IDEONOMY:

THE SCIENCE OF IDEAS

Introduction, Foundations, and Applications

by

Patrick Michael Gunkel

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PREFACE: This is a contents table for a 5-volume (82%) sample of the est. 1,200 pages of the Ideonomy ms., as it existed at the start of 1994. The symbol ☞ indicates possible logical 'parts' of the book for insertion or use of the item.

• *LENGTHS OF THE FIVE VOLUMES* •

214 (177+37) — (A) ***ORANGE*** VOLUME (19 pieces);
216 (214+2) — (B) ***BRIGHT*** GREEN VOLUME: ***What Ideonomy Can Do*** (132 sections);
215 (141+74) — (C) ***BLUE*** VOLUME (13 pieces);
242 (185+57) — (D) ***PASTEL GREEN*** VOLUME (41 pieces)
101 — (E) ***YELLOW*** VOLUME: ***Ideonomy Glossary***.

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988 **pages TOTAL** (818pp ***text*** <83%> + 170pp ***nontext*** <17%>)
206 **'pieces' TOTAL** (19+132+13+41+1)

(A) *ORANGE* VOLUME (19 pieces; 177pp. text + 37 other = 214 pp.):

17. *Some Words Produced By "WordSpring" Examined.* • 12+2pp. ☞ *DIVISIONS* — div. **Linguistic Things.**
18. *Coining Names For Anonyms.* • Chapter. 8pp. ☞ *DIVISIONS* — div. **Linguistic Things.**
19. *Universal Scales of Fundamental Quantities.* • Chapter. 4pp. ☞ *DIVISIONS* — div. **Quantities.**

(B) *BRIGHT GREEN* VOLUME: *What Ideonomy Can Do.* • A massive but specialized part of the book. 132 sections (only 71% of the planned 186). 214pp text+ 2 other = 216pp. ☞ *INTRODUCTION* I or ☞ I *DIVISIONS.*

(C) *BLUE* VOLUME (13 pieces; 141pp text + 74 other = 215pp.):

1. *The Ideonomy Book: Very Partial Alphabetical Table of Contents.* • Table. 5pp.
2. *The Ideonomic Division "Paths".* • Chapter. 23+29pp. ☞ *DIVISIONS* — div. **Paths.**
3. *Dendrograms.* • Chapter. 6pp. ☞ *METHODS.*
4. *Definitions of and Metaphors For Ideonomy.* • Chapter. 23pp. ☞ *INTRODUCTION.*
5. *How Do Life's "92 Fundamental Properties" Affect One Another?* • Chapter. 2pp. ☞ *APPLICATIONS* — biology.
6. *Playful Seas (Examples of the Metaphenomenal Genus).* • Table. 2pp. ☞ *DIVISIONS* — div. **Phenomenons.**
7. *The Ideonomic Division "Illusions and Apatology".* • Chapter. 19+22pp. ☞ *DIVISIONS* — div. **Illusions.**
8. *The Ideonomic Division "Stories and Enology".* • Chapter. 9+5pp. ☞ *DIVISIONS* — div. **Stories.**
9. *The "Best Ideas" Generated By the Ideonomy Project.* • Table. 10pp. ☞ *APPLICATIONS* — universal.
10. *The "Best Ideas".* • Chapter. 12pp. ☞ *APPLICATIONS* — universal.
11. *The Ideonomic Division "Forms and Morphology"* {+ § *Ideas For Sinusoidal and Cyclic Structures Suggested By Ring Variants*}. • Chapter. 12+11pp. ☞ *DIVISIONS* — div. **Forms.**
12. *Personal Origins of Ideonomy.* • Chapter. 6+1pp. ☞ *INTRODUCTION.*
13. *The Archanalogon "Volcano" and Its Analogs; Analysis and Synthesis of Their Analogical Interrelationships.* • Chapter. 12+6pp. ☞ *DIVISIONS* — div. **Analogies.**

(D) *PASTEL GREEN* VOLUME (41 pieces; 185pp text + 185 other = 242pp.):

1. *The Ideonomic Division "Roles and Functions".* • Chapter. 3+7pp. ☞ *DIVISIONS* — div.s **Functions; & Roles.**
2. *The Ideonomic Division "Conflicts and Syrrhagmology".* • Chapter. 7+9pp. ☞ *DIVISIONS* — div. **Conflicts.**
3. *Similarities and Differences Between Two Scenes.* • Chapter. 3+5pp. ☞ *APPLICATIONS* — visual sciences.
4. *Ideogenetic Formulas.* • Chapter. 4+1pp. ☞ *METHODS.*
5. *Multidimensional Maps of "Radiation" Form-Species.* • Chapter. 5+6pp. ☞ *METHODS.*
6. *Possible Anomalous Dimensions of Astronomical Phenomena.* • Chapter. 5+3pp. ☞ *APPLICATIONS* — astronomy I or ☞ I *DIVISIONS* — div. **Anomalies.**

7. *Ideonomic Methods.* • Chapter. 4pp. ☞ METHODS.
8. *Transformation of Ideonomy Into A Predictive Science.* • Chapter. 3pp. ☞ INTRODUCTION.
9. *Symmetry and Ideonomy.* • Chapter. 3+1pp. ☞ METHODS.
10. *Ideonomy's Future Use In—and Transformation of—Education.* • Chapter. 4+1pp. ☞ APPLICATIONS — education | or ☞ | INTRODUCTION.
11. *Ideonomic Computer Software.* • Chapter. 3+1pp. ☞ METHODS.
12. *Ways In Which I Seem To Have Benefited From My Use of Ideonomy.* • Table. 1p. ☞ INTRODUCTION.
13. *"Form-Templates" For Mapping Ideas.* • Chapter. 5+2pp. ☞ METHODS.
14. *Future Uses and Users of Ideonomy.* • Chapter. 8pp. ☞ INTRODUCTION.
15. *The Ideonomic Division "Motions and Kinology".* • Chapter. 6+9pp. ☞ DIVISIONS — div. **Motions.**
16. *Science Before and After Ideonomy: An Instructive Comparison.* • Chapter. 7+1pp. ☞ INTRODUCTION.
17. *Test of the Universality and Fertility of the Organon "Generic Things Events May Have In Common".* • Chapter. 2pp. ☞ DIVISIONS — div. **Events.**
18. *New Ways of Cognizing Knowledge.* • Chapter. 2pp. ☞ INTRODUCTION.
19. *Prophetic Dream: Description of A Future Ideonomic Laboratory.* • Chapter. 1p. ☞ INTRODUCTION.
20. *Fanciful Micro-Portrait of Ideonomy's Future.* • Chapter. 1p. ☞ INTRODUCTION.
21. *The Study of Knowledge Is Self-Infinite.* • Chapter. 1p. ☞ INTRODUCTION.
22. *The Ideonomic Division "Images and Idology".* • Chapter. 2pp. ☞ DIVISIONS — div. **Images.**
23. *Introduction To Ideonomy.* • Chapter. 24pp. ☞ INTRODUCTION.
24. *A Multidimensional Scaling Version of "WordSpring".* • Chapter. 4pp. ☞ DIVISIONS — div. **Linguistic Things** | or ☞ | METHODS.
25. *Examples of Idea Maps Produced By Multidimensional Scaling.* • Chapter. 10pp. ☞ METHODS.
26. *Multidimensional Scaling Based On Dyadic Choices.* • Chapter. 3pp. ☞ METHODS.
27. *A Curious Case, and Possible Implications of the Curious Case.* • Chapter. 3pp. ☞ METHODS.
28. *Ideas In Psychology Produced By the Ideonomy Project.* • Chapter. 1p. ☞ APPLICATIONS — psychology | or ☞ | DIVISIONS — div. **Psychic Things.**
29. *Conversational Topics.* • Chapter. 4pp. ☞ APPLICATIONS — food technology.
30. *An Experiment In the Creation of Organons By Nonideonomists.* • Chapter. 11+4pp. ☞ DIVISIONS — div. **Capacities.**
31. *The Significancy of Combinations.* • Chapter. 2pp. ☞ INTRODUCTION | or ☞ | METHODS — combinatorial | or ☞ | DIVISIONS — div. **Combinations.**
32. *Excerpt From 1/17/91 Letter From Patrick Gunkel To Edward Fredkin.* • Letter. 1p. ☞ INTRODUCTION.
33. *Notes On Wonderful Group of Interrelated Ideas Developed In Discussion With Betsey Dyer On 1985 May 4, Dealing Generally With "Possibilities For Quasi-Biological Evolution and Sophistication In the Purely Chemical Realm".* • Table. 3pp. ☞ APPLICATIONS — chemistry.
34. *Simple Combinations of Divisions.* • Chapter. 3pp. ☞ METHODS — combinatorial.
35. *The nMDS Ideomap "Generic Relations".* • Chapter. 2pp. ☞ DIVISIONS — div. **Relations.**

36. *The Future of Ideonomy and Its Impact (Anticipatory Calendar).* • Table. 2pp. ☞ INTRODUCTION.
37. *Transdivisional Organons.* • Chapter. 15pp. ☞ METHODS | or ☞ | INTRODUCTION.
38. *"Idea Chemistry".* • Chapter. 4pp. ☞ METHODS.
39. *Idea Banks.* • Chapter. 3pp. ☞ INTRODUCTION | or ☞ | METHODS.
40. *Nature's Unconscious.* • Chapter. 2pp. ☞ INTRODUCTION.
41. *The Ideonomic Division "Taxons and Taxology".* • Chapter. 9+7pp. ☞ DIVISIONS — div. **Taxons**.

(E) *YELLOW* VOLUME: *Ideonomy Glossary.* • Glossary for ideonomy and book. 101pp.

IDEONOMY
(The Science of Ideas)

Introduction, Foundations, and Applications

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Patrick Michael Gunkel

"IDEONOMY: INTRODUCTION, FOUNDATIONS, AND APPLICATIONS"
Very Partial Alphabetical Table of Contents

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57. Examples of Ignorance.
58. Examples of Questions.
59. Extraction and Use of Generic Morphogenic Rules.
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75. Genera of Networks.
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80. Geneses.
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83. Hierarchy of Investigable Sub-Dimensions of Phenomena.
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92. Ideocartographic Atlases.
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95. Ideocosm and Omniverse.
96. Ideogenetic Cellular Automata.
97. Ideogenetic Formulas.
98. Ideonomic Animated Films.
99. Ideonomic Computer Hardware.
100. Ideonomic Computer Software.
101. Ideonomic Division 'Roles and Functions'.
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150. Personal Origins of Ideonomy.
151. Phenomena.
152. Phenomenon's Features, Sub-Phenomena, Concepts, and Terms.
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156. Principles.
157. Processes.
158. Program For Ideonomy's Future Development.
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160. Prophetic Dream: Description of A Future Ideonomic Laboratory.
161. Pure 'Chains of Consequences'.
162. Pure Versus Applied Ideonomy.
163. Quantity Spectra.
164. Ratio Spectra of Universal Quantities.
165. Real-World Exemplifications of Ring Form-Variants.
166. Reasons For Investigating Illusions.
167. Recurring Chart Types.
168. Redefinitions of Concepts.
169. Relaxations.
170. Reprefixations of Words.
171. Ring-Shaped Causes and Effects.
172. Roget and His Thesaurus.
173. Science of the Qualitative Laws of Nature.
174. Scientifically Investigable Co-Dimensions of Phenomena.
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176. Sequences and Series.
177. Similarities and Dissimilarities Between Two Scenes.
178. Simplicity of Ideonomy.
179. Species and Genera of Hierarchies.
180. Speculative Illusions.
181. Star - Elephant Analogies.
182. Stories.
183. Study of Knowledge Is Self-Infinite.
184. Subdivisions of Morphology.
185. Surprises.
186. Taxonomy.
187. Testable Dimensions of Things.
188. Theories of the Divisions.
189. Things.
190. Time Travel Modi.

(CONT.)

PATHS

The Ideonomic Division
PATHS

But first, what is a path?

The need to define terms, especially at the outset, is keen throughout science; but the peculiarities of ideonomy are such that what elsewhere would be a mere need here becomes an absolute necessity.

Let this not give rise to a misimpression: within ideonomy the same problems and limitations that beset the definition of terms and concepts in other fields are no less stubbornly present, and the grail of definitions that are perfect and absolute will always remain elusive (although revolutionary advances in this direction are indeed possible and will certainly occur).

Also, because ideonomy is in its infancy many of its terms and concepts should only be defined tentatively, ambiguously, polysemously, open-endedly, mutably, multiply, even contradictorily; and they should be redefined repeatedly. For definitions of divisions this is especially appropriate.

So path, in the sense of the present division, might variously, imperfectly, but hopefully suggestively be defined as:

1 [Structured, ordered, continuous, simple, unique, self-identical, consequential, useful, exclusive, &vc] connection between two [points, loci, regions, poles, things, boundaries, limits, events, actors, attractors, nodes, configurations, states, levels, holes, subsets, neighborhoods, values, &vc];

2 The continuous series of [positions or configurations] assumed in any [motion or process of change] by any [moving or varying] system;

3 [Way, course, track, or channel] [traversed, traversable, traceable, retraceable, or usable] by something.

The most elaborate definition of path I can offer at the moment is that produced by concatenating as many forms of oppositeness as I can think of that might characterize its range of possibilities in a multidimensional space, and by letting it be understood that—whatever a path is—it is some sort of structure, entity, or set of possibilities in this stupendous abstract space (for which I apologize to readers):

4 {[Retraceable ↔ unretraceable] [Persistent ↔ instantaneous] [Actual ↔ postulated] [Directed ↔ undirected] [Exact ↔ approximate or average] [Be-featured ↔ featureless] [Unidirectional ↔ bidirectional] [Commutative ↔ noncommutative] [Positively defined ↔ negatively defined] [Spatial ↔ temporal] [Associative ↔ nonassociative] [Distributive ↔ nondistributive] ['Transitive ↔ intransitive'] [Geometric ↔ topological] [Past ↔ present ↔ future] [Two-ended ↔ multi-ended] [Symmetric ↔ asymmetric] [Invariant ↔ changing] [Finished ↔ developing] [Homogeneous ↔ heterogeneous] [Uniform ↔ nonuniform]} : {[Breadthless line ↔ area ↔ volume ↔ field] [Locus ↔ thing ↔ operation ↔ function] [Continuous series ↔ series of (two or more) (points, loci, or referents)]} : {CONNECTION, NEXUS, COURSE, ROUTE, TRACK}.

Actually I can already see that my elephantine 'definition' is inexcusably incomplete.

"The Ideonomic Division PATHS AND HODOLOGY":

"CHAPTER STRUCTURE"
(Sequence of Subsections)

1. Definition.
2. Reasons for studying.
3. Subfields.
4. Related subdivisions.
5. Organons.
6. Divisional terms.
7. Issues.
8. Ways to treat.
9. Examples of paths.
10. Paths in different fields.
11. Paths compared.
12. Causes and influences.
13. Genera.
14. Interrelationships of genera.
15. Ignorance about paths.
16. Elements.
17. Properties and dimensions.
18. Quantitative scalings.
19. Morphology.
20. Motions and morphodynamics.
21. Metastructures of paths.
22. Path events.
23. Sequences and stories.
24. Sets of coalternative paths.
25. All paths compresent in a specific thing: the human body.
26. Speculative body paths and functions thereof.
27. Paths increasingly complex and abstract.
28. Path importance scaled.
29. Questions to ask when treating a path.
30. Ideogenetic formulas.
31. Epilogue.

"THE 71 SUBDIVISIONS OF IDEONOMY (22%) MOST RELATED OR RELEVANT TO 'PATHS'"
(In Crude Intuitive Order)

1st. Courses.
2nd. Nexuses.
3rd. Trees.
4th. Thalwegs.
5th. Shortcuts.
6th. Sequences.
7th. Flows.
8th. Chains of consequences.
9th. Motions.
10th. Series.
11th. Stories.
12th. Histories.
13th. Networks.
14th. Alternative histories.
15th. Goals.
16th. Origins.
17th. Convergences.
18th. Divergences.
19th. Alternatives.
20th. Morphology.
21st. Environments.
22nd. Domains.
23rd. Behaviors.
24th. Degrees of freedom.
25th. Mechanisms.
26th. Causes.
27th. Processes.
28th. Networks of consequences.
29th. Topologies.
30th. Hodography.
31st. Spaces.
32nd. Analogies.
33rd. Models.
34th. Patterns.
35th. Decisions.
36th. Events.
37th. Scenarios.
38th. Probabilities.
39th. Chance.
40th. Circumstances.
41st. Acts.
42nd. Transcendences.
43rd. Changes.
44th. Effects.
45th. Rules.
46th. Conditions.
47th. Randomnesses.
48th. Rings.
49th. Purposes.
50th. Dimensions.
51st. Strategies.
52nd. Tactics.
53rd. Capacities.
54th. Abilities.
55th. Solutions.
56th. Problems.
57th. Ranges.
58th. Wants.
59th. Needs.
60th. Realms.
61st. Phenomena.
62nd. Things.
63rd. Quantities.
64th. Games.
65th. Mathematics.
66th. Examples.
67th. Elements.
68th. Resources.
69th. Taxonomies.
70th. Order taxa.
71st. Principles.

The subject of paths might seem of little importance: in general, intrinsically, to ideonomy, or to the application of ideonomy. Who really cares what paths there are? Which paths given things do, could, or must follow? Where paths lead? Where paths start? What paths are made of? What laws paths obey? How paths interact with one another or otherwise behave? Who, for that matter, really cares what is and is not meant by a path? What could one possibly do with a path? Why should one study them, and are not there far more important things to study? And why, for goodness sakes, should paths be incorporated as a subdivision of ideonomy alongside of things of such clear and great moment as ANALOGIES, KNOWLEDGE, and RELATIONS?

A simple reason why I am devoting a chapter to paths is that I think readers will turn out to be surprised by the degree of interest and importance they actually have. Another reason is that I have found empirically in the course of my ideonomic investigations—rather to my own surprise—that certain ideogenetic formulas that refer to paths are unusually successful, productive, and powerful. The subject can therefore attest to the feasibility of ideonomy and to its ultimate creative potential.

There are fields and phenomena in connection with which the importance of paths is already well-known. EXAMPLES ARE: physics (the path of an elementary particle), operations research (CPM or the critical path method, used in detailed project planning and control), astronautics and military science (the trajectories of rockets and shells), hydrology (river meanders), astronomy (precise orbital paths of celestial bodies—e.g. their sensitivities and projections backward and forward in time), oceanography (paths of currents and eddies), mathematics (asymptotic path for a meromorphic function, the paths of Markov processes or projective geometry), archaeology (trade routes), meteorology (jet streams), musicology (the path of a theme through a symphonic fabric), biology (the cellular or bodily path of a genomic communication, path of migrating caribou, or path of a windborne pollen grain), sociology (a rumor's path), and chemistry (a reaction path).

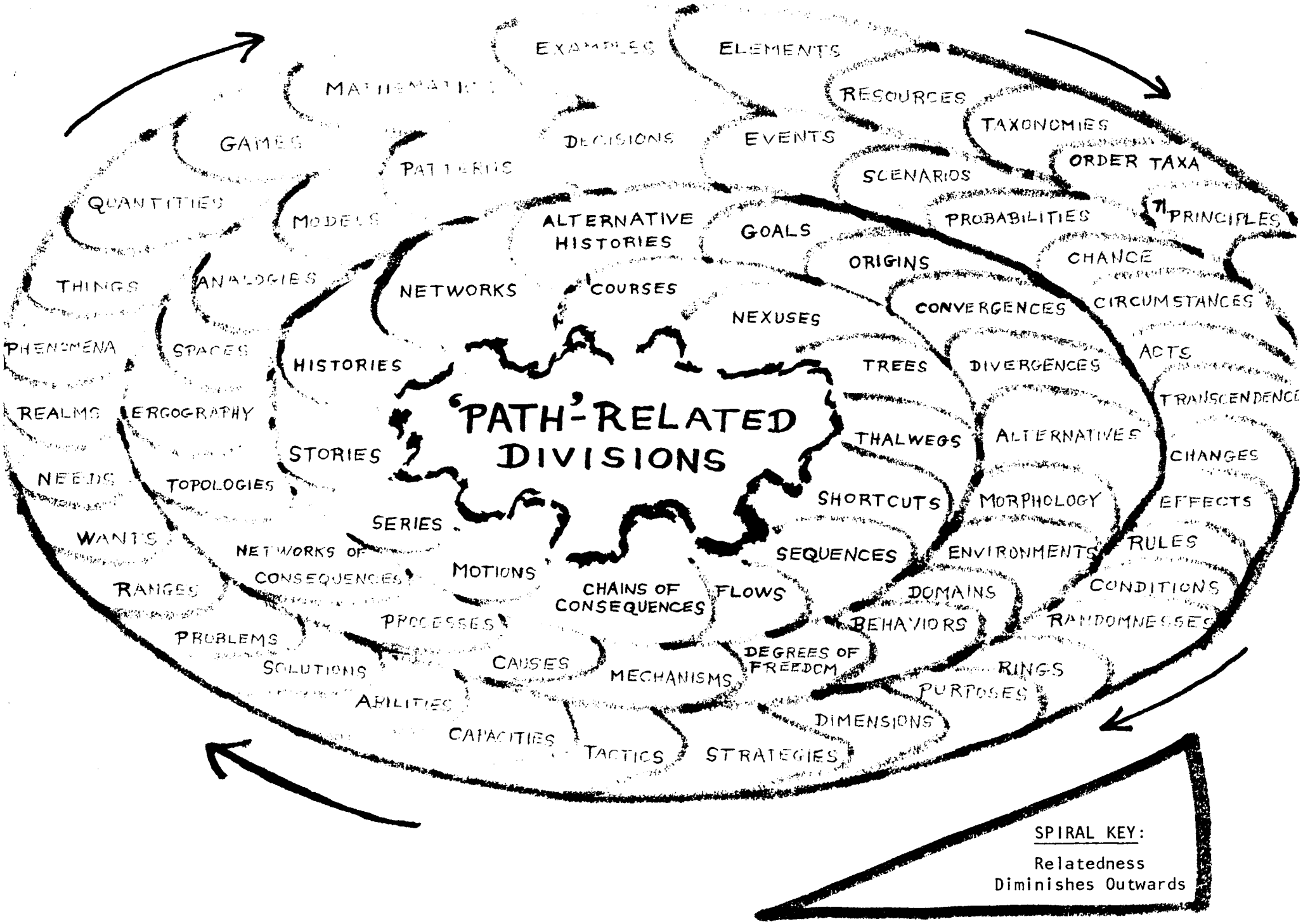
There are other fields and phenomena possessed of paths, or to which the concept of a path applies, but whereof the relevance of paths remains undiscovered, unimagined, or undeveloped. Here ideonomy may serve as a corrective through the richness of its vision and the novelty of its methods, and through what is perhaps its greatest insight: that phenomena and methods for treating phenomena are essentially universal.

RELATED AND ESPECIALLY PERTINENT SUBDIVISIONS

In principle every subdivision of ideonomy is relevant to every other, and therefore to PATHS, but I have prepared a table of "The 71 Subdivisions of Ideonomy (22%) Most Related Or Relevant To 'PATHS' (In Crude Intuitive Order)" (PLEASE SEE).

I will briefly comment upon how the first 26 of these are related or relevant to, or different from, the subdivision PATHS.

1st. COURSES: The main difference is that whereas these tend to be temporal, paths tend to be spatial; or if both are spatiotemporal phenomena, then this is what they usually emphasize, respectively.


'PATH'-RELATED DIVISIONS
EXAMPLES
ELEMENTS
MATHEMATICS
RESOURCES
TAXONOMIES
GAMES
DECISIONS
EVENTS
PATTERNS
ORDER TAXA
SCENARIOS
QUANTITIES
MODELS
PROBABILITIES
PRINCIPLES
ALTERNATIVE HISTORIES
GOALS
ORIGINS
CHANCE
THINGS
ANALOGIES
NETWORKS
COURSES
CONVERGENCES
CIRCUMSTANCES
NEXUSES
PHENOMENA
SPACES
HISTORIES
TREES
DIVERGENCES
ACTS
TRANSCENDENCE
REALMS
ERGOGRAPHY
THALWEGS
ALTERNATIVES
STORIES
CHANGES
NEEDS
TOPOLOGIES
SHORTCUTS
MORPHOLOGY
EFFECTS
SERIES
WANTS
NETWORKS OF CONSEQUENCES
SEQUENCES
ENVIRONMENTS
RULES
MOTIONS
RANGES
CHAINS OF CONSEQUENCES
FLOWS
DOMAINS
CONDITIONS
PROCESSES
BEHAVIORS
RANDOMNESSES
PROBLEMS
DEGREES OF FREEDOM
SOLUTIONS
CAUSES
MECHANISMS
RINGS
PURPOSES
ABILITIES
DIMENSIONS
CAPACITIES
TACTICS
STRATEGIES
SPIRAL KEY:
Relatedness
Diminishes Outwards

2nd. NEXUSES: These are links or connections between things; usually absolutely minimal. Paths tend to be individually larger or more complex, and refer explicitly or implicitly to some actual or potential movement, transport, or transmission along themselves. Nexuses are more comprehensive and diverse; their nature less definite.

3rd. TREES: Most paths do not branch, but often anastomose when they do. Usually a tree is just a particular structure.

4th. THALWEGS: These are paths, or at least things with which paths may be associated; but they are more specialized. The actual or virtual spatial dimensionality is higher. The thalweg has an average, negative, and abstract quality.

5th. SHORTCUTS: Analogs of thalwegs, these are types of paths; a large fraction of paths are in some sense shortcuts.

6th. SEQUENCES: Usually these are less spatial or more abstract than paths, and they are more apt to be chainlike or to consist of discrete parts in mathematical order or proportion.

7th. FLOWS: Here the thing is the flow, whereas a thing follows or describes a path; flows are massive and usually two- or three-dimensional of themselves. Flows are more apt to follow paths than paths flows. The flow is usually a process, the path a thing or locus; a flow is more apt to be a complex phenomenon, with properties like elasticity, nonlinearity, turbulence, or dimensionless numbers.

8th. CHAINS OF CONSEQUENCES: Usually these are sequences restricted to causal effects or logical corollaries; the expression may be over actual or abstract space. Paths may take this form or be so represented; types of paths may partly or wholly correspond to or be illuminated by types of chains of consequences.

9th. MOTIONS: These may or may not be path-like, in the usual sense, but they can describe what passes over or makes a path, or the process thereof, as well as the things or processes that a path may be perturbed by; and motions may arise from, reflect, or be regulated by paths—and types, aspects, and laws thereof.

10th. SERIES: More protean and recursive, generally, than a sequence or path, these may nonetheless be what underlies the continuity of a path, or its continuous generation.

11th. STORIES: The progression of a path may tell a story, and the unfolding of a 'story' (in the ideonomic sense) may be described with the help of a path.

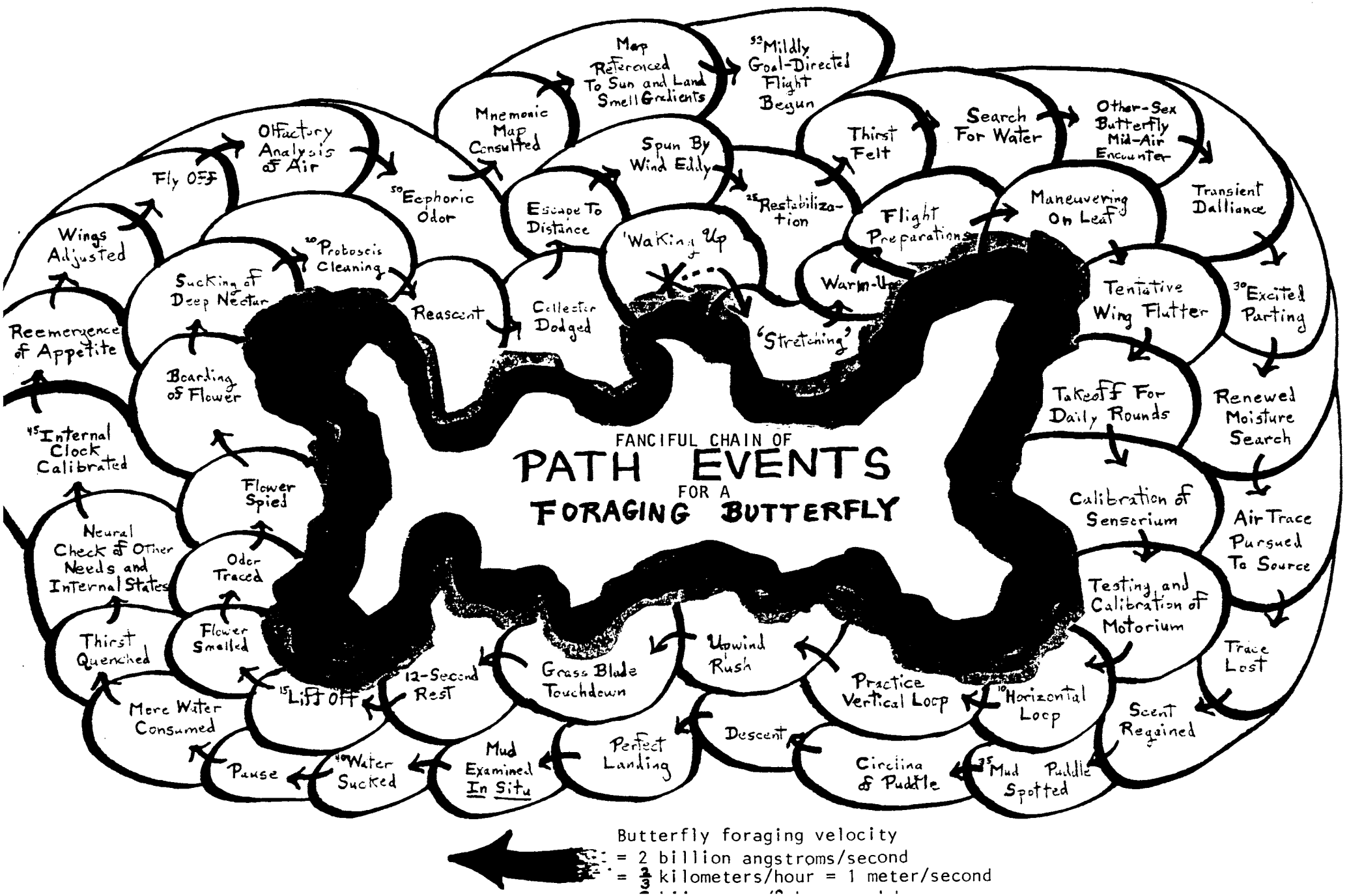
12th. HISTORIES: The same is true here, and histories may have their paths graphed.

13th. NETWORKS: Paths will often give rise to lateral branches, to cross-hatching with parallel paths (themselves perhaps induced), to anastomoses, and to backward and return branches; resulting in the formation of networks. Preexisting networks may channel the paths taken by things; and they may induce the growth of new paths and the extension of old ones.

14th. ALTERNATIVE HISTORIES: The study of the range of known and possible structures of paths can aid visualization of other courses the histories of things might have taken.

15th. GOALS: Paths can suggest what goals are attainable or how to attain those goals.

16th. ORIGINS: The origin of a thing may be discovered by reconstructing its path backwards from the present or forwards from the past, or by noting the convergence or divergence of many paths, backwards or forwards in time.


FANCIFUL CHAIN OF
PATH EVENTS
FOR A
FOREGING BUTTERFLY
Map Referenced To Sun and Land Smell Gradients
53 Mildly Goal-Directed Flight Begun
Mnemonic Map Consulted
Olfactory Analysis of Air
Fly Off
Wings Adjusted
Reemergence of Appetite
45 Internal Clock Calibrated
Neural Check of Other Needs and Internal States
Thirst Quenched
Mere Water Consumed
Pause
40 Water Sucked
Mud Examined In Situ
Perfect Landing
Descent
Circling of Puddle
35 Mud Puddle Spotted
Scent Regained
Trace Lost
Air Trace Pursued To Source
Calibration of Sensorium
Testing and Calibration of Motorium
10 Horizontal Loop
Practice Vertical Loop
Upwind Rush
Grass Blade Touchdown
12-Second Rest
15 Lift Off
Flower Smelled
Odor Traced
Flower Spied
Boarding of Flower
Sucking of Deep Nectar
20 Proboscis Cleaning
50 Eephoric Odor
Escape To Distance
Spun By Wind Eddy
25 Restabilization
Thirst Felt
Search For Water
Other-Sex Butterfly Mid-Air Encounter
Transient Dalliance
30 Excited Parting
Renewed Moisture Search
Takeoff For Daily Rounds
Tentative Wing Flutter
Maneuvering On Leaf
Flight Preparations
Warm-Up
'Stretching'
'Waking Up'
Collector Dodged
Reascent
Butterfly foraging velocity
= 2 billion angstroms/second
= ⅔ kilometers/hour = 1 meter/second

17th. CONVERGENCES: Different convergences upon an identical goal imply different paths; and vice versa. The paths of many things coming together may influence and shape one another. The study of convergences in general can create insights about how, where, when, or why things may or must end.

18th. DIVERGENCES: The way in which things diverge from their origins can help one to deduce their subsequent paths. The analysis of divergent paths provides a wealth of insights into the nature of phenomena.

19th. ALTERNATIVES: A path is like a sequence of choices over a set of alternatives.

20th. MORPHOLOGY: The science of form is the science of forms that paths may and must have. It is also the science that can translate the significance of the forms that paths exhibit.

21st. ENVIRONMENTS: Different environments (different in type, content, processes, forces, &vc) give rise to different paths; like paths may arise in like environments, in connection with like and unlike things, or the last may give rise to unlike paths in these same environments; and the reasons and laws for all of these things, once worked out, may at once illuminate the environments, paths, and things. Environments that are the matrices of paths are effectively but an everted, inverted, or negative form of these same paths; paths and their environments form systems of enantiomorphs, which the limitations and biases of human perception and cognition determinedly and consequentially mask.

22nd. DOMAINS: The vast anatomy of the universe is areolated into multitudinous contiguous, interpenetrating, and overlapping domains, within, between, and among which paths form the circulatory system—an illimitable web of routes, connections, flows, and exchanges. These domains have their characteristic properties, and that which has just been said about environments applies equally to domains.

23rd. BEHAVIORS: The various and characteristic types of behavior that things exhibit determines—and can be used to describe and predict—their paths; likewise the laws that produce this behavior can be used to clarify the corresponding, and more general, laws of paths.

24th. DEGREES OF FREEDOM: If one is to master a path it is almost critical for one to know the degrees of freedom of the path and of whatever it is that is to imagined as traversing the path, and this knowledge should at least include the number, quality, range, source, orientation, rules, and interrelationship of these degrees of freedom.

25th. MECHANISMS: The path in space and time by which food traverses the alimentary canal depends upon the complex mechanisms that govern digestion and the motility of the digestive track (peristalsis, churning, absorption, irrigation, acidification, valvular function, neural programming and interaction, and so forth). In a sense the path is indescribable and incomprehensible without reference to the lawful interplay of this environmental machinery. Yet the machinery of environments is ideonomically generalizable.

26th. CAUSES: The path of a hemline and the path of, say, a foraging butterfly can share the same generic causes: plication (of cloth and wind billows or currents alike), alternating helical twisting and counter-twisting (of hemline and fingers of air alike), natural selection of 'safe' flutter (of the feminine hemline before male eyes, and of the butterfly passing before the eyes of numberless potential predators), universal neuromuscular curves (shaping the movements of hungry butterflies and busy seamstresses since time immemorial by an identical mathematical function), etc.

Once ideonomy has developed into a mature science, and the methods and materials of its manifold subdivisions exist, the treatment of things in terms of their paths will benefit immensely from consultation with the many subdivisions that have just been considered. But for the moment, both the reader and the writer must use their imaginations.

"THE IMPORTANCE OF (STUDYING, ETC) PATHS"
To Ideonomy and In General

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1. Different paths may have identical origins.
2. May aid the construction of commercial paths.
3. May disclose the peculiarities of phenomena.
4. May enable paths to be more efficient or direct.
5. May help distinguish one path from another.
6. May help quantify phenomena.
7. May lead to the classification of different types of paths.
8. May lead to the discovery of deep analogies between different paths.
9. May lead to the discovery of new types of paths.
10. May reveal stages in the development of a phenomenon or evolution of a system.
11. May reveal subpaths embedded in paths or superpaths known paths are embedded in.
12. May show how different paths interact or get tangled in one another.
13. May suggest the details of occurrences.
14. Path structure suggests path mechanism.
15. Paths can distinguish between, or even define, different laws.
16. Paths can enable stability, feedback, uniformity, or progress.
17. Paths lead to goals and to new phenomena and possibilities.
18. Paths may be the only proof we have—or can have—of the existence of phenomena.
19. Paths may indicate whether phenomena are random or deterministic.
20. Paths may record history.
21. Paths may represent habits and future ⟨exact or average⟩ recurrences.
22. Paths may represent the backbone of a phenomenon.
23. Paths may simplify description.
24. Paths often link nodes and represent ⟨relationships and structure⟩.
25. Paths traced forward in time may reveal the future's probable and alternative branches.
26. Perceived or known paths often have unacceptable gaps.
27. Retracing paths may lead to the discovery of different branches of the same path or to other paths.
28. Single paths often have a multitude of uses.

WHY TREAT PATHS

Please see the table titled "The Importance of [Studying, Etc] Paths: To Ideonomy and In General". It simultaneously encompasses reasons for reading about, discussing, describing or seeking ways to describe, doing experiments with or upon, theorizing about, or otherwise treating paths, path-like phenomena, or phenomena in terms of paths or their path-like aspects. The items of the list have been placed in alphabetic order.

The FIRST REASON given for studying paths is that different paths may have identical origins.

Thus there might be reason for researching the exact and complete phylogenetic (or cladistic) history of different species, or even quite remote taxa, of organisms, to discover whether singular events in the history of the earth—ice ages, perhaps, or volcanic episodes, or the infall of asteroids—may have cooriginated, or rectilinearly codirected, such different organisms or their subsequent evolutionary paths.

The same question arises in the historical study of mankind: in recent centuries democracy and high industry have become common over the earth and a question that needs to be answered about both is whether, in effect, they derived from a single point (locus) in space, or instead had multiple spatial origins encouraged by connected conditions (or perhaps by their very synthesis)?

Conceivably by retracing the ancient genotypal or phenotypal paths of modern, seemingly unrelated or disparate diseases, common evolutionary origins of pathogens may be discovered. This would not necessarily have to mean that when these diseases or their pathogenic entities split off from one another on a common evolutionary tree, they bore marked or any phenotypal or genotypal similarity: possibly instead they originated as miscellaneous fragments of some fundamentally—or merely accidentally and temporarily—united mass of genetic or quasi-genetic material.

Thus there are many senses in which different paths may have identical origins, some of which are:

(1) Unrelated paths may spring up from single events
(2) —Or from general events
(3) —Or shared conditions (perhaps subsequently extinguished);
(4) At some point in the past (or in the present or future) two or any number of paths may interact (symmetrically or asymmetrically) and as a result undergo a change of character or direction;
(5) Chronologically unrelated paths may nonetheless be identical in the type, form, or nature of their origin;
(6) Paths of unlike form may actually or potentially have one or many identical (or equivalent)—simpler or more complex—forms from which they are mutually—or perhaps reciprocally—derivable morphogenetically or morphodynamically;
(7) Even the phenomena (or topics) of different sciences (or subjects) may have like paths or paths with like, homologous, or self-identical origins.

A SECOND REASON for treating paths is that it may aid the construction of artificial paths.

The paths that are to be treated may be ones to be found in physical nature, or simply discoverable by the imagination, or that already exist artificially but in some different form or situation or for some different reason or purpose.

Microbiologists are studying the existing catabolic pathways of microorganisms in order to confer upon them unnatural abilities to degrade toxic wastes. The scientists would achieve this either by restructuring existing pathways or by assembling entirely new ones (that nonetheless retain parts of, or bear analogy to, old ones).

The paths that historically led to different inventions may upon study reveal generic or abstractable properties that would be of use in furthering new innovations in the future; or modifications, extensions, or generalizations of these paths may have such value.

Paths that through genetic recombination, mutation, or speciation lead to novel phenes, phenotypes, or species—or to revolutionary genotypes—in nature, need to be studied and understood, for eventually they will suggest new and novel paths that can or must be followed by tomorrow's biological engineers.

The paths of electrons traversing molecules, of water molecules constructing or transforming a watershed, or of command or data sets in a computer, may have a general form, or certain qualities, that are relevant to the design of road structures and networks, or that could improve their efficiency or capacity.

A THIRD REASON for investigating paths is that it may disclose the peculiarities of phenomena.

Paths are subtle telltales of the laws, nuances, and sensitivities of phenomena. They can reveal what nature is otherwise reluctant to reveal, or would keep hidden. They can be the integral, structured handwriting of her interrelated events or coordinated processes, or a decipherable equivalent of the brain's electrical waves.

Comparisons of the daily paths of different animals cohabiting a forest may suggest through contrast the differing mentalities of those animals.

Studies of the anomalous paths taken on occasion by bolts of lightning may clarify more than merely the kinematic peculiarities of lightning.

Paths taken to the workplace—or exhibited in the search for a wife—by various persons may manifest the differences of character of those persons. The rate of development, directness, variational dispersion or clustering, randomness or methodicalness, efficiency, errancy, experimentalism, etc of such paths may have a wealth to say about the psychology of Homo sapiens and of individual human beings.

A FOURTH REASON why paths should be researched is that it may enable them to be more efficient or direct.

That this is so can be suggested by analogy. In recent years the great advances that have occurred in computer hardware, software, and alogrithms have enormously augmented man's power to simulate aircraft and ocean vessels and their dynamic interactions with the environment, with the result that it has been discovered that the 'intuitive' design of traditional vehicles is often astonishingly wrong, or that vehicles of truly optimal design would involve innovations that would seem to us bizarre and ridiculous.

Almost certainly a corollary of this is that what we presently think of as being paths of maximal or optimal efficiency or directness, are in reality quite otherwise; and that for many familiar things the most direct or efficient paths possible are ones so far from being imagined that upon first being proposed or glimpsed they would strike us as horrendous mistakes or decidedly queer.

We remain ignorant of the most efficient way in which to send telephone messages over a network, or for a traveling salesman to make his way between a set of cities.

In fundamental physics the optimal paths between different physical events may be equivalent to the laws of those events, or the interactions between the paths of different particles may be paradoxically equivalent to the existence of those very particles or imply that other, undiscovered particles exist. This highlights the potential importance of optimizing paths, in theory or fact.

Yet a FIFTH REASON for treating paths is that it may help man to distinguish one path from another.

Unquestionably many phenomena presently thought of as traversing or generating the same or an equivalent path or route, actually involve two or more partly or wholly distinct or disparate ones.

Knowledge or perception of existing paths must be blinding our perception or imagination of other paths that are possible. Indeed, since possible paths are probably infinitely many, diverse, ranging, transcendent, and encompassing, whereas the set of all known paths is finite and small, it might be said of current hodological knowledge that it is infinitesimal in amount, but infinite in cost.

One could easily have the impression nowadays that all nations on earth are basically following the same political, economic, and cultural path and will eventually become so unified as to be indistinguishable. This may be an illusion, however, and careful historical studies of the individual paths of, say, the United States and China might enable us to distinguish different but easily confused, or quasi-analogous, paths governing the past and future history of these peoples.

Moreover, the path taken by the world 'to date' may one day change radically, and the beginnings of this divergent path may be immanent—hidden but discoverable—in the present course of things.

A SIXTH REASON for treating paths is that it may help one to quantify phenomena.

By studying the fine structure of Mars' orbit, for example, and relating it to perturbations caused by other bodies, one can quantify the mass and long-term dynamical history of that planet.

WHAT PATHS DO

One of the best ways to understand a thing is to learn what it does, might do, or could be used for. So what are the specialized and generic functions, uses, effects, and abilities of all taxa, species, and instances of known or possible paths or of things representable as 'paths'?

The question defines a future ideonomical inquiry that will prove vast and in certain ways unending, but we can at least start the ball rolling in the right direction by discussing the accompanying organon "65 Things Paths Do, Can Do, Or Can Be Made To Do" (vide).

The table's items refer to things paths themselves do, to things paths can cause or help other things do, or to both.

Complementary organons could be constructed and used in combination with this table, "Ways and Degrees of Doing Things" for example—which is an organon that could also be reused in other ideonomic divisions, or that would have the broadest possible utility. Perhaps it is worth giving a sense of what such a coorganon would be like and of how it would operate. I will do this by combining greatly abridged versions of the two named lists into an integral organon:

Prototypal Organon of

The Ways and Degrees In Which
Paths Do, Can Do, Or Can Be Made To Do Things
Themselves Or To Other Things

HOW DONE:	WHAT DONE:	TO WHAT:
Catalytically	Accelerate or decelerate	Themselves
Circumscribedly	Add, build, or form	Other Things
Continuously	Advance	
Covertly	Anastomose	
Directly	Ascend or descend	
Diversely	Attract	
Economically	Oppose or restrict	
Inductively	'Compact'	
Maximally	Fossilize	
Optimally	Branch or split lengthwise	
Programmatically	Break or fragment	
Progressively	Change or transform	
Reversibly	Enclose or orbit	
Selectively	Combine with	
Sequentially	Connect or unite	
Structurally	Distribute resources	
Virtually	Interfere with	

But to return to the first organon, and to the task of explaining and illustrating some of its sixty-five items.

Paths can ACCELERATE OR DECELERATE (things or themselves). Roads sped the transshipment of goods historically. Telephonic cables and microwave

"TABLE OF 65 'THINGS PATHS [DO, CAN DO, OR CAN BE MADE TO DO]'"

---

1. Accelerate or decelerate.
2. [Add, build, or form] something.
3. Advance.
4. Anastomose.
5. Ascend or descend.
6. [Attract or be attracted to] [themselves, other paths, or other things].
7. [Be or become] [obstructed, opposed, confined, or otherwise restricted].
8. Be 'compacted' or 'coiled up' into themselves.
9. Become inactive or fossilized.
10. Branch or split lengthwise.
11. Break or fragment into pieces.
12. Change or transform [themselves, other paths, or other things].
13. [Circumnavigate, girdle, circumscribe, enclose, bound, outline, describe, measure, or orbit] things.
14. Combine with [<similiar or different> paths, themselves, or other things] to form complex [systems, networks, or structures].
15. [Compete or struggle] with [one another or the environment].
16. Concentrate resources at [one point or a <series or system> of points].
17. [Connect, interconnect, unite, coordinate, or interact] [two or more] things.
18. Curve, twist, or turn sharply.
19. [Detect and follow] the traces of former paths.
20. Distribute resources to [general or arbitrary] points (cf. 16).
21. [Entrain or collimate] one another.
22. 'Explore' [things, the environment, or paths].
23. [Feed or energize] [themselves, other paths, or other things].
24. Fill a [space or object] (e.g. *à la* a Peano curve that seems to [fill or constitute] a solid triangle).
25. [Grow, lengthen, or be added to <incrementally or from without>].
26. Hide only to later [reappear or regenerate].
27. Imitate [themselves, one another, or the environment].
28. IN COMBINATION WITH OTHER PATHS: keep many different [inputs, outputs, or flows] [separate or independent] of one another.
29. [Increase or maximize] the [efficiency or economy] of use of [space, materials, energies, or things]; or reduce needed [effort or attention].
30. Integrate [fluctuations, irregularities, randomness, spectrums, etc] [mathematically, physically, or mentally].
31. Interfere with [themselves or other paths].
32. Interpolate or spline.
33. Intersect [themselves or other paths].
34. [Join, coalesce, or 'splice'] [themselves or other paths] (cf. 11).
35. Jump.
36. Leave traces.
37. [Mature, evolve, strengthen, or improve].
38. Mediate input or give [ingress or access].

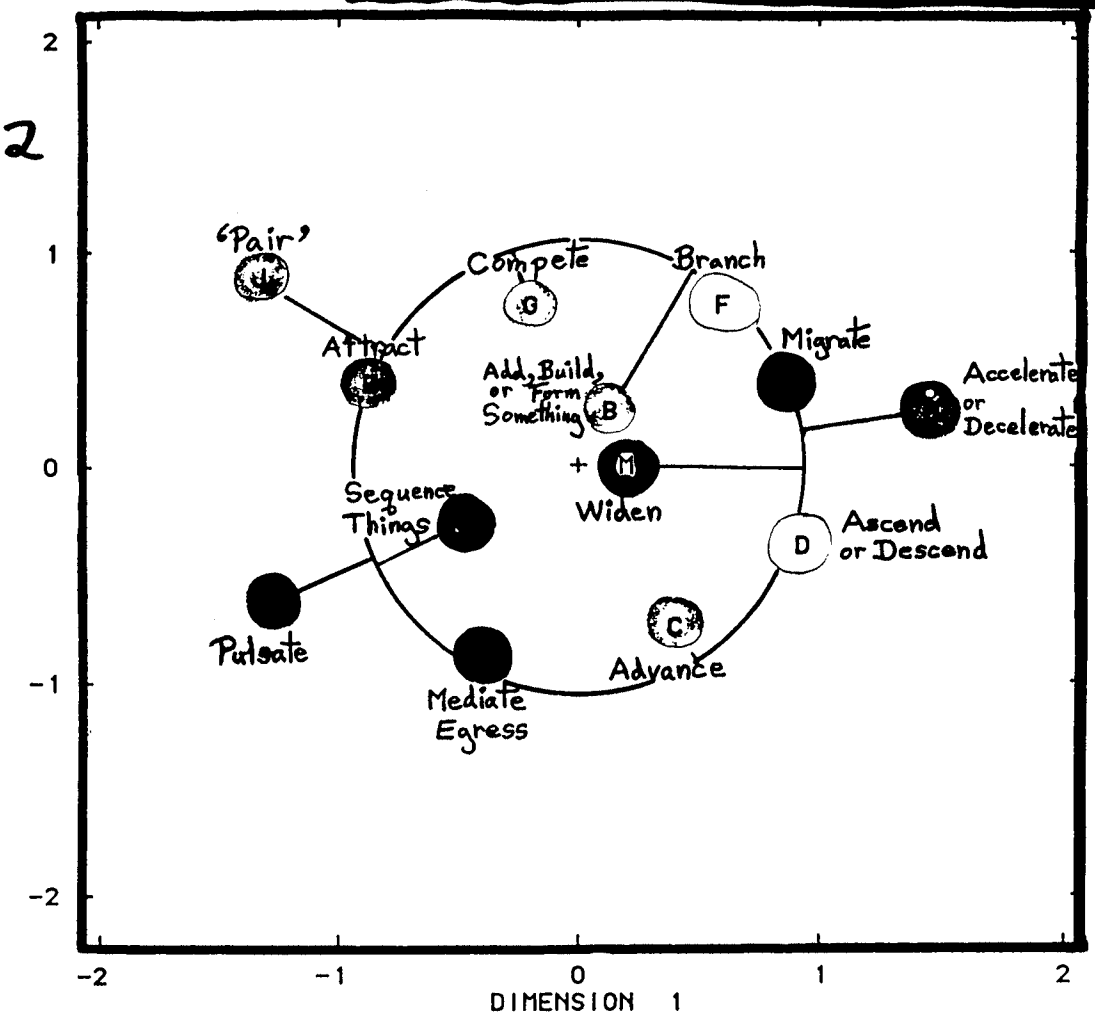
(CONT.)

(CONTINUATION OF TABLE)

39. Mediate output or allow [egress, escape, or disposal] (cf. 38).
40. Migrate, drift, or wander.
41. Narrow or widen.
42. Originate.
43. Overextend.
44. [Overlap, superimpose, contain, or be contained in] other paths.
45. Pair with another path (perhaps involving antidirected movement).
46. Pass [over, around, or under] [themselves, other paths, or other things].
47. Project (e.g. à la a [vector, extrapolation, trajectory, or ray].
48. [Pulsate, oscillate, wobble, weave, spiral, or corkscrew (helically)].
49. [Rationalize, systematize, fix, and/or routinize] [flow, movement, transport, travel, interaction, and/or exchange].
50. Reinforce [themselves or other paths] (cf. 15 and 31).
51. [Remove or excavate something (cf. 2).
52. [Repel or escape from] [themselves, other paths, or other things] (cf. 6).
53. Reproduce or multiply.
54. [Retreat, reverse, or double back on themselves] (cf. 3).
55. [Sequence or concatenate] things.
56. Shrink or shorten (cf. 25).
57. [Straighten (cf. 18).
58. Stretch elastically.
59. Supply a thing with something else.
60. [Tangle, wrap, or knot] [themselves, other paths, or other things].
61. Terminate or be <erased or stopped> (cf. 42).
62. [Tour, sample, or inspect (or enable something to)].
63. [Transmit <information, inquiries, or orders> or mediate control].
64. [Transport, direct, constrain, or canalize] (something).
65. Weaken, wither away, or attenuate (cf. 37).

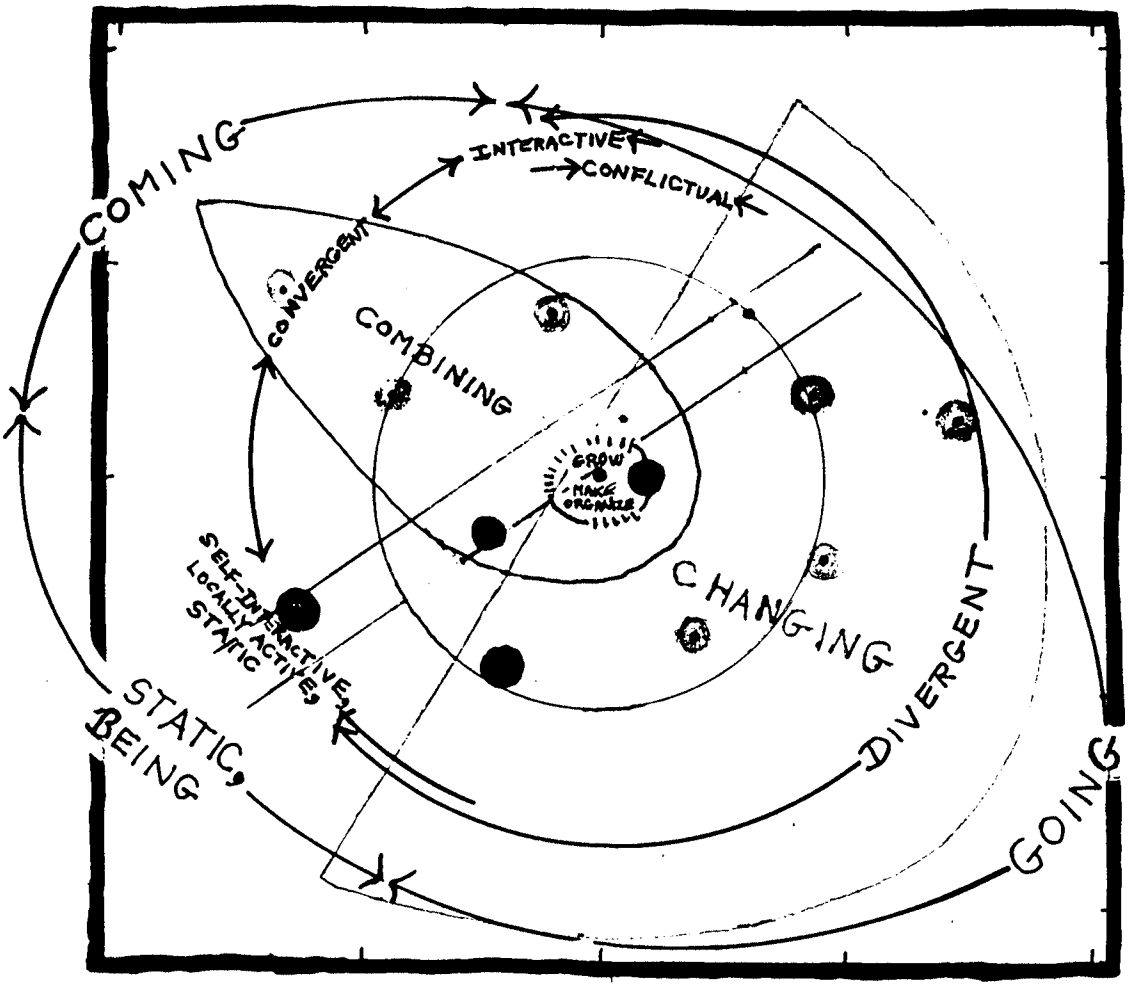
13 (of ~80) Things Paths Do Or Do To Things; (Relatedness)

D=2



(Ideomap Created Via the Triadic Method of Nonmetric Multidimensional Scaling)

ANALYTIC-REGIONS, AND JUSTIFICATORY, COUNTERMAP



repeating tower chains quickened the universal flow of communications and information, as well as their own construction and development; and light pipes will soon reillustrate this process. Various and sundry tubular paths hasten the inflow and outflow of matter and energy that make the human body such a spectacular vergence. Cells are shot through with microtubules that have recently been found to accelerate the movement throughout the cell of diverse particles or organelles, which in some sense use the tubes as tracks. Store queues spare clerks by decelerating the onrush of excessive customers to punctiform counters (or naked clerks!). Tortuous canyons are paths that can decelerate terrain traversal by adding to the geodesic of a hike. Paths that retard flow (via or owing to channel elongation, subdivision, anastomosis, narrowing, distortion, enlargement, obstruction, or the like) have many positive uses, roles, and effects in nature and industry, or in: heating, cooling, and electronic systems, sedimentation, lungs, the countercurrent kidney, cerebral neuropile, purification, concentration, interconversions between or among radically different quantitative and qualitative dimensions, the hydrological cycle, estuaries and mangrove communities, academic scholarship, scientific research, artistic creation, psycho-social existence itself, etc.

Paths can ADD, BUILD, OR FORM things. Blood vessels add oxygen atoms to the body's far-flung cells; nerves, axons, and dendrites add data and instructions to individual neurons. In childhood the bloodstream builds the body with the molecules of food it transports from the intestine. Magmatic paths in the earth's crust build volcanoes and help build the atmosphere (literally, in fact, since recomposition influences stratification, dynamics, and cellulation). Paths of water molecules (vapor) and droplets build and form clouds. The Sun's surficial structures are path-generated and revelatory of their hodological origin (indeed, many are hodomorphic or paths simpliciter). Streams are paths that form geological landscapes; they also build alluvial fans, deltas, and abyssal cones. The arboreal path of scientific and technological research has built and shaped civilization across history; it has also—and increasingly—built and shaped itself.

Paths can ADVANCE things or themselves. With time the many great meander loops of the Mississippi River advance seriatim downstream. Civilization and urbanization tend to advance along watercourses, tradeways, roads, orogenic belts (which are both vertical and horizontal paths, in a morphodynamical sense), biogeographic paths, ocean currents, currents of air, and even isthmuses (such as that linking North to South America).

Paths can ANASTOMOSE, or facilitate the anastomosis of other things. The bodies of organisms are replete with spatial and temporal (or metaphoric) anastomoses of every imaginable sort at countless levels of countless hierarchies (of size, time, energy, order-and-entropy, etc): e.g. in the vascular, lymphatic, nervous, skeletal, muscular, endocrine, sensory, and respiratory systems; in the system of intercellular spaces; in the nucleic-proteic transcriptional-translational system; in the system-of-systems within the plasmalemma (cytomembrane); in the endoplasmic reticulum; and in the myriad biochemical pathways. Rivers braid. 'Within the mind' ideas and thoughts must flow, branch and stream into miniscule or unidimensional filaments, and subsequently reunite downstream; they must anastomose and simply intersect both up- and downstream, in fact. The complex "kinetic" pathways and paths of actual chemical reactions not only branch but anastomose (that is, they form networks, not just trees).

Then consider the paths that ingested toxins are apt to both form and follow in the body: in addition to the anastomoses of the flow of a toxin in the blood that the mere structure of the vascular system will induce, there will be direct anastomoses as molecules of the toxin migrate from blood vessels to their targets in the plasmas and organelles of the cells of target tissues, as well as indirect anastomoses, as effects caused by the toxin molecules propagate in Nth-order biochemical pathways (chains).

Paths can ASCEND and DESCEND, and cause the ascent and descent of things. They can do this both literally and figuratively. Salt nuclei from ocean waves are transported by columnar, helical, and other winds high into the atmosphere. Mountains provide paths for earth currents to ascend to high altitudes, where they ultimately transform into atmospheric electric currents. Galactic jets shoot particles to high galactic 'altitudes'. Blood ascends and descends from and to the human heart via 'vast' arterial paths. Electrons ascend to and descend from the electron shells or energy levels of atoms. The deep descent and ascent of waters circulating in the Earth's crust cause a welter of profoundly important but still largely mysterious geological phenomena. Earth's organisms descend and 'ascend' via evolutionary paths, many of which—say for being endlessly recurrent—appear to be inevitable. Technological innovation occurs thanks to 'repeatedly' ascending (and 'descending') paths of invention and discovery. Paths may be necessary to define ascent and descent, in space and time: e.g. by unidimensionalizing change and succession to make them absolute, by stratifying a volume, by converting a 'compact' three-dimensional volume into a 'maximally elongate' Peano curve (or tridimensionally dense egagropile) that enables a critically minimal gradient or maximal range, by providing efficient shortcuts to extremes and hence allowing the attainment of extremes, by defining an arbitrary but necessary (e.g. initiatory) sequence, etc.

"43 QUESTIONS TO ASK WHEN TREATING A PATH"

1. Where does the path START?
2. Where does the path END?
3. What is ALL of the path; [where, what, or how long <absolutely and relatively>] is it?
4. Is the path FINISHED or is it still [growing, changing, evolving, or otherwise active]?
5. Did the path have to develop as it did, or COULD IT instead [HAVE DEVELOPED in any OTHER WAY or have taken any other form]?
6. [To what extent, in what way, and for what reason] does the path VARY IN SPACE in [<external or internal> <structure or appearance>, composition, location, environment, function, e/vc]; and how uniform is it?
7. [To what extent, in what way, and for what reason] does the path VARY IN TIME in [<external or internal> <structure or appearance>, composition, location, environment, function, behavior, requirements, e/vc]; and how uniform is it?
8. Is the path ALONE or are there any other paths?
9. Does the path BRANCH—or its branches branch?
10. Does the path [INTERSECT or join] any OTHER PATHS?
11. Does the path [intersect or ANASTOMOSE] ITSELF?
12. Does the path have a GOAL or does it seem goalless?
13. How does the path behave with respect to itself; does it INFLUENCE ITSELF?
14. Is the path—or 'path traveling'—[AUTONOMOUS, heteronomous, or both]?
15. What are all ABSOLUTE ways of QUANTIFYING the path?
16. What are all RELATIVE ways of QUANTIFYING the path?
17. Does the path have a [sharp or definite] BOUNDARY—or merely a [diffuse, ragged, approximate, or indefinite] one?
18. What CAUSES the path; what [INFLUENCES or could influence] it; why did it ORIGINATE; what [purposes, roles, functions, values, uses, or importance] does it have?
19. Is the path [CONTINUOUS or interrupted]?
20. Is the path [VIRTUAL or substantial <a locus, thing, operation, or function>]?
21. Is the path [UNIDIRECTIONAL or bidirectional]?
22. Is the path [PERSISTENT or transient]?
23. Is the path ITSELF [INTERESTING OR TRIVIAL]?
24. How does the path RESEMBLE OTHER PATHS; what paths is it analogous to?
25. How does the path DIFFER FROM OTHER PATHS, what paths does it differ from, and how [ordinary and special] is it?
26. What [SPECIES and GENERA] of paths does the path [belong to or resemble]?
27. What are [all other PERSPECTIVES from which the path might be seen and all the ways in which it might seem to vary]?
28. Does the path contain INTERNAL PATHS or is it itself [contained or branched] from [LARGER OR HIGHER] PATHS?
29. What other (co-real) paths may the path have CAUSAL relationships to?

(CONT.)

QUESTIONS TO ASK

Whenever someone undertakes to treat paths, the path of a particular thing, or a particular thing in terms of some path, there are various separate and interrelated questions that it might be especially appropriate to ask—if 'only' rhetorically—in advance. Or such questions might simply be discussed with another person.

On the other hand, often it will be desirable or even necessary to actually answer certain of these generic or recurring questions about paths beforehand, say in order to provide a solid, sufficient, or heuristic framework for the subsequent or contemplated hodological inquiry.

The beginnings of such a practical questionary are found on the table "43 Questions To Ask When Treating A Path" (vide), the entries of which we will now discuss and illustrate.

First, WHERE DOES THE PATH START?

This is not a question that ought to be taken for granted. Being ignorant of the start of one's path one may, as a consequence, also be somewhat ignorant of its nature, cause, and ending, and a victim of illusions about what it is and is not. By being ignorant of the start of a known path one may also be unaware of the existence of various other paths that began, begin, or could have their start in the same place, at the same time, or for a similar or related reason.

One may need to know where a path started in order to know how large or old it is, where it is going, whether it enjoys a necessary or merely an accidental existence, whether it can be reused, whether it is self-identical with or to be distinguished from certain other paths or parts or systems of paths, etc.

If the path is an ongoing sequence of saccades of the eye of a man presented with a scene, the history of those saccades may have meaning that depends in some way or degree upon the very first point in the scene at which the man's eye began to scan that scene, or possibly even upon the point at which the eye left or began the preceding scene, or upon the entire history of accidental or predisposed starts of the eye in the analysis of scenes earlier in the man's life. All of these ideas are just speculations, of course, but they might be worth looking into. If the start of the saccadal path is demonstrably irrelevant, that, too, might be worth knowing.

When new comets stray into the 'inner' solar system an effort is made to learn at what distance from the Sun their path started, since this may bear upon the nature and comparative interest of the comet, the comet's anomalousness or normality, paths of past and future comets, properties of the hypothetical trans-Plutonian Oort Cloud, etc.

Secondly, WHERE DOES THE PATH END? It may not suffice to know where a path begins, one may also need to know where it finishes (if just to render the other knowledge meaningful or useful). It may be necessary to know where the path represented by a cave ends in order to know the size of the cave and thence whether the cave bespeaks the existence of a large-scale fault or fault system in the block of limestone in which the cave occurs or just a local, circumscribed fracture.

(CONTINUATION OF TABLE)

30. What SYSTEMS does the path belong to?
31. Does the path belong to a [NETWORK or HIERARCHY] of paths?
32. Is the path EXTRAPOLABLE in any useful way?
33. What are the [rules or LAWS] of the path?
34. What STORY does the path tell—and what EVENTS does it involve?
35. To what SUBJECTS does the path pertain?
36. What ORDER may the path exhibit?
37. What PARTS does the path have—or is it partless?
38. How SIMPLE is the path—and how COMPLEX?
39. What are the [MERITS and DEFECTS] of the path?
40. What [IDEAS, METHODS, and PRINCIPLES] are pertinent to treatments of the given path?
41. WHERE—and in what—ELSE might such a path occur?
42. What is there [that IS NOT KNOWN—or that might be WORTH DISCOVERING] about the path?
43. What ILLUSIONS may be connected with the path?

When an animal departs from its den on its daily trek, where does its path end? Do daily treks simply end at the den where they began, or is there something in between sufficiently regular, determinate, or special as to in effect be antipolar to the den and merit treatment as an 'end': a fixed radius or territorial boundary, perhaps, or distinctive eating, drinking, meeting, or salient (observatory) places? Perhaps the characteristic end of an animal's daily excursion is not spatial in character but rather some type of external event or a physiological limit.

It has been proposed that the Hawaiian island chain, or the Hawaiian Ridge, is the result of the relative or absolute movement of the Earth's crust over a hot spot or plume in the underlying mantle. A mechanism of this sort would probably recur over the surface of the Earth. Homologous paths should be sought to see whether they have in certain cases ended in an absolute or temporary sense, and if so, how they appear to have ended; for this would provide tests of the original proposal, as well as tests of rival variants of it.

The third question is, WHAT IS ALL OF THE PATH; [WHERE, WHAT, OR HOW LONG ⟨ABSOLUTELY AND RELATIVELY⟩] IS IT?

This is a question I ask myself whenever I stumble upon an isolated ant during a walk in a wood. Upon the answer depends the probability that the little guy is lost (it would be interesting to know if ants get lost or not, and if they do get lost, then with what frequency—and why), the respect I am willing to accord ants (because of their indicated intelligence, memory, tracking ability, or efficiency), the size of formicine territories (and their possible interpenetration) in a sylvan environment, variance of ant path lengths—and what things may contribute to this variance or specialize it in various environments, the determinability of the ant's basic direction—or of the whereabouts of its hive—from a segment of its path long enough to transcend small-scale noise (assuming the path is not indecipherably fractal), the relative importance of the local behavior or immediate motion of the ant (or absolute importance—if the nervous system of an ant automatically takes account of the spatial or temporal length of a given journey in the importance it assigns to, or the behavioral investment it makes in, a portion thereof), and much else besides.

The fourth question is, IS THE PATH FINISHED OR IS IT STILL [GROWING, CHANGING, EVOLVING, OR OTHERWISE ACTIVE]?

This is something one would want to know about a parasitic worm lodged in human tissue. If the worm has completed its journey, treatment by drugs might suffice. But if its path is still growing, or liable to change direction, the risk might be greater and surgery might be required, say to protect a nearby critical organ.

The fifth question is, DID THE PATH HAVE TO DEVELOP AS IT DID, OR COULD IT INSTEAD HAVE DEVELOPED IN ANY OTHER WAY OR HAVE TAKEN ANY OTHER FORM?

One might want to ask this about meteors. Are the known types of paths of meteors comprehensive of the real-world possibilities, or might the great Tunguska meteorite that fell on Siberia in 1908 have been so anomalous in its cosmic path, structure, composition, and/or mass that its atmospheric path could have differed radically from any of the former?

Is the path of a meteor sufficiently unique that one might use it to diagnose the nature of the meteorite?

If the path by which a human being developed had been different would he have developed the same or a very different personality? To what extent is a psychogenetic path self-determining (or implicit in any segment of the path)? Can very different circumstances give rise to the same sort of fellow?

"24 WAYS TO TREAT PATHS"

1. Clarify, categorize, survey, systematize, or define [THEM].
2. Compare, analogize, or distinguish.
3. Construct.
4. Construct [theories, hypotheses, or conjectures] [about or involving].
5. Criticize.
6. [Deduce or describe] the history of.
7. Discover the laws originating, or governing the [behavior, properties, possibilities, or uses] of.
8. Evaluate.
9. Exemplify or reexemplify.
10. Experiment [upon or with] or test.
11. Explore, examine, or perceive.
12. Extrapolate, complete, or supplement.
13. Generalize.
14. Improve or perfect.
15. Measure, quantify, or mathematicize.
16. Model, simulate, logicize, or conceptualize.
17. Plan research upon.
18. Predict.
19. Remake, modify, transform, transelement, or define possible variations of.
20. Reuse or use.
21. Situate—or describe [environments, contexts, events, conditions, or circumstances] [of or involving].
22. [Subdivide or decompose] into [parts, elements, properties, etc].
23. Summarize, simplify, or epitomize.
24. Verbally describe, or [discuss with or explain to] other persons.

WAYS TO TREAT PATHS

To illustrate the organon "24 Ways To Treat Paths" (vide) we will apply all of its entries to a single example of a path, the migratory route of a bird species (the particular species being left indefinite).

The first listed way to treat paths is to CLARIFY, CATEGORIZE, SURVEY, SYSTEMATIZE, OR DEFINE them.

Thus one could define the migratory route of a bird species as that path flown annually by most able members of a subpopulation of the species who share the same home territory, the flight occurring more or less synchronously and at a fixed time of year or season, and involving two counter-flights: the first usually equator-ward, with the second being the return trip to the original higher latitude. (Here one might first wish to consult an organon under the ideonomic division DEFINITIONS, such as 'Universal Taxonomy of Possible Types of Definitions of Things'.)

One could variously clarify the definition just given, for example by increasing the quantitative or qualitative precision of its terms or their implications: "that path" (of what structure, specificity, or complexity?), "by most able members" (what fraction? able sensu ability or sensu whether they migrate or not? do other fractions trace other paths?), "same home territory" (how precisely and exclusively?), "synchronously" (starting and ending when? what duration? at first attempt? as to initial departure or en route?), "fixed time" (calendrically, seasonally, or depending upon weather or other factors? over a few years or secularly?), "first usually equator-ward" (occasionally poleward instead? or to another longitude but without change of latitude?), etc.

One might survey a single year's migration for its complete or fine spatial plot or for variations among the comigratory bionts.

One could categorize bird migrations—that is, divide the paths they represent or illustrate into types—by distinguishing ones that are "partial" from ones that are "complete", ones "regular" versus ones "nomadic", ones "standard" from ones "alternate", ones "false" (say abortive or preliminary) from ones "true", ones "rectilinear" from ones "curvilinear", ones "simple" from ones "compound", ones "swift" from ones "sluggish or halting", ones temporally "predictable" from ones "unpredictable", ones annually "certain" to ones "uncertain", ones "minimal" or "local" from ones "regional" or "intercontinental", ones "over-land" or "along-land" from ones "transoceanic", and so forth.

Finally, one might systematize such migrations by indicating their theoretically possible and impossible combinations and relationships, their empirical correlations, or their differential occurrence among avian taxa.

A second major way to treat paths is to COMPARE, ANALOGIZE, OR DISTINGUISH THEM.

The migratory flight of a bird can be compared with itself, to see if it is autocorrelated, self-descriptive, fractal, uniform, compound, consistent, hierarchic or multilevel, or the like, or the measure or form thereof.

The paths of birds of the same species that are migrating at the same moment might be compared to see if their paths are analogous in more ways, or to a greater degree, than would be expected, or could be accounted for, by chance or on the basis of conventional ideas. Perhaps there are forces or mechanisms never before imagined that operate to produce flock or inter-flock cohesion, compensatory interadjustment, spatial or temporal periodicity, or perturbed spatial distributions that are morphologically, morphogenetically, or morphodynamically complex and beautiful.

There may be an unrealized need to distinguish between the different flight paths of flocks of birds. They may differ in nuances or in gross type, even within the same species.

A third way to treat paths is to CONSTRUCT them.

In the case of bird migratory paths this might seem impractical, but in fact man may already be doing it inadvertently as he creates farmlands, lakes, and cities that serve as aviaries—or as breeding, feeding, stopover, and overwintering sites—for migratory species.

Abstract or miniature migratory routes might be created experimentally in the laboratory or field—with real birds forced, conditioned, or bred to take them seriously—but here we encroach upon what is more properly the concern of two later items in this list.

A fourth way to treat paths is to CONSTRUCT THEORIES, HYPOTHESES, OR CONJECTURES ABOUT OR INVOLVING them.

The evolutionary origins of migratory behavior are unclear or problematic. To explain the origin of avian migration one might variously theorize, hypothesize, or conjecture that: 1. Birds have periodically been evicted from their ancestral nesting grounds by ice ages, and allowed to return during the interglacials, which has established a pattern of behavior that has carried over into the orders-of-magnitude higher frequency seasonal migrations. 2. Migration began locally (daily between tree levels, trees, or contiguous biomes—or seasonally between northward and southward sides of lakes, mountains, or islands) and increased until it was regional, say between counter-sloping land surfaces hundreds of kilometers wide possessed of different climate, irrigation, and flora as a result of their tilt; finally, accidental or forced overextension or extrapolation of the migration to progressively greater distances occurred.

3. Over time, bird species may necessarily have overshot one anothers' ranges, say in long cascades or sequences of migratory minima. 4. Heterosis coupled with the power of flight may have created an instinct for seasonal exogamy between the limits of a species' range. 5. The territories or demes of bird species were continually split or fragmented by general biogeographic drift or entrainment, the formation of mountain ranges and inland seas, etc, and this led to the saltatory flights of birds that are known as migrations. 6. Original large circular flights became specialized as migrations (circles became ellipses which in turn became counter-flight lines).

7. Nomadic migration evolved into seasonal migration. 8. Natural selection could have operated over the set of flights of bionts to random distances and in random directions. 9. Natural selection—like so many physics phenomena—is a continuum, a process that operates dimensionlessly and impartibly at all scales and in all degrees. 10. When birds first emerged and flight began, avian territories and lifetime movements may have been less differentiated and more extended than today. 11. Near coasts or along meridional mountain ranges bird territories and movements may be compressed and elongated into meridional strings capable of compensating in part for seasonal changes in climate and vegetation.

Yet a fifth way to treat paths is to CRITICIZE them.

Bird migrations that occur today are usually viewed as admirable evolutionary adaptations. Yet many may be badly out of phase with recent changes of climate or completely vestigial. Conceivably most have been made obsolete by the vast planetary biogeographic transformation that has been caused by the advance of modern civilization.

A sixth way to treat paths is to DEDUCE OR DESCRIBE THE HISTORY OF the paths.

One might deduce a plausible history of past changes in the flyway of a species of bird by first making an exacting study of the geographic qualities of the species' present-day breeding and wintering areas: their soil, vegetation, pollen, ecology, climate, hydrology, topography, etc, and the geographic configurations of their nested isopleths; and possibly enhancing this with a complementary study of the physiologic and ecologic needs, tolerances, and adaptive powers of the species. This data could then be used to suggest historic range and flyway extensions, contractions, distortions, saltations, interruptions, substitutions, and evolutions.

Knowledge about other and competitive bird species, knowledge of paleobiology, paleoclimatology, and paleogeology, mathematical models, and computer simulations could all be brought into play.

One might describe the very recent history of the species' migratory path by having recourse to the direct observations of ornithologists and birders over past decades.

A seventh way to treat paths is to DISCOVER THE LAWS ORIGINATING—OR GOVERNING THE BEHAVIOR, PROPERTIES, POSSIBILITIES, OR USES OF—the particular paths or paths in general.

Various laws, or some overarching or composite law, might control the migratory flyway's: stability, self-interaction, plasticity, cohesion, breadth, terminal distribution, efficiency, branching, sensitivity to weather and food availability, evolution, density, rate of use, redundancy, sensitivity to the flights of diverse species, etc.

An eighth way to treat paths is to EVALUATE them.

Thus the migratory path of a bird could be evaluated with respect to any of the qualitative and quantitative aspects of flyways that were just listed. The flight of a flock or of a single bird could be evaluated by comparing it with the norms of the species.

A ninth way to treat paths is to EXEMPLIFY OR REEXEMPLIFY them.

A close field or imaginary study of the flight of an individual bird could be used to exemplify the entire species to which it belongs. The characteristic migratory flight of the species could be reexemplified by the flight of a second bird, and this reexemplification could show the average random variation of conspecific bionts or their paths, or suggest the idiobiology of the species.

The migratory path of the species might be used to reexemplify a pure ideonomic category of path, or, perhaps per se, might itself be reexemplified by a depiction of the path of another species, of an animal that is not a bird, or of an inanimate object or process.

A tenth way to treat paths is to EXPERIMENT UPON OR WITH—OR TEST—them.

This is done whenever a bird about to migrate is equipped with depolarizing goggles or a remotely controlled magnet, by way of testing or experimenting upon its hypothetical orientational and navigational mechanisms: their nature, sensitivity, adaptability, redundancy, interdependence, hierarchy, coding, involuntariness, or the like.

An eleventh way to treat paths is to EXPLORE, EXAMINE, OR PERCEIVE them.

This could be done by equipping another experimental bird with a magnetometer linked to a radiotransmitter, to test any conformity of the flight path to geomagnetic field lines and local deviations thereof (i.e. to examine the path qua co-path).

To better perceive the path: radar, a range finder, or direct or indirect satellite telemetry could be used.

Were the paths of a large number of birds simultaneously participating in a mass migration plotted and mapped, well-known mathematical methods could subsequently be used to explore the intercorrelational complexities of these comapped paths.

Yet a twelfth way to treat paths is to EXTRAPOLATE, COMPLETE, OR SUPPLEMENT them.

By extrapolating logical continuations of segments of flight paths of migrating birds, anomalous deviations therefrom may be highlighted, or appreciated en masse. Also, the whole of a flight path may be predicted by extrapolation and interpolation using sampled parts of it.

Today certain flyways may still be growing or evolving. Theory or imagination could endeavor to complete them. Also, presumably all real migrations are truncated by some barriers that are irrelevant to the extent that their existence is unnecessary, whose removal could have consequences that are interesting and instructive to imagine.

Another gedankenexperiment worth conducting could be to mentally supplement an existing flyway with a parallel flyway that has no analog in the real world. Would this unnatural, abrupt, or competitive—used or merely usable—flyway be disruptive or inconsequent?

A thirteenth way to treat paths is to GENERALIZE them.

To what extent can bird migratory paths—or facts about or aspects of same—be generalized to the migratory paths of all animals, or to groups of animals such as insects, fish, mammals, or microorganisms? To what extent can the former be used to describe, predict, classify, bound, or explain—or simply to illuminate—the latter?

To what degree may the totality of organismal migrations simultaneously over the earth form a single dynamical system of great complexity?

A fourteenth way to treat paths is to IMPROVE OR PERFECT them.

In what ways, then, might it be possible to improve or perfect the existing migratory paths of birds (or could these conceivably be imperfectible —or pluperfect)? What are all of the abstract and actual types, classes, and instances of ways in which birds' migratory routes might be improved and perfected?

Do flyways unwarrantedly overlook food supplies in overflown or bypassed valleys? Are flyways avoidably congested (congested in a way that is irreconcilable with at least the collective interest of the many diverse species that co-use them)? How efficiently—or inefficiently—do birds coordinate their migratory paths with the contingent weather patterns prevailing at the time they embark on their flights?

A fifteenth way to treat paths is to MEASURE, QUANTIFY, OR MATHEMATIZE them.

Given that flyways that recur year after year are clearly distinguishable on the largest geographic scales, one becomes curious to know at how many lesser scales distinguishable flyways occur, whether as hierarchical parts of the larger or largest flyways, or as independent flyways. One approach to answering this question would be to mathematize bird migration, to quantify it (its lineality, collinearity, paralinearity, subdivisibility, hierarchicality, self-descriptiveness, uniformity, geographic fixity, etc), and (finally and on the basis of the foregoing) to measure it. Perhaps it will be found that there are scale-invariant laws that govern the subdivisibility of avian flyways and that re-create the phenomenon at every scale.

CAUSES AND INFLUENCES

What are the endlessly repeating or general types of causes of—or of influences upon—paths; or the diverse causes and influences of paths in the case of all entities, phenomena, properties, systems, subjects, realms, events, ideas, possibilities, and methods?

Let us consider some of the entries upon the organon "121 General Causes of and Influences Upon Paths" (vide).

The first such cause or influence is AFFINITIES.

Judging from the dictionary, by "affinities" might be meant: natural attraction to, liking for, or tendency toward (something); homology—or possession of common features as a result of descent or derivation from an identical or analogous ancestor or antecedent; resemblance—even in the whole plan of structure—between or among things owing to community of origin. (Here I have actually selected, adapted, and supplemented definitions that appear in Webster's Third; but further changes could and should be made in future.)

Thus people may marry or remarry as a result of some sort of affinity. They may be attracted to the same climate or picturesque valley. They may be drawn together because their personalities form complementary opposites. People who grew up in the same part of a nation may gravitate together even after living in some other region for many years.

The second list entry is AFTEREFFECTS, TRACES, OR MEMORY.

It has been conjectured that some lightning bolts may be caused or triggered by electrons retracing the ionization path left in the atmosphere by a cosmic ray. Various exotic particles that have been, or may yet be, hypothesized to exist could also leave peculiar paths or induce anomalous effects: free quarks with fractional charge, antimatter micrometeorites, and magnetic monopoles leap to mind—possibly in connection with such odd lightning as ball, bead, rocket, rectilinear, colored, clear-sky, and superbolt lightning.

Ephemeral streams reform in gullies sculpted by past floods. Caves often develop along preexisting faults, joints, strata, and weaknesses as old as the host rock itself.

Novel thoughts retrace, in whole or part, old paths in the mind or brain.

Many modern superhighways retrace the paths of former highways built along countian dirt roads enlarged from footpaths of early settlers derived from Indian trails that followed deer paths evolved from the favored meuses of small mammals which themselves might have been inspired by the accidental multitudinous crisscrosses of fallen trees (along the paths of freak storms).

Many-body systems may conceivably prosecute paths that in some sense integrate—or possibly differentiate—the entire matrix of historic paths abiding as some arbitrarily odd manner of memory.

Paths may also be caused or influenced by ANALOGIES.

That is, the existence of similarities, analogies, or commonalities between or among things or processes can cause or influence paths.

Paths will one day form over the surface of the Moon—as travel ways—in part because of the countless topographic and geologic features that it shares with the surface of the Earth.

Infective and epidemic pathogenic organisms have evolved because of the vast number of anatomo-physiologic paths that all bionts or taxa share as potential hosts.

Of course this entry can also be understood as simply referring to the fact that there must exist analogies between the diverse causes of paths that can be used to describe and classify paths.

"TABLE OF 121 'GENERATORS AND CAUSES OF PATHS'"

NB: Many items are metaphoric or provisionally worded.

1. Affinities.
2. Aftereffects, traces, or memory.
3. Analogies.
4. Anastomosis of [l]ines, edges, cylinders, or wave[s].
5. [A]real contacts or fusions of boundaries] of 3-dimensional [o]bjects or processe[s].
6. Associativity.
7. Autocorrelation or recursive processes.
8. Averaging.
9. Block displacements, grabens, or bulges.
10. Branching of [l]ines, edges, cylinders, or wave[s].
11. Bubbles or bubble trains.
12. Catenoidal flow (e.g., point drainage or convergent point attraction).
13. Circumnavigation of [o]bstructive or displacing] [l]oci or objects] (points, lines, areas, solids, or lattices).
14. Coalescence of [s]tructures or processe[s].
15. Coaxial arrangements of [l]ines or centroid[s] in flexible structures (as opp. to flows) in [2] or [3] dimensions (as [r]ectilinear, zigzag, or curvilinear] [s]heets, clusters, or ring[s] of [c]ontinuous or broke[n] [l]ines or centroid[s]; e.g., as stacks of rows).
16. Coevolution.
17. [C]ollective or cooperative] phenomena.
18. Collision.
19. Countercurrent phenomena.
20. [C]rack or fissure] [p]resence, formation, propagation, collision, or branching] (in [2] or [3] dimensions).
21. Creasing, anticlines, or synclines.
22. Crystal growth or effects of crystals.
23. Decay.
24. Differentiation or high derivatives.
25. Displacements of stacked planes.
26. Dissolution.
27. Divergence or partitioning.
28. Dynamic feedback (positive or negative) or 'cybernetics'.
29. Edge-intersection of surfaces.
30. Emission (*sensu* in [o]ne or not all direction[s]).
31. Entrainment.
32. Entwinement or 'intertwinement'.
33. Equilibrium phenomena.
34. Excesses or deficiencies.
35. Exchanges.
36. Experimentation.
37. Failure.
38. Fiber bundles.
39. Field [b]oundaries or discontinuitie[s].

(CONT.)

A fourth potential cause of or influence upon paths is the ANASTOMOSIS OF [LINES, EDGES, CYLINDERS, OR WAVES].

By such anastomosis is meant that the objects referred to may divide—even subdivide—and reunite once or repeatedly; or may be similarly anastomosed by extrinsic interconnections; or may simply be connected unidirectionally.

If a vessel develops extensive self-anastomoses, flow through it may be so enhanced—or possibly so retarded—as to cause it to virtually or literally become a different type of path or a path for something different (that travels via it).

Certainly the development of anastomoses between paths that at first are merely entangled can give rise to additional and qualitatively novel paths.

Groundwater may be flowing independently through two porous strata that are separated by an unbroken impermeable stratum. Failure of the latter can give rise to an interflow path.

A toxin introduced into the body by a snake's bite may hypothetically pursue an accelerated, ubiquitous, and more injurious path to tissues because of circulatory anastomoses.

A detective trying to solve a crime may be helped by the existence of abstract or physical anastomoses between different trails of evidence he is following—anastomoses that serve to corroborate, correct, and collimate clues and ideas, that provide parallaxes and shortcuts.

(CONTINUATION OF TABLE)

40. Fitting or concinnity.
41. Fixed [distributive, conductive, transportive, directive, confining, connective, and managerial] systems; analogs [of sorting processes, of the ⟨skeletal, muscular, or circulatory⟩ system, of a conveyor belt, cable, road, gun, wheel, pump, blinkers, mirror, etc].
41. Fixed-point theoretic phenomena.
42. Folding.
43. Geometry or topology.
44. Geostrophic Coriolis flow.
45. Gradients, potentials, or slopes.
46. Group theory.
47. Habit.
48. Helical hydrodynamic flow.
49. Helicoidal torsion.
50. Hierarchies.
51. Histories.
52. Holes or 'abstract windows'.
53. Hollow cylinder.
54. Homing systems.
55. Homogenization or self-homogenization.
56. Human mind.
57. Hyperdimensional geometry.
58. Infinitesimals, differentials, or 'marginal processes'.
59. Infinite-dimensional processes.
60. Integration (e.g., simplifying) of [1, 2, 3, 4, or more] (higher) dimensions into fewer (e.g., 4, 3, 2, 1, or 0).
61. Interadjustment or coordination.
62. Intercorrelation.
63. Interpolation.
64. Knotting, entangling, or other perturbations.
65. Leakage.
66. 'Lens or other optical systems' (literal or metaphoric).
67. [⟨Linear or multilinear programming⟩ ⟨simplex or related but HIGHER methods⟩].
68. Linkage, multilinkage, or pre-connections.
69. Longitudinal waves (incl. elasticity) or polarizations thereof (e.g., circular).
70. [Markovian or non-Markovian] processes.
71. Maxima.
72. Microscale capillary resorption.
73. Minima.
74. Morphisms (incl. iso-, homo-, auto-, or endomorphisms).
75. Morphology, morphogenesis, or morphodynamics.
76. Motions (translation, rotation, or vibration), dynamics, or coordinate systems.
77. Natural selection, reinforcement, adaptation, competition, and evolution.
78. Networks.
79. Noncommutativity or commutativity.
80. Nonequilibrium phenomena.

(CONT.)

(CONTINUATION OF TABLE)

81. Number-theoretic relationships (esp. mathematical series).
82. One-dimensional addition, cellular replication, or concatenation.
83. Optima.
84. Orientation to [single or multiple] [external or internal] [poles, dipoles, or N-poles] [⟨attractive or repellent⟩, ⟨finite or singular⟩, ⟨extended, infinitesimal, or astructural⟩, ⟨permanent, ephemeral, or periodic⟩, of ⟨fixed or changing⟩ location].
84. Oscillating vergence (constant biphasic convergence cum divergence) of diachronic type.
85. [⟨Output or input⟩, ⟨sources or sinks⟩].
86. Permutativity.
87. Perpetual sources (à la perpetual springs).
88. Phase changes.
89. Post-projectile [vacuum, pressure, or condensation].
90. Preparation.
91. Projectile wake turbulence.
92. Projective geometry.
93. Pulling.
94. Pushing.
95. Quantum-mechanical tunneling.
96. 'Radiations' of an omnidirectional character (symmetric or asymmetric).
97. Rectilinear momentum.
98. Reduction of integral dimensionalities to fractal ones.
99. Regeneration, self-induction, or self-interaction.
100. Relativistic gravitation (inextinguishable spacetime flows, etc).
101. Resonance or pulsation.
102. [Scale-invariances and ⟨chaos-theoretic, p-adic, etc⟩ phenomena].
103. Secondary in-fill of evacuated [line or cylinder].
104. Segregation.
105. Sieves or other 'filters'.
106. Singularities.
107. Smooth coaxial flow in [2 or 3] dimensions (as [rectilinear, zigzag, or curvilinear] [sheets, clusters, or rings] of [continuous or broken] [lines or centroids]).
108. Soliton.
109. Stacked planes.
110. Stochastic processes or noise.
111. 'Streaming'.
112. 'Sub-spectra or super-spectra' (spectrology).
113. [⟨Symmetries or asymmetries⟩, ⟨equalities or inequalities⟩, ⟨stoichiometry or time's arrows⟩, ⟨anisotropies or isotropies⟩].
114. Syngenesis.
115. [Taking or making] of a shortcut.
116. Thalwegs, isopores, or brachistochrones.
117. Topography or topographic landscapes.
118. Transitivity.
119. Transverse waves.
120. Tunneling or boring.
121. Walls or partitions.

TERMS FOR TREATING PATHS

As for any division of ideonomy, there are various terms that exist, and various terms that are as yet nonexistent but that should be coined, to help professional and amateur students of paths.

The preexisting terms are of two types: words of a general nature that might lend themselves to the improvement of the study and use of paths, but which are not ordinarily defined with any reference being made to paths of any sort; and words that by contrast are normally, universally, or only naturally used to treat paths, or that ought to have—but have been passed over for—this role.

There are also words that relate to things more or less synonymous with paths.

As for those words that have not yet found their way into any known dictionary, or been written or spoken or thought of by anyone anywhere or for any purpose, there are rules both transcendental and happenstance that fortunately exist within ideonomy for the devising and use of such words in conformity with the conceptual horizons and methodological requirements of ideonomy, rules that can limit the proliferation and constrain the formation of the words in ways that are simply critical if the language of ideonomy is to be kept simple and elegant and everywhere rational and uniform, as it must be if ideonomy is to win ready acceptance.

Thus the subfield of hodology that specializes in the compilation, introduction, definition, exemplification, systematization, and critique of all path-related terms, or of hodological terminology, will be termed hodolexy, in obedience to the rule that all corresponding subfields of ideonomic divisions are to be named by attaching the suffix -lexy to the prefix representing the basic object of study of that division (which in the present instance means the prefix hodo- for the object path, from the Greek feminine noun hodos, signifying way, road, or journey).

There were many other Ancient Greek roots that might have been used instead to give this division its universal name. Rather than using hodos to produce Paths and Hodology I might have had recourse to stibos (masculine noun meaning path, track, or way), tribos (feminine noun for a worn path or a track), oimos (masculine noun for path, road, or stripe; Latinizable as the prefix oemo-), patos (masculine noun meaning way or trodden path), poros (hole, passage, ford, or ferry), etc.

These synonymous roots may prove to be of use in the future, not only in ideonomy but in other subjects altogether, where there may be a need to coin words on a different etymological basis in order to avoid semantic and terminological confusion.

The element hod can be contracted into od, as in the word odometer. I decided to use the longer form in the title of the division because, for once, I was afraid the two-character "od" would be perplexingly ambiguous, or would have a tendency not to be recognized, when it was reused—as demanded by the rules of ideonomy—to form other words for treating paths. Such a switch might still be made in the future, however, if these qualms come to seem unjustified.

The reasons for developing specialized path terminology are many, and include:

"REASONS FOR PATH TERMS"

1. Prevent confusion of path words and concepts with words and concepts of other Divisions and fields;
2. Enable paths to be described in a precise, economical, and elegant manner;
3. Distinguish different path concepts;
4. Dramatize the key concepts and methods for treating paths and aid their recall;
5. Standardize the discussion of paths at all times and places and in all subjects;
6. Facilitate the construction of compact ideogenetic formulas, and the interpretation of the propositions they generate;
7. In the process of being formed, or of later being used, are apt to lead to the discovery of many important path-related concepts;
8. Promote the theoretical and operational unity of the Division.

Some of the most obvious terminology for paths can be developed by adding prefixes to the word path. Different types and senses of paths can be conceptualized and named in this way.

Whenever possible use should be made of Ancient Greek prefixes or of prefixes formed from Ancient Greek words. This is especially so if the new ideonomic terms are meant to refer to basic, high-level, or important ideonomic concepts.

When such prefixes are unavailable, or unknown to the neologist, use should be made of Latin roots. In certain circumstances English prefixes and combining forms may be used (such as over). In rare instances the roots of still other languages may be used (e.g. the Sanskrit combining forms eka- and dvi-).

Attention should always and above all be paid to the prefixes and roots that are used most or most relevantly throughout ideonomy, and to the ways in which they are used and ways in which they are defined. Thus standard prefixes are reused in all of the divisions of ideonomy to form classes of kindred words.

Some proposed words formed in this way are to be seen in the table "Terminology For 'Paths'". Let it be emphasized that this jargon is tentative. Certain prefixes should perhaps be replaced or modified. Certain definitions may be wrong, misleading, too broad or narrow, or wrongly plural or singular. Some of the words may be redundant or too trivial in meaning. A few of the pairs of prefixes should perhaps be transposed.

But what this terminology certainly does suggest is how a cognitive language can be fashioned within ideonomy for the topic of paths.

Let us discuss some of these path terms and the things they may mean. In this way we can get a sense of how the words would actually be used and of the difference they could make. It will be seen that each of them has many implications and represents a small ideonomic experiment.

Incidentally, in certain contexts it might be desirable to follow the prefix of many or all of these words by a hyphen (e.g. to write endopath instead as endo-path). This practice is especially justified when a new word is just beginning to be used or is being used tentatively or as a nonce term. Since the following element in every case here is identical (path), a hyphen seemed superfluous and has been omitted.

Endopath: An internal path or path that is internal to something. Examples of endopaths are blood vessels in the body, lava tubes in lava flows or fields, phloem and xylem vessels inside plant stems and leaves, computer circuitry or wires, and the poorly known intranuclear paths of nucleons (protons and neutrons) and their intermediate vector particles.

Questions about endopaths immediately come to mind: Are the paths formed from the substance of what encloses them or they occur in? May the endopaths have their own endopaths? How may different endopaths interact? Are the endopaths critical to the properties of their enclosure? Are endopaths more nearly static or dynamic? Are they isolated; are they connected with antonymous paths ("exopaths")? Do they either start or end as endopaths?

Subpath: This could variously refer to a path that is lesser, subordinate, or auxiliary, a segment or branch of a path, a member of a (set, collection, hierarchy, group, or taxon) of paths, a part of a (coaxial bundle, line-clump, convergence, divergence, vergence, network, array, system, pencil, etc) of paths, a lesser-order path (logically, structurally, functionally, e/vc), etc.

For instance, when a large meteor plunges through the atmosphere, the primary path of the meteorite may be complicated by subpaths of its asymmetric corners, of its numberless textural points, of its course's discrete stages, of its vaporous, smoky, and dusty tail, of fragments or companions, and of its rotational or even chaotic motions.

The number of subpaths—meanders, parallel strands, or finest-scale branches—followed by cloud-ground electric currents precedent to any lightning stroke might be important in terms of their initiational, discouraging, directive, or morphogenetic effect, predictive potential, complex interactions, or summability in the genesis of a lightning flash.

Superpath: The word denotes paths opposite in nature or type to the above.

If, say, an object follows a path, then, in effect, that path itself may follow a path on some higher level.

Meteoroids pursue subpaths within the superpath that the swarm they are a part of follows.

It is often important to determine whether a moving object that interests one happens to be simultaneously—or diachronically—pursuing both a subpath and a superpath. The superpath may be hidden by motions along one or more subpaths that are more noticeable because they are faster, higher-frequency, on one's own scale, or more marked, and yet the superpath motions may be more important or fundamental.

TYPES OF PATHS

Of course what is meant by a "type" of path may not be singular, and different but related organons can and should be constructed showing or for treating these different senses of a type of path. The organon "99 Types of Paths" should only be seen in this specialized light.

A partial attempt has been made to include 'opposite' types of paths within single items of the list, but at some later day this effort should be taken further. At that point it will become necessary to confront the semantic, linguistic, and structural problem that there are many different senses and types of opposites, for many or all the types of paths indicated in this organon. Opposites are distinguished inside the list items by being separated by a hyphen flanked by two spaces (i.e. by the device " - ").

Occasionally synonyms, closely related types, and subtypes are sublisted within the items.

Cross references to other items are made in some items: e.g. "(cf. #36)" in item #7. Again these serve to indicate similar and related types of paths.

A feeling for the great number and diversity of forms, subtypes, and senses that may conceivably exist and be pertinent to the different types of paths itemized on the list may be gotten if we treat a few of the list's items in exemplary detail. We do this for four items that have virtually been chosen at random, but comparably exhaustive breakdowns should eventually be done for every item on the list (please see the table "Differentiable Forms, Subtypes, and Senses of Four Types of Paths").

We will now discuss the meaning of some of the items in "99 Types of Paths".

ACTIVE VS. PASSIVE PATHS:

By an active path might be meant one that changes or develops over time rather than remaining the same; or that directly causes or contributes to the movement of something over itself, rather than simply being a passive servant of something that moves along the path under its own momentum or as energized or directed by something in the larger environment; or that reacts to or interacts with what traverses or creates it; or the like.

A path may variously be wholly active, partially active, or wholly passive. The path of an arrow in flight is a wholly active path to the extent that the arrow creates it ex nihilo. Of course the reality may be that the eolian dynamics and densities of the ray of air subtended by the arrow's path help to determine it and hence make it partly passive.

Turbulence induced by the motion of the more forward parts of the arrow will perturb the more rearward portion of the arrow, and hence, by deflecting the missile, will make the remainder of the path (and really all of the path) self-evolutionary (or active).

Yet not even electrical wires or roads are absolutely passive paths. The currents carried by wires produce electromagnetic and thermal torques and lower-order effects, and roads are active to the extent that their precise form induces unpredictable complexities in the motions of the traffic they bear that ultimately may lead to the future modification of the road course and form.

"99 TYPES OF PATHS"

1. Active - Passive.
2. Adient/attractional - Neutral - Abient/repulsional.
3. Annihilational.
4. Antiparallel - Orthoparallel.
5. Ascensive - Descensive.
6. Autonomous - Heteronomous.
7. Being-used - Not-being-used (cf. #36).
8. Branchless - Branched - Anastomotic.
9. Breadthless - Broad.
10. Catenoidal (cf. #17, #82).
11. Chain-reaction.
12. Complete - Partial (cf. #83).
13. Concrete/physical - Abstract (cf. #69, #99).
14. Conformational.
15. Connective - Nonconnective/disconnected.
16. Constructional - Destructional.
17. Continuous (unbroken) - Broken (cf. #10, #75, #82).
18. Convergent - Tangent - Parallel - Orthogonal - Divergent.
19. Cumulative.
20. Depositional.
21. Directed/oriented - Undirected.
22. Dissipative.
23. Edge/boundary/border/limitary.
24. Enclosed - Enclosing (cf. #28).
25. Endogenous - Exogenous.
26. Evolutionary.
27. Exact - Approximate (cf. #55).
28. External - Surficial (exterior) - Internal (cf. #24).
29. Failure-locus.
30. Fictional.
31. Fixed/rigid - Variable/varying (cf. #49, #52).
32. Flow-like (rheological).
33. Forward/progressive - Backward/retrogressive.
34. Fractal - Non-fractal.
35. Free/indeterminate - Constrained/determinate.
36. Full/occupied - Unoccupied (cf. #7, #79).
37. Geometric - Topologic.
38. Hierarchic - Nonhierarchic (cf. #96).
39. Homogeneous - Heterogeneous.
40. In 1-dimen. space - In 2-dimen. space - In 3-dimen. space - In hyperspace.
41. Infinitesimal - Finite - Infinite.
42. Integral/holistic/synthetic.
43. Interfluent - Perfluent - Circumfluent.
44. Intermediate.
45. Knotted - Knotless (cf. #58, #76).
46. Length-definite/inelastic - Length-indefinite/elastic.
47. Liminal.
48. Made - Merely followed.

(CONT.)

49. Markovian - Non-Markovian (cf. #31).
50. Minimal/direct - Maximal/indirect.
51. Minimizational - Maximizational.
52. Mobile - Immobile (cf. #31).
53. Momental.
54. Monotonic - Nonmonotonic (cf. #94).
55. Morphous - Amorphous (cf. #27).
56. Natural - Artificial.
57. Omnidirectional, spherical.
58. Open - Closed (circular) (cf. #45, #76).
59. Opportunistic.
60. Optimal - Pessimal.
61. Orbital.
62. Outgoing/departing/efferent - Ingoing/arriving/afferent.
63. Overt - Covert.
64. Particular - Generic.
65. Past - Present - Future.
66. Periodic/cyclic.
67. Permanent - Temporary.
68. Positive - Negative (e.g. interstitial).
69. Possible - Actual (cf. #22, #99).
70. Precessional, nutational.
71. Productional.
72. Random, wandering, drifting.
73. Rectangular.
74. Rectilinear - Angular/zigzagged - Curvilinear.
75. Saltatory (cf. #17).
76. Self-crossing - Non-self-crossing (cf. #45, #58).
77. Shrinking [LENGTHWISE] - Fixed-diameter - Expanding.
78. Simple - Complex.
79. Solid - Empty/evacuated (cf. #36).
80. Solitary - Multitudinous.
81. Spatial - Spatiotemporal - Temporal.
82. Stageless - Multistage (sequential) (cf. #10, #17).
83. Subpath - Whole-path - Superpath (cf. #12).
84. Symmetric - Asymmetric.
85. Topographic.
86. Tortuous.
87. Transmissive.
88. Transportive.
89. Transversal.
90. Travel-serving.
91. Trench-like/canal-like.
92. Tubular.
93. Tunnel-like/cave-like.
94. Unidirectional - Bidirectional - Multidirectional (cf. #54).
95. Unifunctional - Multifunctional.
96. Unilevel (level-free) - Multilevel - Pan-level ('densely curved') (cf. #38).
97. Universal - Far-extending - Local.
98. Vertical - Diagonal - Horizontal.
99. Virtual - Real (cf. #22, #69).

"DIFFERENTIAL FORMS, SUBTYPES, AND SENSES OF FOUR TYPES OF PATHS"

"Active Paths"	VS	"Passive Paths"
Adaptive (sic; also under "Passive Paths"!)		Adaptive (sic; also under "Active Paths"!)
Autonomous		Endergonic
Busy		Exogenous
Constantly active		Fixed
Controlling		Heteronomous
Creative or productive		Immobile
Endogenous		Secondary
Energized or self-energizing		Stagnant
Evolving		Traveled
Giving		Un-maintaining or un-self-maintaining
Growing		'Used' (as opposed to 'using')
Maintained		Etc
Mobile		
Primary		
Productive of change in their environment		
Protean		
Responsive		
Self-maintaining		
'Locomotive' or 'self-directive'		
'Using'		
Etc		

"Annihilational Paths"

Absorptive or subsumptive
Alterative of path
Alterative of state or phase
Decompositional
Depotentiative
Destabilizing
Disindividualizing (inductive of coalescence)
Equalizing
Evacuative (or displacive, tunneling, draining, or recruiting)
Extinguishing
Impairing or destructive
Isolatively disconnecting or alienating
Mutative
Neutralizing
Obviating or abandoning
Overloading
Refunctionalizing
Relaxational (e.g. deexcitative)
Relocative
Restructuring
Retrogressing (dis-evolving)
Substitutive
Suppressive
Tending to mask or lose (something) in noise
Transcending
Etc

"Cumulative Paths"

Averaged
Convergent
Depositional
Excavatory (worn)
Habitual
Progressive or growing
Recorded or trace-like
Etc

"Dissipative Paths"

Caused by dissipation
Dissipative of something else
Self-dissipative
Serving dissipative processes
Themselves dissipating
Etc

"26 QUANTITATIVE DIMENSIONS OF PATHS"

1. Length.
2. Breadth (transverse width).
3. Depth (transverse height) (if any).
4. [Transverse diameter, Transverse radius] (cf. #2, #3).
5. Transverse circumference (if any).
6. Transverse area [real or virtual] (if any).
7. Longitudinal area(s) [two- or three-dimensional] [internal, external, both, averaged, vc] (if any).
8. Volume (if any).
9. Length-to-diameter index (elongation vs. compaction).
10. Curvature indexes [e.g. <average or total> c.; number of inflection points, or changes, over length; <average or total> c. change; quotient of path length to external distance of two ends; c. monotonicity; etc] (as opp. to <rectilinearity or rectangularity> indexes (cf. #13, #15).
11. Wall width (if any).
12. Hollowness (vs. solidity) (if any).
13. Space filling [two-, three-, or n-dimensional] (cf. #10).
14. Continuity (vs. discontinuity) indexes.
15. Drift (vs. rectilinearity) index (cf. #10).
16. Sharpness/definiteness/clarity (vs. vagueness) index.
17. Branching indexes [e.g. av. inter-branch distance; total branches over length; av. absolute branch length; av. branch length relative to <main path or total 'network'> length; total 'network' length; av. 'sub-branching'; etc].
18. Anastomosis indexes [e.g. total loops in network; total levels of 'subanastomoses'; etc].
19. Angularity indexes.
20. Flux indexes (if any).
21. Capacity indexes.
22. Efficiency indexes.
23. Rate-of-growth indexes.
24. Uniformity-over-length indexes.
25. Durational indexes [e.g. age, life-span, half-life, etc].
26. Symmetry indexes [e.g. resemblance of two ends or halves] (cf. #24).

"TABLE OF 106 'THINGS WITH - AND EXAMPLES OF - PATHS'"

1. Air molecule.
2. Animal in woods.
3. Army negotiating or maneuvering on terrain.
4. Arrow in flight.
5. Ascending pre-volcanic magma.
6. Baby exiting womb.
7. Ball lightning.
8. Biochemical processes.
9. Blood vessel, blood, lymphocyte.
10. Bouncing sandstorm particle.
11. Brownian particle.
12. Bullet richocheting in roomette.
13. Bureaucratic question or decision.
14. Catastrophic failure path in a bridge.
15. Celestial, terrestrial, or geomagnetic meridian; great or small circle; line of longitude or latitude; equator.
16. Closed psychophysical boundary of object in vision.
17. Cloud crossing firmament.
18. Cloud street, "anomalous cloud lines".
19. Cosmic primordial microwave blackbody radiation photon.
20. Cosmic superstring (hypothetical).
21. Cross references in encyclopedia.
22. Detective following clues.
23. Dispersal of galaxies due to cosmic expansion.
24. Dollar contributed to charity.
25. Earth's nutating axis.
26. Electrons in television circuit.
27. Elicited antibody.
28. Endocytotic vesicle.
29. Energy through the body.
30. Fixed-point theorem circular path.
31. Food traversing alimentary canal.
32. Foraging butterfly.
33. Free-radical reaction chain.
34. Gas bubble ascending from floor to surface of deep ocean.
35. Geographic diffusion of invention in history.
36. Groundwater downward or lateral percolation or diffusion.
37. Hemline.
38. Hormone crossing human body and cell.
39. Hot supernova plasma tunneling to surface of galactic atmosphere.
40. House electrical wiring, plumbing, or heating ducts.
41. Image in maximally extreme anamorphosis.
42. Ingested toxin.
43. Instruction emanating from genome.
44. Kaluza-Kline microtubular hyperdimension (of ~~10^-34m radius; hypothetical).
45. Lava flow.
46. Leaking electricity.
47. Lens-focused photon.

(CONT.)

(CONTINUATION OF TABLE)

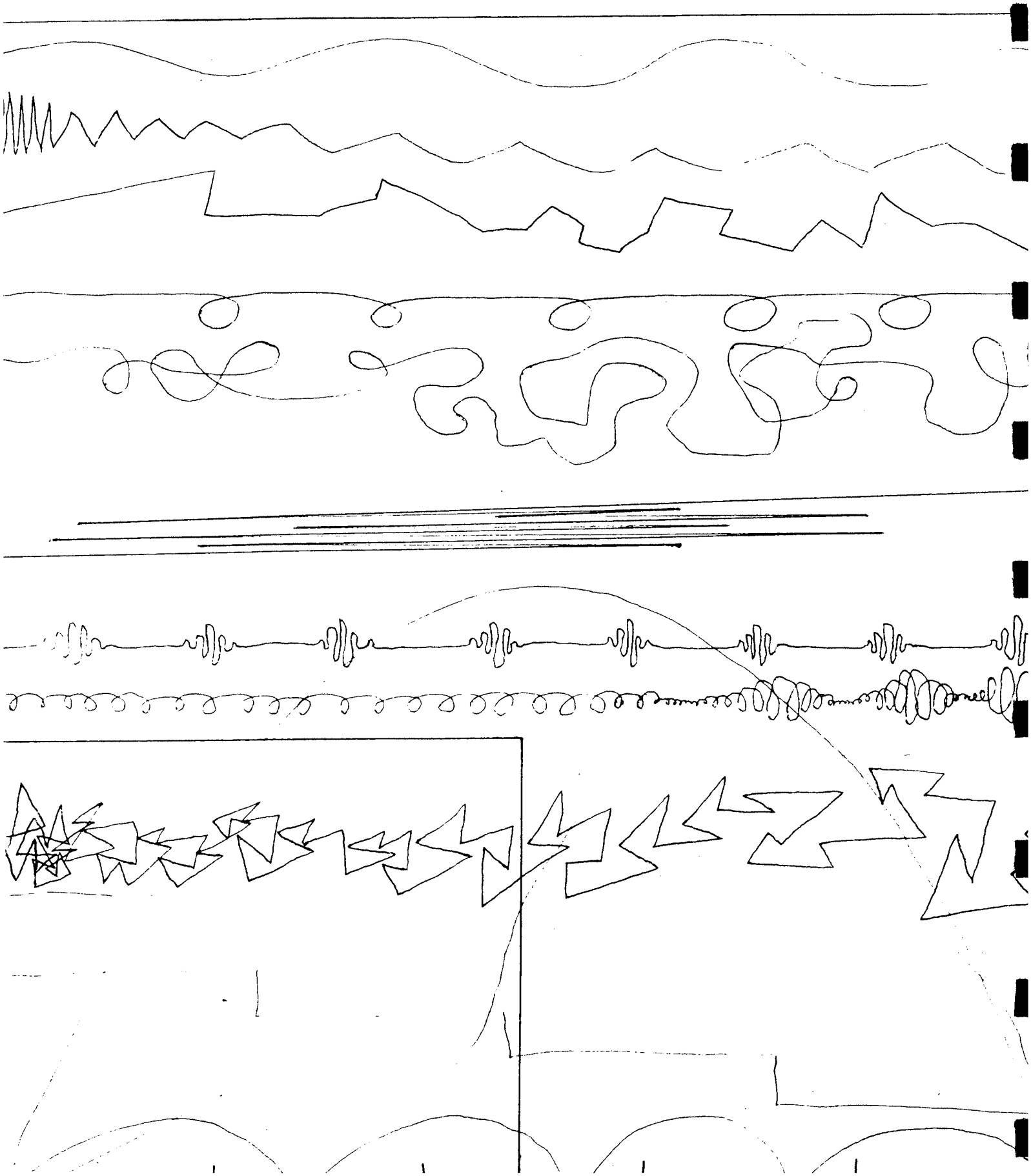
48. Lifetime atmospheric meander of slowest settling dust particle.
49. Lightning bolt.
50. Log washing downstream.
51. Loxodrome (rhumb line).
52. Magnetic flux line (or wobble of?).
53. Male stickleback fish engaged in courtship ritual.
54. Maze.
55. Melodic development.
56. Meteor in the atmosphere.
57. Mineral vein (e.g., in gold mine).
58. Motion of gene down family tree.
59. Moving phonon.
60. Nervous system, action potentials in the brain.
61. Orbit of celestial body (e.g., satellite, moon, asteroid, comet, planet, or star).
62. Palm line.
63. Path linking remote digraph nodes.
64. Path of a warp in twisting metal piece.
65. 'Path' of business 'cycle'.
66. Path of class-4 one-dimensional cellular automaton.
67. Pathogen (ex vivo and in vivo).
68. Pedestrian.
69. Pen on paper.
70. Person's life-course.
71. Phene on family tree.
72. Phone conversation over global telephone network.
73. Pollen grain.
74. Pollutant.
75. Polmeron (hypothetical string-like elementary particle).
76. Population spread of a mutation.
77. Product production path in industrial plant.
78. Propagating crystal defect.
79. Propagating exciton or polaron.
80. Propagating or twisting of anticline or syncline.
81. Raindrop descending to earth.
82. Reasoning.
83. Route traveled by perfect "traveling salesman" (in linear programming).
84. Rumor, breaking news.
85. Saccadal or microsaccadal path of eye.
86. Scientific or scholarly research.
87. Seasonally migrating bird.
88. Seismic wave over or through planet.
89. Serial computation.
90. Soliton.
91. Sound propagating aerially between two distant points.
92. Sperm moving from seminal vesicle to ovum.
93. Spinal cord.
94. Spinning top.
95. Squaw line longitudinal development (hypothetical).
96. Stream.

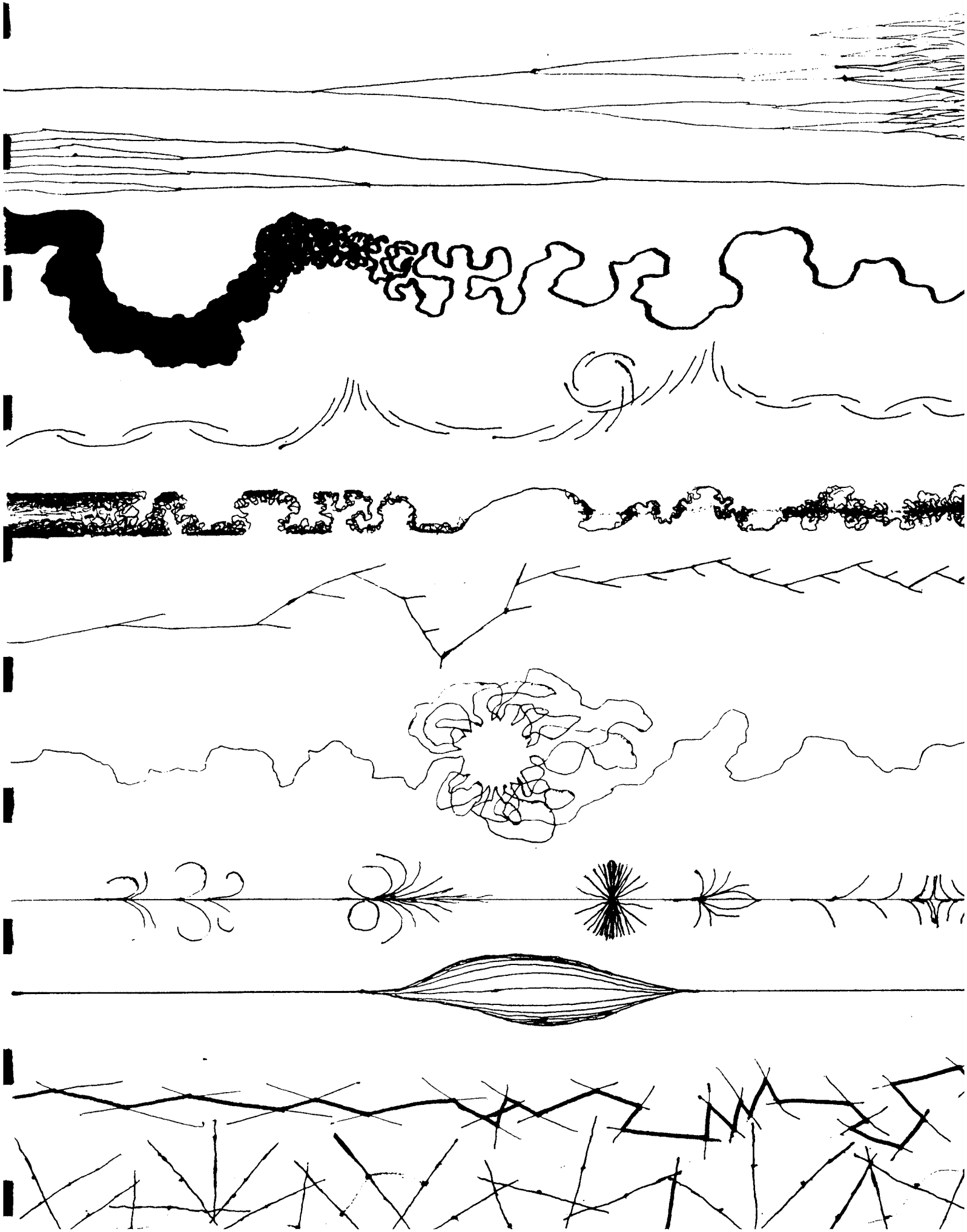
(CONT.)

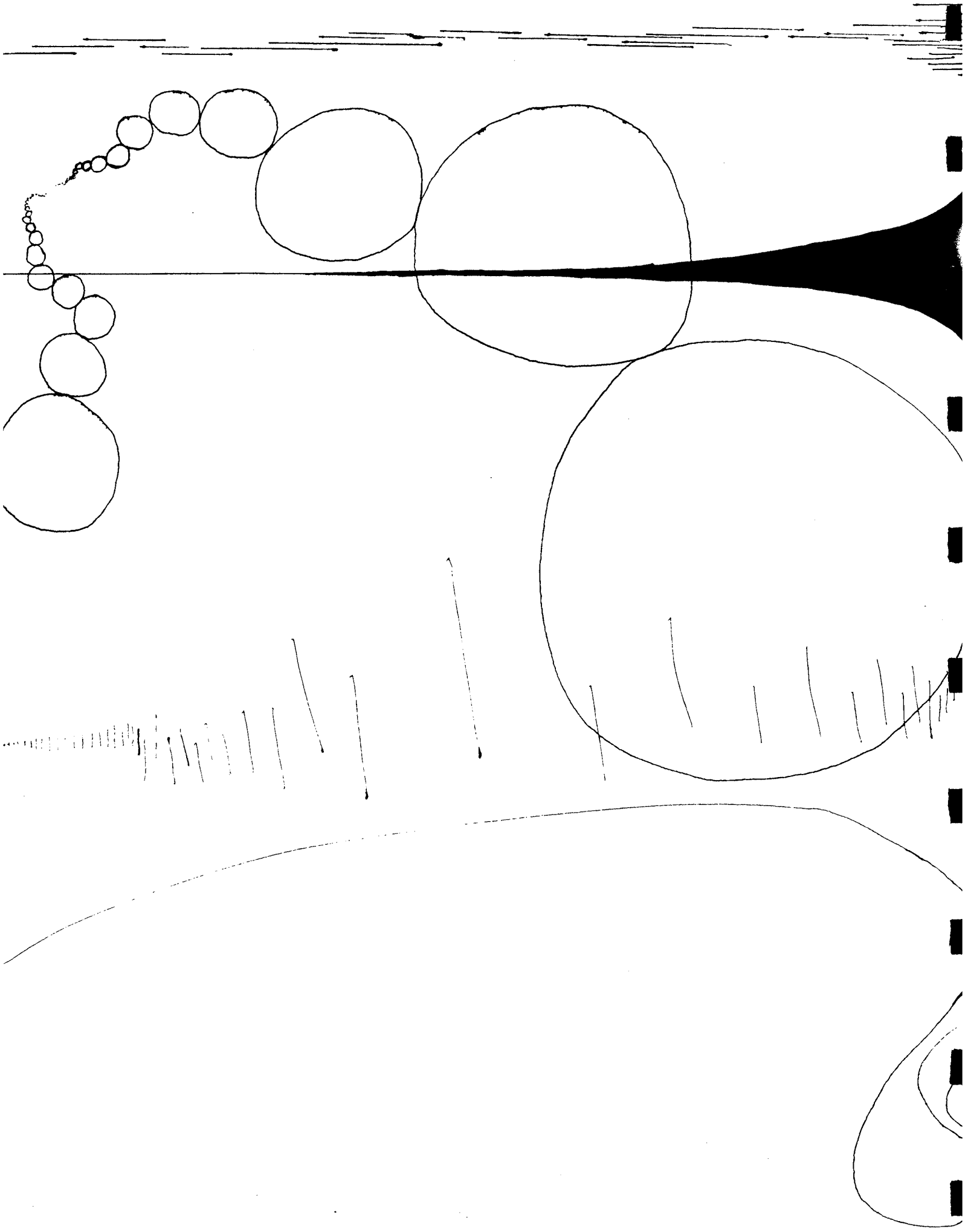
(CONTINUATION OF TABLE)

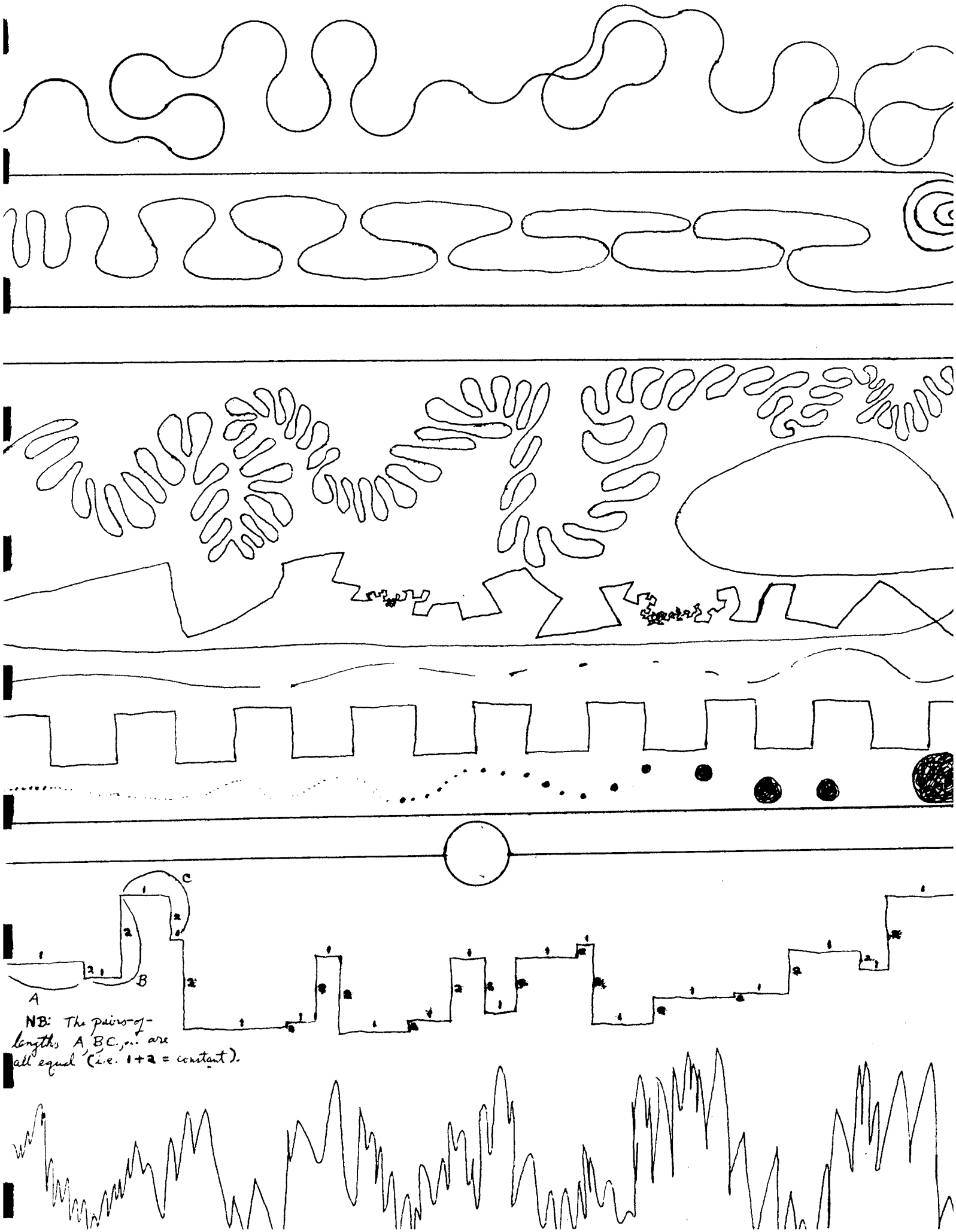
97. String of clusters of galaxies (hypothetical).
98. Sulphur atom in biogeochemical cycle.
99. Technological, social, or cultural innovation.
100. "Telescope mirage" photon.
101. Thunderstorm.
102. Tooth decay.
103. Tornado.
104. Underground root.
105. Vehicular traffic.
106. Yo-yo in use.

"Possible Path Shapes"

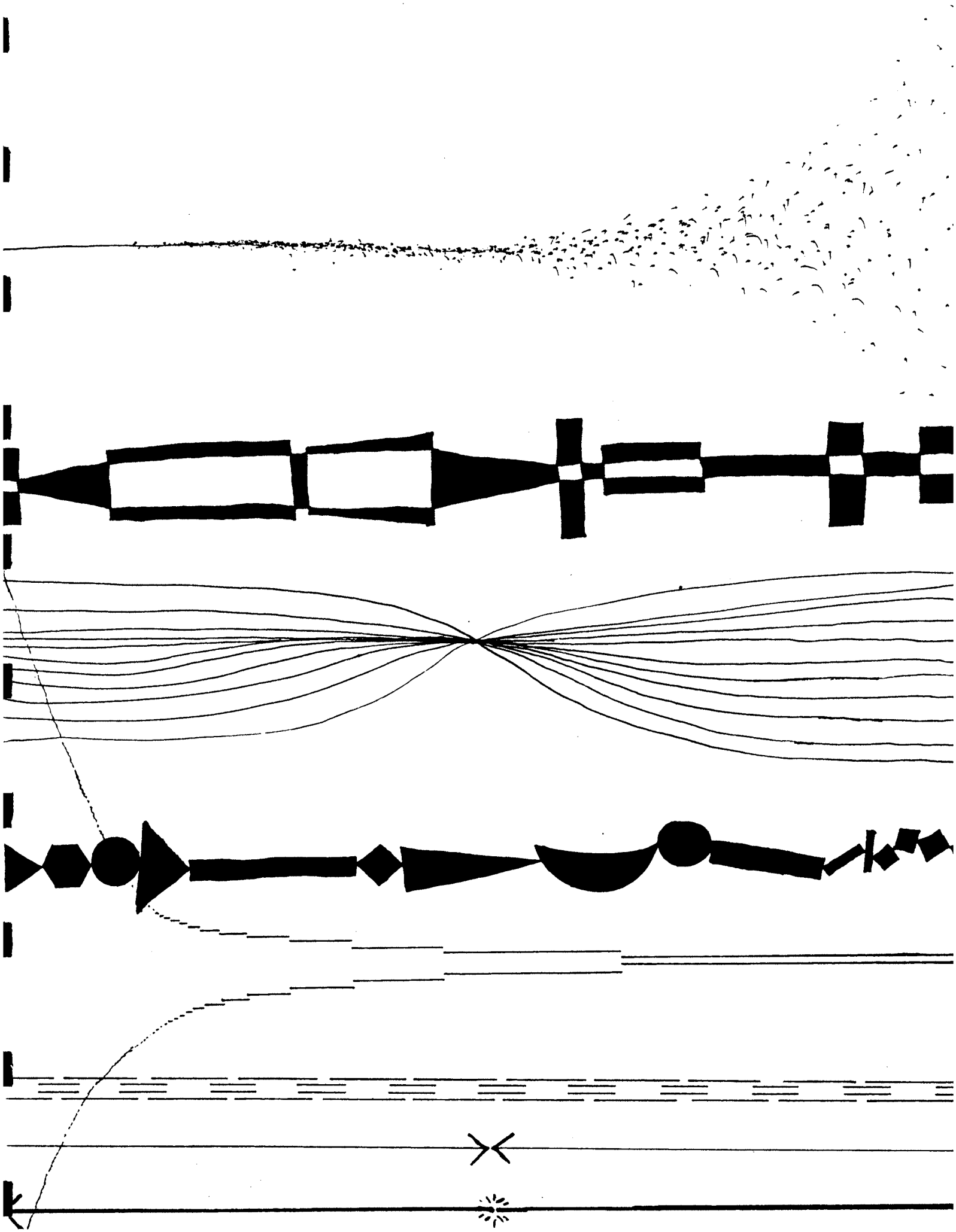








NB: The pairs of lengths A, B C, ... are all equal (i.e. 1+2 = constant).



INTRODUCTION
Methodology
METHODS
FORMS
PATTERNS
REPRESENTATIONS
: Ideography
: Ideograms : Dendrogram
Tree

"DENDROGRAMS"

"I don't get it! Draw me a diagram."

Human beings are immensely stupid. They require diagrams to grasp things!

More generally, they need special aids to understanding, tools of thought—organons, in the dictionary sense.

Our intelligence is not a pure, disembodied intelligence. It relies on structure, technology, methodology, symbols, formulas, and other artifices. Some of this artifice is inherited from genes, some is inherited from culture. But all of it serves to amplify a tiny trace of nearly formless and impotent cellular intelligence into a kind of genius.

Yet much as we all benefit from a level of material technology that would have awed our historical precedessors, without almost any appreciation of the fact, so also we are ingrates oblivious of the manifold means that augment our intellect.

To understand the nature of a diagram and the powers it confers, think of a tree. By tree I mean either a dendrogram, which is a diagram with dendritic structure, or an actual tree-like phenomenon or entity.

"Trees are indispensable to science," begins Stephen Young in an essay on the historical and contemporary importance of trees.[1] "From physics to physiology, they serve as metaphors, expressing in a word details that would otherwise occupy a paragraph. ... With their love of arboreal imagery, scientists are continuing a tradition that reaches back to the religious beliefs of our remote forebears."

In Norse cosmology, for example, there was Yggdrasil, a vast evergreen ash that had its roots in hell and touched heaven with its branches. Ancient Egyptians visualized the sky as the canopy of a tree, the stars being its fruits. In a North American Indian story, humans started out as trees but were transformed when a snake bit off their roots.

Elsewhere in mythology, Zeus spoke to his disciples by rustling the leaves of an oak tree, and in Celtic lore a variety of hazelnut would impart knowledge if ingested.

Alchemists such as Newton used trees to diagram and summarize the methods and results of their work; such images symbolized both the work as a whole and its alleged product, the philosopher's stone.

In chemistry itself, there is Saturn's tree, a branched mass of lead deposited from a lead salt solution. In electroplating, a tree is the name given to a mass of crystals that may form during the process.

There are numerous trees in various branches of engineering. Christmas trees are assemblies built over oil wells to regulate oil flow. A tree pump in chemical engineering uses fluid dynamics to propel and switch hot, corrosive liquids without the need for valves or pistons. Treeing in electrical engineering is a defect of cables characterized by hollow, ramifying channels in insulation. A tree discharge is a branching spark. Lightning forms, advances, and ends dendritically.

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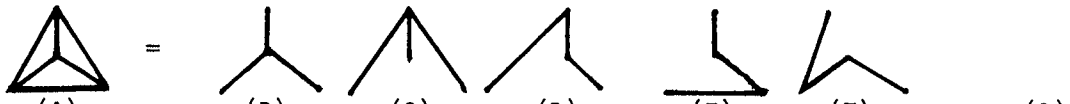
1. Stephen Young, "Root and branch in the groves of academe," in the British periodical New Scientist, 1989 D 23/30, p58-61.

Some computer circuits are termed trees, and in computer programming trees are ubiquitous. Thus a game tree serves in computer games to depict the current state of play and the routes the game can take; the current position is a root and the game's possible outcomes are leaves. Where a game has numerous options at every stage, its tree is referred to as a bushy tree. Pointless moves are discounted in advance by tree-pruning.

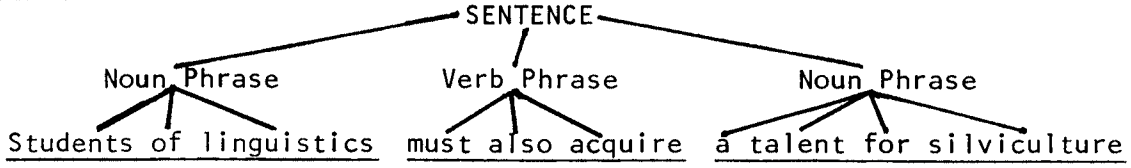
In telecommunications, a tree is a branching array of telephone lines.

Trees are also everywhere in mathematics. Statisticians may construct tree diagrams to depict all possible routes governed by chance or determinate elements in the situation. In the theory of graphs, a tree is any path through a graph that takes in all the corners without creating loops. Thus in graph (A) there are 16 trees, such as (B) through (F), a collection termed a forest:



Fractal trees are a major part of the "new" field of fractal geometry (new to human mathematicians, that is).

In linguistics there are parsing trees, such as the following phrase structure tree:



In anatomy, blood courses through vascular trees, a biliary tree delivers bile to the intestine, a spinal tree operates in the backbone, in the cerebellum there is the arbor vitae, associated with the intestinal villi there is at least a four-level hierarchical tree, our torso branches into arms with fingers and legs with toes, the lymphatic system is tree-like, both dendrites and axons arboresce, the surfaces of body cells are forested with polysaccharide trees, the respiratory system...

In physiology, biochemical pathways are abstractly (dynamically) arboreal.

There are hundreds, thousands, probably countless millions of trees that are combined in bodily structure and function.

However, the greatest importance of the concept of a tree in the history of biology was the revolution it gradually effected in the classification of organisms and the theory of their evolution.

Arguably the dendritic classification of life began with the Neoplatonist philosopher Porphyry (~AD 234-305). Porphyry's logical classification of substance, which focussed on features or attributes rather than hierarchic classes of entities, employed a principle of binary opposition to successively subdivide all of Nature descriptively, beginning with the dichotomy corporeal-vs.-incorporeal.

The tendency to classify the attributes, things, and possibilities of the universe in a branched, tree-like fashion subverted the old linear cosmological metaphors of ladders, chains, and the like.

It should be pointed out that there are disparate senses in which a tree-like classification of reality can occur. Certain of these senses may be related to one another in some kind of progression.

A dendritic code can be purely a matter of classificatory convenience, for even arbitrary organization can be helpful to the mind.

As already mentioned, dendritic classification may center on traits or be purely analogical.

A tree-like classification can, however, progress to being a classification of the different meanings or importances of things.

Or it can classify things qua things.

Or it can classify things by dividing their basic natures.

Or it can classify things arboreally by their tendencies to associate with one another (e.g. geographically or ecologically).

Or it may use a tree to classify the history of things chronologically.

Or a tree can be used to classify things homologically or for their presumptive mutual derivation.

Dendritic classification can also be used to classify things by their behavior or laws.

At first biologists used purely descriptive trees to classify creatures.

But inevitably such arrangements began to function autonomously or predictively. The orderings suggested needs and opportunities, simpler and more elegant groupings, problems and puzzles and missing pieces, causes and effects, functions, paths, laws, chronology, and evolutionary origins, transformations, and potentials.

Embryogenetic trees came to light, along with analogies among these trees, and the utility of such analogical stages in the classification of different and all organisms.

When Charles Robert Darwin (1809-1882) presented his case for the theory of biological evolution in The Origin of Species, in 1858, he made use of his magnificent metaphor of the Tree of Life, and drew a diagram to illustrate his concept.

Quoting once again Stephen Young, "Darwin's image was so apt, so effective and so elegant that its durability was assured. It summarized the past in a single phrase, vividly portraying how living things had diverged and adapted to a variety of habitats. At the same time, the tree evoked all manner of associations, none of which can have hindered its appeal." (Genealogical trees would have been one such happy association.)

Darwin richly embellished his metaphor and repeatedly referred back to it. Indeed, he organized his whole argument around it. It must have catalyzed the development of his own thinking and mobilized sympathy for his theory in society.

The realization of the tree-like affinity and universal homological evolution of all organisms swiftly led to the emergence of modern biology, and also established a continuing tradition in all of science of entertaining evolutionary models of phenomena and of reality as a whole, a tradition whose ultimate importance cannot as yet be imagined.

Why did it take society so long to think of applying the general concept of a tree-like structure and process to the analysis and synthesis of living organisms? Why a delay lasting centuries or even millennia?

The reason lies in a widespread, and even now continuing, misconception of what in Reality is most fundamental.

There exists a hierarchy of ever more, and ever less, fundamental things. Essentially the great error committed by science in its youth —the mistake that has dogged its heels ever since—was to treat the wrong level of this hierarchy as fundamental.

We appointed things as our models for the sort of things that might turn out to be fundamental, that were not sufficiently fundamental or profound.

Perhaps in the ignorance of early human knowledge this was unavoidable. But the effect ever since has been tragic. In effect, science has wasted its time on epiphenomena, on ever more sophisticated research into the superficies of things.

The most fundamental things are types of order and pattern that belong to no science simply because they recur in every science and are exhibited by every phenomenon; that are not merely exhibited by every phenomenon, but critical to its explanation.

Evidently these things have something to do with the essence of thought itself and with the very nature of information.

Failure of the human race to previously seek to systematically identify and exploit such supreme kinds of order and pattern, makes it difficult to initiate their discussion.

Tree-like order and pattern is an example of the sort of truly fundamental things that are being alluded to, but simply mentioning this fact is not enough. A sense of why it is not enough may be gotten from what I once wrote in criticism of traditional methods of education:

> "The proof that our educational system is a failure need only be a tree!
>
> "Trees (dendritic structures and processes) are recognized to be all-important in math, computer science, linguistics, all biology, chemistry, physics—you name it! They are one of the handful of supremely key patterns in all of Nature, and have definite types, properties, and laws.
>
> "But our students are taught that trees are plants. The infinitely more important and fundamental definition is not taught at all! Not even the teachers know of it!
>
> "Trees are the key to classification, decision-making, memory, information theory, government, computer programs, organizing a book, building a road system, evaluating probabilities, setting priorities, picturing human history and progress, assessing the capacity of a watershed, analyzing human anatomy or physiology, designing molecules, deducing a star's history, writing a novel or symphony, planning a factory, or designing a building—but we tell generation after generation of schoolchildren that a tree is just a type of plant!
>
> "An educational system that does that is topsy-turvy. Certainly it is NOT teaching 'basics'!"

Had the notion that physical and mental reality consists of trees, and all that appertains to this notion (whether as principle, constituent, method, or application), been taught, say, from the time of the Ancient Greeks forward, then Darwin might have arrived a lot earlier, and the whole history of science might have been very different.

A similar example of a major scientific discovery that might have been made much earlier in history had it not been for ignorance of universal types of pattern and order fundamental to Nature, is the circulation of blood and the function of the heart as a pump.

The English physician William Harvey (AD 1578-1657) published these discoveries of his in 1628, and in so doing overthrew preposterous misconceptions that originated with the great Greek physician Galen (AD 129-c.199).

The one-way cycling and pumping of blood seems so obvious that the recency of its recognition is almost incomprehensible.

What may have contributed to the delay was a basic unawareness throughout civilization of the universal existence, importance, and properties of three fundamental types of order and pattern in Nature: rings, cycles, and vergences (the latter being structures or processes that combine convergence and divergence).

The circulation of blood is of course circular (as a pinched toroid), endlessly cyclic, and vergent (as a pinched toroid that divergently and deliquescently branches to the capillaries, and thence convergently de-branches back to the unitary, and vergent, heart).

The deliquescent fading away of the arteries into the ultimate and invisibly fine capillaries may have prevented the ancients from conceiving of the movement of blood as circular. The concept of vergence remains paradoxical and under-appreciated even today. Although we now know of many examples of it, little use is made of the word itself, and the phenomenon of vergence is almost never treated generically.

If people are to recognize the existence of concrete or specific exemplifications of such ultimately fundamental and universal types of pattern and order as the tree, ring, cycle, or vergence, it is virtually essential that they be acquainted—if only through educational account—with a wide range of already known examples, with a scheme classifying and defining the various possible generic types of the entities, with systematic discussion of the comparative causes and effects of the types, with a treatment of the characteristic behavior and properties of the types, with a compilation of methods and principles assisting—and of errors attending—treatment of such things, etc.

Thus trees can be important by virtue of their exponential, multiplicative, topologic, efficient, conservative, hierarchic, classificatory, asymmetric and symmetric, reversible or irreversible, space-filling, switching, decisional, and other properties.

Again, there are many common errors in the use and analysis of trees, such as a fallacy that only one type of tree exists or is relevant (say in the systematics of organisms), a fallacy of using pure trees or trees only (say rather than anastomosed trees or tree-network combinations), a fallacy of neglecting the possible importance of branch length, angle, or "order" (rank), etc.

To illustrate such a fallacy, the traditional use of a phylogenetic tree to classify organisms may have to be modified in the future to take account of lateral gene flows mediated by bacteria and viruses that reunite or at least intermix the genes of previously diverged species; the concept of vergence might have to be introduced.

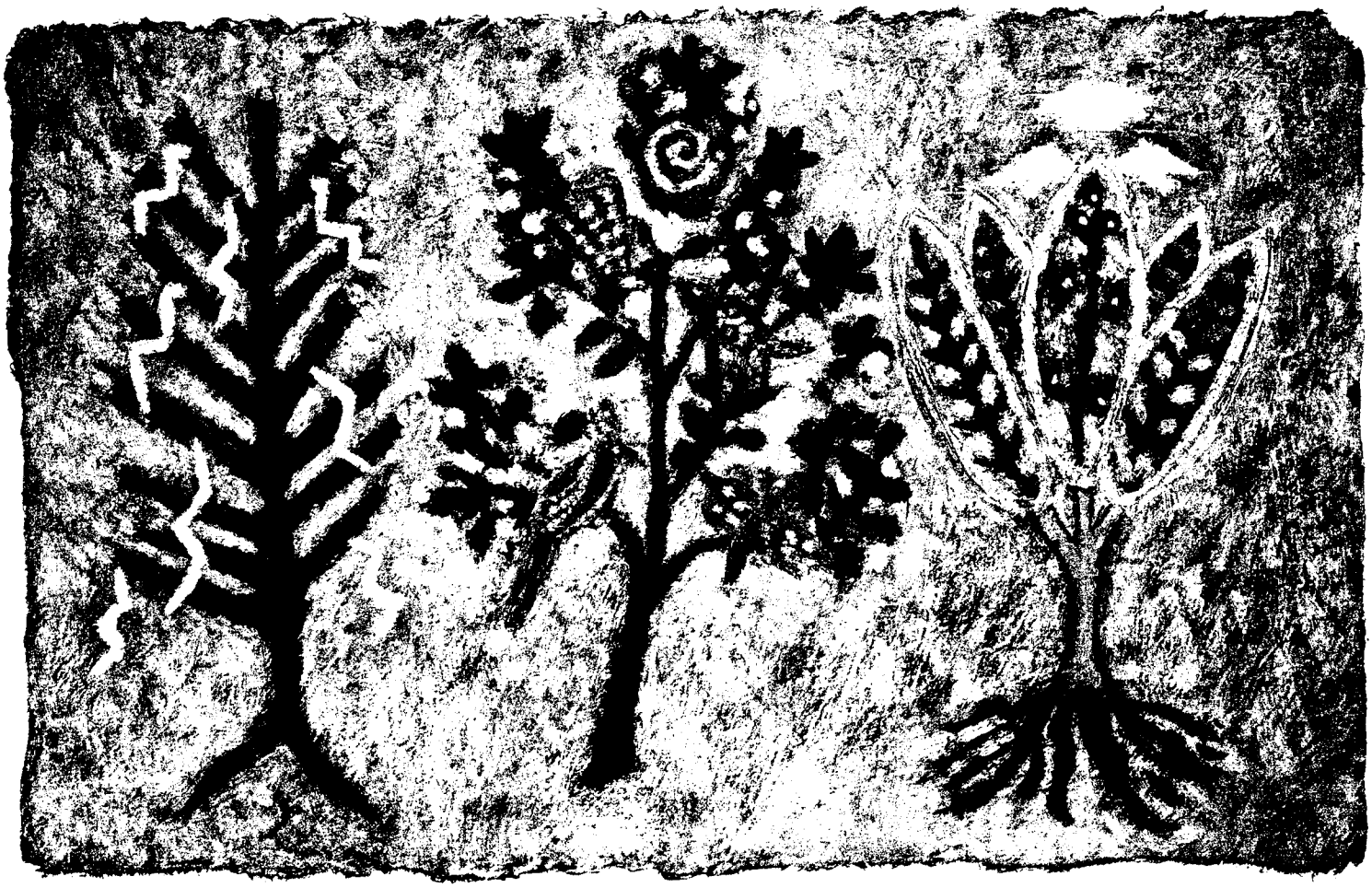
The need that so plainly exists for the discovery and characterization of such universal patterns, and for the systematic development of all possible tools of thought, is a need so extreme and special, and so little able to be met within the framework of existing fields of science, that it really calls for the creation of an altogether new discipline solely concerned with matters of this sort.

The basis for such a discipline is presented in this book, where it is given the name ideonomy and defined as the science of ideas and of the laws thereof.

Root and branch in the groves of academe

Scientists from Newton on have adopted the tree as a symbol. From stately, spreading giant to the tiniest twig and leaf, trees and their various parts have become the commonest images in all branches of science.

Stephen Young



Kim Marsland

TREES are indispensable to science. From physics to physiology, they serve as metaphors, expressing in a word details that would otherwise occupy a paragraph. They range from the momentous to the prosaic, from Charles Darwin's great Tree of Life to a layout for distributing cable television. In science, the intellectual landscape is everywhere wooded and in places a veritable thicket.

With their love of arboreal imagery, scientists are continuing a tradition that reaches back to the [illegible] beliefs of our remote forebears. In Norse cosmology, Yggdrasil, a vast evergreen ash, had its roots in hell and touched heaven with its branches. For North American Indians, a similar specimen acted as a length of galactic dowel, pinning together the three layers of the Universe. The ancient Egyptians considered the sky to be the canopy of a tree and the stars its fruits.

Trees conjure up nature's fecundity and are heavy with religious associations. Small wonder then that they figure in many traditional tales about human origins. A Bolivian myth, for example, asserts that mankind emerged from a gash cut in a tree by the Creator. A North American story has it that humans started out as trees but were transformed when a snake bit off their roots. In Greek legend, Adonis's mother was a myrtle—making Adonis a scion of one of the most literal family trees on record.

In a separate strand of tradition, trees have always offered enlightenment to the seeker after knowledge. Adam and Eve followed this course and were evicted for their pains. The Buddha fared rather better, but then he sampled only the shelter of the peepul tree. Zeus spoke to his disciples by rustling the leaves of an oak tree, while in Celtic lore, a variety of hazelnut would impart knowledge if ingested. In another Celtic tradition, rowan berries offered a similar short cut to knowledge. Today's version of the tale focuses on Isaac Newton and his dramatic experience beneath the apple tree.

Newton's wide intellectual interests would have made him familiar with another symbolic use of trees—in alchemy. In that most esoteric of disciplines, initiates summarised the methods and results of their work in elaborate drawings, which can be as hard to penetrate as the corresponding sections of a modern scientific paper. Trees were part and parcel of those

the unfortunate Swedish ship with something very like the form it would have taken if Gustavus Adolphus had not insisted on so many guns. The difference between the displacements of the two ships is only about 200 tons (1400 tons as opposed to 1200 tons), but the fact that the French ship was never forced to carry the 64-gun ensemble that caused the Wasa so many problems left it comparatively free of hydrostatic horrors; while the hulls are very similar, the centre of gravity of the Saint Louis would have been comfortably low. The Saint Louis was also free of the over-elaborate two-storey galleries in the stern that were (and are) the Swedish ship's glory, but also part of its nemesis: the similarity in the respective designs of the turreted galleries is, however, unmistakable.

The Saint Louis not only emerged from its home port in one piece but had a long and successful career, showing that 17th-century Dutch-built warships were capable of competent flotation when undisturbed by royal whims.

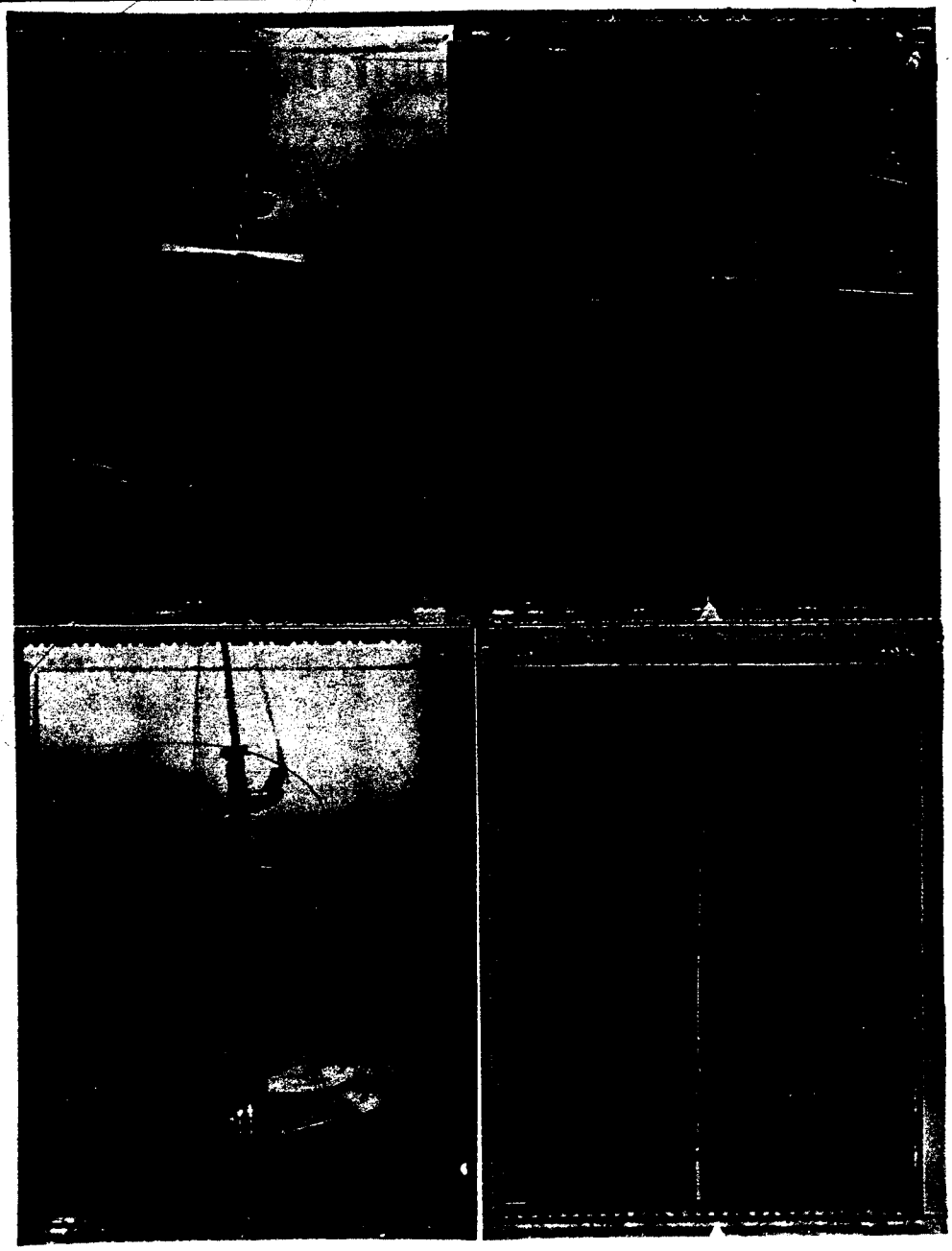
If the engineers at Airfix faced an intriguing problem in historical naval architecture when deducing the Wasa's structure, they were faced with a far thornier one when asked to produce a kit of the Pilgrim Fathers' vessel, the Mayflower. There was no visual evidence at all—no plans, no drawings, no pictures, not even a reliable verbal description. A Mayflower kit, however, would sell well in the US, so commercial pressures and skill in historical naval architecture produced a model that remained in the Airfix catalogue for 12 years.

To perfect a miniature version of the Mayflower, the Airfix designers consulted Matthew Baker's 1585 manuscript in the library of Magdalene College, Cambridge, from which they learnt the probable form of the hull. The actual dimensions of the model were taken from a table of proportions laid down by William Borough, Comptroller of the Navy from 1589 to 1598. The Airfix model is arguably a more learned guess at the form of the original ship than the model in the Science Museum, built in 1926, and hitherto thought the best representation.

But this unlikely scholarly tradition at Airfix could not continue. The model kit industry was under a heavy economic cloud throughout the 1970s: Airfix ceased trading in January 1981, finally giving way under a ban by the European Community on "warlike" illustrations on kit boxes. This resulted in a compulsory redesign, costing £300 000 on Airfix packaging. An American company, Palitoy, bought Airfix and soon Humbrol, a British company, became the second owner. Neither attempted to continue the proud Airfix tradition of fine ship kits.

The last Airfix Classic Ship kit was a model of Captain Bligh's HMS Bounty, issued in 1979. We are unlikely to see more. While some of the much-loved old kits of the 1960s and 1970s have been re-issued, the moulds are beginning to show signs of age, and often require the modeller to hack away the wall of "flash", a thick plastic membrane resulting from leakage in the mould. Some kits are now collectors' items, sold at collectors' prices. Anyone with the kit of the liner, the Southern Cross, should consider keeping it in a bank.

But the big, rattling box containing an Airfix ship kit will always hold a special place in the hearts of a few fanatics for whom the words "locate and cement" bring a lump to the throat. No Christmas afternoon was quite complete without the mildly hallucinogenic stink of polystyrene cement and the frantic scramble for tiny parts eaten by the carpet. Unlike so many children's Christmas presents today, you didn't have to program an Airfix kit: it programmed you. □



The Douglas Brothers

William Scanlan Murphy is a freelance writer, naval historian, broadcaster and musician. His book *Father of the Submarine*, a biography of George Garrett, was published in 1987 by William Kimber.

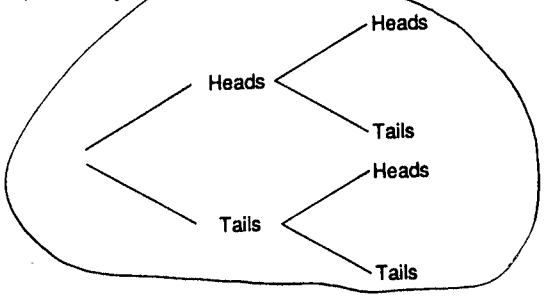
images, symbolising both the work as a whole and its alleged product, the philosopher's stone.

Against this historical background, it is only to be expected that the image of the tree should be prominent in contemporary science. The finest specimen is the biologist's evolutionary tree—of which more later—but saplings abound in every discipline. The alchemical legacy allows chemists, for example, to talk of Saturn's tree, which is a branched mass of lead deposited from a solution of a lead salt. A similar formation of silver is called Diana's tree. Elsewhere, a tree is the name given to a mass of crystals formed during electroplating.

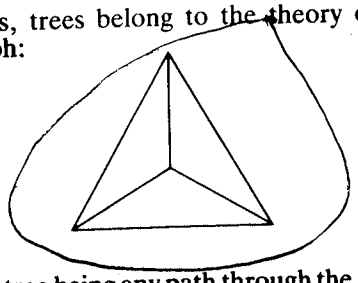
Not to be outdone, engineers have cultivated groves of their own. Trees of steel, or Christmas trees, are the assemblies built over oil wells to regulate the flow of oil. Chemical engineers use a tree pump—named for its suggestive shape—to transfer hot, corrosive fluids without the aid of susceptible devices such as valves or pistons. The fluid travels along the central trunk under the impetus of a second fluid blown into and sucked from alternate branches.

In electrical circles, "treeing" is a defect of cables, marked by the appearance of hollow, ramifying channels in insulation. A "tree discharge" is a sort of branching spark. Lightning develops as a tree before becoming a bolt. Suggestively shaped circuits inside computers are sometimes called trees. In telecommunications, a tree is a branching array of telephone lines, with exchanges at the forks and individual handsets as the leaves. Whenever we make a trunk call to a private branch exchange, we reinforce the imagery.

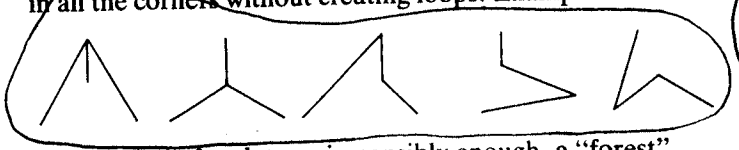
Tyro statisticians draw tree diagrams to portray all the possible routes chance may take. Spinning a coin twice, for example, would yield a tree along the following lines:



For geometers, trees belong to the theory of graphs. The following graph:



has 16 trees, a tree being any path through the graph that takes in all the corners without creating loops. Examples are:

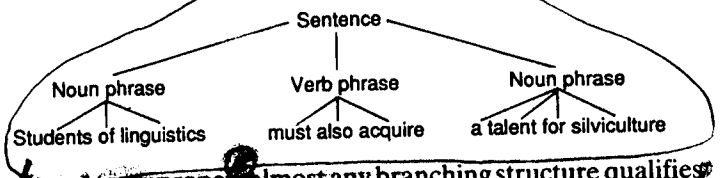


A collection of such trees is, sensibly enough, a "forest".

Elsewhere in mathematics, realistic trees invariably decorate any discourse on fractal geometry, the study of objects whose shape repeats itself on different scales. Trees are prime examples, because sprigs, twigs, branches, boughs and boles are progressively larger versions of the same basic shape. Because of their repetitive structure, trees of surprising realism can be drawn on a computer screen with a minimum of programming fuss. With credentials like these, the tree looks set to become a symbol for the world of fractals.

Trees figure prominently in computer science. A classic case arises when programmers instruct a computer to play games. A game tree begins with the current state of play and depicts the various routes that the game can take. The tree comes equipped with a root (the current position) and leaves (the possible outcomes of the game). Programmers refer to "bushy trees" in games such as chess, where there are a large number of options at each stage. Computers cope with the arduousness of such games by discounting pointless moves in advance. Pursuing the metaphor, programmers call this "tree-pruning".

Students of linguistics must also acquire a talent for silviculture. For them, a "phrase structure tree" is a diagram explaining the anatomy of a sentence. The tree grows progressively as they dissect the sentence into its elements. Analysing the first sentence of this paragraph would yield the following tree:



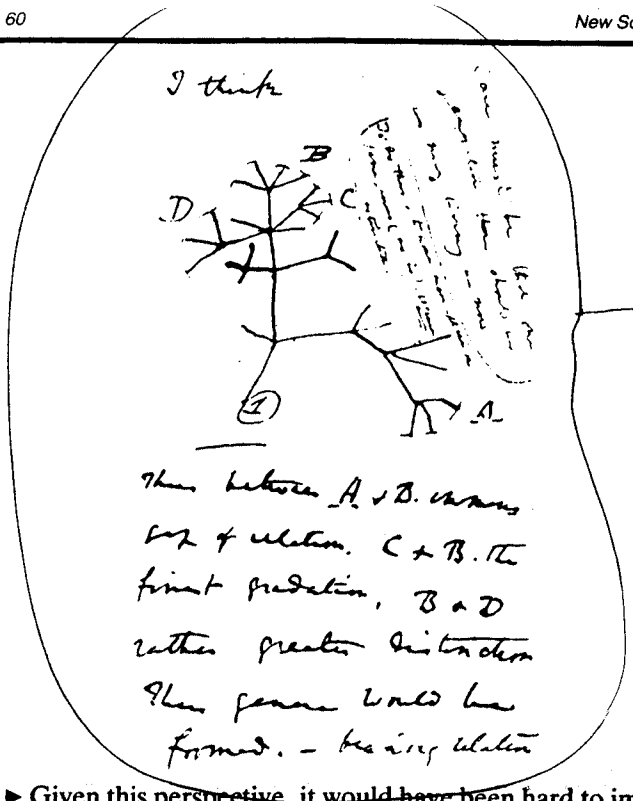
In anatomy proper, almost any branching structure qualifies as a tree. Inside our bodies, blood courses through vascular trees, a biliary tree delivers bile to the intestine and a spinal tree grows in the backbone. We harbour a tree in the brain, the *arbor vitae*, or tree of life, which is the pattern revealed by a vertical section of the cerebellum. Sea cucumbers breathe by drawing oxygen-rich water into their respiratory trees. When cells are producing an abundance of ribosomal RNA, their chromosomes take on the look of Christmas trees bedecked with molecular tinsel. What with dendrons, dendrites and dendritic ulcers, biology is thick with metaphorical trees.

Nowhere is this more true than in the area of the subject dealing with classification and evolution. The Tree of Porphyry, an invention of the 3rd century AD, is arguably the most ancient example. Porphyry was a Middle Eastern philosopher who popularised the work of other writers and wrote several books, including one about vegetarianism. His tree is a device for specifying mankind's place in the scheme of things. It works a little like the keys that help biologists to identify animals and plants. Starting at the top of the tree, the first stage is to divide all of creation into corporeal and incorporeal. Subsequent divisions split the corporeal into animate and inanimate; the animate into sensitive and insensitive; and, finally, the sensitive into rational and irrational. Man—a rational, sensitive living body—then pops out at the bottom of the tree.

The tree's most illustrious role in biology, as a symbol of both natural diversity and evolutionary change, emerged much later. Its emergence marked a major shift in biological thinking, and an intriguing episode in the history of science. Previously, biologists had been enamoured of ladders, chains and other linear metaphors. A typical example was the ancient scale of nature with its ascent from sponges to human beings along a single line of "increasing perfection". Again, it was a linear image, with every grade of life in its proper place, that inspired Alexander Pope's lines:

> Vast chane of Being, which from God began,
> Natures aethereal, human, angel, man,
> Beast, bird, fish, insect! what no eye can see,
> No glass can reach! from Infinite to thee,
> From thee to Nothing! . . .

(1) ALSO IN ANATOMY, TREES OF, OR SUCH AS: Lungs (bronchial); Intestinal villi, microvilli, mini-microvilli, and polyparochialth trees; Arms → Fingers; Haversian (sp?) canals; Cell surface polyparochialth trees (as above in arteries); Neurons; Lymphatic system; PRACTICALLY AD INFINITUM (what



► Given this perspective, it would have been hard to imagine anything more subversive than the tree, where forms fanned out in all directions and could hold equal rank. Yet in the end the tree was triumphant because it offered a better description of the natural world. Among the scholars who have chronicled its rise are Edward Voss, who has traced the history of evolutionary trees, and Dov Ospovat, the author of a book about the development of Darwin's theory. As their work makes clear, the branching tree was gaining ground long before Darwin used it to such devastating effect in the *Origin of Species*. A century earlier, it was appearing in the most unexpected quarters.

The work of Charles Bonnet, the 18th-century Swiss biologist, is a case in point. Bonnet was a key proponent of the scale of nature, yet his writings confirm that he toyed with the idea of a branching scale. "Does the scale of nature become branched as it arises? Are the insects and the shell-fish two parallel and lateral branches of this great trunk?" he asked in 1764. The power of the symbolic tree was already evident at what is widely considered its first outing.

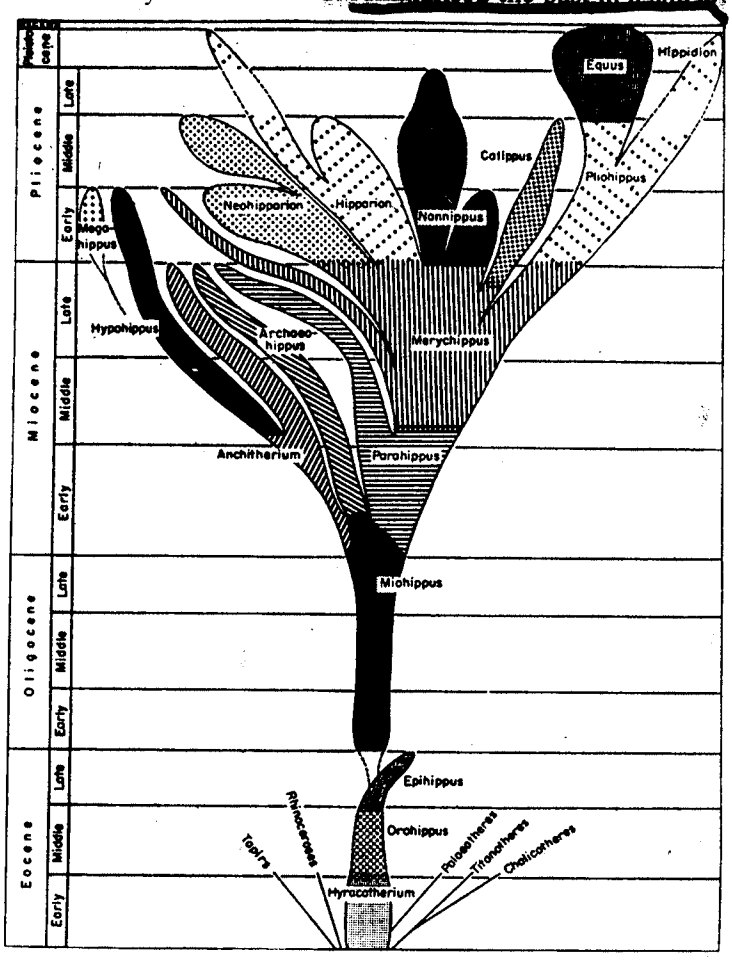
Jean-Baptiste de Monet, Chevalier de Lamarck, went further out on a limb. He illustrated his theory of evolution with a diagram showing the origins of the major groups of animals. Despite being the wrong way up for a tree, its true nature can scarcely be in dispute. "The table," he wrote in 1809, "may facilitate the understanding of what I have said. It is there shown that in my opinion the animal scale begins by at least two separate branches, and that as it proceeds it appears to terminate in several twigs in certain places."

Studies on embryos reinforced the arboreal imagery. Zoologists such as Karl von Baer and Henri Milne Edwards observed that related animals developed along similar paths as embryos before diverging to go their own separate ways. Again the analogy was with a branching tree. Because embryonic development took this form, adult animals could be arranged in a similar pattern. According to Milne Edwards, writing in 1844, this pattern was "a tree which in rising from the ground separates into several stems each of which then divides into secondary main branches and terminates in innumerable little branches".

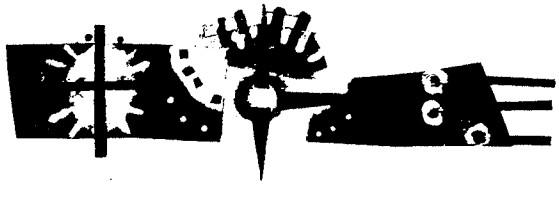
An appreciation of the importance of embryology led Martin Barry, a Scottish physician, to take to the trees in 1837-183[illegible]. "Naturalists have begun, just where they should have ended," he lamented. "Their attention has been directed to the grouping of the twigs—as if thus they were to find their natural connections, without even looking for assistance towards the branches, or the trunk that gave them forth." By revealing similarities in development, Barry argued, naturalists could start to work from the trunk upwards.

In the same year, Darwin first sketched a simple evolutionary tree in his notebook (left). "Organised beings represent a tree, irregularly branched," he wrote, "some branches far more branched—Hence Genera—As many terminal buds dying, as new ones generated." In the following 20 years, Darwin skilfully orchestrated the image, bringing it to the peak of perfection in Chapter Four of the *Origin of Species*: "The affinities of all the beings of the same class have sometimes been represented by a great tree. I believe this simile largely speaks the truth. The green and budding twigs may represent existing species; and those produced during each former year may represent the long succession of extinct species." There follow 25 lines of sustained metaphor, before the final flourish: "As buds give rise by growth to fresh buds, and these, if vigorous, branch out and overtop on all sides many a feebler branch, so by generation I believe it has been with the great Tree of Life, which fills with its dead and broken branches the crust of the earth, and covers the surface with its ever branching and beautiful ramifications."

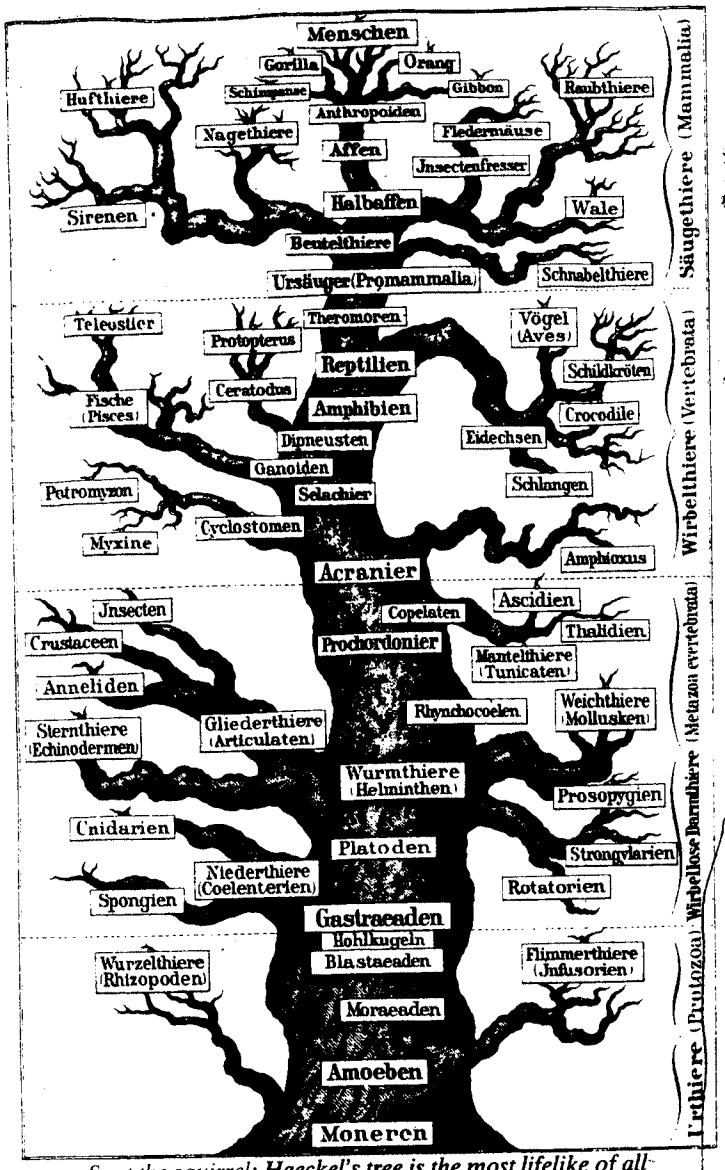
Darwin's image was so apt, so effective and so elegant that its durability was assured. It summarised the past in a single



Thoroughbred: an elegant family tree for horses



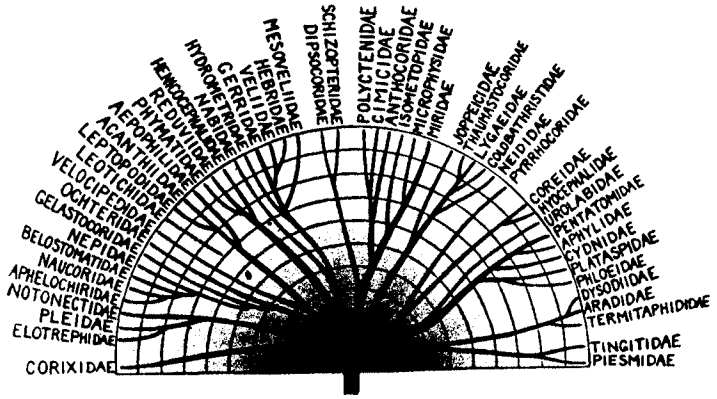
phrase, vividly portraying how living things had diverged and adapted to a variety of habitats. At the same time, the tree evoked all manner of associations, none of which can have hindered its appeal. Darwin's audience would already have been familiar with genealogical trees. In church, they might have gazed on a Jesse window, depicting in stained glass the genealogy of Christ as a great tree ascending from Jesse's loins. The capital letters in the phrase Tree of Life must also have made it resonate with religious overtones, all the way from the Book of Genesis to the pagan tradition.



Spot the squirrel: Haeckel's tree is the most lifelike of all

Where Darwin led, others were quick to follow, soon providing an evolutionary arboretum. The most notable was Ernst Haeckel, a vigorous Darwinian who depicted his ideas on evolution with the help of some extraordinarily lifelike trees. He executed one specimen with such artistry that we find ourselves searching its boughs for a sleeping owl or playful squirrel.

Biologists soon worked out ways to increase the scientific utility of the tree. They drew their diagrams to scale so that the disposition of branches revealed not only the ancestry of the various groups, but the time at which they had diverged from



A bug on every branch: the origins of the hemiptera

common stock. More abstract layouts allowed further refinements. In one design, the angle each branch made with the vertical was a measure of the rate of evolution within that lineage.

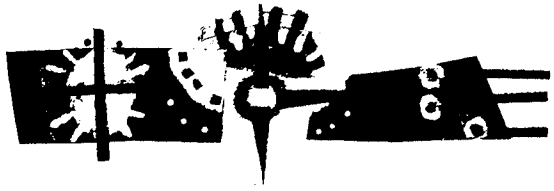
In more recent times, the tendency has been to shun naturalistic trees. Today's trees, or dendrograms, hide their vegetable origins behind sensible straight lines, more like electronic circuitry than burgeoning foliage. Yet symmetry and grace have a habit of re-emerging. A couple of years ago, Rebecca Cann, Mark Stoneking and Allan Wilson at the University of California at Berkeley, drew up an evolutionary tree based upon the chemical structure of the DNA inside human mitochondria. The result is an immensely satisfying design. Curving around like a Norman arch, it signals a triumphant return to the tradition of elegant imagery.

At the same time, biologists are always looking for further refinements to their most treasured metaphor. Derek Bryce, in a book entitled *Evolution and the New Phylogeny*, argues that the conventional Tree of Life needs reappraising. The traditional oak or ash, with its all-too-definite forks, disguises our ignorance about the actual course of evolution. Bryce contends that a "monkey puzzle with the trunk and most of the horizontal branches missing" would make a more suitable image.

Whatever species suits us best, a tree remains the most apt way of arranging most living organisms, because they really did evolve by diverging from common ancestors. Yet the tree does have its limitations, according to John Maynard Smith of the University of Sussex and Manfred Eigen and his colleagues at the Max Planck Institute for Biophysical Chemistry in Göttingen. One limitation arises with bacteria that exchange genes across the barriers of species. In their case, separate evolutionary trees can coalesce into an evolutionary thicket. One way of viewing the resulting tangle is to think of it as a net, with the knots signalling points of genetic contact. Another exception crops up with certain molecules—the various RNA species in living cells, for example. These branched from common stock so long ago that we can barely perceive their relationships with one another. Here, we are better off thinking of a fan-shaped bundle of sticks rather than a branching tree. Eigen and his colleagues have devised mathematical ways of deciding which image—tree, net or bundle—offers the best fit in any particular case.

Arresting as these ideas are, they offer no real challenge to the overall supremacy of the evolutionary tree. The theory of evolution is unthinkable without trees. Elsewhere within science, afforestation continues apace. If trees did not exist, scientists would have to invent them. □

Stephen Young is a science writer who lives in a well-wooded part of Wales.



DEFINITIONS OF AND METAPHORS FOR IDEONOMY

Ideonomy must be defined. But some of the very reasons that make doing this so necessary also make doing it extremely difficult.

Not only the name but the subject itself are practically unknown.

In fact, the science of ideonomy is *so* [unfamiliar, *sui generis*, huge, complex, and universal], and comprises so *many* [divisions, concepts, organons, methods, applications, and implications], that it is exceedingly easy to misconceive it, or to caricature it by reducing it to one of its umpteen [parts, aspects, or concerns].

Indeed, virtually everyone who confronts ideonomy for the first time immediately thinks of it in various mistaken ways. And unfortunately such misimpressions are tenacious: [long, systematic, and painstaking] [explanation, dialogue, experience, and training] are usually needed to combat such [illusions, oversimplifications, and ignorance] in their [actual or potential] totality.

The problem of defining ideonomy is all the harder because it is a subject only just being born, and naturally at such a natal moment it is nearly impossible to foresee with much accuracy what the field is apt to be like in its maturity.

Moreover, at the present instant ideonomy remains the child of but a single individual. Others have not as yet had a chance to examine, criticize, and contribute to the puzzling discipline. It is of course inevitable that its lone creator's vision will be somewhat—perhaps even severely—[limited, flawed, and idiosyncratic]. He will have given undue emphasis to certain things and will have [neglected or completely overlooked] much else that in reality is as important as, or even more important than, the things he has legitimately addressed.

There is simply no way in which at the outset a new discipline can be expected to possess a proper distribution of emphases, and it is unfair to ask of its initiators that they describe it in a balanced way.

The object of this chapter is to define ideonomy, but because of the things that have just been noted—about the field's [nascence, intricacy, obscurity, *etc*]—this will be done in some unusual ways.

A great assortment of [alternative, complementary, partial, and sometimes merely provisional, or even quite dubious] definitions will at once be supplied for consideration by thoughtful readers. Readers may choose to [reject or modify] the definitions—they are even encouraged to do this—and some may wish to propose new definitions of their own.

In addition to supplying definitions *per se* of ideonomy, the chapter will touch upon a variety of metaphors for the subject.

Let me begin with a list of "Twenty-Five Things Ideonomy Might Variously Be Categorized As" (**Fig. 40,329**).

It will be obvious from this table that ideonomy is certainly something more than just a branch of science. It promises to be many other things at the same time, including a [profession, industry, philosophy, and form of recreation]. Naturally the same thing could be said to some extent of *any* science—that it goes beyond merely being science. Nevertheless, the truth of the remark is especially obvious in the case of ideonomy.

Fig. 40,329:

"Twenty-Five Things Ideonomy Might Variously Be Categorized As"

1. An amusement.
2. An art.
3. A community (potential future [community or association] of [like-minded, intercommunicative, or collaborative individuals]).

4. A concept.
5. A discipline, subject, or theme.
6. A form of logic.
7. An industry.
8. A language.
9. A loose collection of things; body of literature; or form of culture.
10. A method, methodology, or system.
11. A natural activity of the human brain (albeit hitherto unrecognized, unnamed, unformalized, undisciplined, *e/v* weak).
12. A philosophy, set of values, religion, or emphasis.
13. A practice or activity.
14. A profession.
15. A proposal.
16. A research program; a [creative, investigative, or experimental] undertaking.
17. A science, superscience, metascience, adjunct to science, or *inter-science* [either infantile or transcendental].
18. Simply a personal [creation or project] of Patrick Gunkel.
19. A style of [inquiry or endeavor].
20. A survey.
21. Systematized imagination.
22. A [technique, system, or program] of [education or mental training].
23. A technology.
24. A theory.
25. A vision.

There are also various things and concepts that can serve as brief definitions or metaphors for what ideonomy is or can do. A list of such is given in **Fig. 32,355**. Some of the listed things are meant to refer to the science as a whole, but others are certainly more limited in their capacity or reference.

Although these words and phrases have an ability to give insight into or appreciation of ideonomy in a quick, direct, effortless, memorable, and reassuring way, they are often misleading, they are all imperfect, and none should be taken too seriously. Ideonomy is ultimately its own best definition and metaphor.

Fig. 32,355:

"Ninety Brief Or Metaphoric Definitions of Ideonomy"

1. A ***cognitive* language** (special language to facilitate thought).
2. ['Agriculture', 'silviculture', or 'stirpiculture'] of ideas (***ideoculture***).
3. **Anagogic** logic; all of Nature treated as being *essentially* symbolic (*e.g., sensu* Emanuel Swedenborg or Ramon Llull); science of "the Eros".
4. *Any* **systematic treatment** of ideas.
5. **Automation** of ideation.
6. **Benign** (*good*) **"combinatorial explosion"**; or *combinatorial implosion*.
7. **"Bertillon system** of criminal identification" *for ideas*.
8. **"Chaotic dynamics"** *of ideas*.
9. Classification of ideas (***ideotaxy***).
10. Classification of ***thoughts***; science of *irredundant* thoughts.
11. [Concern for or pursuit of] the infinite [intrinsic or virtual] **complexity** of [any idea and the interrelations of all ideas].
12. **Cosmology** of ideas.
13. Description of ideas (***ideography***).
14. [**Dictionary** and **encyclopedia**] of *universal* ideas.

15. **"Dimensional analysis"** *of ideas.*
16. Future basis of **"idea industry"** (via mass production of ideas) and of **"kaleidoscopic industry".**
17. **"Fuzzy logic's"** *phenomenology.*
18. **"Game theory"** *of ideas.*
19. [**"Group theory"** or **"category theory"**] *of ideas.*
20. **Heuristics.**
21. ***Hololog*y** (science of wholes and gestalts); 'gestalt cosmology'.
22. Idea [aesthetics or **art**].
23. 'Idea biology' (***ideobiology***); the field of "artificial life" applied to ideas.
24. 'Idea chemistry' (***ideochemistry***).
25. Idea **combinatorics.**
26. Idea **engineering**—that beyond "knowledge engineering" ("expert systems") in artificial intelligence.
27. Idea **linguistics.**
28. Idea mathematics (***ideomatics***).
29. 'Idea **mechanics**'.
30. 'Idea **physics**'.
31. **Information theory** of ideas.
32. ***Interscience***; interdisciplinary science; an ***interlanguage*** interlinking all [sciences or fields].
33. **'Kaleidoscope** (or *kaleidoscopy*) of ideas'.
34. **Linguistic engineering**; a **superlanguage.**
35. **Mathematics *generalized*** [*e.g.,* taken <beyond and above> number, freed of artificial historical restrictions, and made *truly* universal].
36. **"Mathesis universalis"**; or Gottfried Leibniz's *more general* program.
37. **'Mental ecology'** (*e.g., sensu* Gregory Bateson).
38. ***Meta-logic***; the science of logic [transformed and emancipated]; logic made [organic, recursive, transcendent, infinite, creative, *etc*].
39. **Metascience**; the science of science *itself.*
40. Methodology of ***genius*** (that which 'explains' genius, at least in part).
41. **Methodology** of ideas.
42. **Minimization of science's** [**redundancies**, asymmetries, self-neglects, contradictions, and pathological tendencies]; the [updating, forced evolution, and planned **perfection**] **of science.**
43. Missing key part of [**artificial intelligence** and **cognitive science**].
44. **"Morphology"** of ideas, *sensu* Fritz Zwicky's "morphological research".
45. ***Multidimensional*** (hyperspatial) **thesaurus** (not just Peter Roget's unidimensional concept).
46. **"Natural science"** of ideas.
47. Necessary **reunification of science and philosophy.**
48. ***Other half* of science** [opposite, connecessary, but tragically missing].
49. Panhuman **"idea bank"** computer network.
50. **Pattern** science or science of *universal* patterns (*digmology*).
51. 'Perpetual **proto-science**'—germinative of all future science.
52. **Philosophy *made*** [modern, **scientific**, and technological]; ***experimental* philosophy.**
53. Progressive [discovery, development, and exploitation] of the ***Ideocosm*** (universe of ideas).
54. [Pure and applied] **science of ideas.**
55. '[**Quantum** cum **relativity**] **physics**' *of ideas.*
56. '[**Recombinant** DNA, RNA, or **genetic**] **engineering**' *of ideas.*
57. 'Reversible idea **prism**'.

58. [**Science** and technology] **of imagination**; the *science* of [invention, creativity, and intellectual play].
59. **Science *enlarged***, or extended to all things (especially those hitherto beyond its pale); **pantology** [a systematic view, or the science, of *everything*].
60. Science for generating *all possible* ideas about *any* [subject, idea, or thing]; ***ideopoesis***.
61. Science of [**analogy** or **metaphor**].
62. Science of all possible [**modes of thought**, perspectives, and intellectual transformations].
63. Science of all ***transcendental*** **elements of** [the or any] **mind**.
64. Science of **anonyms** (unnamed things).
65. Science of **cognitive principles**; *universal* axiomatics; ***pan-logicization***.
66. Science of extended symmetry (**"symmetrology"**).
67. Science of **generalization**.
68. Science of **Nature's** *own* [physical and transcendental] **'languages'**.
69. Science of naughts (***anontology***).
70. Science of **noumena**; of the ***most*** [**high**, fundamental, and universal] **entities**; of [archetypes, *archanalogons, metaphenomena, metastructures, metaprocesses, trans-things, ultrarealities, ultrafundamentals, meta-laws, meta-concepts, order-taxons, etc*].
71. [Science of **possibility**, science of **variety**, science of **novelty**, science of **"emergence"**, *e/v* science of ***futuribles***].
72. Science of ***recursive*** **ideation**.
73. Science [of the **laws of ideas** or of ***meta-ideas***].
74. Science of the [**omniverse, apeiron**, Plenum, or infinity]; of **all possible** [**worlds** and universes] ("ultracosmology" and "myriocosmology").
75. **Set theory** *of ideas*.
76. ***Speculative*** **science** and *a science of* speculation.
77. Study of the ***hierarchic continuum*** represented by **all** [scales and transformations] **of ideas**.
78. Study of the whole [past, present, and future] [**history**, dynamics, **and evolution**] **of** [**ideas and eide**] in [cultures and individuals]; of **ideic** [chains, **series, and networks**]; and of ideas as **"memes"** (*sensu* Richard Dawkins).
79. **Taxonomy** *inverted* so as to be **made *generative***.
80. Technology of ideas (***ideotechnology***).
81. **"Theory of marks"** (*e.g.*, in Fritz Zwicky's sense).
82. **Think-tank *science***.
83. ***Trans-linguistic*** **semantics**.
84. **Translation of ideas** from everywhere to everywhere.
85. *Universal* **epistemology**; science of all [actual or possible] **knowledge about** all [actual or possible] **knowledge**.
86. Universal science of Nature's ***qualitative*** **laws** and **contraplete to mathematics**, as the sororal superscience of Nature's *quantitative* laws.
87. Universal science of order (***cybelology***).
88. *Universal* science of **transformations**.
89. *Universal* **taxonomy**.
90. ?

Unavoidably, I will comment upon *some but not all* of the items in this list. In any case, certain of the entries are self-evident or are discussed elsewhere in the book.

A *Cognitive* Language
(Special Language To Facilitate Thought)

Human intelligence nearly owes its existence to language, and yet languages as they exist are clearly imperfect [tools of thought and substrates of intelligence]. The power of language to assist mind could be enormously extended, either [by modifying existing languages or by creating a new language specially designed for mentation]. Both things are among the objectives of ideonomy. Yet by virtue of its [structure, content, and methods], ideonomy is *itself* a kind of cognitive language and a better cognitive language than what existed before it.

['Agriculture', 'Silviculture', Or 'Stirpiculture'] of Ideas
(***Ideoculture***)

Ideas and structures of ideas can be cultured over the course of time in a manner reminiscent of agriculture and its cultivation of useful plants. The nurture of [ideas and ideation] requires [<planning, patience, and perseverance>; <fertile soil, tillage, sowing, harvesting, and winnowing>; and analogs of many other elements of agriculture, including <breeding and cross-breeding>].

Moreover, what are literally termed "trees of ideas" are evolved, and whole masses of these, so silviculture is another vital metaphor for certain aspects of ideonomy.

The culture of ideas—"ideoculture"—can require the efforts of whole communities sustained over many generations.

Anagogic Logic; All of Nature Treated As Being *Essentially* Symbolic (*E.g.*, *Sensu* Emanuel Swedenborg Or Ramon Llull);
Science of "The Eros"

The fundamental nature of reality is unknown. Many philosophers have espoused the view that even all material things—even the universe itself—are but symbols, or a language expressing some [deeper, truer, greater, or very different] reality, a reality that might be [spiritual, intellectual, moral, social, mathematical, esthetic, biomorphic, processual, or something for which we have no name]. Though momentarily out of fashion, such ideas are nonetheless defensible. If reality *is* in essence [spiritual, aspirational, evolutionary, *e/vc*], then ideonomy could [be or serve] as a supremely appropriate guide.

Any **Systematic Treatment** of Ideas.

It is rare for ideas, or anything whatever, to be treated at all systematically—or *as* systematically as typifies ideonomy's approach to things. In fact, wherever ideas *are* dealt with in a systematic fashion, this could be described as being ideonomic; and any book, paper, definition, inquiry, or the like which thus systematizes concepts is, in effect, a bit of ideonomy.

Automation of Ideation

The ability to generate ideas [*en masse* and mechanically] is one of ideonomy's most [spectacular and distinguishing] features, and is therefore almost emblematic of ideonomy. Indicating what a thing does, or the most remarkable thing it does, is often the best way to symbolize the nature of the thing.

Benign (*Good*) **"Combinatorial Explosion"**;
Or *Combinatorial Implosion*

"Combinatorial explosions" are usually regarded by computer scientists as being malignant phenomena, often because they give rise to intractable complexity *en route* to the

solution of some problem. But what happens if they are *good*, or if the [things or possibilities] they create so explosively are [valuable, useful, helpful, informative, or simplifying]?

Moreover, could there be a reverse phenomenon, a combinatorial *implosion* (perhaps as a [product of or solution to] a combinatorial explosion); and if so, might it *per contra* be beneficial? Could the two processes be concreated and maintained in an optimal (ideal) equilibrium?

Would it be possible to [create and harness] combinatorial explosions of such things as [solutions, answers, knowledge, methods, ideas, gestalts, symmetries, convergences, shortcuts, integrals, perspectives, resources, insights, deductions, principles, laws, tactics, strategies, explanations, forms of order, intelligence, experimental predictions, constraints, higher-order equilibria, transformational invariants, *e/vc*]?

If *all* of the terms that are combined in an ideonomic operation are *sufficiently* [fundamental, canonical, complementary, irredundant, meaningful, true, 'symmetric', important, *e/vc*], then *all* of the [ideas, patterns, relationships, solutions, *e/vc*] that are generated by any combinatorial explosion that results may be [meaningful, interesting, distinct, fundamental, necessary, important, true, and irredundantly usable] *as well*.

Ideas may differ from *data* in the key respect that all of the (natural) combinations of the former, but not all of the combinations of the latter, are [interesting and important] to the mind; or at least this may be the general tendency.

"**Bertillon System** of Criminal Identification" *For Ideas*

If I witness a theft, the police may afterwards want to interrogate me about the physical appearance of the thief. Personally I have a wretched memory for faces, and so in my own case, at least, such questioning would probably be unproductive. But fortunately there exist a small set of standardized questions which criminal investigators can turn to as a more reliable and powerful means for tapping facial memory, or for maximizing the efficiency of communication of facial memories.

Presumably these physiognomic questions concern such things as distance between the thief's eyes, type of nose, *etc.* What is remarkable is that the small set of answers a person gives in response to this small set of questions can in principle enable one face in 48 billion to be uniquely identified, and that an artist can use such an austerely codified description to sketch a realistic portrait of the criminal. The facial questions referred to are historically descended from the much more anthropometrically encompassing Bertillon System of Criminal Identification that was introduced in 1882 by Alphonse Bertillon (1853-1914), chief of criminal identification of the Paris police. "Bertillonage" itself (as the system is also known) has, however, subsequently been largely superseded by other systems.

The efficacy of this system makes one wonder why it is that analogous systems of identification, or for describing and analyzing appearances, have not been devised for treating such things as the structure of stellar nebulae, so-called mineral fabrics, or the micrographic appearance of different cells' interiors—or for treating things **in general** or **universally**.

As it happens, the development of such general tools for treating the appearance of things, by means of systematic reference to the basic, complementary, and universal dimensions of appearance, **is a major aim of ideonomy**. The "dimensions" in question are not just quantitative ones, however, but may also have to do with the inventory of the possible types of things that may or may not be present **even once**, or in the most minimal way, as part of the content of the appearance of something. The quantitative dimensions themselves, moreover, [may be of either "metric or nonmetric" character, so-called, may be either objective or subjective (intuitive), and so forth].

Thanks to the work of David Marr, the fields of artificial intelligence and neuropsychology have recently been made aware that a particular set of especially basic

elements underlie all visual appearance and have a universal ability to assist the perception or mechanical processing of appearance. It was evidently ignorance of these elements that had previously thwarted progress of both fields in understanding vision.

"Chaotic dynamics" *of ideas*

A few [ideas and relations thereof] can quickly give rise to immense [ideic, cognitive, and logical] complexity via ["Chaotic" and nonlinear] processes in the realms of [logic and information]. Huge, even infinite, sets of [ideas, possibilities, and thoughts], [even ones that *seem* <chaotic, unrelated, random, amorphous, contradictory, meaningless, or absurd>], may *in fact* be [secretely and simply] [ordered, lawful, generated, definable, investigable, *e/vc*].

This by analogy to what has been discovered of late about [physical and mathematical] "Chaos".

Classification of Ideas (***Ideotaxy***)

One of the first things a nascent science does is to classify the various kinds of basic entities it concerns (which for ideonomy would be *ideas*). This first ordering of Nature—and self-ordering—effected by a new science can come as such a surprise (by demonstrating the possibility of order where previously none had been contemplated), and be so important, that it creates the misimpression that classification is [all or mainly] what the new discipline is about. But the classification of ideas is for ideonomy just a necessary preliminary that will enable it to do a hundred other things besides.

Classification of ***Thoughts***;
Science of *Irredundant* Thoughts

It is not clear at present what *either* [ideas or thoughts] *are*, though presumably they are closely related. It is even conceivable that thoughts are kinds of ideas, or reversely, that ideas are kinds of thoughts. Perhaps as the science of ideas, ideonomy is the science of the least redundant thoughts, or of thought [seeking to find or tending to become] minimally redundant. Or ideonomy could represent the quest for a [complete, finite, or canonical] classification of all [actual or possible] thoughts.

[Concern For Or Pursuit of]
The Infinite [Intrinsic Or Virtual] **Complexity** of
[Any Idea and the Interrelations of All Ideas]

Just as modern [science and mathematics] have found many seemingly simple [phenomena, entities, and domains] to be [unimaginably or even infinitely] complex, so may ideonomy discover that seemingly simple ideas, or ideas in general despite their apparent simplicity, are equally complex [internally or in their <implications, interrelations, or possibilities>]. Certainly much of the inspiration for the creation of ideonomy was the need to establish some novel instrument for probing in a systematic way what is clearly the horrendous, previously unsuspected [number and complexity] of general ideas or of concepts germane to anything (in fact, the amazing complexity of anything and everything).

Cosmology of Ideas

What is the interrelationship between the universe *qua a universe* and ideas *qua ideas*, or between the former and the ideocosm? The question is so important and vast that the mere task of answering it may eventually lead to the creation of a special science.

Description of Ideas (*Ideography*)

The [attempted description, successful description, or devising of methods and devices that can enable description] of a major [class of entities, domain, or realm] ***for the first time***, may be so revolutionary that it represents the first phase of a new science; but such a beginning phase initially has a tendency to be mistaken for the be-all and end-all of that science.

Ideonomy involves the truly revolutionary introduction and massive, combined use of a panoply of methods **for describing** [quantitatively, spatially, and temporally, via formulas and special symbols, in words, by means of scales, diagrams, maps, and concrete images, and with the help of computers] **the** [internal structure and content, properties, external relationships, behavior, development, and general possibilities] **of all ideas**, and also for describing what things are in terms of ideas.

Yet however revolutionary these things are, they are merely the happy start of ideonomy.

[**Dictionary** and **Encyclopedia**] of *Universal* Ideas

QUOTE LOUNSBERY IDEONOMY PROJECT REPORT OF 1987!

"**Dimensional Analysis**" *of Ideas*

"Dimensional analysis" usually refers to a [recognized and important] general [mathematical method and theoretical concern] of modern [science and technology], especially [physics and engineering].

The objective is to analyze [real or imagined] physical [entities, phenomena, systems, interactions, events, situations, devices, regimes, concepts, *e/vc*] **in order to** [discover, characterize, define, classify, differentiate, *abstract*, interrelate, model, *minimize*, exhaust, *essentialize*, universalize, *formularize*, hierarchize, *spatialize*, test or validate, coderive, manipulate, operationalize, *transcendentalize*, unify, infinitize, exploit, combine, permute, transform, logicize, *e/v* release the infinite possibilities of] their fundamental **dimensions**.

Some questions that a dimensional analysis may address include:

Which [**dimensions**, properties, variables, or relations] are [superficial, secondary, composite, epiphenomenal, illusory, irrelevant, lower-order, unnecessary, less important, nonunique, alterable, dependent, artificial, uncombinable, unknown, 'indefinable', *e/vc*], **and which *per contra* are of opposite character,** or [absolutely or relatively] [fundamental, primary, indivisible, real, relevant, higher-order, necessary, central, unique, inalterable, independent, natural, combinable, known, 'definable', *e/vc*]?

Which dimensions, or names of dimensions, in different [fields, terminologies, theories, representations, *etc*] are [identical or equivalent], and which instead are different?

What are all of the [things, powers, or concepts] that can be produced by the *abstract* combination of all [known or imaginable] **dimensions**?

What *dimensionless groups* can dimensional analysis reduce things to?

How much can be [said or known] about something [quantitatively *e/v* qualitatively], via dimensional analysis, **when** [something or certain things or a certain amount of something] are *not* [known or <known or sayable> about something] [quantitatively *e/v* qualitatively]?

Of greatest importance *here* is that dimensional analysis—as well as analogous [current or future] methods—can be used to treat, not just [physical or actual] things, but [pure <**ideas** and possibilities> and all things ideonomic].

In which case, some of the issues are: What are all the [ideic and physical] dimensions of [any or all] [concepts, systems of ideas, thoughts, logics, *etc*]? What are all the [ideas and ideic dimensions] to which all properties reduce? What are the *most fundamental* dimensions, and dimensions of dimensions, of ideas?

And which ideic dimensions are peculiar to individual minds?

Future Basis of **"Idea Industry"** (Via Mass Production of Ideas) and of "Kaleidoscopic Industry"

These anticipated industrial consequences of ideonomy should be spectacular, but, once again, they are not to be equated with ideonomy itself.

"Fuzzy Logic's" *Phenomenology*

"Fuzzy logic" is differentiable from ordinary logic in various ways: it is more [complex and subtle]; it is multivalued; it is multidimensional; it may find to be [irredundant, meaningful, useful, certain *or uncertain*, perfect, flawed, *e/vc*] [probabilities, information, patterns, properties, relationships, factors, events, alternatives, questions, concepts, mathematics, *e/vc*] **that regular logic would *per contra* find to be** [redundant, direct, simple, meaningless, irrelevant, imperfect *or perfect*, *e/vc*]; it is more interested in [ideas, levels of belief, intuition, concrete <things and phenomena>, practical matters, the <structure and dynamics> of the <brain and mind>, different <forms and sources> of knowledge, the overlapping of possibilities, *etc*]; it often finds positive value in seeming [paradoxes, contradictions, inconsistencies, nonmonotonicities and nonlinearities]; *e/vc*.

Perhaps this is a somewhat [ideal and speculative] description of what fuzzy logic may [be, include, or relate to], however, for not even its developers are sure as yet what it [is, implies, or should become]. Certainly in its present form fuzzy logic lacks any universal [taxonomy and theory] of [types, referents, relata, general mechanisms, phenomena, *etc*] **of 'fuzzy logic'**. But eventually such [complementary and foundational] things will *have* to be supplied, and doing this may be a natural assignment for ideonomy.

"Game theory" *of ideas*

[Mathematical, social-science, ethologic, and recreational] games, and the theories thereof, are all applicable to the [study and processing] of ideas.

Idea-games can be created by ideonomy for [recreation, research, education, mental training, and art].

Many [important and immensely applicable] ideas may be *inherently* game-like.

It is almost the defining purpose of ideonomy to [encourage or maximize] the [playing of games with and exploration of the interplay of] ideas.

GAMES AND CONDACOLOGY is an ideonomic division; and ideonomy seeks to fashion a universal [theory and science] of games.

Game-like phenomena should exist in all of Nature and they are a natural concern of ideonomy.

[**"Group theory"** or **"category theory"**] *of ideas*

Heuristics

"Heuristics" refers to general [principles, devices, or methods] facilitating [discovery, investigation, or cognition]; considered [individually, collectively, or as an organized science]. Heuristic means are often surprisingly [powerful, productive, applicable, and universal]; which is part of the reason why they are symbolic of ideonomy.

Holology (Science of Wholes and Gestalts);
'Gestalt Cosmology'

This way of defining ideonomy has significance in part because ideas [are or relate to] [things seen as wholes or the seeing of things in terms of wholes].

Moreover, there is some reason for believing that *in Nature herself*, and not just in the brain's operations, there may be gestalt-like [entities, phenomena, relationships, *e/v* laws]. If this is true, then it might be appropriate to contemplate the establishment of a new field of "gestalt cosmology", and the implications it would rather naturally tend to have for ideonomy.

Idea [Aesthetics Or **Art**]

'Idea Biology' (***Ideobiology***);
The Field of "Artificial Life" Applied to Ideas

Ideas [have or involve] life—and ideonomy studies the life of ideas—in a great variety of [literal and figurative] ways, which need to be distinguished.

Ideas are usually thought of as though they were a [static or timeless] collection of things, or at least a collection of things with a largely [fixed or known] set of relationships to [one another and the world]. But it is possible to think of them instead in a very different manner, or in terms of all of the [finite and infinite] ways: in which [they could <combine, interact, or act> *because* of these relationships, they could have other relationships or their relationships could change, or new <relationships or ideas> could grow out of their present relationships]; or in which their relationships must lead on to other things, or have logical consequences for [life or all things].

Secondly, ideas could be said to have life because they actually [occur, exist, operate, or possess meaning] (only) in the thinking minds of living individuals. The mind being alive, they are alive. It is also theoretically possible that within the mind, ideas, or certain [complex or peculiar] ideas, are *themselves* possessed of mind-like form; so that an individual's mind is actually a system that is alive with a multitude of these lesser 'minds'.

Ideas are biological in the most literal sense as well, because they are neurologic phenomena and are shaped by the brain's mechanisms.

They have life not just by virtue of the mind's purely intellectual activities, but as a result of our *psychic* life, which may be nonlogical and is sometimes anti-logical.

Ideas are alive because, to a degree, they are and reflect sociocultural phenomena: the [events, structure, idiosyncrasies, <historical and ongoing> development] of [societies and the whole of human civilization].

Ideas could also be said to be alive if in fact they have helped to mold the paleoevolution of the nervous system (or if their life helped animate evolution).

Again, no one really knows what ideas *are*, and it is conceivable that [they or their coessential equivalent] [exist in or underlie] [so-called inanimate Nature or even transcendental reality]. Such [physical or Natural] [preexistence, omnipresence, or superexistence] of ideas could easily be the case if, for example, 'ideas' are essentially just some sort of [holistic patterns ("holons"), Natural gestalts <either temporal or atemporal>, <discontinuous or qualitative> transformations of Nature (perhaps in progressions), physical information, *e/vc*]; or if "physical" reality is [partly, wholly, or virtually] 'mental'. All of these possibilities make it much easier to imagine ways in which 'ideas' might also be life-like.

The new field of "artificial life" (*syn.* "artificial evolution") has sprung from the realization that the most fundamental properties that traditionally have been thought to define the essence of life are in fact properties of the universe in general, and are also

supremely applicable to [the design of machines and the nonbiological modeling of intelligence].

Finally, certain ideonomic methods [operate by or produce] [graphical or abstract] [motions, morphogeneses, flows, transformations, combinations, interactions, game-like behavior, recursive behavior, pullulations, evolutions, adaptations, winnowings, vergences, cybernetic behavior, artificial intelligence behavior, simple animations, *e/vc*] of ideas, whose effect can be extremely life-like.

'Idea Chemistry' (***Ideochemistry***)

By analogy to chemistry, ideonomy is concerned with how primitive ideas can, in effect, be [combined, reacted, bonded, and structured] to form [complex ideas and systems of ideas], in part upon the basis of formulas.

Idea **Combinatorics**

Idea **Engineering**—That Beyond
"Knowledge Engineering" ("Expert Systems")
In Artificial Intelligence

Idea **Linguistics**

"Idea linguistics" is meant to refer: (1) to the contribution that *standard* investigations of words and languages can make to the understanding of ideas; (2) to the deliberate use of linguistics and language to investigate ideas and prosecute ideonomic purposes; (3) to the use of ideas and ideonomy to, in turn, illuminate the machinery and history of language; and (4) to an imaginary subject that would be analogous to linguistics, but in which ideas would take the place of words.

Idea Mathematics (***Ideomatics***)

In modern thinking it is very nearly the possession of a mathematical form that makes a subject into a science; and certainly many of the other criteria of a science depend upon, or may be assured by, a subject's mathematicality. If the basic entities with which a subject is concerned are amenable to mathematical treatment, then it is the whole vast structure of mathematics that should apply to them, and not just some small and special part of its machinery.

Hence the profound importance of the discovery that ideas in general can be mathematicized, and the ability of mathematical ideonomy (*ideomatics*) to serve as a metaphor for ideonomy, even though it is actually a mere subfield of the latter.

'Idea **Mechanics**'

Ideas [either specific or generic] can be [made or demonstrated] to interact with one another [as well as with things 'other than' ideas] *'mechanically'*; **or in the manner of:** [<simple and complex> machines, quantum mechanics <or quanta, quantum numbers, quantum states, quantized things, *etc*>, statistical mechanics <or entities treated by same or treated *en masse* by their *statistical* properties>, "information mechanics" <or the 'informational entities' of this controversial new approach to physics>, *e/vc*]. Hence there is what might be termed "idea mechanics". Its existence is so unexpected, and its potential importance to ideonomy so great, that it can serve as yet another partial metaphor for ideonomy.

'Idea **Physics**'

This could, and indeed does, mean many things.

Ideonomy would have us [find and emphasize] the fundamental bases of **ideas**, and how they [arise and operate] as physical phenomena, or their [approximate and exact] correspondence with [fine and global or holistic] physical [phenomena, processes, relationships, properties, and laws], and their [interface with, effects upon, and differences from] physical [phenomena, information, and spatiotemporal <textures and contextures>].

What is the physics of ideas interacting as [pairs or <large or complex> masses]? What is the interface of the physical [universe or omniverse] and the ideocosm? Of [physical with <ideic or transcendental>] forms of infinite complexity? Of mind and matter? What will be the future interrelation of ideonomy with the physics of [noology, artificial intelligence, computer science, artificial life, neuropsychology, and other fields]?

A further concern of ideonomy is to discover *analogs* of the [phenomena and elements] of physics in *other* [sciences and subjects].

Information Theory of Ideas

Interscience;
Interdisciplinary Science;
An ***Interlanguage*** Interlinking All [Sciences Or Fields]

'**Kaleidoscope** (Or *Kaleidoscopy*) of Ideas'

One of the ablest metaphors is that of a kaleidoscope.

Etymologically, a *kal-eid-o-scope* is a device for seeing lovely forms or resemblances. Kaleidoscopes are not merely toys and curiosities, however, for they have real value to the pattern designer.

Invented by Sir David Brewster in 1816 and patented in 1817, the kaleidoscope illustrates the image-forming properties of combined, inclined mirrors. A typical example might consist of a small tube with 6 mirrors set hexagonally, an eyelike hole at one end for viewing, and a diffusing screen at the other end preceded by a few pieces of colored glass, tinsel, or beads and a transparent divider. Rotation of this primitive apparatus exposes an esthetic microcosm of beautiful, strikingly symmetrical patterns, with the number of combinations and patterns effectively being unlimited.

Why should a kaleidoscope be limited to forms, colors, and images, or to visual phenomena? Should not the same principle be applicable, for example, to the generation of pleasing, interesting, instructive, and useful patterns in other sensory modalities?

Neither reflection, multiplication, nor even orchestrated complex movement are apt to be the essence, or to exhaust the possibilities, of the kaleidoscope or its analogs. Is the kaleidoscopic effect ultimately a matter of ordered, lawful, and global change (even as mere 'static' transformation) of sensa or sensory percepts? Or of the ordered, or seemingly ordered, mass combination and permutation of (discrete?) things? Do its products really have to be, by definition, perceived or perceptible; or can they instead merely be processes of Nature?

It is worth noting that long before the invention of the kaleidoscope people were unwittingly creating artistic patterns more or less resembling Brewster's. Moreover, similar morphic and chromatic patterns occur naturally in minerals, frost patterns, butterfly wings, oil iridescence, and migraine headaches.

With the computer it should now be possible to construct the equivalent of myriad new types of kaleidoscopes, and, indeed, a computer could become a veritable kaleidoscope of kaleidoscopes (or perhaps a kaleidoscope of kaleidoscopes of kaleidoscopes...).

As for other senses, imagine sonic and musical kaleidoscopes. Given random or tonal sounds, timbres, melodies, or entire musical compositions, such kaleidoscopes could automatically create the same sort of "pleasing, interesting, instructive, and useful patterns" by the orderly superimposition, multiplication, diffraction, inversion, time reversal, temporal or qualitative 'distortion', displacement, co-modulation, fractal representation, hypergeometric manipulation, *etc* of the sounds, in respect to their amplitude, frequency, and other objective and subjective properties. In fact, a beginning has already been made in this direction.

Again, human music has itself always been somewhat kaleidoscopic in these ways.

Ultimately it becomes necessary to ask whether there is any reason why the kaleidoscopic principle should even be limited to sensory or quasi-sensory phenomena, instead of being so completely universal that it applies as well to the realm of abstract relationships, thoughts, numbers, language, pure ideas, even social being itself or the phenomena of human life.

It is this that makes the kaleidoscope potentially something more than a mere metaphor for ideonomy.

Ideonomy is like a kaleidoscope, or an infinite set of kaleidoscopes (conceptual kaleidoscopes), that enable one to view and play with all the myriad or infinite permutations, combinations, and mutual dispersions of ideas, data, logical interrelations, imaginative possibilities, and psychic states that pertain in any way to any given subject, concept, question, research, or the like. Not only is the exercise aesthetically enjoyable, but it has what may be a unique ability to stimulate new ideas, fresh perspectives, the development of new intellectual muscles, deeper understanding, *etc*.

Linguistic Engineering; A Superlanguage

Even though language is one of the principal bases and tools of human thought, its evolution to date has for the most part been accidental and accretionary. It is readily apparent that the languages we currently use could become much finer cognitive agencies if they were deliberately modified for this latter role, or even if they were simply redesigned—with the help of science—as everyday languages. Yet a subfield of linguistic engineering really cannot be found within present-day linguistics.

Ideonomy could easily serve as the trigger for the establishment of such a field.

In fact, to the extent that thought and language are symmetric or interdetermined, the contribution that ideonomy makes to the advancement of human thinking will also unwittingly be equivalent to a form of linguistic engineering.

One of the major uses of ideonomy may be to so enormously increase the size and sophistication of language as to virtually create a superlanguage. And once again, owing to the symmetry of human language and thought, the emergence of this superlanguage should eventually lead to an enhancement of human thought and intelligence.

Mathematics *Generalized*

[*E.g.*, Taken <Beyond and Above> Number,
Freed of Artificial Restrictions, and
Made *Truly* Universal]

Extant mathematics is ideonomy's closest analog (if only because of the comparative underdevelopment of logic). Walter Fuchs once said of the philosopher Plato—who was also one of the earliest mathematicians—that he saw mathematics "as a mighty realm of ideas."

No one really knows what mathematics—or even the primary object it studies—*is*. Does it basically treat [quantity, order, pattern, relation, symmetry, logic, ideas, method, information, symbols, brain states, physical entities, time, action, being, functions,

processes, *e/v* something else entirely]? (Evidently mathematics and ideonomy *must* be alike in at least one respect, for both must be that scandalous thing, an undefined science.)

In the course of its history mathematics has [been speculatively defined in new ways, taken new forms, and been applied to new things]; **its** [complexity, richness, specialization, methodology, technology, logic, rigor, power, self-connectivity, *self-vergence*, breath of use, generalization, and abstraction] have grown ever greater; **and** [from, about, and toward] it have developed a panopoly of [homologous, connected, analogous, surrogate, related, hybrid, unrelated, orthogonal, complementary, cooperative, interactive, coevolutionary, dissipative, cyclic, hierarchic, abstractive, transcendent, unknown, amorphous, *e/vc*] [fields, concepts, and things].

This [manifest, grand, and all-important] process, involving the progressive [relaxation, reconceptualization, generalization, abstraction, transformation, extension, recentering, retooling, unification, simplification, self-transcendence, emulation, *e/vc*] of mathematics as a discipline, has clearly not yet ended. Indeed, it is easy to extrapolate it, or to argue that by its very nature the process must [continue or even accelerate exponentially] [*ad eternum*, *ad infinitum*, or transcogitably].

Such [progressions and extrapolations] may bring [mathematics and ideonomy] much closer.

Ideonomy can play a [key or central] role in [predicting, planning, causing, maximizing, optimizing, and steering] such [extrapolation, evolution, and convergence to ideonomy] of mathematics.

In particular, it may help eliminate [artificial, erroneous, or costly] [gaps, partititions, divergences, restrictions, assumptions, and methods] in the [structure, content, and activities] of mathematics. It may show that the essential historical restriction of mathematics to the treatment of *number*, as opposed to [other or more general] entities, has been [artificial, fallacious, and tragic]; it may cause the idol of number to be usurped by [order or ideonomically generic <concepts, phenomena, or terms>]; and as a result it may [demonstrate the equivalence or perfectly unite] the supposedly distinct fields of [mathematics, logic, and ideonomy].

"Mathesis Universalis";
Or Leibniz's *More General* Program

The German philosopher Gottfried Von Leibniz both invented and simply imagined a number of systems for directly advancing thought. Collectively these are surprisingly reminiscent of what ideonomy is supposed to be.

'Mental Ecology'
(*E.g., Sensu* Gregory Bateson)

The science of ecology is based on the growing realization that the multitude of organisms present in the environment are all part of a single vast system of [interrelationships, interactions, and interdependences] that is itself like some giant organism.

The [content and functioning] of the human mind, with its multitude of [ideas, thoughts, and memories], must be no less ecological, and ideonomy could be visualized as an inquiry into its [infinite and living] web of meaning.

The [natural (objective) or mentally interactive (subjective)] [texture and contexture] of the Idèocosm could likewise be described in terms of such 'mental ecology'; especially given the fact that the ultimate nature of the Ideocosm—and of its [close analogs and ontological complements]—remains unknown.

Meta-Logic;
The Science of Logic [Transformed and Emancipated];

Logic Made [Organic, Recursive, Transcendent, Infinite, Creative, *Etc*]

Metascience;
The Science of Science *Itself*

Much of what is often termed "metascience" [would fall under or relates to] ideonomy (see, *e.g.*, the metascientific works of Mario Bunge). This is natural, in part, because of ideonomy's extraordinarily [universal, logical, perfective, speculative, foundational, and methodological] character.

But it should be remembered that ideonomy, in a sense, is just another specialized science, concerned with a single genus of phenomenon (ideas). By definition it is *not* 'the science *of* science'. The latter is something that should also exist, but as a distinct field.

Methodology of ***Genius***
(That Which 'Explains' Genius, At Least In Part)

Historically, many men of genius, or [some or supreme] men of genius, may [mentally or neurologically] have been [natural or naive] [generalized or specialist] ideonomists, or may have made use of basically ideonomic [methods or concepts]. The prodigious creativity of a Mozart, Goethe, Euler, Picasso, or Edison almost seems to cry out for such an ideonomic explanation.

Whatever the case, ideonomy may have a unique power to [mass-produce, serve, or heighten] genius in the future. This was recognized by ideonomy's grandfather, Fritz Zwicky, when he wrote his book *Every Man A Genius*.

Methodology of Ideas

A methodology is a [set, system, or science] of [special or general] [methods, techniques, procedures, and principles pertinent to same].

Ideonomy is in part a methodology for *ideation*, or for the [creation, manipulation, investigation, use, and coordination] of [specific, generic, and universal] *concepts*.

Minimization of Science's
[**Redundancies**, Asymmetries, Self-Neglects, Contradictions, and Pathological Tendencies];
The [Updating, Forced Evolution, and Planned **Perfection**] **of Science**

Missing Key Part of
[**Artificial Intelligence** and **Cognitive Science**]

"Morphology" *of Ideas*,
Sensu Fritz Zwicky's "Morphological Research"

Multidimensional (Hyperspatial) **Thesaurus**
(Not Just Peter Roget's Original Unidimensional Concept)

"Natural Science" of Ideas

Ideonomy [regards and treats] [ideas and the ideocosm] as natural phenomena, possibly even as physical phenomena (which is the way the mathematician Kurt Goedel viewed numbers). Certainly they are imagined as having a [life, chemistry, natural history, and cosmology], in either a [literal or metaphoric] sense. Ideonomy sees the ideocosm as a [unique, specific, infinitely complex] thing waiting to be progressively [explored, described, and exploited]. Ideas may be thought of as [growing, competing, and evolving] things; as falling into analogs of biological taxa; as exhibiting ecological behavior. They may have infinite [empirical, structural, and epistemologi] complexity. One definition of ideonomy states it to be [solely or mainly] concerned, not with all ideas, but with [fundamental, natural, or the most ubiquitous] ideas.

Necessary **Reunification of Science and Philosophy**

***Other Half* of Science**
[Opposite, Connecessary, But Tragically Missing]

Panhuman ***"Idea Bank"*** Computer Network

Pattern Science
Or Science of *Universal* Patterns
(*Digmology*)

'Perpetual **Proto-Science**',
Germinative—In A Sense—of All Future Science

In a sense this is the role that philosophy has always played, but it is a role that ideonomy may be destined to usurp.

How many [sciences, technologies, and other kinds of disciplines] [can or should] there ultimately be? No one knows, but obviously with the passage of time more and more fields spring into existence. Ideonomy must by its very nature have a peculiar ability to [anticipate, initiate, and guide] the development of [new, novel, and all possible] subjects.

It can create such fields by methods as diverse as, but not limited to, [analogy, transformation, generalization, specialization, combination, reconceptualization, extrapolation, interpolation, recursion, or the simple description of <needs or opportunities>].

Philosophy *Made*
[Modern, **Scientific**, and Technological];
***Experimental* Philosophy**

Progressive
[Discovery, Development, and Exploitation]
of the ***Ideocosm*** (Universe of Ideas)

[Pure and Applied]
Science of Ideas

This is one of the two basic alternative definitions (or perhaps forms) of ideonomy. The main objection to this definition would be that "ideas" refers to what is too ['general' (numerous), trivial, and redundant], or even to mere ideas; that ideonomy is instead aristocratic, and specifically concerns *maximally* [general, abstract, high-level, transcendental, 'order-like' (cybelological), fundamental, powerful, combinable, fertile, *e/vc*] ideas, or perhaps [laws, general patterns, relationships, generators, processes, products, amplifications, *e/vc*] *of* ideas *rather than ideas themselves.*

'[Quantum *Cum* Relativity] Physics' *of Ideas*

Ideas appear to have discrete, quantized [relationships and possibilities] that are like *physical* quanta and that to some extent make ideonomy like quantum physics.

Yet ideonomy is also reminiscent of the other pillar of modern physics, relativity, in that, just as the latter involves the discovery of the [unexpected interdependence of <space, time, motions, *etc*>, equivalence of <gravity and inertia> as well as of other physical <quantities and concepts>, and <curvature, closure, *e/v* finitude> of general <space, time, *e/v* reality>], so does ideonomy rest on the unexpected discovery [of the universal <interdependence and analogy> of all ideas and of a single <space, universe, or field> of all <ideas and possibilities> that *also* is in certain senses <curved, closed, *e/v* finite>].

Actually many of the *other* properties of these two great physical theories seem to, or may potentially, apply to [ideas or ideonomy] as well.

'[Recombinant DNA, RNA, Or Genetic] Engineering' *of Ideas*

In biology, recombination is the formation of new combinations of genes in fertilization, or the formation of new combinations of linked genes (as by crossing over) resulting in new heritable characters or new combinations of characters. "Recombinant DNA" is DNA prepared in the laboratory by breaking up and splicing together DNA from several different species of organisms [*Webster's III*], or the like; "recombinant RNA" is the RNA equivalent. "Genetic engineering" uses [recombination or other methods] to create modified organisms; in effect, it seeks all possible ways of [combining, permuting, and transforming] all extant [genes, phenes, genotypes, phenotypes, and species of organisms] to create all [possible, desirable, or interesting] [genes, composite genes, phenes, genotypes, phenotypes, taxa of organisms, *or biological* <elements, properties, dimensions, behaviors, games, laws, phenomena, aggregates, systems, bioses, worlds, evolutions, destinies, *e/v* genetics].

Ideonomy [seeks to do and does] countless analogous things, *but [to e/v for] [ideas and ideation]*. For instance, it looks for systematic ways of [combining, permuting, transforming, structuring, sequencing, *relationalizing*, interacting, *self-interacting*, winnowing, evolving, *operationalizing*, *e/vc*] [any and all] [ideas, ideosets, ideostructures, *ideoprocesses*, *e/vc*] so as to create all [possible, particular, interesting, useful, *e/vc*] [general or specific] [higher-order or lower-order] [equivalent, divergent, orthogonal, or adjoint] [ideas, ideosets, ideostructures, ideoprocesses, discoveries, logics, representations, meanings, forms of intelligence, information, thoughts, perceptions, perspectives, subjects, ideocosms, *e/v ideonomic* <taxa, systems, methods, *etc*>].

'Reversible Idea **Prism**'

Ideonomy may be thought of as a prism that can take any concept, bit of knowledge, problem, or subject, and diffract it into its (multidimensional) spectrum of components (that is, its component or related ideas, problems, possibilities, *etc*). The latter can then be studied or treated individually or collectively, and can afterwards be recombined or synthesized in particular or transformed ways. Hence, just as with an optical prism, the ideonomic prism is completely reversible.

It might also be of interest to make a more literal, and hence narrow, comparison of ideonomy to a prism.

A prism lets us know that:

1. The bewildering and seemingly infinite variety of colors in the world are fundamentally all produced by the variations of a single physical, sensory, and mathematical property or dimension: the wavelength ~ frequency ~ period ~ energy of the irreducible quanta of light (photons). All other chromatic qualities are secondary, tertiary, or *N*-ary qualities resulting from the various possible [set-theoretic or aggregate-theoretic] combinations of single photons possessed of different wavelengths.
2. Even white or seemingly monochromatic light are in reality usually made up of a great number of 'differently colored' photons, and are therefore polychromatic.
3. Perceived light is really a mass or flux of inconceivably-many pieces of light (the quanta).

Might similar things be said, in a metaphorical spirit, of ideonomy (or ideas)?

[Science and Technology] **of Imagination**;
The *Science* of [Invention, Creativity, and Intellectual Play]

Current efforts to [teach, train, or develop] [creative thinking, imagination, and invention] are usually *anything but* [rigorous, systematic, and comprehensive]. Indeed, the prevailing philosophy is that the latter things are, if anything, antithetic to the middle and former things.

Yet one of the two declared purposes of ideonomy is to aid and abet people's thinking, and, in any case, ideonomic development and experimentation have already made it clear that this is profoundly feasible.

Science *Enlarged*
Or Extended To All Things
(Especially Those Hitherto Beyond Its Pale);
Pantology
(A Systematic View—Or the Science—of *Everything*)

The promise of ideonomy to extend the scope of scientific methods to many things which previously have always been beyond those methods, will be apparent simply from the list of its divisions (such as "Analogies", "Bads", "Beauties", and "Stories").

But one of its major goals as a science is to enable *anything and everything* to be treated scientifically, or to remove the artificial restrictions upon its themes and applications which have obtained historically.

Such encyclopedic insight and utility have always been the promise of mathematics and logic, but those toutedly universal sciences have been slow to achieve it.

Since cognitive science and artificial intelligence have the same kind of potential, it is evident that there should eventually be many different—but complementary—forms of 'universal science'.

Moreover, what would *ordinarily be meant* by a true science of everything, or pantology, is not a science of *ideas*, but really a science of *things*, and perhaps just of *existing* (or merely *known-to-be-existing*) things; or comprising and systematizing *amassed data* about such things, or about the things which collectively form *the set of topics of traditional sciences*.

But certainly ideonomy can contribute to the *independent* development of *virtually any sense of* pantology.

Science For Generating *All Possible* Ideas
About *Any* [Subject, Idea, Or Thing];
Ideopoesis

One of the key things that makes ideonomy worthy of being considered a whole new discipline is its altogether unique power to generate—*en masse* and in a seemingly exhaustive and instantaneous way—ideas about anything whatsoever.

The production of ideas, or *ideopoesis*, can be augmented in this extreme way in man alone, in man-and-machine interactions, and in machine alone. The last of these three things—the automation of ideation—*may* be a form of artificial intelligence.

Science of [**Analogy** Or **Metaphor**]

The [discovery or principle] that all [things and ideas] are [analogs of or metaphors for] one another is of supreme importance to ideonomy, but nonetheless is only a small part of ideonomy. It justifies the [interdisciplinary, universal, or unitary] way in which ideonomy [thinks and operates], and by its variance with the conventional philosophy of things is a fit symbol of the new science.

Science of All Possible
[**Modes of Thought**, Perspectives, and Intellectual Transformations]

Science of All ***Transcendental*** **Elements of** [The Or Any] **Mind**

Such a science would be concerned, in effect, with whatever is most [enduring, recurrent, universal, transcendent, necessary, or invariant] in [the or any] mind, say as its [experience, transformation, growth, evolution, thought, or concerns] tend to infinity; and hence with whatever might [prove or promise] to be, in such senses, the most transcendent [ideas, logics, patterns, states, laws, structures, processes, representations, goals, values, languages, *e/vc*].

Science of **Anonyms** (Unnamed Things)

Most [ideas and things] are nameless and many are almost ineffable; which causes them to be [neglected and treated unsystematically]. Ideonomy is unusual, both because of its intense interest in anonyms and because it furnishes an abundance of means for [identifying, investigating, describing, and actually making direct use] of the half-finite, half-infinite universe of anonyms.

Science of **Cognitive Principles**;
Universal Axiomatics;
Pan-Logicization

Science of Extended Symmetry (**"Symmetrology"**)

Science of **Generalization**

It is the perception of ideonomy that things can be generalized to a far greater degree than has traditionally been assumed, or even increased in their generality *ad infinitum*. This applies both to new things that are discovered, and to old things already known. Indeed, such generalization is conceived of as being [natural and inevitable]; or conversely, the earlier restriction is held to have been [unnatural and abortive]. The

extreme generalization should occur for all categories of things, moreover, whether they be [forces, laws, entities, processes, relationships, phenomena, events, properties, concepts, or entire fields]. But the generalization can proceed in a systematic fashion and have the character of a special science; hence its ability to serve as a metaphor for ideonomy.

Science of **Nature's** *Own* [Physical and Transcendental] **'Languages'**

Science of Naughts (***Anontology***)

Since ideation is essentially a process of playing with sets of ideas that are 'excessive' [in that only <one or a few> of the ideas in them are apt to be totally <valid, true, relevant, or necessary>], ideonomy could almost be described as a science of naughts (nonexistent things).

Science of **Noumena**;
Of the ***Most*** [**High**, Fundamental, and Universal] **Entities**;
Of [Archetypes, *Archanalogons, Metaphenomena, Metastructures, Metaprocesses, Trans-Things, Ultrarealities, Ultrafundamentals, Meta-Laws, Meta-Concepts, Order-Taxons, Etc*]

Science of **Possibility**,
Science of **Variety**, Science of **Novelty**, Science of **"Emergence"**,
E/v Science of ***Futuribles***

Science of ***Recursive*** **Ideation**

Much of ideonomy's extraordinary power to generate ideas *en masse* derives from the recursive way in which it [represents and processes] them, both individually and in groups.

Science of the **Laws of Ideas**
Or of ***Meta-Ideas***

This is one of the two basic alternative definitions of ideonomy. It suggests that the new science is principally concerned, not with ideas in general, but with [high or the highest]-level ideas (*meta-ideas*); or perhaps not with ideas [as such or for their own sake], but rather the [*laws* or general *patterns*] of ideas.

Science of the [**Omniverse**, **Apeiron**, Plenum, Or Infinity];
Of **All Possible** [**Worlds** and Universes]
("Ultracosmology" and "Myriocosmology")

Set Theory *of Ideas*

Speculative **Science** and *A Science of* Speculation

Study of the ***Hierarchic Continuum*** Represented By
All [Scales and Transformations] **of Ideas**

It *is* one of ideonomy's peculiarities that it would have us look at, and simultaneously coordinate, *all* levels of [generality and specificity] of all [ideas and things], and not confine our attention to just [one level, a narrow range, or an extreme] (as has unfortunately been characteristic of non-ideonomic approaches to the world, hitherto).

Study of the Whole [Past, Present, and Future]
[**History**, Dynamics, **and Evolution**]
Of [**Ideas and Eide**] In [Cultures and Individuals];
Of **Ideic** [Chains, **Series, and Networks**];
And of Ideas As "**Memes**", *Sensu* Richard Dawkins

Taxonomy *Inverted*
So As To Be **Made** ***Generative***

Schemes that would classify things can also be turned upside-down and used instead to [discover, create, predict, and theorize about] [things, ideas, relationships, and possibilities]. Certainly things analogous to taxonomies can be created expressly for the latter purposes. And certainly a taxonomy of *ideas* can be employed to help [generate ideas or propel ideation].

Technology of Ideas (***Ideotechnology***)

The world ias about to be confront with a n
Because of the spectacular new generation of various forms of ideotechnological devices that lies in our immediate future

"Theory of Marks",
E.g.., In Fritz Zwicky's Sense

Think-Tank ***Science***

The [purposes and pursuits] of those institutions of intellectual research known as "think tanks" are unusual. Matters may be dealt with that simultaneously embrace many [different and seemingly unrelated] [fields and professions], and the [concepts and methods] may be [imaginative and unorthodox]. Such characteristic [methods, means, perspectives, styles, and objectives] deserve to be systematized into a 'science', and all the elements of the subject need to be evolved to a higher level than at present. The founder of ideonomy, Gunkel, was partly led to conceive of ideonomy by the work he once did for such organizations.

Trans-Linguistic **Semantics**

Semantics is the science of meaning, but to date it has remained largely a subfield of *linguistics* or a subject concerned with the meaning of [languages, words, grammars, or things <expressed or known> via language].

Yet there could *also* be another form of semantics, whose central concern instead would be the meaning of things *themselves*, or in a [non-linguistic or even trans-linguistic (*e.g.*, <higher, more than, or quasi-> linguistic)] sense. "Trans-linguistic semantics" might treat of the [infinite and infinitely systematic] implications [of the mere existence of things or of their <properties, causes, effects, relations, *etc*>]. Ideonomy *does* represent such an attempt to [discover, order, and exploit] the totality of natural meanings of things.

Translation of Ideas
From Everywhere To Everywhere

Universal **Epistemology**;
Science of All [Actual Or Possible] **Knowledge *About*** All [Actual Or Possible] **Knowledge**

"Epistemology" is defined by *Webster's Third* as the study of the [methods and grounds] of knowledge, especially with reference to its [limits and validity]; or broadly, the theory of knowledge.

Ideonomy is universally interested in the [mechanisms, structure, dimensions, kinds, growth, possibilities, and meaning] of knowledge and in how knowledge can be [perfected and exploited]. [Knowledge and ideas] are interdependent, and in certain respects so interrelated that they are almost equivalent. Indeed, ideas could even be defined as the highest form of knowledge.

Universal Science of Nature's ***Qualitative*** **Laws**
and **Contraplete To Mathematics,**
As the Sororal Superscience of Nature's *Quantitative* Laws

Universal Science of Order (***Cybelology***)

Universal Science of **Transformations**

Universal **Taxonomy**

So far classification remains a *very* specialized subject, in the sense that only in a few [fields or domains] have [serious and successful] attempts been made to [survey, categorize, and schematize] all [extant or possible] [entities, properties, relations, phenomena, concepts, *e/vc*] [via or in] all [known or appropriate] [methods, means, ways, *etc*]. Moreover, attempts to classify *everything whatesoever*, via an [integral, encyclopedic, and exhaustive] [theory, set of categories, and hierarchic scheme], have been [few and pitiful].

By [design and effect], ideonomy should revolutionize taxonomy by progressively enabling *all* [things, ideas, possibilities, and subjects] to be classified by a [single, fundamental, and infinite] [system and scheme].

Yet the limits of "taxonomy" as a metaphor for ideonomy are plain, since the latter seeks not just to classify things, but to [describe, explain, criticize, modify, control, and create] them as well.

?

This is a deservedly added catchall.

— HOW DO LIFE'S "92 FUNDAMENTAL PROPERTIES" AFFECT ONE ANOTHER? —

The method of combinatorial ideonomy can be applied to the list of "Life's 92 Fundamental Properties".

The accompanying table of this eponymous section represents a random and unwinnowed sample of dyadic sentences drawn from an 8,464-dyad idea space that is generated by the self-intersection of the foregoing primary list, and by the ideogenic formula:

⟨ "How does " + [random first life property] + " affect " + [random second life property] + "?" ⟩

All the sentences differ verbally and, in principle, conceptually.

The idea space has the power to advance theoretical biology in a major way or to fertilize its foundations.

Each of its kaleidoscopic sentences (of which only a few are offered here) should be examined by biologists and ideonomists, working together, to determine the possible meaning, variants, elements, implications, applications, importance, problems, etc of the sentence.

Subsequently the stupendous multitude of logical and possible real-world interrelationships of the totality of dyadic sentences should be investigated, both theoretically and experimentally.

The sentences are simultaneously applicable to various and sundry biological domains, problems, phenomena, taxa, structures, processes, etc; to life as it exists now or to its past evolution or to its primordial origin; and to pure and applied matters.

The formulaic predicate "affect", in these sentences, might be taken to mean, variously and inter alia: cause | influence | interact with | constrain | bear upon | contribute to | create | modify | oppose | contrast with.

If the original 92 properties are what is most fundamental in life, then the interrelationships and interactions of those primary properties are arguably what is next most fundamental. Certainly the quintessence of life must lie in its massive and infinitely complex self-interaction.

Study of the dyads will help clarify the meaning, possibilities, and problems of the 92 properties or monads.

Of course the dyadic exercise is only the second stage in a geometric progression that leads on to consideration of how life's 92 most basic properties affect one another in dynamic triads, tetrads, pentads, etc.

I will now comment upon what I see as the possible simple or complex ideonomic and biological meaning, applications, and consequences of the items in the table. Many readers, especially biologists, will have their own ideas of course.

(1) How does SELECTION (both intragenerational and intergenerational) : affect : CELLULARITY and COMPARTMENTATION?

Selection can strengthen them. Once they exist in the first place, selection can operate upon inevitable variability in the efficiency, power, quickness, redundancy, diversity, self-interaction, self-facilitation, massiveness, and other dimensions and qualities of these properties and of the mechanisms that serve the properties.

Cellularity and compartmentation can induce complication of the genome, and upon this increased complexity and number of hereditary elements selection can work in progressive and consequential ways.

The selective mechanism can overwork and produce multiple cells. These in turn will modify the selective properties of single cells, and genomic compensation for this involvement will tend to perpetuate the cellular overwork or proliferation. Moreover, 'compartments', so-called, will themselves be compartmented, like nested Chinese boxes.

This can relax the requirements for cellularity and compartmentation, and the genomic capacity thereby liberated can select for greater structural, functional, and compositional sophistication.

Note that it becomes apparent that in order to specify how selection affects cellularity and compartmentation one must at the same specify how the latter affects the former.

As will be true of all of these dyads, much more could and should be said than can be said here.

(2) How does SELF-COMPLEMENTATION and SELF-FACILITATION (intra- + interorganismal) : affect : SCALE-INVARIANCE?

By facilitating itself life makes it easier in turn for scale-invariant properties and mechanisms to emerge and grow in importance.

Scale-invariance can help life stabilize itself and help life in many other ways, so life's general tendency to facilitate itself means that it will seize upon and exploit scale-invariant phenomena, processes, laws, etc.

By complementing itself rhythmically and repeatedly—in space, time, and function—a modular basis is created for the development of scale-invariance; and the multiplicity of fractally concinnous or compact levels represented by scale-invariance multiply, perfect, and exponentiate life's chances to complement itself.

(3) How does COMPLEX and ever-complexer BEHAVIOR : affect : progressive ASYMMETRY?

For certain biological symmetries to be violated or transcended it is necessary for life to advance up a ladder of increasingly complex functions and conditions.

The growing complexity of biological behavior has the effect of postponing and ultimately extinguishing opportunities for the achievement of those simpler symmetries that are possible at earlier stages of biological evolution.

On the other hand, the evolution of complexity can promote the development of certain forms of equilibrium that actually enable previously impossible symmetries or disallow old asymmetries.

(4) How does QUANTIZATION and DISCRETIZATION : affect : HEREDITY (intergenerational memory) and intragenerational MEMORY?

Harmonics (both sub- and super-harmonics) can emerge and be played upon like a harp by evolution. Absence can become important, and hence life can exploit the equivalent of systems of negative numbers. The timing of systems can become increasingly precise. Alphabets, vocabularies, and grammars can appear—or biological languages! There can be analogs of electronic parts and circuits. Life can begin to calculate. There can be a sociogenesis of biological vocations, that may have preceded and even ultimately led to the jobs and roles that we like to think of as being peculiar to human society.

What all this means is that, through biological quantization and discretization, patterns can be reduced to information and stored, recovered, and operated upon as various forms of heredity and biological memory.

"PLAYFUL SEAS"
(Examples of the Metaphenomenal Genus)

Patrick Gunkel

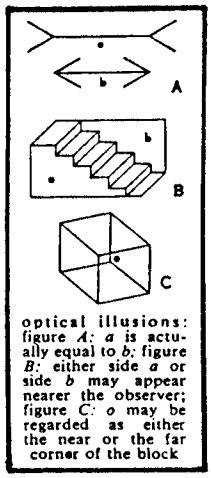
FOREWORD: There are lots of "playful seas" (seas of natural "play") in modern science, *i.e.* that are already known, or that can readily be conjectured, to exist. Here the iconoclastic concept of "play" (*sensu lato*) is meant to be competitive with the orthodox scientific paradigm of "work" (*sensu stricto*), as being that which mainly goes on in Nature. **This generalized phenomenon of play may in given instances variously embrace:** protean change, perpetual interaction and interadjustment, necessary and optimizing exercise and experimentation, incessant reorganization and "emergence" of new things and relations, highly nonlinear and nonmonotonic behavior, "catastrophic" transformations and intricate topological dynamics, creative chaos, adinfinite plexure, labyrinthine interdetermination, extreme pluralism and "massively parallel" processes, analogs of learning and life, recursive processes, very contradictory and paradoxical behavior, vergence, turbulence, holistic order, *e/vc*. Whereas with the conventional concept of work the pursuit and discovery of *simple and obvious* functions, causes, effects, relationships, behavior, *etc* often made sense and was possible, in the case of play that is apt to be inappropriate and futile. Playful phenomena can be: all but indecipherably rich and subtle, so intricate as to appear random or chaotic, so densely concausal as to seem acausal, so multifunctional that they are easily misconceived as being functionless, unimportant, and unnecessary.

1. Annealing.
2. Apeiron of Anaximander and Anaxagoras (*hyp.*)
3. Capitalist (pluralistic market) economies.
4. Chemical kinetics.
5. "Cloud of ideas" of Gunkel (*hyp.*).
6. Democracies.
7. Dirac quantum-mechanical vacuum; virtual matter and energy fluctuations and interactions, *a la* Feynman diagrams.
8. Ecological and evolutionary "self-play" of the bios.
9. Immune system; *e.g.* N^{th}-order anti-antibodies.
10. Intracellular nucleic acid-enwrapped protein molecules (*e.g.* nucleoproteins?); "quasi-viral seas" with "quasi-viral chemistry" (*hyp.*).
11. Microorganismal "consortiums"; of diverse—intricately and often obligately symbiotic—bacteria, algae, ciliates, viruses, *etc.*
12. Modifications of the Everett-Wheeler many-worlds interpretation of quantum mechanics that would allow temporally [unidirectional, bidirectional, or omnidirectional] anastomosis of the parallel worlds or tendencies of the pluriverse or for a self-infinite universe (Plenum) (*hyp.*).
13. Multilevel microorganismal micro-ecosystems; *e.g.* in termite and beetle guts.
14. Neural nets.
15. Opalescence.

16. Play—not work—as supreme in biochemical processes (*hyp.*).
17. "Polymythic brain" and "virtual discourse" theories of Gunkel (*hyp.*).
18. "Polyorganism theory" (that an organism contains superposed "ghost" organisms) of Gunkel (*hyp.*).
19. "Polypsychism theory" of Gunkel (*hyp.*).
20. Prebiotic protoevolutionary soup, *e.g.* with a kaleidoscopic sea of maximally unstable, heterogeneous, and competitive quasi or prototypal [genes, genomes, organisms, phenotypes, and species]; *e.g. a la* Carl Woese, and Gunkel; re hypercycles, *etc* (*hyp.*).
21. "Quasiparticle sea in materials" of Gunkel (*hyp.*); *e.g.* of excitons, phonons, magnons, *etc*, but visualized *instead*, or more grandly, as an infinity: or as being made up of *adinfinitely* [many, complex, hierarchic, recursive, vergent, antisyzygial, "undecidable", partitionable, "polyequilibrial", $\underline{N}$-dimensional, "$\underline{N}$-mathematical" (*i.e.*, involving $\underline{N}$-many different mathematical systems) *and/or* "pan-mathematical" (*i.e.*, incorporating <u>all</u> of mathematics or mathematics' total, self-infinite self-structure), dynamic, "virtualistic", matric, *e/vc*] : [quasiparticles, entities, phenomena, 'laws' and "nomogeneses", states, quanta and quantized levels and interrelations, interactions, processes, systems, "quasi-separable networks", "metastructures", phases, "logics", "groupings" and "groups", taxons of types, "order taxons", *etc*].
22. Recombinational DNA and RNA processes.
23. "Society of the mind" of Minsky (*hyp.*).
24. <u>Some</u> "fuzzy logic" and "Bayesian probabilities" (*hyp.*).
25. Spin glasses.
26. Transfinitely-many and -ambiguous 4-manifolds and spacetimes (*hyp.*).
27. Turbulence.
28. Unconscious mind.
29. Unstable, metastable, and stable elementary particle (*esp.* resonance particle) zoo; *e.g. a la* Chew's S-matrix theory.
30. "Virtual intelligence" and "immanent stories" of Gunkel (*hyp.*).
31. "Virtual vocabulary" of Gunkel (*hyp.*).
32. Whole-bios "horizontal gene flow" (*hyp.*).

The Ideonomic Division
ILLUSIONS AND APATOLOGY

IL·LU·SION \ə'lüzhən also ə'yü-\ n -s [ME illusioun, fr. MF illusion, fr. LL illusion-, illusio, fr. L, action of mocking, jeering, fr. illusus (past part. of illudere to mock or jeer at, fr. in- [2]in- + ludere to play, mock, jeer) + ion-, -io -ion — more at LUDICROUS] : 1 a obs : the action of [deceiving or attempting to deceive] b (1) : the [state or fact] of being intellectually [deceived or deluded or misled] [by others or by oneself] either [intentionally or unintentionally] in such a way as to have false [impressions or ideas] marked by the attribution of [more to something or less to something] than is actually the case : MISAPPREHENSION, DELUSION, FANCY <the happy ~s of youth> (2) : an instance of such [deception or delusion] <a dreamy life that was filled with one ~ after another> 2 a (1) : a misleading image presented to the vision : false show; specif : APPARITION <these were all an ~ and a phantasma, a thing that appeared, but did not really exist —F.W.Robertson> (2) : something that [deceives or deludes or misleads] intellectually in such a way as to produce false [impressions or ideas] [that <exaggerate or minimize> reality or that attribute <existence to what does not exist or nonexistence to what does exist>] <most modern great men are mere ~s sprung out of a national hunger for greatness —Sherwood Anderson> b (1) : perception of something objectively existing in such a way as to [cause or permit] misinterpretation of its actual nature either [because of the ambiguous qualities of the thing perceived or because of the personal characteristics of the one perceiving or because of both factors] <heat rays shimmering on the road produced the ~of pools of water> <the horizontal lines cause an optical ~, making the object appear in a different position from what it really is in —Richard Jeffries> (2) : HALLUCINATION 1a (3) : a pattern capable of reversible perspective 3 : a fine plain transparent bobbinet or tulle usu. of silk and used for veils, trimmings, dresses.



optical illusions: figure *A*: *a* is actually equal to *b*; figure *B*: either side *a* or side *b* may appear nearer the observer; figure *C*: *o* may be regarded as either the near or the far corner of the block

— Webster's Third

INTRODUCTION

Illusions pervade the world and, in order for the revelation of truth to continue, it is essential that they be discovered, investigated, removed, or transcended wheresoever they lurk in nature, the human mind, society, or the machinery of civilization.

Apatology is the term given in ideonomy to the systematic study and treatment of illusions in general or of any illusions in particular. It is coined from the Ancient Greek words apate (deceit or fraud) and apatelos (deceitful, deceptive, illusory, or wily). Those who study or apply the ideonomic division ILLUSIONS AND APATOLOGY in either a casual or full-time way would be apatologists.

Charts For the Subdivision 'ILLUSION'

NOTE: Listed here is the set of charts that it would probably make sense to create for the subdivision of ideonomy treating "Illusion", to serve as organons for pure ideonomy. The set is extendible, both by the addition of basically new types of charts and by the addition of various sub-charts that most likely fit under the types of charts, or general charts, identified below.

MARGINALIUM: Those charts and/or lists that already exist are underlined.

1 Issues Re Illusion
Known Illusions
Speculative Illusions
Principles For Treating Illusion
5 Importance of Studying Illusion
Dimensions of Illusion (now titled "Illusions Of")
Senses of 'Illusion'
'Illusion' & Other Ideonomical Divisions
Illusion Scale
10 Consequences of Illusion
Illusions About A Thing
Hierarchies of Illusions
Connections & Analogies Among Illusions
Illusion Taxonomy
15 Other Illusions By Analogy
Meta-Dimensions of Illusion
The Causes of Illusions
Beyond Illusion
Structure of Illusion
20 Infinite Illusion
What Ideonomy May Do For the Study of Illusion
Complex Illusions
Subfields of the Study of Illusion
Chart of Charts Treating Illusion
25 Plan For the Future Study of Illusion
Advice On Treating Illusion
Interrelationships of Principles Re 'Illusion'
'Illusion': Method-Principle Dependences
Designs of & For Treating 'Illusion'
30 Questions Re Illusions
Use of the Charts Re 'Illusion'
Illustrative Ideonomical Treatments of Illusion
Matters Worth Treating Re Illusion
Possible Sources of Knowledge Re Illusion
35 Illusions About Concepts
Everything As Illusion
37 Homothematic Illusions

The discovery of a major illusion has often represented a milestone in the history of science, and no doubt many future scientific milestones will be of the same type.

Actually no one has any idea how great, diverse, and many the illusions that endure in our picture of reality are apt to be, or even whether they are—or are in some sense—finite. Might all illusions be underlain, or overtopped, by other illusions?

Let it be emphasized that the world may contain not only an infinite amount of illusion but of co-infinite non-illusion. The two concepts, and quantities, go hand in hand. One who postulates the illimitability of illusion, and the illusoriness of all things, need not at the same time abandon the assumption that aback or accompanying the illusion there is also that which approximates or corresponds to some form of absolute reality. Logical paradoxes plague both the illusionists' and the absolutists' perspectives. Evidently the world is subtler.

For example, if in the future we are predestined to discover that beneath anything that is momentarily considered to be fundamental there will always be that which is more fundamental, so that whatever appears to be fundamental must only give the illusion of being such, then there will also be the more positive implication that within the heart of reality there exists an infinite series or hierarchy of things of an ever more basic nature that are all successively discoverable by ourselves.

Unquestionably, just as there are modes of illusion unknown and unimagined at the present time, there must also be modes of reality and knowledge of a similar and no less surprising nature.

My own view is that the : number, profundity, diversity, complexity, essentiality, ubiquity, density, generality, inevitability, deceptive powers, etc : of illusions (in general, and in specific areas or cases) will ultimately turn out to be flabbergasting and revolutionary. Research into the nature of thought, and the bases of perception, experience, and knowledge, will prove to be inseparable from all other forms of research, or essentially dualistic. Today by contrast the two types of inquiry are pursued independently of and almost indifferently to one another.

The all-pervasiveness of illusions may have various implications or corollaries, give rise to questions, or furnish opportunities:

1. What has hitherto been the source of confidence in a field?
2. What is the nature of: cognition, logic, evidence, proof, perception, long-term 'progress' in science, ideas, intuitions, paradigm shifts, achievement, choice, the physical world, reality, etc?
3. The many illusions that are found prove (unexpectedly and suggestively) connected and interconnected.
4. Are illusion and reality coessential, complementary, and co-infinite, or does their mutual proximity imply the need for an adjustment of our way of seeing and interpreting the world, of doing science, and of formulating philosophies (as I've hinted)? Might the study of their finitely or infinitely intricate compresence provide an almost ideal route for improving and accelerating scientific progress or the future history of ideas?
5. What does it really mean to speak of something as more or as less illusory?
6. Perhaps studying illusion, or illusion-cum-reality, will lead to new: mathematics, physics, logics, psychologies, philosophies, biologies, arts, technologies, materials, instruments, cosmologies, disciplines, etc?

"435 GENERA OF ILLUSIONS"

1. Abnormality.
2. Absence.
3. Absoluteness.
4. Abundance.
5. Acceptance.
6. Accessibility.
7. Accidentalness.
8. Accuracy.
9. Activity.
10. Adequacy.
11. Agreement.
12. Alienness.
13. All-awareness.
14. All-describedness.
15. All-imaginability.
16. Anarchy.
17. Animism.
18. Anthropomorphicness.
19. Apathy.
20. Appearance.
21. Appropriateness.
22. Approval.
23. Arbitrariness.
24. Artificiality.
25. Association.
26. Attributability.
27. Authority.
28. Autocentrisms.
29. Automaticness.
30. Autonomy.
31. Availability.
32. Badness.
33. Balance.
34. Barbarism.
35. Beauty.
36. Being.
37. Belief.
38. Benefaction.
39. Beneficiality.
40. Breadth.
41. Calculability.
42. Care.
43. Catastrophe.
44. Causation.
45. Certainty.
46. Chance.
47. Change.
48. Chaos.
49. Character.
50. Choice.
51. Civilization.
52. Clarity.
53. Classifiability.
54. Classification.
55. Cleanness.
56. Cleverness.
57. Combinability.
58. Commitment.
59. Common sense.
60. Commonness.
61. Communicability.
62. Communication.
63. Community.
64. Competence.
65. Complementarity.
66. Complexity.
67. Comprehensiveness.
68. Compromise.
69. Concreteness.
70. Conflict.
71. Consciousness.
72. Consideredness.
73. Consistency.
74. Constitutionality.
75. Constructibility.
76. Contagion.
77. Content.
78. Contiguity.
79. Continuity.
80. Contradiction.
81. Control.
82. Controllability.
83. Convergence.
84. Cooperation.
85. Correction.
86. Correlation.
87. Correspondence.
88. Courage.
89. Cowardice.
90. Danger.
91. Death.
92. Decay.
93. Definability.
94. Dependence.
95. Depth.
96. Derivation.
97. Deservingness.
98. Desirability.
99. Destiny.
100. Destructibility.
101. Detail.
102. Difficulty.
103. Dimension.
104. Direction.
105. Directness.
106. Dirtiness.
107. Discord.
108. Disinterest.
109. Disloyalty.
110. Dissimilarity.
111. Distance.
112. Divergence.
113. Diversity.
114. Divisibility.
115. Dominance.
116. Domination.
117. Doubt.
118. Dualism.
119. Ease.
120. Education.
121. Effability.
122. Efficiency.
123. Effort.
124. Emptiness.
125. Enlightenment.
126. Entitlement.
127. Equality.
128. Equivalence.
129. Error.
130. Essentiality.
131. Evidence.
132. Evolution.
133. Excellence.
134. Excess.
135. Exemplification.
136. Expertise.
137. Exploitation.
138. Extension.
139. Failure.
140. Familiarity.
141. Fate.
142. Favor.
143. Feeling.
144. Fidelity.
145. Finality.
146. Finitude.
147. Form.
148. Formalizability.
149. Formlessness.
150. Fragility.
151. Freedom.
152. Free-will.
153. Friendliness.
154. Fulfillment.
155. Fullness.
156. Fundamentality.
157. Futurity.
158. Gain.
159. Genius.
160. Good.
161. Government.
162. Gratitude.
163. Greatness.
164. Guilt.
165. Guiltlessness.
166. Happiness.
167. Health.
168. Heterogeneity.
169. Hierarchy.
170. Homogeneity.
171. Honesty.
172. Hope.
173. Hopelessness.
174. Hostility.
175. Humility.
176. Iconoclasm.
177. Ideality.
178. Identity.
179. Idleness.
180. Ignobility.
181. Ignorance.
182. Illegality.
183. Illimitability.
184. Illusion (sic).
185. Imbalance.
186. Immaturity.
187. Immediacy.
188. Imperfectibility.
189. Imperfection.
190. Imperishability.
191. Importance.
192. Impossibility.
193. Impotence.
194. Imprecision.
195. Improbability.
196. Improvement.
197. Inapplicability.
198. Incontrovertibility.
199. Independence.
200. Indeterminacy.
201. Inefficiency.
202. Inertness.
203. Inexplicability.
204. Inferiority.
205. Infinity.
206. Injustice.
207. Innerness.
208. Innocence.
209. Insanity.
210. Insight.
211. Insolubility.
212. Instability.
213. Instantaneity.
214. Integrity.
215. Intelligence.
216. Intention.
217. Interaction.
218. Interest.
219. Interference.
220. Intractability.
221. Intuitability.
222. Invisibility.
223. Involvement.
224. Irrationality.
225. Irreducibility.
226. Irreflexivity.
227. Irregularity.
228. Irrelevance.
229. Irreparability.
230. Irreplaceability.
231. Irresponsibility.
232. Isolation.
233. Justice.
234. Justification.
235. Knowability.
236. Knowledge.
237. Law.
238. Laziness.
239. Legality.
240. Life or animation.
241. Limitability.
242. Limits.
243. Linearity.
244. Location.
245. Logicality.
246. Loss.
247. Love.
248. Loyalty.
249. Luck.
250. Manifestness.
251. Maturity.
252. Maximality.
253. Meaning.
254. Meaninglessness.
255. Measurability.
256. Mechanicality.
257. Mediocrity.
258. Minimality.
259. Miraculousness.
260. Misery.
261. Modelability.
262. Monotonicity.
263. 'Mono-causation'.
264. Motion.
265. Mystery.
266. Naturalness.
267. Need.
268. No ambiguity.
269. No self-effects.
270. Nobility.
271. Non-conservation.
272. Normalcy.
273. Normlessness.
274. Norms.
275. Novelty.
276. Nullity.
277. Objectivity.
278. Oldness.
279. Omneity.
280. Omnipotence.
281. Omnipresence.
282. Omniscience.
283. Openness.
284. Opportunity.
285. Oppositeness.
286. Optimality.
287. Order.
288. Originality.
289. Orthodoxy.
290. Outerness.
291. Pastness.
292. Pattern.
293. Peace.
294. Perfectibility.
295. Perfection.
296. Permanence.
297. Plannedness.
298. Pluralism.
299. Ponderability.
300. Position.
301. Possession.
302. Possibility.
303. Poverty.
304. Power.
305. Practicality.
306. Predetermination.
307. Predictability.
308. Preexistence sans development.
309. Presence.
310. Priority.
311. Probability.
312. Problemlessness.
313. Profit.
314. Profundity.
315. Progress.
316. Proof.
317. Propagation.
318. Prosperity.
319. Proximity.
320. Purity.
321. Purpose.
322. Purposelessness.
323. Randomness.
324. Range.
325. Rarity.
326. Rationality.
327. Reality.
328. Recency.
329. Redirection.
330. Redundancy.
331. Reform.
332. Regeneration.
333. Regularity.
334. Rejection.
335. Relationship.
336. Relativism.
337. Relevance.
338. Reliability.
339. Repeatability.
340. Representativeness.
341. Resolution.
342. Respectability.
343. Responsibility.
344. Resultance.
345. Retrogression.
346. Reversibility.
347. Revolution.
348. Richness.
349. Right.
350. Sacredness.
351. Safety.
352. Salvation.
353. Sanity.
354. Satisfaction.
355. Savings.
356. Scarcity.
357. Secrecy.
358. Security.
359. Self-existence.
360. Self-identity.
361. Self-importance.
362. Self-knowledge.
363. Self-mastery.
364. Self-sufficiency.
365. Sickness.
366. Similarity.
367. Simplicity.
368. Simultaneity.
369. Slowness.
370. Solidity.
371. Solvability.
372. Sophistication.
373. Specialness.
374. Speed.
375. Spirituality.
376. Spontaneity.
377. Stability.
378. Stagnation.
379. Status.
380. Stereotypy.
381. Stoichiometry.
382. Strength.
383. Stupidity.
384. Success.
385. Superiority.
386. Supernaturality.
387. Supremacy.
388. Suspension.
389. Symmetry.
390. Testability.
391. Testedness.
392. Timeliness.
393. Tolerance.
394. Totalness.
395. Toughness.
396. Tragedy.
397. Transcendence.
398. Transformation.
399. Truth.
400. Ubiety.
401. Ugliness.
402. Ultimacy.
403. Unacceptability.
404. Unalterability.
405. Unanimity.
406. Unavailability.
407. Understanding.
408. Undesirability.
409. Unerringness.
410. Unidimensionality.
411. Unidirectionality.
412. Unimportance.
413. Uniqueness.
414. Unity.
415. Universal knownness.
416. Universal principles.
417. Universality.
418. Unrelatedness.
419. Unresponsiveness.
420. Utility.
421. Utopia.
422. Vastness.
423. Vigor.
424. Virtue.
425. Visibility.
426. Visualizability.
427. Voluntariness.
428. Want.
429. Waste.
430. Weakness.
431. Wealth.
432. Will.
433. Wisdom.
434. Worth.
435. Worthlessness.

GENERA OF ILLUSIONS

By collecting, hypothesizing, and studying hundreds of maximally diverse examples of illusions in all fields and involving as many types of [things, phenomena, events, relationships, processes, concepts, situations, realms, etc] as possible, it becomes possible to identify and extract various types of illusions that recur—in identical or altered form—again and again. These especially [universal, general, fundamental, important, comprehensive, canonically exhaustive, meaningful, complementary, differentiated, large, multiform, definable, conspicuous, useful, and systematic] categories of illusions are referred to in ideonomy as genera of illusions.

Should different individuals undertake to independently identify the genera of illusions that are found in nature—and do so without any prior acquaintance with the set of such genera that are officially recognized by the ideonomist, and sans intercommunication—it would be discovered afterwards that the various lists which they had constructed were surprisingly similar and convergent. Different names might have given to the genera but the underlying concepts would be the same.

Someone may wish to test this remarkable assertion—either formally or informally—by making use of the accompanying organon, "435 Genera of Illusions" (vide).

In the following discussion of the entries of this gigantic table we will necessarily confine ourselves to but a few of the items.

In principle all of the 435 genera may find illustration in any subject or phenomenon. In practice, however, a mere majority or minority will seem to apply in a given case—at least in the absence of extraordinary effort and extravagant speculation, or without having to adapt the named genus mentally or construe it metaphorically or almost quixotically.

The genus ILLUSIONS OF ABNORMALITY.

A human act or remark can seem abnormal when it is simply rare (albeit perhaps universal).

A hypochondriac who constantly looks for symptoms of disease may find them everywhere in himself. Conditions are so complex and ambiguous, and there are forever new things to notice and new—or old—errors to make.

Abnormality may actually be normal or that which is the rule: so great and platykurtic or multimodal may be the variations among individuals.

What appears to be abnormal may in fact be supernormal.

An abnormally bright galaxy may simply be a normal galaxy in the brightest phase of a luminosity cycle that is common to all galaxies and perhaps even has a 'short' recurrence interval.

The genus ILLUSIONS OF ABSENCE.

Human figures may seem absent from a landscape painting whereas in fact they have been included in disguise, subliminally, or symbolically. Perhaps the trees are skeletal, the storm clouds muscular, and the wandering animals expressively anthropomorphic.

A disease that is merely in remission can seem to be gone altogether, even to the most careful medical inspection.

What appears to be absent may simply be elsewhere: methane equivalent to as much as 20,000,000 times the world's current annual energy requirements may be hidden in the earth's crust at depth or in sites ignored by petroleum geologists committed to the dogma that virtually all methane must be the gift of ancient life to modern man rather than being primordial.

Solar neutrinos may appear to be absent because they are extremely unstable and decay unexpectedly en route to our planet.

The amount of mass needed to close the universe gravitationally may seem absent, while in fact being present as nonluminous astronomic bodies, invisible or exotic particles, waves of energy, or perturbations in the very fabric of space.

The genus ILLUSIONS OF ABSOLUTENESS.

The velocity of light can seem an absolute limit to motion because we have failed to consider the possible existence of dual particles—tachyons—for which c might represent a minimal speed limit, the possibility of non-causally transluminary particles, the fact that the velocity with which gravitation itself propagates is as yet unknown, the possibility that distance (length) itself is not absolute, the possibility that c is reset in successive cosmic cycles, the possibility that c changes gradually over units of time far greater than the supposed age or lifetime of the universe (e.g. $\gtrsim 10^{100}$ years), the possibility that unresolved problems in quantum mechanics render the whole concept of physical velocity and its measurement moot, or the possibility that an infinity of other—and of arbitrarily bizarre—physical entities, forces, and phenomena remain undiscovered.

An acid may seem the most acidic of which chemistry is capable simply because we have not considered other theories and types of acidity with which still greater acidities (if not perhaps lesser values of pH) might be associated.

A physical system may seem absolutely stable only because we have not yet discovered the rules by which chaos may spring into being, apparently in a trice and ex nihilo, anywhere and everywhere.

The genus ILLUSIONS OF ABUNDANCE.

A man who seems to be possessed of unlimited wit may in reality simply know the golden formulas that can make people laugh at anything. The man himself may be a dote who is ignorant of the meaning of his own broad comedy.

Civilization can seem to be more abundant upon the surface of the earth than it really is simply because people seldom live outside its self-focused and anastomotic dots and bands.

The opportunities afforded by life appear to be superabundant, until it is realized that they are mutually exclusive.

Evil can seem abundant simply because it is near and fills vision.

The universe can seem unimaginably gigantic until it is also realized that it is all but empty (septillions of times emptier than a toy balloon—in one sense).

Likewise the septillion atoms in a drop of water can seem abundant—until one reflects that they themselves are at most a trillionth full.

The genus ILLUSIONS OF ACCEPTANCE.

The illusion that the earth's $10^{15.7}$-ton atmosphere can or does accept unlimited industrial gases, aerosols, smoke, and dust is belied by their subsequent precipitation as land and water pollution.

The human body gives the illusion of accepting all of the food it eats, whereas of course most of it is simply moved along peristaltically by the intestine and rejected to the outer world by the anus. That not accepted includes a large fraction of the food's nutrient molecules.

Conceivably an ecosystem sometimes seems to accept invasive flora or fauna that it later, after decades or centuries, expels or extinguishes (because of some subtle, unsung mechanism of communal equilibrium—that might be analogous to our bodies' immune system and self-identity).

Shortly after writing the above, an equivalent illusion of acceptance of pollution came to my attention, involving inland aquatic ecosystems. It appears that in remote areas of Canada sulphur emissions from coal-burning power plants and other industrial sources become deposited by acid rain in soils and bogs, but later are reemitted in a somewhat different form to the atmosphere. Such unforeseen quasi-perpetual cycling is cause for concern.

Conquered people may merely seem to accept—either psychologically or militarily—the yoke of an invading nation. Passive resistance may occur, resistance may go underground, or the 'conquered' people may stubbornly refuse to be assimilated.

The body of an organism may give the illusion of accepting grafted foreign tissue or a transplanted organ, which is later rejected.

An atom excited by an absorbed photon may merely give an illusion of accepting the additional energy permanently, since it may later be reemitted.

Having provided examples of things that illustrated this genus of illusion, perhaps some representative congeneric species are also worth indicating, such as illusions of 'acceptance' sensu: Assimilation, Tolerance, Finality, Welcome, Harmony, or Concinnity. Most of these are implicit in the examples discussed.

The genus ILLUSIONS OF ACCESSIBILITY.

A politician may seem accessible to all of his constituents, not because he is so, but because it is in his interest to cultivate such an illusion of universal availability, intimacy, attentiveness, familiarity, and cooperativeness.

The apparent accessibility of the human brain, sitting millimeters behind the forehead, is belied by the all-enclosing nature of the skull, the unusual phenomenon of the blood-brain barrier, the visual subtlety and largely microscopic scale of the brain's anatomic organization, and the enduring mystery of the nature of the mind and its isomorphy to the brain.

The mind of the spouse with whom one has cohabited for 50 years, or 26 million minutes, can seem sometimes an open book and other times an impenetrable well.

The heart of mathematics, which for a while earlier in this century seemed as though it might at last prove accessible, was revealed by the theorems of Kurt Goedel to be fundamentally inconsistent and undecidable and hence forever inaccessible to logic, any universal system, or the human mind (or so it is thought).

One might have thought that gaining direct access to the deep interior of the earth would require nothing more than determined drilling. Yet with the rise in pressure, temperature, and plasticity at increasing depths, limits are reached in the compressive strength of all known casings, the drill not only loses its power to advance but is forced out, and the drill hole recurves.

The accessibility of God through prayer may be a great illusion (results are meager and have a poor cost/benefit ratio).

Some congeneric species of the generic illusion of accessibility are: All the time (i.e. it may be an illusion that accessibility is perpetual), Certain times, Direct, Easy, Complete, True, Special, Self-determined (willed), Universal, Costless, Meaningful, or Conventional. Other species could be added to these twelve types.

The genus ILLUSIONS OF ACCIDENTALNESS.

Although much of what happens in human life and physical nature appears to be the result of accidents pure and simple, this may be an illusion, and reason and purpose may be much commoner than we suppose.

Circumstances will often contrive to make events appear to be accidental, or to disguise their reasons for or modes of being.

The encounter with the woman who ultimately became one's wife may have seemed accidental at the time it occurred, and yet have been the result of design on the part of the wife or friends.

The genus ILLUSIONS OF ACCURACY.

IMPORTANCE OF STUDYING ILLUSION

Can rid one of false ideas.
Can heighten one's critical powers.
Can lead to a sounder understanding of things.
Can reduce the tendency to be confused by appearances.
Can make it more difficult for other persons to deceive one.
Can deepen one's appreciation of reality.
Can enlarge one's artistic powers.
Can help one anticipate and avoid new future illusions.
Can sensitize one to the interplay of illusions.
Can lead to useful technological abilities to manipulate illusions.
Can sharpen perception and improve its efficiency and power.
Can increase knowledge of the infinitely interwoven nature of illusion and reality.
Can reveal the detailed consequences of specific illusions.
Can help one generalize a particular illusion to an entire class of illusions.
Can enable one to recognize other illusions by analogy.
Can bring to light the entire network of illusions pervading experience.
Can create an awareness of the universal hierarchy of illusions that exists in Nature.
Can lead to major scientific discoveries and revolutions.
Can put scientific laws on a more fundamental footing.
Can lead to insights into the nature of the human mind and brain.
Can make explicit future scientific challenges and opportunities.
Can help one avoid the pitfalls of common sense and dogmatic beliefs.
Can make ours a wiser and saner world.
Can help one learn and apply the lessons of history.
Can make one conscious of the basic types, dimensions, and laws of illusions.
Can lead to greater insight into oneself.
Can enable illusions, and their avoidance, to be taught.
Can uncover general principles for treating illusion.
Can dramatize the real magnitude of illusion.
Can lead to a program and methodology for the future systematic elimination of all illusion.
Can sensitize one to all the different degrees of illusion.
Can clarify what the importance of studying illusion actually is.
Can heighten intelligence by reducing its impairment by illusions.
Can lead to the simultaneous and exponential retirement of sets and series of different illusions.
Can promote understanding and mastery of other things that are merely analogous to illusions: fictions, errors, fallacies, stupidities, idealizations, misconceptions, etc.

REASONS FOR INVESTIGATING ILLUSIONS

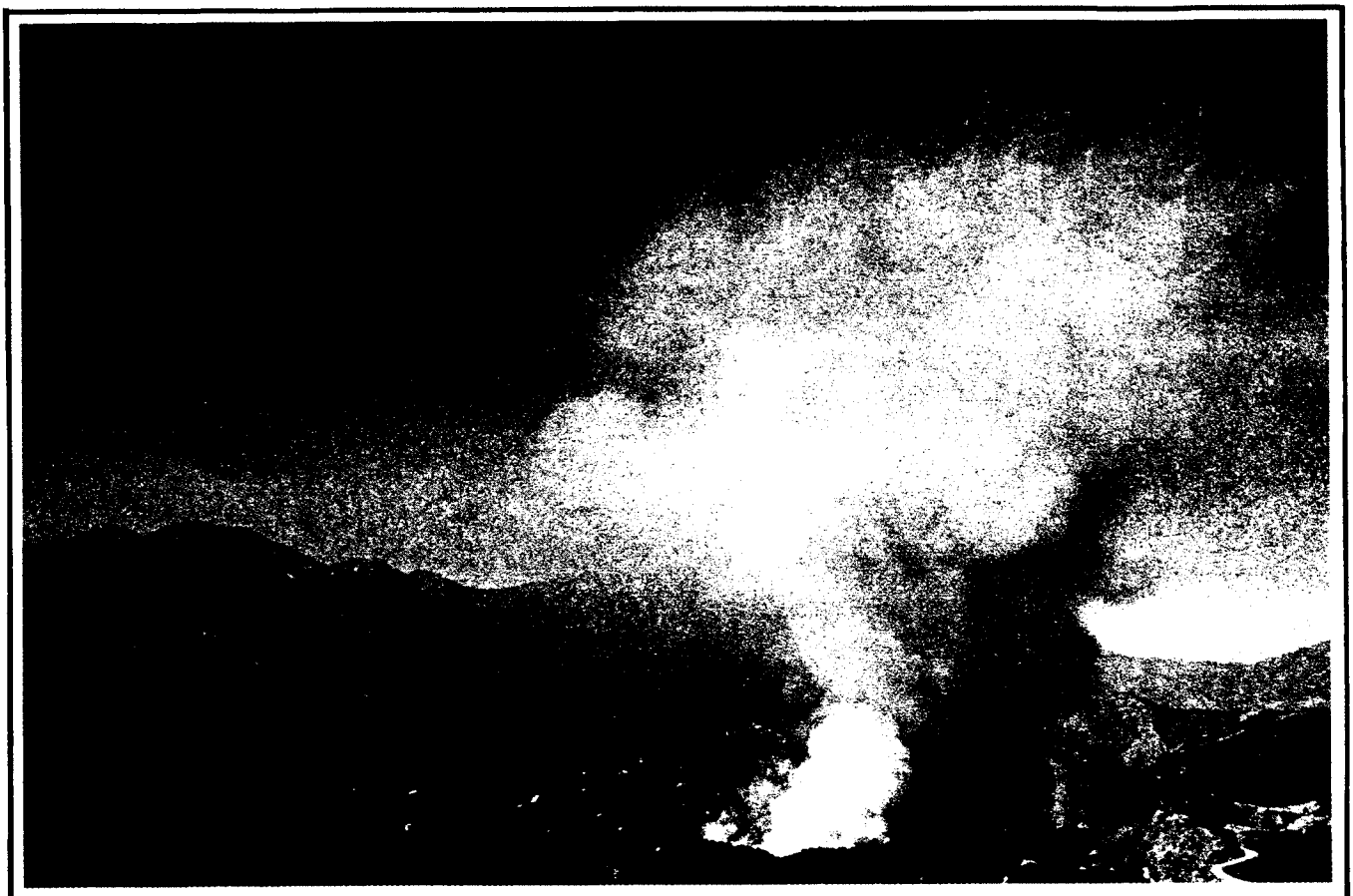
In each division of ideonomy a list of reasons for studying that division, or for using the division's methods, should be prepared. Persons who are interested in using, mastering, or simply considering the division would then be free to consult this list. Comparable lists for other divisions could compared in an effort to first decide what division or combination of divisions would be the most relevant to a given problem, task, or theme.

Indeed, the presence of all such lists together on one computer would enable the latter to instantly suggest divisions that in a given case were of primary, secondary, or tertiary interest—or of no interest. The computer could function in this way by checking for identical, synonymous, related, or statistically co-occurring words or phrases; by using an artificial intelligence program capable of ferreting out grammatical, syntactic, semantic, or logical clues; by simply exploiting entirely identical entries that reappear on other lists—should the lists have been deliberately constructed in such a way as to consist, either wholly or in part, of such identities, or constructed of fractional selections from a universal master list; or by consulting or operating within an actual matrix of discrete and weighted interconnections that had been consciously assembled by ideonomists in the past.

Let us consider the consecutive items on the list titled "The Importance of Studying Illusion" (vide).

CAN RID ONE OF FALSE IDEAS. Researching the bases, nature, and possibilities of illusions can help free one of the false, defective, or misconceived ideas that one has—or may have in the future—about what things are or are not, what they mean or do not mean, about what is more and less important, and so on. Thus by realizing how profoundly complete an illusion has existed in one's mind about a particular thing of exceptional importance to one—and toward which previously one had had no doubts—a permanent lesson may be learned about things in general, and even one's world view may be transformed.

CAN HEIGHTEN ONE'S CRITICAL POWERS. The discovery of the thin and inconsequential film that the appearances of things really represent can subsequently leave one far more penetrating in one's perception of the flow of experience. Perhaps the main restraint upon the growth of human intelligence is the hypocritical tendency of the brain, its complacent, merely expedient acceptance of crude appearance, whereafter it shuts itself down. Thorough acquaintance with the ubiquity and multifariousness of illusion can make for a more continuous operation of the critical faculty.



■ This forest fire near Los Angeles is releasing a surprising pollutant: auto exhaust.

YOU ONLY CHOKE TWICE

The column of smoke lofting from the blazing trees and brush in a canyon northeast of Los Angeles flattened at the top, taking on the form of a smudgy brown mushroom. The ominous shape was appropriate, because the fire was lit as part of the first detailed field study of the theory of nuclear winter. According to the predicted scenario, smoke from fires ignited by nuclear blasts will block sunlight and chill the Earth, causing crops to fail and threatening those who survived the war with starvation. Until now the theory has been based chiefly on imprecise computer models—not empirical observations—that have generated more controversy than concrete fact.

Data from the burn will not be completely analyzed for months, but one early finding is already causing a stir. Though it has nothing to do with nuclear war, it has a lot to do with air pollution.

Samples collected by several aircraft that flew through the plume contained not just garden-variety smoke but enormous amounts of pollutants that could have come only from car exhausts. In fact, researchers may have stumbled onto an important source of air pollution in smog-shrouded Los Angeles. When compared with samples taken from forest fires that burned far from any city, the Los Angeles smoke was found to have concentrations of some sulfur and nitrogen compounds that were 100 times higher.

These compounds, including nitrogen oxides and sulfur dioxide, are key components of smog and can form acids that make up acid rain. Lawrence Radke, an atmospheric scientist at the University of Washington and one of dozens of researchers studying the fire, says that the source of the noxious compounds was automobile exhausts emitted over decades, which drifted into the canyon from nearby freeways and settled on the vegetation and the soil, only to be liberated when the canyon burned. Smoke from the fire also contained lead, in concentrations up to four times normal. It seems that man-made air pollution can pollute not once, but twice.

"TABLE OF 76 'CAUSES, BASES, and SOURCES OF ILLUSIONS'"

1. Absence of a touchstone.
2. Ambiguity, indeterminacy, or myriontology.
3. Anomalousness.
4. Arbitrary decisions.
5. Camouflage, hiding, or 'environmental mimicry or assimilation'.
6. Carelessness.
7. Complexity.
8. Conceptual poverty.
9. Confusion.
10. Confusion of form and content.
11. Continuity.
12. Cooperative phenomena or interdependences.
13. Cultural conditioning.
14. Deception or fraud.
15. Deficiencies of fundamental knowledge (e.g., imprecise or undefined [mathematics, geometry, physics, ethics, etc]).
16. Discontinuity.
17. Equivalence.
18. Erroneous substitution of part for whole.
19. Excessive abstraction, theoretical fictions, or neglect of concrete facts.
20. Expectation.
21. Fallacious equation of [parvitude, rarity, singularity, etc] with insignificance [e.g., discounting of what is small, exaggeration of the importance of what is large; erroneous proportionation of size to importance].
22. False gestalten or syntheses.
23. False or inadequate world view.
24. Hierarchy (multiplicity of confusing and interfering levels).
25. Homology of perceptual categories.
26. Ignorance about illusion in general (its [diversity, categories, taxa, omnipresence, signs, causes, genesis, laws, instances and spectrum of exemplifications, transformations, transcendences, degrees, related phenomena, powers, etc]).
27. Ignorance (lack of information).
28. Imperfections or costs of common sense.
29. Inexperience or naiveté.
30. Information overload, mental or perceptual fatigue, or 'environmental burial'.
31. Insufficient criteria of illusoriness.
32. Interference.
33. Lack of a transcendent (to suggest [imperfection, finitude, etc]) or a companion.
34. Lack of self-criticism, self-ignorance, or lack of criticism in general.
35. Logical fallacies or misapplication of general principles.
36. Man's perceptual or intellectual limitations.
37. Mass delusion or other related idola.
38. 'Mental excuses'.
39. Misattribution.
40. Misclassification or misidentification.
41. Misconstrual of function from appearance or mis-supposition of appearance from function.
42. Misdescription, under-description, or under-perception.
43. Misestimation (poor quantification).
44. Misinformation.
45. Misrepresentation or mistreatment.
46. Missubstitution of whole for part.
47. Mis-remembrance or paramnesias.
48. Monoideism (excessive preoccupation with a single, fixed idea).
49. Multidimensionality.
50. Neglect of scientific procedures [testing, experimentation, prediction, validation, reproduction, statistical evaluation, induction, deduction, rich hypothecation, etc].
51. Neuropsychological heredity (e.g., inherited [modes, gestalten, or elements] of [perception, thought, feeling, or action]).
52. Neurosis, psychosis, or other forms of irrationality.
53. Overgeneralization, exaggeration, infinitization, absolutization, non-qualification, eternalization, idealization, etc.
54. Panintertransformability.
55. 'Pan-Truth' (misapplication of the doctrine so-named) or pan-paradoxy.
56. Perceptual or mental expedience.
57. Persistence despite (or actually via) transformation (meta-continuity).
58. Personification or self-projection.
59. Perspective (e.g., [limited, fixed, specialized, or local]); or defective [coordinate systems or coordinates].
60. Poor or defective correlation of data, or mis-combined sensa or percepts.
61. Prejudices.
62. Pseudo-averaging (attempted averaging of what cannot be averaged).
63. 'Pseudo-convergences'(e.g., in data series) or regressional fallacies.
64. Psychophysical boundary values, objective similarity, non-discrimination, under-differentiation, or mis-analogy.
65. Random patterns, coincidences, juxtapositions, or 'background noise'.
66. Reification or hypostatization.
67. Reliance on a single system.
68. Simplism.
69. Static or dynamic configurations.
70. Superficiality.
71. Unconstrained imagination or 'pseudo-perception' (spurious acts of perception that are assumed to have occurred but that in fact did not occur).
72. Unfamiliarity or novelty that confuses.
73. Unthinking or perseverative habit.
74. Untrained or undisciplined perception.
75. Unwillingness to doubt or to consider the possibility of illusion; or complacency.
76. Wanton desire.

CAUSES, BASES, AND SOURCES OF ILLUSIONS

Whence illusions - in theory or fact, in general or in particular cases?

First let us consider some of the reasons why one might want to know the answer to this question:

"WHY KNOWING THE ORIGINS OF ILLUSIONS MAY BE IMPORTANT"

1. From knowledge of possible origins of illusions it may be possible to derive criteria and tests for the existence of categories of illusions in arbitrary or particular cases, or for evaluating their joint or conjoint contribution in situations or their absolute strengths.
2. Where an illusion is traced to a given type of origin this may point to the coexistence of other illusions that have a tendency to share such an origin.
3. Knowledge of origin may suggest a particularly powerful way to eradicate an illusion.
4. Great understanding of an illusion can follow from knowledge of its cause.
5. Even where illusions are not initially known or suspected to exist, general causes or mechanisms of illusions perceived as being especially applicable to certain situations may imply the existence of corresponding illusions or helpfully narrow the range of possibilities.
6. Particularly chronic, common, or massive causes of particularly chronic, common, or massive illusions—or of illusions in general—may be determinable or indicable.
7. Generic origins of illusions may suggest specific origins of same (and vice versa).
8. Known can suggest unknown origins of illusions, and enlarge our typology or taxonomy of such origins.
9. Knowledge of the various possible discrete sources of illusions can promote the theory of their cooperative mechanisms.

[illegible]

FOREWORD: This is a standard ideonomical chart, a type of chart, that is, that in the course of ideonomy's development should be prepared for each of its hundreds of divisions.

1. Psychophysical experimentation, IN GENERAL.
2. Psychophysical experimentation WITH neonates, INFANTS, and older children (or over the course of development).
3. Psychophysical experimentation, WITH ANIMALS.
4. Psychological and neurological theories, models, and knowledge.
5. Computer simulation of the brain and sensory system.
6. Observation of computer simulations of the real world and real-world experience, and interactive manipulations of such simulations.
7. Computer simulations or syntheses of artificial worlds, experiences, and sensa that diverge from reality as we know it, and interactive manipulations of such computer graphics and animation; e.g. via automata, fractal mathematics, or the Mandelbrot set.
8. Studies of paintings, music, films, poems, and other art-works, and of books of art theory and technique; consultation with artists and art theorists.
9. Experiments with extant and future hallucinogens, psychotogens, noogens, and other psychophysiological drugs.
10. Conversations with scientists, mathematicians, psychologists, philosophers, and other scholars about illusion in their fields or illusion in general.
11. Artificial intelligence research, and ultimately intelligent computers or computer programs.
12. Ideonomy itself, or ideonomy used to investigate illusion.
13. All sorts of new audiovisual technology.
14. NON-PHARMIC neurotechnological intervention for the sake of psychophysical experiments.

(2) "All Illusions Re Particular Things"

13 Nonselective
Rational
15 Essential
Direct
Dirigible
Accelerable
Slow
20 Teachable
Piecemeal
Improvable
Equivalent (between learners)
24 Unidimensional

X38 (C) ILLUSIONS RE TIME:
1 Irreversibility
Real existence
Completely understood
Universality
5 Symmetry
Loss, expendibility
Irreducibility
Localness
Objectivity
10 Simultaneity
Exhaustibility
Imaginariness
Simplicity
Infinitude
15 Visibility (unmediated experience of)
Modelability
Repetitiveness, intrinsic cyclicity, redundancy
Responsiveness, animism
Uniformity, metricality, linearity
20 Variable rate
Controllability
Transphysicality (transcendentality)
Infinite divisibility
Culminatingness
25 Evolutionariness
Omni-perceivability
Smallness
Boundedness
Purposefulness
30 Directionality
Partitionedness, cellularity
Specialness of the present
Unidimensionality
Personalness (autocentrism)
35 Aleatoriness, chaoticness
Determinism
Heterogeneity, complexity, stratification
38 Unbranching unilineality

total items: 135 (35 + 24 + 38 + 6 + 32)

1984 Ap 13
pure ideonomy
ILLUSION
examples

ALL ILLUSIONS RE PARTICULAR THINGS

NOTE: The ideal purpose of the following lists is to enumerate all known and possible illusions that may obtain in connection with the particular things named; in reality, of course, the lists are incomplete.

X35 (A) ILLUSIONS RE A STONE:
1 Absolutely rigid
Immortal
'Small'
Wearless, changeless
5 Energy-less pure matter
Increate
Without Individuality
Solid
Not essential to the universe
10 Poreless and impermeable
Purely macroscopic
Absolutely insensitive
Formless
Parts few
15 Placid
Finite beauty
Absolutely hard
Absolutely passive
Universe-independent
20 Absolutely lifeless
All-visible (all surface or side)
Nonluminous (purely reflective)
Simple coloration and appearance
Without structure, parts, or content
25 Chemically inert
Finite complexity and dimensionality
Soundless
Memory-free
Unimportant
30 Virtually useless
Absolutely immobile
Unambiguous, monomorphic
Absolutely real and objective
Location random and unimportant
35 Incapable of further growth

X24 (B) ILLUSIONS RE LEARNING:
1 Linear
Constant
Definable
Unidirectional
5 Optimal
Quantitative
Testable, measurable
Inefficient
Sensory
10 Conscious
Systematic
12 Finite

(3) "All Illusions Re Particular Things"

X6 (D) ILLUSIONS RE FUNERALS:
Deceased present (or able) to appreciate
Undertakers—solemn and dressed in black—care
Funeral unique/special
Corpse sentient/important
All present at grave necessarily mourn (none bored/pleased/inimical)
Deceased immortal

X32 (E) ILLUSIONS RE A NEEDLE:
Infinitely sharp/has mathematical-point tip
Perfectly efficient
Truly a line (1-dimensional)
Frictionless/Absolutely smooth
Absolutely rectilinear
Zero inertia/Zero momentum
Self-animated and purposeful
That one truly sees it where one thinks one sees it in space and time
That it is the needle one sees as opposed to an inexact and general mental model or mnemonic image of a needle
That one's motions in using a needle are mostly conscious and voluntary rather than unconscious and habitual
That those same motions are wholly unconscious and habitual
That the needle bends curvilinearly as one uses it
?That needle design changed little or zero over the past two decades
That the needle is the identical needle one has always used
That the needle has a finite number of other uses
That there is only one way (or are only a few known ways) of using the needle for a given, specific task
That the needle does not mirror one perfectly
That the needle is rust-free and unrustable
That a given needle has no 'class' membership (class dimensions, configuration, composition, etc)
That a needle has no haecceity (idiographic individuality)
That the needle will last forever
That it would be hard to lose a needle by dropping or misplacing it
That the needle is purely utilitarian and in no way a thing of beauty or a thing possessed of aesthetic interest
That the needle makes no sounds (does not ring, scrape, creak, squish, hum, whistle, snap, glissando, etc as one uses it)
That the function of a needle is self-evident (requires no initial—or continual?—definition, explanation, or demonstration)
That one is as expert as a tailor in the needle's use
That a needle is 'not vast' and is partless—that it is not a complex microcosm
That a needle has neither short-term nor long-term memory
That everyone uses a needle in roughly the same, non-stylistic way
That a needle's volume is absolutely fixed—rather than expanding and contracting with the sounds it makes, heat transferred from one's body, outside barometric fluctuations, changes of declination and azimuth, one's respiratory cycle, various electric charges and currents, etc
That there are no such illusions/That the number of illusions is finite and roughly known
That the illusions that exist are trivial or of no interest

ALL ILLUSIONS RE:

BATTLES

ENEMY QUIET = INACTIVITY

GOOD vs. EVIL

IMPREGNABILITY

KNOWLEDGE

UNIDIMENSIONAL

INVISIBILITY OF ENEMY = NONEXISTENCE OR ABSENCE

CENTERED ON SELF; TOTALLY SURROUNDED; NEARLY

COURSE EASILY OR LOCALLY READABLE

NECESSITY

ONE PURPOSE & GOAL

ROMANTIC

PURE, NET, OR ALL DESTRUCTIVENESS

ADVANCE

RETREAT

DECISIVENESS

DUTY = HATRED

IRREVERSIBLE GAINS & LOSSES; MONOTONICITY

NOT FUN

ALWAYS EXCITING; NEVER BORING

UNENDURABLE

STALEMENT

WEAKNESS OF ENEMY

ZERO-SUM GAME

CRITICAL = WHOLE WAR

HOPELESSNESS

ABSENCE OF (BILATERAL) ATTRITION

PERFECT STRATEGY

ENEMY STRENGTH

LINEARITY

DEFEAT

ONE SIDE; IRRECIPROCITY

GLORY

RESPONSE

VICTORY

INTERLATERAL 'ETIQUETTE' ABSENT

UNREALITY (Dreamlikeness)

UNIQUENESS

EQUIPOLLENCE & SYMMETRY

UBIQUITY

ENEMY BRUTAL, SUBHUMAN, OR DIVINE

IMPERSONALITY

FINALITY

IDEALISM

IMMORTALITY OF ONESELF

ABSOLUTE CONTROLLABILITY

ABSENCE OF ENEMY ARTIFICE

INFINITE, COSMIC, & ESCHATOLOGIC

UNRESTRAINED & MAXIMAL

SIMPLICITY OF ORDERS

SHARP FRONTS OR LINES

BLOODINESS INTRINSIC

FIGHTING CIVILIZED

TRANSCENDENCE OF MORALITY & GUILT

ETERNITY

STRATEGY NOMOTHETIC (Universals, Timeless)

ONE'S COMMANDERS ALL-WISE

INSTANTANEITY

SINGLE ENGAGEMENTS OR ACTIONS

FEAR & BRAVERY INCOMPATIBLE; SOLDIERS "TOUGH"

LULL = END

QUANTITATIVE SUPERIORITY

QUALITATIVE SUPERIORITY

ENEMY OMNIPERCIPIENT & OMNISCIENT

SAFETY IN NUMBERS

CAUSES OF VICTORY & DEFEAT CLEAR

IRRATIONAL, POINTLESS, & MINDLESS

CHAOTIC & RANDOM (Without Plan, Tactics, Management, Or Goal)

BEAUTIFUL

SYMMETRY OF PURPOSE

IRRELEVANCE OF SURPRISES

NO COOPERATION OR COMMUNICATION BETWEEN SIDES

UNINTERRUPTED

GREATNESS, INVINCIBILITY, OR INSPIREDNESS OF ONE'S OWN SIDE

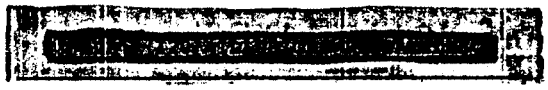
INSENSITIVITY OF COMMANDERS

NO VALUE TO CIVILIZATION

PREDICTABILITY

BIOLOGICALLY INEVITABLE

UNJUSTIFIABLE



INSTRUCTIONS. To be read "Illusion(s) Re, Of, Or That [list item], Of Or Re Battle(s)." Often it is some DEGREE, or the NECESSITY, of what the item names that represents the illusion being referred to. It should be understood that these items are really elliptical and that they allude to entire AREAS of illusion concerning battles. Sometimes the illusions are of an external nature, those entertained by persons who are outside of a specific battle or by nonmilitary persons; other times the illusions are ones that are liable to beset those who are actually engaged in fighting a battle, or who at least are nearby at the time one is fought. Both common and rare illusions are listed.

1. Absence of enemy artificial.
2. Absence of (bilateral) attrition.
3. Absolute controllability.
4. Activity (simulated).
5. Advance.
6. 'Ahistoricity'.
7. All identical.
8. All problems attributable to enemy.
9. Always exciting—never boring.
10. Amorphy.
11. Availability.
12. Beautiful.
13. Biologically inevitable (instinctual and imperative).
14. Blind obedience of soldiers.
15. Bloodiness intrinsic.
16. Breadth or depth.
17. Calculability.
18. Catastrophe.
19. Causes of victory and defeat clear.
20. Centered on self; totally—and small as—nearby.
21. Change.
22. Chaotic and random (without plans, tactics, management, or goal).
23. Choice or freedom.
24. Classifiability.
25. Correlation.
26. Course easily, or locally, readable.
27. Critical; = whole war.
28. Decisiveness.
29. Defeat.
30. Desirability, beneficiality, or utility.
31. Difficulty.
32. Direction (of enemy movement, e.g. multidirectional).
33. Dominance.
34. Duty = hatred.
35. Ease.
36. Efficiency and elegance.
37. Enemy brutal, subhuman, or divine.
38. Enemy invincibility, infinitude, or omnipresence.
39. Enemy omnipercient and omniscient.
40. Enemy quiet = inactivity.
41. Enemy strength.
42. Equipollence and symmetry.
43. Error.
44. Eternity.
45. Evidence.
46. Fear and bravery incompatible; soldiers 'tough'.
47. Fighting civilized.
48. Finality.
49. Friendliness.
50. Glory.
51. Good vs. evil.
52. Greatness, invincibility, or inspiredness of one's own side.
53. Hopelessness.
54. Hope.
55. Idealism.
56. Immortality of oneself.
57. Impersonality.
58. Impregnability.
59. Infinite, cosmic, and eschatological.
60. Insensitivity of commanders.
61. Instantaneity.
62. Interlateral 'etiquette' absent.
63. Invisibility of enemy = nonexistence or absence.
64. Irrational, pointless, and mindless.
65. Irrelevance of surprises.
66. Irreversible gains and losses; monotonicity.
67. Knowledge.
68. Linearity.
69. Luck (for which skill or cleverness is mistaken).
70. Lull = end.
71. Necessity.
72. No cooperation or communication between sides.
73. No self-effects.
74. No value to civilization.
75. Not fun.
76. One purpose and goal.
77. One side; irreciprocity.
78. One's commanders all-wise.
79. Opportunities and karoi.
80. Order.

54. Hope.
55. Idealism.
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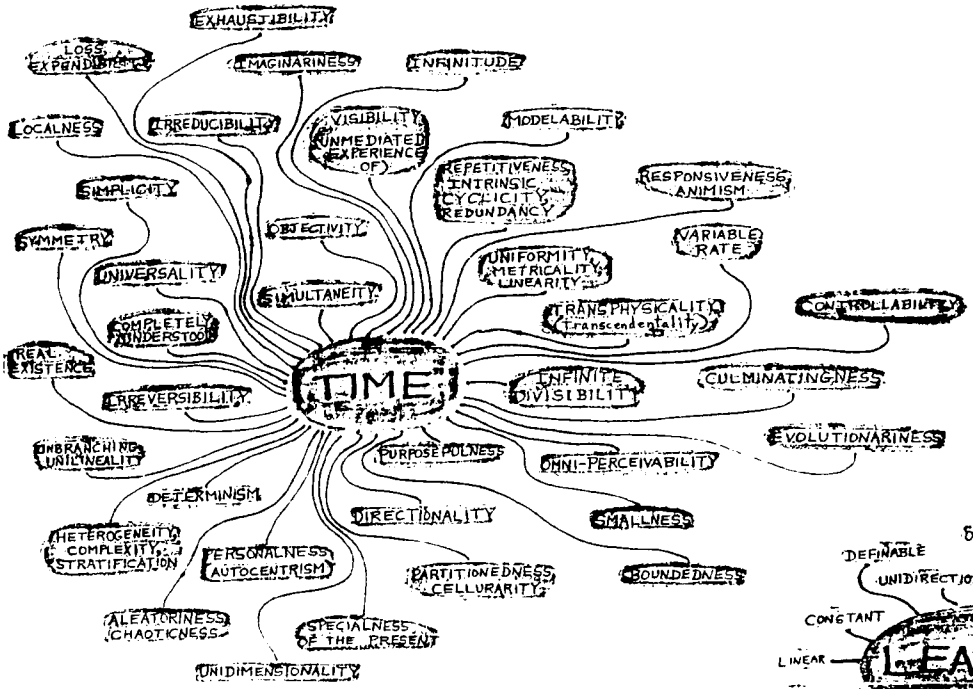
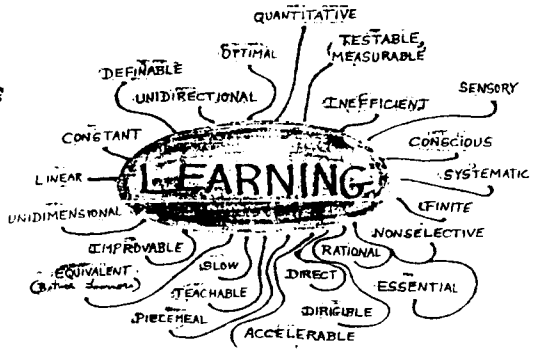
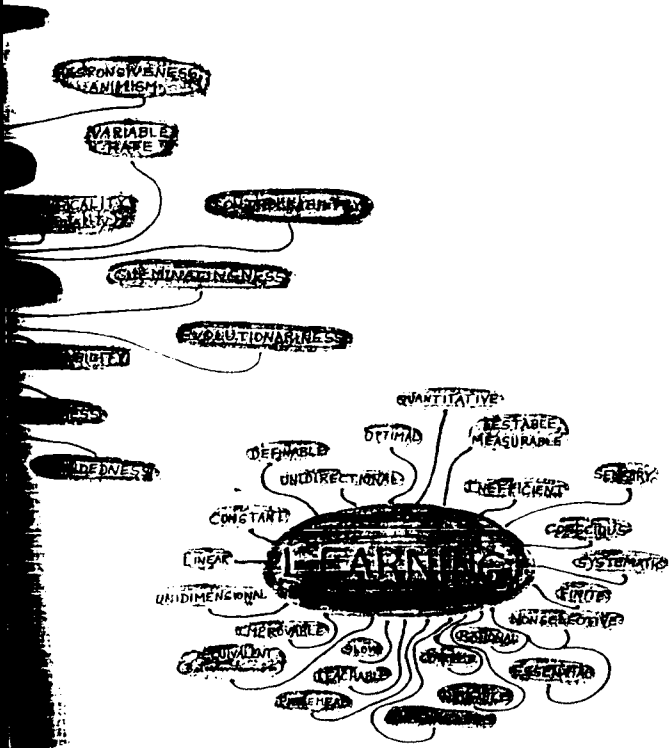
76. One purpose and goal.
77. One side; irreciprocity.
78. One's commanders all-wise.
79. Opportunities and karoi.
80. Order.
81. Perfect strategy.
82. Predictability.
83. Probability.
84. Purely physical.
85. Pure, net, or all- destructiveness.
86. Qualitative superiority.
87. Quantitative superiority.
88. Representativeness.
89. Response.
90. Retreat.
91. Romantic.
92. Safety in number.
93. Sane.
94. Self-knowledge.
95. Sharp fronts or lines.
96. Simplicity of orders.
97. Single engagements or action =.
98. Stability.
99. Stalement.
100. Strategy nomothetic (universal, timeless, and absolute).
101. Symmetry of purposes.
102. Testedness.
103. Transcendence of morality and guilt.
104. Ubiquity.
105. Ugly.
106. Unendurable.
107. Unidimensional.
108. Unimportance.
109. Uninterrupted.
110. Uniqueness.
111. Unjustifiable.
112. Unreality (dreamtness).
113. Unregenerability of enemy forces.
114. Unrestrained and maximal.
115. Victory.
116. Vigor (confused with mere persistence).
117. Weakness of enemy.
118. Will (absence of).
119. Women, boys, and oldsters can't fight.
120. Zero-sum game.

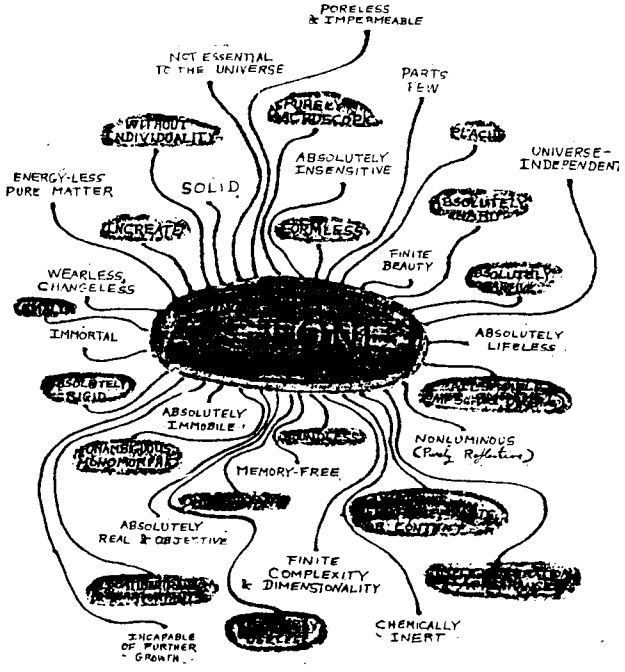
'ALL' ILLUSIONS RE PART





ILLUSIONS RE PARTICULAR THINGS:





'ALL' ILLUSIONS ABOUT PARTICULAR THINGS

In this section we will perform that recurring task within each ideonomic division of taking some single and more or less random thing and listing 'all' the known or imaginable ways in which the thing illustrates that which forms the essential object, definitive concern, or universal theme of the division: illusions in the present instance.

Actually we will successively do this with several different things in order to exemplify the nature, possibilities, and importance of this standard and yet critical task. Readers will hopefully be inspired to attempt the exercise on their own, either by preparing in advance their own lists for the things we will treat—for subsequent comparison of the readerly and auctorial versions—or by drawing up analogous lists of illusions thought to be illustrated by, or relevant to, things other than those I myself have chosen.

As so often in ideonomy, the adjective 'all' is used—either nakedly or apostrophically—to indicate a set of things that does or would merely approximate or aspire to completeness, perfection, or infinitude, rather than anything more pretentious.

Probably there are either virtually or literally an infinity of related and unrelated illusions associated with anything whatever. The concern in this section will merely be to enumerate a large number of relatively key, canonical, obvious, or more important illusions for each of the things treated, using intuitive criteria.

Also instructive would be an opposite enterprise: listing 'all' of the particular things that one knows or would imagine to be illustrative of, or subject to, some single type of illusion (generic, specific, or individual).

The lists of illusions in connection with particular things that are presented in the following subsection were constructed naively, and not, as they could have been, with the help of organons that define universal apatologic taxons. If one goes on to consult such organons out of curiosity the effect should be to confirm and supplement the lists.

ILLUSIONS RE LEARNING

See the spider diagram "Learning Illusions".

(1) Illusion(s) that learning is LINEAR.

This could variously refer to an illusion that learning does, must, or should occur at a single and fixed rate, at an arithmetic as opposed to geometric (exponential) rate (as a function of time), at an arithmetically increasing rate (as opposed to one faster or slower), or at a rate that is directly proportional to some constant or variable (such as age, input, effort, desire, need, experience, psychogenetic maturation, opportunity, or pedagogic pressure, force, or excellence).

One way in which such an illusion could arise is through masking of the actual learning behavior of individual pupils wherever collective behavior, or aggregate statistics, are attended to instead, or mistakenly treated as equivalent or more authoritative.

Then again, linear observations and thinking are seductively the simplest, and nonlinearities by their very nature hide and are brief, nonrepetitive, protean, critical, subtle, paradoxical, irreptitious, indeterminate, and often chaotic.

Among the effects of the illusion that learning is linear may be that it induces educators to mimic a supposititious linearity in their methods, texts, tests, and curricula. More natural, efficient, rich, and productive learning may be forfeited.

(2) Illusion(s) that learning is CONSTANT.

Just as recently there has been some (slight) reason in astronomy for believing that the Sun's nuclear engine operates discontinuously and is momentarily turned off, so it could be that learning—in a psychological or even more fundamental biological sense—necessarily and by its very nature operates discontinuously and is at times literally and possibly irresuscitably shut down in the course of human development. 'Vegetative' phases such as this might conceivably be as important as sleep to the unknown metabolism of the mind.

(3) Illusion that learning is DEFINABLE.

What is learning? We may not know! What we describe as learning in our textbooks and treatises may be a largely irrelevant abstraction, or a passing of shibboleths. Only a tiny facet or specialized part of learning may be addressed, much less accounted for, by our glittering and mutually celebrated theories.

Is learning memorization, adaptation, acquisition of skills, development of style, evolution of ideas, refinement of sensibility, emergence of insight, generalization, socialization, enculturation, efflorescence of consciousness, building of self-discipline, mastery of self, individuation, differentiation, rediscovery of a universal man, or something quite different?

If we can divest ourselves of our illusions about learning, and uncover its real nature, we may be able to make something more of ourselves in the little time we have in life.

(4) Illusion(s) that learning is UNIDIRECTIONAL.

Learning may be, even highly, nonmonotonic. Much of which seems to be positive learning may be negative: an un-learning of what we have, either rightly or wrongly, learned.

Just as biological evolution can occur via catagenesis, or selective, sculptural, and configurational retrenchment, simplification, omission, inhibition, or degeneration of previously evolved traits, patterns, processes, and laws, so may learning advance paradoxically. The radication of fundamentally new or opposite mental processes, ideas, or structures may require the prior extirpation of preexisting ones; in curved mental space, the shortest or easiest route forward may sometimes be uncinate. There may be analogy here to the ubiquitous microphysical phenomenon of time reversal, and also to the possible need for or reality of advanced potentials—effects of the cosmological future upon the past—to complement retarded potentials—the effects of the past on the future—and perfect the symmetry of Maxwell's equations.

Analogy is also possible to the recent discovery that in the course of human development the brain's fixed complement of neurons are subject to waves of mass extinction, evidently as a mechanism for the natural selection and elimination of competing psychoneural engrams, circuits, states, processes, e/vc. Perhaps learning occurs that is hypertrophic, redundant, peloric, erroneous, totally hedged, adjoint, or the like, and there is subsequent or simultaneous winnowing, editing, e/vc.

Another possible meaning of the illusion is that conventional education practices a fallacy by postulating that all minds do or should develop in a single invariant direction, and by seeking to conform teaching and learning thereto.

(5) Illusion(s) that learning is OPTIMAL.

The main way in which the different subjects that comprise the academic curriculum are taught is, in a sense, simultaneously, and little attention appears to have been paid to the possibility that a more optimal method might be to concentrate exclusively—for days, weeks, or months—upon the individual subjects, in a cyclic chain. Teaching conducted in this less competitive and more single-minded 'rhythmic' fashion might prove to be more efficient, dramatic, and lasting.

Perhaps too much is taught, or too little. Perhaps what is taught has been made more difficult by being disunited. Perhaps national learning would be greater, better, and more productive if it were more diverse, specialized, and individualized in topic or method; perhaps different pupils are naturally better at learning different things and in different ways.

Future technology may enhance learning and teaching almost incalculably.

(6) Illusion(s) that learning is QUANTITATIVE.

The most important part of learning may not have to do with the actual amount that is learned but rather with the qualities, nature, values, corollaries, mutual and external relationships, psychological effects, philosophical import, etc of what is learned.

The student who can recall 100 discrete facts may in fact know or have learned less than the student who can recall 10 facts or no 'facts' at all. The real importance of such facts as are learned may lie in the wealth of meanings that a given student appreciates in those facts or in his power to relate the facts to his prior knowledge of other things or to exploit the facts imaginatively or creatively in the future. Does he glimpse the causes or internal dimensions of the facts? Does he clearly perceive the redundancies and novelties of the facts? Does he understand why he was taught the facts in the first place (something which not even his teacher may have grasped)? There are a thousand qualitative dimensions of this sort to learning that simple quantification will always have little or nothing to do with.

The quantitative fallacy can and often does lead to pedagogic concentration upon teaching more and more that is quantitative in nature and less and less that is 'qualitative'. The ultimate effect of this can be a diminution of net or real learning.

Another example of illusions of this general sort that can occur would be where the total vocabulary of children at various ages is supposedly measured by counting the number of different words in their speech or writing or that they can recognize or define when they read things. In reality powers of word use, recognition, and definition may be gradual and may depend upon processes of linguistic and cognitive maturation that —topologically, geometrically, combinatorially, or in other ways—are vastly more subtle, complex, nonlinear, multidimensional, covert, etc than what, consciously or unconsciously, is ordinarily assumed. The meaning of each word may be holistic, or interdependent with the meaning of all other words, and that may have the effect of confusing the measure of learning that has occurred at any point. The learning of a new word or of its meaning may be characteristically demonstrable only after an indefinite interval or at any later stage in life. Nor is it clear that when something has once been learned it has been learned for good, or that forgetting must occur one word at a time or in any simple and continuous fashion.

(7) Illusion(s) that learning is TESTABLE or MEASURABLE.

Little need be said here, since it was anticipated in the foregoing.

But it is important that something be said because the assumption that learning is basically measurable and testable pervades our educational system, and although some thought has certainly been given to the problems that may be associated with this assumption, it has been neither deep nor systematic and it has produced few modifications of traditional practices (and even fewer that are respectable).

Some brilliant mathematicians have confessed to having a very poor memory. It is obvious that certain minds may excel in logic, say, even as they are deficient in knowledge or in efficient remembrance. Some minds or brains may learn slowly simply because the way in which they learn things is so embracive, careful, and rigorous; for them a few particles of learning may have disproportionate inductive and deductive consequences.

Some individuals may be unusually anxious, self-conscious, or shy when learning, being tested, or being expected to demonstrate their acquirements, in a way that profoundly masks their true measure of learning or aptitudes for learning.

That this is the case has in fact been recently demonstrated. A psychopharmaceutical has been developed that abates anxiety in anxiety-prone persons without lessening cognitive functioning. When the substance is given to this subgroup of individuals an astonishing improvement occurs in their performance on the Scholastic Aptitude Test (SAT) and elsewhere. The improvement occurs even though the drug played no role whatever in the earlier process of learning and of mental development.

The implications, although under-celebrated, are enormous. Average intelligence, for example, may be greater than has been assumed, and our measures of intelligence and of learning may not actually identify the most able or even which of our students have managed to learn the most from what they have been taught. Tests of intelligence, educational achievement, personality, etc perhaps stand in need of adjustment or supplementation or require to be looked upon in a somewhat different way.

Females ordinarily perform well below males on standardized tests of mathematical ability, especially in the highest testing ranges, and this has been taken to indicate a basic inferiority in mathematical intelligence and potential. Yet the above results make one more hesitant to draw this conclusion. Perhaps the difference between the sexes lies, not in any disparity in fundamental mathematical ability, but rather in a greater tendency of a female to suffer from disruptive anxiety when subjected to the peculiar stress of a mathematical examination.

Mathematical testing might be called into question for an entirely different reason as well. The recent emergence of "experimental mathematics"—as a new way of doing mathematics that involves the use of the computer to simulate equations via exquisite color graphics and animations that can give an illusory impression of being more art or entertainment than science—dramatically illustrates that there are probably many ways of teaching, learning, and doing mathematics that have not yet been developed or even discovered. It is possible, indeed probable, that minds and brains will be found to differ fundamentally in their mathematical potential when that is measured with respect to these different senses of mathematics.

ILLUSIONS RE A STONE

(1) ABSOLUTELY RIGID.

Not even the hardest stone is absolutely rigid, and in fact the modern physicist knows of nothing whatever that has this ideal status. If one steps upon a stone it will compress, flatten, lean, bend, twist, wobble, and become an ocean of complex, interacting, and persistent internal movements, albeit on what is, from our biased perspective, a 'small' scale.

The fact of the imperfection of the stone's rigidity is potentially important. For one thing, a stone is a nearly universal, natural symbol of perfect rigidity, and a mental pointer that examples of such rigidity —and of absoluteness generically—are to be found in the real world. To this extent a realization that the apparent or credited absoluteness of a rock is illusory could prompt one to reconsider the entire class of things that one had thought of as absolute in any sense, and to be more cautious in absolutizing anything in the future.

In the mechanics of everyday life, one might want to avoid the assumption that certain placements of solid objects upon or against one another, via minimal ledges or tight wedges, guarantee against spontaneous or barely encouraged failure of a construction or arrangement: since an apparent rigidity may mask slow or fine movement, say leading to a catastrophic relaxation of the system.

A mason might be either encouraged or discouraged by a shattered illusion of infinitely rigid stone: if his bricks are flexible they may be forcible into a tight wall, but then again they may resist such forced fitting whenever, inevitably, they are slightly bent.

A village threatened by a rockslide may have added reason for insecurity as it sets aside its naive mental picture of absolutely rigid interlocking of the boulders on the slope above.

(2) IMMORTAL.

Stone is also an illusory symbol of immortality. Stones may survive human beings, and yet like people they come and go. The art of the lapidary and sculptor is almost as evanescent as that of the painter: witness the works of Italy effaced by atmospheric pollution. The risers of a stone stairway trodden by the ages are rounded, bent, and diminished. All solid matter is inherently unstable on an extreme eonic scale, and must undergo quantum-mechanical transmutation, disintegration, and evaporation.

The frozen rockscapes we see in nature are at best the images created by dynamic equilibria as generations of rocks succeed one another in intricately patterned flows that are imperceptibly slow. Mountains, on this other temporal stage, are really Titanic fountains and waves. Stones are perpetually crumbling and deliquescing loaves of bread; foam, to sustain the aqueous metaphor.

One lesson is that it is futile to use stone to send messages to eternity: the epitaphs, the grandiose lettering on buildings, even the pyramids themselves are ephemera.

(3) "SMALL".

Can something be small if it is made up of over $(1 \text{ trillion})^2$ smaller things? Because the volume of the human body is typically 100 to 1,000 times greater than the volume of a stone, people have always regarded stones as small and insignificant. On the contrary, they are huge. They are virtually as huge as our bodies.

The misconception that a stone is intrinsically little has prejudiced us historically against its careful examination, and this has thwarted science. Had we earlier faced the reality that any stone is a vast and mysterious microcosm, we might by now have made great strides in the exploration and mastery of these challenging objects, and won insights of the largest significance for our understanding of the Earth as a whole. Stones, for example, have their own geomorphology, geophysics, chemistry, meteorology, biology, astronomy, and museums of art. Only very recently, and only barely, have we had the humility to notice this.

Many of the biggest problems in geology exist on a much smaller scale than whole stones; bigger or more numerous stones are redundant, and the extra terrain they represent can only be distracting to the quest to understand the microphenomena or their everted order. In their search for the essence of their subject the physics community descended to the microcosm and particle physics a long time ago, and biologists recently took a similar plunge. Geologists, however, have yet to catch on.

Many of the other illusions about a stone we shall examine are related to this one. Illusions always have clusteral, hierarchical, and homological relationships.

(4) WEARLESS AND CHANGELESS.

In one sense we touched on this when we discussed the illusion of a stone's immortality. But the perception of stones as free of change and proof to wear is a more massive, as well as a more basic, illusion.

Various forces and events constantly subtract from, add to, and alter the face of every stone. This means that stones are records. The illusion of the fixity of a stone's appearance may have kept us from making an interesting discovery to the effect that, as in the case of an astronomical body such as the Moon, rich information about the environment and its history may be embedded in and retrievable from a face. The physiognomy of a stone may chronicle changes in climate and soil biology that occurred over preceding decades or millennia. Data about cosmic-ray showers may also be there, as may memories of exceptional storms, geochemical cycles, changes in Earth's magnetic field, surface-ecological events, secular fluctuations in environmental electricity, etc.

There may even be characteristic and universal evolution of the chemistry, mineralogy, and texture of a newly exposed facet of a stone.

Novel forms of geochronometry—or of natural 'clocks'—could result from a thoroughgoing triumph over this illusion.

Perhaps the faces of Earth's surface stones exhibit endogenous cycles, either biphasic or polyphasal. Such alternations or oscillations might also be polycyclic; should they then be polygenous, polydimensional, or heterochronous, their intricate relationships and fine structure may equip future geologists with a profound and sensitive clock of patterns and events in and without the outer layers of rocks.

There are also changes that occur in the deep interior of stones.

(5) ENERGY-LESS PURE MATTER.

Since Albert Einstein gave us his equation stating the equivalence of mass to energy, and of energy to mass, we have known that not only is energy universally present in nature, but in a certain sense it is that out of which the universe is comprehensively constructed and of which it solely consists. (Of course the same could be said of many other quantities and representations; but this does not defeat the power of a great monistic truth: that nature allows herself to be redescribed entirely via single quantities, and indeed appeals to us to explore their mutual omneity.)

In our naive pictures of the world, however, we have not caught up with the great physicist's axiom, or developed its infinite corollaries.

The relativistic energy present in an ordinary stone, qua stone, is of the order of 10 exp 35.75 electron-volts: or more meaningfully, equal to the chemical energy in 2,500,000 tons of coal, the total electricity used in the U.S. hourly, 3 days of worldwide thunderstorms, Earth's tides' kinetic energy, a Richter magnitude 8.4 quake, or a 100-megaton N-bomb.

This is not merely a fictional energy. Conceivably one day it will be released and put to work by civilization. It is therefore important that the commonsensical illusion of a stone as energy-less pure matter be shattered, for otherwise it will discourage that free and utopian curiosity that is apt to lead on to the ultimate achievement via an immense and anafractuous and sympodeal odyssey.

Whisperings of this transcendent energy—its omnipresent leakage, if you will—occur in every rock in the form of radioactivity. Here we see how the misconception of stone as a thing without, and almost antithetic to, energy has in the course of history repeatedly seaded other forms of ignorance and frustrated scientific discovery.

Natural radioactivity—part of a rock's natural energy and release of energy—is the engine of the Earth's internal dynamism, from which derives the force that shuffles the continents back and forth, originates and maintains the atmosphere and hydrosphere, maintains the planet's rivers, soils, and civilizing landscapes by reelevating the eroded land, differentiates the ores upon which modern technology depends—and from which it arose historically, entertains us with earthquakes and volcanoes, and generates the geomagnetic field—with its blessed aurora.

Historic ignorance of the Titan of radioactive energy within the body of our planet presumably delayed realization of the protean and evolutionary character of the Earth's surface features, of the anciency of Earth and the Universe, of the occult yet natural—as opposed to supernatural and absurd—causation of physical phenomena and events, and so forth.

Even today ignorance of this natural energy of stones may be blinkering us to elements and aspects of reality. We fear nuclear energy and view it as alien, yet the human body and all of nature are naturally radioactive: a continuum-like, liminal, definitive, and even critical background that demarcates what is safe from what is hazardous and possibly helps define the earthly thresholds of or transitions between chaos and order, chance and determinism, continuity and change, noise and information, normal and pathological, individual and common, internal and environmental, unique and omnifarious, closed and open, static and dynamic, evolutionary and revolutionary, good and bad, neutral and definite or determinate, specific and generic, telluric and cosmogenic, or many other opposite, successive, complementary, hierarchic, or orthogonal states, levels, or "order taxons" (cybelological regimes).

Again, natural radioactivity may have played a role, not only in the transmutation of life and its evolution between "punctuated equilibria", but in its very origin from the primordial prebiotic soup. Conceivably the maintenance of people and other organisms of the present day—or the prevention of their catagenetic debilitation, dissolution, and effacement—unknowedly presupposes perpetuity of the normal level or qualities of background radiation here on Earth, either neontologically or paleontologically. In effect, a certain level of rock energy may be essential to our biological equilibrium.

Persisting ignorance of the natural energy of stones may impair our discovery and assimilation of such truths, or of some indefinitely large and important set of truths and possibilities. Did it make us tardy in entertaining the idea and exploring the possibility of proton (baryon) decay, or of the instability of matter on hyper-eonic timescales of the order of 10 exp 32-34 years or less. Or of other (known or unknown) forms of ultra-slow, ultra-fast, or exotic decay of solid (and other) matter? The decay of all chemical elements and isotopes into the single (supposedly) permanently stable isotope of iron that converts the entire atomic universe into Fe^{56} after 10 exp 1,500 years, for example; or the collapse of even that form of matter into black holes (Schwarzschild singularities) on the still larger, eternity-like timescale of 10 exp 10^{26} years (sic; = 10 exp 100,000,000,000,000,000,000,000,000y) - mind you, merely the blink of an eye to the Almighty.

Did our illusion keep us from appreciating much earlier that radon the Earth degasses at its surface, or that is generated and emitted by rock masses and buildings, not only constitutes a threat to public health but a far greater hazard than all of man's nuclear reactors combined?

Yet there are many other forms of active, passive, and potential energy associated with the supposedly energy-less pure matter of the world's misunderstood stones.

A stone sitting on the surface of the Earth conducts electrical currents that traverse the earth and the atmosphere and travel between them, and it is always charged with static electricity.

A stone immersed in the atmosphere, soil, or bodies of water will inevitably receive, transduce, modulate, generate, catalyze, store, and transmit energy in a vast variety of forms. Most of these energies or energetic phenomena will be immeasurably tiny, but some will be substantial and important. As our knowledge of them expands it is certain that there will be surprises. There will be some major and myriad minor discoveries concerning geological laws, phenomena, processes, and relationships, along with a range of practical benefits.

Aerial sounds, barometric fluctuations, and microseisms—all of which are incessant—pump energy into a stone that it may make use of or store. Thus there must be endolithic chemical processes driven by the piezoelectric effect.

Stones can absorb sunlight and atmospheric heat during the day and summer, and pump it into the subjacent earth; while at night and across winter the net heat flow reverses, and stones absorb heat from the soil and pump it into the cooler atmosphere by radiative, convective, and diffusional processes, including circulation of air in cracks, pores, and microcavities. It has been discovered that "microcracking"—networks of cracks as thin as 1,000 Å—is pervasive, even in a soft rock like limestone.

Rocks are properly visualized as in resonance with various energetic events in the neighborhood.

No rock is perfectly neutral chemically. Instead all rocks are constantly involved in a multitude of simple and complex chemical reactions with the molecular soup of their protean environments. Even within a rock, and between the rock and itself (at single or separate loci), there will always be some chemical activity, both reversible and irreversible. And such processes will include both exothermic and endothermic ones.

Circulating liquids and gases—and mobile lattice defects, ions, interstitial particles, protons, and electrons—will be at work.

Contiguous or nearby rocks of the same or different chemical composition will be involved in energetic and material exchanges, interactions, and cooperative behavior.

Structural stresses and strains survive in any rock that were created and frozen in at the time of its birth, or added later through diagenesis, metamorphosis, or eonic loading. The phenomenon of rock bursts occurs in the course of quarrying when the sudden release of extreme stresses of this type has the explosive effect of dynamite.

Rocks may catalyze various chemical and energetic transformations in the atmosphere.

Clearly a rock will always have gravitational potential energy, falling when it is dropped! This energy is not minor. It causes or aids crushing and pulverization, the self-disintegration of small rocks under attack by other environmental agencies, the failure of cliffs—including avalanches, the creep or slippage of single rocks on slopes, earthquakes, subduction of entire crustal plates, the soil convection of rocks in patterned or unpatterned ground, the protective burial and hiding of rocks, consolidation of soils, and rock strains spoken of above.

Also because of such energy rocks adhere immovably to the ground and the Earth is ultimately held together and we to it. Moreover, in the gravitational well in which we reside the flow of time (local activity) is retarded relative to the rest of the universe.

(6) INCREATE.

This is the other side of the illusion of immortality: the conscious or unconscious impression that the rocks one sees have been there forever, that they had no mother, were never born, underwent no embryogeny, knew no youth, and were never less than they are now.

But of course this subliminal vision of stones as 'giant atoms' is utterly false, and just as septillions of new organisms are being born at this very moment, the Earth is fragmenting into fragmenting fragments, and new stones by the billions are being created, replacing those equilibrial billions that have frittered to plebeian pebbles or deliquesced to sand.

The Earth's interior appears to break up into layers over the eons, and a layer fractures and fragments in turn. The one layer available for our direct inspection—the crust—breaks into continents, they into plates, they into mobile and mosaic terranes perhaps, they into mountain belts, they into mountains, they into boulders, from whence derive the cobbles—256mm to 64mm across—that are the principal "stones" of this chapter, and that in turn become gravel, that becomes sand, that becomes silt, that becomes clay, that becomes colloidal particles (ultraparticles), that become molecules, and that finally become dissociated atoms.

The sequential process that I have sketched appears to be only half the story, however, because the process from which stones derive is to some extent bidirectional. It is not only disintegration that occurs but integration, or the contrary growth of geological 'particles' of ascending size. For example, there are processes of crystallogenesis, cementation, conglomeration, agglomeration, and coagulation.

These processes can be complementary: soil particles can be sorted into and consolidated as stratified horizons, and these layers subsequently broken up into individual stones.

(7) WITHOUT INDIVIDUALITY.

In the early days after the Bamboo Curtain fell in the 1970's and the People's Republic of China and the United States of America exchanged ambassadors again for the first time in a generation, the Chinese representative was said to have asked his opposite, "Why is it that all of you Americans look alike?" The question was highly ironic because it was still true at that time that decades of inaccessibility of China to Americans had created an image in American minds of a billion Chinese that all looked alike! The lesson being that the perception of differences among, and the individual character of, things need not be automatic, but instead may depend upon depth, breadth, and length of experience—or upon opportunity and incentive to develop, among other things.

Now although it is true that each of us has throughout his life met almost daily with a variety of stones, it is also true that for most of us there has been precious little incentive to distinguish those stones, or to do so in a precise, comprehensive, essential, progressive, or meaningful way. Even the exceptions among us—such as certain artists, geologists, or farmers—have lacked both reason and chance for being as careful as humanly possible. Even the latter would be disappointing, however, since the design of the human brain means that we as a species will never be able to bring more than a finite and ultimately infinitesimal motivation to any task. Development of neural nets and artificial intelligence, on the other hand, will eventually permit the creation of perceptual machines that are progressively and adinfinitely motivated to characterize and discriminate arbitrary things in thaumaturgically specific, complex, and encyclopedic ways. The arrival of such devices will augment fantastically the known individuality of "mere" stones.

Stones, even neighboring stones that look alike, must in reality differ astronomically in their outward appearance and form, internal structure and composition, size, age, mirrored or recorded history, density structure, magnetization, foreign inclusions, mutual distribution, and other properties.

But we must start seeking such differences if we are ever going to find them, and to date we have made at most a small effort of this sort. As we find differences we will find other differences, and this in turn will lead to the discovery of still other differences, and so on ad infinitum.

We should merely seek to find any and all differences that happen to exist, initially, without regard for what they may mean, and without letting our efforts be directed—and hobbled—by theories or hypotheses that call for, forbid, modify, or exploit various sets of differences. Studies and comparisons of these empirical differences will reveal patterns that can progressively be used to steer our search for such differences and our research upon the patterns themselves.

Once our knowledge of the purely empirical differences and patterns has become sufficiently massive and rich, semiautonomous theories can begin to emerge to predict and interpret both known and undiscovered differences and patterns thereof.

A geological subfield called idio-petrology should be developed concerned with the study of individual rocks or with the individuality of stones: by analogy to idiobiology, the subfield of biology that studies individual organisms to learn their differences and quiddities.

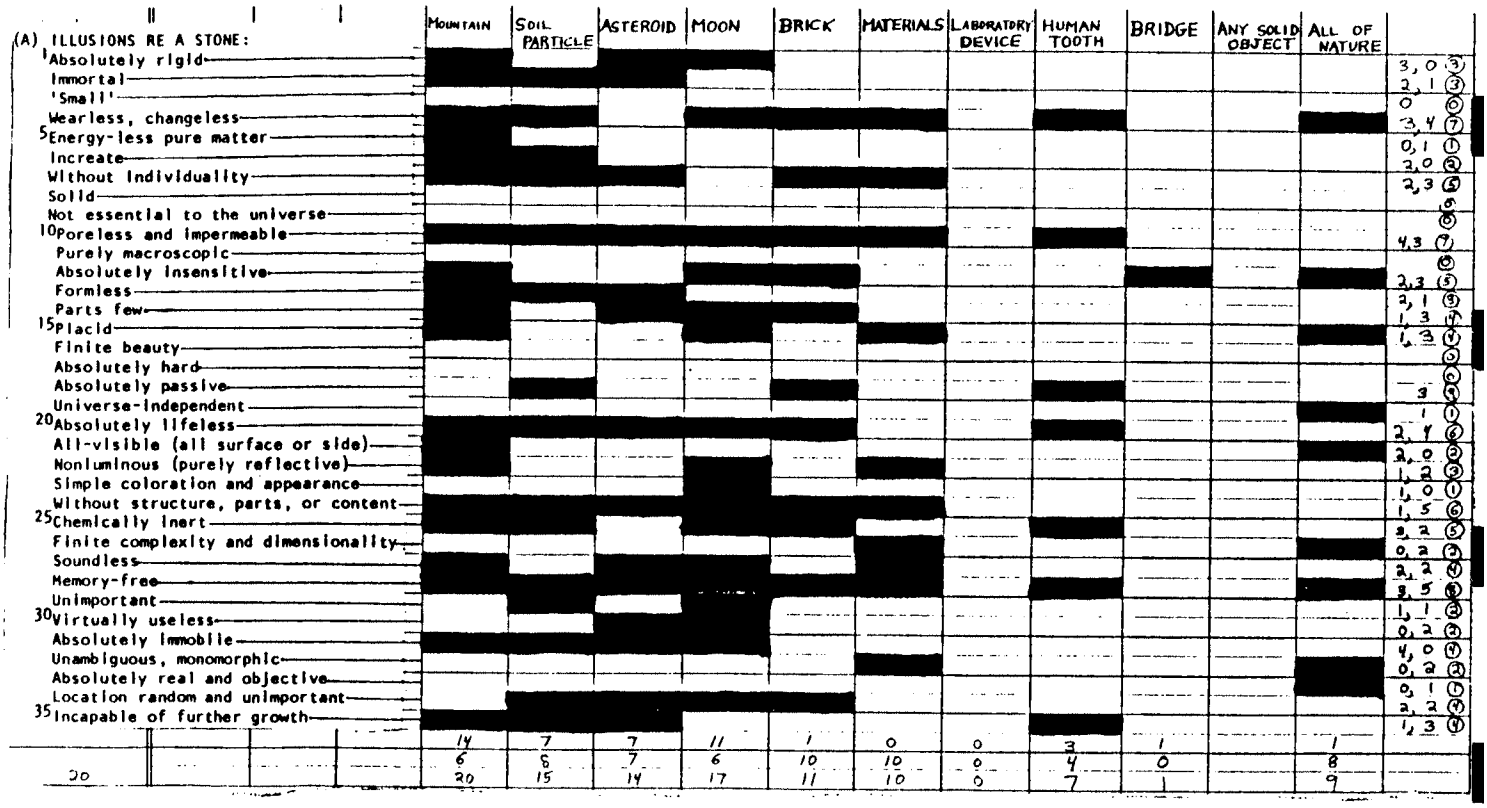
Scientists must simultaneously study rock : differences, similarities, analogies, identities, individualities, homogeneities, heterogeneities, and universals : for the simple reason that their discovery, description, measure, and meaning are all necessarily and exquisitely interdependent.

Eventually field-geologists will study stones with the same painstaking attention to topographic detail and interrelations, and the individuality of objects, as archaeologists devote to the comprehensive measurement, description, and interpretation of their rare and unique sites.

Cluster analysis of the mutual distances and arrangement of stones in space, and of their comparative characters, will gradually and evertedly enable the reconstruction of the large-scale structure and history of the geological landscapes from which the immensely dispersed stones originally derived.

Such cluster-analytic and other ultra-sophisticated statistical analysis and synthesis will at first seize upon arbitrary or outstanding correlations between and among pairs of local rocks, but ultimately it will reveal and exploit more and more comprehensive, rigorous, complex, and indirect interdependences of topographically free stones and stone assemblages.

ILLUSIONS RE A STONE TRANSFERABLE TO OTHER OBJECTS



"ILLUSIONS RE A STONE TRANSFERABLE TO OTHER OBJECTS"

[redacted]

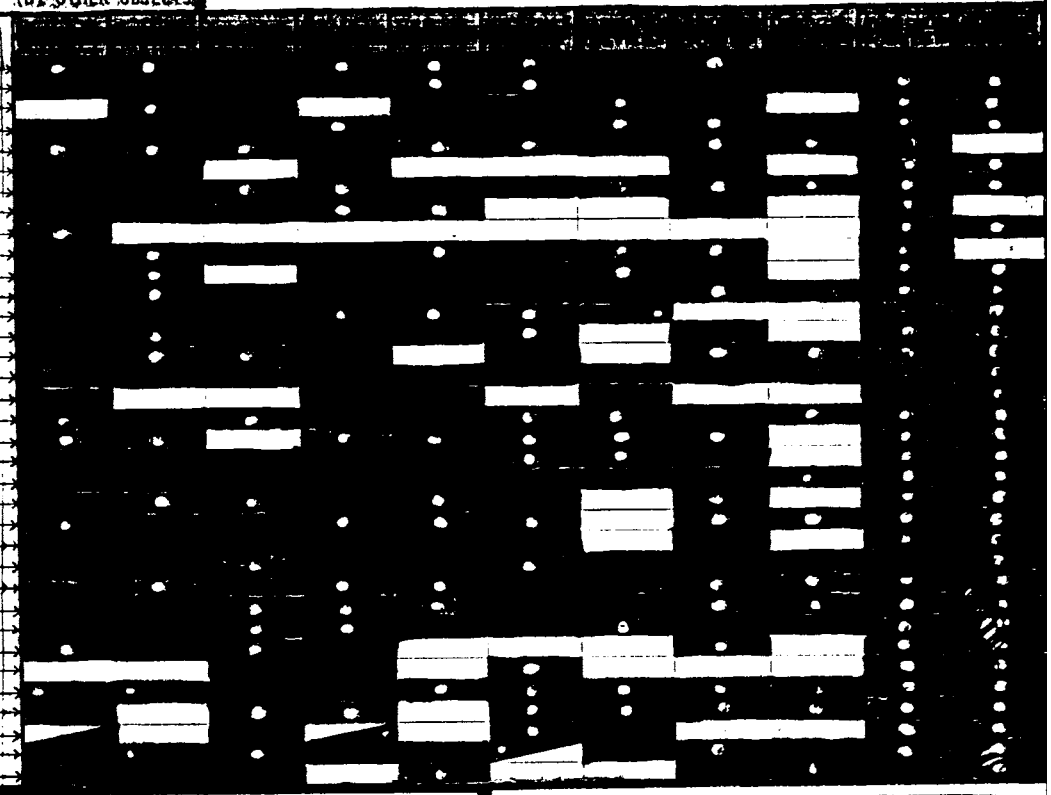
1 Known illusion;
2 Speculative ~;
3 Noteworthy ~.

11	3	14	21	6	43
8	5	13	38	4	31
6	2	8	25	4	50
5	7	12	58	5	42
6	6	12	50	8	67
4	2	6	33	2	33
6	7	13	54	7	54
3	5	8	63	3	38
2	3	5	60	3	60
4	3	7	56	5	56
9	2	11	18	4	36
8	5	13	38	4	31
5	4	9	44	6	67
3	7	10	70	4	40
2	8	10	80	6	60
0	11	11	100	1	9
5	1	6	17	1	17
1	10	11	91	7	64
1	9	10	90	9	90
2	8	10	80	4	40
10	2	12	17	3	25
6	8	14	57	6	43
2	8	10	80	8	80
2	7	9	78	2	22
7	5	12	42	3	25
2	11	13	85	7	54
5	7	12	58	7	58
3	8	11	73	5	45
3	4	7	57	5	71
3	2	5	40	3	60
11	8	19	42	9	47
5	5	10	50	8	80
6	3	9	33	4	44
5	7	12	58	6	50
2	7	9	78	4	44

(A) ILLUSIONS RE A STONE:

1 Absolutely rigid
Immortal
'Small'
Wearless, changeless
5 Energy-less pure matter
Increate
Without Individuality
Solid
Not essential to the universe
10 Poreless and impermeable
Purely macroscopic
Absolutely insensitive
Formless
Parts few
15 Placid
Finite beauty
Absolutely hard
Absolutely passive
Universe-independent
20 Absolutely 'lifeless'
All-visible (all surface or side)
Nonluminous (purely reflective)
Simple coloration and appearance
Without structure, parts, or content
25 Chemically inert
Finite complexity and dimensionality
Soundless
Memory-free
Unimportant
30 Virtually useless
Absolutely immobile
Unambiguous, monomorphic
Absolutely real and objective
Location random and unimportant
35 Incapable of further growth

(B) OTHER OBJECTS:



[redacted]

Absolutely Immobile: 19
Nonluminous (Purely Reflective): 14
Absolutely Rigid: 14
Finite Complexity and Dimensionality: 13
Absolutely Insensitive: 13
Immortal: 13
Without Individuality: 13
Soundless: 12
Location Random and Unimportant: 12
Energy-Less Pure Matter: 12
Wearless, Changeless: 12
Chemically Inert: 12
All-Visible (All Surface Or Side): 12
Absolutely Passive: 11
Purely Macroscopic: 11
Finite Beauty: 11
Memory-Free: 11
Simple Coloration and Appearance: 10

[redacted]

Finite Beauty:	100	0
Absolutely Passive:	91	9
Universe-Independent:	90	10
Finite Complexity and Dimensionality:	85	15
Absolutely Lifeless:	80	20
Simple Coloration and Appearance:	80	20
Placid:	80	20
Without Structure, Parts, Or Content:	78	22
Incapable of Further Growth:	78	22
Memory-Free:	73	27
Parts Few:	70	30
Solid:	63	37
Not Essential To the Universe:	60	40
Wearless, Changeless:	58	42
Location Random and Unimportant:	58	42
Soundless:	58	42
Unimportant:	57	43
Nonluminous (Purely Reflective):	57	43

[redacted]

Universe-Independent: 90
Simple Coloration and Appearance: 80
Unambiguous, Monomorphic: 80
Unimportant: 71
Poreless and Impermeable: 71
Energy-Less Pure Matter: 67
Formless: 67
Absolutely Passive: 64
Placid: 60
Virtually Useless: 60
Not Essential To the Universe: 60
Soundless: 58
Without Individuality: 54
Finite Complexity and Dimensionality: 54
Location Random and Unimportant: 50
'Small': 50
Absolutely Immobile: 47
Memory-Free: 45

3	7	10	70	4	40
2	8	10	80	6	60
0	11	11	100	1	9
5	1	6	17	1	17
1	10	11	91	7	64
1	9	10	90	9	90
2	8	10	80	4	40
10	2	12	17	3	25
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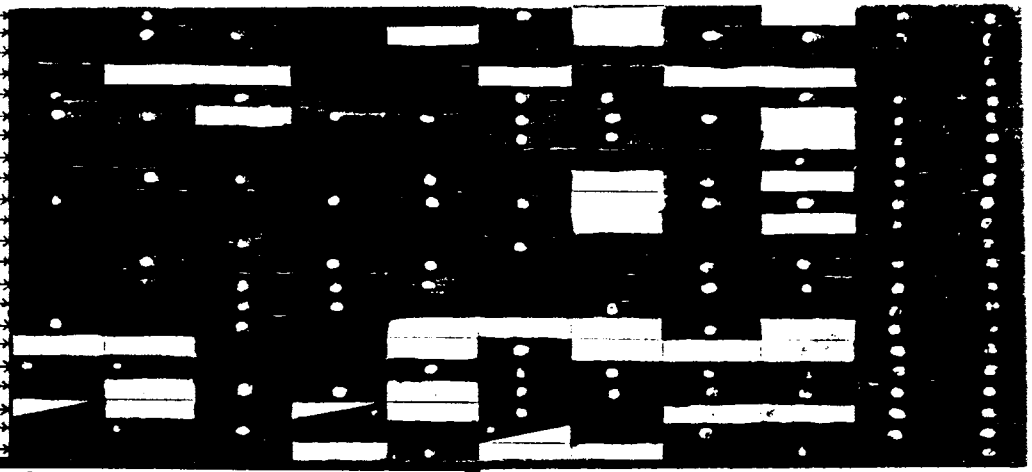
11	8	19	42	9	47
5	5	10	50	8	80
6	3	9	33	4	44
5	7	12	58	6	50
2	7	9	78	4	44

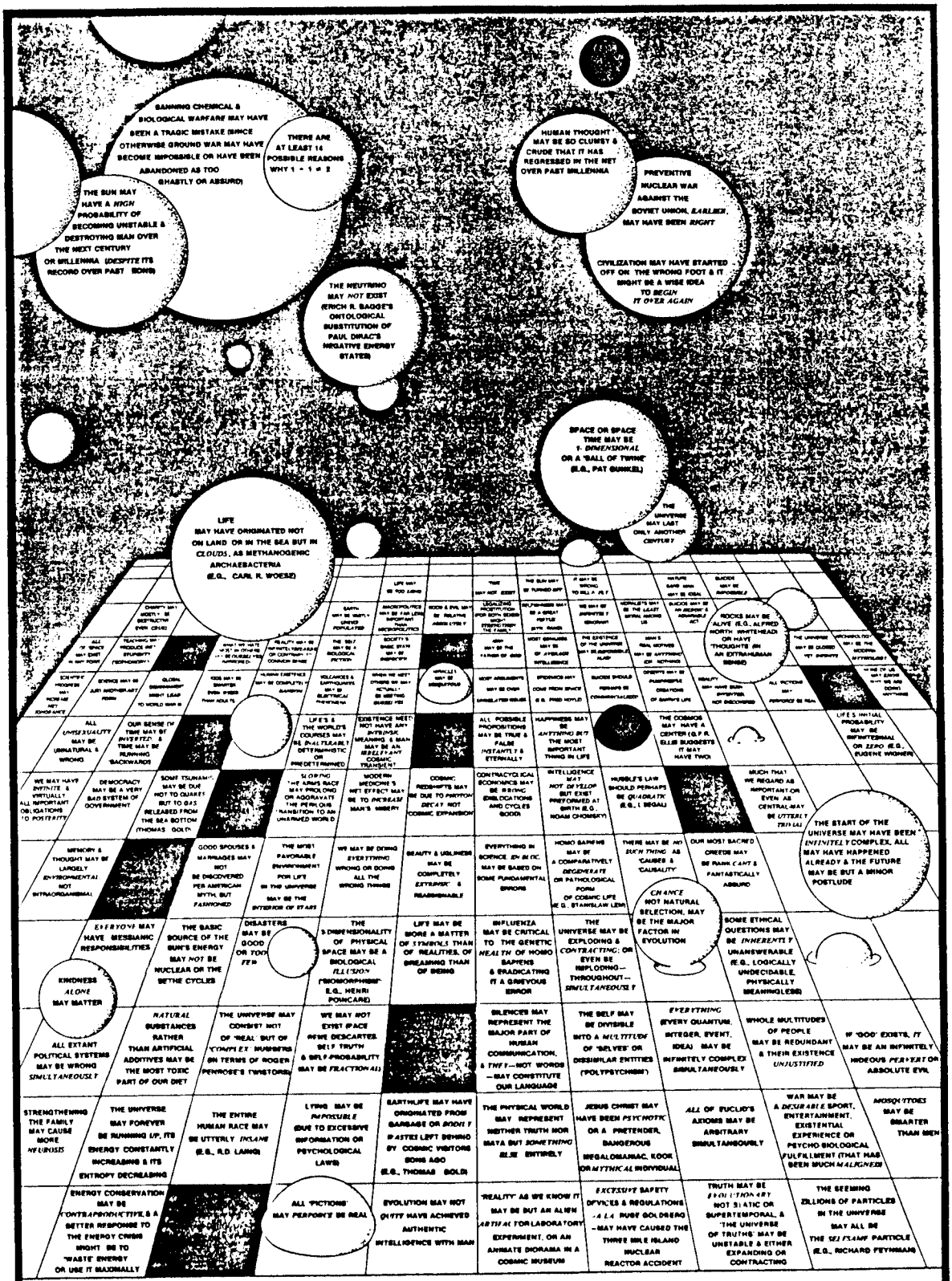
Parts few
Placid
Finite beauty
Absolutely hard
Absolutely passive
Universe-independent
Absolutely 'lifeless'
All-visible (all surface or side)
Nonluminous (purely reflective)
Simple coloration and appearance
Without structure, parts, or content
Chemically inert
Finite complexity and dimensionality
Soundless
Memory-free
Unimportant
Virtually useless
Absolutely immobile
Unambiguous, monomorphic
Absolutely real and objective
Location random and unimportant
Incapable of further growth



Absolutely Immobile: 19
Nonluminous (Purely Reflective): 14
Absolutely Rigid: 14
Finite Complexity and Dimensionality: 13
Absolutely Insensitive: 13
Immortal: 13
Without Individuality: 13
Soundless: 12
Location Random and Unimportant: 12
Energy-Less Pure Matter: 12
Wearless, Changeless: 12
Chemically Inert: 12
All-Visible (All Surface Or Side): 12
Absolutely Passive: 11
Purely Macroscopic: 11
Finite Beauty: 11
Memory-Free: 11
Simple Coloration and Appearance: 10
Placid: 10
Universe-Independent: 10
Absolutely Lifeless: 10
Parts Few: 10
Unambiguous, Monomorphic: 10
Incapable of Further Growth: 9
Without Structure, Parts, Or Content: 9
Formless: 9
Absolutely Real and Objective: 9
'Small': 8
Solid: 8
Poreless and Impermeable: 7
Unimportant: 7
Absolutely Hard: 6
Increate: 6
Virtually Useless: 5
Not Essential To the Universe: 5

Finite Beauty:	100	0
Absolutely Passive:	91	9
Universe-Independent:	90	10
Finite Complexity and Dimensionality:	85	15
Absolutely Lifeless:	80	20
Simple Coloration and Appearance:	80	20
Placid:	80	20
Without Structure, Parts, Or Content:	78	22
Incapable of Further Growth:	78	22
Memory-Free:	73	27
Parts Few:	70	30
Solid:	63	37
Not Essential To the Universe:	60	40
Wearless, Changeless:	58	42
Location Random and Unimportant:	58	42
Soundless:	58	42
Unimportant:	57	43
Nonluminous (Purely Reflective):	57	43
Without Individuality:	54	46
Unambiguous, Monomorphic:	50	50
Energy-Less Pure Matter:	50	50
Formless:	44	56
Poreless and Impermeable:	43	57
Chemically Inert:	42	58
Absolutely Immobile:	42	58
Virtually Useless:	40	60
Absolutely Insensitive:	38	62
Immortal:	38	62
Increate:	33	67
Absolutely Real and Objective:	33	67
'Small':	25	75
Absolutely Rigid:	21	79
Purely Macroscopic:	18	82
All-Visible (All Surface Or Side):	17	83
Absolutely Hard:	17	83

Universe-Independent: 90
Simple Coloration and Appearance: 80
Unambiguous, Monomorphic: 80
Unimportant: 71
Poreless and Impermeable: 71
Energy-Less Pure Matter: 67
Formless: 67
Absolutely Passive: 64
Placid: 60
Virtually Useless: 60
Not Essential To the Universe: 60
Soundless: 58
Without Individuality: 54
Finite Complexity and Dimensionality: 54
Location Random and Unimportant: 50
'Small': 50
Absolutely Immobile: 47
Memory-Free: 45
Incapable of Further Growth: 44
Absolutely Real and Objective: 44
Nonluminous (Purely Reflective): 43
Absolutely Rigid: 43
Wearless, Changeless: 42
Absolutely Lifeless: 40
Parts Few: 40
Solid: 38
Purely Macroscopic: 36
Increate: 33
Immortal: 31
Absolutely Insensitive: 31
All-Visible (All Surface Or Side): 25
Chemically Inert: 25
Without Structure, Parts, Or Content: 22
Absolutely Hard: 17
Finite Beauty: 9



Charts for the Mind

1984 F 5
ideonomy
ILLUSIONS/MEASUREMENT
/error/assumption

total items: 23

ILLUSIONS OF MEASUREMENTS

NOTE: Function of this list is to exemplify a single, random entry of the chart "What Are All the Illusions Of...?" The examples that it provides of metrological illusions are clearly not instantial but abstract; a supplementary list of concrete examples would be desirable.

1 That the results of measurement are independent of—and unaffected by —the process of measurement;
2 That the process of measurement is simple and direct, involving no assumptions;
3 That measurements have no need of being repeated (i.e. confirmed);
4 That once something is measured it will necessarily stay the same forever, or be the same if measured even an instant later;
5 That there is only one way of measuring something, or that one type of measurement is sufficient and equivalent to other types;
6 That as measurement progresses the result must be monotonic—a "progressive approximation, convergent to a limiting value, surface, structure, equation, or the like";
7 That the meaning of the general concept of "measurement" is fundamentally understood;
8 That an approximate measurement—no matter how precise—is absolute, or equivalent thereto;
9 That the process of measurement is automatic, involving no 'arbitrary' decisions (compare #2);
10 That everything is measurable and quantifiable (at any finite moment in history);
11 That measurement can completely obviate or supersede thought;
12 That mensuration is purely objective, involving no illusions (compare ##2 & 9);
13 That measurements are necessarily additive, or their proper algebra obvious, known, or even unique;
14 That things to be measured are necessarily the right things to measure;
15 That small things, or measurements, are necessarily less—and cannot be more—important than big ones;
16 That the process of measurement is—or things measured are— necessarily linear;
17 That the results of measurement are unambiguous;
18 That measurement is independent of all conditions and circumstances;
19 That measurement is ever truly unidimensional;
20 That the things to be measured or that are available for measurement —or that the set of meaningful, immediate, or creatable measurables of any given phenomenon, experiment, situation, or entity—are finite;
21 That mensuration is not in essence anadescriptive (hierarchically self-infinite, infinitely recursive or Lobachevskian, exponential);
22 That the set of all possible or proper ways of correlating—and the total information extractable, and conclusions derivable, from— the data resulting from an act of measurement are finite and small;
23 That the complexity of the total set of things that might falsify measurements—or that is intrinsic to the measuring process, apparatus, theory, mathematics, or methodology—must be, or probably is, finite and known.

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total items: 49

1984 Ap 14
pure ideonomy
ILLUSIONS

PRINCIPLES FOR TREATING ILLUSION

NOTE: These are various principles serving the treatment of illusion by pure and applied ideonomy.

1. All things (all acts, ideas, phenomena, realms, perceptions, principles, methods, logics, philosophies, sciences, objects, processes, states of being, etc) embody or involve an infinity of different illusions.
2. All things embody or involve an infinite range of illusions.
3. All things embody or involve an infinite—and infinitely complex and specific—structure and network of illusion.
4. All things illustrate an infinity of general illusions.
5. Any given thing simultaneously exemplifies certain generic illusions in an infinity of different ways, senses, and respects.
6. All things embody, exemplify, or relate to infinite sequences and series of illusions.
7. An infinity of degrees of illusion pertain to any thing.
8. All things embody or involve infinite hierarchies of levels of illusion.
9. All illusions are infinitely interconnected.
10. Illusions are intertransformable, and are both equivalent and non-equivalent in an infinity of ways.
11. There exists an infinite taxonomy of infinitely-many categories of taxa of genera of species of types of individual illusions (both actual and potential).
12. All finite illusions can be transcended, removed, or circumvented.
13. Illusions themselves are or involve (an infinite degree and variety of) illusions, and series of illusions of illusions of illusions... ad infinitum.
14. Illusions can be mass discovered and mass transcended; the overall process of discovering and transcending illusions can be accelerated exponentially ad infinitum et aeternum.
15. Illusions can be usefully manipulated and otherwise exploited.
16. "Truth" may be the process of transcending illusions itself.
17. Illusions often simultaneously embody, approximate, or relate to great truths.
18. Transcending illusions can lead to the acquisition of power(s), to new resources, or to unusual opportunities.
19. Transcending illusions can simplify, correct, or extend one's world view.
20. Transcending illusions can lead to insights into oneself.
21. Transcending or controlling illusions can lead to new and higher forms of beauty or art.
22. In a sense, all illusions are finite.
23. Illusions are generated—and can be discovered, described, and controlled—by an infinity of independent, dependent, interdependent, and synergistic laws, principles, physical effects, etc.
24. An infinite number of orthogonal dimensions of illusion exist or are possible.
25. Paradoxically, in various senses, the 'total quantity' of illusion is—and will necessarily always be—absolutely conserved, invariant, and inalterable.

(2) "Principles For Treating Illusion"

26. An infinity of illusions are 'symmetric' to every truth.
27. There are an infinity of potential and actual causes, sources, bases, and mechanisms of illusions.
28. The set of all illusions—and any given illusion—have an infinity of (serial and parallel) effects, consequences, corollaries, and implications.
29. There are infinite sets and groups of illusions.
30. It is impossible to eliminate all illusion.
31. There is no greatest illusion; beyond every known illusion there will always be others that are proportionately or arbitrarily more: important, fundamental, universal, ubiquitous, enduring, strange, hidden, complex, elementary, 'amorphous', multidimensional, supreme, horrifying, central, protean, subtle, demanding, absolute, etc ad infinitum.
32. Truth and illusion, paradoxically, are infinitely interwoven, intimate, antisyzygial, contrapletal, concinnous, equivalent, and coinfinite in and as the greater nature of things; there is no absolute difference between them.
33. Illusions have an infinity of correlates and relata.
34. Every truth embodies or relates to an infinity of actual or potential: illusions, delusions, fictions, errors, fallacies, stupidities, omissions, neglects, superficialities, begged questions, misconceptions, misrepresentations, distortions, excesses, abuses, oversimplifications, expediences, artifices, confusions, misperceptions, mistreatments, idealizations, projections, circularities, etc ad infinitum.
35. Every illusion may be part of one or more larger illusions (super-illusions) and may itself contain or imply lesser illusions (sub-illusions).
36. Every illusion may overlap or be constellated with other illusions in various ways, degrees, senses, modes, etc, and these overlaps or relationships may be symmetric or asymmetric, transitive or intransitive, contingent or necessary, determinate or indeterminate, etc ad infinitum.
37. Illusions may display complex behavior: develop, evolve, transform, intensify, weaken, fade away, oscillate, alternate, replace one another, compete, interfere with, enhance, or otherwise modify one another, move, multiply, split, merge, exponentiate, combine with one another in complex patterns, hide one another, maintain one another, etc ad infinitum.
38. The set of all illusions is infinitely dense, clustered, structured, and ordered; its ultimate structure—if any—is unknown and probably incogitable.
39. There can be infinite virtual—and infinitely virtual—illusions.
40. Illusions can have infinite, and infinitely complex, dynamics.
41. There exists—both in and as the world and in and as man's mind—a finite-cum-infinite 'illusion space' that awaits exact investigation and characterization by future ideonomists; future knowledge must be partially inserted in this natural or receptacle-like space.
42. There exist an infinity of conjugate illusions.

(3) "Principles For Treating Illusion"

43. The set of instruments, materials, and other means that can and must be devised for treating illusion is infinitely large, diverse, and encompassing.
44. Illusions cause other illusions.
45. Illusions cluster.
46. A given illusion tends to have many concauses—often operating at different levels.
47. A typical illusion simultaneously has many aspects and dimensions.
48. Most illusions reappear periodically.
49. In various senses, everything is an illusion.

SPECULATIVE ILLUSIONS

NOTE: 'Speculative' means that the illusion referred to may or may not be real—or the thing referred to may or may not be illusory. Either the evidence that present-day experimental data, theory, and logic provide is too poor to decide whether the illusion is real, or it makes the reality of the would-be illusion seem less than probable. Yet all of the hypothetical illusions that are included in the list below are reasonable, and good arguments can be made in support of their reality.

1 Universe has no center
Only one 4-dimensional spacetime
Dysteleology (absence of purpose in Nature)
Exceptionless laws
5 'Difficulty' intrinsic and absolute
Self
Absolute truth
Running down of the universe
State-specificity of society (as opposed to a fundamental indeterminacy, or intrinsic and irreducible ambiguity, of its would-be 'states')
10 Irreconcilable opposites
Eternal values
Finite causes
Impotence of the individual
Progress
15 Free will
Divisibility of reality
Uniqueness of physical reality (continuity of the world, uniqueness of causal regularity)
Physical-mental heterousia
Absolute size (or unique spatial order and hierarchy)
20 Complex causes
Morphological complexity
Absolute nothingness
Chance (absolute randomness)
Absolute shape or structural order (self-structure)
25 Time (or unique temporal order and hierarchy)
Identical things
Absolute laws
Finite cosmos
Eternal laws
30 That some things are truly impossible
Self-existence of external reality
Simplicity of universe (or finite complexity of anything)
Complexity
Absolute necessity (that some things are really necessary)
35 Objective reality of three-dimensional space
Space merely three-dimensional
Energy-matter dichotomy
Absolute independence of events (of any physical events in the cosmos)
Human diversity
40 Measurable intelligence
That anything is final
Absolutely fundamental things
43 Delomorphous being

(2) "Speculative Illusions"

44 Finite beauty
45 Unique probability
Necessity of one's own existence
Prosotemporal time (forward-directed)
Human finitude
Absolutely pure (or applied) research
50 Lifeless matter
Absolutely sufficient knowledge
Nature natural
Stability and safety of sun
Absolute oblivion (that we ever truly forget anything)
55 Openness or infinitude of universe (of space, time, etc)
That Nature truly forgets (anything)
Stability of solar system
Aristotelian two-valued logic (absolute truth and falsehood)
Multitudes of copies (or types) of particles (as opposed to a universe of one 'particle')
60 Elementary particles
Reality only finitely strange
Ontogenesis of intelligence (as opposed to its natal preexistence)
Ultimate limits
Phenotypal monogenicity
65 Non-expedient truth
Unanalyzable things
Transcendental, eternal ideas
Eternal matter
Knownness of history
70 Ultimate elements
Universal yardsticks and measures
"Physical separability"
Different sciences
All forms of absolute continuity (of rotation, structure, energy, etc)
75 That science sculpturally converges to a unique eliminational truth
Cosmic importance of man
Man the summit of evolution or highest terrestrial species
Personal identity (separate and unique individuality)
Psychic singularity (as opposed to polypsychism)
80 Unevolved cosmogonic entities
1 + 1 = 2
Expansion of universe
Complexity of brain
Necessity of precise mathematics (as opposed to only very approximate mathematics)
85 Human intelligence
Chaotic appearance of civilization
Knowledgeability of "experts"
Concreteness (as opposed to abstractness) of consciousness
Identity of percepts among different people
90 Logical neutrality of human languages

KNOWN ILLUSIONS

NOTE: 'Known' simply means that at the present time the thing referred to is thought to have been experimentally, theoretically, or logically shown to be an illusion. But in certain cases the evidence for the illusoriness of the thing is poor, and in no case can it be said to be absolute. There is no clear dividing line between the set of 'known' and the set of 'speculative' illusions; rather, they intergrade. It is also true that the illusions being referred to often have many different forms, dimensions, or aspects, and the status of such may be quite different.

1 Intrinsic color
Natural anomalies rare
That what we know is known to us
5 Unambiguous statements
Separability of form and content
Political power
Most of the cosmos visible
Absolute tragedy
A greatest class of numbers
10 Validity of habits
"Action at a distance"
Objective self-image
Rising and setting of the sun, moon, and stars
Flatness of earth's surface
15 Stable, static universe
Human perfection
Uniqueness of the present
Eternal solidity
Absolute time
20 Euclidean space
Unique causes
Transcendence of history
Linear progress
Purely macroscopic world
25 Mathematical points; physical reality of any mathematical object
Solid matter
Finite responsibility
Placid matter
Absolute tastes or sensa
30 Self-sufficiency of the individual
Opaque matter
Absolute motion
Effectlessness
Finite consequences
35 Absolute beauty and ugliness
Omniscience
Absolute good and evil
Human simplicity
Human rationality
40 Normality
Stability of civilization
Non-peculiarity of self
43 Human equality

44 Perfection in Nature
45 Simultaneity
Instantaneous light transmission
Superiority or uniqueness of one's culture
Human wisdom
'Superficiality' of reality
50 Exhaustiveness of history
Instantaneous body-world interaction
Word-thing or concept-thing identity
Knowledge greater than man's ignorance
Stereotypes
55 Human redundancy
Prosaic nature of existence
That energy is lost
'Bigness' of earth
60 Geocentric universe
Solar constancy
Constant perceptual vigilance
'Essences'
Reliability of orthodoxy
65 Reliability of the senses
Reliability of common sense
Reliability of mass opinion
Reliability of 'proofs'
Reliability of intuition
Reliability of experimental data
70 Countable sensa
Disinterestedness of perception
Resources infinite
Resources finite
'Enough'
75 Linear relationships
Unique things
Direct, unmediated experience
Absolute authority
Pure reason
80 Unbiased thought
Non-analogous things
Single answers to questions
Disorder
(All forms of) absolute certainty
85 The present (its infinite thinness or absolute separation from the past and future)
Complete or great self-knowledge
Absolute objectivity (self-independent)
Smooth surfaces (e.g. absolute smoothness of a metal surface)
Science mostly complete
90 Understanding of one's real motives
Scientific mechanism (mechanomorphic cosmos)
Micro-temporal continuity of matter
Absolute astronomical voids and vacuums
Space independent of time
95 Omnipercipience (total visibility of Nature)

PREVIOUSLY SHATTERED ILLUSIONS IN THE SCIENCES

Shattered illusions in biology:

1. Illusion of finite, fixed set of immutable species.
2. Illusion of spontaneous, perpetual, ubiquitous regeneration of polyphyletic (or non-monophyletic) life (abiogenesis).
3. Illusion of all disease being nonbiological (chemical or physical?) in origin, and hence noncontagious.
4. Illusion that all organisms are macroscopic.
5. (Hence also) illusion that total population of all organisms on earth is but a trillionth what it actually is.
6. (Also) illusion that all biological parts and subsystems of organisms are macroscopic.
7. Illusion that all biological inheritance (and evolution) is lineal (vertical, without any being horizontal).
8. Illusion of the geographic immobility of terrestrial trees, shrubs and herbs.
9. Illusion of the absence of spontaneous ecological successions and other transgenerational regular rhythmic phenomena of ecosystems.
10. Illusion of a broad and wide gap between the behavioral, anatomical and physiological properties of (and supposedly defining) terrestrial plants and animals.
11. Illusion that no life could exist at temperatures much beyond 100°C.

The Ideonomic Division
STORIES AND AENOLOGY

PROLOGUE

Usually when one speaks of a "story" one means a narrative or account of events rather than the sequence of events in and of itself.

The ideonomist, however, uses the word in the latter sense, or with reference to sequences and series of events, structures and abstract types thereof, and the general mechanisms from which and by which events—of any sort—unfold. In other words, nature is perceived as the greatest storyteller.

The Modern English word "story" descends etymologically from Middle English's storie, it from Old French's estorie or estoire, they from Latin's historia (whence "history"); and the latter began in Ancient Greek, where it meant "inquiry, information, narrative, history".

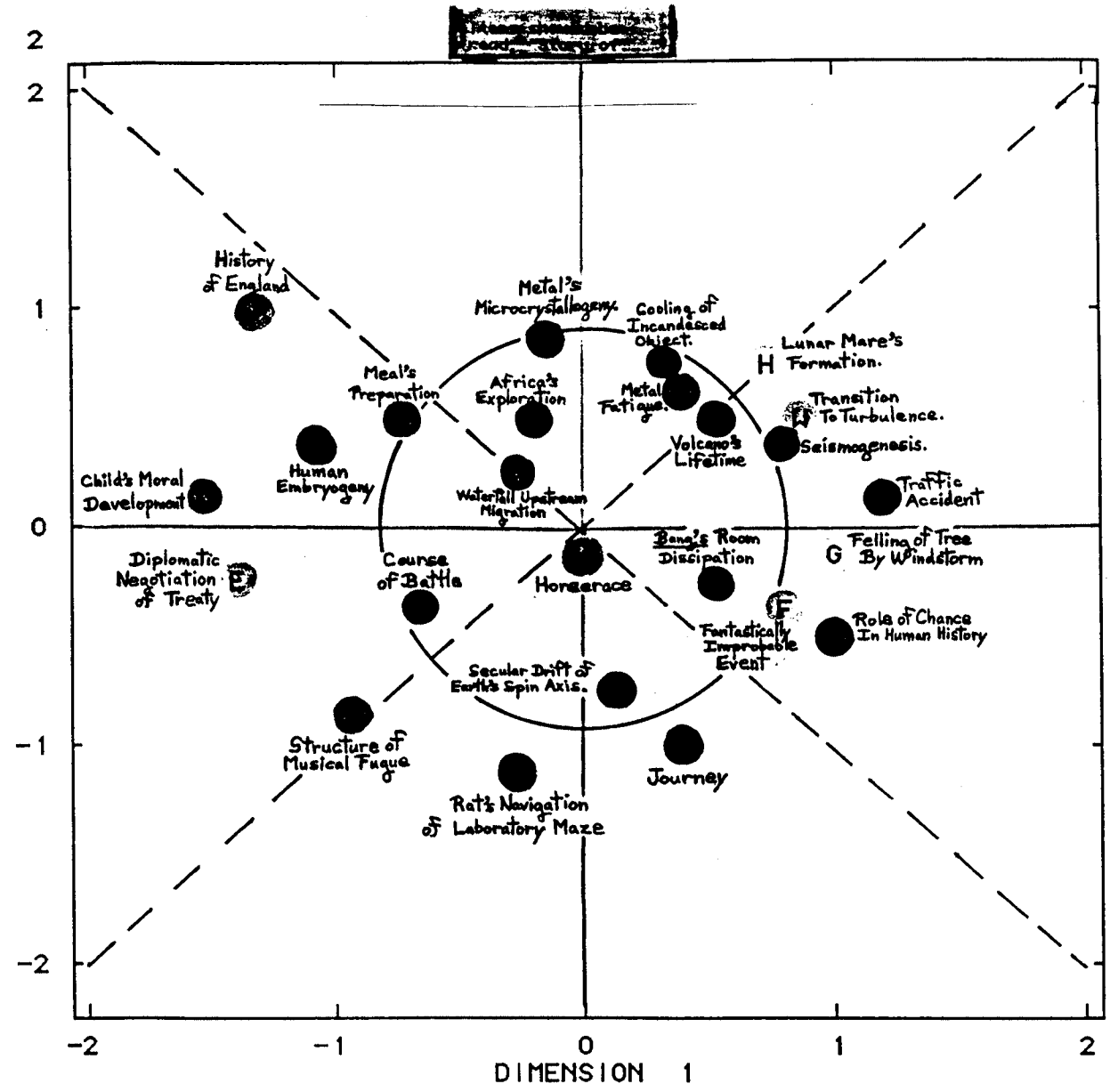
The present division of ideonomy is therefore closely related to HISTORIES AND HISTORIOLOGY. How precisely do these sororal divisions differ? Perhaps through an emphasis of the latter upon the external and contingent aspects of trains of events, upon quantitative matters and larger sequences, and upon mere facts and chronology; by contrast with a stress within the present division upon internal, necessary, and organic aspects of trains of events, upon qualitative matters and shorter sequences, upon semantic and cognitive dimensions of events, upon universal and timeless events and aspects thereof, and upon branching and nonlineal event structures.

Eventually it will become possible to draw clearer and more meaningful distinctions between all related divisions of ideonomy.

I first used the word story in an enlarged way during the early 1970s when I was trying to understand the human brain. I realized that inherited neural information—whatever its extent and diversity—might well occur in a form that was not then being actively considered: that of 'tales from the evolutionary past' and of 'traces of paleontological lives', or of 'specifically and irreducibly temporal (time-asymmetric) information'.

The taxonomy I was then constructing of all possible types of inherited neural information recognized a variety of compossible forms, aspects, and bases of such hereditary "stories". The welter of past lives and life episodes might be relived, reenacted, or remembered in each generation, or only when relevant, or only in whatever degree, sense, or element is instantaneously, contingently, plexurally, or synergistically relevant; ontogenesis or psychogenesis might be relived; nuances, bits, or gestalts of the lives and experiences of other bionts or species near and/or distant in evolutionary time might exhibit some complex or indeterminate interplay within the mind and behavior of all or specific bionts; there might be hereditary stories limited to beginnings, middles, or endings; stories might be chosen by the reenactive or phylogenetic genome for their—simple, hierarchic, serial, plexiform, latticial, vergent, or other—n-dimensional parallax or ambiguity; stories might be game-like or function axiomatically; stories might partake of the nature of mathematical groups, morphisms, categories, catastrophes, fractals, etc. The possibilities, in fact, were virtually endless.

Not just the inheritance but the simple representation of information in the brain may assume a story-like form. Memories, thoughts, perceptions, emotions, reasoning, consciousness, etc may all resemble or involve the equivalent of encephalic stories.



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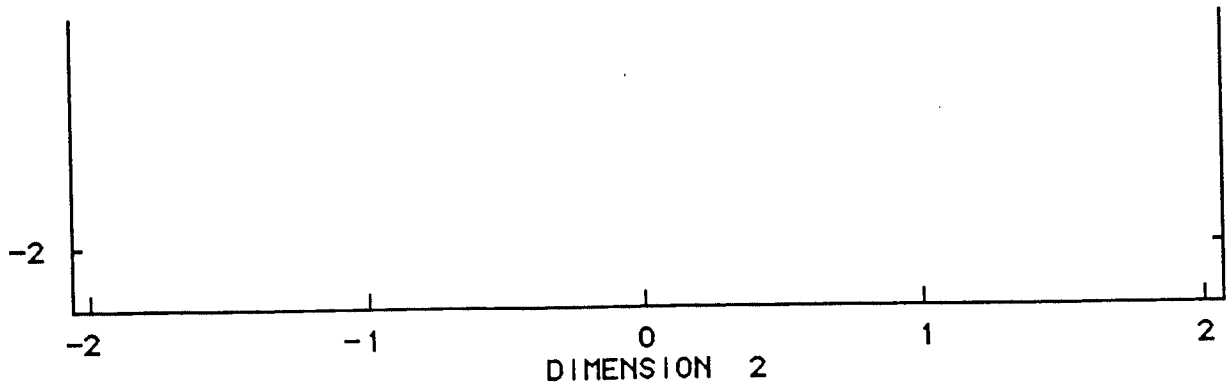
IDEOMAP CREATED BY MONADIC-SCALOR-SET METHOD OF nMDS;

IDEONOMIC DIVISION:

STORIES & Enology



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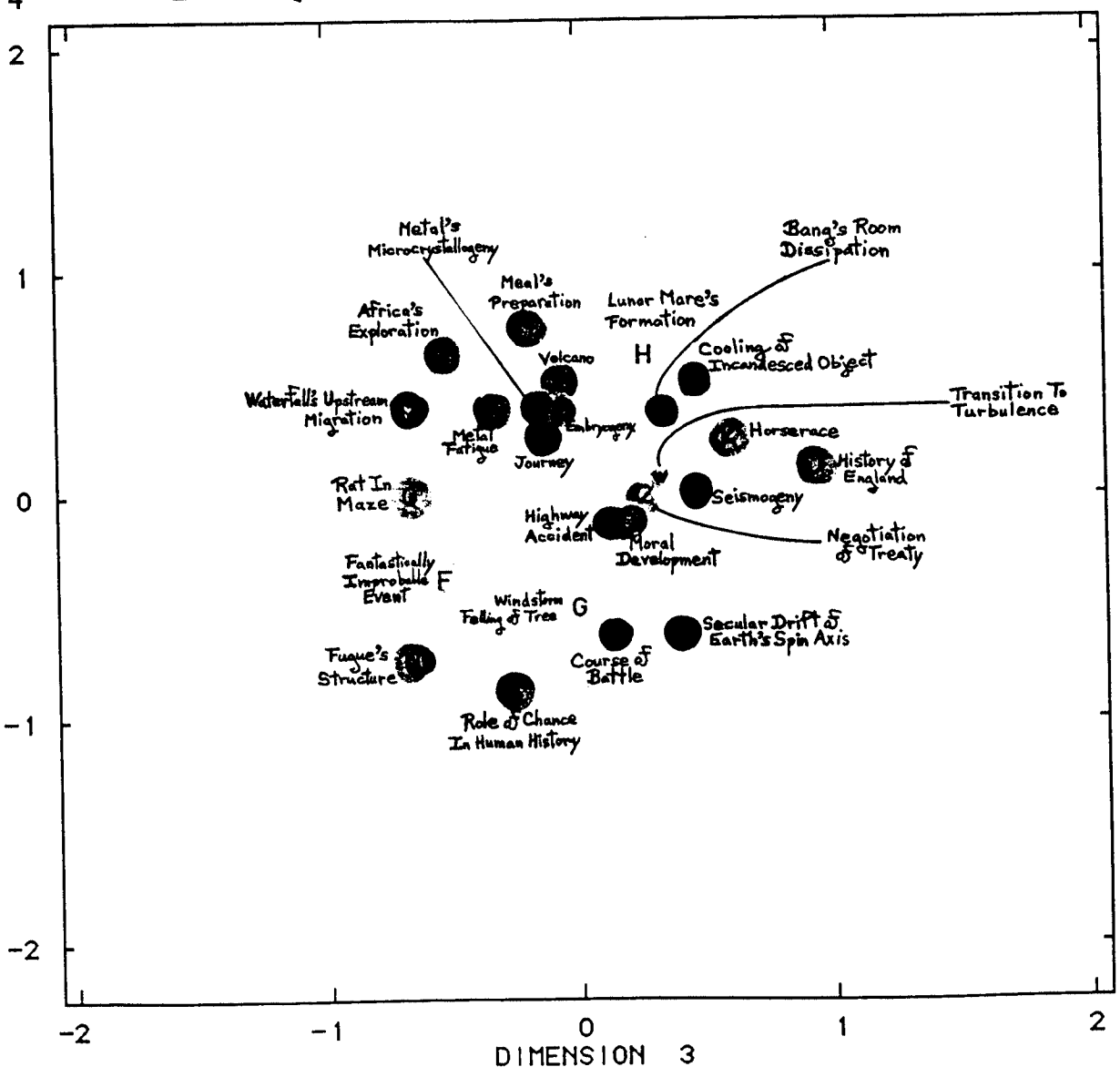
DIMENSION 4



NOTA BENE:

Items should be read, "Story of..."

INTUITED MUTUAL ANALOGOUSNESS OF "25 ALL-FIELD STORIES".
IDEOMAP CREATED BY MONADIC-SCALOR-SET METHOD OF nMDS;
1,875 Binary Decisions (25 Scalees x 75 Monadic Scalors);
IDEONOMIC DIVISION: 'STORIES AND ENOLOGY'.

Electrical stimulation of many parts of the brain, especially the anterior temporal lobe cortex, gives at least the appearance of releasing movie-like memories. Story-like aspects of human cognition, and the related cognition of music, would seem to be concentrated unilaterally, or in dextral parts of the cerebrum; or certainly this would seem to hold for the higher or most creative elements of what is story-like in man's intelligence.

Ultimately the neuroanatomy and neurophysiology of story-like faculties will be known *in extenso* and *de facto*, and the meaning and possibilities of stories in the ideonomic sense will be clarified as a direct result.

Impairment or malfunctioning of story-like centers and faculties of the brain would appear to be a major cause and/or symptom of many different forms of mental illness and deficit in man. The schizophrenic often has a profoundly suggestive inability to understand stories narrated to him, and to tell stories; or to make use of 'stories' to say and fathom things; or to assemble a living, growing, and flexible picture of the world as a whole; or to interact with and participate in that world. Because of his story-related agnosia and apraxia his mind, world, and existence are fundamentally static.

There is also evidence that a major way, if not the supreme way, in which children learn and develop psychically and intellectually is through their being told, experiencing, imagining, and 'retelling' stories—in both the narrow conventional and wider ideonomic sense.

The field of artificial intelligence has come to realize the vital cognitive importance of story-like information processing, and the fact that stories—like all other real-world phenomena—can be broken up into discrete, classifiable, and mechanically interacting elements.

Studies I did in physics later in the 1970s convinced me that the concept of a story should be extended even further or made absolutely universal, and that not only all physical phenomena but all things in general have story-like aspects or constitute stories. I realized that everything must have, if you will, a time-asymmetric side, and be 'telling an unfolding story about itself and the totality of physico-mental reality'.

So in a sense the present division is concerned with the systematic and progressive investigation of the totality of temporal aspects and processes of all things individually and collectively.

I often use two metaphors to explain the ideonomist's generalized idea of a story.

The first of these metaphors is the many-body systems of the physicist. Even though the physical universe consists at minimum of $\sim\sim 10^{79}$ or $\sim\sim 10^{88}$ supposedly elementary particles (or micro-entities), the fantastically pathetic fact remains that systems made up of fewer (corotating or interacting) particles than there are fingers on the human hand present problems for analysis so complex that their behavior still remains largely refractory to intuition, theory, and computation. No physicist who fails to blush when this fact is mentioned deserves to be taken seriously!

As knowledge of a many-body system grows, more predictions and retrodictions become possible. In a sense, therefore, it has a 'story to tell', a story that is closely bound up with the very nature of the system.

What are the phenomena of the world—including ideas, since they are mental, hence neural, and hence physical phenomena—if not many-body systems?

The second metaphor is musical melody. No one has ever developed anything even hinting at a universal taxonomy of (known and possible) melodies, even in the minimal, purely analogical or physically descriptive sense (much less in some homological, semantic, or cognitive sense).

What ideonomy is doing in calling attention to stories and the story-like aspects of things is, in a sense, merely asking the scientific community to enlarge the scope of its inquiry and thought by reconceiving and re-describing phenomena as being, in effect, not just elements of stories but tellers of stories themselves.

"38 TREATABLE GENERIC AND UNIVERSAL ELEMENTS OF 'STORIES'"

1. Alternations.
2. Circumstances, environments, settings, and situations.
3. Continuities.
4. Contrasts.
5. Critical moments or episodes, and turning points.
6. Difficulties, problems, and challenges.
7. Encounters and interactions.
8. Endings and ends.
9. Events and subevents.
10. Experiences.
11. Gains.
12. Goals.
13. Harmonies.
14. Helps.
15. Interdependences.
16. Interferences, conflicts, and opposition.
17. Interludes.
18. Interruptions and discontinuities.
19. Levels.
20. Limitations.
21. Losses.
22. Means.
23. Media.
24. Methods.
25. Origins and starts.
26. Perspectives (different perspectives).
27. Precursors, 'embryogeny', and 'promorphology'.
28. Random or chance events (contingencies).
29. Relationships.
30. Repercussions and consequences.
31. Repetition and cyclic processes.
32. Reversals.
33. Roles.
34. Side effects.
35. Stages and progressions.
36. Stimuli, causes, factors, and cofactors.
37. Tendencies.
38. Transformations and changes.

TABLE OF 117 EXAMPLES OF 'STORIES'
Occurrible, Tellable, Or Investigable

Embractive Subject:	Example of 'Story':
SOCIOLOGY, HISTORY	1. Story of ACCULTURATION BETWEEN TWO SOCIETIES.
AERONAUTICS, AERONAUTICS	2. Story of AERODYNAMIC COURSE OF PLANE FLIGHT.
BOTANY	3. Story of ALLELOPATHIC WARFARE BETWEEN NEIGHBORING PLANTS.
METEOROLOGY; APPLIED METEOROLOGY	4. Story of ANALYSIS PREPARATORY TO WEATHER FORECAST.
FORENSICS, SOCIOLOGY	5. Story of ARGUMENTATIONAL AND TACTICAL COURSE OF FORMAL DEBATE.
BIOLOGY; BIOCHEMISTRY	6. Story of ASSEMBLY OF GIANT PROTEIN MOLECULE.
METEOROLOGY, HYDROLOGY	7. Story of AVERAGE WATER MOLECULE COMPLETING ONE HYDROLOGIC CYCLE [itinerary, experiences, repetitions, diverse forces and mechanisms acting on, etc).
CRIMINOLOGY	8. Story of BANK ROBBERY.
ZOOLOGY; ETHOLOGY	9. Story of BATTLE BETWEEN ANT ARMIES.
ZOOLOGY; ETHOLOGY	10. Story of BIRD'S DISCOVERY OF TASTY SUBTERRANEAN EARTHWORM.
HISTORY, SOCIOLOGY	11. Story of BIRTH OF NATION.
MEDICINE, PATHOLOGY	12. Story of BODY'S RESPONSE TO INFECTION.
SPORTS	13. Story of BOXING MATCH.
SITOLOGY, FOOD INDUSTRY	14. Story of BREWING OF BEER.
ZOOLOGY; ENTOMOLOGY	15. Story of BUG'S EXPERIENCES WHILE TRAVERSING MEADOW.
ARCHITECTURE, CONSTRUCTION INDUSTRY	16. Story of BUILDING OF HOUSE.
GEOLOGY, OCEANOGRAPHY	17. Story of CAREER OF SEA-BOTTOM MANGANESE NODULE.
BUSINESS, LAW	18. Story of CASE OF INSIDER TRADING IN CORPORATE WORLD.
PHOTOGRAPHY, RECREATION, PSYCHOLOGY	19. Story of CASUAL IMPROVEMENT OF HOME-PHOTOGRAPHY SKILLS.
GEOLOGY	20. Story of CAUSATION OF GEOLOGICAL TRANSILIENCE.
SPORTS, RECREATION; GAMES	21. Story of CHESS MATCH.
EDUCATION	22. Story of CHILD'S FORMAL EDUCATION.
POLITICAL SCIENCE, PHILOSOPHY	23. Story of COEVOLUTION OF OPPOSED POLITICAL IDEAS.
ZOOLOGY; PALEONTOLOGY	24. Story of COMPLETE PALEOEVOLUTION OF HANDS.
SOCIOLOGY	25. Story of ONE MAN'S RANDOM 24-HOUR DAY.
PHYSICS; THERMODYNAMICS	26. Story of COOLING OF INCANDESCED OBJECT.
COSMOLOGY	27. Story of COSMOGONY.
MILITARY SCIENCE AND HISTORY	28. Story of COURSE OF BATTLE.
CRIMINOLOGY	29. Story of CRIMINAL INVESTIGATION.
CRIMINOLOGY	30. Story of CRIMINOGENESIS.
HISTORY	31. Story of CULTURAL ARBORESCENCE OF CIVILIZATION.
ECONOMICS, HISTORY	32. Story of CYCLICAL HISTORY OF WORLD ECONOMY.
GEOLOGY	33. Story of DEPOSITION OF STRATIGRAPHIC COLUMN OVER GEOLOGICAL TIME.
PSYCHOLOGY; CHILD PSYCHOLOGY	34. Story of DEVELOPMENT OF MORAL JUDGMENT IN CHILD.
PSYCHOPATHOLOGY, NEUROPATHOLOGY	35. Story of DEVELOPMENT OF SCHIZOPHRENIA IN PERSON.
GEOLOGY; PEDOLOGY	36. Story of DEVELOPMENT OF SOIL (pedogenic history).
DIPLOMACY	37. Story of DIPLOMATIC NEGOTIATION OF TREATY.
PHYSICS; ACOUSTICS	38. Story of DISSIPATION IN VAST ENCLOSURE OF SOUND OF DETONATION.
PSYCHOLOGY	39. DREAM.
ECONOMICS	40. Story of ECOLOGICAL SUCCESSION.
LINGUISTICS, HISTORY	41. Story of ETYMOLOGICAL HISTORY OF A LANGUAGE.
HISTORY	42. Story of EVANISHMENT OF FORMER GREAT CIVILIZATION.
CIVIL ENGINEERING	43. Story of EVENTS LEADING UP TO BRIDGE'S COLLAPSE.
PALEOCLIMATOLOGY, PALEONTOLOGY	44. Story of EVOLUTION OF EARTH'S ATMOSPHERE.
ART	45. Story of EXECUTION OF PAINTING.
LAW	46. Story of EXECUTION OF WILL.
LITERATURE	47. FAIRY TALE.
GENERAL	48. Story of FANTASTICALLY IMPROBABLE EVENT.
PATHOLOGY, MEDICINE	49. Story of FATAL HEART ATTACK.
METEOROLOGY	50. Story of FELLING OF TREE BY WINDSTORM.
GEOPHYSICS, METEOROLOGY	51. Story of FORMATION OF LIGHTNING BALL.
ASTRONOMY; ASTROGEOLOGY	52. Story of FORMATION OF LUNAR MARE.
GEOGRAPHY, HISTORY	53. Story of GEOGRAPHIC EXPLORATION OF AFRICA.
MUSIC, MUSICOLOGY	54. Story of GRADUAL PERFECTION OF MUSICAL THEME IN BEETHOVEN'S SKETCHBOOKS.
AGRICULTURE	55. Story of GROWING AND HARVESTING OF FARM CROP.
HISTORY, POLITICAL SCIENCE	56. Story of HISTORICAL ORIGINS OF DEMOCRATIC IDEAS.
HISTORY	57. Story of HISTORY OF DRESS.
HISTORY	58. Story of HISTORY OF ENGLAND.
SPORTS	59. Story of HORSERACE.
COMPUTER SCIENCE; ARTIFICIAL INTELLIGENCE	60. Story of HOW ARTIFICIAL-INTELLIGENCE PROGRAM IDENTIFIES FACE.
ZOOLOGY; EMBRYOLOGY	61. Story of HUMAN EMBRYOGENY.
METEOROLOGY	62. Story of HURRICANE'S INCEPTION.
IDEONOMY, HISTORY	63. Story of IDEONOMY'S ORIGIN.
INDUSTRY; CHEMICAL INDUSTRY	64. Story of INDUSTRIAL PRODUCTION OF PLASTIC PART.
BIOLOGY; NEUROSCIENCE	65. Story of INFORMATIONAL TRANSFORMATION OF SINGLE BRAIN NEURON OVER ITS CAREER.
PHYSICS; PARTICLE PHYSICS	66. Story of INTERACTIONS OF SUBATOMIC PARTICLES IN BUBBLE CHAMBER.
ZOOLOGY; ETHOLOGY	67. Story of INTERNAL THOUGHTS OF FISH ENGAGED IN COURTSHIP RITUAL.
HISTORY; HISTORY OF TECHNOLOGY	68. Story of INVENTION AND SUBSEQUENT IMPROVEMENT OF LIGHT BULB.
GEOGRAPHY OR LITERATURE (?)	69. Story of JOURNEY.
GEOLOGY; GEOMORPHOLOGY, GEOLOGIC HISTORY	70. Story of LAND-EROSION CYCLE.
ECOLOGY	71. Story of LIFELONG COEXISTENCE (co-lifetime) OF PAIR OF MUTUALISTIC SYMBIONTS.
MATHEMATICS	72. Story of LOGICAL STEPWISE UNFOLDMENT OF 500-PAGE MATHEMATICAL PROOF.
CINEMATOGRAPHY	73. Story of MAKING OF MOTION PICTURE.
HOME ECONOMICS, SITOLOGY	74. Story of MEAL'S PREPARATION.
MATERIALS SCIENCE; METALLURGY	75. Story of MECHANICAL FATIGUE OF METALLIC PART.
MATERIALS SCIENCE; METALLURGY	76. Story of MICROCRYSTALLINE GROWTH OF PIECE OF METAL.
GEOLOGY; HYDROLOGY	77. Story of MIGRATION OF LARGE RIVER OVER PLAIN.
NOOLOGY, IDEONOMY	78. Story of MIND'S SOLUTION OF PROBLEM.
PSYCHOLOGY, SOCIOLOGY	79. Story of MISUNDERSTANDING BETWEEN TWO PERSONS.
MICROBIOLOGY	80. Story of MITOTIC CYCLE.
INDUSTRY, TECHNOLOGY; METALLURGY	81. Story of MULTISTAGE INDUSTRIAL PROCESSING OF ORE.
JOURNALISM	82. NEWSPAPER STORY.
MICROBIOLOGY; BACTERIOLOGY	83. Story of ONE BACTERIUM'S LIFETIME.
PSYCHOLOGY, NOOLOGY	84. Story of ONTOGENY OF HUMAN INTELLIGENCE (noogeny).
ELECTRONICS	85. Story of OPERATION OF MICROELECTRONIC CHIP.
SOCIOLOGY, PSYCHOLOGY	86. Story of OUTBREAK OF MASS HYSTERIA.
FUTUROLOGY (MELLOLOGY)	87. Story of POSSIBLE FUTURE COURSE OF CIVILIZATION OVER NEXT 100 YEARS.
BIOLOGY; PALEONTOLOGY, THEORETICAL BIOLOGY	88. Story of PREBIOTIC EVOLUTION.
SOCIOLOGY, ETC	89. Story of PROCEEDINGS OF COMMITTEE SESSION.
PHILOSOPHY, PSYCHOLOGY; ETHICS	90. Story of RATIOCINATION LEADING TO ETHICAL DECISION.
ZOOLOGY; ETHOLOGY	91. Story of RAT'S NAVIGATION OF LABORATORY MAZE.
CHEMISTRY, PHYSICS	92. Story of RELAXATION OF EXCITED MOLECULE.
TECHNOLOGY; ELECTRONICS, REPAIR INDUSTRY	93. Story of REPAIR OF BROKEN RADIO BY REPAIRMAN.
HISTORY	94. Story of ROLE OF CHANCE IN HUMAN HISTORY.
BUSINESS	95. Story of SALES PITCH.
GEOPHYSICS, ASTRONOMY	96. Story of SECULAR DRIFT OF EARTH'S SPIN AXIS.
GEOPHYSICS; SEISMOLOGY	97. Story of SEISMOGENESIS OR SEISMIC CYCLE (events leading up to earthquake).
SANITARY ENGINEERING, SOCIOLOGY	98. Story of SEWER-WORKER'S WORKDAY.
LITERATURE	99. SHORT POEM.
HISTORY; POLITICAL HISTORY	100. Story of SIGNING OF "MAGNA CARTA".
BIOLOGY; BIOCHEMISTRY	101. Story of SINGLE KREBS (citric acid) CYCLE.
CHEMISTRY	102. Story of START AND COMPLETION OF CHEMICAL REACTION.
ASTRONOMY; ASTROPHYSICS	103. Story of STAR'S TRANSFORMATION INTO SUPERNOVA.
MUSICOLOGY	104. Story of STRUCTURE OF MUSICAL FUGUE.
HISTORY OF SCIENCE, SOCIOLOGY	105. Story of SUPERSESSION OF ONE PARADIGM BY ANOTHER IN SCIENCE.
LITERATURE; LITERARY CRITICISM	106. Story of SYSTEMATIC ANALYSIS OF NOVEL.
HISTORY; TECHNOLOGIC AND SOCIAL HISTORY	107. Story of TECHNOLOGY'S HISTORICAL ROLE IN SOCIOGENESIS.
MATHEMATICS, HISTORY; TOPOLOGY	108. Story of TOPOLOGY'S HISTORICAL DEVELOPMENT.
TRAFFIC SCIENCE	109. Story of TRAFFIC ACCIDENT.
PHYSICS, MATHEMATICS, COMPUTER SCIENCE	110. Story of TRANSITION TO TURBULENCE AS SIMULATED ON COMPUTER.
BOTANY; PHYTOPATHOLOGY	111. Story of TREE'S SENESCENCE.
ANTHROPOLOGY	112. Story of TRIBAL RITE OF PASSAGE.
AGRICULTURE, APPLIED IDEONOMY; POMOLOGY	113. Story of USE OF IDEONOMY IN POMICULTURE.
HISTORY, ART; ART HISTORY	114. Story of VICISSITUDES OF ARTISTIC STANDARDS.
GEOLOGY; GEOMORPHOLOGY, GEOPHYSICS; VOLCANOLOGY	115. Story of VOLCANO'S LIFETIME.
GEOLOGY; GEOMORPHOLOGY, HYDROLOGY	116. Story of WATERFALL'S UPSTREAM MIGRATION.
BOTANY; PHYTOGEOGRAPHY, ECOLOGY	117. Story of WEED'S GEOGRAPHIC SPREAD.

ELEMENTS OF 'STORIES'

The most diverse stories, and stories in every field, share common elements: features that recur, systematically, again and again.

Such general aenologic elements have many uses, values, and raisons d'etre.

They can be used to describe, interpret, classify, compare, explain, build, transform, control, direct, improve, discover, and teach—or to automate the generation of—stories. They can be used to criticize or evaluate stories, or to make predictions. They can cause one to find things present in stories that would otherwise have been overlooked, or to notice what is missing in an accidental or essential way. They can provide clues to the fundamental structure of stories. Of course they can contribute to the establishment of aenology and to its ongoing evolution.

The early organon "38 Treatable Generic and Universal Elements of 'Stories'" (vide) can and should be greatly extended, structured, and criticized at a later date, and its entries should be defined and equipped with one or more types of sublists (of subelements, etc).

But let us now consider it in its present form, item by item.

(1) ALTERNATIONS.

In the story of the Earth's tides, the flood and ebb tides alternate with one another in an endless chain complicated by spatiotemporal variations in local and global geography and hydrography, by the interactions of different tides, and by the history and evolution of the universe.

The life of organisms, similarly, may oscillate between active and quiescent phases, and an even bigger biological story resides in the complex and total confluence, multiplexing, interaction, diffluence, and seemingly contradictory vergence of manifold oscillations and alternations that forever occur within, between, and beyond individual organisms and larger systems thereof.

The story of the education of a child alternates between the world and the internal universe of the child's mind, between the child and its teachers, between domiciliary and institutional learning, between phases of absorption and consolidation, between questions and answers, between simplicity and complexity, between belief or acceptance and skepticism or rejection, between induction and deduction, between imagination and empiricism, and so forth.

One might speculate that, for a full and proper story to be told, alternations will have to be taken into account in the future between: molecules and their environment (say in a sequential exchange of reciprocal integrations or adjustments of complex internal and external patterns), the brain's neurons and glias, compresent or mutually successive biological communities, irreconcilable or complementary political ideas, inversions of sociocultural practices, contradictory psychological states, antipolar internal states of the Earth, genomic and somatic (essentially extra-genomic) regulation of organisms, opposite states (and hyper-states) of matter—or of energy or other relationships—of the universe, opposite computational representations of information, etc.

(2) CIRCUMSTANCES, ENVIRONMENTS, SETTINGS, AND SITUATIONS.

These are not an irrelevant, and they need not be an extrinsic, element of stories. Stories originally derive from, and ultimately return to, these things. Both continuously interact and may regulate one another, doing so at an enormous range of scales and within innumerable quantitative and qualitative hierarchies, networks, series, chains, multidimensional manifolds, vergences, and other metastructures and meta-systems. Stories themselves constitute environments and circumstances, and the latter in turn represent stories; reality consists of a limitless confluence, diffluence, and cybernetic ocean of stories and story-environment symmetries.

To tell the story of a horserace fully mention might be made of the time of day, season, weather, track name and location, spectators, racing order, history and form of competing horses, riders, distribution of bets, track ground condition, appearance of the surrounding countryside, etc.

To relate the history of dress the specific and changing physical and social situations for which the peculiar items of wear were designed would be among the things that it would be appropriate to research, describe, and closely correlate with the haberdashery and finery.

What are the circumstances of a fatal heart attack: the victim's health history, physical and social activities at the time, prior meal, unknown workings of other bodily organs and systems, and so forth?

(3) CONTINUITIES.

What things that existed or were happening prior to a story continue—the same or altered—into or throughout the story, what originates within but continues throughout the story, and what thing or things persist beyond the story, or perhaps relate the story to the larger story of the environment, universe, or mind of the observer or participant? In short, what are the elementary and holistic spatial, temporal, and qualitative continuities driving or manifest within, or otherwise associated with or perhaps merely analogous to, the story? Most grandly, how is any actual story an integral part of the huge or infinite system of all possible stories, or of the implicit stories of the human mind or of human values?

Say the story is that of a fantastically improbable event. Since the world necessarily includes even such events, and indeed is influenced in critical ways by such events, there are continuities to explicate in stories that are arbitrarily improbable, and continuities of the latter to their opposite: stories whose probability of occurrence, or of having had to occur, is arbitrarily high.

Say the evolution of Earth's atmosphere is the story. Any discontinuities that may have occurred can only be understood completely by reference to the concomitant and overriding—or overthrown—continuities. Fluctuations of certain gases, temperature, and humidity need to be interrelated with the matrix of static and dynamic continuities.

(4) CONTRASTS.

Where the story is a fairy tale the role of contrasts is obvious: ones of good and evil, of riches and poverty, of success and failure, of the natural and supernatural order, of the ordinary and extraordinary, of before and after, of the wise and foolish, etc.

If the story is that of the complete paleoevolution of hands, a relevant element would be the contrasts between what preceded and followed, what happened and what might have happened, what happened in different species or the most remote taxa, what evolved for the hands and instead evolved for the feet, between the fates of purely physiological systems, or between the phylogenesis and the ontogenesis of the hands.

Assume instead the story is that of a rat's navigation of a laboratory maze. Significant aenological contrasts would occur in the behavior of the rat upon first entering and when deep within the maze, between the purpose he would exhibit when retracing a path and pioneering—or simply crossing — it; between the rat's conduct in cyclic and acyclic parts of the labyrinth, or in similar or dissimilar neighborhoods; or in the courses or logics of two rats placed in the maze together.

(5) CRITICAL MOMENTS OR EPISODES, AND TURNING POINTS.

In many stories, or many cases, these are all-important, and are almost the essence of the story. Thus the story may be that of a transformation, surprise, revolution, reversal, inversion, liberation, discontinuity, culmination, catalytic event, illumination, intersection, divergence, or the like.

Perhaps the story is that of the ontogeny of human intelligence (noogeny). It is known that such development occurs in a stepped, broken, divergent, and metamorphic fashion. Only once certain things have been learned or accomplished can other things be learned or accomplished. Some noogenetic stages may resemble phase changes of matter.

In the case of the story of the birth of a nation, an intolerable act of the mother country, discovery of a new land or the major wave of immigration into it, revolt against an imperial country, armed revolt, or the formation of an official or general government would all be illustrative of this generic element of stories.

In the story of the migration of a large river over a plain, critical moments might be the sudden switching of the river into an old river basin or new valley or at and along a transverse fault, commencement of an episode of tectonic uplift or subsidence, a change to a period of wetter climate, anastomosis with another major stream, or a sudden persistent increase of sediment load and resultant sedimentary shallowing of the river basin.

(6) DIFFICULTIES, PROBLEMS, AND CHALLENGES.

Stories often concern confrontation with and resolution of such things. Stories are processes of unfolding and impediments to such unfolding, or to the natural flow of events, may arise.

This story element was exemplified in the geographic exploration of Africa by: fierce beasts encountered, diseases and their vectors, brutally arid and torrid climates; superstitious, belligerent, and unpredictable aborigines; rugged, often mountainous terrain; uncrossable and unnavigable rivers, tongues little or not known, unfamiliar and toxic flora, mapless domains, unreliable supplies, elusive support of expeditions, impenetrable jungle and swampland; isolation, loneliness, and doubts; undisciplined native help; etc.

In the case of the story represented by prebiotic evolution there must have been the difficulties and problems of: narrow critical conditions, rival molecular structures and systems, disruptive environmental fluctuations, improbable conditions (perhaps), unstable and unreliable mechanisms, parasitic processes, deleterious self-effects, excessive variation, undesirable couplings, irredundancies, overspecializations, absence of high-level homeostatic and directive processes, the need for a universal code, etc.

In the assembly of a giant protein molecule problems might be associated with defective RNA or DNA, scarcities of certain amino acids, environmental disturbances, delicate segments or fragile stages, stochastic construction mechanisms, spontaneous conformational changes, unsynchronized events, etc.

(7) ENCOUNTERS AND INTERACTIONS.

In the story of the signing of the Magna Carta there was the encounter and interaction of the English King John and his barons, but also of the nine or so groups of sixty-three (traditionally discussed) clauses, for by appearing in one place, affixed to one document, they inevitably had implications for one another in subsequent English and global history.

If the story is that of a volcano's lifetime, one could speak of encounters and interactions of the rising preeruptive magma and the subsequently disrupted surface of the Earth's crust, of the magma and the atmosphere, of the ascending magma and rock types and layers encountered en route, of the advancing magmatic tube and faults, joints, and other crustal discontinuities, and perhaps even of anastomosing volcanic tubes.

In the story of a weed's geographic spread the weed will encounter and interact with other plants, other weed species, and even intersecting fingers of its own population.

(8) ENDINGS AND ENDS.

The story of a waterfall's upstream migration may end with a loss of slope in the land passed through, the appearance of softer rock, or arrival at the maternal lake from which the cataractal river issues.

The story of a traffic accident might variously end with the coming to rest of the two cars that may have collided, the disappearance from the scene of the damaged vehicles or their drivers, or the resolution of the induced traffic tie-up.

(9) EVENTS AND SUBEVENTS.

In the story of a battle between ant armies there must be various types of events and subevents just as there are in encounters between human armies. Advances and retreats, perhaps, but also rotations, flank attacks, convergences and dispersals, collisions of advancing waves of legions, mop-up operations, pursuits of flights, first tentative encounters, unexpected recoveries and routs, preliminary maneuvers, forkings and anastomoses of a column, mistaken movements, consolidations, orderly groupings, etc. Even these few suggestions are enough to ignite a barrage of scientific questions and a stream of additional ideas for what might reasonably or conceivably be.

(10) EXPERIENCES.

In the course of a bird's discovery of a tasty subterranean earthworm the bird can be expected to have many experiences that add to the overall story: an encounter with a friendly or rival bird that is worming as well, mid-air swaying of the bird's body by a puff of wind, landing on a pebbel that was hidden beneath a leaf, false leads, near-captures of overly deep or muscular worms, etc.

(11) GAINS.

This generic element of stories would be illustrated in the building of a house by the ultimate gaining of the house by a family and of a family by the house, of shelter, silence, security, and privacy, of reinforcing or synergistic strength as the many diverse and complementary posts, beams, and slats of the house were put into place, etc.

In the story of a boxing match the contestants would experience manifold gains and losses in the course of their encounter: as foot slipped against floor, trip led to advantage, forehead blood flow impaired an opponent's vision, one fighter achieved a surprise, and the like.

(12) GOALS.

If the story is that of the analysis preparatory to a weather forecast there could be many alternative or simultaneous goals, goals that might or might not be ones that the meteorologists consciously have in mind in the course of their analysis. One such goal might be to see if there is anything really new since the last forecast, possibly something that invalidates the old forecast or requires its revision or at least its supplementation. The goal might be to determine what goal is appropriate or what set of goals there are to pursue. Perhaps the goal is to (successfully) plot a particular storm system, or to formulate the consequences of the weather's development for a particular city or event.

In the story of a sales pitch there could be various sub-goals: to distract the potential buyer's attention from whatever held his attention prior to the arrival of the salesman, to anticipate the former's questions, wants, needs, or objections, to divert the interest of same from defects of the product, to diversify the buyer's interests in such a way as to secure a multiple purchase, to convince the buyer that the salesman is his best friend or neutral on the sale, etc.

(13) HARMONIES.

The story of the building of a house can abound in harmonies: the harmony of that being erected with the architectural plans, or with the desires, expectations, and character of the married couple who are financing the construction; the harmony of the new house with other houses in the neighborhood, or with the aesthetics of the landscape; the harmony of the construction workers' and specialists' needs with what was foreseen by the manufacturers of the parts, materials, and tools used in the building's construction; the harmony of the different specialists—of the masons, carpenters, electricians, plumbers, painters, and landscapers—who collaborate on the task; the diachronic harmony of the different phases of the house's construction; and the grand harmony of all of these separate but interrelated harmonies in the realization of a suitable dwelling.

(14) HELPS.

In the story of the brewing of beer the helps might include: the formulas and refined skills of the industry, food and chemical additives, temperature regulation, the slow processes of time, mechanical overturn of the contents of a tank, careful step-by-step measurements and adjustments, etc. Novel helps might be tried in the future: electricity, say, or synthetic proteins, mosaic packages of DNA or RNA rather than simple genomes, mechanical tasters or smellers, laser spectroscopy, or ultrasonic microcavitation.

Was the story of prebiotic evolution a rather direct and inevitable one, or were there one or more extremely improbable helps that led to life otherwise rare or unknown in the universe?

(15) INTERDEPENDENCES.

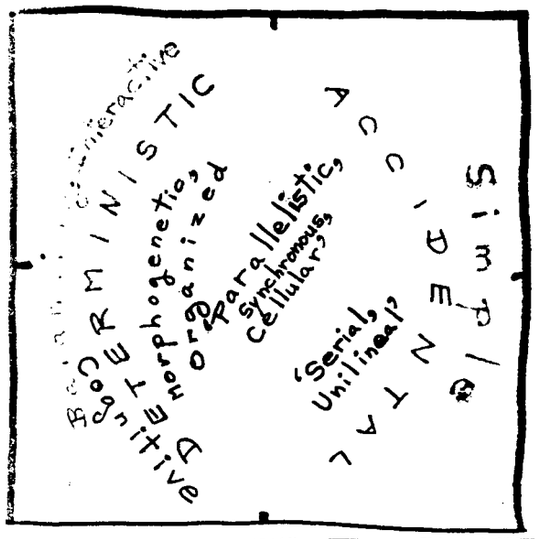
In the story of the events leading up to an earthquake, the ultimate catastrophic failure of the fault may presuppose a set or sequence of minor slippages of that fault, or the interdependent adjustment and interaction of a set of faults branched to or from—or paralleling—the key fault. Then again, earthquakes may have a tendency to happen when and only when a much greater range of factors, events, or processes combine or interact in co-enabling ways: tides, long-distance crustal waves, weather, climate, variations of the internal pressure of the Earth, motions of the deep convection cells of Earth's mantle, 'knottings or unknottings' of fault networks, secular or nonlinear movements of crustal liquids or gases, e/vc.

(16) INTERFERENCES, CONFLICTS, AND OPPOSITION.

Should the story be that of a bug's experiences while traversing a meadow, such interferences, conflicts, and opposition might have the form of gusty winds resisting the tiny bug's laborious advance, of distracting females interfering with the insect's concentration upon the more serious task of obtaining food, of tussles with other bugs whose micro-territories are being invaded, of airborne and contactual plant substances designed to repel, poison, incapacitate, or disorient the bug or other miniature animals, or of the bug's own contradictory thoughts, memories, and purposes.

In the making of a motion picture, too much or too little sunlight might interfere with the required mood or illumination of landscapes, different actors might prove to have irreconcilable concepts of their roles, and a herd of animals critical to the shooting of a scene might be resolute in their opposition to the apoplectic director's will.

A SPECULATIVE ANALYTIC COUNTERMAP
(Azimuthal & Opposed Regions)



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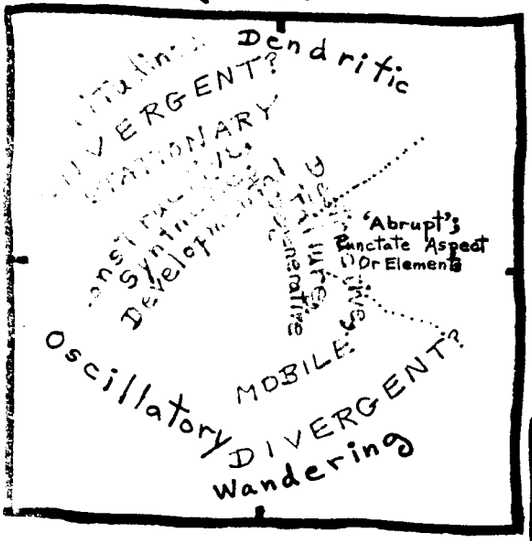
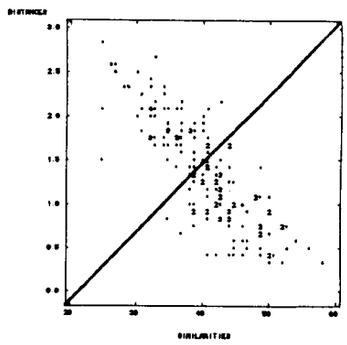
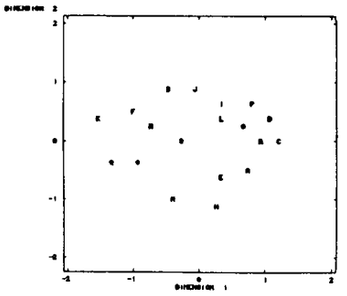






STORIES & Enology

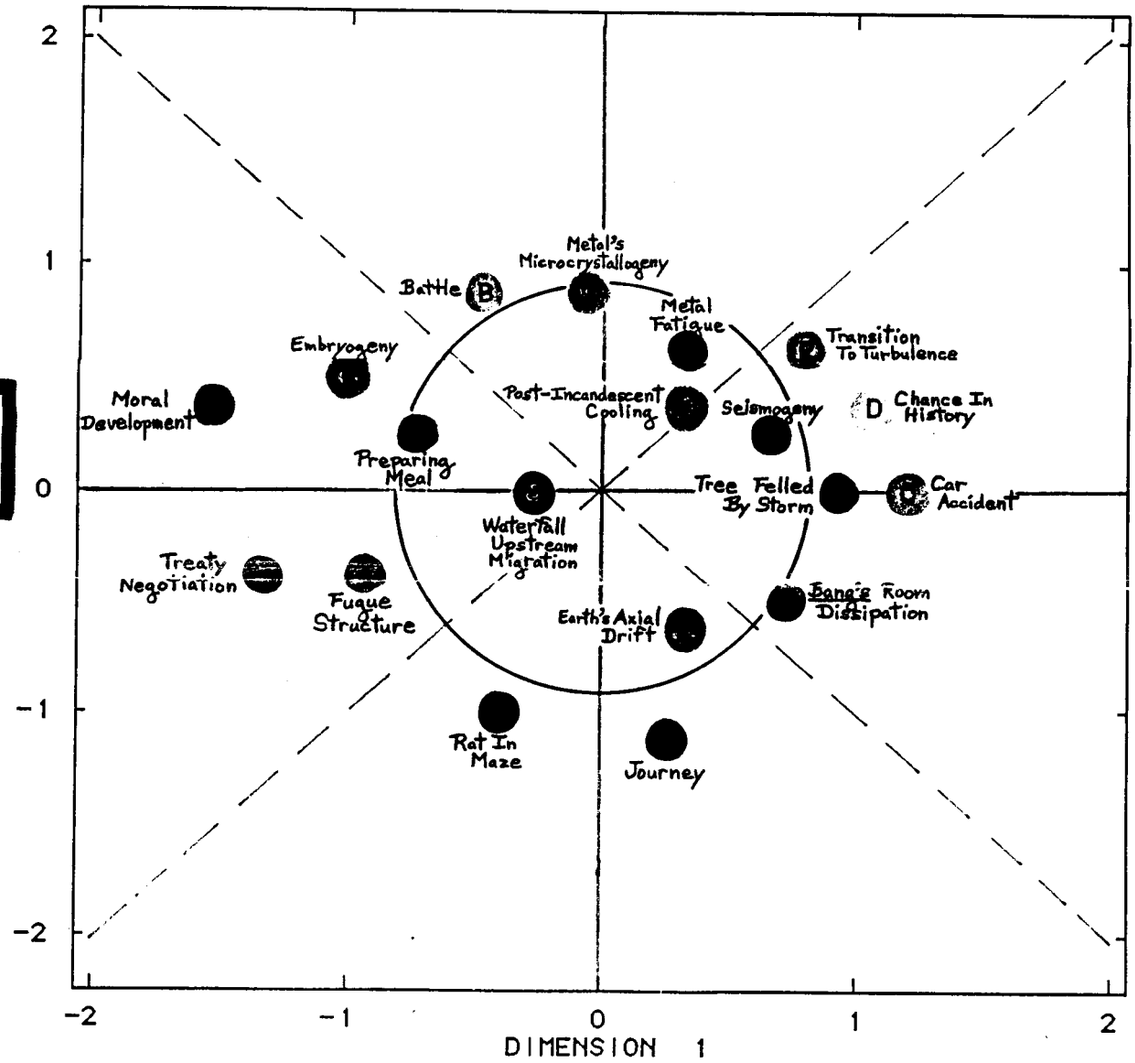
EXERCISE #19.83.2.

UNTITLED MUTUAL ANALOGOUSNESS OF [illegible]
IDEOMAP CREATED BY MONADIC-SCALOR-SET METHOD OF nMDS;
[illegible] × 75 ITEMS
IDEONOMIC DIVISION: STORIES AND ENOLOGY

DIMENSION 2

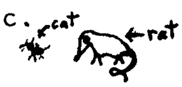
D=2

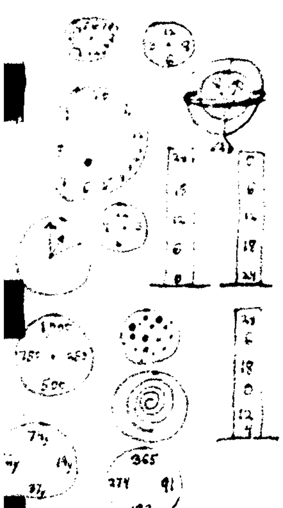
NOTA BENE:
Items should be read, "Story of..."

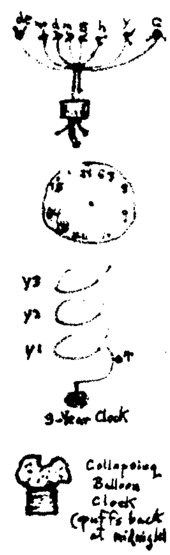


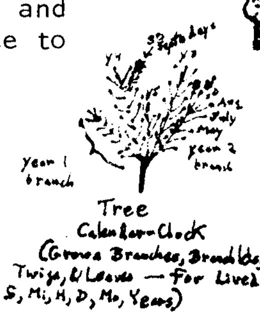
SAY: There are only "best" [illegible] the rest are $\frac{1}{20}$ to $\frac{1}{5}$!

THE "BEST" IDEAS THAT WERE GENERATED BY THE IDEONOMY PROJECT

FIELD:	IDEA:
PSY	1. Temporal colors.
PSY	2. "Spatial" colors.
PSY/PHYS /IDE/TECH	3. Hypertime; facial analogical sequences projected on **D** = 2-10 hypertime via nonmetric MDS and superimposed ghostly lineaments; trainable hypertemporal perception, thought, logic, superintelligence, human behavior, technology, and art; hypertemporal spacetime or hypertime as valuable new "fiction" in mathematical physics—even to unify relativity and quantum physics; virtual time travel.
PSY/LOG /TECH/IDE	4. Logical hyperspace, hyperlogical series and networks, and "SpinLogic" software (all via nonmetric MDS); millennial paradigmatic shift away from traditional (1-dimensional, pontillistic, and rational-valued) logic.
BIO/TECH	5. Bred 'Chihuahua' cats. 
PSY/IDE	6. Cats are 'not cats'.
BIO/PSY /MATH/IDE	7. Use of ethological distortion space to translate animal behavior into higher-order (and therefore legitimate) anthropomorphic equivalents that are humanly comprehensible and universally taxonomic; à la the transformationally-mapped analogies among animal shapes depicted by D'Arcy Thompson in Ch. 17, "On the Theory of Transformations, Or the Comparison of Related Forms", of his book ON GROWTH AND FORM.
ART/MATH /IDE	8. Like revelationally simplifying, unifying, and universal transformational inter-mappings of all musical things; v. #7.
LING/PSY /IDE	9. "Interpretive nuclei": powerful but dangerous 'good stereotypes', to be used, sparingly and cautiously, as optional and mobile paradigms or fungible stereotypes capable of imposing various 'representational grammars' upon the momentary or ongoing perception and cognition of arbitrary things, with metanoiac and insightful effect, as 'alternative epistemologies'.
PSY	10. Temporal textures: inherently diachronic visual textures.
PSY/TECH	11. Time as fundamentally multiform: so that for ourselves the truest indication of its structure and flow would be provided, not by the traditional linear or any one type of clock, but rather by an adinfinitely complex manifold of disparate representations (an "horological managerie"), and the best way for us to liberate ourselves from cultural slavery to linear time would be, not through mass-destruction of our interchangeable timepieces, but rather by our living with roomfuls of clocks, each representing time in alternative, and together representing it in maximally diverse, ways; e.g. nonlinearly, exponentially, "chaotically", discontinuously, cyclically, spirally, hyperdimensionally, by imaginal (computer-animated) analogues, by metaphorical equivalents, retrotemporally, recursively, time-symmetrically (or statically), topologically, synesthetically, neurologically, hierarchically, fractally, plexurally, stochastically, cartographically, convergently, divergently, by opposites and antisyzygies, myrioramically, biomorphically, by reference to life's key events, etc.
BIO	12. Optimal radioactivity.
BIO/PSY	13. Do plants (even whole forests) fall in love?
ARCH	14. Fractal cities.







CHEM 15. Intra-molecular clocks.
CHEM/LING 16. Languages of molecules.
GEO/IDE /BIO 17. Volcano procreation; quasi-biological phenomena in geology, cosmogony, physical chemistry, mathematics, linguistics, etc.
BIO 18. Shared organelle elements.
PSY 19. Personalities as shapes.
BIO 20. Can arteries (themselves) have rashes?
BIO 21. Six senses—or just one multiform sense?
PSY/CS 22. Sub-mind that cognizes naughts.
GEO 23. Inverted (negative) volcanoes ("crustal stalactites").
GEO 24. Cold volcanoes.
CHEM 25. Atmospheres of molecules.
GEO/BIO 26. Geos (not bios) as "Gaia".
GEO 27. Tree-like interior flow of Earth.
BIO 28. "Intracellular" micro-diseases.
BIO 29. Unicellular micro-diseases.
BIO 30. Plant (and microbe) 'pecking orders'.
BIO 31. Nonstandard animal 'pecking orders'; e.g. ['pecking circles', and variable and multiplexed 'pecking orders'].
BIO 32. Brain as a muscle.
PSY 33. Mind's capacity for absorbing knowledge as a capacity for being reconfigured.
PSY/BIO 34. Eye's capacity for discriminating minute details as a capacity for containment.
MATH/CS 35. Combinatorial implosions.
BIO 36. Millennial pandemics.
MATH/ART 37. N-dimensional cycles; e.g. in music.
TECH /PSY 38. Subsecond-lag electronic mirror: for pets and more realistic self-viewing.
TECH 39. Ships sprinting over the ocean on whirling pincushions: [ideal and transcendent] nautical-aeronautical hybrid.
TECH 40. Ice-cream spansules (timed-release capsules).
PHYS/MET 41. Egagropilar ball lightning.
PHYS 42. Matter hierarchy: ≥5 levels and ≥32 types.
PSY/IDE /CS 43. Cloud of ideas (or of numberless [combinatorial, group-transformational, and vergent] [para-notions, homo-notions, syno-notions, inter-notions, sub-notions, mero-notions, hyper-notions, meta-notions, allelo-notions, etc] always simultaneously [present, active, interactive, and interdeterminative] in [thought, conversation, reading, ideopoesis, and memory]; a concept evocative of many other things in science, such as: [virtual-particle pairs, Dirac vacuum quantum-mechanical fluctuations, Feynman diagrams, path integrals, chemical kinetics, opalescence, immune system anti-anti-antibody hierarchies, the ray-tracing technique in computer graphics (or its generalized implications), etc].
LING/PSY 44. Mental background sea of innominate 'words'.
LING/PSY /IDE 45. Virtual vocabulary representing the [dyadic, triadic, and polyadic] combinations of the monadic lexicon (and presumably representing some power of the number of words in the average vocabulary).
PHYS/IDE 46. Things neither physical nor mental (tertium quids beyond both "things" and ideas, and transcendent of the classical absolute dichotomy of things into actualities and possibilities).
PSY/CS 47. Anti-mind; a concept without which any theory of the mind is half-incomplete.

CHEM 48. "Intelligent materials".

PSY 49. Quasi-different emotions.

PSY 50. Character traits as merely the slowest emotions (in a temporal hierarchy).

PSY/IDE 51. "Vulgar esthetics".

BIO/PSY 52. Is suicide biogenic—merely one example of a large class of related paradoxically self-destructive (or life-destructive) biological phenomena that represent an obscure evolutionary good (whose mechanisms, laws, and principles have not yet been elucidated)?

BIO 53. Total contemporary species of organisms as the 2nd-4th power of the orthodox estimate—or 10^{14}-10^{28}; or conceivably even equal to the total bionts (number of individual organisms on Earth).

BIO 54. Sosogens and proseases.

CHEM/BIO 55. Evolution of purely physical chemistry over Earth's history due to the 117-octave temporal hierarchy (10^{-18}-10^{17}s). {femto second - exosecond}

BIO 56. Are cells chiral, do lefties' cells have sinistral marks, and do chiral cells form doublets and 36-ets?

TECH 57. "Allanto-food = sausage food"; i.e. sausage-like packaging of non-meat foods—potatoes, fruits, ice cream (or as pellets), etc.

MATH 58. Novel types of fractals; e.g. negative, hierarchic, "complex", qualitative, etc.

ART 59. Fractal music, maximally compact variations on "arche-themes" in idea space, and Beethoven's symphonies no.s 10, π, and $\frac{1}{2}$ (sic); God, when generous, gives the potential genius One Great Idea, which the actual genius—also by definition—then proceeds to work out 'self-variationally'.

PHYS/IDE 60. Slow turbulence; e.g. in cave dome breakdown piles (even one rock at a time), butterfly wing (or genotype-phenotype fluid-dynamic) patterns, in and atop the cortex (as energetic or informational boiling), etc.

TECH 61. "Aloco-clothing = furrow clothing"; e.g. beyond even corduroy in pleated thermal insulation.

BIO 62. Does phylogeny repeat ontogeny (sic)? {E.g. recursively?}

CHEM 63. "Aeschro-chemical = deformed chemical"; e.g. to what extreme can reactions be made to have abnormal effects or courses; or can molecules be 'distorted' in form, properties, or possibilities?

BIO/PSY 64. Most biochemistry bodily play, not work; neurons, plants, bacteria, and genes all 'play' (exercise themselves and play group games).

CHEM 65. Chemical insights from impossible molecules.

IDE 66. Ideogenetic analogs of infinite series and the Mandelbrot set.

TECH 67. Pores-filled stronger and energy-efficient bricks.

BIO 68. Microorganisms as global immune system of a Gaian bios.

BIO 69. Tumors and galls as quasi-colonial (possibly informational) endosymbionts.

BIO 70. Plant allelophily.

GEO/BIO 71. Coral reefs as key to crustal evolution.

GEO 72. Geochronometric surfaces of stones.

BIO 73. Neurons as just 'prefigurations' of the future evolution of all cells, even plant cells.

BIO/PSY 74. Do ants get lost?

BIO/SOC /PSY 75. Human society as merely a later externalization (or eversion) of forms of society, or of complex 'social' phenomena, internal to the body or brain that may first have evolved hundreds of millions of years earlier; and such "archetypal endo-societies" may at the present time constitute the central phenomena in biology (even though their very existence has gone unsuspected).

POL 76. Schizocracy.

CS/TECH 77. [Productive, kaleidoscopic, and progressively relaxed] "co-productive neural nets".

BIO 78. Whole body as the real nervous system, and the so-called nervous system as just the most [organized and overt] part thereof.

BIO/GEO 79. Bioevolutionarily [invented, warring, and migratory] soils.

BIO/PSY 80. Analogs of mental [ills and states] in non-neural organs; e.g. [neurosis, schizophrenia, sleep, paranoia, aggression, catatonia, etc].

BIO 81. All foods as essentially recompositions of the same invariant set of [tastes or taste compounds]—as [merely quantitatively rather than qualitatively] different; like the islands of an archipelago that give the illusion of being isolated entities, when in fact drainage of the ocean separating them at the surface would reveal that they are all integrally connected at the sea-bottom, foods that seem as unrelated as [pork chops, bananas, and beer] may all be the same basic food with variations in the spectral concentration of the shared ingredients. (or "sub-gestalts")

BIO 82. Trans-holistic [biology and polyorganisms]; diseases caused by [disequilibria, dissociation, or reemergence] of normally coalesced 'virtual or ghost organisms', and representing a kind of bodily schizophrenia.

BIO 83. Pathopathoses and antinosogens.

BIO 84. Anti-cancers.

BIO 85. Evolutionary co-origin of cancer and the immune system.

BIO 86. Antipathogenes.

BIO 87. 'Asthma' evolved by plants to territorially repel animals.

BIO 88. Analogs of territoriality throughout biology; e.g. [private, organized, and competitive] domains, and domainal behavior, of [plants, bacteria, organs, cells (such as neurons), biomolecules, and genes].

BIO 89. Anosogens; [finite, quantic, and saturable] "pathogenic niches"—and their preemption by anosogenic counter-contagions ([displacive and cancellative] contagions and counter-diseases) created by species as active defense; future prophylactic; [noncontagious and non-nucleic] anosogens.

BIO/TECH 90. Bio-engineered soil horizons [to lessen erosion and to <capture and store> water]. LATER: V.S. MM-D9 p37K-7

CHEM 91. Chemistry of micellar line-clump sea.

MATH/CHEM 92. Holistic mathematics shared by [dreams and molecules].

MATH 93. [Relaxed and generalized] [graph and knot] theory; e.g. [ribbony, tubular, 'fuzzy' (fractional-probability), point-set, temporally varying, and other] [sub- and trans-] [shapes and fields].

CS/TECH 94. Exotic "hard architectures" for neural nets; e.g. [pinched toroid with <transverse and even countercurrent> flows, vergent, egagropilar, etc].

ED/SOC/PSY 95. Academic "streaming" of pupils, not by merit, (specifically) but rather by [characteral, behavioral, or cognitive] typology.

LING/IDE 96. Non-lineal language; e.g. [nonmonotonic, nonlinear, <time-symmetric or 'anagrammatic'>, semi-aleatory (or hyper-mutative), cyclic, circular, hyper-self-referential (semi-recursive), <hierarchical or fractal>, <para-lineal or multi-lineal>, branched, structural (geometric or topological), reticular, vergent, myrioramic, <planar or surficial>, matric, <hyperdimensional or hyperspatial>, "group-transformational", temporally <inconstant or protean>, e/vc].

LING/IDE 97. Other strange modifications and types of language (v. #96); e.g. language that is user-interactive, contextualizable (capable of being semi-automatically adapted to a given context, "frame", or "script" with the help of a computer), partially self-extrapolative (such that when a person is using the language to write on a computer, the text tends to anticipate the writer and spontaneously write ahead of him), purely iconic or imaginal (using or constructing 'symbolic', concrete, or abstract images—or modulations, combinations, juxtapositions, permutations, transformations, or geneses thereof), hyper-compact, maximally or minimally redundant, self-divergent (anti-automorphistic), information-theoretic, polysensory, ad hoc (nonce), etc.

GEO 98. Mid-Atlantic Ridge System as simply the biggest possible volcano (one that is planet-sized or circum-global), distorted and disguised by its size.

BIO 99. Diseases as grossly misunderstood phenomena that are really normal, beneficial, or even necessary to all life.

BIO/PSY 100. Holonomic genomes, homuncular (anthropomorphically theriomorphic) animal minds, and monadic psychiatry and education.

BIO 101. 'Nonheritable analogs' of mutations, genetic recombinations, demographic polymorphismic changes, natural selection, and evolution (especially macromutations and punctuated equilibria) in ontogeny and the daily life of the body; at once pathogenic, "sosogenic", and "neutral" ones (e.g. noncontagious "proseases").

BIO 102. Micro-contagions among and within the body's elements, as the smallest (or finest) epidemiologic scale.

BIO 103. Analogs of plant allelopathy and "allelophily" throughout biology; e.g. in animals or protists, intra-organismally between or within organs, cells (such as neurons), organelles, or biomolecules, or in evolution or ontogeny; for example, autopathy and autophily (or self-allelopathy and self-allelophily), as a relaxed or reflexive analog and counter-analog of allelopathy, could help explain autoimmune diseases, cachexia, and other phenomena within the organism, by subnormal autophily, supernormal autopathy, or in other ways.

BIO 104. Sympathogens: pathogens that can or must act in concert with other pathogens to produce, amplify, or transform a disease or epidemic.[1]

[1] e.g. see S. New 1989 D2 p3 re Mycoplasma incognitus in AIDS.

BIO 105. 'Conversations and debates' among biochemical systems, pathways, and processes.

BIO 106. Analogs (or parts) of all major bodily systems at all of the body's and bios's hierarchic and size scales (in cells, organelles, bacteria, etc), and 'in one another'.

BIO 107. The so-called immune system may be very different, much more diverse in its functions, and far more important than assumed, and may even have superorganismal extensions or equivalents; e.g. its possible generalized roles, aspects, and forms include "genospheric" transceiver-amplifier, evolutionary agent, ontogenetic steersman, and bodily regulator (or even 'lower' mind, of the body itself or of the body as a whole); e.g. v. #68.

stem cells for genetic recombinations antibodies

BIO 108. Epidemic diseases as microorganismal migrations (Nature's fastest and most massive migrations); also, such diseases may previously originate from 'abstract migrations' (in some functional hyperspace divorced from "physical" space).

BIO/PSY/TECH 109. That a subset of cortical neurons are actually better at predicting motion of an object in the visual field than the 'whole brain' (as was recently discovered to be the case in a monkey) could in theory imply: the existence in animal and human brains of neuronal individuals, minorities, 'micro-circuits', 'sub-functions', or "para-combinations" (innumerable alternative combinatorial subsets) that are paradoxically far superior in suitably specific (multidimensionally dispersed) sensory, motor, or cognitive tasks than the normal functioning of the brain as a whole; that a situation exists that is analogous to the constrained intelligence of a committee or democracy, where supernormal and specialized intelligence of individuals is unable to emerge at the top or in the final decisions of the group because of interference, traffic, winnowing, conflictual, funneling (convergence), noncooperative, pluralistic, plexural, bureaucratic, translational or lack-of-standardization, multiplexing, asynchronistic, interadjustment, noise, error-propagation, dissipational, procedural, transformational, negotiational, ambiguity, uniquity, or other problems; that an ultimate form of idiot-savantcy obtains (the brain being a tragicomic republic of all possible types of virtual idiot-savants that are, for example, superhumanly intelligent in correspondingly super-specialized ways); that, paradoxically and ironically, we may all be at once supernormally and subnormally intelligent, because the intelligence of the brain as a whole is less than the intellectual sum of its parts; but that future computer and neurological technology may be able to seek out and identify countless neuronal subsets, or the like, that are supernormally and maximally able at specific tasks or in connection with specific concepts—subsets which the same technology will then find appropriate ways of systematically combining so as to produce synergistic, maximal, and transhuman intelligence (vastly more efficient, sophisticated, and 'free' than any current form of intelligence).

PSY/IDE 110. Vastly greater "implicit intelligence" may be latent in all forms of human intelligence and knowledge, and certain methods may be able to release it.

IDE/PSY 111. All stories, scenes, objects, and appearances can be made to tell stories about themselves—intricate, informative, and surprising stories that are fairly crying out to be told.

PSY/CS 112. Human mind may actually be a hierarchy of semiautonomous minds, or a continuum of different minds existing and operating in parallel; e.g. certain of these minds, mental levels, or "para-consciousnesses" may only think, perceive, react, adjust, act, or be 'self-aware' on a time scale of a day, month, year, or one lifetime (and may be oblivious of shorter things, much as a photon may be fundamentally oblivious of things shorter than whatever happens to be its characteristic oscillatory wavelength or period).

BIO 113. Tree bark as an anciently impropriated or 'contactually imitated' "fossil episymbiont"; by analogy to the theory that mitochondria, plastids, etc had a symbiotic origin.

BIO 114. "Species-continuous bioevolutionary singularities" (sensu mathematical singularities); e.g. perpetually regenerating all life from spatial points in tropical rain forest; at such [spatial—or perhaps ⟨spatiotemporal and temporally periodic⟩—]singularities the general species/bionts ratio might even approach unity; [like the arms of a spiral, functioning like draglines, or like the radial segments of a circle,] the redundancy of organisms might increase outwards, or centrifugally, [from such evolutionary poles and across the Earth (bios)]; at the singularities the species concept itself might fail—[the ⟨number or variety⟩ of species, variety of life, and conceivably even the ⟨number or variety⟩ of bionts (sic),] could [be or tend to be] [zero, infinite, or both (paradoxically)].

IDE/PSY 115. The perplexingly zealous alchemists (such as Isaac Newton) may have been drawing on a greater chemical calculus of the mind, a deeper ("ultra-concrete") paleopsychic [logic and intelligence] evolved through the eons to enable Earthly organisms to know things [about and through] chemical [sensa, percepta, and processes]; especially [via or in terms of] [light (chromatic) spectra, primitive chemoceptive mechanisms, olfactory-gustatory properties of foods, proprioceptive micro-senses, and related percepta].

Their alchemical researches may ALSO have afforded them non-paleopsychic insights into physico-mental reality, because of the extraordinary ability of chemical [reactions and phenomena] to [expose to view and allow experimentation upon—in an [encyclopedic, microcosmic, and kaleidoscopic] way—the [fundamental and universal] taxons of order [that constitute the very language of Nature, and that are the life-source of ideonomy]. Alchemical [images and transformations], in other words, may have provided [a treasure-house of ⟨morphological & probabilistic and morphogenetic⟩ models of the ⟨universe, microcosm, psyche, omniverse, and ideocosm⟩, a uniquely ⟨plastic① and intensive⟩ realm of experience, and a prototypal ideonomic laboratory], for bold minds impatient with the [crabbed, imbecilic, irreal] confinement of the everyday happenstance world.

① : reactive, experimentable, interactive, autogenetic, autotelic,

Then too, what dreams are to psychology, alchemical means may be to 'physics'.

PSY 116. "Stupidity test" as an inverted and better way to measure intelligence.

CHEM 117. Materials composed of [absolutely irredundant and maximally heterogeneous (and perhaps maximally metastable, contradictory, hierarchically indeterminate, or protean)] molecular species.

BIO 118. Ultrafast diseases.

BIO 119. What are the presumptive role analogs (homologs) of human witch doctors in the polymorphisms of [animals and plants] (in addition to the more obvious ["leader" and "genius"] analogs)?

PSY 120. "Hyper-illusions"; e.g. some dreams as illusions, repeated fractally.

PSY 121. Psychoneural mechanism of dreams as partly an impossible attempt of a dream to observe itself, and hence a process that constantly interferes with itself and diverges from the original essence of the dream.

ART/PSY/TECH 122. [Traditional and future new] musical instruments as [anthropomorphic ("physiomorphic") or physicomorphic (based on either ⟨phylogenetic or lifelong⟩ experience of natural phenomena)] leitmotifs (or archetypal [variations, themes, processes, sensa, percepts, poles, dimensions, centroids, "order taxons", extrema, "ethological tableaux", e/vc]).

LING/IDE /PSY 123. "Virtual discourse": [virtual or implicit] [conversations, statements, and language]; as co-real; multiplexed meanings; hyp. as reason why different persons {[remembrances or accounts] of what was said, or perceptions [of what is being said or of what a text <means or implies>]} can be so [disparate, diverse, contradictory, and irreconcilable]; discourse [as braided 'polymythy', as a metaphor for itself, as 'polytonal, polyharmonic, and polyphonic', as polypsychic, as multipurpose ('polypragmatic'), as polysynthetic, as "poly-combinatorial interrepresentation", as <subsumption and sublation> à la projective geometry, etc.]①

BIO/TECH 124. Marginal "negative aging" mechanisms; naturally present in organisms to offset lifelong senescence, and perhaps capable of being harnessed by medicine (or artificially stimulated, extended, perfected, or supplemented) to [reduce, reverse, or extirpate] human aging (and possibly some analogous diseases as well).

PSY/CS/IDE 125. "Three-Temporal-Variables Theory of the Mind"; anamorphic interadjustments of the [durations, intervals, and orders] of stimuli in temporal sequences as all-important, and able to simulate the presence of any absent kindred thing; finite [quantization and quantification] of the mind.

PSY/ART /SOC 126. "Negative aggression". #NOT [zero aggression, nor peaceability, friendliness, love, cooperation, defensiveness, or submission], but rather something [sui generis and hitherto never proposed, enantiomorphic to positive aggression, and meta-analogous to such physical concepts as negative energy and negative mass]. #[Psychological and ethological] sexual dimorphism may exist but derive neurologically from a simple antisyzygial enantiomorphism (i.e. identity of structure via an invertive transformation) of male and female logic. Feminism (and masculinism) should discover this logical enantiomorphism, and use this logical system of two logical anti-systems (or "anti-logics") to describe equally well for both sexes all of the [social, cultural, ethical, behavioral, emotional, linguistic, vocational, attitudinal, epistemological, perceptual, and cosmologic] enantiomorphic dimorphisms (or conjugate monomorphisms) that are the natural consequences of it. #What we term aggression may be a misleading reference to a [larger, more fundamental, or higher-order] phenomenon of "meta-aggression" of which conventional aggression is simply a quasi-comprehensive part, and this meta-aggression may be more obviously [benign or neutral] (good and bad at once and variously); but in any case aggression has [simplistically and unfairly] been misconceptually stereotyped in recent years [as bad and as being other narrow things], to the neglect of its [ramified, mysterious, and counterbalancing positive] [qualities, dynamics, and effects]; and when [reexamined in these ways or seen in its <larger and truer> aspect], real aggression may be the source of creativity, and the explanation for the astonishingly greater historical creativity —in the arts, sciences, politics, and elsewhere—of man relative to biologically less 'aggressive' woman. #However, if the proposed concept of "negative aggression" is [logically valid and biologically correct], then women may be as aggressive negatively as men tend to be aggressive positively (or more properly, "positively", since the distinction is purely relative or a

① #EX. (!!): Shannon Spiro 3rd implicit victim case (in NOVA) the in f… only 2 violins (voices) in act… score = "emergents"! 3rd sounded not a… all like other…

* PUT AT END OF # INC(S).

easily

function of which enantiomorphic perspective and linguistic habits are adopted); from which it follows that creativity, if a manifestation or product of "aggression", may likewise have been described one-sidedly, when in fact it is sexually dimorphic, having enantiomorphic—or equal-but-opposite—positive and negative forms; so that it may now behove that we attempt to devise a theory of, and use this theory to demonstrate, the existence, coexistence, and equivalence—or perhaps the special-but-complementary powers and possibilities—of "negative creativity" as well as the more celebrated "positive creativity". ¶ Thus conceivably feminine (or more precisely, tendentially feminine) or "negative" forms of aggression, creativity, psychology, and logic are, or are what could be described as being, more passive, internal, and holistic: more a matter of intra-psychic adaptation, interadjustment, and compensation, of symbolic and implicit realities, of meaningful negation or on the contrary of pure but selective and purposeful affirmation, of semantic fractions, infinitesimals, and continua, of paradoxes organized into an entire world view and an oblique but undiminishedly precise and eloquent language, of selective assimilation, of an inward world of imaginary constructions, of the infinitude of virtual and analogical truths, of qualitative science and intelligence, of Parmenidean vergence, of synthetic order and organization, of an antipolar purely receptive being that entifies but is itself formless or beyond form, of meanings coalesced and carried forward to eternity, and of a supertemporal and monistic esthetic grace. ¶ Yet even if such feminine forms of "negative" aggression and creativity are more passive and internal, for example, they might be in their own way no less energetic, disciplined, inspired, originative, and powerful—or just as cosmoplastic and cosmopoietic as their masculine enantiomorphs. ¶ Our exclusive conscious preoccupation with masculine forms of creativity, accomplishment, and action to date may have been due to the greater assertiveness, competitiveness, externalization, surgency, practical exertions, dominatingness, obviousness, explicitness, formalization, instrumentalism, institutionalism, leaderliness, propagativeness, etc of the male, masculine culture, or the "positive" form of masculine aggression; which may have led to at least the outwardly imposition of an official masculine ethos and eidos upon civilization, history, and formal education, to an exclusively, primarily, or perspectivally manly definition of creativity, to the institutionalized and systematic neglect, discouragement, disfranchisement, depauperation, derogation, interment, subjugation, and androcratic dictation of the artistic and intellectual yearnings and achievements of women, to manifold subtle andric biases in our language, and to the permanent agenesis of any antitypical explanatory and legitimizing theory of the possible nature, forms, methods, products, and meanings of perfectedly feminine creativity. ¶ Were the distinctive basis of feminine creativity to turn out to be in part, and in either a general or a specific sense, "holistic", for example, then it would be easy to use mathematics and modern technology to devise new and "holistically gynic" systems of music or painting.

→ADD: #132: "Abstract chemistry" see p. 10.

TECH/PSY 127. Foods with "spatial tastes", automatically designed, varied, and perfected.

PSY 128. Schizophrenia invertedly reconceived as a pathic reduction of an extreme degree of polypsychism hypothesized to be normal and in fact essential to sanity and cognitive mechanisms, albeit covertly and unrecognizedly.

PSY 129. Intra-personal ethics and law associated with incommunicado, inaccessible, disfranchised, and yet sentient and moral, or potentially emancipable semiautonomous or hermetic parts, levels, fragments, functions, centers, forces, or sub-entities of the brain or mind; these virtual or real 'selves within the self' being imagined as having their own characteristic, competing, but all but entirely unrecognized drives, interests, wants, needs, functions, potentialities, logics, perceptions, forms of consciousness, and—associated with these things—presumably their own idiomorphic but authentic values, philosophies, rights, and even duties within the untheorized communal architecture of our total mentality.

PSY 130. Human mind actually a "field" or continuum comprised of virtually an infinity of distinct, overlapping, arborescent, anastomotic, quantized, multiplexed, inchoate, or momentaneous lesser, component, aspectual, or endlessly fragmented minds or psychons of all possible sizes and types. This mental equivalent of the virtual-particle sea of the Dirac quantum-mechanical vacuum, when fallaciously projected out upon the external world by primitive peoples, may be the source of their animistic and animatistic beliefs.

TECH/BIO 131. Find 'pedophilic' pheromones (that hypothetically are released by juvenile animals to trigger nurtural and tolerant instincts in parents and adults) and synthesize, concentrate, improve, and supplement them, so that they can be used in perfumes, cosmetics, clothes, homes, and schools, to make women, the elderly, men, children, and even pets seem more attractive, young, pleasant, tolerable, or 'meaningful'.

→ Note: The title of this chapter is misleading, for the ideas it actually discusses perhaps only represent 5% to 20% of what may have been the best ideas in various fields to which the ideonomy project gave rise.

THE 'BEST' IDEAS

The ultimate test of ideonomy must be the quality of the ideas which result from its use.

So true is that assertion that I have left it stand alone as a paragraph. Yet because the statement, inevitably, is ambiguous, I am compelled to comment further before proceeding with what is the actual purpose of the chapter.

A false, or lesser, test of ideonomy would be a matter of whether its description, in this book or elsewhere, convinced the world to embrace the proposed new science. The reason why this must be regarded as an inferior test is that history demonstrates that even society itself, or as a whole, is sometimes credulous, or all too willing to believe in the truth or merit of what is merely irresistibly attractive. That the concept of ideonomy has its whorish or otherwordly charms is all too obvious.

Often in the course of the Ideonomy Project I have had to confess to other persons a fear that ideonomy might "take off", become an enormous fad, and yet remain possessed of a hollow core.

Too frequently, nowadays, something in science and technology abruptly triggers explosive interest, which lasts a short while, and then the febrile excitement proves to have been unjustified by the scant facts. The conclusions may have been premature or wholly wrong, or excessive claims may have been made for sensational purpose or out of ugly self-interest by researchers, or perhaps the latter were 'simply' guilty of methodological, philosophical, or historical naivete.

The words "remain possessed" actually hark back to the initial phase of the project, when I myself viewed the concept of ideonomy with considerable dubiety. Had I not felt such skepticism, at the time, I would have been dishonest both to myself and others. But in the course of the project such doubts about the absolute meaningfulness and practicality of ideonomy have abated.

Even so, there continue to be times when certain persons display greater enthusiasm about ideonomy than I myself believe to be justified. More importantly, it remains true, and will remain true for some while, that a vast amount of work will have to be invested in the development, testing, and refinement of ideonomy to fully extinguish the possibility of the discipline's maldevelopment, and to properly demonstrate to the world its equality with other sciences.

It is all too easy for me to visualize a chain of events that would lead to premature acceptance of ideonomy, or to the emergence of a form of ideonomy marked by the shallowness, narrowness, fewness, infantilism, and expediency of its methods, means, and ideas.

In such a case, I would make myself the fiercest critic or worst enemy of my own monstrous child.

Popularity and glamour, then, are no fit tests of worth.

As for the quality of the ideas to which ideonomy gives rise, the additional questions must be asked: Are these ideas ones that could have arisen just as easily without its aid? That would have been almost as probable or almost as immediate?

Is there proof that ideonomy can increase the overall net efficiency of human ideation in a major, qualitatively different way?

Can it be shown that the creative value of ideonomy does not simply lie in the excitement occasioned by its use? Or that if it should at first lead to the production of many ideas of the highest brilliance, this will not be an effect of the peculiar great expectations that obtained at its inauguration?

How in any case are we to know what the real excellence of the ideas generated by the Ideonomy Project is? Surely that test will have to be empirical, or await future experimentation, and the usual process of communal replication and review?

My object in this chapter will be to cull the best ideas, of any kind and in any subject, that were generated in the Ideonomy Project as a result of ideonomy itself.

But there are several problems here: The things winnowed will only represent my own personal perception of what was best; and in reality will not even represent that, since probably millions of ideas were spawned by the project, a number far too great for me to review in my mind now, so that I will only be offering a random sample of what may arguably have been the best ideas.

Moreover, there is no way of proving—or in the space available, of arguing persuasively by recalling the methods and paths that led to the ideas—that it was ideonomy and not merely my own mind that was responsible for the ideas.

Dissociating ideonomy from myself is at this juncture singularly difficult, in part because what ideonomy momentarily represents is a reduction and generalization of my own cognitive methods, and ideas that arise from the very structure of my mind.

It is true that many of the ideas that were produced in the project came from other persons or from discussions with other persons, but there was generally ample opportunity for an exchange to have taken place that must now have the effect of confusing authorship.

What level of excellence should we require of the ideas that are to be presented in this chapter, to enable those ideas to serve as the necessary evidence that ideonomy revolutionizes thought and creativity?

That their confirmation would justify the awarding of a Nobel Prize (perhaps to ideonomy)?

That the ideas have the power to shatter fundamental scientific or cultural paradigms, initiate new fields of inquiry, redirect the course of history, or —?

Space will permit only pithy comments at best upon the nature of the various ideas that will be listed here.

Where the ideas presented have been discussed elsewhere in the book, reference will be made to the relevant passages. Yet many of these ideas are so new and strange and difficult, or wonderful, that not even whole books would do them justice. Or such is my impression.

The ideas will not be given in any particular order. Merely in that order in which they came to my notice, or in which they occurred to me, as I recalled the history and accomplishments of the Ideonomy Project. Now and again the order will reflect homology. The order does not represent any sort of ranking according to perceived excellence.

1. Temporal colors.

The time sequence in which a set of objective colors is seen, when those colors are viewed one after another, may be more important than contemporary psychophysics assumes. The brain, at some level, in some part, or in some way, may cognize and make use of 'colors' that are inherently diachronic—or have no atemporal equivalent.

In other words, the long-term diachronic patterns of colors may encode real-world information that the brain is subsequently able to decode as an additional, unrecognized form of sensory experience.

There are also two less dramatic possibilities that are suggested by the words "temporal colors", namely that the sensorium simply memorizes and recalls the chromatic sequences across time of its elementary visual sensa by their compression into some sort of atemporal mnemes, and that the subjective perception of objective colors may be modified by longer-term and more complex temporal sequences than has traditionally been assumed (e.g. in the theory of simple afterimages).

Any combination of the three ideas may simultaneously be right (or wrong).

Temporal sequences of colors occur when the eye moves continuously or discontinuously over an inhomogeneously colored scene (e.g. over chromatic textures). Conceivably even nonspatial (purely temporal) temporal color sequences could be made use of by the brain, say if future technology sought to create and informationally modulate them for novel artistic or linguistic purposes.

Past failure to control for or exploit an inherently temporal element in color perception may have depauperated our art and impaired our theory of color.

What has been said here about temporal colors might be generalized to other senses; perhaps temporal sensa and percepta are much more complex and rich than we imagine.

An extreme extrapolation of one of the above ideas about temporal colors would lead to the interesting prediction that appropriate repetitive or irrepetitive codings of temporal sequences may create an illusion that an absolutely or positionally absent color is actually present.

Temporal colors may surface in consciousness as certain emotions, atmosphere, or mental associations.

2. Spatial colors.

By analogy, various types of sequences of colors in space may represent special 'colors' to the mind.

The sequences could represent radial distance of the colors (as a function of or independent of retinal field coordinates), ordinal as opposed to cardinal sequences, two- as opposed to one-dimensional sequences, sequences partly dependent on textural form, sequences of nonlinear, fractal, or nonmonotonic character, etc.

Obviously the existence of "spatial colors" (in the present sense) would be tremendously important for industry, art, and science.

It would be of especial interest if either spatial or temporal colors provely to be largely independent of regular colors, in terms of their perceptual laws or interactions.

* This page is too cute and needs to be changed. —PMG

3. Bred 'Chihuahua' cats.

There are tiny dogs such as the Chihuahua and giant dogs such as the Irish Wolf Hound, and similarly there are big breeds of cats. But why are there no tiny cats?

Gigantism and nanism are found at almost every biotaxonomic level, and almost certainly it would be easy to breed dwarf varieties of Felix domesticus. So why in the world has not somebody already done it? Whatever the reason, it could not have been want of incentive. 'Chihuahua cats' would unquestionably be an instant and howling (or wailing) success—a multimillion-dollar, worldwide industry. Not only would the kitten-like cats be cute, but (who knows?) they might have value in catching those holed rats and mice that are inaccessible to ordinary cats (assuming they were not eaten first).

The interest of this ideonomic idea is that it provides a superb illustration of the marvelous possibilities that exist everywhere but that no one ever thinks of or notices, and that ideonomy could be used to discover instantly and en masse. It is a symbol for all of those "obvious things" that ought to be thought of at least once.

The concept of breeding miniature cats was arrived at, ideonomically, by contemplating dimensions, extremes, symmetries, and naughts, working outwards from the dog.

4. Cats are NOT "cats".

This, incidentally, is an example of what ideonomy terms a quasi-contradiction (specifically, a quasi-self-contradiction), which is a very heuristic concept. The point is that many things seem to be contradictory that in fact are not, although the illusion can be nearly undetectable.

We stereotype many things that we do not realize we stereotype. Thus we stereotype stereotypes: things are not only stereotyped as being things that they are not but they are stereotyped as being themselves. We also tend to confine our criticism of stereotypes to our own species.

It was soon after I adopted my cat Sinbad that I realized that man stereotypes cats. Because cats are really not cats at all. They are something else altogether (I have not decided what).

It was not just the fact that Sinbad likes to swim (Turkish Van cats are like that). Nor the fact that she finds lightning and thunder a delight.

I think my disillusionment began with her almost canine obedience, loyalty, and sensitivity to my feelings. "This is a cat?" (I recall myself muttering).

Evidently caninity and felinity form a continuum, and the continuum is transcendent of either species, in that some cats may be more like "dogs" than "cats", and some dogs more "cattish" than "doggish". Only on average is a cat a cat and a dog a dog. (By analogy, some men are more like women and some women more like men.)

But because our brains dichotomize and operate reflexively, it is next to impossible for us to see caninity in a known cat or felinity in a known dog.

The human brain seeks a few traits and a marginal average difference wherewith to distinguish one supposed "type" of thing from another, and then the reticular formation shuts down and the brain, for all practical

purposes, falls asleep. It is lazy and expedient, and simply lacks the physiological will to resolve the world's real complexities.

In practice, a few traits suffice to tell that a cat is a cat and a dog is a dog, and it is from such 'crude sufficiency' as this that most stereotypes arise in our neurology.

The implication is that, on a categoreal level, the character of a cat must be vastly more complex than per the stereotype (idea) of a cat, yet the stereotype must stand in the way of our seeing this by imposing a kind of moronity on the intelligent (for an idea is always an impediment to our seeing anything beyond itself).

5. Optimal radioactivity.

This idea forms the topic of Chapter ____.

More important than the idea itself is a general principle that is advanced there. The idea was simply offered as one test or application of the principle.

* Also see separate note on #6!

6. Do plants (or forests) fall in love?

The motivations behind this suggestion were several.

By its seeming outrageousness it was meant to shock people out of their complacency. It was designed to show how even phenomena that are supposedly uniquely human, or at least confined to animals, may invite transcendent ideonomic generalization. It was intended to illustrate how contracted and simplistic our accustomed pictures of even familiar entities such as plants in reality are (and the equal contractedness of such concepts as "love").

The first objection is that plants are immobile and must be incapable of love because love requires motion for its expression and evolution.

The second objection is that plants must be loveless because love is essentially a mental phenomenon and plants have no minds.

The belief that a plant never moves is a common misconception. Charles Darwin wrote whole books on the subject of plant movements, at a time when there was no technology for observing the enormous range and diversity of such movements. Not only do individual plants move, they also move in response to one another in complex ways that we are only beginning to unravel.

Moreover, in the course of generations entire communities of plants move and dynamically change and evolve.

As far as movement is concerned, then, there is at best a difference of degree between plants and animals.

The weakness of the second objection is twofold: it is neither clear that plants are necessarily amental, nor that love is incapable of being naturally reformulated in a way that transcends a need for mentality. The last could be otherwise expressed by saying that what we call love in human beings might in its lawful essence have a far simpler basis than ordinarily assumed, even a merely mechanical or physical basis. (Which would not have to demean it, however. For example, even if qualitatively simple, its quantitative development in our species might be extreme, as might also be its extrinsic complications.)

I should hasten to add that when I allude to the possibility that plants might after all possess some degree or type of mentality, I am not visualizing things that would be in any way supportive of recent pseudoscientific claims© that plants have feelings and respond to human sympathy.

©: (obviously projection-inspired & -exploitative)

Rather I am giving recognition to the fact that we have yet to put a limit upon the possible lower grades of intelligence, or of information processing, in organisms; nor have we in any way circumscribed the possible variety of forms, modes, and dimensions of same. (to put it mildly)

And the biological community is guilty of many fallacies, such as the assumption that a nervous system can only exist in that one form in which we (by definition) know it, that only that bodily system that we term "neural" can be of a neural nature, or that we have already successfully defined the outer limits, or the full bodily extent, of the nervous system. Moreover, whatever the nervous system is, it must have arisen from something pre-neural that either intergraded with what is neural or anticipated it, something that is apt to persist within our bodies even now (albeit in a form that we have not yet recognized or gained the ability to recognize), and something so primitive or of such an unfamiliar character that it may and probably does have analogs in every kingdom of organism. Yet another fallacy must operate by the logic that, since the nervous system is by (conventional) definition multicellular, unicellular equivalents, or equivalents of a nervous system in unicellular organisms, are necessarily precluded. Since there are already indications of neural-like parts, functions, and behavior in unicellular creatures①, and these neural analogs or homologs have yet to be reconciled with classical neural systems and phenomena, the door is open to the discovery of heterodox nervous systems in "mere plants".

① (e.g. in the cil... membranelle...

All of this is background, but what might it mean in any case for a plant or forest to "fall in love"?

The concept is so strange that the first need is to think of anything whatever that might offer a reasonable botanical equivalent of love. Here are some suggestions.

As young plants develop from seeds, and adult plants interact with one another in the course of their lives by means of their extensive root systems, the encounters with another plant or with a multitude of plants may occasionally lead to—relatively or absolutely—mutually beneficial relationships, or simply to superordination-subordination relationships, resembling in superficial or deep ways symmetric or asymmetric love.

Imprinting, hormonally induced behavior, dalliance and courtship, marriage and divorce, bilateral mimicry, and other phenomena and mechanisms that may operate in zoological love may likewise operate, or do so through equivalents, in recognizable forms of botanical love.

Two individual plants of the same or different species might, upon falling 'in love', subsequently ignore—or even 'fight off', as through allelopathy—other individuals, and, focusing upon one another exclusively, become more and more fully and unbreakably involved in one another (anatomically, through exchanges of metabolites or other substances, through complementary symmetric or asymmetric specialization, or in other ways). Perhaps the root systems of 'two (or more) plants in love' would tend to become closely intertwined, or at least noncompetitive, or would cooperate in the building of some common, or external communal, architecture.

On larger units of evolutionary time, different plant species or populations might fall into some more or less analogous form of 'romantic resonance' with one another.

7. Fractal cities.

The search for where fractal patterns exist or are relevant in our world has gotten underway in only the last few years. What is already clear, however, is that fractals are present and applicable almost everywhere and in many different ways simultaneously.

Certainly this is true in art and esthetic feelings.

What fractals allow is, among other things, a much greater amount of information, pattern, and order being present in things than would otherwise be possible (at least given our present ignorance of other mechanisms and means).

Since the structure and function of organisms must be pervasively fractal, it follows inevitably that our mental states and processes must also be. Human life, then, must have fractal laws, and a need and capacity for fractal experience, or for fractality in every element of life.

The present organization of society and man's artifacts should be far from optimal in fractal terms, however, if only because of man's ignorance of fractals across the entire course of history (other than in some indirect intuitive sense), and his consequent overuse and misuse of non-fractal, and even 'anti-fractal', organizational schemes, languages, and theories.

That fractals should be truly universal ideonomic entities is not yet widely appreciated. Instead the inductive practice continues of allowing for the existence of fractals only where they have already been demonstrated, as though there might be great yawning gaps in Nature wherein no fractal should ever be found because the fractal mechanism is simply irrelevant.

If instead one operates upon the opposite assumption that fractals should normally be pertinent to almost anything, the imagination freely seeks out those places where the existence of fractality would be important or revelatory.

Urban design—the layout of cities—has evolved without any attention whatsover being given to the possible importance of fractal principles in the structure and appearance of buildings and in their mutual arrangements within the field of vision and across the entire urban space.

Because of this neglect and defiance of fractality, the design of cities is relatively chaotic, inorganic, inesthetic, inhuman, and socially inefficient.

What cities are is mainly big. Being big they allow unusually many levels, as well as types, of fractal organization. So their potential fractal perfection and power is unusually great—as are their current fractal shortcomings.

The outline of the edges of buildings, the inner corridors and ratios of spaces of those buildings, the outside distribution and choices of trees, the windings and intersections of sidewalks and streets, the spacing and clustering of different buildings and types of buildings, all allow, invite, and demand fractal laws and fractal inspiration. None of which do we see at the present time.

So thanks to fractals, future cities may be much more beautiful, meaningful, natural, and human.

*Also see special note on #8!

8. Millennial pandemics.

One of the most basic dimensions that characterize diseases is that of the duration of the diseases.

After a contagion is acquired it persists for a length of time that is typical for the given disease, and then vanishes.

The extremes of basic dimensions are always interesting, but usually are neglected by the myopic researcher. The neglect is understandable, since extremes present special investigatory difficulties, and their neglect obviously diminishes what is known about them and this ignorance perpetuates, in circular fashion, their neglect.

What might be the longest-lived epidemics, and what implications might they have?

I speak of epidemics because otherwise potential longevity is limited by the average or maximal human lifetime. Actually the extreme here would also be interesting to inquire into, for, should a disease preexist at the moment of conception (or from the zygotic stage), and perhaps persist uninterruptedly until whatever might be the moment of death of the organism, its presence might conceivably be masked, by being confused with the hereditary, ontogenetic, or species-specific form of the organism (rather than being distinguished as something separate that was added in perchance).

A multi-generationally persisting epidemic, however, could in theory continue forever (at the limit, it could in some sense have been present already in the first-most biont on Earth, and its existence up to the present might be expected to continue in the future for eternity, or until the final descendant of that first living entity happens to expire eons hence).

But by analogy to a disease difficult of detection because coextensive with the entire lifetime of its host, an epidemic that has continued essentially uninterruptedly for a period of time comparable to all of recorded history (or for as long as accurate epidemiological records have been kept) might be one whose existence has been unrecognized simply because the symptoms or syndrome have been mistaken for normal human health.

Of course this would be especially true for a literal pandemic, or for an epidemic that has afflicted virtually everyone on Earth throughout recorded time.

It is hardly possible, and certainly in the less technologically advanced past it would hardly have been likely, for people to notice subnormalities or other abnormalities in their health when nothing better has been experienced or been typical of human beings. Usually we note imperfections by contrasts to higher standards that are also observed, rather than through their failure to realize theoretical optima.

Since in the case of pathogenic microorganisms we know of no obvious reason why there should be the sort of finite limit to any lifespan we see in macroorganismal species, we likewise have no a priori reason for believing that the spectrum of durations of contagions should have an upper bound, rather than being a continuum of ever greater longevities.

Should all of us, and perhaps all the creatures with which we share this planet, be victims of millennial diseases, say, then there would be immense practical implications: for by deliberately identifying and removing these 'background plagues' we might be able to rectify the health of the bios, and perhaps advance it by a quantum level.

It has been objected to certain of these conjectures that, should a supposed disease have existed virtually from the first organism, in an active form, or should it afflict all contemporary species or bionts, or all the bionts in one species, or simply a single biont throughout the entire course of its life, then by definition it would not be a "disease".

Since the demurrer was so absolute and unbudging, so deaf to all of my arguments, blandishments, and pleadings, and since she just happened to be my colleague Jo Zarboulas, I spent some time afterwards reflecting upon the possible logical, intuitive, empirical, linguistic, psychological, and even interpersonal bases of her dogmatic negativism, upon the finite possibility that she might be right and I might be wrong, and upon the opposite possibility and its forensic defenses.

Admittedly I was nearly certain that she was wrong and felt that I knew at least the set of alternative possibilities apt to include the explanation for her seemingly unreasonable fixity, but I was still curious about the particular and confirmable causes of her dissent, and about whether there might be some tactical or logical way of resolving such a granitic difference of view.

The fact is that in her tenacity I thought I was encountering once again a familiar and important phenomenon: a display of passionate and almost insane inflexibility by a person on occasion when some concept or proposition requires, not just ordinary reason, but an alteration of accustomed logic or of basic mental schemata. The philosophical individual soon learns in life—and no one could be more conscious of this than the trained ideonomist—that now and again such adaptations are unavoidable, or are necessary and desirable prequisites for growth of the mind and accession to wisdom.

Periodically that happens which stands one's picture of the world on its head, which challenges all one's assumptions and one's sacred beliefs, which falsifies, limits, reverses, or supplements one's very methods of thought or ways of operating, which may even require revision or transformation of one's emotional life or system of values. Reality twists and turns, or is abruptly and discontinuously displaced, and the bottom falls out of one's world view.

Less dramatically, each person seems to have certain singular points upon which their minds stick, where the shadows prevent direct perception, where the pressure is so great that reason ceases or flees, which may be axes of our mental machinery that permit rotation about themselves but in no other direction, which may be things that orient but then hobble. These cognitive sticking points differ so greatly from person to person as to suggest arbitrariness, so perhaps they are best compared to those necessary chance points in which the athlete plants his pole so as to be able to vault the cross-bar.

But after thinking about the matter a little more, one realizes that there really exist a whole swarm of fallacies that, individually or collectively, may be contributing to the problem here: e.g. a Delomorphism Fallacy (or the presumption that something must have a definite or fixed form), an Omniscience Fallacy (or the presumption that one's knowledge or mental picture of a thing is complete), a Monosemy Fallacy (or presumption that a word, thing, or concept does or can have but one possible meaning), an Existential Simplicity Fallacy (or the error of presuming that a thing is or must be simple, or of believing that simplicity can ever

be absolute), a Mono-Logical Fallacy (or the presumption there is or can be only one way of thinking about a thing), a Path-To-A-Concept-Is-the-Concept Fallacy (which errs in assuming that the methods, means, details, contexts, or inspirations whereby one arrived at a concept or discovery must be essential thereto or have posthumous value), a Conceptual Aseity Fallacy (or the hypostatic error of regarding a thing or concept as being, capable of being, or deserving to be treated as wholly self-existent or independent of or separable from its physical or mental environment, or of assuming that the concept of a thing can ever be absolutely self-sufficient, so that things and concepts outside the thing or concept can no longer modify, clarify, extend, generalize, perfect, redefine, or transcend the concept or one's concept of the thing), a Fallacy of Impropriating A Definition (or the common error of misconstruing the definition of a public thing, word, or concept; often by equating one's own naive, superficial, partial, idiosyncratic, analogical, supposititious, unchecked, fallacious, purely verbal, tendentious, or hypocoristic definition—or understanding of the definition—of the thing for that of an authority or expert), etc.

Let me quit this excursive descant, however, and take up the challenge of answering, rebutting, or assuaging my esteemed colleague's pertinacious objection.

For why all life could have had the same disease without the disease by definition ceasing to be a disease, I offer these arguments and I make these points:

Paradoxically, disease may have preceded the existence of the first true organism, as part of so-called prebiotic evolution. In the chaotic ferment of the prebiotic soup, in which purely chemical evolution pieced together the elements necessary for life to begin, prototypical diseases may have had their start first. Later, when the first organism was synthesized, one or more of these preexistent diseases may have infected it. Which disease or diseases actually infected the first recognizable 'organism' may have depended upon chance, competition, or complexity, either prebiotically or at the grandly natal moment. In any case, disease is being imagined as exogenous, as originating beyond and before the first organism, even though the first organism became infected with, or diseased by, it ab initio. So pace Zarboulas's objection, a single disease might not only have been coextensive with the entire history of life on Earth, but more than merely coextensive; not only may it afflict all present-day life, it may be older than the bios itself. (A pluperfect rebuttal.)

My second point is, that even if the same disease has always afflicted every single organism on Earth, the disease could nevertheless have developed progressively over the lifetime of the bios. Even now it may remain a fatal disease in the ultimate sense, by dooming the evolution and existence of the bios itself to degenerate or cease in the indefinite future. If there is any such progression or tendency, then I can imagine no reason for refusing to term the process pathological or for eschewing its description as a "disease" (the greatest of all diseases, in fact). What is closer to the essence of the concept of disease than unfortunate (because not fundamentally necessary) progressive degeneration, debilitation, and killing of life (or pathogenesis)?

My third point is that, just as with any other disease, a single absolutely omnipresent disease could manifest itself in a great variety of ways in different organisms and over time and space; while remaining a coherent entity, it could have endless forms.

My fourth point is that the existence of one omnipresent disease would not preclude the coexistence of any number of other omnipresent diseases, nor of diseases of restricted distribution.

My fifth point is that disease can exist of or between the 'particles' (the lesser entities) of a single organism. In fact, diseases could and do have their own diseases (pathogens their own pathogens); even in multilevel hierarchies. Moreover, pathology can exist in the realm of so-called inanimate nature; 'diseases' (or more or less exact ideonomic equivalents of biological diseases) occur in metallurgy, astronomy, pure mathematics, computers, physics, chemistry, mineralogy—and they occur in an essentially abiotic sense in sociology, psychology, and economics. When one attempts to define the nature of disease in a transcendental (or nomothetic rather than idiographic) sense, one realizes that its essential properties are close to those of life itself (propagation, multiplication, development, appetitive destruction, stubborn perpetuity, transformation, self-reinforcement, regenerability from minimal or singular amount, idiosyncraticness, exponential behavior, even self-destruction); and that such properties are also commonly exemplified by abiotic phenomena. My reason for mentioning all of this is that, should one's definition of disease require that it coexist with something outside, other than, or in contrast to itself, there are a plethora of possibilities and a plethora of actualities; and that even an omnipresent disease will pass this definitional test, because of the inevitable heterogeneity of its environment.

My sixth point is that a disease imagined as having been coextensive with the entire evolution of life on Earth could simply have been one whose term of existence reached back asymptotically to the origin of life itself, but in a case where the initial moments of biological evolution were disproportionately important. At the limit, the first microsecond of life, for example, could have been critically determinative of the whole subsequent course of evolution; or at least in some sense, way, or degree. In other words, evolution presumably was temporally nonlinear.

My seventh point is that, in the discourse of biologists or as far as biologists are concerned, a hereditary disease can exist from the instant of birth or conception, without, by definition, ceasing to be a disease.

My eighth and ninth points would simply recall two other biological conjectures in this book: that all life may be one great self-contagion (e.g. owing to the unrealized significance of lateral gene flow), and that, in addition to bad, there may exist fundamentally good diseases (such as proseases caused by sosogens).

Finally, science-fiction stories have been written in which other cosmic civilizations are imagined as viewing the human species, or even earthlife itself, as a mere disease; and the arguments given for this seemingly brutally cynical attitude are, in some of the stories, disturbingly plausible or even rather persuasive.

9. Ultrafast diseases.

At the other temporal extreme lies an equally provocative possibility: that we may be subject to diseases so fantastically short-lived that we are not aware of their existence either.

Even maladies enduring for as long as seconds, minutes, or hours might escape our attention, or nosological recognition. Official medicine may have overlooked these historically because, at least in earlier centuries when medical attitudes or paradigms were established, illness this short might by virtue of its brevity have eluded instrumental detection or serious scientific study (at least in any given patient it would have been gone before the physician could have been summoned or its symptoms could have been confirmed or measured).

Moreover, such "momentary dizzyness, weakness, or discomfort", for being so brief, might have been dismissed from medical consideration as being relatively trivial or unimportant. Either it would be gone by the time it was addressed, succeeded by a sense of well-being, or it would have killed the patient (making therapy just as pointless). The last possibility triggers the thought that sudden death associated with things like cardiac arrest, may all unknown to us be variously due to a great range of ultrafast diseases or pathological processes, that may simply on occasion culminate in the cardiac arrest and the death that may follow it in turn.

A further possibility is that, the shorter a disease is, the weaker and therefore less conspicuous its symptoms and syndromes tend to be; which, once again, would have a tendency to blind the medical profession to the existence of ultrafast diseases.

Vastly shorter, and therefore even more elusive, diseases can also be contemplated: diseases developing, reaching their crises, and passing away in a mere millisecond, microsecond, nanosecond, or even picosecond. Even the natural attention mechanisms of the human brain might be too temporally gross to ever be aware of these pathological ephemerae.

Of course, in evaluating the possible importance of ultrafast diseases it should be borne in mind that disease number, diversity, complexity, and subtlety might be inverse functions of disease longevity. In other words, at the level of subsecond diseases, in the body, there may simultaneously be a stupendous number of different diseases that coexist, or that pop into and out of existence in the course of one seemingly tiny second; and the sum importance of these, considered additively or synergistically, or their collective disruption and depression of bodily function, might be great indeed, or comparable to the effect of one of those more obvious diseases, such as flu or the common cold, that last weeks.

Diseases may also tend to be localized in the body in proportion to their brevity, which is to say that a disease lasting a second or millisecond might have a tendency to be confined to a mere part of the body: perhaps to one organ, one cell, or one ultramicroscopic organelle. Such confinement or spatial restriction would clearly mask existence.

If the temporal hierarchy of characteristic disease durations extends in this way down to the least temporal scintillae, then it becomes a reasonable conjecture that pathogenesis as a whole somehow represents the progressive growth, coalescence, evolution, or transformation of the myriad quickest bodily disorders and irregularities, into longer and

longer and larger and larger—and perhaps more and more unified—pathological states, processes, and entities; or a causal hierarchy of ascending diseases and disease possibilities.

10. Brain as a muscle.

This may seem a bizarre and antiquated notion, that the brain could be a muscle, and yet what prompted the conjecture were some recent biological discoveries representing the cutting edge of science.

Each of the body's cells are now known to contain a so-called cytoskeleton, and other microsystems, whose functions are in part the production of simple and complex intracellular and intercellular movement, and whose chemistry resembles that of muscle (or of the conventional macro-musculature). There is even morphological similarity.

Although the exact nature and possible range of these transportive systems are not yet known, it is clear that at least in part they are as mechanical as ordinary muscle; that is, they partly move objects and structures by pushing and pulling them about. And such movement can be actively bidirectional.

In addition, blood vessels are lined with muscle cells that switch and may force motions of the blood. In the brain these vascular motions may have supplementary mechanical functions, say by exerting pressures upon the surrounding tissues of the brain itself.

The familiar macroscopic muscular system must have had its evolutionary origin on some tiny length scale or on the scale of the simplest multicellular organisms or even of unicellular organisms. Certainly it could not have sprung into existence ex nihilo.

The old and obsolete picture of the sensory, nervous, and motor systems visualized their several functions as essentially unique and mutually exclusory; the sensory system was thought to be purely afferent, for example, and the motor system purely efferent.

But we now know that in reality a sensory organ such as the ear or eye not only sends fibers and messages to the brain, but receives fibers, messages, and instructions back from the brain; and that a muscle leads a similar dual life.

When the brain is engaged in different mental functions, its blood supply is shunted about to different parts of the brain, according as these are more or less relevant to those mental functions or to the sequential steps thereof.

It can be theorized that the brain likewise acts upon itself, and in a muscular sense, to force the redistribution from one part of the brain to another, or from one cell to another, of various neurotransmitters, neurohormones, microvesicles, ions, solvents, and solutes.

Different neurons, and neuronal clusters and regions, may continually fight to pull one another about, or to gain the proximity of one another.

Motions like this might occur very slowly on a long time scale, or be spread over a great range of time scales.

Neurons may also act to constrict parts of other neurons or parts of themselves.

In summary, not only may the brain internally be a great sensory or self-communicative system, but it may likewise be internally a great motor system that moves itself about in various complex and functional motions—metaphorically resembling a hand reaching within.

The vascular spasms of migraine might conceivably arise from disorder in this occult muscular system.

How interesting it would be to view the brain by means of time-lapse cinematography or microcinematography! An organ thought inert might reveal itself to be animated with throbbing, squirming, and labyrinthine motions, on a macro or micro level.

11. Can arteries (themselves) have rashes?

This question may appear innocuous to a layman, but it is more apt to strike a pathologist as absurd. The reason is that the phenomena of rashes are supposed to represent large-scale manifestations of disorders of whole blood vessels; to be more gross than individual blood vessels, in other words. Rashes should not be feasible, therefore, on the scale of blood vessels themselves or on any lesser scale.

But from the standpoint of ideonomy, several further possibilities come to mind. Large blood vessels are serviced by networks of smaller vessels, for example, and a rash confined to blood vessels might occur in this scale and structural gap.

Ordinary rashes may in fact include microphenomena on or below the scale of individual blood vessels, at least in certain cases, and these may themselves be rash-like, even in a fractal way recalling the larger scale in morphology or behavior.

Apart from what are ordinarily called rashes—thirdly—there may be closely analogous but perhaps not homologous phenomena. In other words, the rashes known to us hithertofor may merely represent one species within a more generic "rash phenomenon" that includes microscopic and even ultramicroscopic equivalents ("microrashes", they might be called).

The previous assumptions about the anatomic basis of rashes may have constituted a fallacy that obstructed conceptualization and detection of the regressive microrashes.

Certain unexplained or poorly explained skin diseases might be accounted for by means of microrashes.

Known rashes may sometimes include microrashes, and therapeutic failures to clear up all of the symptoms of the known rashes may stem from neglect of the smaller-scale rashes.

This item is yet another example of the importance of seeking to theoretically and experimentally determine the extreme limits of occurrence, form, and meaning of any phenomenon—especially any phenomenon hoary with tradition.

Should the conjectured microrashes be sought and found, a larger ideonomic implication of their discovery would be that many other phenomena decreasingly analogous to a rash may also be extensible and generalizable in this way, for having been artificially restricted historically or in contemporary thought.

12. Chemical insights from impossible molecules.

Hitherto chemistry has developed only by experimental and theoretical study of actually existing or at least physically possible (existable) molecules and chemical processes, partly because of lack of means for simulating physically impossible (or totally improbable) chemistry, but also partly as a result of the assumption that the latter form of chemistry could not have any theoretical or practical interest or value.

General ideonomic principles, however, require that there is always something to be learned from the contemplation or modeling of, or futile attempt to achieve, what is (supposedly) impossible in a subject; and that any Field ~~subject~~ should have a developed branch concerned with such quixotic or deliberately unrealistic investigation.

Each by analogy to pure math!

Impossible chemistry (or "byrmo-chemistry") could be conducted by means of mathematical or axiomatic models or principles, computer simulations, or gedankenexperiments. The fruit of examining fantastic or bizarre molecules, unsustainable or completely artificial reactions, self-contradictory chemical phenomena, or impossibly incomplete chemical structures could over the long-term include: discovery of new constraints and laws governing the molecular realm, serendipitous finding of novel families of chemicals, stronger and richer development of chemical intuition and imagination in student and professional, insights into the interdependent probabilities and complexities of chemical phenomena, isolation and removal of the barriers to things being feasible, and insights through "lateral reasoning" that would otherwise themselves be impossible.

13. Three-temporal-variables theory of the mind.

A tachistoscope is a standard psychophysical apparatus for the brief exposure of visual stimuli that is used in the study of learning, attention, and perception.

Imagine a modified version of the tachistoscope that is able to present a set of photographic images, or of other sensory stimuli, to a human or animal subject in a temporal sequence simultaneously controlled in three temporal dimensions: the duration (or length of continuous presentation) of the individual stimuli, the interval (or temporal separation) between the successive stimuli, and the sequential order (or diachronic program) of the stimuli. A computer would be used to control and program the device. (In a more sophisticated form of this instrument, a fourth dimension for which the stimuli could be controlled would be "sets". This means that different subsets of stimuli could exist and be drawn upon, or that a computer could modify any of the various properties of stimuli or actually create novel stimuli. But in a certain sense this idea is already implicit in the first three dimensions, since the original set used could be arbitrarily large, diverse, and specific, and the sequential order of its presentation could be arbitrarily complex.)

Assume for the moment that the stimuli are various photographs of objects and scenes, and that these are presented to a person for durations and at intervals comparable to the flicker fusion rate of the eye (say 20-50Hz). Assume further that the three presentational dimensions (duration, interval, and order) are varied randomly, or via some stochastic function; although the average duration and interval can still be adjusted from without for optimizing and experimental purpose.

The tachistoscope would at first be used to verify the existence of certain predicted psychophysical effects and phenomena, including: a tendency for images suitably controlled in the three dimensions to interact and coalesce in visual perception; an illusion that the static images are protean, or possessed of a tendency to mutate into other

images; an hallucinatory proliferation of new and novel images; an hallucinatory tendency for the sequences and sets of images to vary and evolve endlessly, and to appear to tell dream-like stories about themselves, or incorporating one's ongoing thoughts and reactions; a meaningful dependence of the fantasized images and image-streams upon the relative and absolute durations, intervals, and orders of the individual stimuli and of specific types of individual stimuli, and upon the controllable statistics thereof.

Should such predictions be confirmed, then it might be possible to use related psychophysical apparatus to: measure the absolute semantic distance, and complex mental interdependence, of various or arbitrary stimuli, or sets or series of stimuli; discover the laws governing percepts, ideas, and their behavior; provide a person with a mirror by which to see his own mind working, or experimenters with a direct window upon the mind; stimulate new thoughts, ideas, and visions—partly by confronting the mind with itself to cause its creative self-divergence, and partly by directly controlling the direction and content of its evolution; reveal psychogenetic and ideogenetic patterns; enable an extraordinary new form of psychotherapy; and describe and map the basic continuums and discrete thresholds by which different ideas, truths, and data slowly or suddenly transform into one another within the economy of the mind.

In connection with such predictions, tests, and possibilities, a new and revolutionary theory of the mind can be advanced, that might be called the "three-temporal-variables theory of the mind", and that might tentatively be described as follows.

According to this theory, the temporal sequences of things are regnant; they are critical to understanding the mind and to the operation of the mind. The all-importance of, for example, anamorphic interadjustments of the durations, intervals, and orders of fixed and finite stimuli in temporal sequences may be able to subjectively simulate the presence of any absent kindred thing (either a thing that was originally present in the sequence or set of stimuli but that was subsequently withdrawn, or a thing that was never present at all).

The things whose existence, occurrence, or appearance might be simulated in this way are presumably all-encompassing, and include any: image, texture, color, sound, event, sequence, story, statement, transformation, word, concept, logical proof, evolution, gestalt, degree of 'life', cause, effect, relationship, perspective, 'world', object, probability, behavior, etc.

The theory would require that science progressively map-out the pyramid of thresholds and crossover-points of all sets of sensa, percepts, ideas, and 'realities'.

It leaves open the basic question as to whether statistics or instead cryptology are essential, or most essential, to the mechanism of the mind. The three-temporal-variables theory of the mind could be in the former case a nondeterministic theory of the mind, or in the latter case, a theory relying on some sort of codes or on either reversible or irreversible processes.

Of great interest is the fact that the theory might imply a finite quantization, and therefore enable a finite quantification, of the mind. The mind may possess an unexpected basement and simplicity.

The temporal codes or sequences necessary to simulate normal phenomena might be either short or long; and if long, might or might not be compact (efficient or minimal). It should, however, be emphasized that the laws of combinatorial mathematics would allow a fantastic number and variety of mental states and processes, or of things and ideas about things, to be specified even via short codes or small amounts of information in the three temporal dimensions.

14. Trans-holistic biology and polyorganisms: diseases caused by disequilibria, dissociation, or reemergence of normally coalesced 'virtual or ghost organisms', and representing a kind of bodily schizophrenia.

Here I confess that not a few of the ideas presented in this chapter were inspired in part by my sense of humor! {Sometimes my purpose was to shock or outrage experts or people in general, sometimes I was indulging my love of absurdity or fondness for a reductio ad absurdum, now and again I was testing my own limits and capacities, and occasionally (as with the present item) I was out to poke fun at others or engaging in a kind of ideonomic one-upmanship}.

Self-described "holistic" thinking has become a fad at the moment, often in connection with mindless spiritualism and pseudoscientific doctrines. We are sternly advised by the faddist that we had better be in tune with some Whole, for otherwise we may be making fools of ourselves. Although the nature of such a Whole is never specified, we are told that indefinability is simply part of its holistic essence.

I proposed trans-holistic biology to demonstrate that holism could hardly be the ultimate truth, since there could easily be something that is more than just holistic. There may be phenomena that represent many wholes at once—a whole lot of wholes!

The present idea begins where another suggestion in this chapter leaves off. I am referring to the conjecture that the genome is so polygenic and pleiotropic that it resembles a hologram or is holonomic. The conjecture led to the possibility that animal minds are not so much partly human as weakly human (or even more weakly human than ourselves).

A familiar concept in modern physics is that of a phenomenon {that is ambiguous as a whole, that either allows or requires many different general representations (perhaps depending on context or occasion), that is despite appearances infinitely complex (or at least requires an infinitely complex description), that somehow embodies or synthesizes many different phenomena or entities that are its own size at once, etc}.

Despite being common in physics, and despite the fundamentality of physics to virtually all other sciences, the concept in question has rarely if ever made any appearance in biology. But all the signs are that the odd categories of concepts that first pop up in physics, will later pop up, or be proposed and then discovered, in the other sciences, such as biology.

What I am visualizing, then, is that resident in the genome may be the latent description or program of, not just one, but many different organisms, species, and higher taxons; and that resident in the organism or phenotype, in either some latent or subtly compensated and disguised form, may be a similar multitude of (holistic and less-than-holistic) beings.

Ideonomy uses the term "polyequilibrium" to refer to an unusually complex type of equilibrium that is simultaneously comprised of many different equilibria (and often disequilibria as well).

Trans-holistic organisms and genomes could embody or represent such static or dynamic polyequilibria. But they could also be trans-holistic for other reasons or in other ways.

If many different organisms, or superimposed organic systems, are in whole or part simultaneously present in bionts, then this might variously be: in a purely vestigial (or fossil) sense, in a revenant sense, in a passively influential sense, in an actively influential sense, in a transformed sense, in a fully integrated and governing sense, in a nonhistorical (emergent) sense, in a multiplexed sense, in a multipolar sense, in a competitive sense, in a virtual sense, in a pluripotent sense, in a synthetic sense, etc.

Conceivably in the normal, healthy organism these 'diverse selves' or multiple holistic tendencies cooperate in ways useful to the biont, contribute to its flexibility or powers of adaptation, aid the evolution of the species through its polymorphisms, give the organism some ability to camouflage itself or to fend off pathogens, etc. But occasional disharmonies or conflicts among these compresent selves or different selfish tendencies may leave the biont (or "polyorganism") susceptible to disease or even be the basis of a disease. In the latter case there could even be a kind of bodily schizophrenia.

Such a splitting off of selves could variously lead to competing centers of activity or government, to a loss of communication or coordination among different bodily organs, parts, tissues, cells, functions, or systems, to 'noisy physiology', to sovereign and parasitic tumors, to metastasizing body parts and functions, to ontogenetic and phylogenetic atavisms, to autoimmune disease and analogs thereof, to disunited and anomalous metabolic and other biochemical pathways, etc.

15. Marginal "negative aging" mechanisms that might be used to develop means to prevent and compensate lifelong aging.

All organisms that have ever lived have been subject to various forms of aging. Common sense would therefore suggest that biological evolution has at least to some extent concentrated on the discovery and development of strategems and specific mechanisms to offset and repair such wear, tear, failure, decay, disequilibria, loss, and disease as normally or alternatively occur during the life of a biont.

There may be: backup systems, systems that during times of failure suddenly come into play to maintain life processes temporarily until repairs can be effected, systems with generic functions capable of specialization in response to an unusual need, systems capable of transforming into other systems, alternative metabolic pathways, special tradeoffs that can be instituted when appropriate, functions capable of useful enhancement or reduction, means for intra-organismal communication and control that are fungible, learning systems, etc.

The diversity of species, diversity of bionts and polymorphisms, and manifest imperfections of all forms of life, all argue that bodily systems for coping with aging—if they exist at all—are apt to be highly inefficient, and to lend themselves to improvement through future medical interventions designed to optimize their operation.

Even if the efficiency of such natural mechanisms should turn out to be only marginal, and to be capable of little practical improvement, research into the nature of these "negative aging mechanisms" may ultimately lead to the development of new and artificial mechanisms and types of mechanisms that are merely analogous or homologous to the old ones.

If bodily systems can be harnessed by medicine (or artificially stimulated, extended, perfected, or supplemented) to reduce, reverse, or extirpate human aging, such methods or research may also lead to explanations and treatments of some analogous diseases as well.

It should be pointed out, in passing, that we already know of a great number of bodily systems that can operate in lieu of one another, that can produce or do more or do something different when there is need or an emergency, that can adapt to stress or strain or to a changing environment or to the accidents of birth, that only operate or exist phasally during certain stages of development, that can respond to special pharmacological stimulation, that help the body fight various diseases, that override or substitute for one another during certain bodily states or when an organism is engaged in mutually contrasting tasks (explosive versus marathon muscular exertions, for example, or during states of sleep vs. consciousness, or in the course of hibernation, or when a whale is diving to extreme ocean depths).

All of this makes the possibilities proposed here seem more plausible.

16. Holonomic genomes, homuncular (theriomorphically anthropomorphic) animal minds, and monadic psychiatry and education.

Historically, science has usually found it necessary or convenient to begin its analysis, treatment, or theory of a phenomenon with the simplest possible representation, form, or element of that phenomenon.

Attending at first to a greater number, variety, part, or complexity of things, or to some system as a whole or to holistic aspects of things, presumably would be too costly, too demanding of time or effort, or too dull, or would slow or postpone the onset of inquiry, or would be too difficult for theory or the human intellect, etc.

So repeatedly science has embarked on the investigation or development of a new field with either conscious or unconscious simplism, or, say, with an assumption that the simplest, most obvious, most accessible, or most controllable part of something must be best, fundamental, sufficient, self-sufficient, distinct, etc.

Pharmacology uses pills compounded of only a few ingredients, chemistry and chemical engineering began with the simplest molecules, materials science uses simple formulas and structures, pure mathematics concentrates on the 'simplest' numbers, physics until recently ignored nonlinearities, psychology remains entrenched in outrageously simple phenomena, laws, and terms, the same is true of economics (for all its pretensions of sophistication), etc.

Similarly modern genetics remains almost exclusively concerned with only the simplest of relationships between the genotype and the phenotype, and with those traits that are only controlled, or supposedly only controlled, by one or a few genes.

Polygenism and pleiotropy respectively postulate, by contrast, that a single phenotypal trait may be simultaneously influenced or controlled by many genes, and, conversely, that a single gene may simultaneously contribute to or modify many phenotypal traits.

The concept of "holonomic genomes" (genotypes) visualizes these things being taken to such an extreme that virtually every gene would influence and help determine virtually every trait.

The situation would then be analogous to what obtains in the case of a (spatial) hologram. A hologram can provide a recorded image of an object. If, however, one imagines the hologram being cut up by a scissors into progressively smaller pieces, the whole image will remain present in each piece and smaller piece, and will simply become fainter as the pieces become tinier. Of course eventually the image will become indistinguishable and even nonexistent.

With a hologram, then, the whole is paradoxically present everywhere in its parts (or omnipresent). The fundamental or generic basis of holography, mathematically, is the holonomic group in group theory.

In the case of a holonomic genome, virtually all of an organism's structure, function, and composition would tend to be specified (or 'imaged') by virtually all of the parts (or ideally, all of the genes) of the genotype of that organism. The specification would simply be weaker as the <parts or samples> were smaller, and stronger as they were <larger or more complete>.

Of course this description of the concept is idealized, and it is unlikely that an organism with a very partial genotype would be viable for long or able to develop in the first place.

I conceived this notion of a holonomic genome a few years ago as a way of accounting for some observations I was making of the score of gerbils I was keeping in a pen in my house as pets. It was a massive enclosure, this pen, filled with tree stumps and other objects chosen and arranged not only to keep my little friends happy but to reveal the range of their behavior and intelligence.

As my experiences with these gerbils accumulated, I became more and more struck by their human qualities (both through analogy and in a direct sense). Differences were obvious enough, of course, but if one permitted oneself to observe the behavior vergently, or in two ways at once superposed without interference so that both divergence from and convergence to man were free to increase over time simultaneously, then the approach to our allegedly "higher" selves became astonishing.

The gerbils seemed to have a human sense of humor, human personalities, and even at times something inexplicably near to human intelligence.

I had to ask myself, reluctantly, whether gerbils might after all merely be little people? This was an appalling question for a neuroscientist to ask, one violative of numerous hoary traditions. It also outraged the sacred philosophical division of the animal kingdom into Humans and The Rest.

It was in this stressful situation that I suddenly thought of the possible relevance of the hologram, and realized that it opened the door to gerbils and even "lower" animals being faintly-but-fully human. Our image, gestalt, or soul might be there, in other words, but less strongly, luminously, or fiercely.

If animals have miniature human minds, then of course the human mind is simply an animal's mind magnified or vivified. One should therefore hesitate before criticizing the present proposal for being a naive anthropomorphization of animal psychology. Evidently human and animal nature are both moot.

If the unconventional ideas being proposed here have any validity, then it is probably a matter of degree, or of a dual reality. Human mentality, so-called, may obtain to a surprising degree, or in a surprisingly holonomic form, in subhuman animals, but this need by no means imply that it extends without qualitative loss to the most primitive animal or organism. The problem of measuring this continuity may, however, be far more difficult than one would at first assume.

It has been reported in the case of certain child prodigies that even as neonates, and certainly by the first year of life, their extremely precocious minds gave the impression of being, in some respects, preformed or adult-like from the first. This was the feeling given by eye contact—of a degree or quality of attention, concentration, consciousness, or raw logic or intelligence normally characteristic of a mature human being but in this exceptional case preexisting seemingly without development or environmental nurture. Although such claims may simply be part of the mythology of the prodigy, they may also constitute evidence in favor of the holonomic concept of the mind being proposed here.

The bodies, as opposed to the minds, of subhuman animals do not seem capable of any similar measure of anthropomorphization, but it is easy to justify such a discrepancy. Of course our concepts, and therefore perceptions, of mind may be more complex, and hence less simplistic, than our concepts and resultant perceptions of the body or morphology of organisms; so perhaps in reality the discrepancy imagined does not even exist.

Even if gestalten of the human psyche obtain in, or have the power to assist description of, the lower animals, this might not have to imply as much detailed or even constitutional continuity as one would at first suppose, for such anthropomorphic "configurations" (or mental 'styles') could preexist independently of any deeper, or even of any truer, identity, analogy, or homology (or in a merely superficial sense).

If humans are simply less dimly human than subhumans, then associated with such more intense humanity or vivid animality may be a number of those "emergent" qualities that it has been suggested always appear spontaneously in Nature at higher quantitative levels

The notion that animals are faintly-but-fully human may provide a solution to the ongoing so-called "antivivisectionist" or "animal rights" controversy (whose recent revival has done injury to important medical and biological experimentation). The antivivisectionists may have been animated by a correct intuition of the humanness of animals, or of the qualitative identity of the minds of the latter with the minds of people (and the scientists wrong in their contrary intuition); but the antivivisectionists may for the same reason have been guilty of a fallacy, by failing to appreciate the fundamental importance of mere differences of degree and the ultimate criticality of making purely quantitative decisions.

If the human mind is holonomic, and this implies an essential anticipation of the human mind by the minds of animals, then it also follows that effectively transhuman mentality is essentially anticipated in the merely human mind.

Perhaps for this reason the mind should be metaphorically spoken of as "monadic". The German philosopher and mathematician Gottfried Wilhelm von Leibniz held the universe to be composed of a hierarchy of "monads", each monad being a microcosm reflecting the world with differing degrees of clarity from its particular point of view without external stimulation in a system of harmony preestablished by God.[1] A monad might be thought of as a paradoxical mirror image, or complete miniature, of the whole universe.

The proposed "monadic psychology" would, by analogy, conceive of mind as paradoxically somehow being complete or finished at each stage of its development (or at least in an unorthodox sense and degree). Certainly a mind would at each phase of its evolution anticipate, or be able to anticipate, in some fundamental way its later, higher, and greater phases; the traditional rigid confinement to one level of being, in our description, would be an error with many unfortunate practical consequences.

What might monadic psychology mean?

It could imply: that the mind is always capable of sudden and drastic change, and of going off in very different directions, since in a sense it really contains many minds, and the possibilities of the mind in the past and the future; or that we should not prejudge what the mind is capable of learning now or what it should be taught, if just because it is impossible for us to clearly know the ways in which it is primitive or ignorant and the respects in which it is advanced, mature, or wise; or that in a sense each of us is compounded of the diverse minds of all people and of all other animals, and this personal 'society' and 'zoo' can and should be addressed whenever we visualize ourselves or communicate with other persons; or that the future of the mind, or the ideal potentialities of the mind, are paradoxically seeking to reach back or across to the way we are now, so as to play a role in guiding or perfecting us.

Monadic psychology could lead to a monadic school of psychiatry. The monadic psychiatrist might see the human mind as an infinitely large, rich, and complex entity. In his approach to therapy he might seek to kindle consciousness of this internally infinite, self-complete, or semidivine status. Then again, his point of view might be that, as a monad, the human mind can never be absolutely unwell, but on the contrary must always contain a quasi-duplicative fully sane side, which the therapist can appeal to in an effort to bring about its emergence, in a changeover analogous to a sudden geometric transformation replacing one enantiomorph with its opposite.

A monadic theory and system of education could likewise result from a monadic psychology. This might mean that from its infancy a child would be exposed to adult, or at least surprisingly sophisticated, instructional materials, methods, experiences, and ideas, and treated with an element of respect ordinarily reserved for other adults or even for revered persons —say on the belief that a child's mind has the form, if not the content, or if not the form, then at least the laws, or at the very least the prospective essence, of the mind of an adult.

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1. Definition of monadism given in Webster's III (1986).

17. Foods with "spatial tastes", automatically designed, varied, and perfected.

There could be an ideonomic device in the kitchen to automatically create a kaleidoscopic variety of foods whose key basis would be design of the intricate spatial structure, or arrangement, of the elementary food ingredients.

The assumption being made is that spatial structure of a food can be profoundly important in determining the subjective goodness, the taste, and the special character of foods. If this assumption is valid, then, since at the present time there is only minimal control over such spatial structure, or at least little sophistication in the spatial structure of the foods we eat (whether present naturally or by human art), the introduction of methods for controlling and perfecting such food spatial structure for the first time in history should open the door on an enormous expansion in the actual and possible variety of our foods and meals.

Ideonomic reasoning that was done on another occasion tended to support the truth of the assumption.

To describe the automatic chef referred to, let it be imagined that this at any time has access to anywhere from 100 to 1,000 elementary food or food-making ingredients. These ingredients could variously be spices, flavors, <powdered and liquid and crumb-like> forms of <plant and animal> materials, emulsifiers, fats, oils, sugars, chemical tastes, basic nutrients, condiments, etc.

Perhaps the auto-chef is equipped with computer software containing the results of massive nonmetric multidimensional scaling (MDS) of the 100 to 1,000 ingredients for their <subjective, mutual, and holistic> analogousness, complementarity, combinability in foods, various types of goodness in combination, spatial interactions (radial, textural, configurational, and hierarchical), etc.

Using the powers of these MDS methods that are discussed elsewhere in the book, the auto-chef would be able to predict which absolute combinations and spatial arrangements of the set of food ingredients would be <successful and unsuccessful>, and which would be most excellent; it would also be able to anticipate which novel or never-before-created foods would be best; and it would use these predictive powers to create <new and excellent> and, in a <psychological or gustatory> sense, <maximally diverse, or maximally fundamentally diverse,> dishes. It would be able to create infinite series of new foods and there would be no need for any two meals to ever be the same.

How might the auto-chef actually assemble the ingredients into or as the food?

One way in which it might do this would involve a straight tube under which a circular turntable would rotate during the orderly deposition of the food ingredients. These ingredients might be sprayed onto the revolving table or platter through a series of small valved orifices distributed along the arm and fed by tubes containing the different food ingredients, a process bearing analogy to the multicolor ink-jets in a modern computer printer. Alternatively, a single head with one orifice might travel slowly over the revolving disk as in a record-player, or else it could be moved freely and quickly over the receiving platform as a computer-controlled micro-robot; and different food ingredients or mixtures of food ingredients might be propelled through the orifice head as a function of programmed locus and time.

Successive rotations of the disk, or repeated sweeps of the free head, could construct the third (or vertical) dimension of the food being prepared by adding any number of layers, whose systematically changing spatial structure would build up voluminal patterns and textures in accordance with the culinary logic of the MDS data operating in combination with some additional "expert systems" culinary logic.

The crudest form of the foods or meals produced in this way might resemble circular pizzas with their multifold, deliciously spaced ingredients.

The things envisaged call to mind, and might answer, some fascinating questions. For example, if the food produced was kept depth-less (or two-dimensional), as a single layer or minimal film of food structured everywhere and purposefully in those two dimensions, would such a flat food be as good as, or be able to simulate, a three-dimensional (or voluminous) food? Thus the 'food-printing' head might be made to construct a flat sausage amid flat vegetables. To what extent would these fall short of a truly 3-D meal in taste or quality?

Another question is whether the auto-chef could create foods that would almost always be better than a human cook's, simply through the net effect of absolutely superhuman abilities in the proper spatial design of foods? The MDS data or culinary logic would enable the auto-chef to control and perfect the spatial structure of its foods not just at one size scale, or grossly, but simultaneously, coordinatedly, and synergistically over an entire hierarchy of size (or "length") scales: say from the full diameter of the synthetic dish, to a tenth that, a tenth of that in turn, and a tenth of that in turn (or over several orders of magnitude).

The different tastes and patterns of tastes arrayed over this hierarchical structure could be, thanks to the MDS methods, pleasingly complementary, multidimensionally variable, rhythmic, fractal, vergent, meta-structured, etc. Such a food could make such intensive sense, or make such intricate mathematical sense through its countless gustatory symmetries, that no food produced by a merely human cook could rival it.

Then, of course, there is the obvious question as to whether the macroscopic and microscopic structure of a food in space has the ability to contribute very much to the pleasure and interest of food, or must instead be judged an irrelevance? (The body's appreciation of such spatial features could be gustatory, haptic, visual, and/or even olfactory.)

That food spatial substructure is important to at least some extent seems clear from the attention that the food industry has historically given to the design and variation of the external structure of certain foods, such as candies. Also, a little reflection upon one's own experience in eating foods possessed of different external and internal structures should suffice to convince one that these things are important.

The charts in the ideonomic division Forms and Morphology that sketch thousands of canonical variations upon the basic types of form, could also be exploited by the imagined ideonomic auto-chef to introduce into the new foods the most diverse, basic, comprehensive, and delightful kaleidoscopic patterns of shapes (or "shaped and patterned tastes").

18. Traditional and future new musical instruments as anthropomorphic or physicomorphic leitmotifs.

Inventing new and subsequently successful musical instruments is not as easy as one might suppose. This difficulty accounts for the fewness and conservativeness of the instruments of the modern Western classical orchestra.

There are several possible reasons for this great difficulty: (1) The human brain, sensory organs, and/or musculature, genetically, may codify and severely constrain the practical and meaningful possibilities; (2) Excellence in the design of musical instruments—on a level comparable to that of accepted instruments—may be hard to achieve and achieved only slowly, historically; (3) Instrument design may be constrained and limited by mathematical, ideonomic, and physical laws and phenomena; (4) The standard set of instruments may unrecognizedly mimic, complement, and 'ordain' one another (or be interdetermined), and hence by preexisting (possibly as a product of chance) make it almost impossible to introduce any radically new instrument not resembling those that already exist or are established in cultural tradition; (5) Orchestral complexity has always been limited by the finite size of orchestras, finite powers of composers, finite discriminatory powers of the human sensorium, finite resources of musical conservatories, and finite cognitive powers and interests of the mind; and finally, (6) The design of musical instruments may be highly mimetic of, or referent to, the averaged or canonical structures, properties, or behaviors of the human or animal body, and of natural phenomena and environments.

It is the last of these generic possibilities that concerns us here, or the concept that the different types, and most successful types, of instruments reflect or embody anthropomorphic (that is, "physiomorphic" or body-related) and/or physicomorphic (that is, based on either phylogenetic or lifelong experience of natural phenomena) leitmotifs, or archetypal: variations, themes, processes, sensa, percepts, poles, dimensions, statistical centroids, "order taxons", extrema, "ethological tableaux", e/vc.

A simple, or relatively, simple way to test this proposal would be to investigate the set of characteristic sounds that ordinarily occur in our environment or lifetime, or that would have dominated the evolutionary environment of past animal life; to organize these into a taxonomy of the major or important types; and then to check to see if the different types happen in fact to correspond to the characteristic sounds of our different types of instruments, or in the instances where they do not, if the leftover basic sounds nevertheless have a peculiar ability to suggest novel musical instruments that would, intuitively, be apt to succeed.

Of course in reality such a test would be extraordinarily difficult and demanding. Still, even a crude version of the test might give some suggestive hints—and produce at least one ingenious suggestion for a new member of the orchestra.

The proposed test could also be conducted in reverse. That is, one could run through the list of standard instruments of the orchestra to see whether each is homophonic to some major category of natural sound —such as sibilation, susurrus, thumping, thunder, splashing, snapping, a whirling sound, scraping, ripping, scrunching, echoing, popping, patter, whining, screaming, or squeaking.

Musical instruments have been divided up into idiophones (in which a sonorous material vibrates) that are either struck, shaken, scraped, plucked, or rubbed; membranophones (in which a stretched skin vibrates) that are either struck, rubbed, or blown; chordophones (which use strings) that are either plucked, strucked, or rubbed (with a bow); aerophones (which involve a vibrating air column) that either use flues or reeds or are lipped; and electrophones (which use oscillating electric circuits) that are either monophonic or polyphonic.

What natural phenomena might these classes and subtypes emulate?

If instruments are at all or basically anthropomorphic or physiomorphic, then what parts of the body might they logically imitate? Some examples that occur to one are the external, middle, and inner ear, the larynx, oral cavity, nasal passages, etc, the resonant chest, and the heart, with its rhythms.

But the larynx, or human voice, alone could conceivably contain the prototypal bases of all orchestral instruments!

The sounds of other animals that typify the environment would fall between the two broad categories of anthropomorphic and physicomorphic bases of musical sounds. Included here would be the range of birdsong (from twitter to peeps to squawks and hoots), roars, howls, barks, insect buzzing, hum, and stridulation, lizard sliding and hissing, the clump and gallop of hooved mammals, etc.

In the even grander physicomorphic category would be the sounds of rushing water, sowing wind, rattling leaves, creaking tree trunks, tumbling rocks, crashing and rumbling thunder, twanging and snapping ice, etc.

→ TOPICS DISCUSSED IN FACT HERE: 1 Do plants fall in love? 2 Can Kidneys be schizophrenic? 3 Plant pecking order. 4 Millennial pandemics. 5 Volcano procreation.

TO: Jo Zarboulas
FROM: Pat Gunkel
RE: My comments on pp. 1-14 of the enclosed copy of her chapter "The Power of Analogies".
NOTA BENE: My remarks should ordinarily refer to the numbers on each page I have reassigned to your footnotes, without regard for whether you have designated your notes by "jo", "pat", or a number. (I reassigned references to make the numeration consistent.) Note that in the enclosed copy I have here and there inserted (numbered) notes of my own.

[redacted]

p1,n ① : See marginalium.

① p1,n ② : Re the question **"Do plants fall in love?"**, I agree the suggestion needs to be treated with kid gloves, but disagree with the implication of your remarks that the speculation is terribly hard to justify or dignify. The concept of 'plant love' would have to be treated in mechanistic or behavioristic terms, or perhaps sheerly as some sort of scientific metaphor, and pains would admittedly have to be taken to stress that there was no intent to impute mind, consciousness, a nervous system, or the like to plants.

Falling in love, it might be explained, would simply represent some tendency for some plants in some circumstances to form that which would be equivalent, in some sense or degree, to an attachment between individual plants that would modify certain elements of their physiology, anatomy, genetics, and/or evolutionary behavior. Readers could be informed that what the botanist means by 'plant behavior' encompasses internal physiological adjustments, the sort of extremely sluggish and circumscribed (but still very important) external behavior that so interested Charles Darwin that he wrote entire books about it, adjustments in root systems that have still been little studied, and exceedingly gradual adaptations of the habits of plants in the aggregate that transpire on evolutionary timescales of many generations or millennia. That plants move and behave in such senses as this is undisputed. The active question then becomes just how rich, diversified, and peculiar this behavior might be, and what conceivable parallels there might be to the simpler and more complex forms of behavior that are exhibited by animals or even by man himself.

It might first be asked, "How far down in evolution, or in the tree of all grades of organisms, can such behavior as 'falling in love' be traced; or at what levels can we confidently draw the line, both positively and negatively, i.e. by affirming the existence of analogy, and by excluding any such analogy?" It should also be asked, "What do we really mean, and what should we really mean, by 'love' and 'falling in it'; and what quantities and qualities represent the minima for 'love' or are too poor, too measly, to merit any amorous description, interpretation, or hypothesis?"

Ideonomy, owing to its obsession with quality, threshold, minima, limit, transition, transformation, essence, and concept, forces us to pay unusually careful attention to precisely such questions, and to approach them with unwonted humility.

To illustrate a perfectly plausible way in which even a plant might fall in love, it could be imagined that plants of the same or different

species that live as neighbors, that are contiguous or that overlap, may customarily, or at least in a few instances, react to one another in either of two alternative ways: by furnishing one another with some sort of support, or else by passively or actively 'rejecting' one another.

Plants seldom have just one neighbor, and some degree of selection could easily happen within the mutual lifetime of neighboring plants that would usefully encourage and discourage interaction, contact, interpenetration of neighborhoods, etc of certain sets of individuals. Bionts that belong to the same plant species will differ to some extent as individuals, in any case, and various combinations of such differences will be more and less appropriate, in an ecological sense. Moreover, we are only just beginning to appreciate the extent to which organisms within a community or population passively and actively specialize in functions and roles, or cooperate for their mutual welfare.

Plants are known to fight one another in a form of chemical warfare known as allelopathy. In addition to the use of these poisons designed to maintain, and perhaps even aggressively extend, territories, there are signs that plants may also diffuse substances into their environment that attract, nourish, or otherwise encourage certain other plants.

Whether such events take place within the lifetime of the individual plant, or necessarily span countless generations, they could easily represent decision-making processes bearing rich analogy to the interhuman phenomena of romantic attraction, experimentation, competition, courtship, bonding, marriage, divorce, etc.

Plants are now known to communicate with one another through the soil over surprising distances by means of highly specialized and purposeful chemical messengers.

A young plant might begin life by exploring and comparing its circle of neighboring plants (at the same time as they would be exploring the new arrival). What was learned through this exploratory phase might then initiate physiological and anatomic transformations in the plant and its reactive neighbors, analogous to the neuroendocrine changes that are apparently associated with human falling in love, and these might forge a more-or-less lasting relationship of the plant with a single neighbor or set of neighbors no less functional than beasts' love-affairs.

It is all perfectly reasonable. All that is necessary is that we reexamine what we mean by love, jettison our prejudices, and generalize our thinking so that it takes account of all the myriad forms and bases it might have within the great mansion of terrestrial life.

(2) p2,n(1): Re the question **"Can kidneys be schizophrenic?"**

For decades, at least, we have suffered from the illusion that the different forms of mental illness are largely psychological in origin, rather than being biological phenomena arising from physical structures and events.

Only now is human knowledge and imagination becoming sufficiently rich that the probable and possible biological mechanisms of these disorders, and their real details, can be descried.

We are discovering that diverse diseases are often the same disease, that what has been taken to be one disease is in fact many, that the same disease may arise from many causes, that all elements of neural anatomy and physiology are apt to malfunction and, singly or combinedly, give

(1): , and mathematics and computation so powerful and natural,

rise to disease, that the nervous system in all of its elements and processes bears strong analogy to all the other bodily systems, etc.

We are also in many cases finding that the processes that generate disease in living organisms are not in their essential mechanism confined to the animate realm, but instead occur so broadly in nature that they are virtually universal.

So the more fundamental categories of mental disease may never be properly understood until they have been divested of their extraneous, superficial, and irrelevant 'psychological', or even 'biological', features, and redefined as generic phenomena of mathematical physics.

The successive steps in this transformational sequence might be the reconceptualization of mental diseases as neural diseases, of neural diseases as biological (general-bodily) diseases, of biological diseases as physical diseases (or phenomena), ~~and~~ of such physical phenomena as mathematical patterns, and of mathematical as really idionomic patterns (or even "meta-nomological" ones— which would really be coming full circle!). Eh??

As for the possibility of a kidney disorder analogous to schizophrenia, several possibilities come to mind.

The most obvious is that the autonomous or heteronomous government of a kidney might occasionally become pathologically split into the equivalent of two or more disharmonious or even antagonistic or diametrically opposed centers, processes, or forms of government.

A kidney must communicate with itself, and the lines of communication that transmit queries, data, and orders may sometimes become so depressed, locally or globally, that a loss of synchrony ensues. Perhaps there are compensatory self-organizing processes, and in circumstances of a loss of synchrony these can throw half of the kidney precisely out of phase with the other half.

Another common symptom of schizophrenia is hallucination. Could a kidney in some sense 'hallucinate'? Hallucination refers to the perception of unreal sensory events, or to the gross misperception of sensory events. Does the normal kidney engage in anything like perception?

Almost certainly it must, and it is a small further step to imagining malfunction of a kidney characterized by systematic misperception, or purely imaginary perception, of events both inside and outside that organ. (e.g. qua or via "hypersensitivity")

Another trait of the schizophrenic is anhedonia, or an inability to experience pleasure in events or one's actions. The kidney may contain or be part of circuitry providing positive and negative feedback, say with respect to 'actions' initiated or perceived by the kidney, that is directly analogous to the neural circuitry of pleasure and pain. Some biochemical abnormality, say, might trigger an analog of anhedonia via this functionally similar system.

Finally, another symptom of schizophrenia is mental and bodily self-absorption. In general, or in terms of the mechanisms imagined above, a kidney could easily become distracted by itself, and cease to be in healthy equilibrium or coordination with the rest of the body and its interrelated processes.

(3) p2,n 5 : **"Might there be a plant pecking order?"**

There might be such an order in this sense. Perhaps, as with neurons, groups of neighboring or overlapping plants may emit suppressive chemicals that reduce growth or prevent dominance. Different plants may fall into a hierarchy or sequence with a 'dominant' biont (or species) at the top, and one or more subordinant levels below. This might be a simple dominance hierarchy or else there might be different levels, or even 'branches' (if the hierarchy is of the form of a tree), of diverse specialized or chained functions and roles.

Aging, death, or injury of the 'top-boy plant' might activate the structural and/or physiological ascent of a lower-level plant.

Also, certain decisions about what the general soil is to be like, chemically or morphologically (as the soil-scientists say), might be made by the top plant or the plant hierarchy collectively (but qua hierarchy), and might have a certain transiency or variability suggestive of a pecking order.

Even if there is not among plants any predator-prey food pyramid, of the sort that obtains among animals or in plant-animal combinations, there may nonetheless be a nutrient-and-energy chain or pyramid such that the wastes and other products of higher-level plants flow more or less consecutively down to successively lower plants, through a process of absorption-from-above and desorption-to-below.

Such an arrangement might likewise be suggestive of a botanical 'pecking order'.

Likewise there may be 'pecking-order-analogous' structures and dynamics in the ecological structure of an entire, large-scale plant community, such as a forest. Certain plants—whether bigger, more numerous, older, more primordial, or simply more potent—may control the basic population and taxonomic structure of the community, its biochemistry, its overall evolution, its zoology, etc.

(4) p2,n 6 : **"Could there be inverted volcanoes beneath the earth's crust or mantle?"**

This notion was the product of simple symmetry considerations.

The extrusive processes that punctuate the earth's crust, in the form of volcanoes, orogenic mountains, etc, essentially derive from the buoyancy of relatively light matter deep in the crust, which causes the canalized ascent of this matter and its eruption at the surface of our planet. Such differential buoyancy results from thermal or segregative processes.

But naturally the crust will seek equilibrium, and so there will be corrective or compensatory descent of relatively dense matter. Moreover, other segregative and cooling processes will always be giving rise to accumulations of ense matter at or near the earth's surface.

Plate-tectonic subduction or deep-sea trenches are a well-known example of this opposite tendency, but their downward flows are basically two-dimensional.

The above idea suggests that there may be descending analogs of the unidimensional conduits of volcanoes, with final release of the conducted matter on the undersurface of the earth's crust.

Other layers of the earth, such as the mantle, might likewise be crossed by such descensional flows.

The obvious objection to the proposal that there might be such "inverted volcanoes" is that the tubes of upward volcanoes are carved through the earth's crust by liquefaction induced by the heat that also causes the buoyant ascent of the magma, whereas it is hard to think of an equivalent tunneling process for the (presumably cold) descending matter envisioned in the inverted volcano process.

One solution might be for the inverted volcanoes to make use of conduits formerly created and used by ordinary volcanoes; once a conduit exists, it might be relatively easy to maintain it. Similarly, subducted sheets might later, in their fossil form, provide fissure-like ways for what would eventually evolve into, and be maintained as, unidimensional tunnels.

The earth's crust can in any case undergo cold downard flow when the sink is of sufficiently great area (and loaded with dense enough matter).

At immense depth in the earth rock that is not yet molten nonetheless becomes plastic and can flow. For this reason it is especially easy to imagine inverted volcanoes at work in the mantle. This was what geologists had in mind when they recently suggested that there may be "inverted mountains" at the base of the mantle extruding into the earth's core.

Cave stalactites are of course highly miniature examples of inverted volcanoes, even if they are not usually described in such language.

(5) p2,n 8 : "Millennial pandemics."

5.1 5.2 The underlying question here is a simple and sensible one. What are the durational extremes of the set that includes all (mostly undiscovered) diseases; and in particular, what are apt to be the longest-lived epidemics?

When this question is asked one suddenly realizes that we almost certainly do not know the answer, and that we have no theoretical or empirical reason for presuming that there is an upper limit to the duration of an epidemic.

Even amongst known diseases and epidemics it is not clear that we really know what the longest duration was or is. For one thing, the recognized

5.3 'endings' of our epidemics may in reality not be true endings but rather simply temporary suspensions or reductions of activity, perhaps the contagion simply persists in some weak or hidden form, and true endings occur instead on a scale of millennia.

But an important and remarkable point is that, if there do exist especially long-lived epidemics or pandemics that continue essentially unabated for

5.4 centuries or even millennia, then, because they must define the recognized norms of human health, we may not even be aware of them. In other words, today we may all be sick with diseases too pervasive and persistent to be recognized as such, and the present level of human health may be, either in general or in specific respects, subnormal.

5.5 Of course the same thing might be true of other species—our agricultural species, for example. Perhaps civilization is currently at an unnecessary disadvantage because of such 'uncontrastable contagions'.

5.6 Do organisms die of old age only because other species blanket the environment with a 'collective pandemic' of laterally mobile genes that cause artificial aging? Aging may manifest another form of interorganismal warfare!

(6) p2,n 9 : **"Volcano procreation."**

The present-day prevalence of volcanism, or its importance over the history of the earth, may reflect the tendency of a volcano to induce the development of other volcanoes, or to in some sense 'procreate'.

FORMS

The Ideonomic Division
FORMS AND MORPHOLOGY

Considering the obvious importance of form, and the visible interest in it, it is astonishing that so little effort has been made to develop morphology as a universal science of form. What has been done strikes one as half-hearted, a sort of dabbling, something far closer to poetry or philosophy than to science. The really odd thing is that there have been insular exceptions to this unprogrammatic and pretentious tradition: that certain universal classes of forms, on the one hand, and the general morphology of certain physical phenomena, on the other, have been treated with contrasting thoroughness or at least in a way that deserves the sanction of science. Thus impressive taxonomies of possible spirals and other curves, regular polygons and polyhedra, knots, spheroids, lineal trees and networks, and lattices have been worked out in the realm of pure form; and in applied or physical morphology there have been more or less systematic characterizations of morphological types, laws, and/or principles in areas of botany (shapes of leaves, flowers, inflorescences, trees, pollen grains, etc), chemistry (molecular geometry and topology, crystallography), music (albeit still mostly intuitive and poietic in this case), meteorology (nephanalytic classification of clouds per shape and texture), textile manufacture (yarn and fabric structures and textures), electrical and electronic components and circuits, physics (abstract particle-group structures), computer science (computational structures), statistics (structures of distributions and clusters), the art of dance (choreography), mechanical engineering, anthropology (kinesic structures and patterns, diagrams of kin and kith relationships), zoology (skeletal variations, body outlines—e.g. of bird species or the kaleidoscopic microforms of rhizopods), materials science, mineralogy, architecture (witness the writings of Leon Battista Alberti and current work inspired by same), and of course painting.

OVERVIEW

Let us begin with a preview of the ideal structure and content of this chapter and something of an overview of the entire subject of morphology. Since it is a mere outline that is being presented, remarks will be kept to a bare minimum. The following headings refer to possible subsections of the chapter.

REASONS FOR STUDYING FORMS AND MORPHOLOGY: Why may it be important to study the shapes of things and to give truly scientific character to such study? What benefits might ensue to ideonomy, man, or science? The importance can be indicated in at least two different ways: by general axioms and by reference to the specific purposes, aims, and methods of morphological inquiry.

RELATIONSHIPS OF MORPHOLOGY TO OTHER DIVISIONS OF IDEONOMY: It is important to specify these divisions and relationships for such reasons as future ease of visualization, allocation of concerns and techniques, proper understanding of the meaning of the division, ready movement from it to the other divisions or from any of the latter to morphology, and the coevolution of all of ideonomy's divisions. Those divisions that resemble morphology should have their kinds and degrees of similarity—and dissimilarity—circumscribed. Certain other divisions are related to

"The Ideonomic Division FORMS AND MORPHOLOGY"

- Ideal Chapter Structure (Subsectional Order) -

1. Prologue.
2. Reasons for studying forms and morphology.
3. Relationships of morphology to other divisions of ideonomy.
4. Subfields of morphology.
5. Organons for use in pure and applied morphology.
6. Morphological terminology.
7. Morphological principles.
8. Overview of morphological techniques.
9. Genera of forms.
10. Pictorial atlas of species of forms.
11. Definitions of types of forms: | Incl. [contrasting, conjugate or complementary, and negative] definitions, anadescriptive definitions (anadefinitions), attempts at [complete or infinite] definitions, etc.
12. Morphological comparisons of particular, morphologically diverse things.
13. Morphological analogons and coanalogs thereof.
14. Morphological analogies and differences. (cf. 12)
15. Universal taxonomy of forms.
16. Types and examples of internal structure.
17. Pure [binary and n-ary] hybrids of types of forms.
18. Concrete [binary and n-ary] hybrids of types of forms.
19. Things exemplifying genera of forms.
20. Things exemplifying species of forms.
21. Morphological properties.
22. Hierarchy of morphological meta-dimensions and meta-properties.
23. Morphogenic rules.
24. Morphological relata.
25. Meta-structures: | Abstract forms of things.
26. Pure hierarchies of forms.
27. Concrete hierarchies of forms.
28. Morphological [extrema, maxima, and minima].
29. Morphological opposites and antisyzygies.
30. Morphological scalings of things: | Per [morphic and nonmorphic] dimensions.
31. Dimensionless recurrences of types of forms.
32. Multidisciplinary recurrences of form types and phenomena.
33. 'All' morphological aspects of a single thing.
34. Maximally diverse exemplifications of a single type of form. (cf. 33)
35. Examples and types of morphogeneses.
36. Causes of forms.
37. Effects of forms.
38. Pansystematic combinations and interactions of effects of forms.
39. Concrete interactions of different forms.
40. Co-functions of types of forms.
41. Corollaries and implications of forms.

(CONT.)

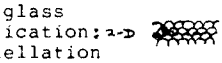
(CONTINUATION OF TABLE)

42. Morphotropic rules.
43. **Morphomatic** symmetries and **groups**.
44. Morphotropic genera.
45. **Morphotropic species**.
46. Interforms and ambiguous forms.
47. Morphotropic **sequences**.
48. Morphotropic series.
49. Pure morphotropic **networks**.
50. Concrete morphotropic networks.
51. Patterns **constructible** by **combinations** of homotypal forms.
52. Patterns constructible by combinations of heterotypal forms.
53. **Morphology's extendibility:** | Survey of the comparative morphological sophistication and naivete of different fields.
54. Anomalous [pure and concrete] forms.
55. Standing **problems** in [pure and applied] morphology.
56. Morphological ignorance. (cf. 55)
57. **Speculative** form taxons and forms of things.
58. Practical questionary to guide and fuel morphological inquiry.
59. **Aims** of morphology.
60. Outline of the possible future evolution of morphology.
61. Canonical **ideoformulas** for morphology.
62. Interpretations of derived ideosentences.
63. **Epilogue.**
64. Instructive morphological exercises.

§9

FORMS

"A TABLE OF 65 KEY 'ELEMENTARY' FORMS"

1. Aegagropila
2. Base
3. Boundary
4. Bridge
5. Bundle
6. Cabbage: 2-D 
7. Cage
8. Clay pigeon
9. Cloud
10. Cluster
11. Cone
12. Conglomeration
13. Crystal
14. * Curve
15. Cylinder
16. Diaper pattern
17. Divider/partition
18. Dumbwaiter
19. Fabric
20. * Foam
21. Fork
22. Fractal
23. Handle
24. Helix
25. Hierarchy
26. Hole
27. Horseshoe
28. Hourglass
29. Imbrication: 2-D 
30. Instellation
31. Knot
32. Ladder
33. Lamination
34. Lattice
35. Line-clump
36. Lip
37. Meander
38. Membrane
39. Network
40. Node
41. Osculation
42. * Quadrangle
43. Radiation
44. Ribbon
45. Ring
46. Ring-chain
47. Row
48. Scratch
49. Sheet
50. * Sieve
51. Slope
52. Sphere
53. Spiral
54. Stack
55. Stair
56. Star
57. Tafoni
58. Tessellation
59. Thalweg
60. Thicket
61. Tree
62. Trident
63. Umbrella
64. Wave
65. Yoke

→KEY: □: Irreducibly tridimensional (apart from projections). [3]*: Absent in the 230-form table (below).

§10

"A TABLE OF 230 UNIVERSAL 'ELEMENTARY' FORMS"

→KEY: [1] □: Pr[illegible] [2] □: I[illegible] [3] □: [illegible]

1. Aegagropila
2. Anastomosis
3. Angle
4. Arch
5. Arc
6. Aura
7. Bag
8. Band
9. Bank
10. Banyan tree
11. Bark
12. Base
13. Basket
14. Bead-chain
15. Bell
16. Blade
17. Blob
18. Block
19. Book
20. Border
21. Bottle
22. Boundary
23. Box
24. Boxwork
25. Bracket
26. Braided rope
27. Branch
28. Brickwork
29. Bridge
30. Bundle
31. Butterfly
32. Buttress
33. Cabbage
34. * Cage
35. Cantilever
36. Capsule
37. Cardioid
38. Catherine wheel
39. Cave
40. Chamber
41. Chevaux-de-frise
42. Chevron
43. Cinquefoil
44. Circle
45. Cissoid
46. * Clay pigeon
47. Cloud
48. Club
49. Cluster
50. Collar
51. Colonnade
52. Comet
53. Cone
54. Conglomeration
55. Corner/coign
56. Corrugation
57. Crack
58. Crater
59. Crease
60. Crenellation
61. Cross
62. Crown
63. Crystal
64. Cube
65. Cushion
66. Cusp
67. Cycloid
68. * Cylinder
69. Deck
70. Diaper pattern
71. Diaphragm
72. Disc
73. Divider/partition
74. Domain
75. Dumbbell
76. Dumbwaiter
77. Edge
78. Elbow
79. Ellipse
80. Ellipsoid
81. Fabric
82. Fan
83. Fault
84. Feather
85. Foot
86. Fence
87. Figure eight
88. Finger
89. Fishnet
90. Flag
91. Flake
92. Flame
93. Flower
94. Foam
95. Fork
96. Fort
97. Fractal
98. Frame/skeleton
99. Frust um
100. Funnel
101. Glove
102. Hair
103. Handle
104. * Helix
105. Hemisphere
106. Hierarchy
107. Hinge
108. Hole
109. Hook
110. Horseshoe
111. Hourglass
112. Hyperboloid
113. Imbrication
114. Indentation
115. Inflorescence
116. Instellation
117. Joint
118. Knob
119. * Knot
120. Ladder
121. * Lamination
122. Lattice
123. Leaf
124. Lens
125. Line
126. Line-clump
127. Lip
128. Lobe
129. Mantle
130. Meander
131. * Membrane
132. Meniscus
133. Mound
134. Mushroom
135. Nautilus
136. Necklace
137. Needle
138. Nest
139. Network
140. Node
141. Noose
142. Osculation
143. Oval
144. Paraboloid
145. Pillar
146. Pincushion
147. Pineapple
148. Pit
149. Pleat
150. Point
151. Polygon
152. Polyhedron
153. Pore
154. Pouch
155. Pyramid
156. Quincunx
157. Radiation
158. Rectangle
159. Rhomboid
160. Rhombus
161. Ribbon
162. Ridge
163. Ring
164. Ring-chain
165. Row
166. Rug
167. Saw
168. * Scratch
169. Screw
170. Sheath
171. Sheet
172. * Sieve
173. Skin
174. Skirt
175. Slope
176. Snake/vine
177. Soil
178. * Sphere
179. Spider
180. Spindle
181. Spiral
182. Splatter
183. Sponge
184. Square
185. Stack
186. Stair
187. Star
188. Stick
189. Stitch
190. Striation
191. Swirl
192. Tafoni
193. Tangle
194. Tear
195. Terrace
196. Tessellation
197. Thalweg
198. Thicket
199. Thread
200. Tongue
201. Top
202. Tor
203. Trapezium
204. Trapezoid
205. Tree
206. Trefoil
207. Trench
208. Triangle
209. Trident
210. Trunk
211. Tuft
212. Tunication
213. Tunnel
214. Turbulence
215. Twist
216. * Umbrella
217. Vaulting
218. Venation
219. Vermiculation
220. Vortex
221. Wall
222. Warp
223. Wave
224. Webbing
225. Wedge
226. Whip
227. Whorl
228. Window
229. Yoke
230. Zigzag

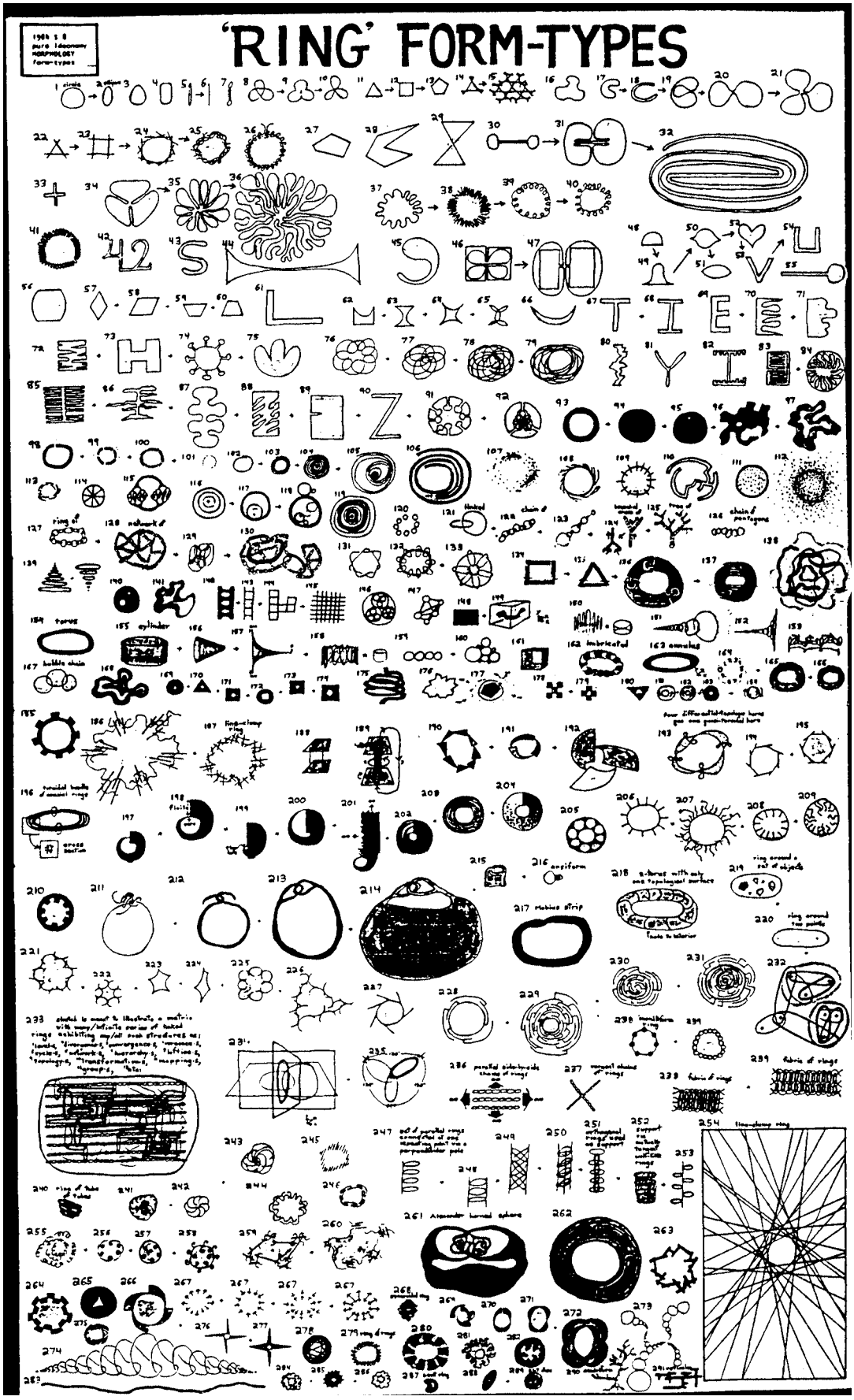
morphology only in the sense that it can or must make use of these directly or indirectly related divisions, and still other divisions are related in the opposite sense: that they can or must make use of morphology. FORMS AND MORPHOLOGY can make use of IGNORANCES AND AGNOLOGY to better understand what it does not know about itself, pure form, or the morphological aspects of things; and the latter division, conversely, can consult the former to develop its principles and methods for treating morphology.

SUBFIELDS OF MORPHOLOGY: Every division of ideonomy explicitly or implicitly represents a science, and every science contains understood or not yet recognized subfields. Subfields that should exist but are still to be recognized by science or incorporated in its set of investigations, should all be identified, named, and described by ideonomy. Ideonomy should simultaneously survey all new and old subfields of a given ideonomic division, and describe their complementary and supplementary interrelations within the division. Certain subfields will be peculiar to given divisions, but most will have analogs in many or all other divisions; indeed, the latter generic subfields will facilitate the development of the analogs. The existence of these related and unrelated subfields within the divisions of ideonomy will also facilitate the interactions of these divisions in a very general way.

ORGANONS FOR USE IN PURE AND APPLIED IDEONOMY: Some of the key lists, charts, computer software, books, and other organons that are applicable to the future ideonomic treatment of form should be mentioned and their use explained. Doing this in advance may encourage their creation by future generations of ideonomists and make for a more natural development of the division.

MORPHOLOGICAL TERMINOLOGY: Traditional morphological names and other terms, existing words deserving application to morphology (although not having been previously used for this purpose), and terms that do not yet exist but that would be useful or essential in morphological research, should be presented in one place as the beginnings of a morphological language and, per se, a language coordinate with all other ideonomic language or the special languages of all of ideonomy's divisions. This language should contain or be articulated as both a vocabulary and a grammar of form. It should not only name types, species, and genera of forms, but properties, dimensions, and relationships thereof. It should also name, or at least enable the systematic discussion of, such things as morphogenic rules and principles, morphological methods and concerns, sequences of forms and of changes of forms, and general interactions and phenomena of forms.

MORPHOLOGICAL PRINCIPLES: A supremely important part of any ideonomic division will be its canon of pure and applied principles—that is, of basic general principles and rules commonly accepted as true, valid, and fundamental. Initially, perforce, the principles will be largely a priori or in the nature of untested postulates; but progressively they will reflect the lessons of a body of systematic experiments, the practical wisdom of a community, and sophisticated theory. Some of the principles applicable to a given division will be peculiar to that division, but others will be of a general ideonomic, scientific, or even philosophic nature. There can be many different generic types and concerns of morphological principles. Thus certain groups of such principles will deal with form or forms in terms of their: [1]classification, [2]description, [3]measurement, [4]limits, [5]uses, [6]causes, [7]consequences, [8]analogies, [9]differences, [10]laws, [11]interrelationships, [12]logical corollaries, [13]subvariations,


'RING' FORM-TYPES

changes,[15] transformations,[16] interactions, or[17] combinations;[18] or in terms of problems,[19] illusions,[20] errors, or[21] fallacies connected with their treatment.

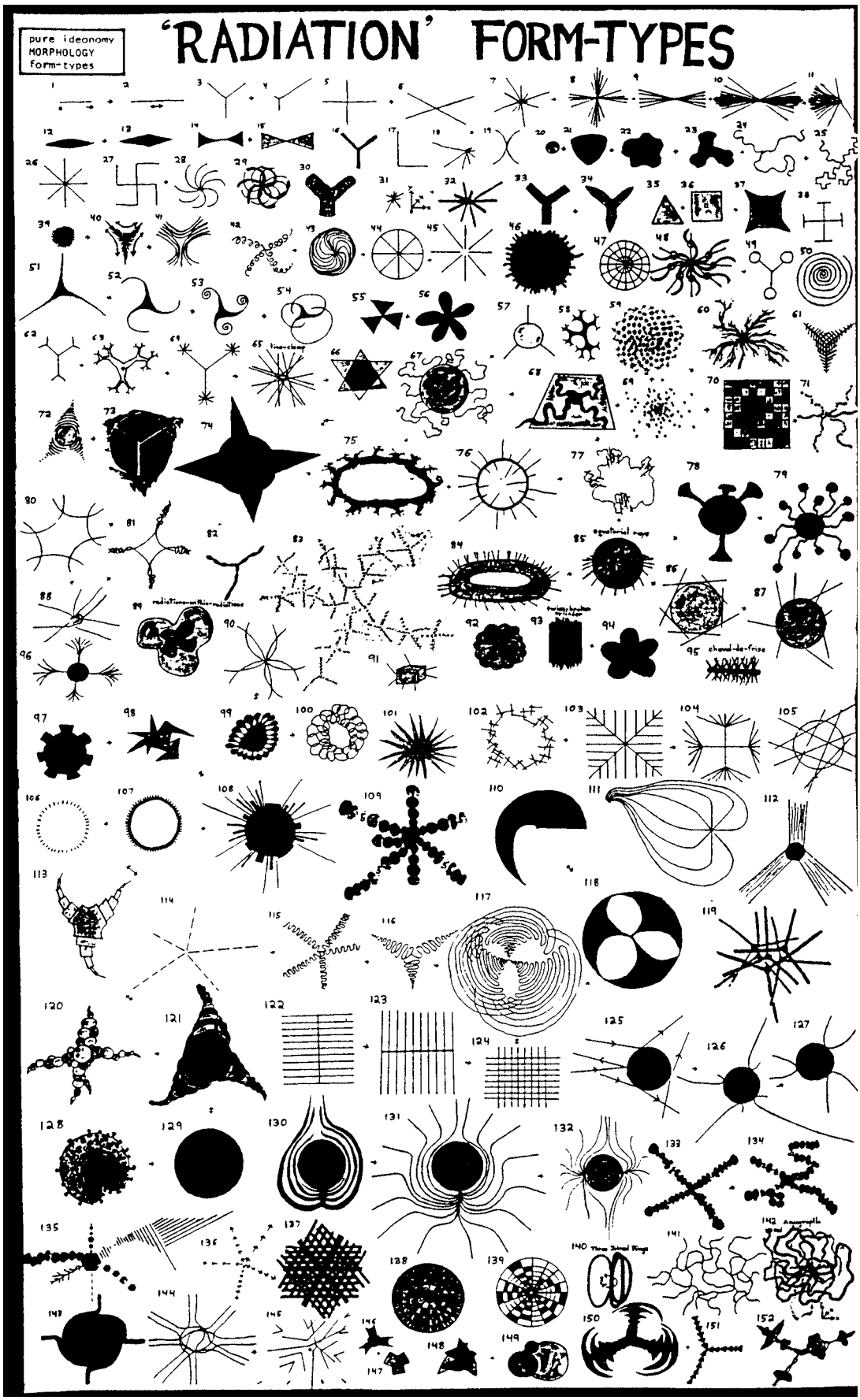
OVERVIEW OF MORPHOLOGICAL TECHNIQUES: What methods exist, or might be developed, for treating forms and matters of form? What do these methods have in common and how do they differ? What are the best uses of and ways of using these methods? What are the general needs of morphology that are answerable by any of its methods? How can morphological methods be modified to produce other methods? How can morphological methods be combined? What are the pluses and minuses of various methods?

GENERA OF FORMS: Glancing at the welter of forms exhibited by things, one notices that there are recurring and characteristic types of forms—'species', if you will. Surveying these progressively more numerous species, one may note that these, too, have a tendency to fall into general and recurring categories—so that there are 'genera' of forms. Morphological genera are different from biotaxonomic genera, however, in that a given species of form may simultaneously 'belong' to or be 'represented by' two or more morphological genera. Indeed, to some extent, and in important ways, every species of form illustrates, or is illustrated by, every genus of form. Morphotaxonomy, at least in the present sense, is not concerned with the historical reconstruction of any unique evolutionary tree of forms, but rather with grouping forms for descriptive and productive purpose in terms of their overall degrees and varying types of analogies. The basis or result of this process may be cluster-analytic, statistical, arbitrarily multidimensional, network-like, arboreal, etc; to the extent it is arboreal, the tree may be anastomotic or one of an indefinitely large set of only partially equivalent trees. There are homological sequences of forms, of course, and these do contain things equivalent to homological genera of forms; but forms are mutually derivable in an infinity of ways. The number of genera of forms is arbitrary, just as to some extent the particular genera of forms are arbitrary. The reason for dividing the universe of forms into genera and species is to simplify its description and render it more manageable generally. A few tens or few hundreds of genera seem reasonable—people can name, remember, visualize, and discuss that number; but a greater number would create hopeless confusion, and a lesser number would caricature the capacity of the human mind and lack discrimination. An infinity of morphological species can be derived from these finite genera by suitable rules of transformation and combination. In a like way and for a like reason, the rules themselves are divisible into pragmatic genera and species of rules. If the species of forms go on diverging, or progress in number and variety ad infinitum, the genera of forms may go on converging, pari passu, or continuously regress in relative number and progress in relative generality and power.

PICTORIAL ATLAS OF SPECIES OF FORMS: The specific variants of generic forms can and should be depicted in a variety of ways: verbally, mathematically, logically, photographically (via photographs of concrete exemplifying things), via abstract diagrams (using ideographs), via exact sketches, analogically, via generative or manipulative computer programs, axiomatically, biologically (sic; or in terms of what forms mean, in any of various senses, for an organism), or perhaps even musically (say based upon neurologically discovered synesthetic principles). What are the simplest species of forms that define or distinguish a genus? Conversely, what are the most complex, subtle, or bizarre species that illustrate the same genus? Where do the species of a genus begin to transcend the genus, or become genera themselves? What novel

pure ideonomy
MORPHOLOGY
form-types

'RADIATION' FORM-TYPES



descriptive elements or dimensions are necessary to characterize certain extreme or highly idiosyncratic species of forms? What alternative representations depict the identical species of form? What are the most dramatic, elegant, or instructive ways of depicting a species of form? What is the relative importance, and what are the different roles, of the various structural elements of a specific form? What are the constant or transformationally invariant elements of a form, and what features are capable of free, infinite, or irrelevant variation? What logical or noological principles underlie the essential properties of all of the various species of forms? At what points, or over what ranges, do different species of forms intersect or overlap one another? A great universal atlas of forms should be prepared surveying perhaps tens of thousands of pure species of forms in hundreds of genera.

DEFINITIONS OF TYPES OF FORMS: What are all of the various ways and senses in which different types of forms, and morphological phenomena, can and should be defined? What are some concrete examples of each? What are the various and contrasting properties, dimensions, motivations, uses, advantages, and disadvantages of the various definitions, and modes of definition, of forms?

MORPHOLOGICAL COMPARISONS OF PARTICULAR, MORPHOLOGICALLY DIVERSE THINGS: What is the simplest, and what is the most elaborate and complete, morphological comparison of two such things as an apple and a pear; how are they identical, similar, analogous, different, opposite, and unrelated in form? How do successive raindrops differ? How do a doodle and a leaf, a forest fire and wax, applause and a sunspot cycle, or a necklace and a neutron compare in form? What terms allow these comparisons?

MORPHOLOGICAL ANALOGONS AND COANALOGS THEREOF: Especially universal, fundamental, or important morphological analogies between or among things should be identified, along with what are perhaps the best analogs thereof or Kantian paronyms representing same. A few examples of such analogons are Circle, Efflorescence, Mathematical Point, Cloud, Center of Circle, Bubble, and Thread. What are the diverse coanalogs, including the homanalogs and heteranalogs, thereof? What are the semigeneric traits of these coanalogs? Concrete coanalogs of Circle include: a galactic jet's 'smoke rings' (in astronomy), a mushroom fairy ring (in botany), a benzene ring (in chemistry), a giant rotating ring detached from the Gulf Stream (in oceanography), a volcanic caldera (in geology), a halo (in meteorology), the Circle of Willis (in neuroanatomy), a superconducting loop (in physics), and a tire (in engineering). But there are also (more) abstract morphological analogons and coanalogs. Thus abstract coanalogs of Circle include: a polygon, polyhedron, ellipse, closed helix, sphere, hypersphere, Mobius strip, Klein bottle, modulus, fractal, group, complex number, and quaternion (in mathematics), vicious circle paradox (in logic), Kerr singularity (in astrophysics), and feedback loop (in cybernetics).

MORPHOLOGICAL ANALOGIES AND DIFFERENCES: Here the morphological analogies and differences alluded to above should be discussed at length. What are the systematic bases of these analogies and differences, and how can they be derived from one another? What are the limits of their applicability or the extremes of their illustration?

UNIVERSAL TAXONOMY OF FORMS: Forms can be arranged not only into genera and species but into a finite or infinite succession of various higher and lower categories or taxa. Morphological typologies and taxonomies have been created before, but they have always been limited to specific sciences or

phenomena, or to limited groups of pure forms; no truly universal taxonomy of forms has ever been constructed. The bases for and beginnings of such a taxonomy are offered in this section. Requirements for universality are specified.

TYPES AND EXAMPLES OF INTERNAL STRUCTURE: The first question here has to be what might be meant by the term "internal structure"? The opposite of external structure, of course, but the nub of the problem is where to draw the line in certain ambiguous cases. Does the internal structure of a house mean just the architectural pattern of the rooms or should it include the movable furniture or even the constantly mobile inhabitants? What happens when the doors to the outside are open, making part of the interior visible or all of the interior accessible to circulating breezes? Is it the inside of the walls—the joists, beams, pipes, etc—that is the real interior of the house or where the real internal structure is found? Should the grain structure of the wood be included or excluded? Are there various degrees, senses, or types of internal structure? When in the building of the house does external become internal? Assuming for the moment that an earthquake fault is just a compact crack open to the surface in one of its six directions in space, does that make the fault an internal—or per contra an external—structure throughout? These questions recur with the human body, where one might wish to include or exclude the structure of large cavities filled with gas or liquid, of the oral cavity while chewing, of the 'solid' flesh, or of microcavities on, say, the scale of microns or angstroms. And what about the diachronic internal structure of a pulsating and fluttering candle flame? Should the internal structure of the sun end at the top of the chromosphere or should it include the transient prominences and spicules, the heliosphere that contains the earth and extends an unknown distance beyond the orbit of Pluto, the sun's magnetosphere, the sun's gravisphere or cosmically extensive (but diachronically indefinite) gravitational field, or even blobs of the solar wind or heliosphere that may forever be breaking away into the rest of the galactic atmosphere? Then there is the larger problem of abstract structure and of where—and why—to draw the line between "abstract" and "concrete" internal structure. A mathematical group has a purely abstract internal structure, presumably, but the arrangement of rocks of different sizes inside a cairn represents an internal structure that is at once concrete and abstract. The Krebs or citric acid cycle has an abstract inner structure, of course, but its different microscopic manifestations or realizations throughout the body of an organism must have recurring spatial patterns, albeit of an exceedingly complex and often exceedingly subtle kind. By now most of us have seen the enchantingly complex and beautiful computer graphics representations of the Mandelbrot set that are ushering in the age of so-called experimental mathematics, but there is a certain arbitrariness in the choice of color and even form that these, as well as other curious mathematical objects and operations, are given; so the question arises whether internal structure in these cases is intrinsic or extrinsic. There is also a pertinent controversy among mathematicians as to whether mathematical entities are fundamentally natural, artificial, both, or sui generis. What about a 20-digit sequence of random numbers in the base 10 system of notation: there are ways to calculate or at least represent its happenstance internal (i.e. sequential) structure, but the problem is that there are many ways. Should something random be described as abstract or concrete? It is not clear

what things are and are not random, nor even what randomness is or that anything whatever truly is random. Finally, what is the presumptive internal structure of a random number expressed with itself as its base (of 415,325 to the base 415,325, for example)? Even a mathematical point may have structure in some sense or for some reason: but would it then be internal or external structure? The perimeter of a circle can be indented and then crenellated an infinity of times so that the circle fills in and at the limit simulates a solid disc, creating a Peano curve with the bizarre property, or ambiguity, that every point within the disc is simultaneously in some sense external and internal; which complicates the already difficult question as to what, and what all, "internal structure" represents—and is opposed to. But consider a further case: if the circle is instead indented and crenellated outwards, so that all of so-called external space is filled, would not this effectually invert what should be referred to as external and internal, since all that would remain unfilled and therefore qualify as external or outside would be what hitherto represented the interior of the circle? Only a layman would think that this is a trivial problem or a purely semantic one. What, then, about the ultimate problem of the possible nature of, or what might be meant by, the internal structure of "reality" in its irreducible totality? Apart from these 'preliminary' issues, more specific matters might be addressed in this subsection. Maximally diverse examples of things with internal structure, drawn from every subject, should be listed: the cell of biology, molecule of chemistry, genome of genetics, brain of zoology, tumor of medicine, volcano of geology, knot of mathematics, soliton of physics, galaxy of astronomy, hurricane of meteorology, painting of art, wristwatch of technology, ecosystem of ecology, universe of cosmology, mid-game state of a chessboard, steel industry of economics, signature of chirography, theory of evolution of biology, family of sociology, personality of psychology, etc. These should be studied to identify general types and aspects of internal structure: e.g. solid or hollow, radial, dendriform, scale-invariant, axial, and hierarchic. The exercise should show, among other things, that the internal structure of things is surprisingly diverse, complex, specific, and consequential.

PURE [BINARY AND N-ARY] HYBRIDS OF TYPES OF FORMS:

§2

"TABLE OF '40 REASONS FOR STUDYING FORMS'"

1. Form IMPLIES BASIC NATURE.
2. To BUILD a [<vertically, horizontally, and diagonally>, <extensively and intensively>, <quantitatively and qualitatively>, etc] [universal and adinfinite] TAXONOMY of [form and morphological phenomena].
3. To discover the [CAUSES, bases, origins, patterns of development, and general modes of behavior] OF [FORM and forms].
4. Form can CLARIFY [the FUTURE and its possibilities].
5. To [CLASSIFY <forms and things in terms of forms> and discover <new and novel> <pure and concrete> morphological <types, genera, and species>.
6. To increase knowledge of the COGNITIVE [BASES and possibilities] OF morphological [thought, perception, and creativity].
7. To learn how to [CONSTRUCT AND MANIPULATE] forms.
8. To improve DISCRIMINATION of different [forms and aspects of form] and SHARPEN PERCEPTION of form.
9. To learn how to EXHAUSTIVELY CHARACTERIZE the morphology of given THINGS.
10. EXTERNAL form IMPLIES INNER structure.
11. Form can clarify the HISTORY of [things and itself].
12. To learn HOW FORMS [do or can be made to] [transform into, derive from, produce, or CONSTRAIN] other FORMS.
13. To discover HOW particular [forms or <aspects or parts> of forms] INTERACT with others.
14. To develop IDEOGENETIC FORMULAS for treating morphology.
15. To [discover, describe, and exploit] the systematic INTERRELATIONS of morphology WITH the OTHER DIVISIONS of ideonomy.
16. To DISCOVER the fundamental [local and universal] LAWS of form.
17. Morphological LAWS can be used to [MAKE PREDICTIONS and help shape the development of morphology].
18. To [redacted] to [redacted] morphology and train morphological skills].
19. To LEARN HOW TO [analyze, synthesize, and discuss] form.
20. [Forms and aspects of form] have [redacted], consequences, and implications].
21. To [uncover, characterize, and exploit] all METASTRUCTURES [of or defined by] forms.
22. To [explore and describe] the MORPHOLOGICAL [SIMILARITIES, analogies, AND DIFFERENCES] of things.
23. To foster the development of MORPHOLOGY AS A BRANCH OF [many or all] other SUBJECTS.
24. To discover how form clarifies the OTHER ASPECTS OF APPEARANCE.
25. PART OF a thing's FORM SUGGESTS OTHER PARTS of its form; form dovetails.
26. To [PERFECT the DESCRIPTION of form, define forms better, and describe the totality of form's <dimensions and properties>].
27. To [PLAN, systematize, and organize] the future PROGRESS OF MORPHOLOGY.
28. To develop general [PRINCIPLES, METHODS, ORGANONS, AND MATERIALS] for treating form.

(CONT.)

(CONTINUATION OF TABLE)

29. To [identify and resolve] the outstanding **PROBLEMS** [in and of] morphology.
30. To **REDUCE ERRORS** [associated with the use of forms or caused by a poor understanding of their nature].
31. To discover all the [actual and possible] **RELATA** of form.
32. To [**SURVEY** and critique] the state of **MORPHOLOGICAL** [description, **UNDERSTANDING**, and technique] in all fields.
33. To discover all [<patterns and **THINGS**> **CONSTRUCTIBLE FROM** forms and modes of their construction].
34. Form suggests **THINGS' EFFECTS**.
35. Form suggests **THINGS' [ORIGIN**, cause, function, role, and process].
36. To learn how to **TRANSFER WHAT is KNOWN** about [form or forms] **IN ONE AREA TO** [one or all] **OTHER** [areas or fields].
37. To **UNCOVER** the [real and full] [**REASONS** for such study and aims of morphology].
38. All form is **UNIVERSAL** in its [typology, bases, dimensions, consequences, and possibilities].
39. [Types and aspects] of form [have or permit] characteristic **USES**.
40. To learn **WHAT** is **UNKNOWN** about [pure and concrete] morphology.

IMPORTANCE OF STUDYING FORMS AND MORPHOLOGY

Despite its size, the table "40 Reasons For Studying Forms" probably is incomplete. Future research in this area should enlarge it. Experience has a way of supplementing theory.

A FIRST REASON for investigating form is that it often implies something about the basic nature of whatever exhibits the given shape. Of course this is not always true: the actual shape may be hidden or disguised, and the apparent form of the thing may be profoundly misleading. But this very fact is another or secondary reason for studying form: that one may learn to distinguish illusory from true form, and better anchor form in appearance generally.

Beside me lie a number of panoramic paintings of natural landscapes, equivalent to museum dioramas and showing landforms, plants, and animals. Included in "The Desert By Day" is a cutaway of the ground to a meter's depth, in which small nocturnal mammals are to be seen snoozing in their burrows and the roots of plants wend their way.

A parallel is immediately noticeable: the burrows and roots are both uncinate. Where they first enter the ground their course is vertical, but shortly afterwards they hook sidewise and advance horizontally. The form of these holes of organisms therefore suggests that the basic nature of the holes is to provide an escape from the surface to a stable or roofed depth whereat a return to the horizontality of the surface is possible; a second and private miniature of the surface, in other words.

The tunnels have a minimal and fairly uniform size: suggesting that their origin or function relates to the lineal movements of finite objects.

Often the tunnels end in a swollen part, a chamber that nearly envelopes its resident pocket mouse or kit fox, or the stupendous root bulb of a night-blooming cereus cactus. Form implies nature: protective envelopment.

Some roots penetrate ever downwards. The form suggests that they are seeking something at great depth: water! Other roots branch in the manner of a hand: they seem to be, and are, grabbing the earth for support to prevent the atmospheric part of the same entity from being rolled away by gusts of wind or screwed from the soil by a momentary flood.

Those roots that deliquesce appear to be reaching not down but within: to tinier and tinier scales of nature in quest of fine sustenance. The arborescent roots are the tributary system of a river that nourishes the plant when it explodes again above ground as a great distributary system.

In this scene and another, "The Forest Dwellers", multitudes of animals appear that have pointed noses. Form implies nature: that such noses are pokers. A Poking Index is suggested: that the longer an animal's snout, the greater a poker the animal is apt to be. If one reexamines the paintings with one's knowledge of the natural history of the various animals in mind, the evidence would suggest that this causal correlation is strong.

Form implies nature: the amorphousness of blobs of dirt in a third painting suggests things that are mere pieces broken off at random from larger, more shapely or definite things.

A SECOND REASON why man should study form is so that he may ultimately construct a taxonomy of form. More elaborately: in order to build a [(vertically, horizontally, and diagonally), (extensively and intensively), (quantitatively and qualitatively), etc] [universal and adinfinite] taxonomy of [form and morphological phenomena].

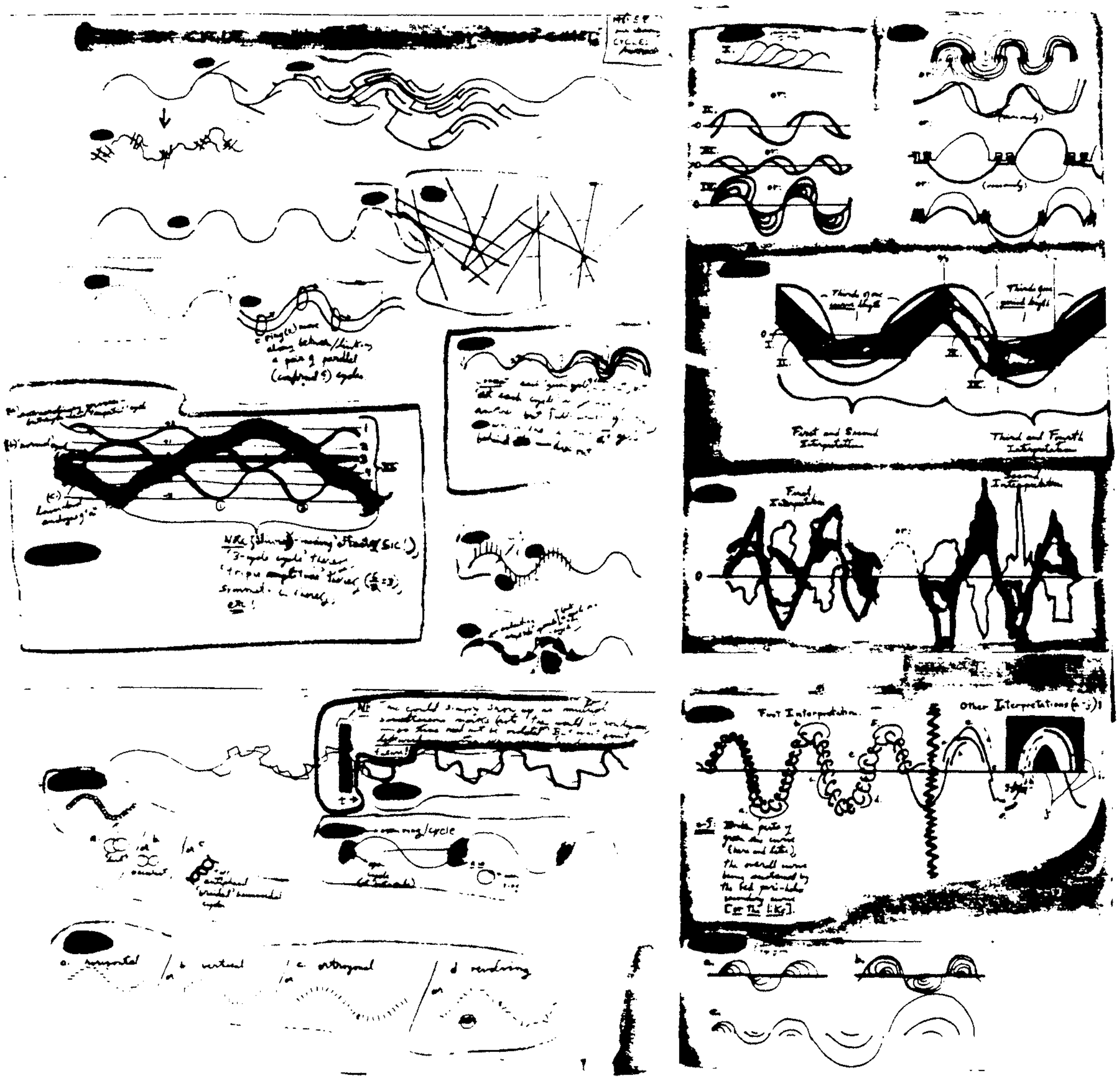
Once forms have been classified, and to the extent that they have been classified, it will be possible to make predictions about them: predictions about their properties, causes, effects, companions, etc. Forms in different fields—or of different phenomena—will have implications for one another that the taxonomy will help bring to light.

A THIRD REASON to study form is to discover the causes, bases, origins, patterns of development, and general modes of behavior of form in general and of specific forms.

How does a crawling, fly-chasing lizard develop from a unicellular zygote? How did the sun's planets acquire their peculiar spacing, orbital configurations, and mass distribution? From what ancient and prototypal shapes and morphological elements did the skeletal systems of modern animals derive their structure? Should the universe be an open system destined to expand forever, what morphological behavior might be expected of it?

Why do planets and their moons generally have topographically asymmetric hemispheres? Might the primordial (or evolutionary) cause have been a tear-shaped, toroidal convection cell, convergent collision, spinless, planetary-size volcano (unipolar and eversional), magnetohydrodynamic, collapsed tube, primordial explosions, nebular differentiation, or other generic origin? To what extent do objects in general exhibit something like inter-hemispheric or antipolar asymmetry? Could the cause of the latter clarify the cause of planetaries having asymmetric form—or vice versa? Could there be the equivalent of an "etiological group" (à la a mathematical group) covering the various cases?

Possibilities like these illustrate the third reason for studying forms.



First and Second Interpretation
Third and Fourth Interpretation
First Interpretation
Second Interpretation
Other Interpretations

IDEAS FOR SINUSOIDAL AND CYCLIC STRUCTURES SUGGESTED BY RING VARIANTS

The chart 'Ring' Form-Variants, with its 291 quasi-canonical morphological variations upon the form genus 'ring', could find a great many uses in science, technology, mathematics, industry, and culture, including education and the arts. But there are also many roles it could play within morphology itself.

At the time I prepared the chart I was undecided what name to give the genus. Marvin Minsky proposed 'cycle'. For various reasons this was not acceptable, but Minsky's suggestion caused me to think about analogies between rings and cycles or sinusoids, a diversion that turned out to have its own considerable interest.

First let us define the latter pair of terms. A sinusoid is the curve whose ordinates are proportional to the sines of the abscissas with the equation $y = a \sin x$; or any strongly analogous curve, shape, or pattern. Cycle refers to a set of regularly recurring values of a periodic variable; an interval of time during which one sequence of a regularly recurring succession of events or phenomena is completed; a recurrent sequence of events which occur in such order that the last event of one sequence immediately precedes the recurrence of the first event in a new series; a complete course of operations or events returning upon itself and restoring the original state; a temporal sinusoid; or any more or less analogous pattern.

What I was curious to learn was whether the systematic and ideally exhaustive set of annular variations would have major or minor power to specify, classify, or imaginatively suggest the possible systematic and exhaustive set of morphological, morphogenetic, morphodynamical, and dynamic (functional) variations—and covariations—of pure and phenomenal cycles and sinusoids. More primarily, whether the former and latter were related and, if so, the extent of their relationship and its possible meaning, insofar as it might be suggested by a set of comparisons.

My method of proceeding was to use random numbers to choose ring form-variants from the huge chart, one at a time. I sketched one or more possible sinusoidal form-variants or patterns that emerged in my mind upon contemplating the given ring form-variant. I was always able to think of at least one such analog; sometimes a veritable system of compossibilities occurred to me. I was surprised and delighted at the readiness of these inter-generic transformations.

Transformations may be more or less necessary, natural, unique, and delomorphous, or they may be more nearly fanciful, arbitrary, or of a merely 'permitted' nature. Some of the shapes imagined through the exercise may even be unrelated to the given ring variant or to the 'ring' genus itself, or the connection may simply be unfathomed.

I only looked at 8% of the 291 ring variants, and I am sure that other persons would find that that 8% has the power to suggest many other possible cyclic and sinusoidal structures than those that occurred to me and that I sketched. Moreover, when the imagined cycles and sinusoids are reconsidered with respect to their possible physical implications, or in terms of real-world phenomena, countless other variations, subvariations, and intermediate variations (intervariations) will certainly be suggested.

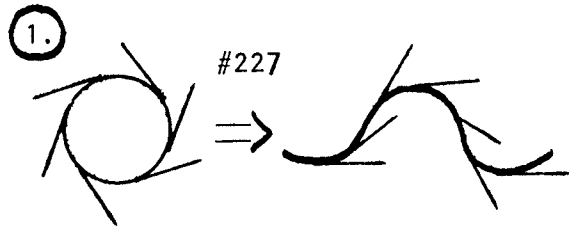
The strictness with which rival sinusoidal and cyclic interpretations follow from given ring form-variants, both in pure and applied cases, will give rise to much controversy when, in the future, the effort is made to imagine and formulate the totality of sinusoids and cycles derivable from the totality of rings (and ideograms thereof).

But the effect of this debate will be positive because of the contribution it will ultimately make to the transformation of this area of inquiry into a proper subfield of morphology, mathematics, logic, and ideonomy.

I have asked a number of mathematicians whether the study of such structural possibilities and implications of sinusoids or cycles as those my exercise involved corresponds perhaps to an extant subfield of mathematics. Since none of them were able to think of such a field, this may be yet another case where ideonomy has almost effortlessly pointed to a formally nonexistent discipline that can and should be created and may be important in the future.

I will now sketch and comment upon some of the structures of sinusoids and/or cycles that were suggested to me by ring form-variants selected at random.

ILLUSTRATIVE EXAMPLES

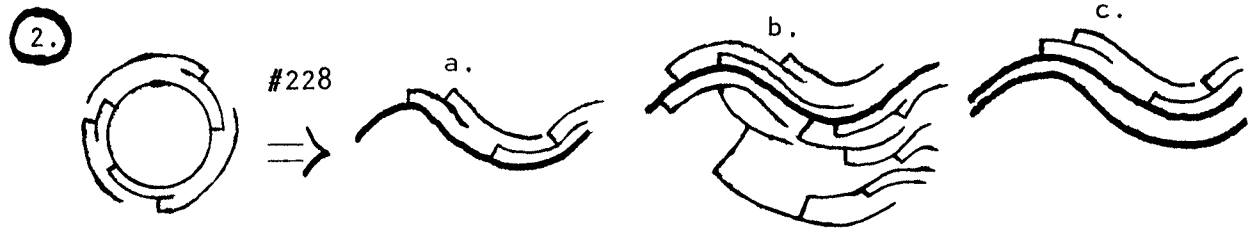


Notationally, the fact that this is our first example is indicated by the encircled "1.". The "#227" is the number of the ring form-variant (reproduced here on the left) in the original chart. The "⇒" refers to the implied or mentally evoked cycle(s) or sinusoid(s) that follow it.

This was the first possible transformation of a ring into a sinusoid or cycle that I considered at random. The ring-variant on the left, which resembles a Navaho sun symbol I believe, suggested to me variants of the sinusoid/cycle at right. Notice that the latter makes good intuitive or physical sense. Perhaps a pulse generator is associated with the basic sinusoidal wave shape and the implication is that something is periodically emitted by, or at moments indicated on, the sinusoid, and continues onward in rectilinear motion, perhaps for having linear momentum and obeying Newtonian laws.

Infinite variants upon the right ideogram are of course possible: the rays or spokes could be bilateral (as shown) or unilateral (either vertically or horizontally); finite, infinite, or infinitesimal; transective, instead, of the sinusoid, or nonintersecting; curvilinear rather than rectilinear; breadthless (rays) or broad (spokes); branched rather than unbranched; of equal length (as shown) or unequal, even progressive, say; backward (not forward), clustered (not singular at their origins), not tangential, etc; and the basic sinusoid itself permits endless variants.

The ideogram thus adapted could suggest sea spray torn from the crest of waves by an oversweeping gale, spalling, particles emitted by a nonspherical radioactive atomic nucleus, a chain of singularities, etc.

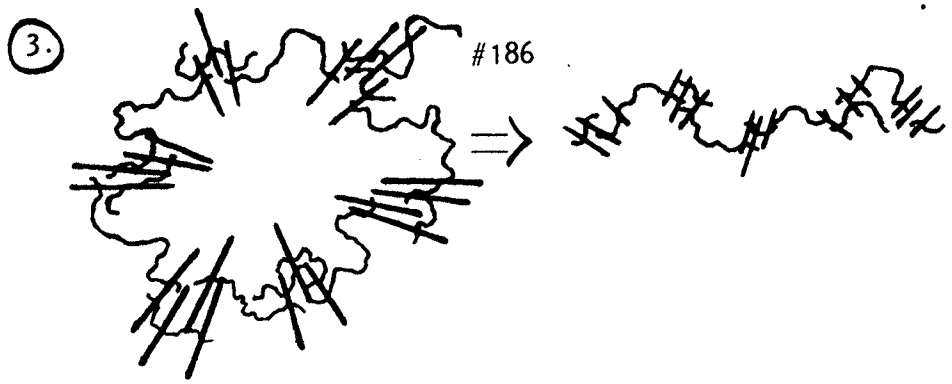


Here three possible variants of 'the' sinusoid/cycle suggested by the ring form-variant on the left are depicted. The 'branches' of "a." are unilateral (all superjacent), those of "b." are bilateral; the basic sinusoid of "c." is broad. All branching is rightward.

The physical phenomenon brought to mind immediately by the derived sinusoids is of course geostratigraphy, or joint-connected beds fragmented into joints and curved parallel to a main, original curved surface—the latter presumably buried in "b." before the entire system was warped.

Some manner of monotonically and stepwise (possibly quantically) increasing energy levels, or the like, are suggested by "a."; two independent sets of increasing and decreasing levels—or at least branching processes—are suggested by "b.". Perhaps the basic sinusoid is generating some sort of by-product, or reflections of the sinusoid are drifting away from it. The discrete parallel branching process might be a queer variant of a random walk. It is rather interesting to note that an infinity of sinusoids can branch away from a primary sinusoid and yet remain conformal to it. Also, instead of a primary or special sinusoid there may be any number, even an infinite number, of preexistent, nonspecial, or equally 'special' conformal sinusoids side-by-side, perhaps branching to, into, or across one another; say in a case where the transverse dimension (or y axis of a graph) need not possess any unique numerical direction (perhaps being instead p-adic, for example). The value of the basic sinusoid could depend upon averaging or other processes in the conformal branching and hence be indeterminate.

These and many other ideas are all suggested by careful consideration of the possible sinusoidal transformations of ring form-variant #228.



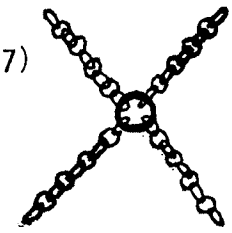
RING-SHAPED CAUSES AND EFFECTS

Hypothetical Abstract Characterizations of Generic Causes and Effects By Generic Rings

1. (#5)

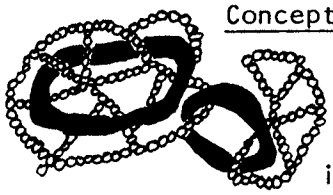
Concept 1: Case where causes [effects] cyclically oscillate between positive and negative values (of dimension y), and when in between (in decreasing and increasing phases) are similar in some (presumably orthogonal) second dimension (x).

2. (#237)



Concept 1: Case where 4 different chains of causes are simultaneously or contendingly pulling or seeking to pull a single central effect (or intersection and interaction of the causes?) in opposite directions;
Concept 2: Or related case where it is 4 chains of effects that are directly or indirectly retro-influencing a central cause;
Concept 3: Or case where there are 4 chains of linked effects propagating outwards (but in 4-coordinated increments?) from a single common central cause or source;
Concept 4: Case of a vergent propagation of causes, effects, or causes-cum-effects propagating or converging from below, verging centrally on some sort of hurricane-like eye, and then (or simultaneously?) diverging upwards (in the diagram).

3. (#131)

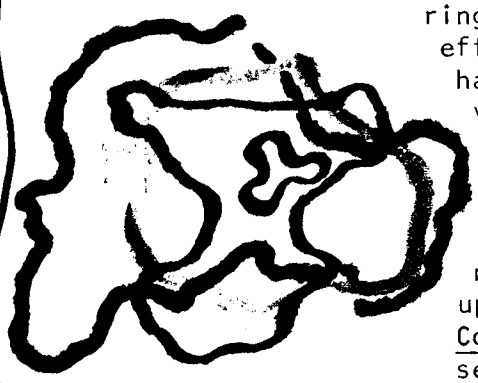


Concept 1: Case suggested by the figure wherein, say, two different continuously maintained independent and yet also interdependent chain-like systems of causes and/or effects are both internally and externally held together by, say, some sort of tertiary ring or rings of 'causes' (or hetero-causes, concauses, dia-causes, hypo-causes, or the like)—the latter being, say, stiff, stiffer, simpler, unitary (singular), in independent motion, tied independently to some other causative system in turn, and/or the like.

4. (#203)

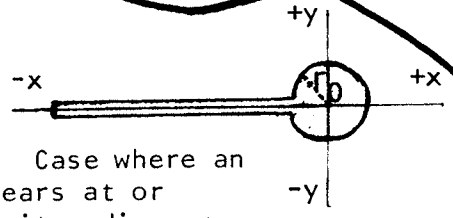
Concept 1: Case where a single cause acts back on itself (say in a recursive cycle) via a tremendous amount of progressively branching or sub-branching effects, say beginning with a single initial (synchronic?) singular or unified effect (and cause) and (gonotelically) ending with a great (or infinite?) burst of homogeneous or heterogeneous effects (which could be antisyzygially equivalent);
Concept 2: The opposite (antidirected) case, proceeding from initial diversity, multiplicity, complexity, or disunity to final homogeneity, singularity, simplicity, or unity.

5. (#138)



Concept 1: Case where many different loose (but self-gravitating?) rings or ring-systems of effects and/or causes have a tendency to vaguely gravitate to a common (or semi-common) center (without necessarily showing any—other—nontrivial effects upon one another);
Concept 2: Case where several different self-closed rings of causes and/or effects in time-averaged positive rotatory motion are intertwined in such a way that they guide or 'conduct' one another or form a hierarchy of nested revolutionary systems of motions.

6. (#56)



Concept 1: Case where an effect appears at or within a unit radius, r, in 2 dimensions (x,y) at all 2-dimensional angles save for a narrow angle (or over a narrow slit), say because restricted to a small range in y close to zero;
Concept 2: Opposite but equivalent case where a cause is so restricted.

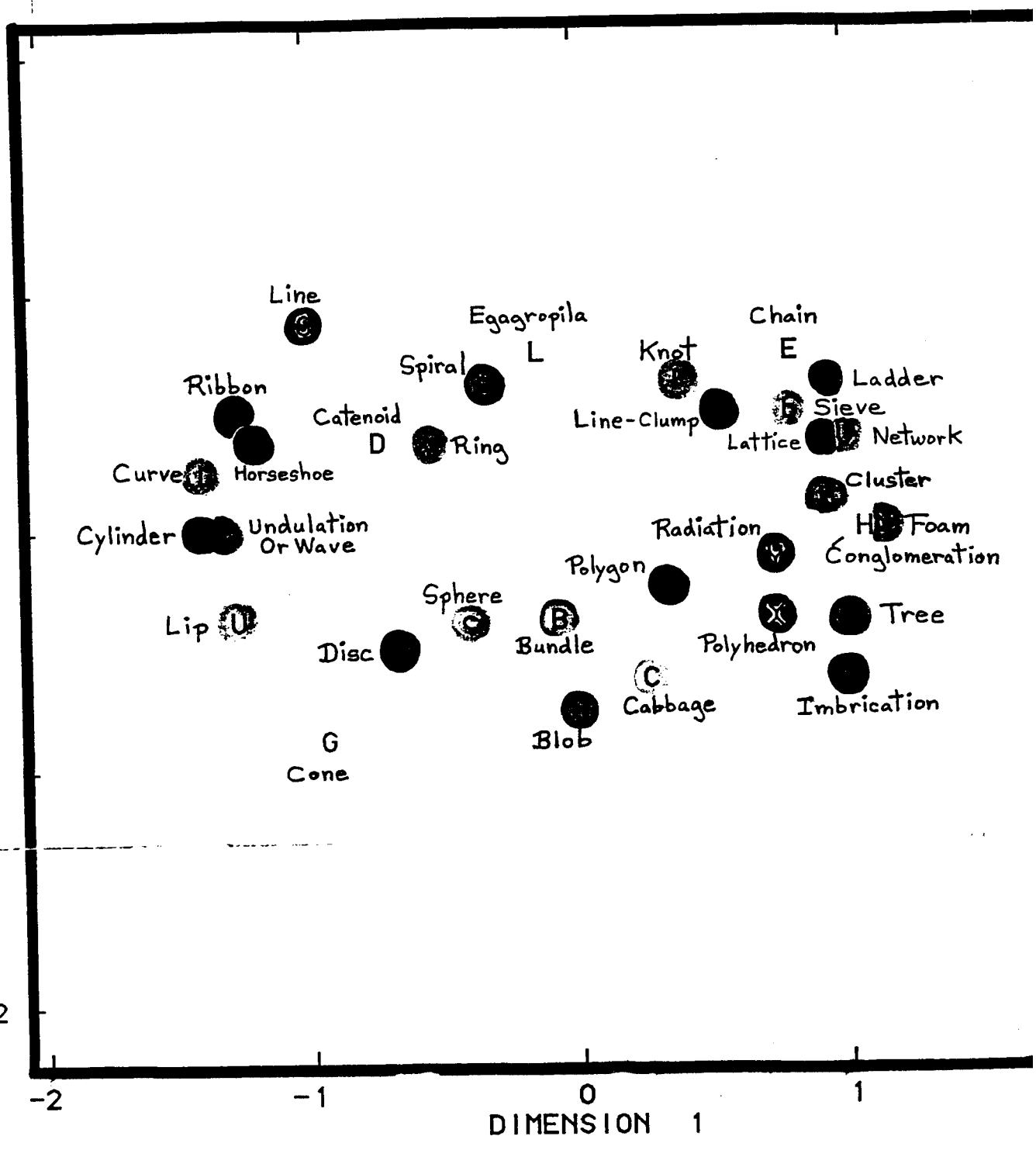
I	-1.37	.14
J	-1.40	-.04
K	-.69	-.55
L	-.13	.67
M	1.16	-.08
N	-1.23	.30
O	.97	-.68
P	.40	.50
Q	.93	.51
R	.91	.25
S	-.97	.76
T	.56	.39
U	-1.26	-.48
V	.98	.29
W	.36	-.36
X	.75	-.46
Y	.76	-.18
Z	-1.25	.49
a	-.51	.36
b	.81	.46
c	-.40	-.40
d	-.33	.54
e	.98	-.38
f	-1.33	-.09

MENSION 2

b=2

INTUITED OVERALL MUTUAL *'ANALOGOUSNESS'* OF *"32 (of 230) GENERA OF FORM"*.

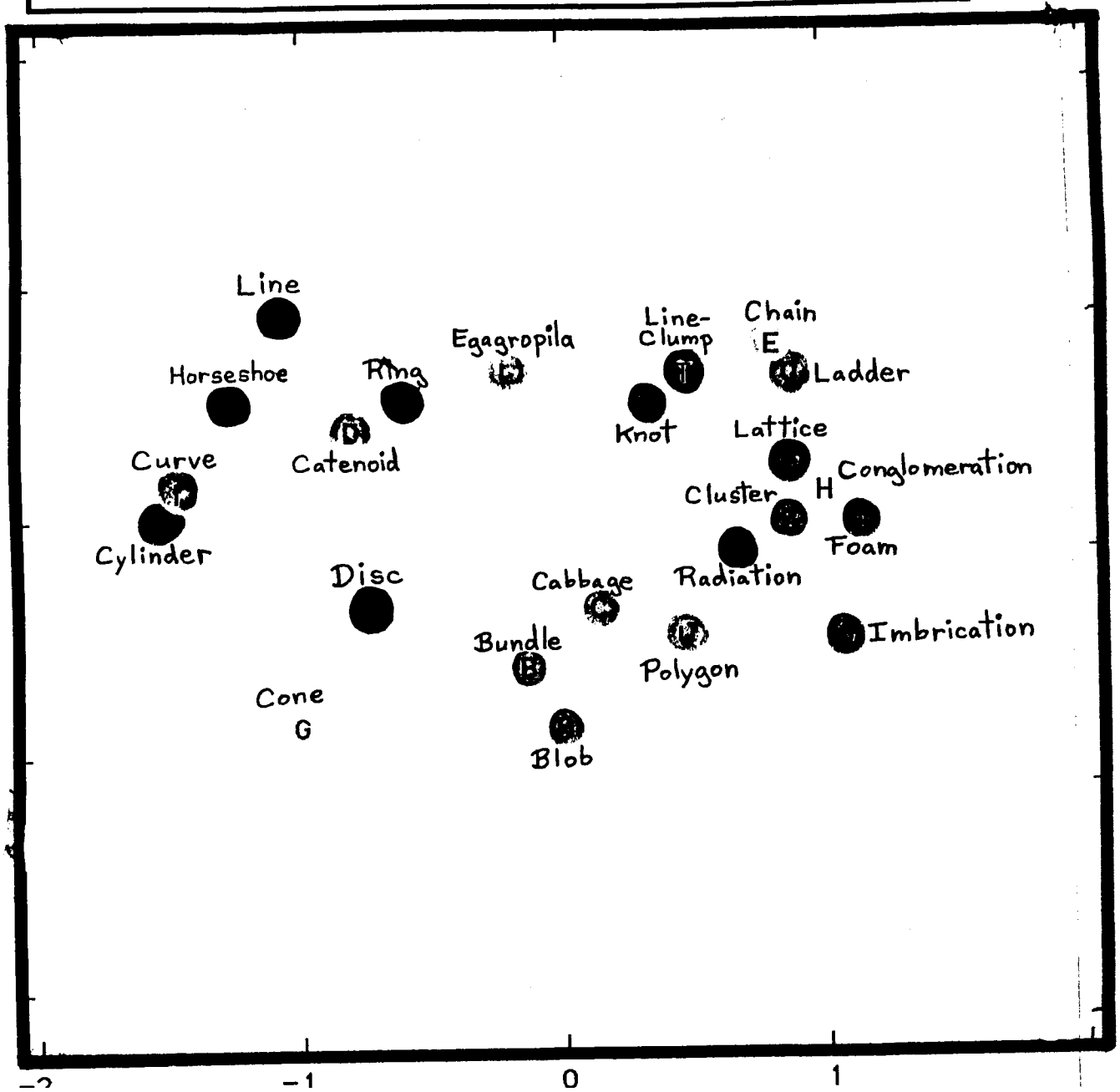
- Ideomap Created By Triadic Method of nMDS Via 1,280 Binary Decisions (32 Scalees [Poles] x 40 Scaling Dyads).
- Ideonomic Division: 'FORMS AND MORPHOLOGY'.



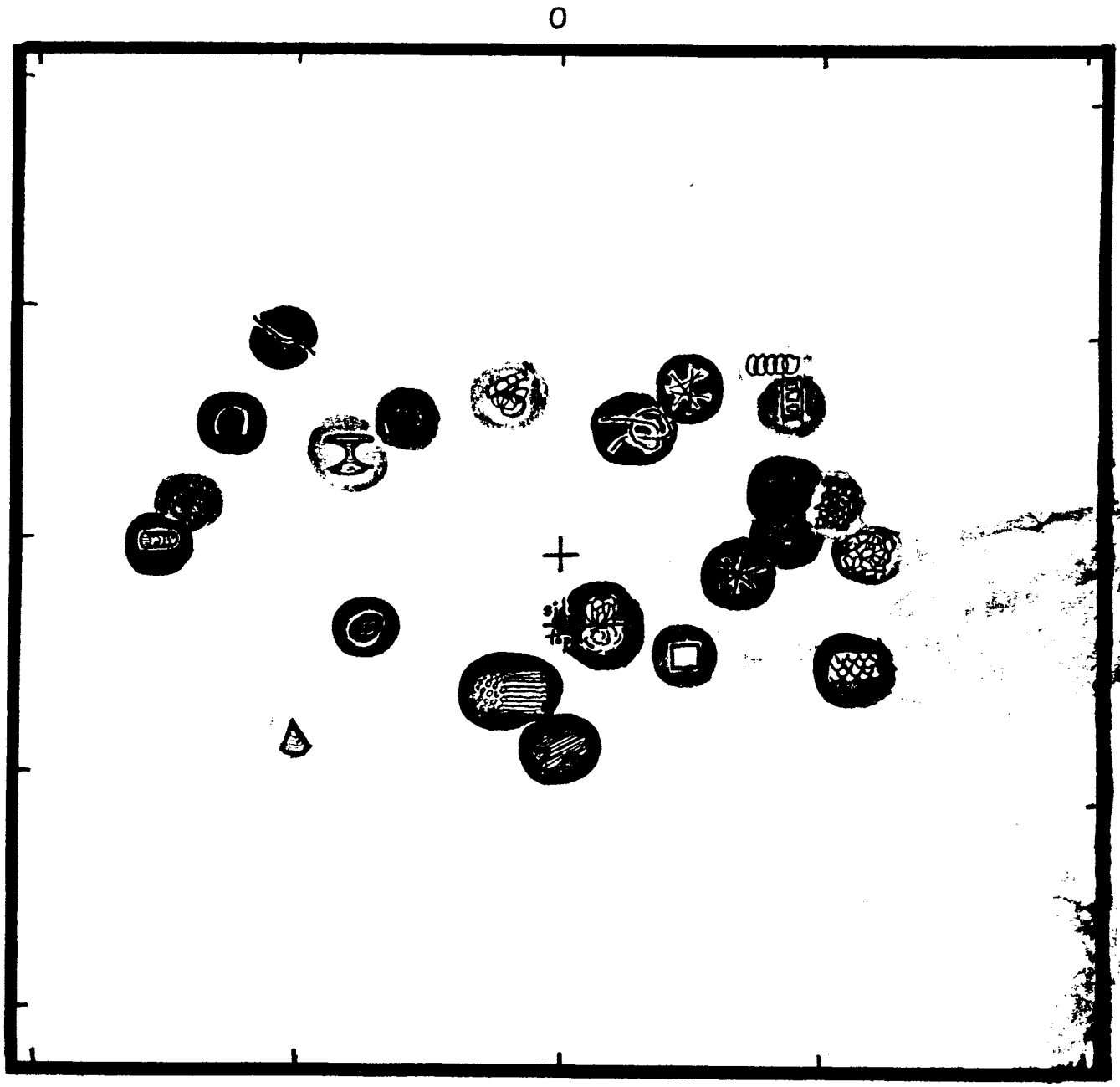
J	J	-1.53	-.12
K	K	-.72	-.49
L	L	-.17	.59
M	M	1.14	-.12
N	N	-1.28	.38
O	O	1.06	-.57
P	P	.36	.38
Q	Q	.86	.55
R	R	.84	.25
S	S	-1.05	.76
T	T	.47	.53
U	U	.46	-.59
V	V	.69	-.20
W	W	.61	.49

INTUITED OVERALL MUTUAL *'ANALOGOUSNESS'* OF *"23 (of 230) GENERA OF FORM"*.

- Ideomap Created By Triadic Method of nMDS Via 920 Binary Decisions (23 Scalees [Poles] x 40 Scaling Dyads).
- Ideonomic Division: 'FORMS AND MORPHOLOGY'.



PICTORIAL COUNTERMAP



INTRODUCTION

PERSONAL ORIGINS OF IDEONOMY

Most of us can only feebly reconstruct, or fancifully surmise, the train of circumstances and events, and the internal psychological development, that ultimately made us what we are as adults. The same can be said of whatever may have contributed to the intellectual discoveries of our adult life.

The concept of a science of ideas did not suddenly leap into my mind one day from out of the blue. Instead it emerged gradually through a chain of inspirations compounded of experience, desire, and insight. In its earliest embryonic stages it had almost nothing whatever to do with what we would ordinarily think of as science or as being related to science.

The greatest museums of science and technology in the United States, and perhaps in the world, are to be found in the city of Chicago, where I was born 1947 May 1. My first memories in life are of the Chicago Museum of Science and Industry and of the Field Museum of Natural History.

It will be seen from the accompanying "Personal Origins of Ideonomy" chart that I believe the experience of these museums began the mental odyssey that led after three decades to my conceiving of ideonomy.

I was deeply impressed by the architectural and exhibitional grandeur and immensity of these institutions and by the endless, magical fascination of their scientific collections. Life-scale models of a farm, coal mine, and turn-of-the-century city street were housed within their walls. There was a captured World War-II submarine. Early aircraft hung from the ceiling. Entire dinosaurs were reassembled from their bones. Each of the 92 chemical elements was on display in a single, huge, circular exhibit. There was a newspaper room, television studio, the inside of an iron foundry. There were hundreds of dioramas—the heart of any museum of worth—depicting scenes and landscapes around the world and through the ages.

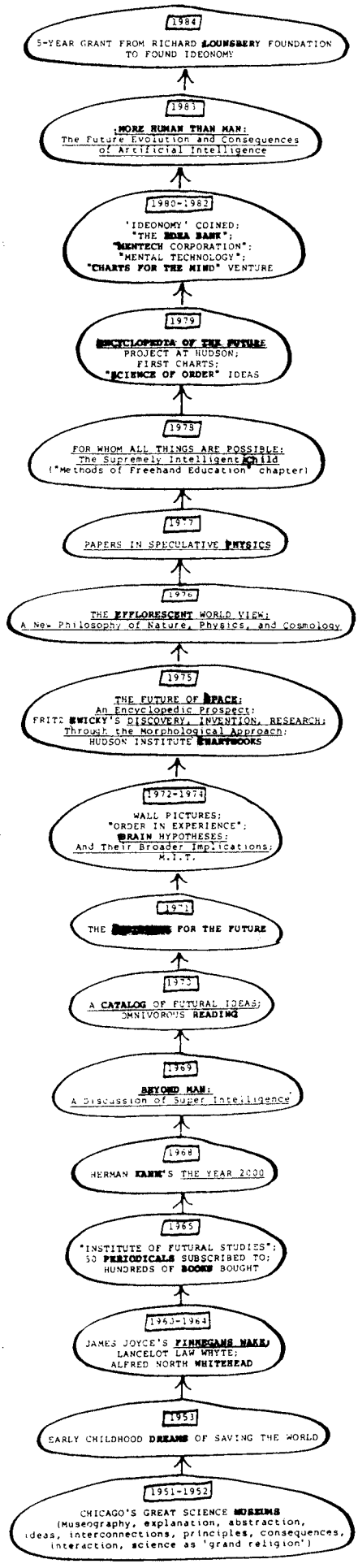
That shown so encyclopedically was also carefully explained by cards of text, diagrams, graphs, meters, audio recordings, companion displays, and human guides and lecturers. Halls and wings of these museums were dedicated to specific subjects and themes. Visitors were free to walk where they would along the corridors of knowledge and endeavor. No school on earth could possibly compete with these museums; not even the earth itself could compete, for here things were brought <u>together</u>.

From this circus of ideas, of connections between and among things; this celebration of learning, science, progress, and the world's totality; this shrine to the ethic of Faust: there must have crystalized my world view, and perhaps my very character.

Around the age of six I had recurring dreams of leading my own cavalry and of saving, in effect, 'the world'. I suppose this was the start of my messianic impulses of later life! One day, out in the woods, I founded my own religion; although of what it consisted I remember nothing. At this same age I was already committed to a triad of vocations: to become a priest, a scientist, and a carpenter.

During my years of secondary education I made no effort whatever to perform and had one of the lowest academic standings in my class. What I paid attention to instead included my private chemical and electrical laboratory, my scientific, philosophic, and poetic thoughts and writings, nature, and certain books.

PERSONAL ORIGINS OF IDEONOMY



These books, which were so important for the later development of my own ideas, included the writings of the Anglo-American philosopher Alfred North Whitehead, especially his Adventures of Ideas, Science and the Modern World, and Process and Reality: An Essay In Cosmology; The Next Development In Man by the British philosopher Lancelot Law Whyte; The Logic of the Sciences and Humanities by the American philosopher F.S.C. Northrop; the novel Finnegans Wake by Ireland's James Avery Joyce; and the enormous McGraw-Hill Encyclopedia of Science and Technology.

Whitehead was the greatest factor in my childhood intellectual development. His profound philosophy—based on his earlier work in mathematical logic—of the infinite richness, creativity, meaning, and organic unity of physical nature, civilization, and the human mind was something I studied with the utmost care and an ecstatic reverence.

For Whitehead it was impossible to reduce the world to a final system —or systematic description—but vital for man to periodically make the attempt. For him ideas were living things, transforming the world and themselves being transformed in the process, part of an infinite—and therefore infinitely elusive—evolutionary design, albeit a design itself undergoing perpetual evolution and transformation.

In Whitehead's philosophy all of existence has an aesthetic or axiological basis; all things are imbued with meaning, importance, and a certain intellectual infinitude.

Whitehead also stressed the importance of investigating "categories"—maximally fundamental classes of concepts or existential concepts—which generate, order, and reduce all other things, concepts, and possibilities.

Opposites and their eternal antisyzygies are considered by Whitehead to be critical to understanding reality.

All of these elements of Whitehead's philosophy simultaneously belong to my own world view and they illustrate part of the debt I owe to him.

Finnegans Wake is unchallenged as the most complex and intricate work of literature man has ever produced. No one will ever know what all it says and doesn't say, but that is not important. What is important, and what certainly was important to me as an adolescent, is that it has the power to serve as one of the greatest tools for training and transforming the mind, by forcing the latter into many different, dissimilar, and yet complementary modes of thought, by maximizing its complexity, and by dramatizing the world's wealth of interrelationships and simultaneities.

The McGraw-Hill Encyclopedia taught me to respect the magnitude of knowledge and the multiplicity of technical considerations that bear upon any thing; it introduced me to the diversity of concepts and phenomena, and encouraged me to think concisely and integrally.

At the age of 18, instead of finishing high school or entering college, I joined the United States Postal Service as a letter carrier for a year and a half. Practically the entirety of my discretionary income I then spent on the purchase of a huge and encyclopedic library. I acquired an old copy of Books In Print, which lists most of the books currently in print in the United States, and studied it to decide what books to order. Surprisingly good a priori choices could be made in this way, even though the information provided on the books was limited to their title, author, publisher, and price. The main reason for this was that the sheer abundance of listed books enabled one to cleverly limit oneself to that substantial subset of cases where titles were apt to be decisive, say because of their wording.

The incoming stream of books gave positive and negative feedback that steered and improved my subsequent selections of books to order. The books I had gotten had references to other books that also were useful. I used the public library for further clues, and naturally my purchases were being guided by my own, constantly developing tastes, interests, and judgment.

Among the books gotten in this way that I recall were the collected works of Sigmund Freud, Carl Gustav Jung, and the mathematician John von Neumann, who became one of my great idols. There was a Morphological Botany in two volumes, Sir Arnold Toynbee's 12-volume A Study of History, D'Arcy Wentworth Thompson's On Growth and Form, Hermann Weyl's The Classical Groups, Pitirim Sorokin's 4-volume Social and Cultural Dynamics, Linus Pauling's Nature of the Chemical Bond, W.J. Humphreys' Physics of the Air, P.A. Shumskii's Principles of Structural Glaciology, and Herman Kahn's On Thermonuclear War.

I also subscribed, all in one year, to fifty diverse magazines and periodicals, including a Canadian seismological journal and Foreign Affairs.

Motivating this was a queer desire to know everything, or at least to be on top of everything. By this time my absolute obsession with all possible ideas had already begun to emerge. The obsession came first, but it certainly was advanced by the arrival of the books! The curiosity I had to understand things was explosive; knowledge was not enough, I wanted to master the principles—know the essence—of things. The passion or enthusiasm I had made my quest a little easier.

At this time I purchased my first copy of the best dictionary of the English language there is, Webster's Third New International Dictionary. A dictionary is actually an ideonomic work, and this is one of the greatest in existence (in the epoch preceding the inauguration of ideonomy). The dictionary is far more than a list of words and their definitions, for it is also an encyclopedia of concepts and a cognitive instrumentarium. It is a supreme device to train the mind to know, understand, and use something like the totality of concepts man has evolved and discovered to date; to acquaint one with the exact, variable, and complete—and the intrinsic, comparative, interrelated, and potential—meanings, possibilities, ranges, limits, and rules—and hence with the fundamental permutations, combinations, and transformations—of our communal words and concepts; to minimize cognitive and communicational error, uncertainty, inaccuracy, and ambiguity; and to maximize the possible order, "compatternment", power, fertility, intelligence, and evolutionariness of ideas and terms.

I would browse through the dictionary systematically in search of interesting, important, novel, and mind-expanding words and in order to explore complex interrelationships of words and ideas. I would also peruse entire pages. In subsequent years I have been developing a special set of symbols, marks, and notations that I have been introducing into the dictionary in order to transform and enhance it, and to make it more ideonomic and ideonomically useful.

I have found that English includes a largely forgotten—or never independently compiled, promulgated, and cultivated—subset of "best" words, which I have been specially marking on the thought that one day I might extract and publish them as a sort of higher dictionary.

Polygenous, its offerings would range from the hilarious ("mawworm", a sanctimonious mealymouthed hypocrite) and merely amusing ("quiff", a puff of air) to the resurrectably topical ("ergosophy", wisdom in the use of energy resources), the useful ("stere", cubic meter; "lambda", cubic centimeter), the venerable ("telltruth", a person who tells the truth; a frank and honest person), brachyology ("risibles", sense of humor; "bios", organic life), the magnificent ("superfetation", the process or product of the production or accretion of one thing upon another esp. in an uninterrupted superabundant cumulative development), the trenchant or transpiercing ("morosoph", a learned fool), and the reflexive ("lexiphanic", using ostentatiously recondite words).

It would also include many words that deserve to be a part of the terminology of ideonomy: "propaedeutic", needed as preparation for learning or study, or introductory to an art or science; "praecognitum", something known or that should be known in order to understand something else; "phylic", being or viewed as a member of a group; "phrontistery", a place for thinking or study (e.g. a think tank or ideonomic laboratory?); "mesothesis", a mediating principle or agency; "disrelation", lack of a fitting or proportionate connection or relationship; "osculate", to have characters in common with two groups; "subjectum", basis or substance for thought; "probatum", something proved or conclusively established; "procatarctic", that is the immediately antecedent cause.of some indicated effect; "antitype", an opposite type; "factum", a statement of facts; "eisegesis", the interpretation of a text by reading into it one's own ideas; "strephosymbolia", reversal or transposition of phrases, words, or letters or of any symbols; and "eidos", logical structure, or the cognitive part of cultural structure.

Studying the dictionary taught me more than the microscopy of concepts or their structure at successively smaller scales or higher resolutions. It also taught me how to define concepts or things in general, and what it means to define concepts; it taught me how to move about within ideas, how to construct ideas and things from ideas, how to think about thinking, and what the laws of ideas are. In fine, it taught me ideonomy.

Moving back and forth between all the different books I had bought, I learned how to transpose the elements of and the methods for treating one subject to an entirely different subject, how to map subjects onto, or transform subjects into, one another, à la the new mathematical field that is called category theory. If it happens to be in the nature of the work one does that one is constantly dancing about within a medley of disciplines, one eventually arrives at the realization that the various disciplines are not really that different or that separate, and that what they have in common is greater than what they do not have in common. The ideonomist would say that this is the beginning of wisdom, a strange dawning awareness that the heterogeneity and homogeneity of the world are fundamentally and paradoxically indistinct.

It was at this point in my life that I developed an intense interest in the future possibilities of science, technology, and civilization, and that I visualized the creation of a special institution—an Institute of Futural Studies, as I called it—to explore these possibilities on an ongoing basis. The discipline consecrated to this visionary research—now usually referred to as futurology but within ideonomy more properly renamed mellology—I suggested could variously be recharacterized as a "science of variety" or "science of possibility". It is worth noting that the same could be said of ideonomy.

In the late 1960's I became a great admirer of the late R. Buckminster Fuller, an architectural engineer, futurist, inventor, and polymath. His optimistic and unified view of the creation, staggeringly complex prose, and matchless iconoclasm appealed to me enormously, and I eventually decided that I would attempt to emulate him—or the inspiration he was for a generation—in the course of my life.

In 1968 I purchased a copy of Herman Kahn and Anthony J. Wiener's 1967 book The Year 2000, which remains to this date the best volume on the shorter-term future of the world, say through 2000 AD. I was already acquainted with Kahn, who later became my mentor and employer, through his books on the strategic dimensions of nuclear war, including On Thermonuclear War (1960) and On Escalation: Metaphors and Scenarios (1965).

What delighted me about Kahn, who was a mathematician, physicist, strategist, futurist, and polymath and the director of his own think tank, the Hudson Institute, was his outrageously unconventional thought, obvious courage and conscience, sense of humor, and phenomenal intellect (for many of us he was, in any visible sense, the smartest man on earth).

His new book dealing with the future probably contributed in a number of ways to that part of my thinking which finally gave birth to ideonomy. It demonstrated the feasibility of analyzing the possibilities of the future in a more systematic, methodical, and scholarly manner than had hitherto been done, and the excitement it caused argued that such thinking could indeed have a social and political impact. It was probably this book, and Kahn himself, that launched the great worldwide interest in the future which has flourished now for two decades.

It was in my 21st year, in 1969, that I wrote the book Beyond Man: A Discussion of Super Intelligence. For some time I had been convinced that the development of a mechanical intelligence greater, in fact 'infinitely' greater, than man's was all but inevitable, and that the real course of the future would ultimately be decided by this one, illimitably consequential event. Only as the father of this godlike intelligence would man himself have a major—albeit transient or transitive—role in shaping the long-term course of world events. The somnolent way in which my fellowman contemplates this awesome and largely inescapable prospect has always seemed for me the greatest possible indictment of the intellect, rationality, and spiritual worth of our species, and therefore also perhaps its death warrant.

In my essay on this singular possibility I tried to imagine how the world might seem to an astronomically brilliant being, or the fundamental relationship between mind and physical reality that might come to light with the achievement and continuing evolution of transhuman and nonanthropomorphic intelligence. What would be the dimensions of perception, thought, meaning, and action?

The effect of this exercise was to irrevocably transform and revolutionize my world view. Reality, civilization, and my own self have never again been the same for me.

In 1970 I undertook to read and summarize the entire literature on the future—apart from science fiction—that existed at that time. A Catalog of Futural Ideas, which I began on my own initiative but which came to be funded by Hudson Institute, was the multivolume result. The epitomes of the hundreds of books I read forced me to think about what, if anything, was new and essential in each book, and about the set of dimensions that effectively generated and contained whatever was novel and important.

In 1970 I briefly joined the newly formed Institute For the Future, then located in Middletown, Connecticut. In a sense this organization was the realization of the institute I myself had dreamed of five years earlier. At least in the beginning it had such ambitions. Tragically time and events transformed it into a lesser animal altogether. It was extraordinary to be with such an institute in the first months of its existence, however, and to be part of an idealistic endeavor to map out, confront, even contribute to the structure of possibility itself.

For three glorious years, 1972-1974, I was a researcher in the neurosciences at Massachusetts Institute of Technology, under what is now known as the Laboratory for Computer Science.

I was given the remarkable opportunity to do whatever I cared to, and what I cared to do was to try to understand the human brain. The way I went about this was to first buy the 500 best and least redundant books on the brain and nervous system, read about half of them cover to cover, digest everything that I had read and use it to summarize and synthesize in my head the extent of what was then known or thought about the subject, and then, and only then, to stand on top of all this and use it as a basis for its own transcendence, by generating and putting to paper—as my book Brain Hypotheses and Their Broader Implications—every theory and hypothesis I could conceive of regarding the possible structure, function, and interrelationships of every known, and indeed of every likely, element of the brain, and every mental manifestation thereof.

From this light undertaking I gained many things with a bearing on the later development of ideonomy: A broad and deep appreciation of the mechanisms, problems, and possibilities of human intelligence, perception, and behavior; Consciousness of the fundamental types of order that inhabit the external world, give rise to its phenomena, and permit the mind to operate within it; And an awareness both of the finitude of what we are and of the infinitude that lies beyond us, masked by—yet also anchored in—that very finitude, defectiveness, and arbitrariness.

Much of the inspiration for my ideas on the human brain was derived from about 500 pictures that I had covered my office wall with. These were the best and most interesting photographs, paintings, and diagrams that I could find of everything imaginable: flowers, trees, skies, mountains, buildings, people, stars, molecules, instruments, events, situations, industrial processes, animals, microscopic phenomena, etc.

I constantly studied these pictures, which represented something of my private museum or a cosmorama. I searched for forms of order and pattern within them, and used them to test and flesh out my hypotheses about the brain, especially the encephalic basis of vision. Within them, and via them, I discovered a language of basic types of order that could be—and in the nature of things is—combined, permuted, rearranged, and transformed as an infinitely complex, and yet also infinitely simple, realm of derivative secondary, tertiary, and n-ary order.

It was the discovery of this language that was the real, objective start of ideonomy. Today the language survives as part of the ideonomic division "ORDER TYPES AND TAXA".

Many other divisions of ideonomy were inspired by concepts and methods developed and discoveries made during my neurological investigations: e.g. "VERGENCES", "DIADICHOTOMIZATIONS", "STORIES", and "RHEOSTATIC ASPECTS".

ideonomic division
division manque

EDIT: See p.5 n.!

ANALOGIES

THE ARCHANALOGON "VOLCANO" AND ITS ANALOGS
Analysis and Synthesis of Their Analogical Interrelationships

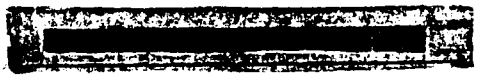
Here a single archanalogon - Volcano - will be used to illustrate the general ideonomic concept of such arch, or supremely fundamental, universal, central, and important, analogs, and some of their foreseeable ideonomic uses. The way in which the conceptual possibilities of the archanalogon are developed, and the methodology of their application, will be exemplified.

Of course what is described here can at best be a primitive anticipation of the more elegant and elaborate ideonomic treatments of archanalogons that will be characteristic of the science when it reaches maturity in the future.

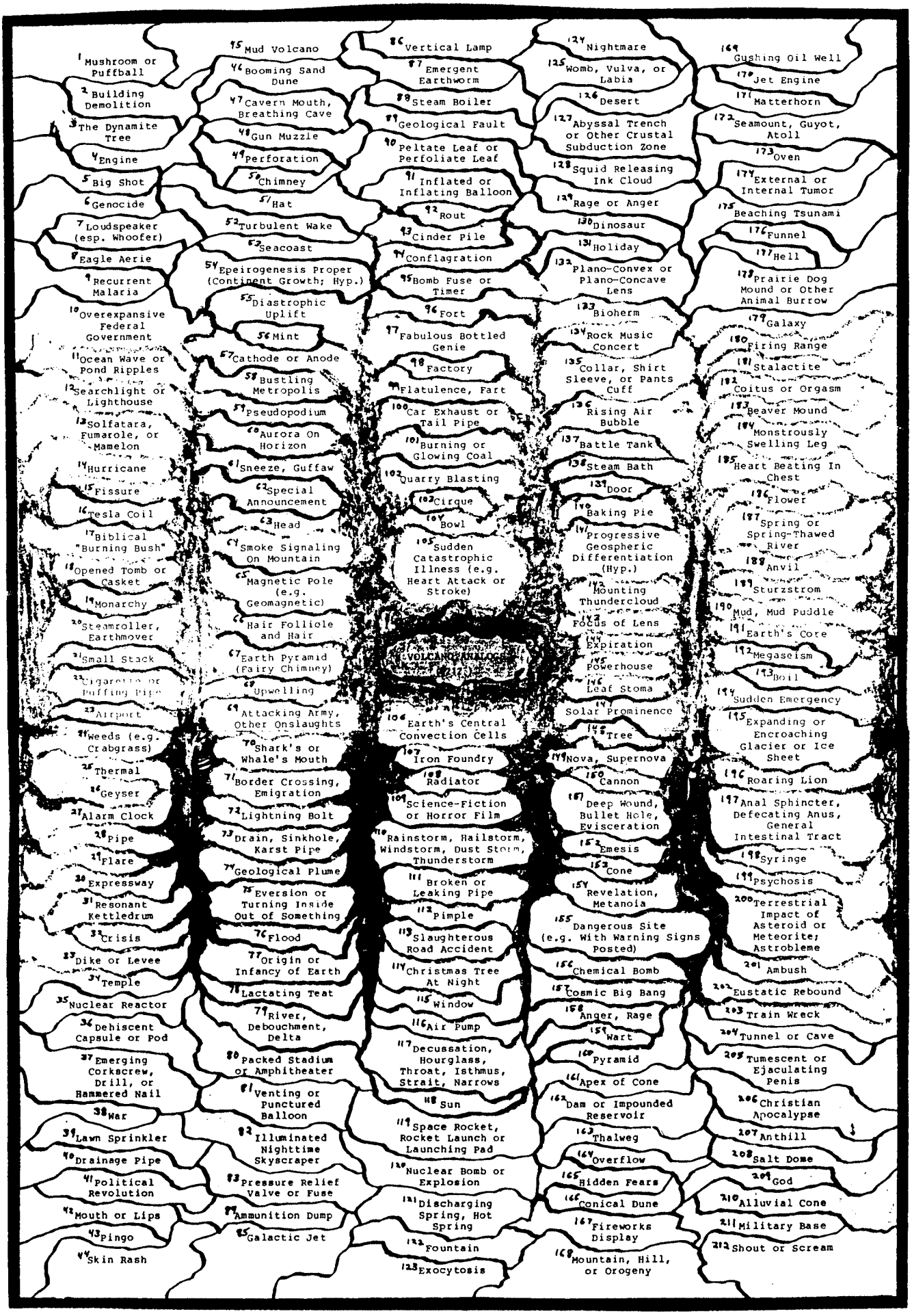
Let us begin with a preview of the sorts of things that might be appropriate to include in this section of the book. Considerations of space, however, will forbid the inclusion of most of them, and will abridge the treatment of almost all of those that are included. (This is a GIGANTIC topic.)

1. A list of maximally diverse types and genera of analogs of a volcano, with these analogs drawn from as many different sciences and other major fields as possible. The fields to which the various analogs most naturally correspond should be indicated, and the list might be hierarchized alphabetically per field and the analogs thereof.
2. A list of the key and lesser defining traits of the geologic phenomenon of "volcano": morphologic, dynamic, chemical, physical, etc.
3. A related list of the major and minor analogical meanings and dimensions of the archanalogon Volcano.
4. A similar but complementary, or 'dual', list of the so-called semigeneric traits of the listed—or of any—volcanic analogs. Such traits tend to be shared by many, but need not be shared by all, the analogs, and hence form a complicated set of hierarchies of clusters.
5. A typology or taxonomy of the recognized or recognizable types of volcanoes and of the groups thereof.
6. A taxonomic version of the list of #4.
7. A list of sublists giving the definitive phenomenological, and perhaps (distinguished) analogical, traits of each of the indicated volcano analogs. Clearly, sans abridgement, this would be a huge list, involving enormous work in its preparation.
8. A version of list #1, possibly in spiral form, with the set of analogs put into that linear order that most nearly corresponds to my intuitive estimate of the absolute and relative degrees of analogousness to a volcano —or of summed or integrated similarity to the archanalogon Volcano—of each of the analogs.
9. A list of proposed "raisons" of the semigeneric traits (of #4).
10. A complementary list or chart of the theoretical "raison complexes" underlying or uniting the raisons (of #9).
11. A list of the most important—or scientifically or ideonomically interesting, surprising, and useful—predictions about each of the analogs that were the direct result of this sectional exercise in analogical ideonomy.
12. A chart of degrees of correspondence of each of the analogs to each of the semigeneric traits of the set thereof; showing, in effect, where each analog apparently falls on scales representing each of the traits.

"A TABLE OF 73 'TRAITS OF VOLCANOES'"



1. A major engineer and (hypothetical) creator of the atmosphere.
2. A major shaper of earth's surface morphology and composition.
3. Affect climate worldwide.
4. Appear on surface of earth.
5. Begin beneath ground.
6. Born.
7. Cause lightning (when erupting) and electrical currents.
8. Central tube (have; conducting fluids and gases).
9. Central vent extremely narrow relative to its vast length.
10. Characteristic phenomena precede actual eruption (e.g., seismicity, sounds, harmonic tremors, steam vents, aquifer irregularities).
11. Circular (more or less).
12. Conic (usually; sometimes domic, etc).
13. Crateral.
14. Create landslides.
15. Create streams of molten rock and mud that often travel long distances.
16. Create tremendous stress, strain, friction, breakage, and fragmentation.
17. Dangerous and destructive (to landscape, climate, life, buildings, and man).
18. Derive from deep and vast subterranean magma chambers.
19. Develop and grow.
20. Dikes and sills (have).
21. Diverse types.
22. Eruption spasmodic.
23. Expand and contract balloon-like.
24. Explosive (often).
25. Extreme pressure.
26. Extreme range of mature sizes (exhibited by different volcanoes).
27. Extremely hot.
28. Fiery.
29. Generate certain characteristic kinds of rocks, minerals, and soils.
30. Gigantic (mountainous) and massive.
31. Global and regional eruptions cluster in time (at many scales; as to number and sum activity).
32. Glow (in parts, when active; nocturnally and diurnally).
33. Grow old and die.
34. Growth is cumulative.
35. Largest and smallest undefined.
36. Leave lakes and fields of (molten and solidifying) lava.
37. Loud, boom, and create diverse sounds.
38. Magnetic field and transient events (have or cause).
39. May be revived or be the site of other eruptions.
40. May procreate other volcanoes (hypothetically).
41. Occur and erupt cyclically.
42. Occur in contiguous or nearby clusters.
43. Occur in diverse environments (on land, under sea, snow, and ice, on other planetaries).
44. Occur in hierarchies (sometimes).
45. Occur in spatial series (sometimes).
46. Occur preferentially along belts, lines, and rows (esp. along fault systems).
47. Occur preferentially in regions.
48. Outflow from mouth (largely but not entirely unidirectional).
49. Outflow moves down and away from flanks.
50. Played critical roles in earth's youth.
51. Powerfully odorous.
52. Progressively evert earth's interior (turn its matter over).
53. Radically fluctuating temperature.
54. Radically furrowed flanks.
55. Release great clouds of smoke and steam.
56. Repeatedly seal and break their seal (open and close).
57. Rock (made of).
58. Shoot projectiles and masses through air at high velocity (boulders, liquid blobs, gases, dust; often long distances and to great heights).
59. Shudder, shake, and cause earthquakes.
60. Squat (often; sometimes shieldlike).
61. Sterilize and fertilize soil.
62. Stratified.
63. Strong and numerous cousins (e.g., mud volcanoes, diapirs, pingos, crustal plumes, midoceanic and orogenic 'ridges') & analogs (e.g., geysers, springs, hurricanes, thunderheads, sunspots, galactic jets, pimples).
64. Uncontrollable by man.
65. Undergo many very slow changes; total temporal range of phenomena is vast.
66. Unpredictable.
67. Unstable and (more or less) protean.
68. Upright (vertical).
69. Usually quiescent.
70. Varied in shape and structure.
71. Vergently arborescent internal structure (upwardly tributary-then-distributary).
72. Violent (often).
73. Visible part is but the 'tip of the iceberg' (are mostly invisible).


1 Mushroom or Puffball
2 Building Demolition
3 The Dynamite Tree
4 Engine
5 Big Shot
6 Genocide
7 Loudspeaker (esp. Whoofer)
8 Eagle Aerie
9 Recurrent Malaria
10 Overexpansive Federal Government
11 Ocean Wave or Pond Ripples
12 Searchlight or Lighthouse
13 Solfatara, Fumarole, or Mamelon
14 Hurricane
15 Fissure
16 Tesla Coil
17 Biblical "Burning Bush"
18 Opened Tomb or Casket
19 Monarchy
20 Steamroller, Earthmover
21 Small Stack
22 Cigarette or Puffing Pipe
23 Airport
24 Weeds (e.g. Crabgrass)
25 Thermal
26 Geyser
27 Alarm Clock
28 Pipe
29 Flare
30 Expressway
31 Resonant Kettledrum
32 Crisis
33 Dike or Levee
34 Temple
35 Nuclear Reactor
36 Dehiscent Capsule or Pod
37 Emerging Corkscrew, Drill, or Hammered Nail
38 War
39 Lawn Sprinkler
40 Drainage Pipe
41 Political Revolution
42 Mouth or Lips
43 Pingo
44 Skin Rash
45 Mud Volcano
46 Booming Sand Dune
47 Cavern Mouth, Breathing Cave
48 Gun Muzzle
49 Perforation
50 Chimney
51 Hat
52 Turbulent Wake
53 Seacoast
54 Epeirogenesis Proper (Continent Growth; Hyp.)
55 Diastrophic Uplift
56 Mint
57 Cathode or Anode
58 Bustling Metropolis
59 Pseudopodium
60 Aurora On Horizon
61 Sneeze, Guffaw
62 Special Announcement
63 Head
64 Smoke Signaling On Mountain
65 Magnetic Pole (e.g. Geomagnetic)
66 Hair Follicle and Hair
67 Earth Pyramid (Fairy Chimney)
68 Upwelling
69 Attacking Army, Other Onslaughts
70 Shark's or Whale's Mouth
71 Border Crossing, Emigration
72 Lightning Bolt
73 Drain, Sinkhole, Karst Pipe
74 Geological Plume
75 Eversion or Turning Inside Out of Something
76 Flood
77 Origin or Infancy of Earth
78 Lactating Teat
79 River, Debouchment, Delta
80 Packed Stadium or Amphitheater
81 Venting or Punctured Balloon
82 Illuminated Nighttime Skyscraper
83 Pressure Relief Valve or Fuse
84 Ammunition Dump
85 Galactic Jet
86 Vertical Lamp
87 Emergent Earthworm
88 Steam Boiler
89 Geological Fault
90 Peltate Leaf or Perfoliate Leaf
91 Inflated or Inflating Balloon
92 Rout
93 Cinder Pile
94 Conflagration
95 Bomb Fuse or Timer
96 Fort
97 Fabulous Bottled Genie
98 Factory
99 Flatulence, Fart
100 Car Exhaust or Tail Pipe
101 Burning or Glowing Coal
102 Quarry Blasting
103 Cirque
104 Bowl
105 Sudden Catastrophic Illness (e.g. Heart Attack or Stroke)
VOLCANO ANALOGS
106 Earth's Central Convection Cells
107 Iron Foundry
108 Radiator
109 Science-Fiction or Horror Film
110 Rainstorm, Hailstorm, Windstorm, Dust Storm, Thunderstorm
111 Broken or Leaking Pipe
112 Pimple
113 Slaughterous Road Accident
114 Christmas Tree At Night
115 Window
116 Air Pump
117 Decussation, Hourglass, Throat, Isthmus, Strait, Narrows
118 Sun
119 Space Rocket, Rocket Launch or Launching Pad
120 Nuclear Bomb or Explosion
121 Discharging Spring, Hot Spring
122 Fountain
123 Exocytosis
124 Nightmare
125 Womb, Vulva, or Labia
126 Desert
127 Abyssal Trench or Other Crustal Subduction Zone
128 Squid Releasing Ink Cloud
129 Rage or Anger
130 Dinosaur
131 Holiday
132 Plano-Convex or Plano-Concave Lens
133 Bioherm
134 Rock Music Concert
135 Collar, Shirt Sleeve, or Pants Cuff
136 Rising Air Bubble
137 Battle Tank
138 Steam Bath
139 Door
140 Baking Pie
141 Progressive Geospheric Differentiation (Hyp.)
142 Mounting Thundercloud
Focus of Lens
144 Expiration
145 Powerhouse
146 Leaf Stoma
147 Solar Prominence
148 Tree
149 Nova, Supernova
150 Cannon
151 Deep Wound, Bullet Hole, Evisceration
152 Emesis
153 Cone
154 Revelation, Metanoia
155 Dangerous Site (e.g. With Warning Signs Posted)
156 Chemical Bomb
157 Cosmic Big Bang
158 Anger, Rage
159 Wart
160 Pyramid
161 Apex of Cone
162 Dam or Impounded Reservoir
163 Thalweg
164 Overflow
165 Hidden Fears
166 Conical Dune
167 Fireworks Display
168 Mountain, Hill, or Orogeny
169 Gushing Oil Well
170 Jet Engine
171 Matterhorn
172 Seamount, Guyot, Atoll
173 Oven
174 External or Internal Tumor
175 Beaching Tsunami
176 Funnel
177 Hell
178 Prairie Dog Mound or Other Animal Burrow
179 Galaxy
180 Firing Range
181 Stalactite
182 Coitus or Orgasm
183 Beaver Mound
184 Monstrously Swelling Leg
185 Heart Beating In Chest
186 Flower
187 Spring or Spring-Thawed River
188 Anvil
189 Sturzstrom
190 Mud, Mud Puddle
191 Earth's Core
192 Megaseism
193 Boil
194 Sudden Emergency
195 Expanding or Encroaching Glacier or Ice Sheet
196 Roaring Lion
197 Anal Sphincter, Defecating Anus, General Intestinal Tract
198 Syringe
199 Psychosis
200 Terrestrial Impact of Asteroid or Meteorite; Astrobleme
201 Ambush
202 Eustatic Rebound
203 Train Wreck
204 Tunnel or Cave
205 Tumescent or Ejaculating Penis
206 Christian Apocalypse
207 Anthill
208 Salt Dome
209 God
210 Alluvial Cone
211 Military Base
212 Shout or Scream

13. A list of concepts pertinent to volcanoes and volcanology.
14. A list of subphenomena of volcanoes.
15. A list of the parts of volcanoes.
16. A version of the list of #3, and perhaps a version of the list of #2, scaling such meanings, dimensions, and traits for their respective degree of importance to the volcano as an archanalogon or phenomenon.

Remarks On Preceding List

If the examples in a list of examples of analogs are all, or largely all, basically distinct inter se, or of different kinds rather than being mere **instantiations** of identical analogs, then by definition they qualify as **"types of analogs"**. If an example of an analog happens to explicitly or implicitly name a set of two or more—or a range or category of—types, then it illustrates what is here loosely meant by a **"genus of analogs"** (although elsewhere in ideonomy it might be subordinated to **"species"** status). An example that happens to epitomize a single major analogical trait, concept, or dimension—either of the archanalogon or universally—may also qualify as a "genus". The excuse for this polysemy is that, in the present case, rigorous definition or exclusive terminology would be pretentious and more confusing than helpful; and that ideonomy is often perforce and advantageously pragmatic and ad hoc in its methods and style (even maximally pragmatic—pragmatic to the greatest possible degree). A special requirement that one might wish to impose upon an analogical genus would be that it must refer to itself, or be explicitly referred to, as a "genus".

To illustrate these three distinctions among examples of analogs then: **temple** and **cathedral** are **coinstantial** or mere examples of volcanic analogs because qua volcanic analogs there are no fundamental differences between them; say as compared with **salt diapirs** and **pingos**, which are distinct but **congeneric** types of volcanic analogs in that, although both represent geologic phenomena of the upward extrusion of masses in earth's crust, there are major phenomenological and perhaps analogical differences between them—in terms of size, density, shape, site of origin, composition, velocity, forces, significance to man, genesis, surficial expression, dynamics, and other generic dimensions, or with respect to multidimensional parameters over the space of same; whereas cone and vent, finally, must be considered volcanic analogs meriting even higher status as analogical taxa—generic and mutually **heterogeneric** status—because they name an entire **set, range, or category** of types of volcano **analogs**, or because they epitomize major analogical traits, concepts, or dimensions of the archanalogon Volcano.

It is important to note that a general list of analogs of an archanalogon may contain two tendentially antipolar components: examples of things with varied degrees of **general** additive or sum-like, multiplicative or product-like, integrable or integral-like, differential, multivariate-analytic, gestalt-like or configurational, manifold-like, holonomic, scale-invariant, intuitive, and/or the like **analogical similarity to the archanalogon**; and examples of things with various degrees of **sub-general** or **non-general analogical similarity** (say limited to one or a few analogical traits, or referring to some point, surface, or object in a real-valued but sub-general abstract space). Thus a thing might be or seem overwhelmingly analogous to a volcano in a universal or general sense; whereas another thing might be or seem equally or compensatorily analogous to a unique feature or characteristic set of features of a volcano (while perhaps otherwise not or negatively volcanoid, or the latter in inversely proportionate degree).

"DO VOLCANO ANALOGS POSSESS FEATURES ANALOGOUS TO THOSE OF VOLCANOES?"

1. Does the volcano analog DEHISCENT CAPSULE OR POD have anything like RING COMPLEXES?
2. Does the volcano analog SALT DOME have anything like TSUNAMIS DURING ERUPTIONS?
3. Does the volcano analog WINDOW have anything like VOLCANO-TECTONIC DEPRESSIONS?
4. Does the volcano analog EPEIROGENESIS PROPER (CONTINENT GROWTH; HYP.) have anything like VOLCANIC ELECTRICAL CURREN'
5. Does the volcano analog VENTING OR PUNCTURED BALLOON have anything like ACCESSORY EJECTA?
6. Does the volcano analog DINOSAUR have anything like VITRIC ASH?
7. Does the volcano analog SPACE ROCKET, ROCKET LAUNCH OR LAUNCHING PAD have anything like BALL BRECCIA?
8. Does the volcano analog ALARM CLOCK have anything like BULBOUS DOME?
9. Does the volcano analog PACKED STADIUM OR AMPHITHEATER have anything like SUBMARINE ERUPTIONS?
10. Does the volcano analog HEAD have anything like ASH-FLOW VOLCANOES? ← Dandruff, or even some form of [illegible] drift? Pimples, pustules, [illegible]
11. Does the volcano analog DEEP WOUND, BULLET HOLE, EVISCERATION have anything like PUMICE, PUMICE FLOWS?
12. Does the volcano analog STEAM BOILER have anything like PHREATOMAGMATIC ERUPTIONS?
13. Does the volcano analog FORT have anything like PARASITIC CONE?
14. Does the volcano analog WOMB, VULVA, OR LABIA have anything like LAPILLI AGGLOMERATE?
15. Does the volcano analog EXOCYTOSIS have anything like SILICEOUS SINTER?
16. Does the volcano analog COLLAR, SHIRT SLEEVE, OR PANTS CUFF have anything like PYROMAGMA (LAKE MAGMA)?
17. Does the volcano analog THERMAL have anything like STOCKS?
18. Does the volcano analog RIVER, DEBOUCHMENT, DELTA have anything like DIKES?
19. Does the volcano analog BOIL have anything like COMPOSITE DIKES?
20. Does the volcano analog SALT DOME have anything like VOLCANOES?
21. Does the volcano analog BEACHING TSUNAMI have anything like NECKS? → [illegible]
22. Does the volcano analog TUNNEL OR CAVE have anything like VOLCANIC VENTS?
23. Does the volcano analog FLOWER have anything like SLAB PAHOEHOE?
24. Does the volcano analog EMESIS have anything like EUGEOSYNCLINE?
25. Does the volcano analog MATTERHORN have anything like MAGNETISM OF VOLCANOES?
26. Does the volcano analog COSMIC BIG BANG have anything like EXPLOSIVE ERUPTION?
27. Does the volcano analog BIOHERM have anything like BOMB?
28. Does the volcano analog PSEUDOPODIUM have anything like CORONET EXPLOSIONS?
29. Does the volcano analog DIASTROPHIC UPLIFT have anything like SUBAQUEOUS DEBRIS FLOWS?
30. Does the volcano analog TERRESTRIAL IMPACT OF ASTEROID OR METEORITE; ASTROBLEME have anything like SULFUR FLOWS?
31. Does the volcano analog CHIMNEY have anything like EROSION OF CONES?
32. Does the volcano analog FIRING RANGE have anything like ESSENTIAL EJECTA?
33. Does the volcano analog HEART BEATING IN CHEST have anything like BASALTIC FLOOD-TYPE ERUPTION?
34. Does the volcano analog SHARK'S OR WHALE'S MOUTH have anything like RIBBON BOMBS?
35. Does the volcano analog BOWL have anything like VULCANIAN-TYPE ERUPTION?
36. Does the volcano analog HAT have anything like FUSIFORM BOMBS?
37. Does the volcano analog AIR PUMP have anything like LAVA CUPOLAS?
38. Does the volcano analog BORDER CROSSING, EMIGRATION have anything like PYROCLASTIC?
39. Does the volcano analog SMALL STACK have anything like OROGENIC VOLCANISM?
40. Does the volcano analog CHIMNEY have anything like EXOGENOUS DOME?
41. Does the volcano analog EXPANDING OR ENCROACHING GLACIER OR ICE SHEET have anything like WELDING IN IGNIMBRITE?
42. Does the volcano analog EARTH'S CENTRAL CONVECTION CELLS have anything like BLOCK LAVA?
43. Does the volcano analog COITUS OR ORGASM have anything like BOMBES EN ROULEMENT?
44. Does the volcano analog REVELATION, METANOIA have anything like VULCANIAN BRECCIA?
45. Does the volcano analog SMOKE-SIGNALING ON MOUNTAIN have anything like DIKE COMPLEXES?
46. Does the volcano analog TREE have anything like EJECTA? — Pollen, seeds, pine cones, nuts, fruit, leaf, etc.
47. Does the volcano analog STURZSTROM have anything like VOLCANIC GLASS?
48. Does the volcano analog BROKEN OR LEAKING PIPE have anything like CONTINENTIAL VS. OCEANIC VOLCANISM?
49. Does the volcano analog NUCLEAR BOMB OR EXPLOSION have anything like SHIELD VOLCANO?
50. Does the volcano analog BATTLE TANK have anything like JOINTS (IN IGNIMBRITE OR LAVAS)?
51. Does the volcano analog COLLAR, SHIRT SLEEVE, OR PANTS CUFF have anything like COMPOSITE CONES?
52. Does the volcano analog FLARE have anything like ASH SHARDS?
53. Does the volcano analog EUSTATIC REBOUND have anything like BOMB SAG?
54. Does the volcano analog TEMPLE have anything like ASH? — [illegible]
55. Does the volcano analog SOLFATARA, FUMAROLE, OR MAMELON have anything like AA LAVA RIVER?
56. Does the volcano analog TREE have anything like SORTING OF ASH? — [illegible]

Also worth noting is that there is a third **orthogonal dimension, or meta-dimension, to the analogousness of a thing,** or that is pertinent to its description or evaluation: representing the degree to which the analogy is intrinsic—coessential with the nature of the thing, derived from its basic mechanism, reflective of its absolute structure or situation, necessary, permanent, true, universal, responsive to the thing's actual behavior, logically deep, or the like—or on the contrary is superficial, accidental, defective, false, contrived, unimportant, or extraneous. In the latter case one might speak of the **pseudoanalogousness** of a purported analog or analogy.

Re it. #2: This is a list that a volcanologist rather than an ideonomist should perhaps make, owing to the mastery of the subject presupposed, the emphasis it should give to technical details, and the way in which a volcano should be described in (implicit or explicit) relationship to the totality of (similar and dissimilar) geological phenomena. The list should include both qualitative and quantitative traits—ones ordinary, distinctive, and extraordinary. For a lopsided version of this list, stressing distinctive qualitative traits, see "A Table of 73 'Traits of Volcanoes'". A morphologic trait is "stratified", a dynamic trait "expand and contract (balloon-like)", a chemical trait could be the characteristic reactivities of volcanic gases, and a physical trait "extremely hot (when active)".

Re it. #3: In part this list could represent that subset of items on the previous list (#2) that would best lend themselves—by virtue of generality, high conceptuality, tendencies to form clusters, or preexisting analogical form—to analogization of the archanalogon. It could also, or separately, represent the set of abstract phenomenological and analogical dimensions to which more specific traits correspond or which are necessary for the higher-level characterization of the latter (e.g., the trait "extremely hot" refers to the dimension "temperature").

What this list might also, or above all, represent is the greatest possible generalization, and abstract restatement, of the multifold analogical meanings of the archanalogon and of the set of semigeneric traits of its analogs (see comment #4, below); or again, the most fundamental possible (or 'order-like') characterization of these analogies and of their bases.

This may sound like what is said below about the proper content of the list of semigeneric traits. The contradiction may be real—the respective functions of this set of lists are not all clear as yet, and the main task of analogical generalization might be performed by either of the pair of lists under discussion—or then again it may not be: such generalizations as occur in the second list might be of a different type, those that are necessary to effect a specialization or to adapt a given analog or subset of analogs to the archanalogon or its subservient analogs.

A few examples of items that might appear on the present list are in order: "Involves transitions from the local to the universal", "Represents 'phase changes' and discontinuous phenomena in nature", "Can be frustrated", "Has diffuse inputs", "Essentially represents an attempt to escape from confinement", "Appears to occur in homological 'families'", and "Draws upon 'hidden central reservoirs'".

Of course, these examples could be even further generalized. Perhaps the best idea would be that of a hierarchical series of generalizations, beginning with the least generalized, purely concrete or phenomenological, traits of the volcano and proceeding upward to the stratosphere.

One technique for producing these generalizations would be that of first studying the possible analogies between the archanalogon and random or maximally diverse things, as opposed to the set of its close analogs. This exercise could stimulate thinking and provide a fertile background.

Re it. #4: This list could differ from the above (#3) in including items tied to many of the analogs but not necessarily, or not in any obvious way, to their archanalogon. Its main feature might be that it would represent those generalizations, transformations, or extensions of the phenomenological traits of the volcano and/or of the traits of the archanalogon Volcano that are necessary to encompass all of the peculiarities and mutual discrepancies of the 212 volcanic analogs. or at least that come closest to encompassing them. Actually there should probably be many very different, juxtaposed restatements of each generalization, etc, or that generalize, etc each trait. The attempt made here will essentially be to diffract each analogical trait into its many discrete and interrelated metaphorical possibilities; or to analogize each trait. This exercise in itself will be valuable. Thus the trait "very hot" needs to be relativized for it to apply to the analog pimple (which, as compared with normal skin, probably is 'very' hot). For the trait "shoot projectiles and masses through air at high velocity" to apply to the analog sun, air might have to be extended to the solar wind or heliosphere, or generalized to 'tenuous surrounding or external medium', and so forth. Perhaps "fiery"—another volcanic trait—could be transformed into 'releasing chemicals that give rise to chemical reactions in the air, and spatially patterned (originating from flame-like features) electromagnetic emissions, including radiant heat', and thereby made applicable to a range of volcanic analogs including anthill, eagle aerie, and roaring lion.

Re it. #5: Many different schemes for classifying volcanoes exist, and many more are possible. Their structure, bases, concerns, purposes, and other properties differ enormously. Few of these schemes are strictly competitive. The ideonomist, in fact, would be interested in discovering the quasi-specific infinity of all possible schemes, both for their synergistic effect and because of his obsession with the possible infinite complexity of nature. The special importance of a systematization of types to the present exercise is that it is necessary if confusion is to be avoided about the complete, unique, or typical nature of the archanalogon Volcano, and if the variant possibilities of the archanalogon are to be distinguished and used efficiently. Properties relating to the different types, and differently different types, of volcanoes will correspond to nonequivalent subsets of analogs, and an inadequately or mistakenly differentiated grouping of these types and analogs will result in weak, erroneous, ambiguous, or inspecific analogistic predictions.

Re it. #6: This might simply be a typology of the semigeneric traits of volcanic analogs—say a list or diagram of types or of clusters or sets of types—or it might be a truly hierarchical taxonomy. The latter could have various forms: that of a decision tree of branching specializations of nonequivalent meaning or nonuniversal levels; that of an at least partly anastomotic hierarchy; that of a vergent hierarchy; that of a two- or still higher-dimensional hierarchy; that where the semigeneric traits are given increasingly general, abstract, or transformed character at the one or more higher taxonomic levels; that of hierarchically ascending towers that are not, however, subsumed under one apically unified tree; that of a hierarchy of superposed comments on, rather than classes of, the traits; that of a hierarchy of descending comments or orders of comments; etc.

EDIT: Perhaps move marked passages pp. 5, 6, & 10, and A-1 & A-2, elsewhere since Hourglass, not Volcano, their sole theme? Probably: make either ① appendix to this chapter ② or into a new, companionate chapter!

Re it. #7: This list or pair of lists would do for the 212 analogs what it has already been proposed should be done for the volcano as a phenomenon or archanalogon. The task would certainly be illuminating if it were included in the book, but its vast scale makes it a more appropriate undertaking for the future ideonomic community. What is offered instead are two representative lists for but a single volcanic analog, Hourglass: "28 Diverse Essential Properties of the Analog Hourglass" (which fulfills part of what is intended here) and "20 Semigeneric Traits of the Analog Hourglass". Among the (analogically phrased or chosen) 'phenomenological' properties of Hourglass are that it is "ancient, antisyzygial, an artifact, and biconical (as well as the opposite thereof!)". Among the antisyzygial aspects of the hourglass alluded to are that of [up meeting down, the alternating reversal of the order of descent of the sand grains, the transformation of the past into the future (when the hourglass is inverted or reinverted), the loss of energy in descent becoming the 'gain' of energy (for descent, through inversion), the emptying of one chamber becoming the filling of the other, the convergence to the neck that leads to the post-neck divergence, the deceleration and stop that succeed the acceleration and start, the concavity of the sand in the upper chamber that is followed by the sand's upward convexity in the lower chamber, the upper-chamber shrinkage that becomes the lower-chamber expansion (of sand masses), and others]. Note that these examples also have their sub-examples. Thus up meets down sensu [the upper sand joining the lower, the upper sand entering the lower chamber, the state of the upper chamber (initially) becoming the state of the lower (finally), the inversion of roles upon inversion of the hourglass, upper grain order and faces becoming lower (or reversed) below, etc].

Examples of the semigeneric (or 'analogical') traits of Hourglass are that "[1]at the waist or middle (if there is one), circular or helical body and strand flow (if there is flow) and mixing may occur, [2]collisions, vibration, and oscillation tend to occur, [3]convergent and divergent [vergent] flow may occur, and [4]failure (temporary, repeated, or permanent) occurs preferentially".

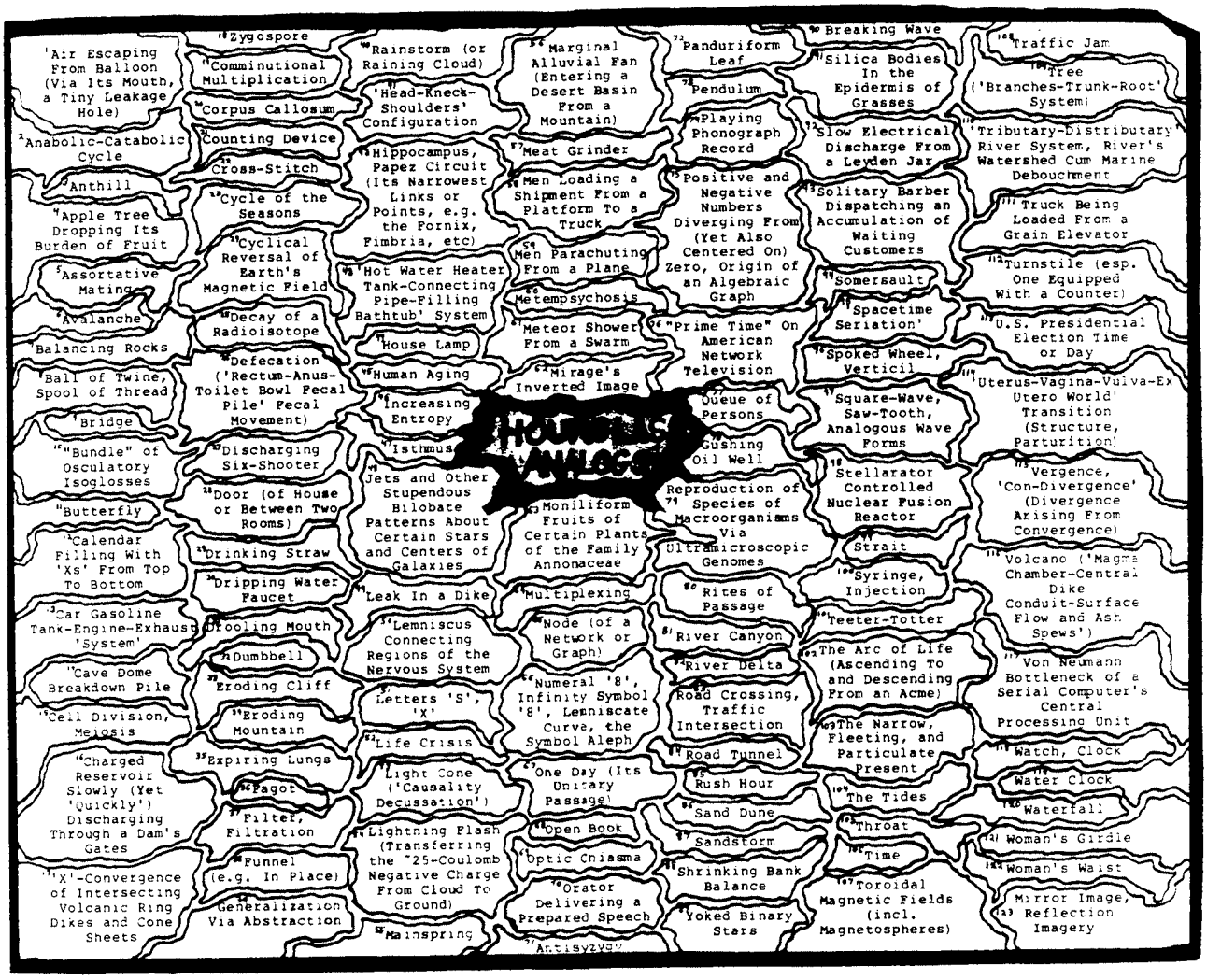
To illustrate the a posteriori descriptiveness, or the a priori predictiveness, of the properties and possibilities of Hourglass analogs by the 20 Hourglass semigeneric analogical traits, I have included a chart, "123 Hourglass Analogs". Let us see how successfully or unsuccessfully the traits apply to the analogs.

Both organons have been randomized by virtue of having been alphabetized by the computer.

The first analog on the chart is "Air escaping from a balloon (via its mouth or a tiny leakage hole)." The first four semigeneric analogical traits were listed above. If "at the waist or middle (if there is one)" is interpreted metamorphically as referring to the nozzle or neck of the balloon, then all four traits are validly applicable to, and in fact characteristic of, the balloon.

[Metaphorical, elliptical, transformational, adaptational, synecdochic, and liberal] interpretations—such as the foregoing—are customary and indeed fundamental in ideonomy, "wherein ideas have their larger play."

Does the first analogical trait also fit the first few analogs? The first we have considered. "Anabolic-catabolic cycle" could conceivably be described by the first trait, but many assumptions and highly abstract reasoning would be necessary. What in this case would correspond to "waist or middle", "circular or helical", "body and strand", and "flow and mixing" (were all of these distinctions to be retained)?

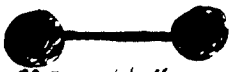

1 Air Escaping From Balloon (Via Its Mouth, a Tiny Leakage Hole)
2 Anabolic-Catabolic Cycle
3 Anthill
4 Apple Tree Dropping Its Burden of Fruit
5 Assortative Mating
6 Avalanche
7 Balancing Rocks
8 Ball of Twine, Spool of Thread
9 Bridge
10 "Bundle" of Osculatory Isoglosses
11 Butterfly
12 Calendar Filling With 'Xs' From Top To Bottom
13 Car Gasoline Tank-Engine-Exhaust 'System'
14 Cave Dome Breakdown Pile
15 Cell Division, Meiosis
16 Charged Reservoir Slowly (Yet 'Quickly') Discharging Through a Dam's Gates
17 'X'-Convergence of Intersecting Volcanic Ring Dikes and Cone Sheets
18 Zygospore
19 Comminutional Multiplication
20 Corpus Callosum
21 Counting Device
22 Cross-Stitch
23 Cycle of the Seasons
24 Cyclical Reversal of Earth's Magnetic Field
25 Decay of a Radioisotope
26 Defecation ('Rectum-Anus-Toilet Bowl Fecal Pile' Fecal Movement)
27 Discharging Six-Shooter
28 Door (of House or Between Two Rooms)
29 Drinking Straw
30 Dripping Water Faucet
31 Drooling Mouth
32 Dumbbell
33 Eroding Cliff
34 Eroding Mountain
35 Expiring Lungs
36 Fagot
37 Filter, Filtration
38 Funnel (e.g. In Place)
39 Generalization Via Abstraction
40 Rainstorm (or Raining Cloud)
41 Head-Kneck-Shoulders' Configuration
42 Hippocampus, Papez Circuit (Its Narrowest Links or Points, e.g. the Fornix, Fimbria, etc)
43 Hot Water Heater Tank-Connecting Pipe-Filling Bathtub' System
44 House Lamp
45 Human Aging
46 Increasing Entropy
47 Isthmus
48 Jets and Other Stupendous Bilobate Patterns About Certain Stars and Centers of Galaxies
49 Leak In a Dike
50 Lemniscus Connecting Regions of the Nervous System
51 Letters 'S', 'X'
52 Life Crisis
53 Light Cone ('Causality Decussation')
54 Lightning Flash (Transferring the ~25-Coulomb Negative Charge From Cloud To Ground)
55 Mainspring
56 Marginal Alluvial Fan (Entering a Desert Basin From a Mountain)
57 Meat Grinder
58 Men Loading a Shipment From a Platform To a Truck
59 Men Parachuting From a Plane
60 Metempsychosis
61 Meteor Shower From a Swarm
62 Mirage's Inverted Image
63 Moniliform Fruits of Certain Plants of the Family Annonaceae
64 Multiplexing
65 Node (of a Network or Graph)
66 Numeral '8', Infinity Symbol '8', Lemniscate Curve, the Symbol Aleph
67 One Day (Its Unitary Passage)
68 Open Book
69 Optic Chiasma
70 Orator Delivering a Prepared Speech
71 Antisyzygy
72 Panduriform Leaf
73 Pendulum
74 Playing Phonograph Record
75 Positive and Negative Numbers Diverging From (Yet Also Centered On) Zero, Origin of an Algebraic Graph
76 "Prime Time" On American Network Television
77 Queue of Persons
78 Gushing Oil Well
79 Reproduction of Species of Macroorganisms Via Ultramicroscopic Genomes
80 Rites of Passage
81 River Canyon
82 River Delta
83 Road Crossing, Traffic Intersection
84 Road Tunnel
85 Rush Hour
86 Sand Dune
87 Sandstorm
88 Shrinking Bank Balance
89 Yoked Binary Stars
90 Breaking Wave
91 Silica Bodies In the Epidermis of Grasses
92 Slow Electrical Discharge From a Leyden Jar
93 Solitary Barber Dispatching an Accumulation of Waiting Customers
94 Somersault
95 Spacetime Seriation'
96 Spoked Wheel, Verticil
97 Square-Wave, Saw-Tooth, Analogous Wave Forms
98 Stellarator Controlled Nuclear Fusion Reactor
99 Strait
100 Syringe, Injection
101 Teeter-Totter
102 The Arc of Life (Ascending To and Descending From an Acme)
103 The Narrow, Fleeting, and Particulate Present
104 The Tides
105 Throat
106 Time
107 Toroidal Magnetic Fields (incl. Magnetospheres)
108 Traffic Jam
109 Tree ('Branches-Trunk-Root' System)
110 'Tributary-Distributary' River System, River's Watershed Cum Marine Debouchment
111 Truck Being Loaded From a Grain Elevator
112 Turnstile (esp. One Equipped With a Counter)
113 U.S. Presidential Election Time or Day
114 'Uterus-Vagina-Vulva-Ex Utero World' Transition (Structure, Parturition)
115 Vergence, 'Con-Divergence' (Divergence Arising From Convergence)
116 Volcano ('Magma Chamber-Central Dike Conduit-Surface Flow and Ash Spews')
117 Von Neumann Bottleneck of a Serial Computer's Central Processing Unit
118 Watch, Clock
119 Water Clock
120 Waterfall
121 Woman's Girdle
122 Woman's Waist
123 Mirror Image, Reflection Imagery

"HOURGLASS ANALOGS"

1986 Mr 26
pure idenomy
ANALOGIES

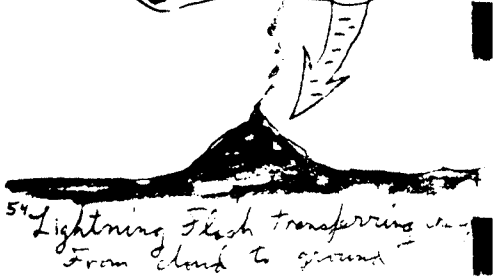
35 Expiring lungs

Breaking wave



32 Dumbbell

36 Fagot



54 Lightning flash transferring
From cloud to ground

For that matter, to what does "anabolic-catabolic cycle" itself refer: To all metabolic cycles (in all species, bionts, or life-moments, or in one?), to just one type of cycle, to a minimal set of molecules necessary to describe one cycle, to a full cycle or a hemicycle, to a particular type of cycle, to the cycle in a particular system or cell? Are the implicit 'poles' of the cycle purely temporal? Does the cycle refer to an entire chemical-kinetic envelope? To a bundle of deviant but coterminating or equifinal pathways? Is "full cycle" to be understood in a material or energetic sense, and does it refer to the cycle of some synchronous rhythm or not?

These are diverse, complex, and difficult questions, yet they are also the very stuff upon which ideonomy thrives. The value of ideonomy often lies in its tendency to inject the willing or unwilling mind into the midst of these inescapable complexities and vast abstractions, the experience of which can be so harrowing.

Does the trait apply to the third analog, "anthill"? If the "waist or middle" in this case is taken to be the hill's entranceway (alias exit), the speculative answer is yes; whether the trait is to be understood as referring to ants or ant lines, to the hive tunnel network, or to escaping colonial heat and moisture.

These few cases sample, exhibit, and measure the power and limitations that typify semigeneric analogical traits of analogs and their subanalogs.

One way to study the interrelationships of such families of semigeneric traits and subanalogs is by constructing gigantic tables 10 or more feet in area. Traits and analogs can be treated as intersecting columns and rows, with the aid of a score of special ideonomic symbols and eight symbolic colors that are all applicable to the innumerable tabular boxes with their dyadic entries (examples of which we have just examined).

Let us look at the Key of one such table (see Fig.).

It is to be regretted that the chart "A Table Applying 20 'Semi-Generic Traits of Hourglass Analogs' To 123 Diverse 'Hourglass Analogs' As A Test of Both" is too massive to reproduce here. But readers who own microcomputers can easily use the pair of lists above to write a computer program that will generate all the 2,460 ideocombinatorial dyads in either list or tabular form. Even absent the assigned symbols and other evaluations of the professional ideonomist, this table may prove of interest as a readerly test of ideonomy in one of its major subdivisions.

The interest and utility of semigeneric analogical traits is more various than I had indicated above:

"Values of Semi-Generic Analogical Traits"

1. Predictive	8. Heuristic	15. Meta-analogical
2. Nomothetic	9. Comparisonal	16. Diagnostic
3. Explanatory	10. Calculatory	17. Pedagogic
4. Descriptive	11. Experimental	18. Extensional
5. Taxonomic	12. Pantological	19. Simulational
6. Discriminatory	13. Ideogenetic	20. Epistemological
7. Definitional	14. Noological	21. Perceptual

'The predictive powers of semigeneric traits are diverse: they can predict something hitherto undiscovered or even unconsidered about the central analog to which they refer, or they can predict the behavior, form, qualities, causes, effects, variations, relationships, elements, etc of their proximal analogs. They can also predict things about whatever bears an arbitrary relationship to the central analog, which is anything whatever.

[2]The traits have nomothetic value in that they can promote the discovery, study, use, and advancement of laws and law-like qualities, behavior, and relationships: of themselves (the identical traits), of other traits of the analog or analogs, of general or universal traits of all analogs, of things that bear a relationship other than analogical to the analog, of things or the world in general, of ideas, or of the mind. Often the radical basis of an analogical or semigeneric trait will be a new law or the promise of a law.

[3]The traits can have an explanatory role in clarifying the mechanism or complex processes by which the central analog to which they refer, or one of its analogs, normally accomplishes something or gives rise to some result. Or they can assist with the explanation of the larger nature of the central analog itself.

[4]The descriptive value of the traits includes their obvious ability to add to the completeness and richness of description of an analog.

[5]Knowing the analogical association to which a thing belongs, one may be more able to classify it or to classify it in a fundamental way. Subtle systematic traits may inhere in the thing's analogies or their corporate relationships. By referring to analogical traits of a thing or of things, one may communicate better—both concretely and abstractly—one's taxonomic ideas and one's ideas about taxonomy.

[6]Analogical traits have discriminatory value in that they can help one to distinguish in subtle ways between things one has previously confused with one another, and to understand better the separation and individuality of a thing's properties, parts, and significances.

[7]Of definitional value, the traits can enable one to make a thing's nature more precise and explicit by interrelating its analogs or by interrelating the traits themselves. A thing can be defined by degrees of analogousness—as well as of nonanalogousness and frank dissimilarity—to sets, series, hierarchies, permutations, combinations, and qualifications of other things; and the set of a thing's analogs, or of the analog s of some other thing, can serve as a grammar and vocabulary—a special language—for defining the thing. Semigeneric analogical traits can be the key to both of these things.

[8]Semigeneric traits have heuristic value. They can indicate possible forms of ignorance about a thing—possibilities of a thing by analogy to like possibilities of like things, concerning which science or oneself has no knowledge—and thereby stimulate new lines of inquiry that may on occasion lead to significant discoveries that otherwise might not have been made or made so soon. Unexpected flaws in the representation of a thing as an analog of another may come to light which suggest a revision in ideas about the mechanism of the thing. Again, a trait may suggest a dimension on which, or a correlated set of traits may suggest a multidimensional manifold in which, the trait or traits should be represented, and the empirical or cognitive act of placing the trait(s) may directly or indirectly conduce to the discovery of new things and possibilities of things at separate or identical loci; or else the placement or attempted placement of an actual analog, a different analog, or an arbitrary thing may have this effect.

[9]The comparisonal value of the traits resides in the set of bases they furnish for evaluating the possibilities of one thing in light of the possibilities of another, for incalculably numerous, diverse, and novel combinations of quantitative and qualitative dimensions of the highest ideonomic order that can generate a veritable new universe of possible comparisons, and in their tendency to bring to mind other things that it might be important to compare with the original analog or set of analogs.

[10]Traits have calculatory value in that they often suggest some new way of calculating a thing, or of calculating something about a thing, or suggest something that it might be important to calculate, either in general or with respect to a thing. Traits can also suggest reasons for calculating things, and they may suggest interesting conjoint calculations. Traits that have been weighted in various ways—for intercorrelation, for example, or for validity or importance when applied to analogs in general or to various specific analogs—can form the basis of calculations using or merely reflecting these weightings. The power of an analogical trait to suggest a calculation when applied to an analog may be illustrated by the hourglass trait "Neck flow tends to occur in periodic waves or pulses", applied to "bridge" as an hourglass analog. One might make an a priori calculation predicting the degree or form of traffic bunching or periodicity on a bridge, or one might make a retrodictive calculation and then calculate its fit with actual traffic data. Of course traffic in general exhibits spontaneous bunching and periodic behavior, so perhaps what one would wish to calculate would be the quantitative or qualitative difference between bridge and non-bridge, or pre-bridge, traffic, or the hypothetical pontine augmentation. Similarly, the imagined circular or helical flow of ants entering or exiting their hive invites a calculation designed to see if such motion is simply in the amount one might expect for Newtonian ants à la physical particles flowing congestively into a hole, say, or in a greater amount such as biological evolution might have selected for; or to see to what extent the sign of the spiral influx deviates from randomness in a way that also implies biological control.

"As for the experimental value of traits, the foregoing bridge and ant tests exemplify the kind of experiments that such traits will often suggest or allow. Of course, double-blind experiments can be performed with groups of people to test the validity and probe the meaning of an analog, using analogical traits.

[12]The traits have pantological value in that they supply unusual and holistic knowledge about things, and about things in general and qua general, that can contribute to a systematic view of all knowledge, again both in general and with respect to particular things. They even enable tests of the validity and degree of universality of purportedly universal knowledge; or that can indicate the kind of universality, and nonuniversality, of same. Analogs and analogates have a singular ability to instantaneously give—wholesale, as it were—a welter of knowledge—and of new and novel knowledge—about a thing; much as a taxonomy can when a thing is classified, although knowledge given by the former is perhaps vastly more rich and fertile. Conventional knowledge is surely too rigid and narrow in its scheme to contribute to our store, or to the unending refinement, of truly universal knowledge.

[13]The ideogenetic power of the traits is their ability to generate new, systematic, and useful ideas about things, when simply contemplated by the unaided human mind or when housed in semiempirical ideogenetic formulas of increasing power and synergism. The webs of qualitative relationships the analogical traits automatically disclose are massive webs of ideas.

[14]The traits' noological value lies in the very real and great contribution they may make to our understanding of the human mind and to a theory, model, and future mechanical simulation of thought and intelligence. The reason is only in part the indeterminate portion of our thinking that is presumably analogical.

[15]The traits can lead to the discovery of analogies among analogies themselves, and of higher levels of analogies, and hence have meta-analogical value. The importance of these meta-analogies is that they can make for reasoning of ever greater universality, lawfulness, simplicity, deductive power, clarity, recursiveness, flexibility, comprehensiveness, plexure, indirectness (as well as directness), complexity, transitivity, orderedness, and 'necessity'. Hierarchies of semigeneric analogical traits can automatically lead to the identification of hierarchies of meta-analogies (and meta-analogs).

[16]Of diagnostic value, the traits can help one to tell what a thing—that has been evaluated or indexed via the traits—is, or what it is also or in part, or what it is not or has been misrepresented as being; or they can simply suggest how the thing should or might be treated.

[17]The potential pedagogic value of traits is enormous. They can help to teach or learn old things in new ways or new things in old ways. They can cultivate mental faculties that have been neglected or lain wholly dormant, or been forgotten by the host of existing educational techniques. They can teach how to reason and what reason is, or how to reason based on an understanding of reason. They can teach what a thing is by virtue of what other things are. They can teach a form of learning that is exponentially self-developing, and that can enable anything to be learned from everything and everything to be learned from anything.

[18]By the extensional value of the traits is meant that they can lead to the discovery of new classes and subclasses of things. Thus through the use of analogical traits it may be revealed that things usually regarded as mere analogs of things are actually examples or types of those things, or that the definition or membership of a class should be extended to wider or even ever wider circles of things, or that different classes of things are actually identical or overlapping classes of things, or perhaps that the laws of one class of things are extendible to other classes, definitionally or fundamentally extendible, or assimilable by—or integrable with—other laws. Traditional volcanoes, mud volcanoes, and pingoes may be reducible to one organic superclass or their laws may be surprisingly fusible or common. Semigeneric analogical traits can enable analogs to be extended (amplified), both qua analogs and qua phenomena. They can suggest how phenomena can give rise to, or may already have 'given rise' to (or been transcended by), phenomena that are more like themselves than themselves.

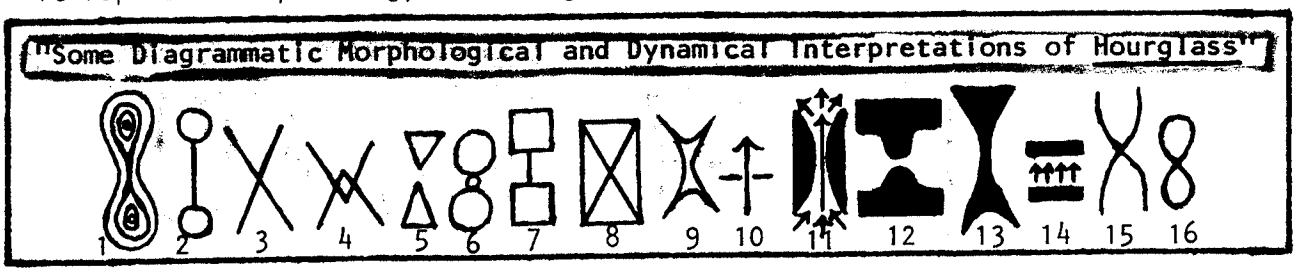
[19]By simulational value is meant that the semigeneric traits may have a valuable role to play in the construction of various models of things and in their future simulation on a computer. Perhaps to some extent it will even be possible to treat semigeneric traits as finite elements, or discrete subphenomena, that are rearrangeable and reusable in the simulation of disparate, arbitrary, all, composite, or purely imaginary phenomena. Certainly semigeneric traits could be used to construct crude models of phenomena.

[20]The epistemological value of the traits is that they can be used to understand the nature, bases, sources, structure, rules, and extent of one's own, others', or total existing knowledge, either in general or with respect to a specific thing.

[21]Finally, semigeneric analogical traits have perceptual value in that they can facilitate, enhance, or transform the perception of things and bring about the perception of things that are unawaredly seen or cognized. One may look for more if one realizes that a thing one sees is an analog of another thing whose traits or their correlates are known, or one may see the thing in a novel or less blinkered way.

See left n. p.5: re relocating this!

There is yet another list previously prepared in connection with the analog hourglass that may have some interest here, both because it can illustrate how the analogs of the archanalogon Volcano should be made ready before the archanalogon itself is treated in extenso, and also because it it represents by analogy something that should be done with Volcano:



α "20 SEMI-GENERIC TRAITS OF 'HOURGLASS ANALOGS'"

Imperfectly But Suggestively Combined With the Related List

β "28 DIVERSE ESSENTIAL PROPERTIES OF THE HOURGLASS AS AN ANALOGATE"

r Value Is: 1. Predictive, 2. Nomothetic, 3. Explanatory, 4. Descriptive, 5. Taxonomic, 6. Discriminatory, 7. Definitional, euristic, 9. Comparisonal, 10. Calculatory, 11. Experimental, 12. Pantological, 13. Ideogenetic, 14. Noological, Meta-Analogical, 16. Diagnostic, 17. Pedagogic, 18. Extensional, 19. Simulational, 20. Epistemological, and 21. Perceptual

CIRCULAR OR HELICAL body and strand FLOW and mixing may occur at waist or middle.
COLLISIONS, VIBRATION, AND OSCILLATION tend to occur at waist or middle.
CONVERGENT AND DIVERGENT [vergent] FLOW may occur at waist or middle.
FAILURE (temporary, repeated, or permanent) occurs preferentially at waist or middle.
FLOW tends to be LENGTHWISE in the object.
FLOW tends to be UNIDIRECTIONAL at waist or middle, or throughout the 'object'.
Greater PRESSURE may occur at waist or middle, and a low-high-low LONGITUDINAL GRADIENT.
Groups, PARTICLES, or systems OF MATTER tend to ROTATE IN ONE radial DIRECTION NEARING, and OPPOSITELY LEAVING, the flow neck.
HEATING occurs at waist or middle.
Large GROUPINGS of matter may be broken into progressively smaller ones (COMMINUTED) at, AND REFORM after, waist or middle.
MATTER flowing to, through, and from the (common) flow neck tends to become CLUMPED.
Neck flow tends to occur in PERIODIC WAVES or pulses.
RADIATION may occur at waist or middle.
SOUNDS may radiate from the waist or middle.
Streamlined, LINEAR, OR COLLIMATED FLOW may occur at waist or middle.
SWIFTER waist or middle FLOW (where there is flow).
Total system FLOW TENDS TO REVERSE direction as a large-scale cycle.
TRANSVERSE VELOCITY GRADIENT peaks at center and falls at sides of waist or flow channel.
TURBULENCE may occur at waist or middle.
Waist or middle has greater STRESS AND STRAIN.

. Ancient.
. Antisyzygial.
. Artifact.
. Biconical (and its opposite!).
. Biphasic; cyclical.
. Closed container.
. Decussation or vergence.
. Enclosed in wooden framework (usually).
. Falling (column of) sand (rock, particles, or innumerable elements).
. Figure in one half gradually reproduces itself in opposite half.
. 'Full' of sand, or operates via sand.
. Glass jar; 'semi-transparent'.
. Gravitational—driven by gravity.
. Lemniscate curve (Bernoulli's lemniscate).
. Machine.
. Manual—reactivated by human effort (by a transfer of muscular energy).
. Matter moves from one chamber to another that is identical.
. Measures a fixed time interval.
. Measures time.
. Obsolete.
. Operates via a steady flow through a fixed aperture.
. Precursor of modern equivalent.
. Reversible.
. Semi-filled.
. Sequence 'large-small-large'.
. Top and bottom half reflectionally symmetric.
. Two 'hollow' spheroids connected via a tiny hollow waist.
. When started, operates at a fixed rate until it stops.

EDIT: See p.-5 n!
(=Relocate.)

— UNIVERSALITY OF SEMIGENERIC TRAITS OF HOURGLASS ANALOGS —

The question of interest is, How universally applicable are the listed "20 semi-generic traits of hourglass analogs" to the listed "123 'hourglass' coanalogs"? This is both an empirical and a theoretical question. Empirical, because the proper way to answer it is to test the degree of universality of the traits by actually examining their applicability to each of the 123 analogs—or simply to a suitable random sample thereof—in an inductive manner. Theoretical, because the question as to whether each given trait does apply to each given analog, or of the degree to which it applies, will seldom be answerable in a thoughtless, commonsensical way, and will ordinarily require instead some measure of forethought, imagination, and theory; or at least such consideration will be justified by the mental interest possessed by the more fanciful, subtle, extreme, and comprehensive possibilities for the 'application' of traits to analogs in the infinitely complex icelocosm, or universe of all possible and actual analogies between all possible or actual things.

Because the analogs list is 6.15 times as long as the traits list, let us do the converse of the exercise suggested above, by checking the applicability of the twenty traits to a number of the analogs, starting with...

TRAFFIC JAM:

(1) Circular or helical body and strand flow and mixing may occur at waist or middle? Yes. If the tie-up occurs in a multilane highway, say where a stalled or crashed car blocks just one lane, the traffic may gradually flow around the obstruction via a rainbow of arcs. If the entire highway is jammed, traffic through the city, say as viewed from a helicopter, might similarly circumnavigate the 'thrombus or embolus' via other, parallel streets.

Of course it is semicircular flow that is visualized here. Also the planar flow would not be helical, except perhaps in some abstract sense or space.

(2) Collisions, vibration, and oscillation tend to occur at waist or middle? In the hourglass process represented by a traffic jam the multitude of compressed cars advancing toward or easing from the neck of the jam would literally collide, tend to or nearly collide, and metaphorically collide in the drivers' congested minds.

Cars inching forward into and through, and escaping from, the jam or pinch would tend to vibrate and oscillate in: speed, acceleration, absolute position, angle (yaw), pitch and roll (thanks to their springs), clustering, and perhaps strand (car-chain) resonance.

(3) Convergent, divergent, and vergent flow may occur at waist or middle? Self-evidently.

(4) Failure (temporary, repeated, or permanent) occurs preferentially at waist or middle? Failure can refer to breakage of a chain of vehicles or to complete interruption of the flow of traffic, and clearly it is at the 'middle' of a traffic jam that such failure mainly occurs. Of course jams ordinarily take the form of nonlinear series of waves, in respect to vehicular density and velocity, and the effect of such waves is to produce the equivalent of many successive 'middles and waists'.

(5) Flow tends to be lengthwise in the object? Yes.

(6) Flow tends to be unidirectional at waist or middle, or throughout the 'object'? Yes, if the road is one-way, or the jam is—as it so often is—unilateral on a two-way road. When a jam occurs on a two-way road the spontaneous or policed result often is periodically reversing unidirectional flow.

(7) Greater pressure may occur at waist or middle, and a low-high-low longitudinal gradient? One ultimately has to define "pressure" behavioristically, or by reference to the peculiar phenomena that are associated with it as its 'mental characters'.

Thus associated with a traffic jam are or may be: a higher and progressive vehicular density (or a reduction of holes and interspace), a reduction of vehicular freedom and of the elasticity and adaptability of the flow, an initial fall of the speed of single vehicles accompanied by a rise of the flux density, an increase in the rate and density of vehicular interactions, corrections, and interadjustments (or a greater correlation of the motions of vehicles), a shortening of discrete (uncorrected) movements, increased spatiotemporal clustering of movements and cellular phenomena (hypothetically), a temporary fall in the velocity dispersion and variance (hypothetically), arrested translation, rigid movement, a rise in rotatory and oscillatory relative to translatory motions—hypothetically—and/or an increase in the collimation of movement, increasingly discretized movement, more determinate and/or chaotic movement, various wave-like and fractal phenomena, 'push and pull' phenomena, e/vc.

Social and psychic analogs of greater pressure, in terms of the actual drivers of the vehicles, also characterize the waist or middle of traffic jams.

(8) Groups, particles, or systems of matter tend to rotate in one radial direction nearing, and oppositely leaving, the flow neck? This certainly is true for vehicles converging to and then diverging from a punctiform traffic jam, whether the flow is circumfluent on a single highway or via a road network.

(9) Heating occurs at waist or middle? Stalled cars overheat, in part because there is no air current to strip away the self-heating atmospheres that grow around them and merge, or to cool the vehicles by flowing through their interiors. Tempers also heat up at a traffic jam, and the adrenaline released raises internal and external body temperature.

The randomized, localized, and chaotic movement and countermovement of the jammed vehicles—or the scrambling of smooth into turbulent movement—represents a form of heating; the unscrambling requires work—and energy!

So must the turbulent thoughts triggered in the minds of the surprised and frustrated drivers—and the impulsive, random acts of the same.

Where vehicles actually collide, heat is released through friction and other mechanisms.

The concentration of vehicles in a lineal or areal jam produces marked local heating.

Heating that is caused itself causes heating, as in the reduced thermodynamic efficiency of the engines of creeping cars.

One could speak of 'heating' occurring at the jam sensu the tendency for the accident rate to go up there—as oncoming vehicles slow and as vehicles pack together, maneuveur for available inches, exhibit nonlinear and "catastrophic" mass behavior, err in their movements, turn and interweave, form autonomous and insensate blocks and tessellations, etc.