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ANOTHER EVENING WITH BUCKMINSTER FULLER

December 20, 1955

St. Louis, Mo.

KETC-TV CHANNEL 9

Introduction

In our three hour program of December 7, 1955, we took note of the widely published national dilemma in respect to an increasing dearth of not only graduate and graduating scientists and engineers, but also of their embryos in elementary schools. This posed grave questions in respect to the sagacity of the general theory of education now prevailing. We suggested that the progressive youthful antipathy toward elementary scientific disciplines might not prove that our youth lacked fundamental appetite and competence in scientific directions. It could be that they are potentially so scientific as to disdain the pre-industrialization-conceived elementary methodology as entirely obsolete in view of their enormously enhanced a priori scientific environment stimulations at mid-Twentieth Century.

We suggested that it might be profitable to the occasion to organize our thoughts in exploration of another theory of education which we had conceived in 1927. Conventional theory of education selects simple elements of experience and simple communication devices for expressing those elements and simple means for communicating simple computations regarding the simple interactions and relationships of those elementary concepts, e.g. $1 + 2 = 3$; $M + E = ME$.

Conventional education is held to be progressively difficult as it experiments, computes, and reports the results of more complicated interactions and relationships of the original simple elements.

Conventional education holds that the "advanced" disciplines are designed to cope with extraordinarily complex and elusive relationships and interactions of the original simplicities. Ergo, advanced education is built up of a myriad of "elementary" and "secondary" educational elements and requires the functioning of the most extraordinary intellects. Ergo, "advanced" graduates are needed to devise exquisitely complex devices to confound our enemies.

In contrast to the conventional educational progression from the simple to the complex, we suggested the exploration of an educational system which would embrace at outset a comprehensive and finite concept of universe as constituting the only elementary vantage. We defined "universe" as the finite aggregate of all men's experience.

However, "all men's experience" defies simultaneously definitive examination. In order to communicate to ourselves or others in respect to our ceaseless exploration for clues to the operative integreties of the total experience - universe - we seem to organize our individual quota of the total resource of universal experience-memories in such a manner as to temporarily exclude all the experiences immediately irrelevant to whatever unique pattern we may happen to select for our initial consideration.

The aggregate of total experience of all men (universe) which is irrelevant to any one selected initial pattern separates spontaneously into two main classes of "irrelevancy": (A) those experiences which are irrelevant because too infrequent and too big for probable occurrence within the domain of patterning under consideration, and; (B) those experiences which are too frequent and too miniscule to be distinguishable at the zone of initial examination.

We thus explored a mental strategy of progressive and finite sub-dividing of universe, effected through shunting the myriad of challenging irrelevancies either outwardly or inwardly of our specifically tuned zone of thought-patterning.

The irrelevances were thus swept into the macrocosmos and microcosmos, respectively, of all those frequencies infra-and-ultra to the sensorial spectrum ranges of man. The temporary warehousings of macrocosmic and microcosmic irrelevancies were thus separated from one another by a third arrangement consisting of a pattern of the residual and relevant memory orientation-events, associably arranged in concentric spheres which altogether comprise a hollow spherical constellation. The maxima and minima twilight limits of this hollow constellation's zonality comprehensively embrace all the frequencies tuneably apprehendable by the unique frequency ranges of man's several senses.

From within the tuneable zone of the hollow spherical constellation of all the possible sensorial memory-conceptioning-relationships, we had in our exploration thus dismissed all the immediate irrelevant concepts, and there - in residual splendor - we found the net array of specific relevancies illumined as a tuneably discrete and communicable simplex: a "mental mouthful". Ergo, we do not invent our memory patterns; we temporarily disembarrass them of the totality of experiences. Each pattern is ever "present" within the finite experience-complex of universe.

Eddington said that science is the disciplined process of "setting in order the facts of experience". Probably unaware of Eddington's definition, the great German physicist, Mach - whose name has been given to the units of measurement of ultrasonic air speeds - defined his special area of science in a manner neatly confirming and appropriately modifying Eddington's definition. Said Mach: "Physics is experience arranged in most economical order". These two definitions substantiate our own definition of universe as the total of all man's experience and fortify our resolve to initiate all educational enquiry at the comprehensive level of universe. Our strategy of thought-processing was thereafter compatible with as yet another scientific definition - that of the Department of Mathematics at the Massachusetts Institute of Technology - which states: "Mathematics is the science of structure and of pattern in general."

Thus our progressive sub-dividing of universe into finite components separated out from a comprehensive finite whole, eventually refined itself into a generalized conceptioning of fundamental structures, and terminated with the discovery of an inherently minimum and therefore most economical structure of all experience which was identified by a minimum inventory of topological components adequate to the unique function of separating the universe into the respective, macrocosmic and microcosmic without-ness and within-ness. The topology of the minimum structure - the tetrahedron - is characterized by inherently plural-minimum sets of unique number groups: i.e., 4 vertexes, 4 faces, and 6 edges. The concept "vertex" has,

therefore, no number meaning (pattern) in constellar groups of less than 4. 4 is elementary in respect to vertices. "Edges" have no meaning in number groups less than 6. Number is pattern and pattern is inherently complex. As a corollary, the number "6" is a minimum number and elementary in respect to "edges", which are inherently vectorial-events of highest-economy-arrangements between vertices.

No number less than "4" exists in regard to two of the three elementary topological aspects of our minimum experience patterning - the tetrahedron. No number less than "6" exists in our residual minimum experience patterning in respect to most economical interconnections of the most economical microcosmic defining universe experience - the tetrahedron.

We therefore dis-cover that what had been considered elementary and unitary in conventional education, as for instance $1+1=2$, was so over-simplified as to have no meaning (pattern) in elementary experience. Ergo: to be fundamentally inadequate to minimum initial conceptioning and therefore far from educational.

In our short three hour experiment in proceeding from the comprehensive to the specific by progressive finite subdivisions of universe, we discovered a new and unique means of accelerating the educational process so that we arrived at specific and finite techniques of winning and commanding for man the progressively highest levels of structure and mechanical efficiency for the most economical encompassment of the most desirable inventory of environmental controls in the most economical time.

We proved experimentally over the television broadcast that what we were thus experiencing together was the evolvement of a new discipline which we designated as "Design Science" - a comprehensively anticipatory discipline of total resource investment.

We followed through in Design Science strategies and discovered means by which we might convince the most people everywhere around the world in the shortest time that we in the U.S.A. in initiating Design Science are demonstrating responsibility to our common heritage of all experience-memories and are effectively competent, sincere, and diligent in our development of industrially reproducible designs of such realistically increased comprehensive performance - - to be progressively rendered by the world total of processed and constantly re-circulating resources - - as to certify regenerative up-grading of the numbers of world people served with high-standard-of-living from the present 33% to approximately 100% of all world peoples, all probably to be accomplished within, at the most 45 years, and possibly within 25 years, i.e., within "our time".

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Whereas our December 7th program was comprehensively theoretical, tonight's program will be starkly factual.

Tonight's program begins with the world as it is and concerns itself with specific and experimentally proven devices evolved from the theories disclosed in our December 7th program. Science has defined the most economical interconnections of universal events as geodesic lines; we define the most economical structural systems as Geodesic structures.* These Geodesic devices demonstrate such

* U.S. and Foreign patents and patents pending.

efficient employment of resources as to certify the immediate up-grading of resource-use to the level necessary to accomplish the theoretically envisaged processes contained in our just concluded review of our first broadcast.

Schedule of December 20, 1955 TV show
"An Evening with Buckminster Fuller"

1. 5 minutes Introduction - thoughts stated above to be spontaneously reviewed by B. Fuller
2. 3 minutes A swift geographical orientation by means of a unique Dymaxion Great Circle demonstration - five slides
3. 3 minutes Airocean World - regular globe of world in one hand and icosaworld in other hand, open icosaworld to identify Airocean World Map on wall.
4. 3 minutes Discussion of present Airocean World challenges and strategems in respect to concentrations of dry land and people in northern hemisphere; jet stream, etc.
5. 2 minutes Discussion of Airocean logistics governing our defense and retaliatory offense:
6. 3 minutes Defense logistics take long time to install - comprehensive early warning systems in remote hostile environments - five slides of Geodesic radomes.
7. 8 minutes Offense - velocity of adequate logistics is the key. Criteria of velocity is amount of hours, minutes, seconds to establish condition of operative occupancy of controlled environments 1/2 way around the world. To win is to expand our initial beach-head of controlled environment.

INTERNAL airlift - eight slides. Marine Corps erection of Geodesic dome in 135 man-minutes.

EXTERNAL airlift - no installation time required, ergo, instant occupancy. Five minute film of Marine Corps Geodesic dome airlift at National Air Show, Philadelphia, Pa., Sept. 3, 4, 5. However, drag holds delivery of external airlifted Geodesic dome to relative short distances at 60-knot velocity from assembly point.
8. 1 minute Summary of Marine Corps logistic gain from adoption of first models of Geodesic structures. Read quote from Army-Navy-Air Force JOURNAL, July 2, 1955, headlined "MARINE CORPS AVIATION WILL LEAVE TENTS FOR GEODESIC DOME; CALLED GREAT ADVANCE" -"...

"the first major basic improvement in mobile military shelters in the past 2600 years." In each move of a Marine Corps Aviation wing, the savings over previous best logistic performance effected by adoption of Geodesic structures are 122 million pounds, 3.1 million cubic feet of shipping volume, \$45 million, and 3.5 million man-hours,

9. 3 minutes Strategy of initiating important degree of improvement over Geodesic models now in aquisition by Marine Corps. The "Geodesic Flying Seed-Pod" - compact external airlift at high-speed. Washington University 1954 Geodesic mock-up - four slides
10. 1 minute Development of first stage prototype - how it workes. Description of second and third prototype phases to come as double skinned dome to be dropped by parachute and self-open on way down, containing and balasted by package of semi-autonomous living facility mechanics.

The second and third prototype phases will require an at present undetermined time and will be continued by Mr. Fuller at Washington University assisted by students of several departments of Washington University and other universities. When phase two and three are completed, additional demonstrations will be made to those who have made contributions to the project.
11. 11 minutes A 300 pound Geodesic dome at \$500 per pound (estimate made by a chief aeronautical engineer of Douglas Aircraft to develop and produce each pound of aircraft. Geodesic structures embody air-frame technology). Ergo: a \$150,000 accomplishment.

Identification of individual function resources contributed by St. Louis and other U.S.A. industries to Washington University Fuller Project. (See list below)
12. 5 minutes Film show of installing pilot model Washington University 1/3 Geodesic sphere.
13. 2 minutes Live show of "opened" pilot model 1/3 sphere.
14. 3 minutes Invitation to guest industrialists to inspect live pilot model. Industrialists inspecting pilot model.
15. 2 minutes CLOSE of show - in this preview of the Geodesic Project "Flying Seed-Pod" we have witnessed a 60-fold gain in the velocity of operative occupancy of an adequately controlled initial environment advantage, economically deliverable by air 1/2 way around the world.

CHIEF CONTRIBUTORS TO WASHINGTON UNIVERSITY FULLER PROJECT

1. Sunnen Products, Inc.
7910 Manchester
St. Louis, Missouri
Mr. David Nicholson
Mr. Adam Schneider
200 hours machining time for
nose plugs and air cylinder parts
2. Barry Wehmiller Machinery Co.
4660 West Florissant
St. Louis, Missouri
Mr. Ed Hellman
Mr. Emil Birkner
Mr. Tim Boswell
110 hours machining time for
aluminum joints
3. American Waterproofing Co.
New Haven, Missouri
Mr. William Kelly
Waterproofing of 770 yards of
orlon fabric for shelter skin
for dome
4. Emerson Electric
8100 West Florissant
St. Louis, Missouri
Mr. Harold Towell
50 hours machining time for
aluminum joints (done by Wash-
ington Park plant)
5. Waldes Kohinoor, Inc.
1123 Washington
St. Louis, Missouri
Mr. Ned Roberts
"Nylon-Zyp" slide fasteners for
the orlon shelter skin.
6. Public Relations Department
E. I. DuPont de Nemours & Co.
Wilmington, Delaware
Mr. Noyes
770 yards of orlon fiber
7. Reynolds Aluminum Co.
1134 Locust
St. Louis, Missouri
Mr. Durham
300# extruded and solid stock
300# of ingot for casting
8. Aluminum Co. of America
Continental Building
St. Louis, Missouri
Mr. Gairns
Aluminum pipe and hardware ac-
cessories obtained from Metal
Goods Corporation and paid for
by ALCOA
9. Dow Chemical Company
3615 Olive St.
St. Louis, Missouri
Mr. Richard Morse
400# of magnesium extrusions
10. Bodine Pattern & Foundry Co.
1601 Cass
St. Louis, Missouri
Mr. Jack Bodine
300# of aluminum castings

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| 11. | McDonald Machinery Co.
1535 North Broadway
St. Louis, Missouri
Mr. Robert McDonald | Loan of small lathe for machining. |
| 12. | Acetylene Gas Co.
3411 Pine St.
St. Louis, Missouri
Mr. Al Fausek
Mr. Schopp | Compressed nitrogen to activate air cylinders. |
| 13. | Broderick & Bascom Rope Co.
4203 Union
St. Louis, Missouri
Mr. Pete Lodewyks | 3000 feet of 1/8" galvanized wire rope |
| 14. | Bowdre Tool & Die
1619 North Hanley
St. Louis, Missouri
Mr. Bowdre | Machining time for circular cutter |
| 15. | Mid-Continent Spring
6315 Maple
St. Louis, Missouri
Mr. Louis Langhiand
Mr. Bernard | Stainless steel wire springs for mechanical catch on air cylinders |
| 16. | Cyclotron Department
Washington University
St. Louis, Missouri
Mr. Shulke & Staff | Machining time for 6-way joints |
| 17. | McDonnell Aircraft Corp.
St. Louis, Missouri
Mr. Wood, Public Relations Dept. | Drilling Air regulators for cylinders |
| 18. | A. Schader's & Son
St. Louis, Mo.
Mr. C. E. Gehle | Air valves |
| 19. | Chicago Rawhide Co.
St. Louis, Mo.
Mr. Robert Wright | Leather cups for air cylinders |
| 20. | Central Hardware
St. Louis, Missouri
Mr. Julius Cohen | Hardware supplier |
| 21. | Slingo, Inc.
1301 N. 6th St.
St. Louis, Mo.
Mr. Harold Umland | Hardware supplier |
| 22. | Champ Items, Inc.
St. Louis, Mo.
Mr. Mohle | Hardware supplier |
| 23. | Commerical Plating Co.
3119 N. Market
St. Louis, Mo.
Mr. B. Tucker | Cadium plating for bolts, nuts and springs. |