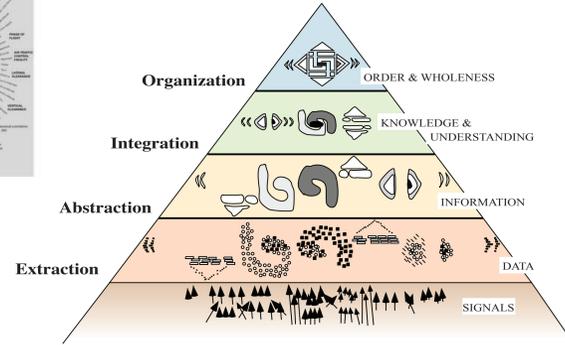
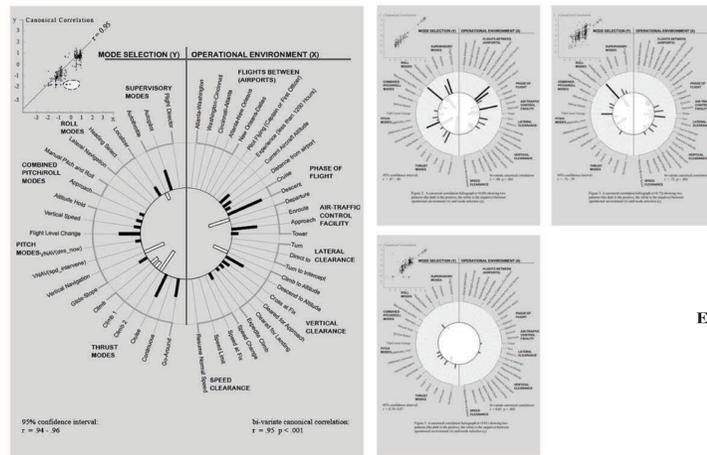
THE VOID



ECHOS



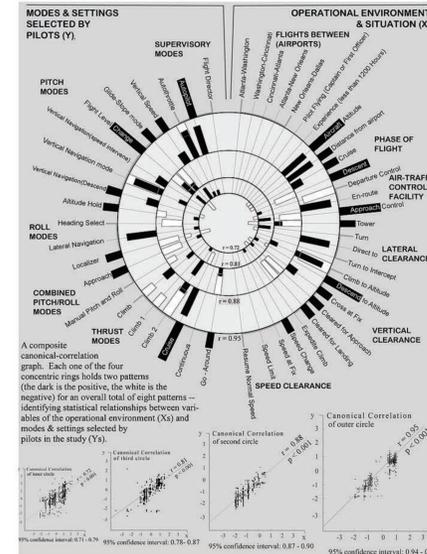
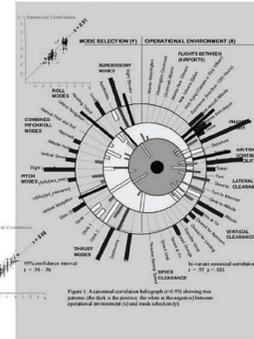
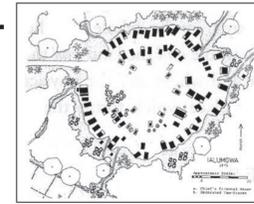
ROUGHNESS (NON-RIGID GRID)



A conceptual framework. The pyramid in the figure has four levels: (1) extraction of signals from the system and its environment and turning them into data; (2) abstraction of data into corresponding information; (3) integration of information into geometrically coherent structures so as to show meaningful relationships, supporting knowledge and understanding; and (4) organization of these information structures in order to create order and a sense of wholeness.

Inspiration.

This organization of the sets was inspired by a diagram of the concentric arrangement of houses and storage huts in a typical Trobriand Island village (Papua New Guinea), which corresponds to the social structure in the society.



Initial.

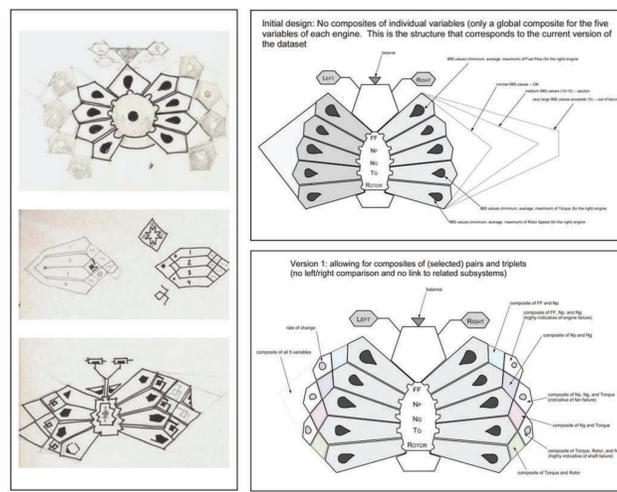
A canonical correlation graph. The graph holds two patterns (the dark is the positive, the white is the negative) -- identifying a single statistical relationships between variables of the operational environment (Xs) and modes & settings selected by pilots in the study (Ys).



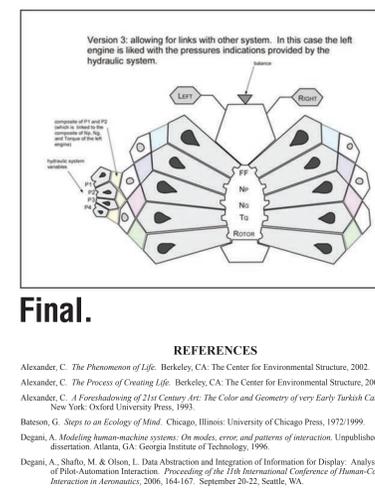
Problem.



Inspiration.



Early.



Final.

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