

Outline of Ars Morphologica - Chapter 1

Conceptual Modelling, Combinatorial Heuristics and *Ars Inveniendi*

A brief History in four acts: Plato, Llull, Leibniz & Zwicky

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SYNOPSIS

(1) An introduction to the principles of conceptual modelling and combinatorial heuristics; (2) a brief history of conceptual spaces and blending theory, *ars inveniendi* and *ars demonstrandi*, and the two modes of analysis and synthesis; (3) Plato's notions of conceptual analysis, meta-hypothesis and "models" (*paradeigmata*); (4) Ramon Llull's introduction of concept analysis and combinatoric spaces; (5) Gottfried Leibniz's development of analysis and synthesis by combinatorics as a general modelling method and a paradigm for *ars inveniendi*; (6) Fritz Zwicky's revival of the morphological method of analysis and construction, and its computerised applications; (7) Outline of research for "Ars Morphologica", its Contents and Personae Dramatis.

1. Introduction and theoretical background

- 1.1 What is Morphology?
- 1.2 What is a morphological model?
- 1.3 What is combinatorial heuristics
- 1.4 Why this historical account?

2. Concepts for a rational account of scientific discovery

- 2.1 Mental models, conceptual spaces and blending theory
- 2.2 *Ars inveniendi* and *ars demonstrandi*
- 2.3 Analysis and synthesis: sequential and compositional
- 2.4 Taxonomies and typologies as *logical* and *heuristic* structures

3. Plato and the genesis of modelling theory

- 3.1 Plato's conceptual spaces and blending theory
- 3.2 Higher-order hypotheses and *ars inveniendi*
- 3.3 Divisions, collections and *paradeigmata*

4. Ramon Llull and the Great Art

- 4.1 Llull and *ars inveniendi*
- 4.2 Islamic influence on Llull's combinatorial art
- 4.3 Llull's combinatorial art

5. Gottfried Leibniz: Combinatorics & *ars inveniendi*

- 5.1 *Cognitio symbolica*: Extended cognition and operative symbolism
- 5.2 *Dissertation de ars combinatoria* (1666)
- 5.3 Morphology and Monadology

6. Fritz Zwicky: Morphology *redivivus*

- 6.1 On the philosophical basis of the "morphological approach"
- 6.2 Morphology as discovery and innovation
- 6.3 Computer-aided General Morphological Analysis and its applications

7. Outline of research for *Ars Morphologica*

8. General Reference List