Baars, B. Cognitive Revolution in Psychology -2-

(Content:) Revolution (Adaptors): Miller, Levine, Jenkins, Mandler — // Nonlaboratory Psychologists (Ulric Neisser; Ernest R. Hilgard; Walter Weimer; Michael F. Wapner {The Revolutions}) --- // Contributions from outside Psychology: (The Neo-Rationalists): -- Noam Chomsky; Jerrold A. Fodor; Herbert A. Simon; Donald F. Norman.) -- // Introduction continued:

P.4 The cognitive revolution as a change in the metatheory of Psychology. Roughly in the decade from 1950 to 1965 a quiet revolution in thought took place among research psychologists. // That means, the revolution preceded Sperry's post papers + those were affected by it // -- the dominant metatheory of the previous 50 years was discarded or changed fundamentally, and a new point of view began to take shape. -

(P.5) Behaviorism Dominated Psychology Between 1913 and 1960. Cognitive psychology normally used in applying the information-processing metaphor to human functioning. This could have two different sense: Cognitive psychology = new metatheory for psychology - a new approach to the subject matter of scientific Psychology. - P.6 - 3 Metatheories in Psychology: (1) intro-spectionism (2) Behaviorism (3) cognitive psychology. — (1) Intro-spectionism: domain of psychology is human subjective experience. — (2) Behaviorist Psychology = denial of dissociation. - (3) cognitive psychology: Psychologists absence dissociation in order to make inferences about underlying factors that can explain

P.7

to humans. — "information processing." → Thought, language, knowledge (P.8) meaning, purpose, imagery, instinct, even qualia and emotion — all the commonsense vocabulary inherited from our culture becomes scientifically useful again. — Metatheoretically, everyday psychology is cognitive, since common sense is constantly making inferences about events that underlie the observable world. — The mind-body problem. Is reality basically physical or mental? Apparently inconclusive arguments can be mounted either way, but common sense is unlikely to accept either extreme physicalism or mentalism. — Commonsense psychology is dualistic (physical objects + mental events.) — (100 years ago, psychology proclaimed itself an independent discipline.) P.9 — antiphilosophical attitude ended. — (Introspectionists: Mind real; Behaviorists: Mind an illusion. Cognitive Psychologists: Mind = an inferred entity; but the history of science shows that inferred constructs gradually begin to take on reality as people become used to them. — Most cognitive psychologists are practically "dual aspect physicalists" — tending to believe that reality is ultimately physical, and that subjective experience is merely a different perspective on the physical world. — ... unique nature of scientific enterprise in psychology. — Private experience O.K. — but we cannot expect anyone else to share our experience unless we can find some common evidence for it in our shared reality. — Science = reasoning that can be publicly shared. — P.10 — Scientific revolutions + the importance of shared frameworks. — Re Kuhn's paradigm shifts. — Popper: Science consists of rational debates. (P.11) Kuhn: But scientists with diff frameworks of mind cannot talk to one another. —

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P.11 – e.g. "latent learning" issue, hotly debated in 1940s, meaningless today. Today's issues are similarly unimaginable within the framework of classical behaviorism. – [all current scientific approaches to psychology may be "preparadigmatic". – P.12 Shared Frameworks in Science: A Source of Insight + Blindness. It is impossible to view the world without some theory. – P.13 – new paradigm doesn't prove that the previous one in a scientific revolution is [illegible] wrong -- merely that it lapses. – The Adolescence of Psychology. (P.14) – there already exists a reasonably effective psychology in everyday life, which employs a rich + apparently meaningful vocabulary. – Exaggerated admiration of physics by psychologists. – P.15 The Scientific community as an Ecosystem. – ... even today we are not sure whether psychology warrants characterization as a 'science' in the strong sense of that word. –

1985

Benson, D. Frank and ERAN ZAIDEL - The Dual Brain -

Hemispheric Specialization in Humans - The Guilford Press, New York 1985

26th in a series - UCLA Forum in Medical Sciences - founded in 1960 - 26 symposia - diverse activities of School of Medicine. -

Introduction - D. Frank Benson -

Roger W. Sperry: A appreciation - Eran Zaidel

Consciousness, Personal Identity, and the Divided Brain - Roger W. Sperry

etc. - etc. ---

P.8 - My strongest impression of Sperry comes from his style of doing. One sunny afternoon in the fall of 1970, I went to Prof. Sperry's office on the third floor of the Church Bldg. in the Biology Division at Cal Tech and proposed a new technique for presenting info. to one visual half-field at a time while presenting continuous hemispheric ocular scanning. Others had tried diff. electronic techniques and failed, and Sperry was skeptical. One could foresee difficulties in getting these patients to accept and to wear during testing a large scleral contact lens. He was critical but not devastating. He forgot, he provided money for developing the technique, as well as office space in his psychobiology lab. For 9 months I struggled with optical design and with the precision instrument shop. 11 Only later, when comparing notes with fellow and former students

did I mention that Sperry's skepticism was his usual "survival test." The question was whether students had enough commitment to persevere in spite of obstacles. Did they have enough insight to follow these arcane hunches? If they did, they would gain Sperry's respect. ---- Sperry did not, as a rule, try to tell students what experiments to run --- reinforcement of good ideas --- tough-minded critical analyses --- were all flourished in this Socratic-Paine environment. Some younger or perhaps less independent students did not enjoy or pass the "survival test." —

--- He is a master at designing dramatic experiments whose results are unencumbered by special cases or complex theoretical machinery. — Always asked: "What diff. does it make --- 10 years from now."

On Jacket! Although the basic circuitry of the brain and central N.S. is laid out at birth, it is modifiable or plastic throughout life at the level of the synapses. This volume is the first to consider the full range of ways cells in the N.S. can be replaced, increase or decrease in number, and modify their functions when required. --- Synaptic growth is responsive to environmental factors (Carl Cotman's introduction + final section --- molecular mechanisms underlying plasticity). — Other "Book!

Bonsall emphasizes duality of brain function.

Bergmann, G. – Holism, historicism, + emergence. (2) 1944

P. 216 arise from their conjunct agency". – Physics, chemistry, biology, psychology = progressive levels of emergence. – Contemporary empiricists do not generally favor emergentism. – Mill did not realize that the composition rule is always an empirical law in the same sense in which the laws of the elements are empirical. P. 217 John Stuart Mill deviated from his pattern views when he accepted the idea of mental chemistry. P. 218 mechanism = meaningless world; organismic emergence = emergence of meaning. ∴ there is meaning in the world. – P. 219 Historicism = thought pattern which underlies + unifies (philosophically) some of the most important intellectual movements of the 19th century. Evolutionary theory, Hegelianism, Marxism, Spencer's doctrine of progress. – P. 221 Novelty of laws has nothing to do with explanatory emergence. – explanatory emergence only relative + therefore not synonymous with unpredictability in principle."

– Rather old-fashioned imprecise view of emergentism. – (MH)

1944

Bergmann, Gustav - Holism, Historicism, and Emergence -
Philosophy of Science, 11, 1944 Pp. 209 — 226

Ref. to "The Status of Emergence" by P. Henle, J. of. Phil., 1942, 39, 486-493. - (About the emergence of characteristics) - emergence of qualities and relations. Present paper deals with some detail of Henle's article: elementarism, vs. holism or organicism. - // I am dealing (like Henle) not with psychological matters, but rather with emergence in an objective sense. - // The thesis is that no true or even undefined descriptive characteristics are intrinsically related. - ... It is not even necessary that everything that has pitch also has loudness. - The true empirical laws "cats eat mice" and "oxygen and hydrogen combine to form water" are both inductive predictions and alike in a sense which precludes the second one from referring to any meaningful or worth-while instance of emergence. - P. 210 - As far as characteristics them selves are concerned, not their prediction or explanation, emergence then amounts to novelty of characteristics. - That is, to first occurrence. — ... novelty of an undefined descriptive characteristic.) since our concern is with universals, a new instance of a universal already instanced would not be novel. — (e.g. new water can evolve after enough time.) -- P. 211 Novelty of characteristics is not the core meaning of emergence, it

is at best only a minor part of it. // Every proper novelty is an emergent. - (Relative chance). Absolute explanatory emergence is absolute chance, that is, unpredictability in principle." - The assertion that there is absolute chance or emergence becomes a very general, negative prediction about science. But there is still (relative, explanatory) emergence, -- // Let us call any theory irreducible of another if the former explains all the phenomena explainable by the latter. - P. 212 - There are several kinds of emergence in the world ... Hence words attributing metaphysical status to emergence. - P. 213 - 2 varieties of novelty of forms - novelty through complexity + novelty through initial conditions. - Novelty of complexity = several planetary systems with diff # of member planets. - Novelty through initial conditions = 1 sun + 1 planet and 1 sun + 1 comet (different positions). - P 214 Every theory consists of laws of elements + rules of composition, any breakdown of a theory with composition rules at a certain level of complexity is a case of relative explanatory emergence. = holistic or organismic emergence - P. 215 Vitalism, primarily --- asserts the occurrence of organismic emergence at the level of the biological organism. - Whether there is vitalism is open - mimic emergence = question of science. - -- if the critical complexes can only be described by an entirely "new" formula one is, at this stage of knowledge, faced with an instance of full organismic emergence. - Fechner forerunner of modern emergentism. - P. 216 Mill " if we happen to know the cause would be the effect of each cause when acting separately from each other, we can often also be sure to determine deductively ... or in correct parenthesis of what mill

1907

Bergson, Henri - Creative Evolution. t. 1911

New York, Henry Holt and Co. -

I The Evolution of Life - Mechanism and Teleology. I -
Result of the enquiry - The vital impetus - 87 - X

II The Divergent Directions of the Evolution of Life - Torpor, Intelligence, Instinct.
Life and consciousness - The apparent place of man in nature 176 - X

III. On the meaning of Life - The Order of Nature - and the Form of Intelligence.
Creation + evolution - do. - do. - do. - 236 X

IV. The Divergent Mechanism of thought and the Mechanistic Illusion - A glance at the History of Systems - Real Becoming and false Evolutionism. -
The Evolutionism of Spencer X 363

P. 37 <u>Introduction</u>: X. - Most often, when experience has finally shown us how life goes to work to obtain a certain result, we find its way of working is just that of which we should never have thought. - // Yet, evolutionist philosophy does not hesitate to extend to the things of life the same methods of explanation which have succeeded in the case of unorganized matter.

P XI - Action cannot move in the unreal. - // Would the idea ever have occurred to us to doubt this absolute value of our knowledge if philosophy had not shown us what contradictions our speculation meets, what dead-ends it ends in?

But these difficulties + contradictions all arise from trying to apply the usual forms of our thought to objects with which our industry has nothing to do and for which, therefore, our molds are not made. - XII - If we were pure intellects, if there did not remain, ~~although around~~ around our conceptual and logical thought, a vague nebulosity, made of the very substance out of which has been formed the luminous nucleus that we call the intellect. - XIII Theory of knowledge + theory of life inseparable. - push each other on unceasingly. - P 5 Our past (including prenatal dispositions) then, as a whole, is made manifest to us in its impulse; it is felt in the form of tendency, although a small part of it only is known in the form of an idea. - P. 6 Our personality shoots, grows and ripens without ceasing. Each of its moments is something new added to what was before. We may go further: it is not only something new but something unforeseeable. Doubtless, my present state is explained by what was in me and by what was acting on me a moment ago. In analyzing it, I should find no other elements.

P. 6 - But even a superhuman intelligence would not have been able to foresee the simple indivisible form which gives to these purely abstract elements their concrete organization. For to foresee consists of projecting into the future what has been perceived in the past, or of bringing for a better time a new grouping, in a new order, of elements already perceived. But that which has never been perceived once and which is at the same time simple, is reasonably unforeseeable. - P. 7 ... we do what we are - and we are what we do ... creating ourselves continuously. --- For reason does not proceed in such matters as in geometry, where impersonal premises are given once and for all, and an impersonal conclusion must perforce be drawn. - Here, on the contrary, the same reasons may dictate to diff. persons, or to the same person at diff. moments, acts profoundly diff., often equally reasonable. - The truth is that they are not quite the same reasons, since they are not those of the same person, nor of the same moment. - --- for a conscious being, to exist is to change, to change is to mature, to mature is to go on creating oneself endlessly. ....
(Mechanical object opposite - either remains same or changes through outside

force. -- P. 11 The universe endures. The more we study the nature of time, the more we shall comprehend that duration means invention, the creation of forms, the continual elaboration of the absolutely new. The systems marked off by science endure only because they are bound up inseparably with the rest of the universe. It is true that in the universe itself 2 opposite movements are to be distinguished, as we shall see later on "descent" and "ascent". The first only marks a step already prepared. In principle, it might be accomplished almost instantaneously, like releasing or opening. But the ascending movement, which corresponds to an immense work of ripening or creating, endures essentially, and imposes its duration on the first, which is inseparable from it. P. 12 - The bodies we perceive are, on the one hand, cut out of the stuff of nature by our perceptions, and the sensations follow, in some way, the mountains of lines along which action might be taken. -- But the body which takes this action, the living body, is this a body as others are? -- P. 13 - Immobility: to give a precise and general definition of reality. -- A perfect definition applies only to a completed reality; now, vital properties are never entirely realized, though always on the way to become so; they are not so under states as tendencies. And a tendency achieves all that it aims at only if it is not thwarted by another tendency. - (domain of life -- always intervention of antagonistic tendencies implied) P. 14 - The present contains nothing more than the past, and what is found in the effect was already in the cause. -- But - distinctive feature of an

P. 14 organized body is that it grows and changes without ceasing, i.e. indivisibility and turning from one into many don't contradict. -- P. 15 - but individuality is never perfect; life manifests a search for individuality. -- Living being in own person to its organic world not like a thing but rather like [illegible] of material universe - Essential character: Organization (P. 16 - Protozoa - can't divide indefinitely; grow old and established rules regeneration through conjugation occurs occasionally. -- P. 17 The metaphysician that one each thing unconsciously within us, and the presence of which is explained, as we shall see later on; by the very place that man occupies amongst the living beings ----> the inconsistency of time must be an apparent relative to our ignorance.... P. 18/19 It is often impossible to say whether we are dealing with an organism growing old, or with an analogy continuing to evolve. (e.g. law use of insects and crustacea. - P. 19 - Puberty or menopause - terms form individual completely - comparable to changes in course of normal or embryonic life. -- Change is accompanied by organic destruction (aging) -- P. 20 We can at most calculate organic destruction.

Organic creation we cannot in any way subject to mathematical treatment. -- the present moment of a living body does not find its explanation in the moment immediately before: all the past must be added - heredity + the history. - P. 22 Evolution is the very essence of life. - P. 23 up to a certain period in its development, the embryo of the bird is hardly distinguishable from that of the reptile - etc. P. 26 - Apart from the question to what extent the theory of evolution describes the facts and to what extent it symbolizes them, there is nothing in it that is irreconcilable with the doctrine it has claimed to replace, even with that of special creations, to which it is usually opposed. For this reason, I think, the language of transformation forces itself now upon all philosophy, as the dogmatic affirmation of transformation forces itself now on science. - P. 27 Life is like a current passing from germ to germ through the medium of a developed organism. - ... an invisible progress on which each visible organism rides. -- Organic evolution resembles the evolution of consciousness. - We can explain new forms from its antecedents only after they have appeared; we can't foresee them. (future explained without calling it so.) (Sounds like much about that [illegible]) -- P. 28: It may perhaps be said that the form be foreseen if we could know, in all their details, the conditions under which it will be produced. -

P. 39 It is no use to hold up before our eyes the dazzling prospect of a universal mathematic; we cannot sacrifice experience to the requirement of a system. That is why we reject radical mechanism. — But radical finalism is just as unacceptable, and for the same reason. — (teleology) — P. 40 Nature sets living beings at discord with one another. She everywhere presents disorder alongside of order, retrogression alongside of progress. — P. 42 Footnote, admiration for Driesch's vitalism. (Many pages copied) -- P. 45 — Finalism + mechanism: consummation of 2 tendencies of mind — P. 46 Real duration is that duration which gnaws on things and leaves on them the mark of its tooth. — P. 48 The idea that for a new object we might have to create a new concept, perhaps a new method of thinking, is deeply repugnant to us. — P. 50 Our philosophy represents the organized world as a harmonious whole. But this harmony is far from being as perfect as it has claimed to be. It admits of much discord, because each species, each individual even, retains only a certain impetus from the universal vital impulsion and tends to use this energy in its own interest. The species and the individual thus think only of themselves — whence arises a possible conflict with other forms of life! (P. 51) -- Harmony exists not in fact but only in principle. —
- ~~It is~~ P. 52 Reality is undeniably creative. (but not toward a predetermined final end.) -- P. 53 Life, from its origin, is the continuation of one and the same

P. 28. - but these conditions are built up into it and are part and parcel of its living; they are posterior to that phase of its history in which life finds itself at the moment of producing the form: how could we know beforehand of an evolution that is unique of its kind, that has never yet occurred and will never occur again? -- Of the future, only that is foreseen which is like the past or can be made up again with elements like those of the past: (astronomical, physical + chemical facts clear.) -- (But not species or individuals & or living forms.) -- P. 29 Fatalists: Socialists: Creation = synthesis of elements. - Doing: one of the possible arrangements: Mechanism, Hyperhumanism intellect could have perceived in all cases. - Bergson: No! in the domain of life, the elements have no real + separate existence. They are manifold mental views of ours in discernible forms. -

And for that reason there is real discontinuity in progress, irreversibility between what goes before + what follows, in short - duration. - (Some typical examples follow here -) P. 35 -- the tendency to explain everything by physics + chemistry is discouraged rather than strengthened by deep study of historical phenomena. -

P.53 impetus, divided into divergent lines of evolution. - P.55 similarities of structure (from diff. evolutionary lines) are the strongest argument against mechanism. (I can't see that.) -- B. thinks that elimination of the unfit is not sufficient to explain creation of same things from 2 diff. evolutionary branches. P.59 Foundation same in plants and animals. Both sexual rather than asexual. B. sees no (P.60) advantage in sexual reproduction (I do! Diversity increases!) -- P.63 Darwin: small "insensible" variations gradually form new species - v.s. others: Sudden formations of new species. - / Hugo de Vries: obtained at the end of a few generations a certain # of new species!!! (Never heard of that!) -- His theory: Species pass through alternate periods of stability + transformation. - During a period of "mutability" unexpected forms spring forth in a great # of diff. directions. - P64 - all new structures have to be co-ordinated! How can a new variation be retained that's useless, and how can it be of use unless coordinated with other new chance occurrences. - Something in Darwinian view is wrong. - "Unless ... reserved for a later construction ..." (That's just what occurs. -!) -- P.65 The change of one part alone will make vision impossible, unless its

absolutely infinitesimal. -- P. 67 But that all these simultaneous changes should concur in such a way as to improve or even merely maintain vision, this is what, in the hypothesis of sudden variation, Pedersat doubt, unless a mysterious principle is to come in, whose duty it is to watch over the interest of the function. But this would be to give up the idea of "accidental" variation. P. 68 To sum up, if the accidental variations that living agent undergoes are insensible variations, some good genius must be applied to - the genius of the future species - in order to preserve and accumulate these variations, for selection will not lead after this. If, on the other hand, the accidental variations were sudden, then, for the previous function to go on or for a new function to take its place, all the changes that have happened together must be complementary. So we have to call back on the good genius again, this time to obtain the convergence of simultaneous changes, as before (P. 69) to be assured of the continuity of direction of successive variations. But in neither case can parallel development of the same complex structures (vertebrate + mollusk eyes) be independent lines of evolution due to accumulation of accidental variations. 2nd hypothesis: Suppose the variations were not accidental and inner causes, but the direct influence of

P. 69 anter circumstances. // Though molecules and vertebrates have evolved separately, both have organized exposed to the influence of light. --- supposing that light acted directly on the organized matter so as to change its structure and somehow to adapt this structure to its own form. --- The more and more complex eye would be something like the deeper and deeper imprint of light on a matter which, being organized, possesses a special aptitude for receiving it. - (How can this over effect germ plasm !!! He's all wrong! (That's Lamarckism) // The pigment spot of the lower organisms (P. 70) --- may have evolved then somewhat physically, by the mere action of light. (Through misunderstanding of Evolution) // P. 71 - Light may have produced a pigment spot by physical means --- But we are would hold that the influence of light has physically caused the formation of a nervous system, etc. - The truth is when one (P. 72) speaks of the gradual formation of the eye ---- one implicitly attributes to organized matter a certain capacity and genesis, the mysterious power of building up

very complicated readiness to utilize the simple excitations that it undergoes. (P. 72.) Different butterflies, according to whether developing under high temperature - always thought to be diff. species. -- (Bongaon does not seem to understand that reproduction occurs only through fertilization in genes, stored in the germ cells. - His refutation of Lamarckism - as well as Darwinism - is based on disbelief that chance variation and selection could sufficiently explain elaborate complexity of interacting organisms - esp. where very similar structures arose elsewhere.) - - (Check for confirmation of this thought.) -

P. 75 Un vertebrate retina derived from expansion of vertebrate brain. - Un invertebrate, from ectoderm. - if removed, regenerated by iris (vice versa argu.)

P. 76 Whether we will or no, we must appeal to some inner directing principle in order to account for this convergence of effects. - Such arrangements possible through Darwinian insensible accidental variations, over through greater leaps. - - - Lamarckism - the only theory capable of admitting a possible inner psychological direction of evolution (i.e. by conscious will).

P. 77 P. 78 We are not going to enter here into the certain errors of the theory of fertility of acquired characters; still less do we want to take too definite a side on this question. Scientific experiments important

(P. 79)

Bergson, H., Creative Evolution – tr. 1911

P.80 – there remains hardly a single unquestionable example of acquired and transmitted peculiarities, beyond .... (exp. by Brown-Séquard.) – P.82 – which can be explained by effect of a toxin on a germ. – (Same in alcoholism?) Alcohol affects living being + germ plasm. -- // Comes after long deliberations to the conclusion that Lamarckism is improbable... // P. 83 All Lamarckism probably only caused through change in germ plasm. – There may be diff. from casual somatic effects. – Most likely hypothesis – no definite proof yet. – But even if true, it couldn't explain enormous # of interacting variables to form organs + organism (P.84). – No reason to reject evolution. –

P. 85 – Darwin probably right that transmission of individual diff. is transmitted only by germ-cells. – Where we fail to follow these biologists, is in regarding the diff. inherent in the germ as purely accidental and individual. We cannot help believing that these differences are the development of an impulsion which passes from germ to germ across the individuals, that they are therefore not pure accidents, and that they might well appear at the same time, in the same form, in all the representatives of the same species, or at

least in a certain # of them (?) -- Already, in fact, the theory of mutations is modifying Darwinism profoundly at this point. -- True, the change itself would be coordinated ... in diff. directions in diff. representatives of species. --
P.86 = Chance possibly greater in plants than in animals, because in vegetable world Lamarckian does not so strictly depend on plasm, —
"Periods of mutation are determinate ... the direction of mutation may therefore be as well, at least in animals .... (?) No!!! The evolution of the organic can not be predetermined as a whole ...
but, indetermination can't be complete; it must be due to certain part to determination. ... Age, e.g. must have been formed by fact of continual changing in a definite direction. (No, you're wrong, Bergson.)
Physical + chemical causes are not enough to cause the result, a psychological cause
! intervenes. But as conscious effort of the individual, it couldn't occur in plants
! but it's clear how it could produce increase in complexity. P.87 = Different needs
divergence and resemblance can produce identical organs (How?) -- P.89 = Mechanism
knows that nature brings parts together, but Life does not proceed by the
association + addition of elements, but by dissociation + division. ? ? ? No!
P.91 = There is in vision more than the component cells of the eye and their mutual

P. 91 coordination. (Here he diverges from Spaun who says that -- yes! Vision is a subjective experience, an emergent of all action, caused by their coordination.) -- Vision = very simple. Complexity of eye = mental construction; "In reality eye is as simple as vision!... (See page 90 - just as seeing simple painting divided in innumerable impressions.) -- P. 92 diff. between mechanism (from many parts to one) and organism (from one to many.) -- (Specialization → organism.) -- P. 93 Intellect may get along with mechanism (to handle things) but not philosophy (concerned with life, essence.) -- -- Mechanicity of machine does not represent sum of various employed but sum of obstacles avoided. -- Vision not unlimited, but limited to objects on which the living can act. (Effective vision.) -- P. 94/95 construction of eye by nature like invisible hand going through million fibrings many elements - but receiving of complete + perfect order among them. -- Not a part only of this harmony can be realized. -- = The cause cannot produce its effect except in one piece + completely finished. - Completion goes in steps from simple to complex - but not gradually. - Elsewhere, organisms at other level of evolution may have similar organs! (That's enough!) -- P. 96 Life is, more than anything else, a tendency to act on inert matter."

(No! There isn't any silent matter – matter itself is acting!!!) -- (Life is the organization of acting matter in a certain way!!!) -- (~~It implies at least a rudiment of choice.~~)
Direction of action is not predetermined, hence the unforeseeable variety of forms which life, in evolving, forms along its path. But this action always presents to some extent, a character of contingency; it implies at least a rudiment of choice.
(Through contingency? O.K. That makes sense.) --