Ishino, Iwao. Papers.
Michigan State University.
Institute of Community Development 1961-1963, 1966

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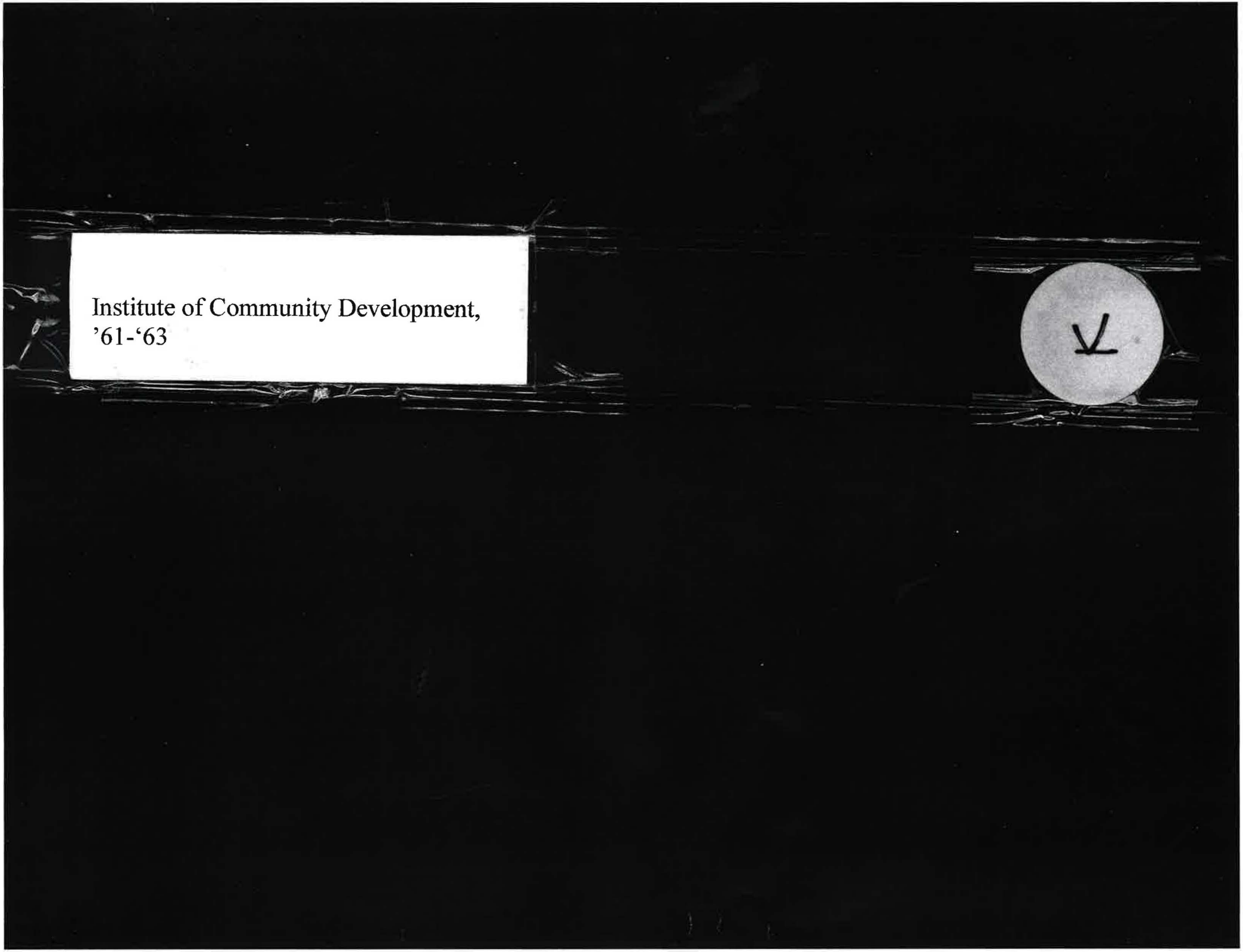
Institute of Community Development,
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Alchin's Cottage

S T E W A R T D. M A R Q U I S, J R.

618 Cornell Avenue East Lansing, Michigan

Born in 1920 at Evanston, Illinois Married - two children

American Institute of Planners (Associate Member)

Society for General Systems Research

Regional Science Association

SUMMARY OF EDUCATION AND EXPERIENCE

Planning: More than six years of university teaching and research in urban planning and extension education for community leaders and professionals. Five years of practical planning experience (planning assistance to small towns, big city planning staff, and small metropolitan suburb). Nine quarters of graduate planning education. M.A. in planning from the University of Chicago. Passed written examination for Ph.D. in planning.

Political Science: Four quarters of graduate education at University of Chicago.

Engineering: Three years of varied practical engineering experience. Four years of undergraduate engineering education. B.S. degree from Purdue University.

Administration: Ten months as director of planning office of nine people.
Sixteen months as planning director of one-man office.
Eight months as air force operations officer in combat.

Teaching: Nineteen quarters of teaching at graduate and undergraduate levels in urban planning curriculum at Michigan State University (one course each quarter). Emphasis on comprehensive planning process and the application of the social sciences in urban-regional planning. Six quarters participation in community development seminar for foreign and domestic students. Taught one city planning course at University of Chicago.

Research: Currently involved in research on the urban-regional ecosystem and the planning process. Participating in interdisciplinary group in the development of applied mathematical systems models for socio-economic systems. Project leader for study of "Spatial Patterns of Development of the Lansing Region."

E D U C A T I O N R E C O R D

Planning: University of Chicago, 1951-1953 Master of Arts (Planning)
Nine quarters of graduate study in city and regional planning, including core courses in Program of Education and Research in Planning and classes in economics, statistics, geography, sociology, administration. Completed course work and passed written examination for Ph.D. degree in planning.

Political Science: University of Chicago, 1949-1951
Four quarters of graduate study in government, political theory, political parties, public administration, international relations. Completed course work for M.A. degree in political science. Transferred to planning program.

Engineering: Purdue University, 1937-1941 Bachelor of Science (E.E.)
Four years of undergraduate study in general and electrical engineering.

Systems Analysis: Michigan State University, 1964-1965
Audited three-quarter sequence in Systems Analysis for Social Scientists given by Dr. Herman Koenig, Department of Electrical Engineering.

Miscellaneous: University of California at Los Angeles, 1947-1949
Extension courses in economics, psychology, philosophy, labor movement, education, mental hygiene.

E X P E R I E N C E R E C O R D

Planning: Michigan State University November 1958 to Present
Associate Professor with joint appointment in Urban Planning and Continuing Education (Community Development). Teaching of undergraduate courses in comprehensive planning and graduate seminar in the application of the social sciences in urban-regional planning. Activities in the Institute for Community Development include extension education with leadership groups in cities, counties and metropolitan areas and training for community development professionals from developing countries. Consulting activities include assistance to metropolitan county in the formation of a planning commission and program assistance to the state planning program in Michigan. Research activities include a study of spatial patterns of development in the Lansing urban region, development of an ecosystems model of the urban region, study of planning as an information-search-decision process, and exploration of the role of state government in the planning and development process. Also currently involved with an interdisciplinary group of faculty from engineering, business, geography, and resource development on the development of mathematical systems models of socio-economic systems and in the development of a general systems curriculum.

E X P E R I E N C E R E C O R D (C O N T .)

Planning: (cont.)

Tennessee State Planning Commission — March 1956 to October 1958
Chief Area Planner directing office of nine people. Assistance to local planning commissions in six Upper East Tennessee cities of 3,000 to 35,000 people, one county of 100,000 people, and a three county planning region. Full range of planning studies, proposals, and administration. Written reports on land use, schools, housing, recreation, parking, traffic, population, flood zoning, annexation and fringe area problems. Drafting and administration of zoning, housing and subdivision regulations.

Chicago Plan Commission — April 1954 to December 1955
Senior Planner representing staff on urban renewal project for the University of Chicago (Hyde Park) area, including liaison with public agencies and local organizations and preparation of general physical urban renewal plan. Coordinated staff work on citywide land use and circulation plan. Assisted in drafting sketch metropolitan area and central business district plans.

Park Forest Plan Commission — April 1953 to April 1954 (Full-time); February to November 1952 (Half-time)
Planning director for rapidly-growing planned Chicago suburb. Prepared preliminary capital improvement program report and draft of new subdivision regulations. Zoning and subdivision administration and planning for schools, recreation, streets, sewers and other public improvements. Presentations and reports at commission meetings and public hearings.

Engineering:

Over three years of engineering work experience — 1941 and 1945-49
General Electric Company (Schenectady, N.Y. and Philadelphia, Pa.); National Advisory Committee on Aeronautics (Langley Field, Va.); Automatic Electric Company (Chicago); AiResearch Manufacturing Company (Los Angeles); National Air Control Company (Los Angeles); Crown City Plating Company (Pasadena, Calif.); Southern California Gas Company (Los Angeles).

H. S. Nachman & Associates, Chicago — 1950-1953 (Part-time)
Engineer and draftsman on design and layout of mechanical, electrical and plumbing installations for apartment, commercial, and industrial buildings.

Military:

U. S. Army Air Forces — March 1942 to October 1945
Pilot and operations officer (Major) with combat medium bomber squadron in European theater. Responsible for planning and administration of combat operations and training programs for two hundred combat crewmen.

Other:

Pasadena Safety Council, Pasadena, California — February-July 1947
Managing director of civic safety organization. Planning and promotion of community safety program and fund-raising efforts.

R E F E R E N C E S

Charles R. Adrian	Chairman, Department of Political Science, Michigan State University, East Lansing, Michigan (former Director, Institute for Community Development)
Myles G. Boylan	Director, School of Urban Planning Michigan State University, East Lansing, Michigan
John D. Cordwell	925 Winona, Chicago, Illinois (former Director of Planning, Chicago Plan Commission)
Richard L. Meier	Department of Conservation, School of Natural Resources University of Michigan, Ann Arbor, Michigan
Martin E. Meyerson	Dean, College of Environmental Design University of California, Berkeley, California
Harold V. Miller	Executive Director, Tennessee State Planning Commission Cordell Hull Building, Nashville, Tennessee
Harvey S. Perloff	Director of Regional Studies, Resources for the Future 1145 19th Street NW, Washington 6, D.C.
John L. Scott	Village Manager, Village Hall, Park Forest, Illinois

P U B L I C A T I O N R E C O R D

Research Reports:

Research Papers on Spatial Patterns of Development in the Lansing Region (prepared for the Tri-County Regional Planning Commission, published by the Institute for Community Development, Michigan State University):

Local Service Centers, Functions, and Areas, July 1962
Industrial Activities Outside the Lansing Area, August 1962 (with Thomas Borton)
Market and Material Linkages of Industrial Firms, August 1962 (with Thomas Borton)
Basic Data on Number and Floor Area of Commercial Establishments Outside Lansing and East Lansing, August 1962
Functional Profiles of Local Service Centers, September 1962
Communities and Planning Areas: A Systems Approach to Spatial Community, February 1963
Development of Community Centers, 1830-1960: An Analysis of the Evolution of Human Community Systems, May 1963

The Urban-Regional Ecosystem: An Operational Research and Planning Approach, ditto draft, March 1965

Planning Reports:

Published Reports for General Distribution:

A Series of Planning Reports to Michigan Communities, published by the Institute for Community Development, Michigan State University:

Utilities in the Owosso-Corunna Area, June 1960
Transportation in the Owosso-Corunna Area, June 1960
Development and Use of Land and Buildings in the Owosso-Corunna Area, July 1960
Development Guides and Controls in the Owosso-Corunna Area, December 1960
Organization for Physical Development Planning in Kent County, Michigan, April 1961
The Need for Comprehensive Physical Development Planning in Kent County Michigan, June 1961
Land and Building Development and Use in Branch County, Michigan, June 1961
Land and Building Development and Use in Calhoun County Michigan, August 1961

P U B L I C A T I O N R E C O R D (C O N T .)

Planning Reports: (cont.)

Published Reports for General Distribution (cont.):

A Series of Planning Reports to Tennessee Communities, published by the Tennessee State Planning Commission:

Public Schools in the Kingsport Area, June 1956
Traffic, Parking and Major Streets in Kingsport, July 1956
10 Years of Zoning in Kingsport, June 1956
Kingsport Public Recreation Areas, June 1956
Housing in the Kingsport Area, June 1956
Elizabethton Land Use, April 1957
The Use of Land in Kingsport, July 1957
Comprehensive City Planning for Kingsport, November 1957
Growing Kingsport: Potential Residential Distribution and Population Growth, January 1958
Utilities in Kingsport, October 1958
Toward a Development Plan and Policy for Metropolitan Kingsport, October 1958

A Series of Planning Reports to the Park Forest Planning Commission:

Staff Planner's Report on the Capital Improvement Program, July 1953
Toward a Master Plan for Recreation Sites, March 1954
Report and Recommendation on Annexation Procedures and Policies, March 1954
Report on ACB's Master Plan for Proposed Additions to the Village of Park Forest, April 1954

Other Reports:

Materials prepared for limited distribution:

A Preliminary Report on the South East Chicago Urban Renewal Program, Chicago Plan Commission, 1954
Community Renewal Manual (initial draft), Chicago Plan Commission, 1955
Toward a Plan for Planning in Chicago, Staff Memo, 1955

Notes prepared for Seminar in Community Development, Michigan State University, 1963-64:

Plans and the Planning Process
The "Middleman Role" of Community Development
The Image-Plan-Action-Evaluation Model in Community Development

Student reports in Planning Program, University of Chicago:

Toward a Plan for the Andrew Corporation and the Orland Park Community, 1951 (chairman, editor, major contributor)
Master Planning for Transportation in Puerto Rico, 1952 (major contributor)

1963 County Dev

Communication

Transport.

Urban Research Methods Seminar

S. D. Marquis
Feb. 25, 1963

URBAN COMMUNICATION FLOW ANALYSIS

1. Urban can have narrow meaning (just densely settled and built up area) or broad meaning (urban re gion, including hinterland of central city). The broa der meaning is implied here.

2. Communica tion can also have narrow meaning (just messages) or broad meaning (including transportation or transmission of people, materials a nd goods, fluids, energies, messages, and funds). The broader meaning of communication is also implied here.

3. Analysis of flows (movements through space of people, materials and goods, fluids, energies, messages, a nd funds) is suggested as a meaningful method for understanding some of the major interactions between human, man-made, and natural components of urban regions.

4. These flow s are major characteristics of the operations of "man-machine-resource" systems in urban regions. Can study communication and transportation flows as a major kind of linkage for interaction between components of subsystems and between separate subsystems in the urban region.

5. Flows can gene rally be described by the following pa rameters:
   a. Location of start and end points and routes.
   b. Flow content (people, etc.)
   c. Direction of flow
   d. Times of starting, flowing, ending
   e. Rates of flow
   f. Periodicities
   g. Quantities of flow

6. Most flow systems include: collection, storage, combina tion, transformation, trans mission, distribution, reception.
   a. Message flow systems (and some others) take the form of
      "sender - content - channel - receive r"
   b. Passenger transportation systems as variant, with form of
      "origin - trip - route - carrier - destination"

7. Flow systems have various kinds of "nodal" points:
   a. Start or end points (terminals, collection or reception)
   b. Storage points
   c. Combination or tra nsformation points
   d. Transhipment or interchange points
   e. Distribution points

8. Some flow systems have "open network" structure or form; others have "tree and branch" form; still others ha ve "closed loop" form.

9. Flow systems can be studied at both aggrega te and detailed levels:
   a. Aggregate inputs and outputs for total urban regional system
   b. Internal inputs and outputs and interchanges between subsystems
   c. Detailed inputs and outputs of subsystem components (human, man-made, and natural)

10. Flow systems can be studied with flow accounts or flow charts:
    a. Flow accounts: Aggregate data on total system inputs and outputs
       Internal inputs and outputs of subsystems (regional input-output analysis)
       Detailed inputs and outputs of specific components
    b. Flow charts: Aggregate - schematic diagrams of total system inputs and outputs with general locational relations.
       Internal - schematic diagrams of subsystem inputs and outputs with locational relationships
       Detailed - mapped location and direction of input and output flows of subsystem components

11. Some flow channels are flexible, while others are rigid:
    a. Some channels fixed in specific routes, others can alter routes
    b. Some channels can handle several types of flows (people, materials)
    c. Some channels can handle two way flows, others only one way.

12. Can study flows in both temporal and spatial dimensions:
    a. Temporal - Timing of start and end, duration, periodicity, trends
    b. Spatial - Location of start and end, route, direction of flow.

13. Can study interceonnections and transformations of flow types:
    a. Some flows substitutable for others (messages for people)
    b. Some flows transformable to others (coal to steam to electricity)
    c. All flows dependent on other flows (people flows dependent on flows of energy, messages, funds)
    d. All flows dependent on information flows (information related to knowledge and skills affecting technological development)

14. Can study relationships of flows and flow systems to growth and form of urban region (need to expand flows - linear - faster than areas or volumes of urban regional development?)

15. Can study relationships between flows and the form and location of nodal facilities (land uses, buildings, structures) and channel facilities.

16. Can study movements through space as one major parameter of human interaction that is only dealt with in limited ways so far:
    a. Many existing flows ignore specific route (desire lines) or direction (traffic flows) or actual type of flow (traffic flow maps include people, materials and goods without separation).
    b. Many existing flow accounts and maps deal separately with one type of flow
       (1) Motor vehicle traffic separate from mass transit or railroad
       (2) Electric energy flow separate from flows of coal, gas, oil
       (3) Information flows separate from each other (mail, telephone, TV)
       (4) Water supply flows separate from natural water flows, storm drainage flows, sewage disposal flows

17. Flows related to "open system" character of urban region - inputs and outputs to outside world. Balanced continuous growth as "steady state" for open urban regional ecosystems?

18. Pertinent theories and methods of flow analysis research: Communication content analysis, mathematical information theory, central place theory, nearest neighbor analysis, linear graph theory, trip generation and traffic flow, electric network theory, hydrology and fluid flow, inventory and queing theory, regional accounts, input-output analysis, linear programming, natural ecology, general systems theory, network planning, and others.

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C-36

Feb 3, 1963

Transportation

Transportation: Moving People and Goods

(From Richard L. Meier, Science and Economic Planning, 1956, pp 122-29)

A. Introduction.

= Transportation has consumed an enormous amount of energy and capital equipment. Can this consumption be reduced?

= In contemporary society which manages to provide a relatively adequate standard of living, somewhere between 10 and 20% of all energy is expended for transport purposes.

= Also an equal amount-roughly, is used to manufacture the equipment designed to meet transport needs.

= Thus, somewhere between 25 and 40% of all energy is committed one way or another to transport.

B. Heavy duty, main-line movement vs. local feeder or distribution services.

1. Mainline includes double track railroads, cross-country pipe lines, overland trucking, intercity bus lines, scheduled deep water shipping and major air routes.

= The design effort is devoted to improving safety, saving labor, and reducing friction in the operating equipment.

2. Local transport serves the customer and consumer directly.

= Thus convenience has tended to have priority over energy savings.

= The design effort is directed toward comfort, flexibility of function, and time saving.

C. Table 16: Typical Energy Costs for Transport--1950

System and equipment	Cal/ton-km	Btus/ton-mile
Ship: ocean going, 20,000 tons, bulk	22	60
Pipe line: petroleum	48	130
Pipe line; natural gas	2500	7000
Railrodd: diesel locmotive, bulk	370	1000
Railroad: coal-steam, bulk	1500	4000
Highway: diesel truck -- 20 ton	650	1750
Highway: delivery truck -- 2 ton	2200	6000
Pathway: wheelbarrow--100 kg	2000	5400

* These costs assume that the movement is overrelatively flat terrain.

Table 18: Typical Costs for the Movement of People, p. 128.

	* Energy expended Cal/ pass.-mile	Fares or Charges, cents/ pass. mile	Aver. speed, mph	Delay, % of trip	Time, $/hr **	Cost for movement, cents/ pass.-mile ***
Airplane	1500	5	300	30	1.00	5½
Helicopter	2500	7 (?)	100	30	1.00	8½
Train (intercity)	100	4	50	10	0.80	6
Train (rapid transit)	100	2½	30	40	0.60	6
Private auto (2 pass.)	800	4½	35	20	0.60	6½
Bus (city)	100	2	20	40	0.40	5½
Motorscooter (1½ pass.)	200	1½	20	20	0.40	4
Bicycle****	25	3/4	15	10	0.40	3 3/4
Walking ****	100	1	2½	10	0.20	10

* These are bastardized units for the expression of costs, but they seem to convey meaning to a much wider audience than units more rationally contrived. The figures presented do not include energy costs for equipment and improvement of right of way.

** This is an imputed average value per hous of time lost in delay for the persons normally using the respective modes of conveyance. Because of apparent inconsistencies in human behavior the value of delay time is very difficult to measure.

*** These totals take account of the value of time and cost of service under the conditions specified. Differences of $0.02 per mile are probably significant for decisions between alternative transport systems.

**** This is not only for the amortization of equipment, and the waring out of shoe leather, but also for the calories of extra food consumed as shown in the first column. Starchy foods at $0.05 per 1000 Cal are adequate to meet this extra demand.

D. Some generalizations and rules of thumb

1. For most societies the gross pattern revealed in Table 18 is likely to recur.

2. The over-all costs for the bicycle and the motorscooter tend to be lower than for the other modes of movement.

3. The urban electric railway system can become a more economical mode than any if the time lost waiting for trains can be reduced.

= This might be accomplished by a careful planning of routes and the use of forethough in the choice of sites for settlement and productive activities.

4. In any society where time is valued at more than 10¢ per hous, walking becomes an expensive way of moving.

5. The cost of fuel energy (at 0.2 to 0.5¢ per 100 Cal) becomes an important share of over-all costs in only a few instances, so that doubling or trevling the costs of fuels should not seriously affect over-all cost relationships.

E. Future planning.

= 1. If one were to start afresh and devise a pattern of urban living that was both convenient for the resident and efficient in its energy consumption, it would probably be linked by an arterial network of high speed electric railways which hauled passengers by day and freight by night.

= A system of bicycles, carts, car-hire, and small delivery vans working out of each station would probably be the most effective means for local distribution.

2. High population and commercial densities would exist around the stations while parks, gardens, and low-density residential areas would occupy the interstices.

= Such arrangements could match the over-all convenience of movement now enjoyed by middle-income Americans, but the cost would come to only a small fraction of that paid by Americans.

3. What can be done if these cities are overwhelmed with congestion?

= If a personal carry-around radio-telephone system existed it would be convenient to call taxis or other vehicles to whatever out of the way point persons happen to be stranded in a metropolitan area within a few minutes.

= This is an example of substitution of communications for transport.

4. With long-range planning perhaps half the vehicles on the road cna be eliminated--with no real reduction in living standards.

C-35

Reed Feb 1964

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THE SUBSTITUTABILITY OF COMMUNICATIONS FOR TRANSPORTATION

by Frederick W. Memmott 3rd
Senior Transportation Analyst
Niagara Frontier Transportation Study[1]

The Problem

Today urban area transportation is in serious difficulty, and the prospects are that it will remain this way in the future. The basic problem is that our economy cannot afford the investment necessary to provide truly adequate transportation facilities (express highways, arterials, mass transportation rail and bus lines, etc.) designed to efficiently handle today's traffic demand and tomorrow's.[2] The present vast expenditures on urban transportation facilities of various types are minor compared to the expenditures needed to provide totally adequate facilities. The observed trends of ever increasing suburbanization of urban commercial and industrial activities, low density development of vacant land, population growth largely concentrated near the fringes of existing urban areas, and expanded automobile ownership and increasing personal income accentuate the demands placed on a region's transportation network at an ever increasing pace. As a consequence of this, the question arises: Is there any possible end to the requirement for constructing new and costly transportation facilities?

---

[1] Formerly Transportation Research Engineer, The Cerand Corporation, Boston, Mass.

[2] Public expenditures on transportation facilities are in direct competition with other worthwhile expenditures, such as schools, government, recreational facilities, welfare services, etc.

No, if future person-to-person interactions involve individual contacts in the same manner and to the same extent as at present. Here the word "interaction" refers to all forms of person, machine, or stored information transactions taking place. Transactions involving persons, machines, or stored information represent mutually different relationships, since a person is always the primary decision maker and source of information, a machine is usually a transmitting device or sometimes a collection, sorting, selecting, and storage agency with secondary decision making powers, and stored information is just a storage file. Categories and examples of various types of person-to-person interactions are listed below.

Category	Examples
1. Person ⇄ Person	1. Face-to-face contact through auditory facilities.
2. Person ⇄ Stored Information	2. Reading, writing, mail, books, reports, memoranda, telegrams, newspapers, magazines, etc.
3. Person ⇄ Machine ⇄ Person	3. Telephone, closed circuit television, radio.
4. Person ⇄ Machine ⇄ Stored Information	
5. (Person ⇄ Machine) ⇄ (Person ⇄ Machine)	

Today communications technology is represented by Interactions 2, 3 (partially), 4, and 5. Physical transportation is represented by interactions 1 and 3. Past and anticipated long term growth of these interactions is indicated below in Figure 1.[3]

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[3] Diagram based on a similar figure appearing in "Communications and Social Change", by Richard L. Meier, Behavioral Science, Vol. 1, 1956.

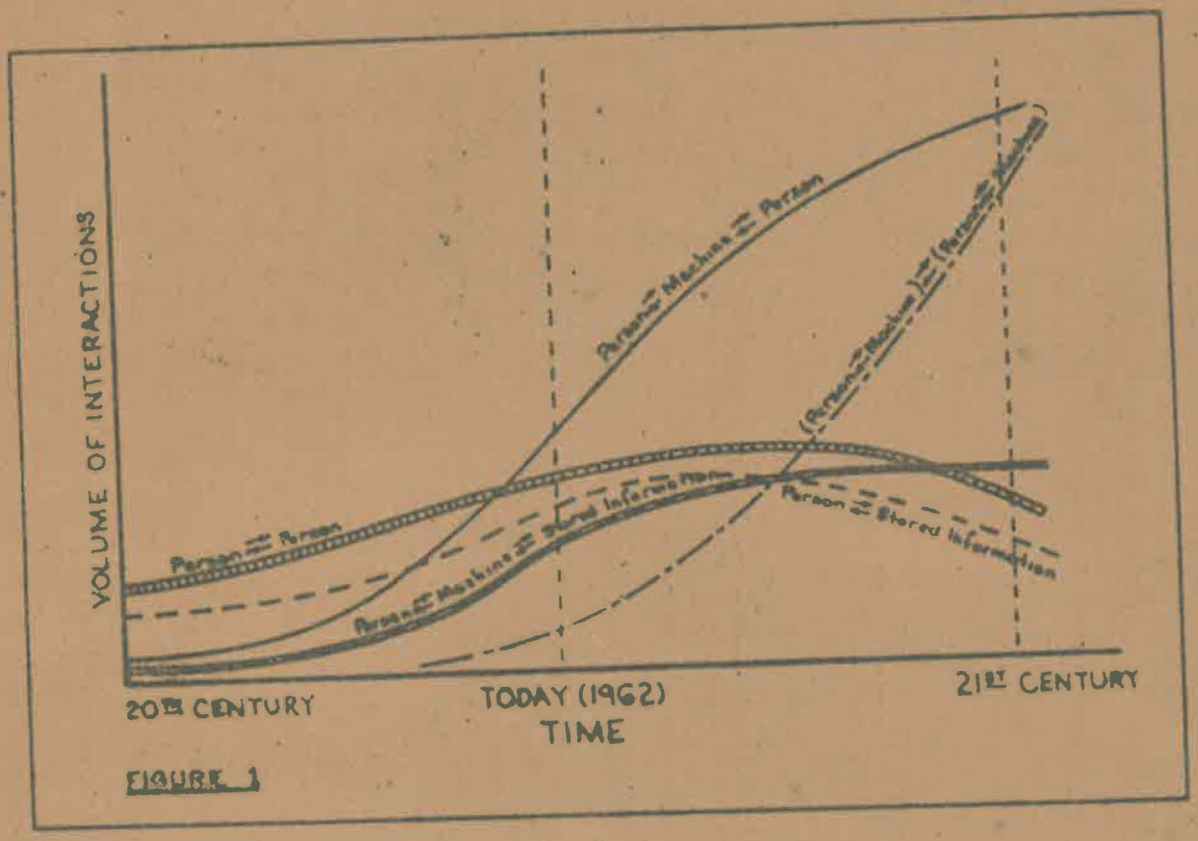

FIGURE 1

It should be apparent from Figure 1 that the relative volumes of different types of person, machine, and stored information interactions will change considerably in the future. If person-machine interactions are substituted wherever possible for person-person interactions, or, in more common terminology, if communications are substituted for transportation, then the need for constructing new transportation facilities will diminish proportionally to the degree of substitution obtained, modified to some extent by the urban area growth subsequently taking place.

How important might substitution of communications for transportation be? What types of trips are susceptible to substitution? How probable is it?

There is a strong probability that this substitution phenomena will be forced upon us whether we desire it or not. Increasing traffic congestion will reduce person trip generation rates by eliminating unnecessary trips and will accelerate the gradual substitution of communications for transportation. Urban area transportation studies invariably foresee constant or moderately expanding person or vehicle trip generation rates in predictions for the future. Congestion is assumed to be constant or to decrease. With increasing congestion, it is likely that a leveling off and even a decrease in person or vehicle trips per day will occur. Traffic or transportation engineers should be more interested in this likely trip generation characteristic than they presently are, since when it occurs the demand for new transportation facilities will change considerably.

Therefore, let us recognize the impending substitution of communications for transportation and actively explore its possibilities and probable effects on our future planning of transportation facilities. Let us anticipate the technological advances in communications which lie, figuratively, just around the corner - advances which will infinitely improve the fidelity, versatility, usefulness, and acceptability of person-machine forms of communications. Let us explore this substitution possibility now, so that our transportation (and communications) planning for the future is not in considerable error when the future arrives. Let us not place our reliance in planning for the future solely on the extension of past trends and on out-dated empirical methods, since we are in the age of dynamic and revolutionary changes in transportation and communications technology. Let us lay the groundwork now for a thorough and comprehensive study of the interrelationships and interactions of communications and transportation, so that we will be in a better position

to predict the future requirements for both communications and transportation facilities.

Terminology

Before proceeding further, it is desirable to recognize the distinction between the substitution of communications and the substitution of merely another form of transportation. It has been stated that both constitute an interaction, which is defined as the transfer of some form of a commodity. In transportation, we usually consider only commodities having significant mass, so that transportation becomes the displacement of persons and physical objects having definite mass through space. In communications we are concerned with commodities of trivial mass, so that we have a low friction type of point-to-point interaction. Communications commodities consist solely of information in one form or another. In substituting communications for transportation, the informational aspects are extracted from persons and objects and are transported via communications transmitting, transmission, and receiving facilities, rather than by means of conventional land, sea, or air transport facilities. The replacement of some transportation processes, in part or in entirety by a communications system, certainly constitutes a substitution of communications for transportation.

Why Transportation?

The decision to enter into a transaction involving transportation is based upon some motivation. Having determined and analyzed the motivation, we can then decide if it can be best satisfied by communications or transportation.

What procedures could be used to identify and measure the amount of substitution taking place? What are the implications of this to transportation planning and traffic engineering? This paper will explore these and other questions and will present rudimentary, largely hypothetical answers to this substitution possibility.

Importance

Why is study of the substitutability of communications for transportation potentially important? The main reason is the ever present and distinct possibility that more economical and effective ways exist for solving our transportation facility dilemma. We must seriously ponder the wisdom of making the large investments required in physical transportation facilities when these facilities cannot meet the demands and provide the quality of service desired in facilitating person interactions. Urban area traffic congestion will increase considerably in the foreseeable future in spite of the estimated three billion dollar investment per year in new facilities (state highway extensions, arterials, and urban interstate routes).

Indeed one of the goals of urban transportation planning should be to minimize the total cost and improve the efficiency of all forms of person interactions in general, consistent with other desirable social and economic goals of the community. This does not automatically imply that large expenditures on physical transportation facilities are necessary. One way of meeting this goal is to seek new means for transporting some of the commodities presently carried on the conventional network of transportation facilities. One of the most promising means for accomplishing this is utilizing communications to carry commodities having minimum mass, namely information, to the maximum extent possible.

Some of the motivations for transporting men, materials, energy, and information from one place to another, and the substitution possibilities, are listed below.

Motivation for Transportation	Substitution Possibilities
Transportation of men in order to	
1. Observe an activity	visual substitution
2. Participate in an activity	non-substitutable, if physical, otherwise substitutable
3. Hear	audio substitution
4. Talk, discuss	audio substitution
5. Spend leisure time, change scenery	non-substitutable, if attraction is in physical travel or activity
6. Have services performed	non-substitutable
7. Perform services	non-substitutable
8. Meet business associates	visual and audio substitution
9. Because some characteristics of personality or intelligence make face to face contact desirable	non-substitutable
Transportation of materials and energy in order to	
1. Increase their value	non-substitutable
2. Stimulate trade, commerce, industry	non-substitutable
3. Provide the essential constituents of various processes (body, industrial, or commercial)	non-substitutable
Transportation of information in order to	
1. Facilitate the process of decision making	substitutable

The above only serves to emphasize the fact that in general the production of transportation is not an end result in itself. Therefore, if we can achieve the desired results by some means which reduces the total amount of transportation, time, money and energy may be saved. Since we have defined communications as a low friction interaction, any method which economically substitutes communications for transportation is likely to result in this saving. The problem is to examine the various cases to determine whether the substitution is both desirable and feasible from economic and physical standpoints, and whether the cumulative effect of these cases is large enough to significantly reduce the demand for physical transportation facilities.

Substituting Communications for Transportation

In considering the replacement of transportation by communications, it seems reasonable to expect that trips involving the transportation of information, rather than materials and services, are the most susceptible to substitution, provided that it can be done economically. Since most urban area transportation problems involve persons, present trip motivations and purposes should be divided into categories denoting the information, material handling, or combination aspects of the trip itself or the destination activities.

1. Trips involving the personal transportation of information, or having an informational purpose at either the trip origin or destination offer potentially the greatest opportunity for substitution. As an example, consider the case of a business executive making the daily trip to and from his office. His primary function, once in the office, is one of communication — with his associates,

his secretary, and with whatever papers he finds piled on his desk. The trip to the office is motivated only by the necessity to be in a position to facilitate an informational process. Therefore, if a means of communications can be devised whereby this business executive might accomplish all his duties without leaving his home, or in a location nearer to his home, we will have made a substitution of communications for physical transportation.

2. Trips involving the personal transportation of materials, or having a material or equipment servicing or handling trip purpose, offer a much more limited opportunity for substitution. An example of this would be an assembly line worker at an automobile plant. Assuming that his job is not replaced by a machine, he must make the trip so as to be able to do a specific manual task. The only benefit he could expect to derive from a general substitution of communications for transportation would be the secondary benefits resulting from less vehicular travel [resulting from the substitution of communications for transportation by others).

3. Trips involving a combination of information and material handling, both in personal transportation or in trip purpose, offer many interesting possibilities for substitution, provided that the materials handling aspect of the trip can be divorced from the informational aspects. If this can be done, then the information portion of the trip can be replaced by communications and the material handling portion by a more efficient cargo transportation service. If not, then this type of trip is not susceptible to substitution by communications.

A Proposed Procedure for a Symbolic or Statistical Study of the Substitutability of Communications for Transportation

To quantitatively predict the effect that communications will have on transportation, the following procedure is proposed for a symbolic or statistical study of the substitutability of communications for transportation. This procedure is essentially a systematic, comprehensive, and detailed outline of one method of evaluating the substitution effects which are expected to occur. No attempt has been made to evaluate the comparative advantages, disadvantages, and costs of this proposal — indeed, the ideas presented below only form framework for a pilot, or preliminary study of this intriguing interaction substitution possibility. In this procedure, the following distinct phases of study are recognized:

1. Identification of and determination of the magnitude of the number of person and vehicle trips presently being made in the urban area by type.
2. Momentarily ignoring economic, technical, and social considerations, what proportion of these trips are potentially susceptible to substitution by communications?
3. In the trips that are susceptible to substitution, determine the type and amount of communications equipment required.
4. Determine the amount people are willing to pay for various types of communications equipment in lieu of physical transportation.
5. Determine the initial, operating, and maintenance cost characteristics of various types of present and proposed communications equipment.
6. From the number of person and vehicle trips (1, 2), required types of communications equipment (3), amount or price required for sub-

stitution (4), and the actual or estimated cost of different types of communications equipment (5), determine the potentiality for substitution (or substitutability), barring technical and social considerations.

7. Determine the amounts and types of communications equipment (3), with the appropriate technical characteristics, that can be provided at the amount people are willing to pay (4), and adjust the substitutability previously determined (6), to reflect this constraint.

8. Determine a probable social rate of acceptance for various types of communications equipment. Adjust (7), accordingly to determine the potential substitutability of communications for transportation due to partial satisfaction of transportation demand through the use of present and improved forms of communications.

9. Determine the potential utilization of (8), in urban area transportation and communications planning.

Carrying this approach farther, several aspects of the above procedure have been studied in greater detail.

1. Susceptibility of present urban area person trips to substitution by communications appears to be a function of several different factors.

   a. Purpose of Trip. This is undoubtedly the most important, clearest indicator of potential susceptibility. From preliminary investigation, it would appear that proposed research could profitably be limited to the substitutability of communications for intra-urban area work trips, since this type of trip forms the largest segment of trips involving potential substitution.

b. Income. The substitution of communications for transportation will be most profitable for persons earning high incomes, since the cost savings of communications equipment and services over physical transportation, including time, will be the largest. However, the number of persons in this category is small; hence the total effect will likely be small.

c. Location Within the Urban Area. Persons located at considerable distance from the CBD will profit more than those located closer to the center in terms of time savings and reduction in the cost of transportation. However, the cost of communications will be greater, and may offset the potential transportation savings.

d. Time of Day. Will probably reduce rush hour trips, or commuter travel, most. May transfer some central city rush hour problems to suburban communities, if suburban work centers are utilized, instead of downtown office and commercial concentrations.

One method potentially useful in determining the susceptibility of communications technology to the replacement of physical transportation involves a careful analysis of the flow of persons, information, and goods to, from, and within carefully selected representative industrial, commercial, and residential establishments. In essence this is a systems approach to all forms of internal and external interactions involving an establishment, although in this case we are primarily interested in external interactions. The flow of persons, information, and goods to and from an establishment (in this case, either a commercial or an industrial one) can be thought of as follows

a. Flow of Persons (to and from an establishment)

(1) employees, whose jobs involve:

(a) information processing

(b) commodities handling

(c) information processing and commodities handling

(2) customers (or clients, salesmen, etc.), who desire

(a) information only (e.g. persons who look, but do not make a "carry" purchase)

(b) commodities handling (e.g. a purchase by a customer, an "on-premise" service of some nature, etc.)

(3) "service" personnel

(a) information

(b) commodities handling to or from (e.g. delivery of merchandise, rubbish pickup, etc.)

(c) service with equipment handling, but goods not left on premises

b. Flow of Commodities (to and from an establishment)

(1) commodities handling to by delivery and service persons, employees

(2) commodities handling within

(a) commodities retained by service personnel

(b) commodities consumed on premises

(3) commodities handling from by customers, employees, service personnel

c. Flow of Information (to and from an establishment)

(1) "physical" (mail, publications, paper work, magnetic tape, etc.)

(2) "audio" (radio, telephone)

(3) "visual" (teletype, telegraph)

(4) "audio and visual" (closed circuit television)

2. If the substituting of communications for transportation is to be achieved, it must clearly be more economical than present or proposed physical transportation in terms of direct cost, time, and comfort and convenience, assuming momentarily no technical limitations on the extent of communications or equipment available. This must be true for the two parties involved; the individual and the commercial or industrial establishment. Whether a particular form of communications is economically substitutable for physical transportation in a particular application would require a specific economic analysis. In general, larger time and distance savings will permit a more extensive and sophisticated substitution of communications for transportation (e.g., intercity business trips are potentially more prone to replacement by a new form of communications than are intra-urban area commuter work trips or trips related to business). An economic analysis for determining the substitutability of communications for transportation might include the following basic steps.

a. Determination of the costs associated with abstracting the required information from the original source (magnetic tape, paper, microfilm, etc.)

b. Determination of the costs associated with the:

   (1) transmitting of the information by communications

   (2) transporting the information

c. Determination of the gains or losses, associated with b. (1) and b. (2) above, in:

   (1) quality or fidelity (including accuracy, legibility, readability, etc.)

(2) reliability

(3) security

(4) time

d. Determination of the costs associated with various types of new equipment in terms of its:

(1) technical characteristics

(2) initial, volume production unit costs of transmitting/receiving units

(3) maintenance, operating costs of transmitting/receiving units

(4) material, installation, maintenance, and operating costs of inter-machine transmission facilities

3. In order for communications to replace transportation in the future, it must have one or more of the following technical characteristics, in varying degrees.

a. Audio transmission

b. Visual transmission

c. Limited manual control (e.g., signing one's signature to a visually transmitted letter)

d. Time storage (storage of audio and visual aspects of communication for delayed transmission)

e. Simplicity, flexibility, reliability, inexpensive to manufacture, operate, and maintain

4. The following social characteristics must also be present.

a. Communications, reduced traveling (whether individual remains at home or travels to a suburban work center), working atmosphere, etc., must be such as to offer increased personal and social satisfaction over personal face-to-face contact with

its resulting trip making.

b. Full realization of the time and cost of present travel, and the benefits accruing to the individual by the substitution of communications for transportation.

c. Since the number of hours worked per week is becoming steadily shorter, time savings brought about by communications will probably be added to leisure time.[4]

d. A person-reaching-person interchange of information must become socially acceptable as part of the normal way of life.

Implications to Transportation Planning and Traffic Engineering

How would a substitution of communications for transportation affect the field of traffic engineering? Since this is a very real question, a few of the more important implications are briefly explored below.

First, it cannot possibly make our present investment in transportation facilities obsolete. Any substitution of the type described is necessarily gradual. The rate at which this substitution will occur is a direct function of developments in technology, communications and transportation economics, and social acceptance by the general public. Therefore, its primary effect will be to modify long-term physical transportation demand characteristics in a manner barely noticeable to traffic or transportation engineers.

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[4] In other words the only savings accruing to the employer will result from greater productivity during business hours. Time savings would accrue to the employee, based on precedent over the past years. Cost of communications would probably be borne by the employer, with the employee pocketing the savings in transportation expenditures.

This leads directly to the second implication. Acceptance of the hypothesis that this substitution phenomenon is indeed occuring implies that family income, automobile ownership, and urban residential location do not entirely account for trip generation rate variations. In other words, time variations in trip generation rates are partially explainable by developments or advances in communications and transportation technology and economics. Therefore, a substitution of communications for transportation does indeed modify our present trip generation concepts.

The potential interchangeability of communications and transportation does encourage traffic engineers to make a more fundamental, comprehensive examination of observable urban person and goods movement. This substitution possibility does not lead solely to a theoretical academic exercise, but underlies the importance for engineers to deeply explore and understand the reasons for and the amount and characteristics of person and goods movement. Its salutary effect is measured by its basic rather than superficial approach to physical transportation, an undertaking long needing dedicated research efforts. Much can be gained through a comprehensive, cooperative research program on the described substitution phenomenon by the communications and transportation industries. This would undoubtedly lead to more accurate and reliable forecasting techniques and improved transportation and communications planning.

One additional and perhaps the broadest implication is the possibility of more effective and economical allocation of our financial resources based on a better understanding of the role of communications and transportation, in part brought about by the study of the potential substitutability of communications for transportation. It certainly could reshape our present concepts on the function, arrangement, and constituents of cities and our planning for their renewal and expansion.

These have been just a few of the possible implications. One does not have to tax his imagination far to draw others. Traffic engineers could profit considerably by seriously pondering these and other implications.

Conclusion

As stated in the introducing section, most of the material presented here is hypothetical in nature. Documentary evidence is needed which will either clearly substantiate or reject the above hypotheses. Careful, detailed, systematic research is the only known method through which the answers can be obtained. The groundwork has been laid. It must be supported or rejected by unbiased and accurate survey data properly analyzed and processed. Traffic engineers have a vital stake in research efforts into the substitutability of communications for transportation, as the outcome of research efforts may definitely alter future traffic and transportation demands, operations, and plans.

Indicates how systems might be applied to C.D. Problems.

Urban Research Methods Seminar

S. D. Marquis
Feb. 25, 1963

URBAN COMMUNICATION FLOW ANALYSIS

1. Urban can have narrow meaning (just densely settled and built up area) or broad meaning (urban re gion, including hinterland of central city). The broa der meaning is implied here.

2. Communica tion can also have narrow meaning (just messages) or broad meaning (including transportation or trans mission of people, materials a nd goods, fluids, energies, messages, and funds). The broader meaning of communication is also implied here.

3. Analysis of flows (movements through space of people, materials and goods, fluids, energies, messages, a nd funds) is suggested as a meaningful method for understanding some of the major interactions between human, man-made, and natural components of urban regions.

4. These flow s are major characteristics of the operations of "man-machine-resource" systems in urban regions. Can study communication and transportation flows as a major kind of linkage for interaction between components of subsystems and between separate subsystems in the urban region.

5. Flows can gene rally be described by the following pa rameters:
   a. Location of start and end points and routes. — nodes
   b. Flow content (people, etc.) —
   c. Direction of flow —
   d. Times of starting, flowing, ending —
   e. Rates of flow —
   f. Periodicities —
   g. Quantities of flow —

6. Most flow systems include: collection, storage, combina tion, transformation, trans mission, distribution, reception.
   a. Message flow systems (and some others) take the form of
      "sender - content - channel - receive r"
   b. Passenger transportation systems as variant, with form of
      "origin - trip - route - carrier - destination"

7. Flow systems have various kinds of "nodal" points:
   a. Start or end points (terminals, collection or reception)
   b. Storage points
   c. Combination or tra nsformation points = e.g. coal → steam → electricity.
   d. Transhipment or interchange points = e.g. shipping to railroad
   e. Distribution points = e.g. "nearest neighbor theory"; land use map indicate a nodal points & their distribution. A house is an end point to water, elect., gas, mail, telephone, etc.

8. Some flow systems have "open network" structure or form; others have "tree and branch" form; still others ha ve "closed loop" form.

9. Flow systems can be studied at both aggrega te and detailed levels:
   a. Aggregate inputs and outputs for total urban regional system
   b. Internal inputs and outputs and interchanges between subsystems
   c. Detailed inputs and outputs of subsystem components (human, man-made, and natural)

10. Flow systems can be studied with flow accounts or flow charts:
    a. Flow accounts: Aggre gate data on total system inputs and outputs
       Interna l inputs and outputs of subsystems (regional input-output analysis)
       Detailed inputs and outputs of specific components
    b. Flow charts: Aggregate - schematic diagrams of total system inputs and outputs with general locational relations.
       Internal - schematic diagrams of subsystem inputs and outputs with locational relationships
       Detailed - mapped location and direction of input and output flow s of subsystem components

11. Some flow channels are flex ible, while others are rigid:
    a. Some channels fixed in specific routes, others can alte r routes
    b. Some channels can handle several types of flow s (people, materials)
    c. Some channels can handle two way flows, others only one way.

12. Can study flow s in both temporal and spatial dimensions:
    a. Temporal - Timing of start and en d, duration, periodicity, trends
    b. Spatial - Location of start and end, route, direction of flow.

13. Can study interceonnections and transformations of flow types:
    a. Some flows substitutable for others (messages for people)
    b. Some flows tra nsformable to others (coal to steam to electricity)
    c. All flows dependent on other flows (people flow s dependent on flows of energy, messages, funds)
    d. All flow s dependent on information flow s (information related to knowledge and skills affecting technological development)

14. Can study relationships of flows a nd flow systems to growth and form of urban region (need to expand flow s - linear - faster than areas or volumes of urban regional development?)

15. Can study relationships between flows and the form and location of nodal facilities (land uses, buildings, structures) and channel facilities.

16. Can study movements through space as one major parameter of human interaction that is only dealt w ith in limited ways so far:
    a. Many existing flows ignore specific route (desire lines) or direction (traffic flow s) or actual type of flow (traffic flow maps include people, materials and goods without separation).
    b. Many existing flow accounts and maps deal separately with one type of flow
       (1) Motor vehicle traffic separate from mass transit or railroad
       (2) Electric energy flow separate from fl ows of coal, gas, oil
       (3) Information flows separate from each other (mail, telephone, TV)
       (4) Water supply flow s separate from natural water flow s, storm drainage flows, sewa ge disposal flows

17. Flows related to "open system" chara cter of urban region - inputs and outputs to outside world. Balanced continuous growth as "steady state" for open urban regional ecosystems?

18. Pertinent theories and methods of flow analysis research: Communication content analysis, mathematical information theory, central place theory, nearest neighbor a na lysis, linear graph theory, trip generation and traffic flow, electric network theory, hydrology and fluid flow, inventory and queing theory, regional accounts, input-output analysis, linear programming, natural ecology, general systems theory, network planning, and others.

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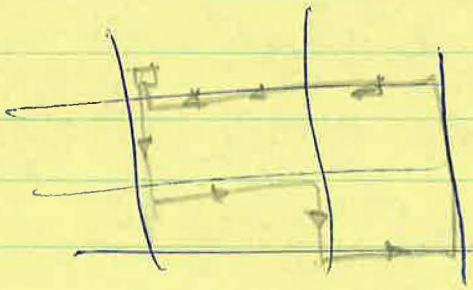
Stew Morgan's

Point 8

A general consideration
= open network
= tree & branch form
= closed loop form
e.g. a school bus route



Open network systems make possible for continual expansion -
e.g. in highways

Point 9

Flows need to be examined at aggregate & detailed levels.

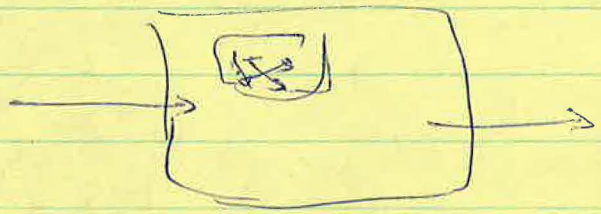
= at aggregate level, measure the total inputs & outputs.
= comes close to the account system.

= at detailed level.
within the "black box" components have inputs & outputs.

Point 10

Flow accounts + flow charts.

=



e.g. 90,000 dwelling units in Tri-County.

- each of these ~~dwelling~~ dwelling are end points for elect, gas, tele. etc. but also beginning or generating points for trips, auto flows, etc.

Some graphics showing the flows.

1. City flow
2. Gross national produce (see my U.S.A. dimensions),
3. Input - output account (econ.),
4. Example of crops to dairy + livestock industries.

   Annual Rept 1954 - Fed Res. Bank of Chicago. Mid. Agri.

5. River flows (Tri-County Rpt),
6. Transportation flows (Tri-County Rpts)

   Freight
   Air
   Bus
   auto

Point 10

Flow accounts + flow charts.

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4. Example of crops to dairy + livestock industries.

   Annual Rept 1951 - Fed Res. Bank of Chicago Mid. Agri.
5. River flows (Tri-County Rpt),
6. Transportation flows (Tri-County Rpts)

   Freight
   Air
   Bus
   auto

Point 17

11c. →

Whenever you find a one-way communication flow, you will probably find a "feedback system" on another channel.

Point ~~8~~ (14)

1. Linear proportion grows more rapidly

2. $\sqrt[3]{\ }$ root low. (Look up Mason Haire "Organizational Theory")
The flow channels must be multiplied ~~most~~ more rapidly than the area ⓒ or linear ~~&~~ growth.

→ Look into Rice,

Point 16

The concept of "desire lines" of traffic flows.

Ratio of Basic / Nonbasic

B = no. of ppl in Olds
Non = Service Re above.

Home Hoyt

1950 — 60
53-6

John Alexander

~~Geographical Rev.~~
Econ Geography 1953-6

Note on the Basic - Nonbasic ratio

recap.

1 : 2.35

Fortune Mag : Osceola vs. United States,
April 1938
Economic Analysis

C – 4

7

A Conceptual Model for Communications Research

BRUCE H. WESTLEY
and MALCOLM S. MacLEAN, JR.

Communications research and theory have blossomed from a variety of disciplinary sources in recent years. People probing the communications area have here focused on theoretical issues and there on "practical" concerns. Thus, one finds today a jungle of unrelated concepts and systems of concepts on the one hand and a mass of undigested, often sterile empirical data on the other.

In this paper, we are trying to develop a single communications model which may help to order existing findings. It also may provide a system of concepts which will evoke new and interrelated research directions, compose old theoretical and disciplinary differences, and in general bring some order out of a chaotic situation. Clearly, we do not propose here a full-blown theory of mass communications, but rather a paradigm or model as a preliminary orientation to a theoretical system.

Can a simple, parsimonious model be built capable of drawing together many of the existing approaches to mass communications without serious loss in utility?

FROM FACE-TO-FACE TO MASS

First, let us look at a simple act of communication. Person *A* transmits something about an object *X* to person *B*. Newcomb has found this simple model of interpersonal communications useful in the study of roles and norms. He says that, when *A* communicates to *B* about *X* (other things being equal), systematic changes in the cognitions of the system can be predicted. For example, if *B* likes *A* (or at least does not dislike him), *B*'s perception of *X* will be more similar to *A*'s after than before the communicative act.

This model frees one from the limitations of either the personality or social systems as such. Can it serve as a guide to both face-to-face and mass communications? Need the extension from the simple communicative act to the mass communicative act destroy its system character?

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Two basic distinctions between face-to-face and mass communications are suggested: Face-to-face communication involves more sense modalities. It also provides immediate [illegible] information from B back to A about the change [illegible] other words, more senses (and kinds of simultaneous stimulation) and more person-to-person act than in any other situation. Thus, A has a [illegible] effect. He can clear impressions he gets through one sense with those he gets through another. And A has the advantage of learning B's response almost immediately — for instance, "message received."

Mass communications, then, differ from face-to-face communication to the extent that (a) the number of modalities tends to be minimized and (b) "orientative" feedback is minimized or delayed.

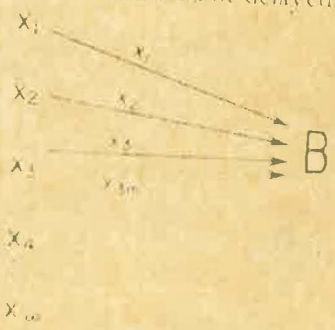


Figure 1. Objects of orientation (X_1 . . . X_n) in the sensory field of the receiver (B) are transmitted directly to him in abstracted form (X_1 . . . X_n) after a process of selection from among all Xs, such selection being based at least in part on the needs and problems of B. Some or all are transmitted in more than one sense (X_m, for example).

Now for a look at X, which may be taken as an "object of orientation." From the standpoint of B, the world consists of a confusion of X's. And these X's may include As. B has within his sensory field an infinity of potential Xs. He has learned that in order to maximize satisfactions and solve security problems he must orient toward Xs selectively. But the nature B, Newcomb emphasizes, does not orient toward X alone, but tends, in the presence of an A, to orient simultaneously toward both A and X. This means that he comes to orient toward an X not alone on the basis of its intrinsic capacity to provide satisfactions and help solve problems but also with respect to the relationship between A and X. This also means that A and X relate systematically to B.

Let us assume that an X is any object (or event) that has characteristics capable of being transmitted in some abstracted form. Let us assume further that a system has a need for transmissible messages—as a means of orienting itself in its environment and as a means of securing problem

learning theory, will tend to return to those Cs which have provided past need satisfactions and problem solutions.

C, then, is capable of serving as an agent for *B* in selecting and transmitting information [text illegible] relationship). He does so by

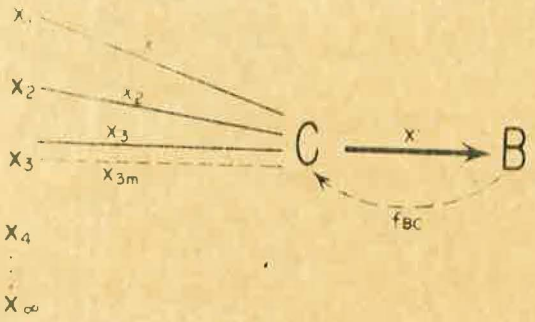


Figure 3. What Xs B receives may be owing to selected abstractions transmitted by a non-purposive encoder (C), acting for B and thus extending B's environment. C's selections are necessarily based in part on feedback (f_{BC}) from B.

means of symbols expressing shared meanings about Xs through channels that provide connection between *X* and *B*. And he does so in circumstances where such a connection is otherwise impossible for *B*. Thus *B* has a basis for increasing his security in the larger environment and for gaining increased need satisfactions. In other words, *the effect of the addition of the C role is to provide B with a more extended environment.*

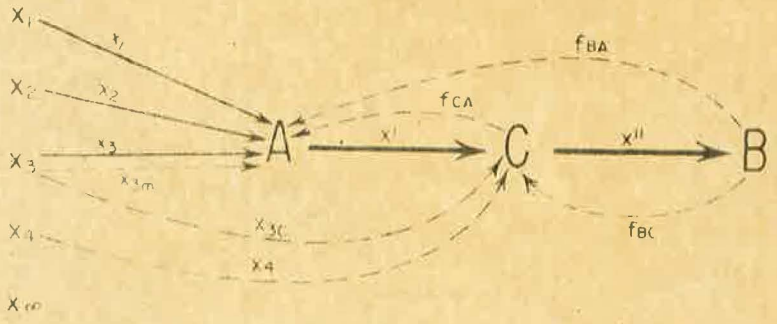


Figure 4. The messages C transmits to B (X'') represent his selections from both messages to him from A's (X') and C's selections and abstractions from Xs in his own sensory field (X_3, X_4), which may or may not be Xs in A's field. Feedback not only moves from B to A (f_{BA}) and from B to C (f_{BC}) but also from C to A (f_{CA}). Clearly, in the mass communication situation, a large number of Cs receive from a very large number of As and transmit to a vastly larger number of Bs, who simultaneously receive from other Cs.

For Newcomb, *A* and *B* can only be persons. While we have tended to imply persons in these roles, it should now be made clear that we do not intend to confine the model to the level of the individual personality. The role of *B*, for instance, may be that of a person, or a primary group, or a total social system.

In stating that any "system" has need for transmissible messages as a means of orienting itself in its environment, it is meant that this statement be applied to a person, a primary group, or even a social system. Any of these levels can be plugged into the role of *B*. At the personality level, *B* can be the housewife, too busy to rush around the neighborhood in order to observe the details of her surroundings; in such a case the *C* function can be attributed to the neighborhood gossip, and transmits a limited portion of all possible messages supplying the information needs of *B*. At something like the primary group level, one can think of the relatively isolated frontier colony, which posted sentinels as *C*s to observe and report the condition of the environment by means of a special code such as a rifle shot and greeted eagerly another kind of *C*, the information-bearing circuit rider. At the social system level, a national state requires and maintains an elaborate network of *C*s performing such special information functions as that of the diplomatic service.

It might even be possible that the model holds for even "lower" levels than that of the personality. For instance, at the physiological level, it would appear that homeostasis requires some sort of "transmission" of "information" with respect to states of parts of the body.

Not only is the model highly general with respect to levels, it is highly general with respect to kinds of messages. Messages can be seen as either *purposive* or *non-purposive*. Other models have tended to obscure one or the other.

"PURPOSIVE" OR "NON-PURPOSIVE"?

A purpose message is one *A* originates for the purpose of modifying *B*'s perception of an *X*. A non-purposive message is one which is transmitted to *B* directly or by means of a *C* and in the absence of any communicator's intent to influence him. The absence of a communicator's intent to influence *B* transforms his act into an *X*. When a person says something he hopes will reach another person's ears, he is an *A*; but if he says it without such intent and it nevertheless is transmitted to *B*, his act must be conceived of as an *X*, the selection and transmission having been performed by a *C*. The reasons we consider this distinction to be crucial for mass communications theory will be discussed below.

Messages are transmitted in codes (symbol systems). But this model is by no means limited to the most obvious ones—linguistic systems. In fact,

as Newcomb has already emphasized, the crucial characteristic is the **shared meanings** associated with symbols. Such symbols can take virtually any form, so long as and to the extent that there exist shared meanings and that they are transmissible. Such shared meanings surrounding symbols can be either *affective* or *cognitive*. Language has both affective and cognitive elements. Poetry, for instance, emphasizes the former. This emphasis is, of course, characteristic of all the arts. For instance, modern artist *A* in communicating with a series of *B*s casts his message in a symbol system which is shared, even though with only a few of them, those *B*s who share it or part of it will attain satisfaction from the communication of an affective state; those who cannot decode the message but attempt to do so will probably be frustrated in the attempt and express hostility toward the message, or the communicator, or conceivably even the gatekeeper.

The example above leads into further illustration of how the model deals with **"special publics."** These are illustrated by the immense segment of the media consisting of trade publications, scholarly journals, hobby and craft media, house organs, and the like. These are often defined out of the area of mass communications, usually on the grounds of audience size; and this in spite of the fact that some of these special interest publications media shade off from the specificity of the *Turkey Grower's Gazette* to attain circulations in the millions. The fact would seem to be that these the generality of *Holiday*, suggesting that decisions as to what is "mass" and what is not mass must necessarily be arbitrary.

The present model requires no such distinction. Our *B*s vary in the degree to which they share common problems. Common problems imply the necessity of attaining communication with common *X*s. Media serving to bring such *X*s to such *B*s arise out of the perceptions by *C*s of the existence of just such a need. Special symbol systems are developed to maximize transmission.

It will be noted that we have consistently referred to both **"need satisfactions"** and **"problem solutions."** These concepts relate directly to the "immediate" and "delayed" rewards of Schramm which seem to us to be provocative and potentially fruitful. Building on the two-factor learning theory of Mowrer, Schramm proposed a "reader reward" basis for characterizing the content of news stories. The correspondence is, of course, between his "immediate reward" and our "need satisfactions" and between his "delayed reward" and our "problem solutions."

FEEDBACK

Another concept crucial to the model is that of "feedback." In the first place it should be clear from the foregoing that it is feedback that assures the system character of the *ABX* (or *ABCX*) relationship. If *A* is to utilize

his experience in influencing *B*, he must have information about any changes in the condition of *B* attributable to his communications. *C* is equally concerned with effects on *B* if he is to make realistic adjustments in his role as *B*'s "agent." Such *A*s as advertisers facilitate feedback by means of elaborate market research; public relations men obtain feedback by means of public-opinion polls and other devices for determining the effects of their messages. Such *C*s as newspaper publishers sponsor readership surveys and, more recently, reader motivation studies to estimate and predict reader response. Radio's concern with "fan mail" and popularity ratings is well known.

Although feedback originates with *B* under most circumstances, it need not be assumed that *B* is necessarily trying to communicate back to *C* or *A*. When he does try to do so, we may think of this as ***purposive*** **feedback.** This is the case when an angry reader writes a letter "straightening out" the editor on some favorite issue. But there are also many ways *B* can feed back without intending to. These we will call ***non-purposive*** **feedback.** When a television fan decides to try a well-advertised detergent, his purchase becomes part of the data of a market survey, even though he may not have intended to let the sponsor know he had won a convert.

OTHER MODELS

In the final analysis the worth of such a model as this lies in its heuristic value. In view of the fact that several other models already exist in this field, it is reasonable to ask why another is necessary. A brief look at some others may be in order.

Perhaps the most pervasive of existing "models" is that of Lasswell: "*Who* says *what* through *what channels* to *whom* with *what effect*." The difficulty here is that the model seems to demand the presence of a communicator—the *who*—and to imply that his communication is a purposive one. It is no accident that our model has included the non-purposive case, transmitting *X*s to *B*s by the way of *C*s in the total absence of *A*s. The fortuitous origination of a great deal of the news material transmitted in all media seems to demand a place in the model. There is also an unidirectional implication in the Lasswellian formulation that ignores feedback phenomena.

The information theory-cybernetics paradigm has excited some interesting theoretical contributions but would appear to have certain drawbacks. It, too, appears to require the presence of a communicator, although not necessarily a purposive one. In addition it poses all the problems of a "borrowed" model. Taylor's use of the redundancy concept would appear to be an example of an exact mapping from mass communications phe-

nomena to an element in the model. But such precise correspondences appear to be rare, and mappings become contrived and tenuous. The model strains common knowledge, for instance, in assuming perfect correspondence of symbol systems encoded and decoded.

SUMMARY

A conceptual model of the total communication process has been presented in the belief that such a model will prove useful in ordering existing data in mass communications research, point to areas of strength and weakness in our knowledge, and stimulate further efforts. The model is intended to be sufficiently general to treat all kinds of human communication from two-person face-to-face interaction to international and intercultural communications. It assumes that a minimum number of roles and processes are needed in any general theory of communications and attempts to isolate and tentatively define them. It must not be viewed as a theory but as a preliminary step to the construction of a general theory.

The principal elements in the model are these:

As. (Advocacy roles). This is what is usually meant by "the communicator"—a personality or social system engaged in selecting and transmitting messages *purposively*.

Bs. (Behavioral system roles). This is what is usually meant by "the receiver," "the public," etc.—a personality or social system requiring and using communications about the condition of its environment for the satisfaction of its needs and solution of its problems.

Cs. (Channel roles). Often confounded with *As*, *Cs* serve as the agents of *Bs* in selecting and transmitting non-purposively the information *Bs* require, especially when the information is beyond the immediate reach of *B*.

X. The totality of objects and events "out there." X^1 is these objects and events as abstracted into transmissible form: "*messages*" about *X*s and *A*-*X* relationships (such as "opinions").

Channels. The means by which *X*s are moved by way of *A*s and/or *C*s to *B*s. Channels include "gates" manned by *C*s who in various ways alter messages.

Encoding. The process by which *A*s and *C*s transform *X*s into X^1s. *Decoding* is the process by which *B*s interiorize messages.

Feedback. The means by which *A*s and *C*s obtain information about the effects of messages on *B*s.

C - 30

Operations Research
extracted Dec. 27, 1962

Extracts from:

David W. Miller and Martin K. Starr, Executive Decisions and Operations Research, Prentice-Hall, 1960.

p. 11: The organization as a communication network.

A communication network is simply a collection of points between which information is transmitted. Any telephone system provides a good example of a communication network.

= The reason for isolating or abstracting certain characteristics of an organization in the form of a model is to gain an understanding of the effect of the abstracted characteristics on the total organization.

= A model is a simple way of thinking about an organization by abstracting only a few aspects of the organization.

Information: p. 12.

(This includes not only verbal and written communication.) Blueprints, budgets, part numbers, and the like are another form of information. Materials and parts flowing through the factory or warehouse are legitimate units of information. In fact, any charactristic of an operation that can be observed and recorded constitutes potential information for the communication network.

From this standpoint the production of an item is represented by the transmission of the information that that item has been added to inventory. The sale of an item is represented by the transmission of the information that certain sum of money has been added to the organization's bank account. Similarly, most of the routine activities of the organization will have their information-flow analogs.

Viewed in this way any large organization is a tremendously intricate system of communication links through which an enormous amount of different kinds of information is constantly flowing.

Input-Output and the Black Box, p. 12

(The environment of the organization contains information. Suppliers, buyers, competitors, tax agencies and other outsider units are sources of information.)

The information that comes into the organization from the outside world is the input to the company.

In response to the input the company buys materials, hires labor, prices its products, advertises, floast stock issues, and so forth. The organizational presponses are the outputs.

The "Black Box." It is useful at times to treat the organization as though it were covered by a black box and therefore completely unobservable. The "black box" is a convenient term to describe a system (organism or mechanism) whose structure is unknown--either because it cannot be observed or because it is too complex to be understood.

How well can the content of the organizational black box be inferred from a knowledge of the inputs and outputs?

Can reasonable predictions be made of the outputs that would occur from some hypothetical set of inputs if the contents of the black box cannot be inferred?

answer: a qualified "yes"

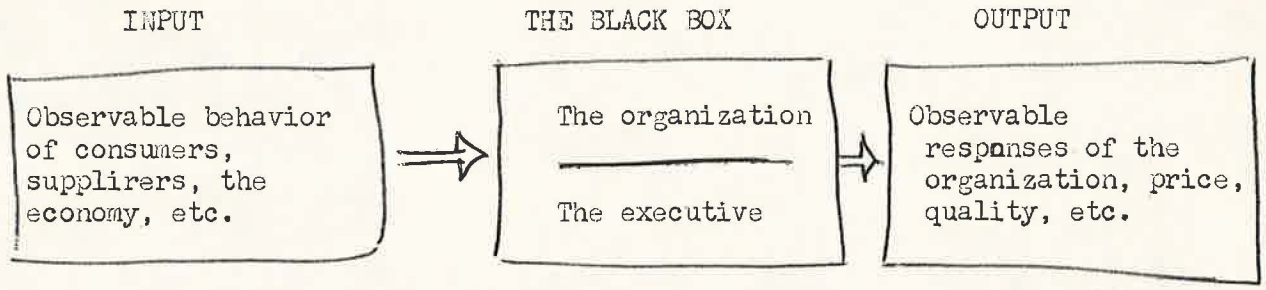


Figure 2.1 (a) Input-output model of the organization

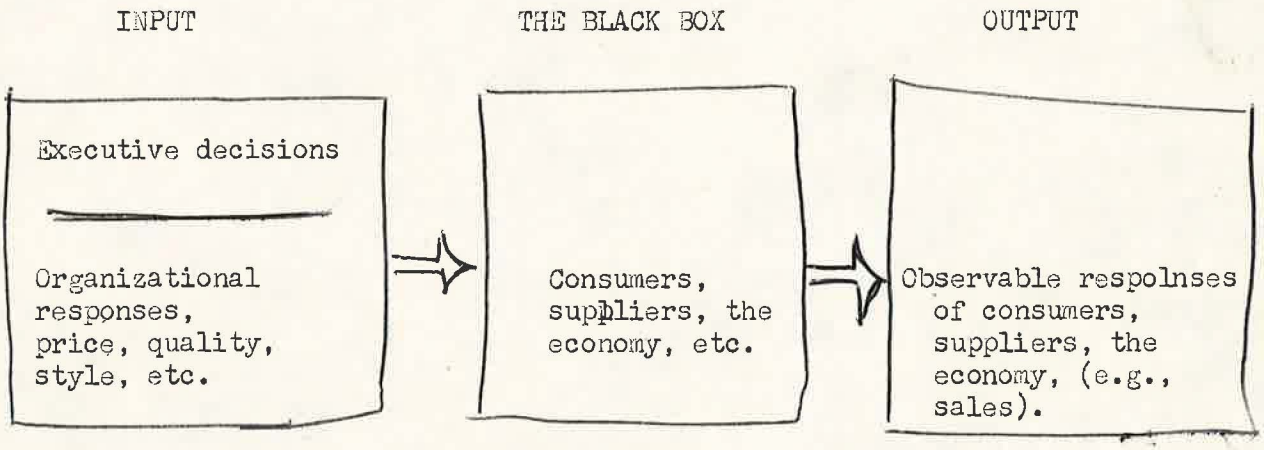
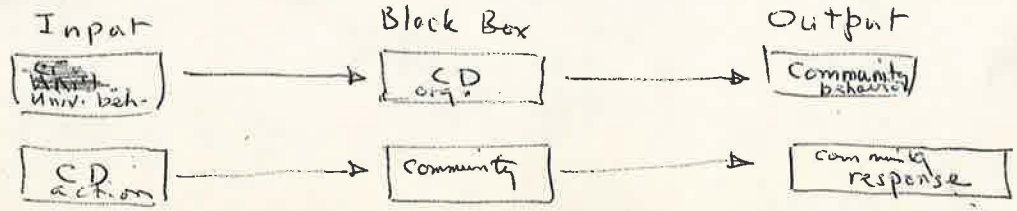


Figure 2.1 (b) Input-output model of executive control.



Explanation of the above figures: p.13

From an exaecutive's point of view the black box does not cover hiw own organization, and he hardly likes to think that it (the box) covers his behavior (as in Figure 2.1 (a)). Instead, he thinks of the black box as covering the outside world (as in Figure 2.1 (b)).

The output shown in Figure 2.1 (a) is transformed into the input of Figure 2.1 (b), where management controls the inputs.

When the black box covered the organization, only the organizational output could be observed. This output was all doing and contained no deciding to do. (This "doing" and "deciding" set refers to a distinction between chiefs and Indians. The chiefs do the deciding and the indians the doing.)

In fact, deciding was the circuitry that was hidden by the black box.

By transforming to Figure 2.1 (b), we have exposed the decision process to bring it into the realm of observable information.

Decision defined:

From the standpoint of a communication network a decision consists of instructions from one point in the network to other points. p. 13

As a result of the decision these other points will process the information they receive in a different manner or will change the rate of flow of information passing through them.

Or, of course, the decision may result in the establishment of new points in the communication network.

Information Storage and Memory

1) A specific decision will depend on the analysis, interpretation, and evaluation of the information available to the decision-maker.

= part of the information that comes to a decision-maker comes to him from storage. (E.g., file cases filled with information). (E.g., in the memories of its workers).

2) A decision-maker can be deluged with information, if he does not know how to select infomration that is pertinent to his problem.

= For this reason, information must be carefully categorized.

Decision-problems exists at to wxt:
= what information should be collected and in what form.
= where and how long it should be stored;
= when ~~xxshouldxdx~~ and by whom it should be called for;
= how it should be evaluated;
= when it should be supplemented; etc.

(How should this storage problem be handled? The authors suggest that the executive should decide the policy; the Indians should do the collecting, recording, ~~dixpatchxing~~ dispatching, and storing of information.)

Information Feedback Channels, p. 14

1) Any decision that has been made may be countermanded or supplemented by subsequent decisions.

= any such change will, presumably, be based on additional information.

2) This additional information may result from the changes that stemx from the implementationx of the decision or it may result from sources extraneous to the implementation of the decision.

= To the degree that it is the former, the decision process is closely entangled with the doing.

= To the degree that it is the latter, the decision process is more independent of the doing.

3) To make this clearer, an additional element is needed, namely feedback. "This term is also derived from electrical engineering where it is used to denote an electrical ouptut which is fed back into the circuit from which it emanated."

= Figure 2.2 illustrates two different feedback connections (IV) and (V).

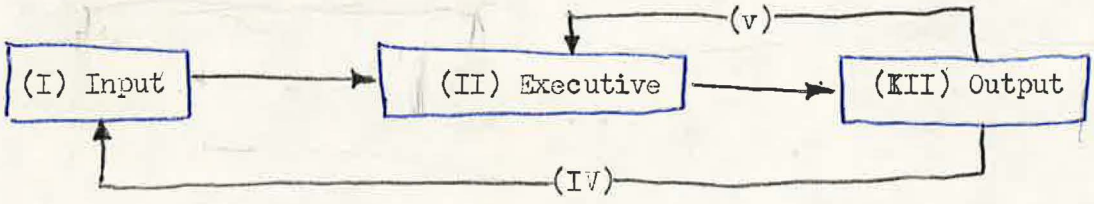


Figure 2.2. Input-ouput model of the organization with feedback channels.

4) We can now examine the implications of the feedback links, assuming that the executive occupies the position of the black box.

= For our purposes, the black box is not so opaque as to entirely hid the operations of the executive.

= Feedback channel IV indicates the executive's ability to call for certain inputs and to specify the form in which these inputs should arrive.

+ This matter was previously discussed in connection with memories and information storage.

= Basically, there are three types of inputs:
1. inputs what cannot be controlled.
2. inputs that are controlled by an outside agency with intelligence.
3. inputs that our executive can control.

5) Link IV is the channel through which the executive exercises whatever control he has over the inputs.

= Whenever feedback channel IV operates, we see that doing and deciding are implicitly bound together in a sequence: DECIDE → DO → DECIDE → DO, and SO On.

= The nature of organizational control requires that most outputs should be fed back for inspection, evaluation, and follow-up.

6) On the other hand, the executive responds to a great range of inputs that do not arrive via feedback channel IV. (E.g., maneuvers of competitiors, the changing situation of the economy, and a variety of random events).

= Inputs (of this kind) are examples of situation where the deciding and doing are separate!

7) Feedback channel V is required to show that an executive decision can result in an output that is capable of modifying the future behavior of the executive. (That is, the executive can decide to decide in a certain way in the future). A decision can alter the decision-maker's image (values and attitudes).

= in this case, the output does not affect inputs but symbolically achieves a rewiring of the not entirely opaque black box.

= The importance of deciding how to decide is not trivial...There are not pat solutions...but there is a methodology to help decision-makers.

8a)= To whatever extent the executive devotes his time and attention to this executive problem (deciding how to decide), he is relegating doing to other areas of the organization.

In consequence, we can say that only when Channel IV is operating are doing and deciding bound together within the executive province. p. 16

8) The input-output feedback model has helped to indicate the nature of the decision process and the limiations involved in separating it from other organizational processes. Let us consider a few practical examples in terms of the distinction between deciding and doing.

1. The lathe operator who decides to start his lathe will promptly reverse his decision if one of the cutting tools breaks. Clearly, this decision is completely found up with his doing.

2. The decision to build a new plant might be countermanded because of unforeseen difficulties in financing or because of unexpected changes in the over-all situation, but these are extraneous to the implementation of the decision. So this sort of decision could be legitimately treated separated from the doing.

3. A decision to increase production might be revoked because of a sudden slump in sales, which is extraneous to the implementation, but it might also be countermanded because of production-line difficulties, which are directly tied to the implementation. Here the validity of a separate consideration of the decision problem would depend on the point of view taken. In most organizations the decision-maker would be two different people, or at least it would be one man acting in the two different capacities of production and marketing management.

= This example should suffice to show that no one model is adequate to describe and categorize all decisions.

Cybernetic Systems, p. 16

1. When the input-ouptu model with feedback links is fully developed we enter the domain of integrated control systems, or cybernetic systems.

= The classic example of thermostat systems for house heating is given.

2. Previously, we acknowledged that the inherent circularity of such feedback systems (thermostat feedback) would make the separation of decision from actions purely arbitrary.

=In other words, the deciding and the doing are too closely related to permit a valid distinction between them.

3. However, the cybernetic model permits the separation of deciding and doing by calling for decisions which are made only once and which determine the design of the organizational process.

   = It can be recognized that the input arriving via the feedback channel become repetitive and that many of these inputs call for repeat decisions which should not require executive time.

   = Many organizational designs (plans) permit these feedback inputs to by-pass the executive and to pass instead across an assistant's desk.

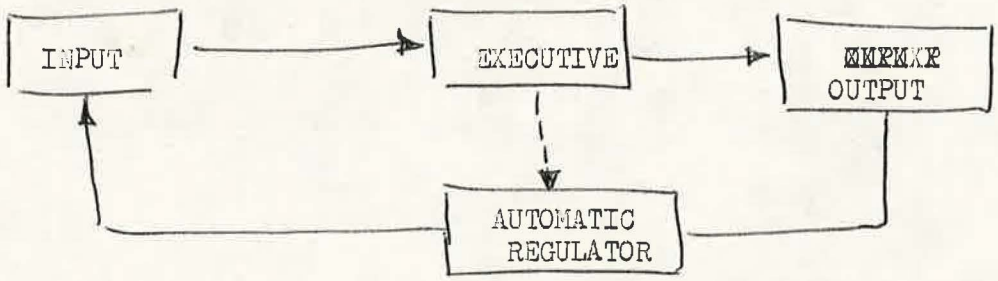


Figure 2.3. Automatic decision-making by-passes the executive but carries out his instructions.

4. In Figure 2.3 we see that the executive transmits decision criteria and opeational requirements for the construction of an automatic decision-maker (or regulator). After that, the executive is relieved of the responsibility of employing the same decision criteria every time a given situation repeats itself.

   = By tranmitting deicision instructions to subordinates in the form of policy and operating rules, the executive achieves almost the same degree of freedom (as having an automatic regulator).

5. (The following "decision criteria" for the simple thermostat provides analogues for decision makers:)

   1. The desired temperature gradients in the heated space.
   2. The allowable flucuations in temperature under conditions of steady demand, or sudden changes in demand (such as a door opening).
   3. The location of the thermostat to deliver the required temperatures.
   4. The cost of installation.
   5. The reliability of the error-sensing device.
   6. The cost of maintaining the installation.
   7. The element under control (fuel or heat valve or whatever).

The Nature of a Decision, p. 18

= There is general dictionary agreement that a decision is a conclusion or termination of a process.

However, the end point of one process can also be viewed as the starting point of another. (Like the hall of mirrors, where each mirror reflects its image onto an adjoining mirror in a seemingly endless progression).

= Miller and Starr's definition: p. 19

"What, then, is the decision problem? Simply the determination of how people should proceed in order to reach satisfactory or best decisions. In other words:
= what methods can be used;
= what questions should be asked;
= what steps should be take;
= what are the best decisions, etc.

A Logical Model for Decisions, p. 21

Why are decisions made?

1. Decisions are made because the decision-maker wants to achieve something (a goal, purpose, objective) that is called here a "state of affairs."

What do they involve?

2. These decisions involve:
= a choice among two or more courses of action, each course is a strategy.

= Any specific utilization of resources under the decisio-maker's control is a strategy.

= His decision, then, will consist of the selection of one of his available strategies.

3. Why do many the decision-makers not achieve their objectives?
= There may be factors affecting the achivement of objectives, factors which the decision-maker cannot control.

= These uncontrolled factors are:

1) state of nature: weather conditions, etc.
2) competitive strategies: these are the actions taken by the decision-maker's competitors who prevent him from achieving his success.

4. Summary: "The decision-maker wishing to achieve some objective selects a strategy from among those available to him. This strategy, toether with the State of Nature that exists, and the Competitive Strategy that occurs, will determine the degree to which his objective is obtained." p. 23

Prediction and Control, p. 25

1. From the input-output model, we learned that certain elements can be controlled by the decision-maker.
   = The decision-maker's strategy is a plan of control for these variables.
   = The only reason for controlling variable (elements) is to achieve objectives.

2. Obviously, a good strategy includes the right variables, which means those variables which determine the degree of attainment of the objective.

   = There are many examples of situations in which either the wrong variables are controlled, or not enough of the right ones are considered.

3. (Mention has been made of uncontrollable variables, e.g, the State of Nature).

   The decision-maker has the responsibility of examining all noncontrollable variables that affect his attaining the objectives.

   = Although he can exercise no control over these variables, he can make predictions about them.

   = The farmer can analyze weather records in order to estimate the kind of weather he is likely to experience.

4. Therefore, a good strategy must not only include good control of the right controllable variables, but it must also be based on good precitions of the right noncontrollable variables.

   = Usually both states of nature and competitive strategies can be studied and estimates made to indicate that certain occurrences are more likely than others.

Nice problem to give to students:

Develop the input-output model for an electric typewriter.
How does this differ from a mechanical typewriter?
What control is exercised over the inputs?
What feedback exists?
Transform the output into the input of a corresponding system.

TOWARDS A BEHAVIORAL THEORY OF COMMUNICATION*[1]

RUSSELL L. ACKOFF

Case Institute of Technology

This paper presents a conceptualization of information as related to the decision problems of the recipient. The orientation is toward a formal definition of behavioral elements in an individual's "purposeful state": specifically, these elements are his objectives, his valuation of each objective, his possible courses of action, the efficiency of each course of action in achieving each objective, and his probability of choice for each course of action.

The *amount of information* in a purposeful state is explicitly defined in terms of the probabilities of choice of the available courses of action. The amount of information in a *message* is defined as the difference between the amount of information in the purposeful state following the message, and the amount of information in the purposeful state preceding the message. The *amount of instruction* in a purposeful state is defined in terms of the efficiencies of the available courses of action; and the *amount of motivation* is defined in terms of the values of the objectives. The amounts of instruction and motivation in a message are defined, just as information is, by comparing the amounts in a purposeful state before and after receipt of the message.

The *value of a purposeful state* to an individual is defined as a function of the amount of information, the amount of instruction, and the amount of motivation in the state. This concept can be generalized to express the value of the state to some other individual.

Introduction

The significance of Claude Shannon's work in communication theory is such that anyone presuming to contribute to this theory is obliged to relate his work to Shannon's. In exploring this relationship it will be helpful to refer to Warren Weaver's masterful exposition of Shannon's work (9).

According to Weaver, "Relative to the broad subject of communication, there seems to be problems at three levels." These are

"Level A. How accurately can the symbols of communication be transmitted? (The technical problem.)

"Level B. How precisely do the transmitted symbols convey the desired meaning? (The semantic problem.)

* Received August 1957.

[1] This research was conducted under a grant from the Research Fund of Case Institute of Technology. The author is indebted to C. West Churchman, Michael H. Halbert, Joseph F. McCloskey, Leon Pritzker, John W. Tukey, and Arthur J. Yaspan for their criticism and suggestions. Their agreement with the author is not implied by this acknowledgment.

I would particularly like to thank Professor George A. Miller, who in his capacity as referee made a number of very helpful comments and suggestions. It was generous of him to permit his identity to be revealed to me. I am sorry if I did not treat all his suggestions with equal generosity.

"Level C. How effectively does the received meaning affect conduct in the desired way? (The effectiveness problem.)" (9:95–96)

Weaver classifies Shannon's work as follows:

"The mathematical theory of the engineering aspects of communication, as developed chiefly by Claude Shannon at the Bell Telephone Laboratories, admittedly applies in the first instance only to problem A, namely the technical problem of accuracy of transference of various types of signals from sender to receiver." (9:97)

He goes on to note, however, that "the theory of Level A is, at least to a significant degree, also a theory of levels B and C." (9:98)

The effort in this paper is primarily concerned with level C, the effectiveness problem. But the effectiveness problem is conceived here in more general terms than those in which it appears to have been conceived in Weaver's formulation. This effort can be characterized by the following objectives:

1. To identify the ways in which the receiver's behavior can be affected by a sender.
2. To construct measures of these effects.
3. To define and construct measures of effectiveness for these effects relative to the receiver's objectives and those of the sender as well.

The question, "What is communication?" will be considered in more detail here than is provided by Shannon and Weaver. A related question, "How does one measure amount of information?" is as critical here as it is in Shannon's theory. But "information" is given a considerably different meaning here than it receives in Shannon's treatment.

"The word *information*, in this [Shannon's] theory, is used in a special sense that must not be confused with its ordinary usage. In particular, *information* must not be confused with meaning." (9:99)

The meaningfulness and value of information *is* central in this discussion. "Information," according to Weaver, "is a measure of one's freedom of choice when one selects a message." (9:100) Here we shall develop a more general concept of information, but one in which the concept of "choice" is also fundamental.

The fundamental idea of this paper consists of the analysis of communication into three components: the transmission of information, instruction, and motivation and the definition of these in terms of a purposeful state. *The measures discussed are only intended to be suggestive.* They are not "best" measures in any sense of the word. I certainly hope to improve on them in the future. My hope is that—with what might appear like premature publication—I can encourage others, who are more qualified than I, to undertake the task.

An Apology

Few references are made in the discussion which follows to the work of anyone except that of Shannon and Weaver. This is, of course, unfair to many others who have worked on this problem, to many of whom I am indebted. My purpose, however, is neither to review the voluminous literature nor to evaluate it, but

rather it is to present an idea which has been "tested" on a number of persons better qualified in this area than I am. As far as I can determine the material presented here has not been presented before. To save space I do not make all the obvious and not so obvious connections to the work of others. In all honesty I must also admit that I have chosen this course to save work as well. The only ones who will be offended by such omissions are those already familiar with the field. For those who are not, Colin Cherry's recent work in this field (2) is recommended not only for its own sake but for its extensive bibliography on the subject.

Some Fundamental Concepts

Weaver defines communication as "all of the procedures by which one mind may affect another." (9:95) His and Shannon's discussion, however, is restricted to only one such type of procedure: the transmission of *messages*. Their use of the term "communication" conforms better with common usage than does their definition. For example, the man who produced the slide rule I use may affect my mental processes without that man communicating to me. In general, many who have shaped my environment or the instruments which I use have affected my mental processes without communication with me in the ordinary sense.

If communication is to be restricted to the transmission of messages, the concept "message" must be clarified. First, however, "the effect of one mind on another" must be translated into operational (i.e., behavioral) terms.

1. *A Purposeful State*

Communication is an activity in which only purposeful entities can engage. Purposefulness exists only if choice is available to the entity involved and if that entity is capable of choice.

A purposeful state (S) may be defined by reference to the following concepts and measures:

I: the individual or entity to which purposefulness is to be attributed.

C_i : a course of action; $1 \leqq i \leqq m$.[2]

O_j : a possible outcome or consequence of a course of action; $1 \leqq j \leqq n$.[2]

[2] I assume here that the C_i and O_j form finite sets. The C_i and O_j are not "given" by the state or by the entity I; they are conceptual constructs of the researcher. They are his way of looking at the state. In practical situations as a researcher I have never found it necessary to consider infinite sets or even large finite sets. In practice I have found it fruitful to classify the C_i and O_j by use of the Boolean expansion of the basic characteristics of action and outcome which are of primary interest to me. This yields an exclusive and exhaustive set of C_i's and O_j's. A discussion of this method of formulating the C_i and O_j can be found in (4).

It should be noted that the relativity of the definitions of the C_i and O_j to the researcher is not unique to this system. It exists in Shannon's as well. In one situation if I give you a yes-no question I consider you to have only a choice of two messages. In another I will take the *way* you say "yes" or "no" (e.g., pitch, hesitation, etc.) into account. Or again, if a telegrapher considers the choice between pressing the key with a finger on his left hand or his right hand, I need not consider this choice as relevant to my study.

P_i : the probability that I will select C_i in a specified environment, N; that is, $P_i = P(C_i/I, N)$.

E_{ij} : the probability that O_j will occur if C_i is selected by I in N; that is, the efficiency of C_i for O_j in N.

$$E_{ij} = P(O_j/C_i, I, N)$$

V_j : the value (importance) of O_j to I.

Clarification of some of these concepts is necessary.

2. *Courses of Action*

A course of action is not to be construed as mechanistically specified behavior. Variations in the action with respect to certain physical characteristics may not change the course of action. For example, "driving a car" may be designated as a course of action. There are many different ways of driving a car but it is frequently useful to group these into one class of behavior. Despite the variations within the class, it can be distinguished from other classes; for example, from "using a street car." A course of action may be specified with varying degrees of rigidity depending on the purposes of the research. For one purpose it may be desirable, for example, to distinguish between left-hand and right-hand driving. For another purpose it may be desirable to group the use of all self-powered vehicles into one course of action.

It should be noted that the problem of specifying a course of action is essentially similar to that of specifying a physical object. For one purpose an automobile may be considered as a unit; for another it is a composite of many other units (e.g., wheels, transmission, etc.), and for still another purpose it may be considered to be a part of a unit (e.g., a fleet of cars).

A course of action is said to be *available* in an environment if there is a probability of its being selected by someone, that is, if

$$\exists I_k : P(C_i/I_k, N) > 0.$$

An available course of action may have no probability of being selected by a specific individual under a particular set of conditions. Then it is not a *potential* course of action for him. This is equivalent to saying that a course of action, C_i, is potential to an individual in an environment if, for one or more sets of values of E_{ij} and V_j in N, P_i is greater than zero. Nevertheless, for some specific set of values of E_{ij} and V_j, P_i may be equal to zero.

The relativity of courses of action and outcomes should be noted. They are conceptual constructs which may be converted into each other depending on the interests of the researcher. For example, "sawing a tree" may be considered as a course of action which yields the "falling of a tree" as an outcome. But "felling a tree" may be considered as a course of action which can yield the outcome "clearing a path." Such relativity of concepts is common in all areas investigated by science and hence does not present any unique methodological problem in this context.

3. *Efficiency*

Many different measures of efficiency are in current use. It is fairly common to use some measure of the cost, time, and/or effort required to bring about a specified outcome (e.g., to complete a specified task such as "travelling one mile") as a measure of efficiency. It is also quite common to measure efficiency in terms of the portion of an outcome which is realized by the expenditure of a specified amount of money, time, and/or effort. For example, one can measure the efficiency of a machine tool either in terms of the number of units produced per dollar or in terms of the cost per unit. Thus efficiency is commonly measured either as (1) units of input required to obtain a specified output, (2) or as units of output obtained by a specified input. Neither type of measure is sufficiently general to be applied in all situations.

The input required for a fixed output and the output yielded by a fixed input are not constant. For example, the number of units made per hour by a machine varies from hour to hour and the miles per gallon obtained by an automobile also varies. Hence, for a fixed input various possible outputs exist to each of which a probability can be assigned. If, in the definition of a course of action, an input is specified then the efficiency of that course of action for a specified outcome can be defined as "the probability that the outcome will occur if the course of action is taken." This measure can always be applied in a purposeful state.

This measure of efficiency of a course of action depends on the environment and the individual involved. For example, use of skis may be efficient for self-transportation down a snow-covered hill but not so down an uncovered hill. Different individuals may ski with different efficiencies and the efficiency of the same individual may change over time (e.g., by learning). Consequently, the relevant time period, individual, and environment should be specified in designating efficiency.

4. *Value*

As in the case of efficiency there is no one measure of value or worth of an outcome that is generally accepted. Fortunately, however, such a measure is not necessary for our purposes here. Nevertheless, it is convenient to use some kind of standard measure wherever possible. A dimensionless measure of *relative* value may provide such a convenient standard. If the values (v_j) assigned to the various outcomes are all positive, a measure of relative value (V_j) for each outcome may be obtained by the following conversion:

$$V_j = \frac{v_j}{\sum v_j}.$$

Then, since

$$\sum \frac{v_j}{\sum v_j} = 1.0$$

it follows that

$$\sum V_j = 1.0.$$

The minimum relative value ($V_j = 0$) occurs only when the absolute value (v_j) is equal to zero. The maximum relative value ($V_j = 1.0$) occurs when all but one outcome has zero value.

In some cases negative measures of value are used (e.g., cost versus profit). The following transformation may be used in such cases:

$$V_j = \frac{v_j}{\sum |v_j|}.$$

In the discussion that follows we shall use the concept of relative value and assume that all V_j's are positive and, therefore, that $\sum V_j = 1.0$. All the results, however, are easily modified to cover the use of either absolute values or the case in which negative values are employed.

It is assumed here that no v_j can have an infinite absolute value. This assumption is not made lightly. It is based on an analysis of the meaning of "absolute value" which appears in (1). Following the argument presented there a value can approach an infinite magnitude only as an unattainable limit.

This "light" treatment of value theory is no more intended to imply that the meaning and measurement of value presents no problems than is my unsupported use of the term "probability" meant to imply that its meaning and measurement present no problems. This is no place to argue the issues of value theory. Churchman and I have done this in several places; most recently in (5). Churchman's manuscript in preparation (3) goes into these questions more deeply than they have yet been dealt with in print. Many of the problems and findings in Value Theory are presented in (10).

A purposeful state (S) may now be defined relative to the concepts which have been discussed. An individual (I) may be said to be in a purposeful state in an environment (N) if the following conditions hold:

1. There are at least two exclusively defined courses of action available in N; that is, in N for C_i, where $1 \leqq i \leqq m$, $m \geqq 2$.
2. Of the available courses of action in N, at least two are potential choices of I.
3. Of the set of outcomes (defined so as to be exclusive and exhaustive) there is one (say, O_a) for which two of the potential courses action (say, C_1 and C_2) have some efficiency; that is, $E_{1a} > 0$ and $E_{2a} > 0$. Furthermore, $E_{1a} \neq E_{2a}$.
4. The outcome relative to which condition 3 holds has some value to I; that is, $V_a > 0$.

This definition may be summarized less technically as follows: an individual may be said to be in a purposeful state if he wants something and has unequally efficient alternative ways of trying to get it.

If we consider an individual over a period of time it will be convenient to refer to the purposeful states at the beginning and end of that period as *initial* and *terminal* states, respectively.

The conceptual labors which have been involved in defining a purposeful state are necessary in order to make explicit the meaning of "one mind affecting

another," and for enumerating the various possible types of effect. As subsequent discussion will show, these effects may be defined in terms of changes in purposeful states. Before we consider such changes in detail, the meaning of a "message" should be explored.

5. *Message*

A message may be defined as a set of (one or more) signs. This definition is of little value without considering the nature of a sign. A sign signifies something to somebody; that is, it produces a response to something other than itself.[3] This may be put more precisely in terms of the following concepts and symbols:

x_i : an object, event, or property.

$x_1 \rightarrow x_2$: x_1 produces x_2 ; that is if x_1 is a necessary but not a sufficient condition for x_2 .

If x_2 is a change in a purposeful state of I, then x_2 is said to be a *response* of I to x_1 , which is said to be a *stimulus.*

Then, x_0 is a sign of x_1 if it produces a response (x_2) of I to x_1 ; that is, if $x_0 \rightarrow (x_1 \rightarrow x_2)$.

If, for example, "pointing to a chair" or saying "chair" produces in someone a (purposeful) response to an object (e.g., sitting down), then the pointing or statement is a sign of that object to the respondent.

Signs are of two types, natural and man-made. For example, a dark cloud is a natural sign of rain. The word "cloud," however, is a man-made sign of the object, cloud. Smoke is a natural sign of fire but smoke signals are man-made signs of many other things. Messages consist of man-made signs.

This brief definition of a sign raises many questions; for example, "What do such words as 'but,' 'if,' and 'or' signify?" These and other questions can and will be answered in a subsequent paper. In the meantime, however, it will be apparent to the reader that many, if not most, of the familiar natural signs (e.g., smoke, which is a sign of fire) and linguistic signs satisfy the definition given above.

Communication

Now we can make precise the conditions under which one individual, I_a , may be said to communicate to another, I_b . If an *individual I_b responds to a set of signs selected by I_a in a purposeful state, then I_a is the sender and I_b is the receiver of the message.*

Several aspects of this definition of communication should be noted. First, I_a and I_b may be the same individual. That is, a person may communicate to himself as in writing a "reminder" to himself. Secondly, the sender of the message need not intend or desire to communicate to the receiver in order to do so. The interceptor of a message, for example, is communicated to, although unintentionally. Thirdly, the sender and receiver may be widely separated in time and space.

Now we want to concentrate primarily on the communication received, that is, on the receiver.

1. *The Value of a Communication*

A purposeful state of an individual (I) is described by

1. the set of available courses of action, C_i ,
2. the set of possible outcomes, O_j ,
3. the probabilities of choice associated with the courses of action, P_i ,
4. the efficiencies of the courses of action for each objective, E_{ij} , and
5. the value of the outcomes to I, V_j .

Then, given the available courses of action and possible outcomes, the value of a state, $V(S)$, must be some function of P_i , E_{ij} , and V_j ; that is,

$$V(S) = f(P_i , E_{ij} , V_j). \tag{1.1}$$

The nature of the function, f, depends on the definition of the state's value. This value may be defined in several different ways; for example, in terms of expected return, expected gain, or expected loss. The discussion and measures that follow are independent of the definition of state value which is used. But for illustrative purposes we shall use "expected return" as the state value, that is,

$$V(S) = \sum_{i=1}^{m} \sum_{j=1}^{n} P_i E_{ij} V_j .$$

Since $P_i \leqq 1.0$, $E_{ij} \leqq 1.0$, then, if a measure of relative value is used in which $0 \leqq V_j \leqq 1$ and $\sum V_j = 1.0$, it follows that the minimum and maximum values which $V(S)$ can assume are zero and one, respectively.

Receipt of a communication involves a change in the receiver's purposeful state. Let S_1 represent the initial state and S_2 represent the terminal or changed state where the change is in response to a message. Then the changes must be in one or more of the P_i's, E_{ij}'s, or V_j's, or some combination of these. Let $V(S_1)$ be the value of the initial state and $V(S_2)$ be the value of the terminal state. Then the value of the communication to the receiver, ΔV, is given by the equation:

$$\Delta V = V(S_2) - V(S_1). \tag{2}$$

Even if only positive absolute values, v_j , are used, the value of the communication may be negative; that is, it can do the receiver harm.

The value of the communication to the sender may be obtained by substituting his values for the outcomes O_j in the receiver's state for those of the receiver in computing $V(S_1)$ and $V(S_2)$. As is apparent, the value of the communication to anyone may also be obtained by using his V_js' rather than those of the receiver.

[3] Perhaps the most comprehensive behavioral treatment of "signs" has been given by C. W. Morris (7). This brief treatment is closely related to his except for one rather important point, it substitutes the concept of "potential producer of a response" for Morris' concept of "disposition to respond." Efforts to treat signs behavioristically go back at least as far as the 19th century American philosopher, Charles Peirce (8).

2. *Types of Communication*

We have considered three basic ways in which the value of a purposeful state may be changed by communication: by changes in P_i, E_{ij}, and in V_j. There is one other way that a purposeful state may be changed; those available courses of action which are not initially potential choices may become so. But unless such change is accompanied by changes in the P_i, it will not affect the value of the state. The significance of such a change, however, is best considered after discussing changes of the first type.

A particular communication may change only the P_i's, E_{ij}'s, or the V_j's, or some combination of these. We may study a communication which yields a combination of changes in terms of each type of change taken separately. This is, in fact, what has been done in the past, but the relationship between these types of changes has not been systematically studied because of the lack of a unifying conceptual framework.

By way of preview, we shall say that a communication which changes the probabilities of choice, *informs*; one that changes the efficiencies of courses of action, *instructs*; and one that changes the values of outcomes, *motivates*. Any single communication may, of course, do any combination of these simultaneously.

2.1 *Information*[4]

Shannon, his predecessor, R. V. L. Hartley, and most others who discuss information in mathematical terms are concerned with the amount of information that *can be* communicated rather than with the amount that *is* actually communicated. Shannon was primarily involved with systems in which each possible message can be coded into a combination of two symbols. For example, if there are four possible messages and two symbols (0 and 1), the messages can be represented as 00, 01, 10, and 11. Then, to select one message out of the four, two choices from among the two symbols (i.e., binary choices) may be made. One binary choice allows two messages (0 and 1) and three binary choices allows eight messages (000, 001, 010, 100, 110, 101, 011, and 111). In general, x binary choices allows 2^x possible messages.

For Shannon, the amount of information contained in a message is the amount of freedom of choice involved in the selection of the message. A unit of choice is defined as the selection of one out of two equally available symbols. Thus, in selecting one of two equally available symbols, one choice-unit is involved and the resulting one-symbol message contains one unit of information.

In general, if there are M equally available messages in a state, the selection of one contains x units of information where

$$x = \log_2 M.$$

Equal availability of the symbols means equal likelihood of choice by the sender. That is, if there are M possible messages and the probability of each being selected is $1/M$, complete freedom of choice exists. If the probability of selecting a particular message, p_i, deviates from $1/M$ there is not a completely free choice. In the extreme case, if the probability of selecting any one of a set of messages is 1.0, then there is no freedom of choice and no information can be communicated by the one message which is always selected.

In order to cover cases in which choices are not equally likely (as well as where they are), Shannon derived the following general measure of the amount of information (symbolized by H in his system) contained in a state:

$$H = -\sum p_i \log p_i,^5$$

where p_i is the probability of choice of the i^{th} message. If $\log_2$ is used, then H is expressed in binary units which are called *bits*. Thus, a state which contains two equally likely messages contains one bit of information.

The measure of information to be developed here will also be related to freedom of choice; that is, it will be a function of the probabilities of choice associated with the alternative courses of action. It will be a different function, however, because of the difference between a message and a course of action. The measure here will also be a function of the number of alternative potential courses of action, m.

When we talk of the amount of information that a person has in a specified situation (state), we do so in two different but related senses. First, we refer to the number of available courses of action of which he is aware; that is, to the number of potential courses of action. For example, a person who is aware of four exits from a particular building has more information than the person who is aware of only two when there are four. The act of informing, then, can consist of converting available choices into potential choices. For example, a statement such as "There are exits at either end of this hall" may convey information in this sense. The person who has this information (i.e., who has these potential choices) may or may not exercise it depending on his appraisal of the relative efficiencies of the alternative exits. In one sense, then, information is the amount of potential choice of courses of action which an individual has.

The second sense in which we talk of information involves the *basis* of choice from among the alternative potential courses of action. For example, an individual who knows which exit is nearer than the others has a basis for choice and hence has information about the exits. Information in this sense pertains to the efficiencies of the alternatives relative to desired outcomes (e.g., a rapid exit). Suppose, for example, that there are two exits and one is nearer than the other. If this is known and the objective (valued outcome) is to leave the

[4] Because of the pervasiveness of the use of "information" in Shannon's restricted sense, it might seem preferable to use another term here. But since the usage here conforms more closely to common usage, if a change is required, it would seem preferable to change Shannon's term. As Colin Cherry notes, "the measure for H_s [average information] from Wiener and Shannon, is applicable to the signs themselves, and does not concern their meaning. In a sense, it is a pity that the mathematical concepts stemming from Hartley have been called 'information' at all." (2:50)

[5] For an edifying discussion of this measure and its derivation see (2:177–80).

building quickly, the choice is *determined* in the sense that the individual will always select the nearest exit. If he always selects the most distant exit then he is obviously misinformed (i.e., he has information, but it is incorrect). If he selects each exit with equal frequency then he apparently has no basis for choice; that is, no information. In this sense, then, information is the amount of choice which *has been* made. Now let us make this concept more precise.

Consider the case of an individual (I) who is confronted by two potential courses of action, C_1 and C_2. If the probabilities of selecting the courses of action are equal, $P_1 = P_2 = \frac{1}{2}$, the situation may be said to be *indeterminate* for I. He has no basis for choice and hence can be said to have no information about the alternatives. This is clearly the case when one of the alternatives is more efficient than the other. But if the two courses of action are equally efficient, the individual may have information to this effect and select each with equal frequency. Strictly speaking, however, he has no real choice in this situation since the alternatives are equally efficient. In a situation like this—a non-purposeful state—information has no operational meaning. Consequently this discussion has relevance only to situations in which all of the alternative courses of action are not equally efficient.

If $P_1 = 1.0$ and $P_2 = 0$, then the situation is *determinate* for I; all the choice that can be made has been made. The maximum possible information is contained in the state. It may not be correct but this is another matter which will be considered below.

We may define a unit of information as the amount contained in a two-choice situation that is determinate.

Let us consider the general case involving m alternative potential courses of action. In order to select one from this set, a minimum of $(m - 1)$ choices from pairs of alternatives is required. Table 1 illustrates this fact.

We can conceive of the amount of information contained in a purposeful state, then, as a point on a scale bounded at the lower end by indeterminism (i.e., no choice has been made) and at the upper end by determinism (i.e., complete choice has been made). Location on this scale will depend on the values of P_i.

In an indeterminate state each $P_i = 1/m$. Therefore, one measure of the distance of a state from indeterminism is

$$\sum_{i=1}^{m} \left| P_i - \frac{1}{m} \right|.^{6}$$

For an indeterminate state this sum is equal to zero. In a determinate state one P_i is equal to 1.0 and the remaining $(m - 1)P_i$'s equal to zero. Therefore, in a

[6] It may turn out, on further study to be desirable to square these deviations, or raise them to some power other than one. Squaring deviations is a congenital disease of our age, however, which implicitly assumes that the error-cost function is quadratic in form. Although this form has many mathematical advantages, in my experience, error-cost functions which can be established empirically seldom take this form. This is, of course, no argument for using the power, 1. It has been pointed out to me that if this quantity were to be squared the result would be Pearson's chi-square divided by m, and that this is directly related to Shannon's measure of redundancy.

determinate state,

$$\sum_{i=1}^{m} \left| P_i - \frac{1}{m} \right| = \left(1 - \frac{1}{m}\right) + (m - 1)\left| 0 - \frac{1}{m} \right|$$

$$= 1 - \frac{1}{m} + (m - 1)\frac{1}{m} = 1 - \frac{1}{m} + 1 - \frac{1}{m} = 2 - \frac{2}{m}$$

The ratio of (a) the deviation of a specified state from an indeterminate state to (b) the deviation of a corresponding determinate state from that indeterminate state, then, provides a measure of the fraction of the maximum information such a state can contain, to that which it does contain. Symbolically this ratio is

$$\frac{\sum_{i=1}^{m} \left| P_i - \frac{1}{m} \right|}{2 - \frac{2}{m}}.$$

The product of this fraction and the maximum amount of information such a state can contain—that is, $(m - 1)$—provides a measure of the amount of information (here symbolized by A) in that state:

$$A = (m - 1)\frac{\sum_{i=1}^{m} \left| P_i - \frac{1}{m} \right|}{2 - \frac{2}{m}} = \frac{(m - 1)\left(\frac{m}{2}\right)\sum_{i=1}^{m} \left| P_i - \frac{1}{m} \right|}{m - 1}$$

$$= \frac{m}{2}\sum_{i=1}^{m} \left| P_i - \frac{1}{m} \right| \tag{3}$$

Now the amount of information communicated may be said to be the difference between the amount of information contained in the state of the receiver immediately preceding the communication (i.e., the initial state) and the state immediately following the communication (i.e., the terminal state). Let $A(S_1)$ be the amount of information in the initial state and $A(S_2)$ the amount of information in the terminal state, then the amount of information communicated, A_c, is given by the following equation:

$$A_c = A(S_2) - A(S_1), \tag{4.1}$$

TABLE 1

m =	2	3	4	5
	C_1, C_2 } 1	C_1, C_2 } 1	C_1, C_2 } 1	C_1, C_2 } 1
		C_3 } 2	C_3 } 2	C_3 } 2
			C_4 } 3	C_4 } 3
				C_5 } 4

which may also be written in an expanded form:

$$A_c = \frac{m'}{2}\sum_{i=1}^{m'}\left|P'_i - \frac{1}{m'}\right| - \frac{m}{2}\sum_{i=1}^{m}\left|P_i - \frac{1}{m}\right|, \tag{4.2}$$

where m is the number of potential courses of action in the initial state, m' is the number of such choices in the terminal state, and P_i and P'_i are the probabilities of choice in the initial and terminal states, respectively.

A_c can take on values from $-(m-1)$ to $(m'+1)$. Negative values represent a loss of information (e.g., as in going from a determinate to an indeterminate state).

It should be noted that this measure contains no implication concerning the correctness or incorrectness of the information received. Further, it should be noted that this measure is relative to a specific receiver in a specific state. The same message may convey different amounts of information to different individuals in the same state or to the same individual in different states. Consequently, to specify the amount of information contained in a message it is necessary to specify the set of individuals and states relative to which the measure is to be made. If more than one individual or state is involved it is also necessary to specify what statistic (e.g., an average) is to be used. Generality of information may be defined in terms of the range of individuals and/or states over which it operates.

It should also be noted that messages are not the only source of information. One may obtain information by observation. For example, one may count the number of exits from a house. The measure of information suggested here is applicable to information obtained by either observation or communication.

2.2 *Instruction*

As indicated above, communication which involves changes in the efficiency of one or more courses of action is said to contain instruction. In conformity with common usage, instruction is here taken to be the equivalent of teaching to do more efficiently.

Consider a state containing two courses of action, C_1 and C_2, and two outcomes, O_1 and O_2. A complete lack of instruction would exist in this state if each course of action had no efficiency for either objective; that is, if

$$E_{11} = E_{12} = E_{21} = E_{22} = 0.$$

The other extreme, a state of perfect instruction, would exist if each course of action had perfect efficiency for each objective; that is, if

$$E_{11} = E_{12} = E_{21} = E_{22} = 1.0.$$

It is clear that the minimum amount of instruction that can exist in a state is zero and the maximum amount is some function of m and n, say mn, where m is the number of potential courses of action and n is the number of possible outcomes. Then it follows that the amount of instruction (B) in a state is simply

equal to the sum of the efficiencies over all potential courses of action for all outcomes; that is,

$$B = \sum_{j=1}^{n}\sum_{i=1}^{m} E_{ij}. \tag{5}$$

Then the amount of instruction communicated (B_c) to a receiver is the difference in the amount of instruction between the initial and terminal state; that is,

$$B_c = \sum_{j=1}^{n}\sum_{i=1}^{m} E'_{ij} - \sum_{j=1}^{n}\sum_{i=1}^{m} E_{ij} \tag{6}$$

where E'_{ij} represents the efficiencies in the terminal state and E_{ij} the efficiencies in the initial state. This quantity, B_c, can range from $-mn$ to mn. Negative values represent the loss of efficiency due to communication.

2.3 *Motivation*

If an individual in a state places value equally on all possible outcomes, then he has no basis for selecting among them and we can say that he has no motivation within that state. It should be recalled that the outcomes used to define a purposeful state are defined so as to be exclusive and exhaustive. From this it follows that the sum of the relative values of these outcomes is always unity. It also follows that if value is added to one outcome, an equal amount must be subtracted from the others. In the limiting case where there are two contradictory outcomes, O_1 and O_2, this last property clearly holds.

A state containing no motivation (in the relative sense) is described by the condition $V_1 = V_2 = \cdots = V_n = 1/n$. A state containing complete motivation is one in which one outcome has a relative value of one and all others have none; for example,

$$V_1 = 1.0, \qquad V_2 = V_3 = \cdots = V_n = 0.$$

These descriptions correspond to those employed in the discussion of information where P_i was a measure of preference for courses of action. The amount of motivation in a state (C) may therefore be defined analogously:

$$C = \frac{n}{2}\sum_{j=1}^{n}\left|V_j - \frac{1}{n}\right|. \tag{7}$$

Consequently the amount of motivation communicated (C_c) may be defined as follows:

$$C_c = \frac{n}{2}\sum_{j=1}^{n}\left|V'_j - \frac{1}{n}\right| - \frac{n}{2}\sum_{j=1}^{n}\left|V_j - \frac{1}{n}\right|, \tag{8}$$

where V'_j are the relative values in the terminal state and V_j are the relative values in the initial state.

3. *The Value of the Components of Communication*

It will be recalled that the value of a communication to the receiver was given by the equation:

$$\Delta V = V(S_2) - V(S_1). \tag{2}$$

Using expected return for the measure of value, this equation may be rewritten as follows:

$$\Delta V = \sum_{j=1}^{n}\sum_{i=1}^{m}(P_i + \Delta P_i)(E_{ij} + \Delta E_{ij})(V_j + \Delta V_j) - \sum_{j=1}^{n}\sum_{i=1}^{m} P_i E_{ij} V_j. \tag{8.1}$$

By expansion, this may be converted into the following expression:

$$\begin{aligned}\Delta V = {} & \sum\sum \Delta P_i E_{ij} V_j + \sum\sum P_i \Delta E_{ij} V_j + \sum\sum P_i E_{ij} \Delta V_j \\ & + \sum\sum \Delta P_i \Delta E_{ij} V_j + \sum\sum \Delta P_i E_{ij} \Delta V_j + \sum\sum P_i \Delta E_{ij} \Delta V_j \\ & + \sum\sum \Delta P_i \Delta E_{ij} \Delta V_j .\end{aligned} \tag{8.2}$$

The first three terms represent the value added to the initial state by the information, instruction, and motivation communicated, respectively. That is,

$$\begin{aligned}\Delta V_A &= \sum\sum \Delta P_i E_{ij} V_j \\ \Delta V_B &= \sum\sum P_i \Delta E_{ij} V_j \\ \Delta V_C &= \sum\sum P_i E_{ij} \Delta V_j ,\end{aligned}$$

where ΔV_A is the value added by only the changes in P_i, ΔV_B by the changes in E_{ij}, and ΔV_C by the changes in V_j.

The value of any of these expressions may be either positive or negative. If ΔV_A is negative, the receiver has been *misinformed*; if positive, he has been informed. If V_B is positive, he has been instructed; if negative, he has been "mis-instructed" (unfortunately we have no commonly used negative of the verb "to instruct"). The same remarks apply to ΔV_C.

The remaining four terms in equation 8.2 represent ΔV_{AB}, ΔV_{AC}, ΔV_{BC}, and ΔV_{ABC}. For example, ΔV_{AB} is the joint contribution (not the sum of the independent contributions) to value of the information and instruction communicated. The other terms may be interpreted similarly. It is convenient, then, to think of the value of a communication as the sum of the independent and dependent contributions of information, instruction, and motivation. That is

$$\Delta V = \Delta V_A + \Delta V_B + \Delta V_C + \Delta V_{AB} + \Delta V_{AC} + \Delta V_{BC} + \Delta V_{ABC} \tag{8.3}$$

Conclusion

Not enough of the theory can be presented in the confines of an article to allow fruitful exploration of its applicability to the study of the human aspects of communication. Extension of the theory and discussion of its application will have to wait for another paper. But it may be helpful to relate what has been presented here to some more familiar ideas.

Those acquainted with Decision Theory will recognize that the conceptual framework of the theory of communication presented here is suitable for the formulation of the problems of Decision Theory. This has been done, in part, in (5). The basic problem of Decision Theory is the selection and application of a criterion that should be used for selecting a course of action in (what we have here defined as) a purposeful state. Thus Decision Theory concerns itself with measures of efficiency, value, and effectiveness.

The study of communication, as conceived herein, concerns itself with the acts of humans which affect the decisions of other humans. For example, the final report of an applied research project, say in Operations Research, is a message intended to modify or justify the course of action pursued by management in a purposeful state. The value of such a communication is the change in effectiveness of the management policy which has been brought about by the report.

The value of the report, assuming it has some, may be due to either the disclosure of a new alternative course of action or the demonstration of greater effectiveness of a course of action known to, but not currently used by management. In either case, if management's policy is changed because of the disclosure or demonstration, information has been transmitted.

It is commonly recognized that when the recommendations contained in most research reports are accepted a critical step still remains, implementation. Implementation is a problem because the recommended course of action may be followed with varying degrees of efficiency. Implementation, then, consists of *instructing* personnel how to follow a course of action efficiently.

Management research projects usually take organizational objectives and their relative importance as given and hence seldom attempt to motivate management. The consultant, as contrasted to the researcher, is more likely to try to change management's "values." But even in research such motivational efforts do creep in. For example, the research may reveal that management is paying more to avoid shortages than they cost when they occur. Therefore, the researchers may try to have management de-evaluate the outcome, avoidance of shortages. To the extent that the researchers do so their communication is motivational.

As we explore the concepts and measures introduced here in more detail it will be found that we can obtain behavioral definitions and measures of such communicative concepts as ambiguity, obscurity, generality of information, and reliability of signs and messages. But this will have to wait for a future communication.

Finally, it should be reemphasized that the author feels much less certain of the appropriateness and usefulness of the *measures* introduced here than he is of the *concepts*. His hope is that the criticism and suggestions of others will moderate their revision into a more appropriate and usable form. It is for this reason that the most important word in the title of this essay is "towards."

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COST HORIZONS AND APPROACH TO S...

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Received June 1957.
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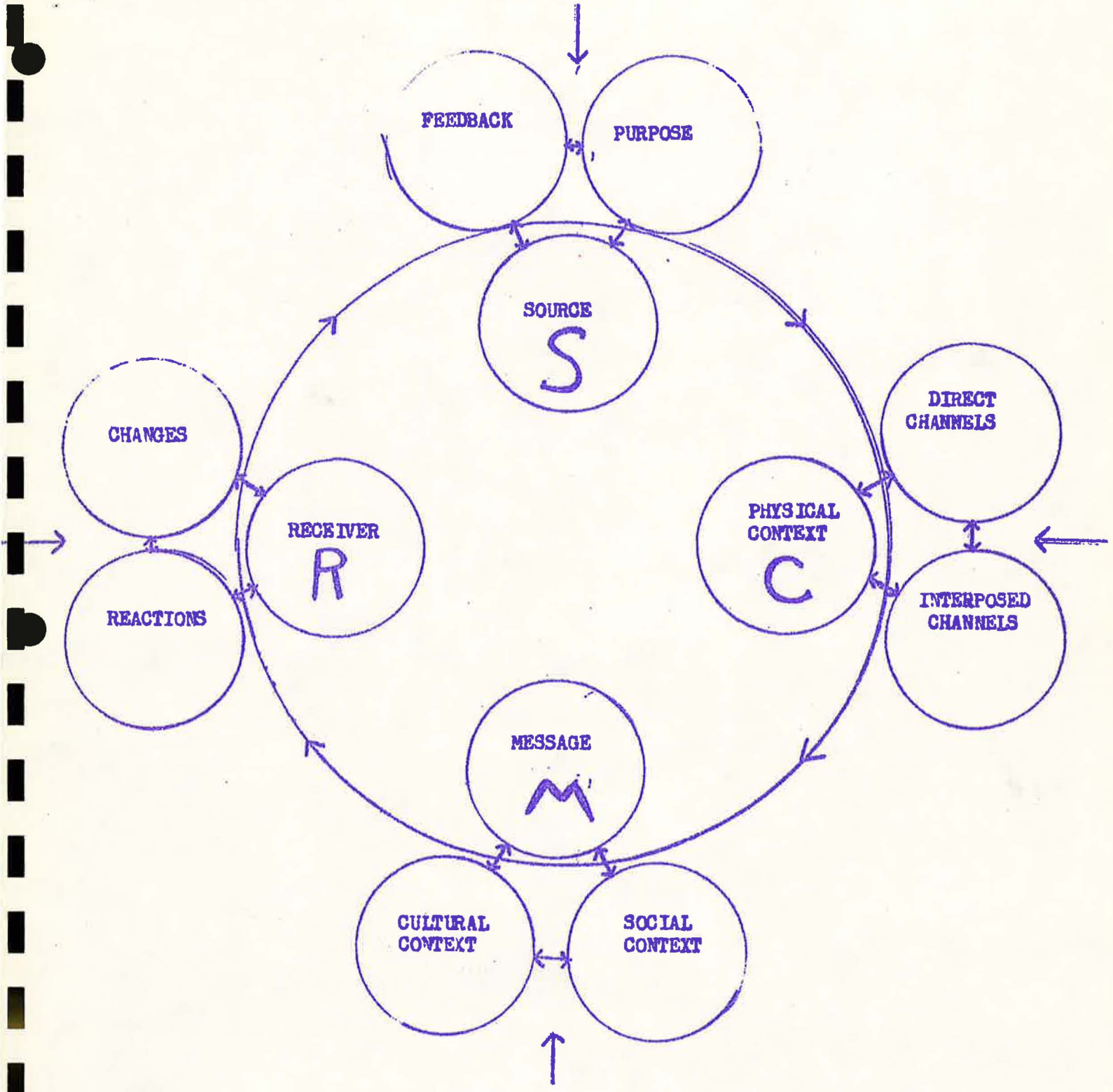
Ellingsworth
Communications



DOOB COMMUNICATION MODEL AS REVISED BY ELLINGSWORTH

A Proposal for a "new" Communication Model

For the past 3 years, the writer has been plagued by his inability to use the SMCR model effectively in teaching. Sometimes in doing "M", he forgot the distinction between structure and treatment; in troubled sleep he had a nightmare in which the pieces went together only in the form of a "W". He also worried about the specific and limiting nature of the sensory checklist under "C" when compared with the complex and abstract concepts listed under other elements. For "S" and "R", he had only the highest regard. There were other problems, such as the straightline nature of the model, even when innovators brought in homemade feedback arrows, and the difficulty in adapting the SMCR mood to the more fluid Interpreter Model. These inferiority feelings have spurred a search for a communication model in which he might more effectively locate the elements in the the process. In the early days of the seminar, the social action construct had been presented on Monday and used as a conceptual framework for the week. SMCR was not broad enough to serve this function without considerable elaboration. Leonard Doob's new book, Communication in Africa, is an attempt to examine communication in terms of 12 variables arranged in a modular relationship.[1] In the accompanying diagram and explanation, eight of Doob's variables have been renamed or altered to bring them more into line with other communication theory, but the process nature of the model has been maintained, along with its larger dimensions.

While the model may be entered at any point, as suggested by the four external arrows, the SMCR syndrome which afflicts most of us would suggest starting with the SOURCE. The SOURCE is identifiable as the producer of particular oral, written, or non-verbal messages. One of the matters to be learned about the individuals serving as the source is <u>status or position within the social group</u>. The source may be male or female, young or old, high class or low class, with much power or little. The source may be an <u>insider</u> or an <u>outsider</u> relative to the proposed

[1]Doob model used with permission of Yale University Press, though it is possible that Doob would neither recognize nor approve the revision.

receivers. He must also be located in terms of his position in the communication network. He may initiate a message, act as a channel, or participate in a two-stage flow of communication by first receiving and then retransmitting or reinforcing the message for others. One important way in which receivers identify the source is in terms of his demonstrated attitude toward them. How accurately does he gauge their own estimate of who and what they are?

Sources may also be discussed in terms of the resources they command: their knowledge of themselves, of the message, the physical and social context, the available channels, the receivers, and of previous and current feedback.

Associated closely with the source is his PURPOSE or purposes for communicating. This determination may not be easy. The source may express certain public goals and work toward other private ones. But he does have an intended purpose, the strength and nature of which will help to explain his acts in present and future communication. Success of the communication will depend in part on how adequately the purpose can be verbalized. Feedback will also be an influence in modifying the purpose of future messages.

PHYSICAL CONTEXT is a necessary conditon for any communicative act -- that is, the act must be located in time and space. If the context provides for a face-to-face relation between source and receiver, then DIRECT CHANNELS--voice, language, action, dress -- will dominate and will be affected by physical conditions of noise, lighting, temperature, and the like. If proximity of source and receiver is not available, INTERPOSED CHANNELS such as print, pictures, and broadcasting will have to be used. Many sources use a combination of direct and interposed channels, as in the case of the public speaker who uses audio-visual aids and then passes out printed materials at the end of the speech. Or he may speak directly to an audience and have his remarks broadcast elsewhere. While the source may have

While the sourse may have some freedom of choice in the selection of channel or the use of multiple channels, physical context determines the method of presentation.

The basic intent of the selected medium is symbolically to suggest reality. There fore, appropriateness is a vital dimension of channel selection, given the range of choice that physical context allows. Channels vary in their versatility--i.e. their ability to transmit a variety of thoughts, objects, relations, etc. They also vary in their permanence. A book continues to deliver and reinforce a message whether or not the message remains pertinent. An oral message is subject to immediate amendment but will continue to be available only as long as the listeners' perceptions and memories of it are adequate and permanent.

A source with a purpose and an available channel is not free to act as he sees fit in formulating and presenting a MESSAGE. He and his receivers are part of an immediate SOCIAL CONTEXT and a larger CULTURAL CONTEXT. The source has a set of personal resources out of which has come a purpose for communicating. Variables here are his place in the social structure and the roles of his receivers. By virtue of his role in the system, there are acts which he must perform and others which he is not allowed. Between the extremes is a range of choices. His message must be formulated with this allowable range in mind. The receivers likewise possess roles and responsibilities which limit their ability to respond to communication and which should affect the formulation of the message. All are bounded by the culture in which they exist. Culture provides a still more comprehensive set of taboos and expectations.

So the concept of message formulation draws on the variables of the source and his analysis of the situation, his evolving purpose, the choice and availability of channel, and the allowable behaviors of source and receiver.

We have referred to the RECEIVER frequently without describing him or discussing what might be expected to happen to him. It should be noted taht he is subjected to a

flow of stimuli from the source, and physical and social context, as well as the message. When these stimuli successfully impinge on the attention of the receiver, they produce REACTIONS. In some cases, the individual is predisposed to react in a certain way. Past experience has provided tendencies to act in certain ways when triggering stimuli are present. One of these predispositions is toward the source--what sort of values do potential receivers hold about him? Another is the prestige or perceived importance which the receivers expect from attending to the message. Still another involves the credibility of the medium. Do receivers believe or disbelieve that they read in the paper or hear in person? Still another lies in the perceived ease or difficulty of the message, based on its form and content. This is true not only of its ease of perception but the amount of change called for by the message. The strength of the predisposition is a valid concern. One of the variables here is whether the predispositions have been communicated publicly or are still a private view. Persuasibility may be higher if the concerns have remained largely at a private level.

It may be possible in psychological terms to say that reaction and change are synonymous when they describe the effect produced by a stimulus which has received attention. Sources are often interested in larger units of change over longer periods, however, and this is the justification for introducing the related, but separate, concept of CHANGE. Some changes resulting from communication remain covert and form a basis for predispositions toward later stimuli of a similar nature. It should be noted that one such covert change may result in a change in other predispositions or actions. A more determinable variable in the change category is the observation of <u>overt action</u>. Action is not a guaranteed method of evaluating success. It may occur because or in spite of the communication, or in relation to some other unrelated or unintended stimulus.

When change has occurred, it becomes important to compare it with the original purpose expressed by the source. An adequate definition of success is difficult.

to secure, since time may produce complete or partial goal attainment. Or rejection of the particular goal and attainment of some related purpose may occur. Success with one receiver may alienate another audience.

A final important dimension to be noted is FEEDBACK, that special set of cues by which the source learns to some extent the result of his efforts. Feedback may be simultaneous, as when a speaker adjests his speech to accommodate observed receiver reactions. Delayed feedback may contribute useful data for the development of future messages. Such a use, of course, presupposes that change will occur slowly enough to keep the feedback relevant.

Feedback may arrive intermittently or in a continuous flow depending on the physical, social, and cultural contexts of the process and on observed reactions and changes. Feedback does not accumulate; it must be actively sought. It may be gathered by direct observation, by interviewing, or perhaps by analysis of past communication. Often it is the source who does the collecting. At other times a collector may have to be utilized, and this introduced a new set of variables in the transmission of the feedback. Whatever its nature, feedback will have its effects on the speaker, will modify or reinforce his purpose, and so contribute to the generation of another round of the communication cycle.

Summary

With this type of model, it might be possible to pull out the symbols SOURCE, RECEIVER, REACTIONS, CHANGES, and FEEDBACK to emphasize the variables discussed in the Interpreter model. FEEDBACK, PHYSICAL CONTEXT, and CHANNELS suggest the matters usually included in Interpersonal. SOCIAL CONTEXT suggests the major theme of Group Structure, as is true of CULTURAL CONTEXT and Process of Change. Social action might be viewed as a plan of action for utilizing all the variables.

for: Iwao Ishino

COMMUNITY DEVELOPMENT NOTES

Institute for Community Development and Services
Continuing Education Service • Michigan State University

INFORMATION FLOW AND CULTURE CHANGE

By

Iwao Ishino

December 27, 1962

INFORMATION FLOW AND CULTURE CHANGE*

By
Iwao Ishino
Michigan State University

The preceding paper by John Donoghue (1962) introduced the concept that time is a measurable unit for indicating culture change. Every group and community has its characteristic way of allocating its time budget. When this allocation changes over time, we believe that it provides a measurable index of culture change and, more important, an index for evaluating the degree of success achieved by a community development project. I would like to build on this fundamental idea by suggesting that this time budget, in turn, is generally altered as the result of another factor, that of information. Thus, while time budget provides us with a cross-sectional view of change, we submit that the flow of information suggests ways in which the allocation of time is modified.

One of the most helpful contributions to this latter concept came from Robert Redfield's study of the transformation of the primitive world. Redfield, one will recall, was concerned with the linkages

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*These notes were presented at the annual meetings of the American Anthropological Association on November 15, 1962 in Chicago, Illinois. It followed a related paper entitled "Time Allocation and Cultural Change" presented by John Donoghue. Time for presentation did not permit a more detailed analysis of the information flow model.

The writing and analysis for this report was made possible by a grant from the Office of International Programs of Michigan State University and the Ford Foundation. Opinions and views expressed in this report are those of the author and not necessarily of the University or the Ford Foundation.

between the peasant and urban worlds, and between the little tradition and the great tradition. In the course of our study we began to see that the Japanese villagers were also linked up in such a manner. To be more precise about the kind of inspiration we received from Redfield, I quote from Peasant Society and Culture, page 91:

> When the anthropologist studies an isolated primitive community, the context is that community and its local and immediate culture. When he comes to study a peasant community and its culture, the context is widened to include the elements of the great tradition that are or have been in interaction with what is local and immediate. If he is interested in the transformations that take place through this interaction (diachronic studies), he will investigate the communication of little and great traditions with each other and the changes that may have resulted or come to result in one or both because of the communication.

The important point to note here is that Redfield speaks of communications. In his various other writings he also mentions interactions and linkages. George M. Foster expressed similar ideas in his recent paper "The Dyadic Contract."

Both Redfield and Foster are concerned with interactions between people and between groups of people. While Redfield directed his attention toward the linkages between the peasant community and the larger community of the great traditions, Foster concentrated, by the nature of his data, on the internal linkages between villagers and groups of villagers. We are also cognizant that Chapple and Coon in their introductory textbook, The Principles of Anthropology (1952), expressed similar ideas.

Taking a cue from such writers, Donoghue and I focused at first on the interpersonal relations between people in the village and the linkages between the village and urban communities. But this was an enormous task. There were so many statuses, role obligations, role expectations and other factors to take into consideration that the mere inventory of these facts seemed overwhelming.

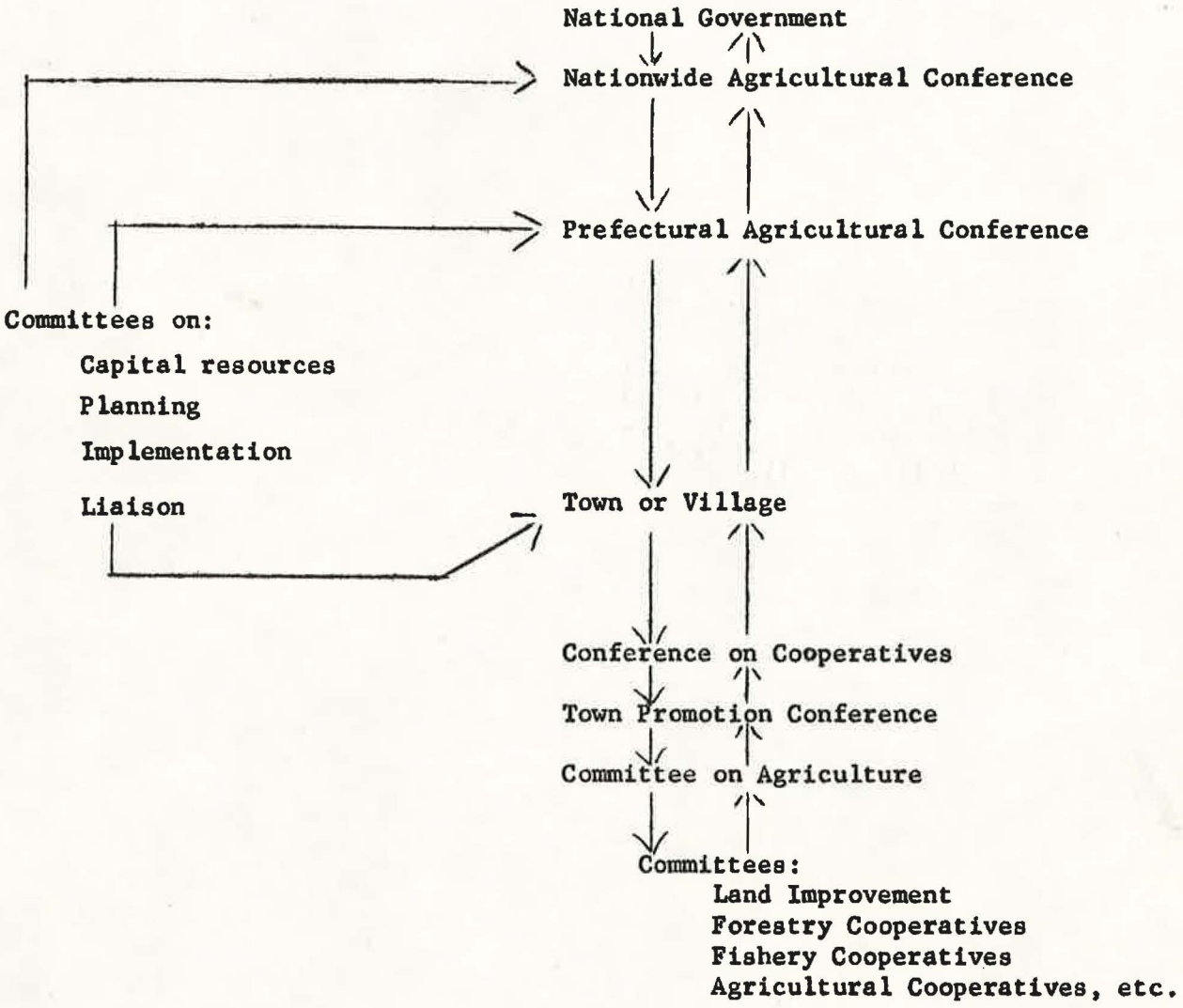
Then, too, we were not entirely satisfied with the solution of either Redfield or Foster. At this point, we began to ask ourselves the fundamental question which led to what we think is for us a break-through. In these dyadic relationships and in these linkages, what is it that is being transmitted?

The answer we came up with we have called, simply, "information." With this as a basis, we could concentrate our attention not on specific roles and obligations but on the information transmitted. In this way, we could trace certain pieces of information as they filtered down through the village structure. The network of this information flow outlines the social organization of the community. According to this model, kinship groups, social clubs, cooperatives, village assemblies and other forms of social organization exist as a result of this information flow.

Take for example the introduction of new agricultural technology, such as the use of chemicals to cut down thr growth of weeds in the paddy fields. The farmer is the ultimate consumer of this information; he is the one who will benefit directly from it. From his point of view, the agricultural extension agent is the source of the information, but beyond him there are linkages from the extension agent to the district officer, to the Ministry of Agriculture, and ultimately to the chemists who developed and tested 2,4-D (See Figure 1 for a formal designation of information flow as visualized by the planning commission of one of our sample communities. The title given is almost a literal translation of the original Japanese statement.)

Figure 1

Inflow of New Policy and Technical Skills: A Chart of Enterprise Propulsion



(1) Diagnosing Community Receptivity to Change.

When information on birth control and similar ideas was introduced, it was apparent that not all villages had accepted and made use of it. From the standpoint of information flow, one hypothesis follows immediately, that there were blockages in the information flow. Some villages, in other words, were more reluctant to accept this information than others.

From our model of information flow, blockages can result from one or more of these factors:

1) lack of communication channels, or linkages, for conveying the message to the ultimate consumer, and

2) information overload, wherein the conveyers of information are so preoccupied with other matters that they have insufficient time and energy to devote to the transmission of information that would lead to change. Similarly, the recipients of new information are so over-committed to other matters that they do not pay sufficient attention to the new information.

The first case is illustrated in Viet Nam where inadequate roads, physical danger, illiteracy, linguistic barriers, and prejudice toward ethnic minorities prevented the montagnards from greater participation in development programs of the nation-state. Under these conditions, information about new techology and other change programs was not reaching these tribal peoples in spite of the national government's recognition of their importance to the struggle against the Viet Cong.

The second type of blockage of information flow is exemplified in the lowland provinces of Viet Nam where the people are literate and more culturally advanced than the mountain peoples. A province chief

Mr. Ba said, "The government in the capital has many employees who are well organized and had much time to conceive of programs and immerse themselves in details." But he complained,

> They issue far too many instructions to me, most of them in writing and I do not have sufficient personnel in my province to do justice to these instructions. Provincial government in Vinh Long is overburdened by paper work and yet I am required to carry out a multitude of instructions which originate with people in Saigon who are not sufficiently sympathetic to my limited resources. (Finkle, 1961).

Planning the Strategy of Change.

From this method of analyzing information blockages, we gain some clues for implementing change.

1) The case of insufficient channels of communication. Here the problem is basically one of improving a given channel, or of increasing the number of alternative channels by which information can be transmitted. In Japan, the extension agents improved and increased their channels by organizing various local study groups, lecture groups, cooperative associations, 4-H clubs, and the like. The leaders and members of such groups then acted as further channels for the communication of the information put out by the extension agents and other information sources.

Other channels also served to assist the information flow; use of communication media such as radio, newspapers, and television has increased in recent years. As an extension agent in one of our northern villages expressed it, "Because of radio and T.V. the people of this town have increased their knowledge. They can easily understand new ideas and the value of progress. Before I explain these ideas to them, the people already have heard about them. So change comes easier because of mass communication."

2) The case of information overload. According to the theory, if we find cases of information overload, we can suggest the following ways it may be reduced: (1) Increase redundancy, i.e., repeat the same message over and over until the consumer receives it correctly. (2) Arrange in the most effective sequence the amount of information given out at any particular time. There are several ways in which information may be sequenced or arranged: one is a time sequence. If information comes in a predictable fashion, then some rule of priority can be established to determine which events will be presented and in what order. (3) Store temporarily unimportant information for future use. (4) Balance the information load so that tasks can be shifted from one part of an organization to another in case of emergency. (5) Evaluate the effectiveness of the organization according to its adaptation to the environment. In this connection, we could ask: How many linkages are necessary, and in what ways do they balance the information-carrying capacity of the organization or system? An increase in the number of linkages sometimes means an increase in the distortion of information. On the other hand, a large number of linkages may also function to reduce information-overload as well as to provide other kinds of payoffs. For example, if the sole source of ideas and information about new agricultural technology in the village were a single individual, the number of linkages would certainly be reduced to a bare minimum. At the same time, this individual's political and social power over the people he served would be greatly enhanced. From this perception of leadership it follows that the most influential and powerful members control the most relevant information for the organization. In short, social power can be defined as a function of the scarce information controlled. Leadership can exercise control over the membership by selectivity

in the kind and amount of information he passes on. An example of this was found in Viet Nam. When the president originated the agroville program, he had grandiose ideas of what it would accomplish at the village level. As the information flowed from the presidency, through the province, the district, and the village office to the village worker, the original message had been distorted and the content removed. Therefore, the original information never got through to the people for whom it was intended. If there had been a number of direct channels to by-pass the intermediate linkages, such as newspapers, radios, television, and a large number of local associations, this distortion might not have resulted.

The relationship between locus of power and control of information will be a subject for a future paper. The main point concerning the number of linkages and distortion is that some optimum balance between an increase of linkages and an increase of distortion must be established.

Summary

In summarizing, we would like to emphasize that the information-flow theory presented here is a further development of the ideas contributed by Robert Redfield, George Foster, and other anthropologists. This information concept is also finding its way into applied anthropology and other disciplines involved in development programs. We cite an instance from an article by a high administrator in the AID program (Ohly, 1962: 142).

> Another troublesome, and again almost universal problem concerns the construction of institutional bridges between a central government which has traditionally been only a tax collector and policeman and the millions of rural inhabitants which it now must also serve in an affirmative fashion--bridges that will permit the channeling of vast stores of information and many services to the man at the grass roots level. Where does one begin in creating an agricultural extension, a community development, or public health system?

> Should one build out from the center, build toward the center from the grass roots, or build in both directions at once? To the dispensers of foreign assistance such questions are of central importance. No foreigner can expect his knowledge, skills and values to "rub off" directly on more than a handful of locals, and yet the value of what he communicates will often be insignificant unless it is recommunicated to, and affects the action of, the mass of people. This means that much of our thought and energy must be directed toward the creation of new local institutions, or the adaption and extension of old institutions, to perform a function which is largely new to these societies--that of continuously disseminating to vast audiences the knowledge and skills which are communicated to the very few locals with whom foreign technicians can ever personally work.

At present we know far too little about the ways in which institutions of this nature can best be developed. This same AID official goes on to advance the possibility that research should not be carried out at the local level, that foreign aid deals with the complex problems of an entire, national society. He suggests that "it is a large intellectual jump from research data on problems of a specific Vietnamese Delta village or of a community development project in the highlands to reliable guidelines for dealing with the many interweaving forces that affect Viet Nam as a whole. It is a jump we have to make, and we need your help in doing so." (Ohly, 1962, p.144).

We feel that this paper, which explores the problems of institutional linkages and communication channels, is a step in this direction.

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Daniel F. Wozniak
302 Wilkes St.
Berkeley Springs, West Va.

Aug 15, 1962

Dear Iwao and Jack:

Here is the outline I promised you. It is based primarily on the summary of our discussions and my notes on the Donoghue-Ishino third culture seminar presentations. I have also thrown in a few comments on theory based on Kelly.

The primary purpose of this outline, it seems to me, is to induce a structure by attempting to identify and isolate apparent and emerging elements and placing them into some sort of relationship or pattern.

The main function of the outline, it seems, is to stimulate further developmental thinking and discussion. Also, I hope, that we have identified a sufficient number of elements and can see vague outlines of a structure so that we may develop a section or two more fully.

The prehistory discussion suggests some important generalizations ---which you pointed out in the seminar presentation, I believe, and in our discussions--that can serve as a cue to the developmentoof the theoretical section. Also, these generalizations can be used as a cues in the organization of the prehistory or evidence section of the book.

Some of the cue words or phrases in the outline include:

> the constant emerging of something new, genetically and culturally, that seems to run through the entire history of mankind; the notion of constant reorganization and adaptation of culture; the stablizing influence of culture on genetics (and the current problem imposed by culture produces, thermonuclear explosives, which may upset the genetic stability); adaptive radiation; etc.

As the theoretical structure emerges more clearly, perhaps you will feed data to me for processing and further development. Perhaps I will be able to plug in some of my specific materials.

This can be discussed when we make our E. Lansing visit--- as soon as either Hidy and/or Mal MacLean are available. At that time, I have some questions that are suggested by discussions--one is a philosophical point, relating to determinism.

Daniel F. Wozniak
302 Wilkes St.
Berkeley Springs, West Va.

A note on publication:
1) It might be to our advantage to push the development along so that by September 1 we could have an outline to give to a publisher.
   a) Please feel encouraged to feed materials to me for processing and writing. This is a most welcome break in my routine.

2) The theoretical materials (particularly the communication view combined with the genetic notions) might make a journal article. Perhaps we should also consider one or more scholarly journals for this material before long.

Incidentally, you will note from the outline that I now have a competent, young typist. Please feed us materials--we are geared to work.

Thank you for the information on the position. I don't mean to push you on this score, I am just interested.

Regards,

Dan

Daniel F. Wozniak

August 15, 1962

Drs. Jack Donoghue and Iwao Ishino
Department of Sociology and Anthropology
Michigan State University
East Lansing, Michigan

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August 8-12, 1962
Wozniak

TITLE OF BOOK: Theta Man

By John Donoghue, Iwao Ishino and Daniel F. Wozniak

Intended Audience:

New Yorker, Harpers, Atlantic Monthly, Esquire, Saturday Review type of audience; college graduates, sophisticated, intelligent, medium high socio-economic level, fairly well informed, cosmopolitan.

The purpose of this outline: to present a rough organization of some of the materials taken from discussions by Donoghue, Ishino, and Wozniak.

This outline is divided into five parts:

I. Introduction

II. Prehistory: The Story of Cultural and Biological (Genetic) Development of Mankind

III. The Legacy of Prehistory for Contemporary Man

IV. Theta Man Theory: the emerging generalizations, the emerging structure

V. Theta Template Applied to the Contemporary Scene

Part I: Introduction

I. Riechauer and Fairbanks, East Asia, The Great Tradition, p6:

"There are many signs in East Asia as elsewhere in the world, of the growth of what may be called a common world culture. In every phase of life, whether it be transportation facilities, political systems, or even ethical ideas and family relations, we and the peoples of East Asia today, have much more in common than we did a century ago.

"Ultimately, the growth of this common world culture and of mutual interests, may greatly facilitate harmonious understanding among the various parts of the world. In the meantime, however, the process made the understanding more difficult. A mixing of things that are familiar to us with things that are quite foreign, tends to confuse, rather than enlighten. Moreover, culture change in the East Asia, as in the rest of the world, have been accompanied by violent upheavals of all sorts. If China had actually been unchanging, we would find it much easier to understand, no matter how different its culture from that of the West. Instead, China has been changing rapidly and explosively. Our task of focusing clearly on this alien culture is compounded by its rapid motion."

II. In a fast changing world, we find unfamiliar things in a familiar context, and familiar things in unfamiliar contexts.

A. Sorting out these familiar and unfamiliar things in their contexts and their bewildering combinations in a systematic way through the study of cultural history is one of the tasks of this book.

1. Example: a man from Kenya who had fought the British in the Mau Mau movement a few years ago is now in the U. S. learning about cooperatives.

2. To understand such examples as the Kenyanese problem, we must sort out these items in the context, trajectory, and stream of history.

B. Unless we have this cultural history (theta culture theoretical perspective), the world will continue to be a blooming, buzzing, bewildering, confusing set of events.

C. If history is a vital part in the process of understanding of the cultural changes taking place now, then the book must present data of a rather detailed sort. Mss5-6.

III An objective of the book is to provide a theoretical framework based on a new way of analyzing cultural and biological history of mankind which would enable the reader to organize the many small occurrences and differential behaviors of people in the world today that may take for granted at present.

A. Objective: To influence like Reisman's notions of other directedness and Warner's concepts so that one no longer sees people or society without being influenced by these concepts.

1. Once they read book and once they have learned notion they will no longer view what is going on in the present world without having some kind of theta culture framework.

2. No longer think of people as foreigners, as aliens, and as we and they, we should have our readers think in terms of alpha, beta and theta culture.

3. Traditional concepts of nationals and natives and indegenous peoples, and so on, ought to be modified by these concepts that we are presenting here. 2-3mss

B. Objective of this book is to present a comprehensize story of the development of human culture without the unnecessary baggage of jargon that is currently available in scientific literature. mss6

1. Anthropologists have been able to pull together information and data from various disciplines--paleontology, archeology, linguistics, etc, to make a rather meaningful story of the development of culture or the history of man from the very beginnings.

a. Unfortunately, much of the story of cultural history is wrapped up in the particular jargon of the subdisciplines.

b. Terms like paleolithic, neanderthanl, neolithic, etc. are examples of these jargons that make communication difficult.

c. We can tell the story of cultural history without the jargon, and thereby communicate a story, a message, that would be understandable to the layman. mss6

2. One barrier to understanding is the tendency for

each people to believe its contribution to world history has been greater than other peoples.

a. Another is the ethnocentric cosmology people have; for example, religious cosmologies that interfere with scientific findings.

b. People still speak of Adam and Eve and the Garden of Eden.

c. In any event, the natural cosmology of any race, tribe, or nation has pulled together all the relevant information with respect to accurate time spans, space distrubution of all peoples on the earth into a coherent story. mss6

3. Objective:

a. Write this book so that it becomes for readers' experience that seminar becomes for participants (think built-in).

b. Present a theoretical model by which the participants or audience can lock bits of information so that they can begin to understand the various strands of history, various strands of culture that make the present rapidly changing world more meaningful and more understandable.

c. Emphasis is on descriptive model derived from a new interpertation of cultural and biological history of mankind.

d. This kind of history can be told without getting into emotion laden items such as communism, etc.; neutral history, cosmic viewpoint, looking at mankind as a whole, not separate entities, races, societies, etc.

C. Purpose of new look: to make sense of the world and utilize the vast knowledge of human biological and cultural history.

1. Essentially Alpha, beta, theta, is a new way of looking at culture and mankind.

D. Objective: To describe the evolution of alpha to beta to theta culture.

1. Adaptive radiation is a term which may be applied to this process.

E. Practical purpose of all this: To enable the individual to apply the theoretical framework and to see the events around him as meaningful; make predictions regarding future.

F. Purpose is to discuss communication at a broader, more inclusive level than the interpersonal (person-to-person) level; provide broad historical perspective; only interested incidentily in teaching and communication concepts.

IV Methodology: Develop a limited number of terms which would constitute the basic elements in a "flannel board" type model; each term would include complicated ideas when strung together.

A. The story of man (history of culture) has been written before.

1. We are striving for a model for understanding this cultural history.

2. Essentially we are preparing a "flannel board" type presentation. mss6

B. A reader may use the whole model to reorganize his thinking about cultures and how he fits into that cultural system.

1. This scheme, therefore, if presented correctly and adequately, should provide any human being within this society or any society with a frame-work for placing incongrous things together in an understandable way. 14mss

C. The model is a new approach to what has been handled in a traditional fashion in anthropology.

D. Both the scheme and model as a whole and their subparts should be a kind of template by which our audience could look at work and make sense out what they are experiencing at the moment.

Part II: Prehistory: The Story of Cultural and Biological Genetic Development of Mankind.

I. The underlying theme of importance is the constant emerging of something new---genetically, and culturally.

A. This is the big point of the total history of mankind---genetic and cultural development.

II. Culture is defined as an organized set of understandings, beliefs, and values manifest in art and artifact, which characterizes a society and differentiates it from other societies.

A. General processes include Aeinterpretation, reorganization, reformulation, reassembling.

1. Individual perception are important.

2. These processes have consequences.

B. Visuals might include:

1. Evolution of life

2. Primate evolution

3. Early man and history: time-space

4. Increase of human population

5. Landmarks in culture history

III Culture happens over time.

A. Were in a constant reorganization and adaptation of culture.

B. This may be demonstrated through the history of life: 4 billion years ago life on earth began development: Biological---genetic

Mammals

Birds

Reptiles

Amphibians

Fish

C. Constant emerging out of new forms and adaptations to changing environment is the important point here.

Today	Lemuroids Tarsoids, Shrews	Proto primates	New world	Monkey old world	apes gor. orangatang chimps gibbons	man
generalized types, tree dwellers						

75 million years ago

1. Specialized types, lived on earth.
2. Primates developed 3-d vision
3. Tree living animals, need 3-d vision
4. Generalized animals.

D.

Today	Africa	Europe	Asia	America
Homo Sapiens	xxxx	xxxxxx	xxxxxx	xxx
20,000	xx		xxxxxx	x
75,000 Neanderthal	xxx	xxx	xxx	
200,000 Neo/anthral		xx	xx	
650,000 Paleo-anthropic	xx			

E. Man developed in Africa and fanned out.

1. Climactic changes affected man.
2. Idea of areas.
3. We know the ages by recognizing geological time periods.
4. All men have common ancestory, then why different colors, black white, etc?

5. Generlalized more developed.

6. Man moved out in small groups--ice age, isolates some, there are not intermarrying, breeding in own area.

7. Inbreeding not total imbreeding, isolated, new type of men.

8. Reorganization of genes, lighter skins more adaptive in Europe, in Africa, dark skins of value, Asia, different thing happened. Cultural impact on man--gentically, etc.

F. Culture and population growth:

1. Industrialization 200ad

2. Food producing 1700ad

3. Hunter and gatherer 10,000 before present

4. Domestication came AFTER food growing, staying in one place, more children reared, wheat growing spread, rice growing, (SE ASIA); sedentary life, exploding population; industrialization again, population explosion; change make of the population.

G. Growth of culture thru time

IV Energy: Surplus emergy permits specialization, cities, scholars, etc.

V Culture is an organized set of understandings and has an impact on perceptions; trapezoidal window, raindrops problem, art are examples of different forms and revolve.

1. Belief systems

2. Cultural perceptions

VI What does impact of cultural history have on communication?

A. Diversity of culture, sources of conflict, of socio-economic-political upheaval.

B. Why overpopulation? Techniques for sustaining life--- maybe we now have these goods, know-how to control cultural change; seminar is oriented toward these goods.

Part III: The Legacy of Prehistory for Contemporary Man

The consequences of a million years of cultural and genetic history.

The data that constitute the raw material from which cultural theory is derived.

I What the legacy of prehistory means for contemporary man.

A. Tremendous diversity of cultures in the contemporary world is one consequence.

1. This diversity helps us to explain in part what produces political, economic and social upheaval.

2. This diversity helps explain the rising population and threat of population explosion.

B. A second look at how this diversity of cultures emerged.

1. The haphazard transmission of cultures from one place to another.

2. The unplanned growth of technical means of transmission.

C. Because of the transportation and communication revolution, something is happening to notion of culture, a new concept is emerging, which we call the third culture.

1. New culture patterns without a specific point of origin.

2. All peoples are contributing to this.

3. Illustrations:

a.) food

b.) science

c.) education

D. Why a third culture? Because a universal set of values are emerging regarding:

1. hunger

2. health

3. opportunities for creativity

4. economic development

E. Examples of the third culture: Which is emerging now include: English language, now spoken all over the world: cross culture--No one country owns it.

1. Consequences are that people who are underdeveloped in maintenance, tectology etc. are developing a common value systems that is cutting across political boundaries.

1.) Hunger-----agricultural experiment stations, no human should be without food;

2.) Health----no man should suffer from disease, difference of medical knowledge; extent of human life.

a) New value system is emerging

3.) Opportunity-----every individual should be given the opportunity to develop his native skill;

4.) Economic development.

II AID Communication Seminar, trained technicians are examples of an attempt at a programmed change of culture--- specialists in engineering, technology, etc., make predictions, plan for change.

III How do origin of mankind ideas fit the theory of evolution? What should we believe?

A. Third culture attempts to bring together cultures of the entire world.

B. Culture in traditional sense lies in a specific society.

C. Third culture is a set of patterns not identified with one society.

D. Examples: corn---all over world now
tobacco---all over world now
English---all over world now

E. Impact has been felt in religion, science. (Organizations, international in scope) etc.

Part IV: Theta Man Theory: A Model of Theta Man.

Emerging Generalizations, Emerging Elements and Structure.

Notes on Theory

I. Man looks at his world through transparent patterns of templets which he creates and then attempts to fit over the realities of which the world is composed.

   A. The fit is not always very good, yet without such patterns the world appears to be such an undifferentiated homogeneity that man is unable to make any sense of it.

   B. Even a poor fit is more helpful to him than nothing at all.

   C. Constructs are ways of construing the world and enable man to chart a course of behavior consistent with other courses of behavior or inconsistent with them, intellectually reasoned or vegetatively sensed. (Kelly p9)

II. A theory may be considered as a way of binding together a multitude of facts so that one may comprehend them all at once; When theory enables us to make reasonable precise predictions, one may call it scientific.

   A. Theory is a tentative expression of what man has seen as a regular pattern in the surging events of life.

      1. Theory, being itself an event can in turn be subsumed by another theory, or by a superordinate part of itself, and that in turn can be subsumed by another.

   B. A theory binds or determines ~~that~~ those events which are subordinated to it. It is not determined by the events themselves, it is determined by the superordinating point of view of the theorist.

      1. Yet he must conform to events in order to predict them.

      2. The number of alternative ways of conforming are, as far as we know, infinite, but discriminable from the infinite number of ways which do not conform. (Kelly 18-19)

   C. Theories are the thinking of men who seek freedom amid swirling events.

1. The theories comprise prior assumptions about certain realms of these events.

2. To the extent that the events, may from these prior assumptions, be construed, predicted and their relative courses charted, men may exercise control, and gain freedom for themselves in the process. (Kelly 22)

D. Theory is a way of binding a multitude of facts--- it provides an explicit framework within which certain deductions may be made and future events anticipated.

1. Provides a general framework within which certain facts may be held in place, pending one's induction of some specific principle among them.

2. Theory acts as a tool for the man who actively seeks to anticipate the future and to explore its possibilities. (Kelly 24)

E. Viewed from the perspective of centuries man may be viewed as an incipent scientist; each individual formulates own constructs thru which he views the world events. Every man is a scientist, man seeks to predict and thus to control. (Kelly 12)

Theta Theory:

I. Traditional ways of organizing the development of culture, that is, paleolithic and neolithic ages to ages of civilization and industrialization may be recast into a sequence of alpha, beta and theta culrues. (p1 mss)

A. Alpha= prevailed during paleolithic and neolithic periods

B. Beta= probably comes in at the time of the civilizations

C. Theta= perhaps begins around 1900

II. Synchronic look rather than historical look at developmeent of theta culture.

A. Dimensions of theta culture:

1. Ideology

2. Roles and statuses (drs, professionals, scientists basic sharing)

3. Values (universal declaration of human rights, etc)

B. Example of roles involved in theta culture; there are a number of doctors, professionals, professors, scientists, people in categories of this kind, whose basicknowledge and information are shared and transmitted ~~omitted~~ among themselves.

But these people, to the extent that they participate in their professional activities, are not necessarily tied down to their own local cultures, but are tied to an international culture, namely, theta culture.

1. Thus, a medical doctor in Indonesia could participate as a scientific doctor in the theta culture, butwith respect to his religious orientations, his family life, his kinship relationships, he participates as a member of the beta culture, and perhaps even that of the alpha culture.

2. Finally, example of social organizations, numerous international scientific organizations--world bank, UNESCO, etc. that representsthis third dimension of theta culture. (p2 mss)

III. Communication model as a relevant templet to apply to cultural history. Evolution of man and evolution of culture in communication terms: one generation is source, offsprings would be receivers, offsprings in adulthood become sources to children, etc.

A. Two basically different COMMUNICATION CHANNELS through which information or messages flow:

1. Basically biological, ie, genes transmitted from generation to another thru the genetic mechanisms.

2. Cultural--parents teach children what to say, how to behave, how to think about the universe, etc. This is culrual channel of information transfer. (p7 mss)

B. Biological information transfer includes four mechanisms bywhich some of the transfer takes place and how the information may be altered in the process.

1. Mutations (like produces like, but with variations) error, misinformation--random change in genetic terms;

2. Genetic drift, systematic changes taking place within a system.

3. Gene flow: same thing as crossbreeding or hybridization.

4. Selection: environment in which the population exists exerts certain kinds of pressures favoring the continuation of certain genetic traits and elimination of other genetic traits.

C. Environment exerts certain kinds of pressures favoring certain kinds of genetic traits and eliminating others.

1. Four mechanisms operate in systematic way over many millions of years have brought various kinds of species of life on earth.

2. Four mechanisms help explain how man evolved from apes or ape-like creatures and in turn from monkeys and more primitive forms of primates.

3. Trace this to homoSapiens: large brain, upright posture, skillful pair of hands.

D. At this point, second channel of information appears: cultural dimension.

1. Beginnings of culture primitive--gradually developed in this area till now he goes into outer space. How did process take place:

2. Four stages comparable on cultural level to genetic stages:

a. Mutation--------invention or discovery

b. Genetic drift------drift

c. Gene Flow----diffusion or acculturation

d. Selection----------selection

E. Time dimension: roughly one million years ago small brained primates on earth.

1. As social life changed, brain size incfeased and culture increased appropriately. Finally both biological and cultural aspects go on until man appears. Homo Sapiens emerged roughly 50,000 years ago.

2. Took about one million years to fifty thousand years to develop modern man---Homo Sapiens.

a. Fifty thousand years man has not changed biologically very much: ~~radical~~ racial variations only important one.

b. Various racial types developed within the last thirty-five thousand years.

c. Brain capacity, intelligence temperamental characteristics not changed in thrity-five thousand years.

F. WHY: Culture has been stablizer for genetic development.

G. Tremendous change culturally occured:
hunter and gatherer, then small society, kinship is important.

H. Man has developed culture, he could put on more clothes when it got cold, build fire to keep warm, medicines to restore health, etc.

1. Culture thus intervenes to protect man's biology from being subjected to environmental stresses and strains--selective process of natural environment would have occurred if man continued to live as primitve.

2. Man could determine his future biology by careful selective breeding and use of artificial insemination.

IV. The Cultural channel: (Until) About ten thousand years ago, man hunter and gatherer, fought disease, climate looking for food.

A. Domesticating of Plants and Animals took place which was an advantage over the hunter and gatherer.

1. Areas: South west Asia from western half of India to Egypt to Caspain sea--first most important one in this respect.

2. SW Asia = Wheat, barley, oats, sheep, goats, horses.

a. 2nd center = SE Asia= Thailand, Burma, Indonesia, Vietnam, etc. rice culture, taro, breadfruit, coconut etc; chicken, pig and water buffalo.

3. 3rd center = central and South America = beans, squash, corn; llama, guinea pig; alpaca.

B. Each center spread out in every increasing circles and eventually each of these complexes developed a high civilization.

1. SW Asia = civilizations of Egypt, Mesopotamia, Mohendo Jaro, Europe

2. SE Asia = China, Korea, Japan, Viet Nam

3. third New World = Mayas, Aztecs and Incas

C. Diffusion: Wheat complex moved throughout mid East eventually into Europe--then to America.

1. Wheat came into contact with American Maize complex: here Europeans learned to domesticate turkey, plant corn etc; tomatoes, pineapples, cotton, tobacco, potato.

2. Rice complex split in two directions: Pacific Islands far eastward as Easter Island and Hawaiian Islands, spread over the intervening islands: other wing into north: china, korea, japan and philippines.

3. Note: As we review flow and the diffusion of these cultural items, we understand the fact that Am diet today includes materials which has been brought into this society from many parts of the world.

D. Thus we could untangle the various mixture of cultural items.

1. Kenya farmers raise peanuts, cotton, corn, rice and wheat. Borrows from all over the world: truly member of the third culture. (p12 mss)

2. Wheat now associated primarily with Western civilization: corn with American indian civilization; rice East Asis but each of these have borrowed items from others and in world.

3. Industrialization is comparable and could be traced in time and space.

4. Basic idea of industrialization developed in Europe around 1700 and by 1900 reached US by 1930 flowed into Soviet Russia; 1890's into Pacfic and to Japan; 1950-60's Africa, Southeast Asia and Latim America.

V. Saltation: certain leaps in the development or progress of technology, underdeveloped countries are skipping stages.

VI. Gene pool notion is important: no single individual has all the cultural attributes of his cultural group or population.

A. Single individual may have cultural attributes that belong to another culture gene pool.

B. Individual can have cultural attributes that belong to another culture gene pool.

C. One person can be alpha, beta, theta at same time.

VII. Energy is subject to flow or not flow by kind of information people have.

A. Cottrell's notion that underdeveloped countries did not have enough energy resource even if exploited every bit of energy they had.

B. Flow of information may bring in greater energy to that country. Birth control information is an example of information influence.

C. Power: is essentially information. Pol power can be translated into the information control. Power holders are information flow controllers.

VIII. Gatekeepers in cultural system; gatekeepers subverts the cosmic view---notion that they are manipulated by the system and cannot manipulate the system.

IX. Culture: Theta culture programmed for the computer.

A. Computer as a society and its program essentially the culture, as computer learns and records information in certain way and then adapts itself to the environment, new inputs into the computor symbolizes the process culture change.

B. Computer that act as computers for other computers feed in information to other computers, that is the theta culture. (18mss)

Part V: Theta Templet Applied to Contemporary Scene.

I. International relations---relationships between countries, etc.

A. Industrialization and theta culture---

1. Example: USSR and USA similarities

2. European common market, etc.

II. Religious

III. Education

IV. Technology

V. Values: changing values; conflicts, psychological disruptions.

A. Male-female roles in the USA

B. Male-female roles in other countries

1. problems of dominant, independent woman, inadequate man kind of notions.

2. the conflicts created inside participants and others who are committed to theta and are becoming theta men.

C. Others: on smaller scale perhaps.

S.A. BASOEKI SOEKANTO

FKIS IKIP Bandung
Jl. Sebelas Maret no 229

Jalan Mundinglaya No. 2
Kampus IKIP Bandung

Dear Sir,
With best wishes
for all staff.
My best regards
to the whole family

BIRO
PERKULIAHAN
UMUM
INSTITUT
TEKNOLOGI
BANDUNG

Dear Prof. DR.
Iwao Ishimo
Dept. of S.A
Mich. State Univ.
E. Lansing USA.

JALAN — GANECA 10, BANDU

NETWORK ANALYSIS

by

Iwao Ishino

The Institute for Community Development and Services
Michigan State University

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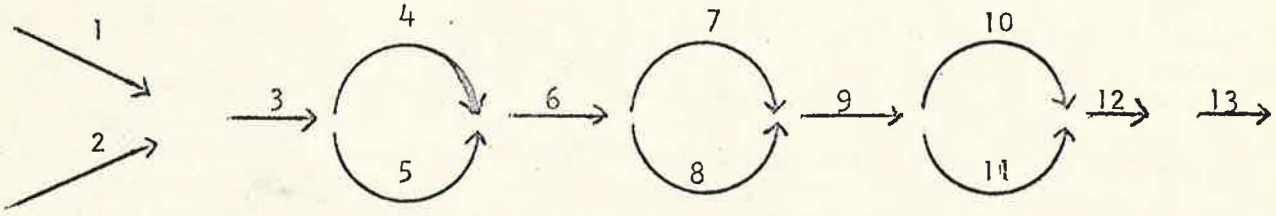
Dr. Iwao Ishino, Professor
Department of Anthropology, and
Institute for Community Development

NETWORK ANALYSIS

The process of encouraging community action is a very complex operation which involves many people with a wide variety of skills and talents. Here at Michigan State, for example, we have on our community development staff, urban planners, sociologists, political scientists, economists, geographers, and anthropologists. When such a team goes into a community on some development project it could entail the active participation of scores of other people including local government officials, business leaders, professional people and many other public-spirited individuals. To coordinate effectively the activities of such a wide range of workers, some kind of action plan is necessary. Network analysis is a technique for planning and executing a coordinated effort on some project of community action. The ideas for this network analysis have come out of management planning systems known as Program Evaluation and Review Techniques (acronym is PERT) and the Critical Path Method.

Statements which have attempted to organize the various phases of community action programs, of course, are not unique. A good example is one published in Adult Leadership, February 1953, entitled, "Initiating Social Action." (See attached sheet # 1A and B.) This Adult Leadership plan contains 13 phases, each with a number of subsidiary steps. These phases are: (1) Looking within the action group, (2) Looking at the community outside, (3) Identifying possible action targets, (4) Assessing the group, (5) Assessing readiness of the community, (6) Selecting one action target, (7) Translating ideas into action plan, (8) Assessing community forces relative to action target, (9) Planning the first action step, (10) Preparing the group for the first step, (11) Involving outsiders as partners, (12) Taking the first step, and (13) Redefining the action target.

Let us now take this example and see how it might be translated into a "network analysis" technique. The first problem is to diagram the logical sequence of the 13 phases. This is done by letting an arrow symbolize each of the 13 phases and "networking" the arrow into a logical scheme. Thus, the Adult Leadership phases will look like this:



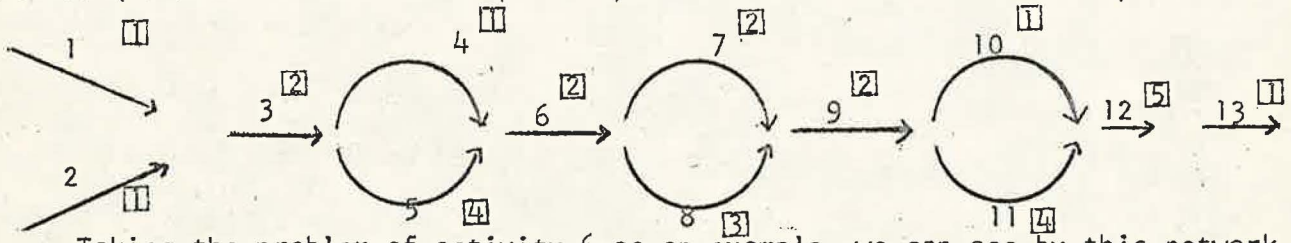
There are certain conventions in "reading" this logical network. The arrows designate the activity (or activities) that need to be accomplished. Each arrow now represents an activity (or a set of subactivities) and the total network of such arrows designates the logical order in which each activity fits into the total scheme. If individuals are assigned different activities because their time commitments and competencies differ, then each individual can see by this network diagram where his particular assigned work fits into the total community action program. Let us say that individual A is responsible for activity 6 (see arrow 6), this means that his particular responsibility does not begin until activities 4 and 5 have been completed. It also means that logically activities 7 and 8 should not begin until the completion of activity 6, for their action depends upon decisions and information gained from activity 6. The logical place of other activities is also succintly represented in this network.

Now, let us move to the second problem of network analysis. Suppose that the particular community action program is one which is farily routine for our community development team (say, a program to institute a zoning ordinance), and we have enough experience now to estimate the number of weeks it takes to complete each of the phases listed in the above logical network. If this is the

case, we are ready then to move toward establishing (in addition to a logical network) a time allocation network. Let us assume that the following number of weeks are necessary to complete the respective activities:

Activity	Number of weeks to complete activity
1) looking within the action group	1
2) looking at the community outside	1
3) identifying possible action targets	2
4) assessing the group	1
5) assessing readiness of the community	4
6) selecting one action target	2
7) translating ideas into action plan	2
8) assessing community forces relative to action target	3
9) planning the first action step	2
10) preparing the group for the first step	1
11) involving outsiders as partners	4
12) taking the first step	5
13) redefining the action target	1

We can now add this information to the network diagram by indicating the number (of weeks needed for completion) in a "box" beside the activity number:



Taking the problem of activity 6 as an example, we can see by this network diagram that it should not get started until the beginning of the eighth week (cumulate the times of completion for the preceding activities). Similarly activities 7 and 8, which are dependent upon the completion of activity 6 should not start until the beginning of the tenth week.

By such analysis we can estimate the time of completion for the total program. Similarly, as the project proceeds, unexpected delays at any step in the process will have consequential delays on dependent or still uncompleted activities in the program. The consequences upon the completion date can be estimated if such delays in any intermediate phase occurs.

The foregoing discussion briefly alludes to the kind of analysis that is possible by means of network analysis. All of the refinements and implications of the method, of course, cannot be indicated in such a brief presentation but it is hoped that some idea of the general value of network analysis can be gleaned from the above.

I would like now to move to a slightly more complicated sequence of activities that a community action group might wish to take. For this example, I have assumed that a citizens' group (referred to here as a "Action Group") came to our Institute for Community Development for consultation purposes on some problem. As the attached diagram indicates (see sheet # 3A and B), I have listed 20 activities that could be considered in the goal or image setting, planning, action, and evaluation phases of the project. These activities are now networked into a logical diagram (see sheet #2A and B).

In our training program for community development workers, a network of this kind has been helpful as a pedagogical device as well as a planning device for them to carry out field research programs. As a pedagogical tool, these networks have facilitated communication among the members of the class because they tend to reveal hidden assumptions, muddy thinking, and false expectations each has held about change process in the community. On the planning level, the networks have provided us with the incentive and technique to sequence the multitude of specific activities that should be taken into account when a person plans to study a community action program.

PHASES OF COMMUNITY ACTION

Community action may be thought of as progressing through several phases. These phases do not necessarily fall in chronological order, but they occur, in one way or another, in every successful democratic action project as it is planned and carried through. Groups that want to improve their ways of working may find the following diagram useful in assessing and modifying their own methods of taking action.

LOOKING WITHIN THE ACTION GROUP

Getting ideas and feelings of members about needed action

- every member's wishes-not just a few-are considered
- their pictures of what should and can be done are weighed thoughtfully

LOOKING AT THE COMMUNITY OUTSIDE

Getting ideas and feelings of the community

- review picture of social action under-way in community
- study reports of community surveys, if available
- discuss group's ideas with others

IDENTIFYING POSSIBLE ACTION TARGETS

- the most important community problems
- the ones that demand action first
- the ones the group can do something about

Assessing the group

- see the group as an instrument of social action
- find the target most in line with the group's purpose
- assess the group's limitations of time, resources, power
- decide which action will ready both group & community for further action
- look honestly at motives for under-taking the project

Assessing readiness of the community

- study what has been done in the general areas being considered
- review probable relations of current action efforts to the project
- estimate probable support and opposition
- estimate community resources that can be rallied

SELECTING ONE ACTION

SEE NOTE A

- a community concern of high priority
- a problem that members of the action group feel strongly about
- one that is realistic in terms of group's own resources and the support it may expect to get from outside

SEE NOTE B

NOTE A

Members may have many motives: getting the problem solves, venting righteous indignation, putting over a pet project, getting attention, getting revenge on some other group, blocking some other program, and others. None of these is necessarily "bad" or "good". But they are dangerous if they operate as hidden motives, interfering with rational planning and effective action.

NOTE B

The group must select a general field of action-housing rather than international relations, or race relations rather than mental health. Then the group must define a specific project within the chosen field-for example, within race relations, working for fair employment practices in the town's industries, or working against race labeling by the town's newspapers. Often the impetus to action comes from a few interested persons, or arises from some dramatic incident.

NOTE C

The action group will develop feelings of high morale and of increasing confidence in its own ideas as it works out its preliminary plans. It must guard against seeings its first step as missionary work among the heathen and ignorant outsiders. It must try to see its purpose as leadership in getting the problem understood and solved by the community, not as selling a "solution". The group should see its action steps as ways of learning better, along with other people, what the problem is and how it can best be solved.

Sheet # 6A

Translating ideas into action plan

- identify needs of group for information and ~~consultation~~
- collect and use relevant information
- involve outside informants where group members cannot supply needed information
- identify possible steps required to reach action targets
- select first action step in relation to the group's and the community's readiness and resources

Assessing community forces relative to action target

- analyze probable active and passive support and resistance by other organizations
- analyze informal power and communication structure of community
- chart organizational and informal communication channels for informing people about project
- estimate availability of mass communication facilities-newspapers, radio, TV, etc.-for publicizing project

PLANNING THE FIRST ACTION STEP

- which the group feels capable of carrying through
- which brings in other persons and groups that need to be involved
- which promises best visibility or publicity for project as it is reported & talked about
- which makes responsible use of opposition

Preparing the group for the first step

- clarify goals of the first step
- map out division of responsibilities
- assign special responsibilities to members who are interested in doing them
- provide necessary training for assignments
- rehearse first step (perhaps by role playing) & replan in light of tryout
- build plans for evaluating first step into the action plan

Involving outsiders as partners

- identify ways in which the project needs the help of other persons and groups
- ask persons and organizations to help in ways they are likely to find congenial and possible
- prepare announcements and publicity to reach different groups effectively
- recruit outsiders as genuine partners, not as servants of the action group

TAKING THE FIRST STEP

- to involve other people in thinking seriously about the problem
- to involve others as partners in the project
- to focus community's resources on the problem
- to test the group's thinking about the problem in relation to the community
- to furnish data for replanning further action steps

REDEFINING THE ACTION TARGET

- in relation to new information about itself
- in relation to new information about community

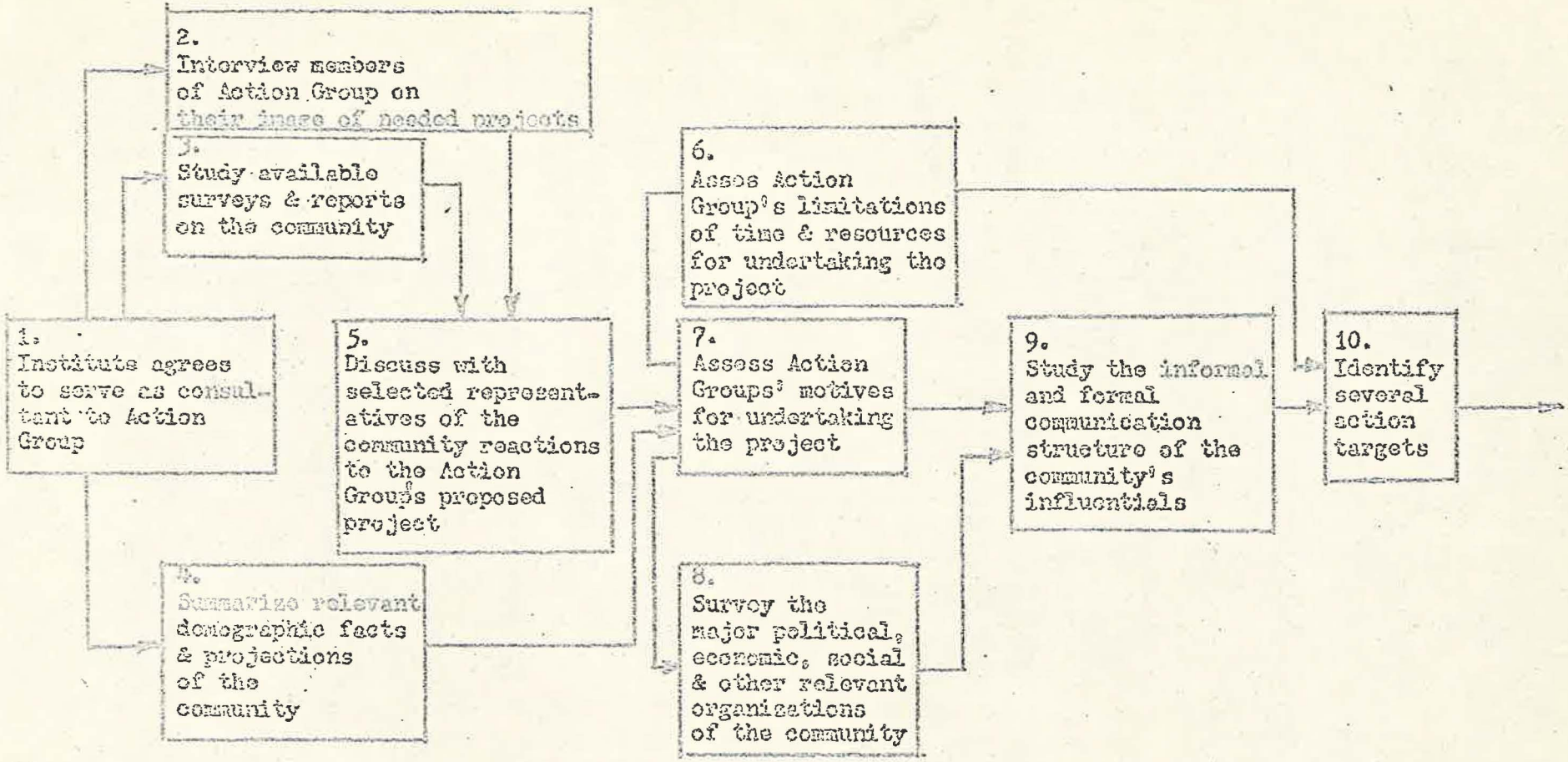
SEE NOTE C

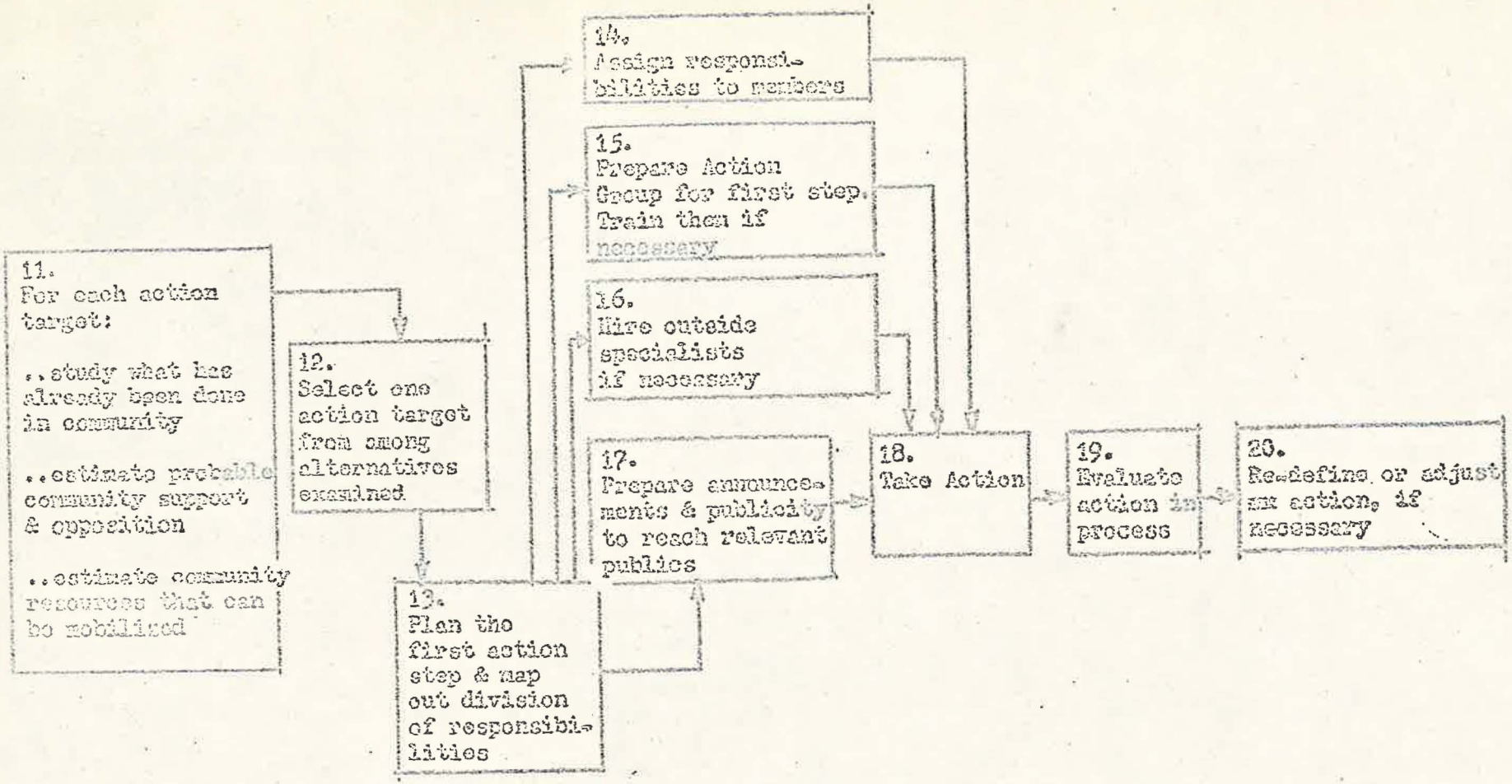
SEE NOTE D

NOTE D

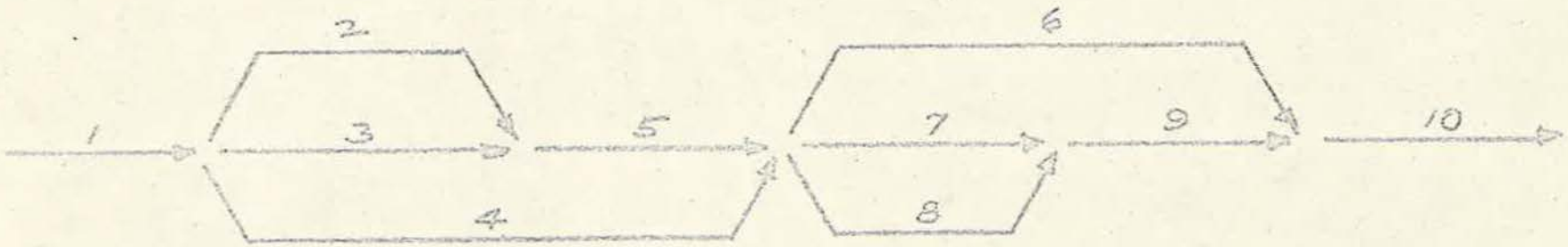
Sooner or later, the action group has to move its action project out into wider community. The group must take a first step toward actually implementing its plans and testing them. The first action step may take many forms-a series of programs in various organizations, interviews with key people of the community both to get their advice and invite their further participation, block organization of interested citizens, an invitation to interested people to consider and recommend further plans, pressure on official agencies, a mass meeting, a publicity campaign covering the problem and its seriousness, etc.,etc. Whatever form the first step takes, it should be designed to get maximum involvement and also to test the action group's thinking about the pattern of community forces with respect to the problem, and about the best ways of channeling them into working out a solution.

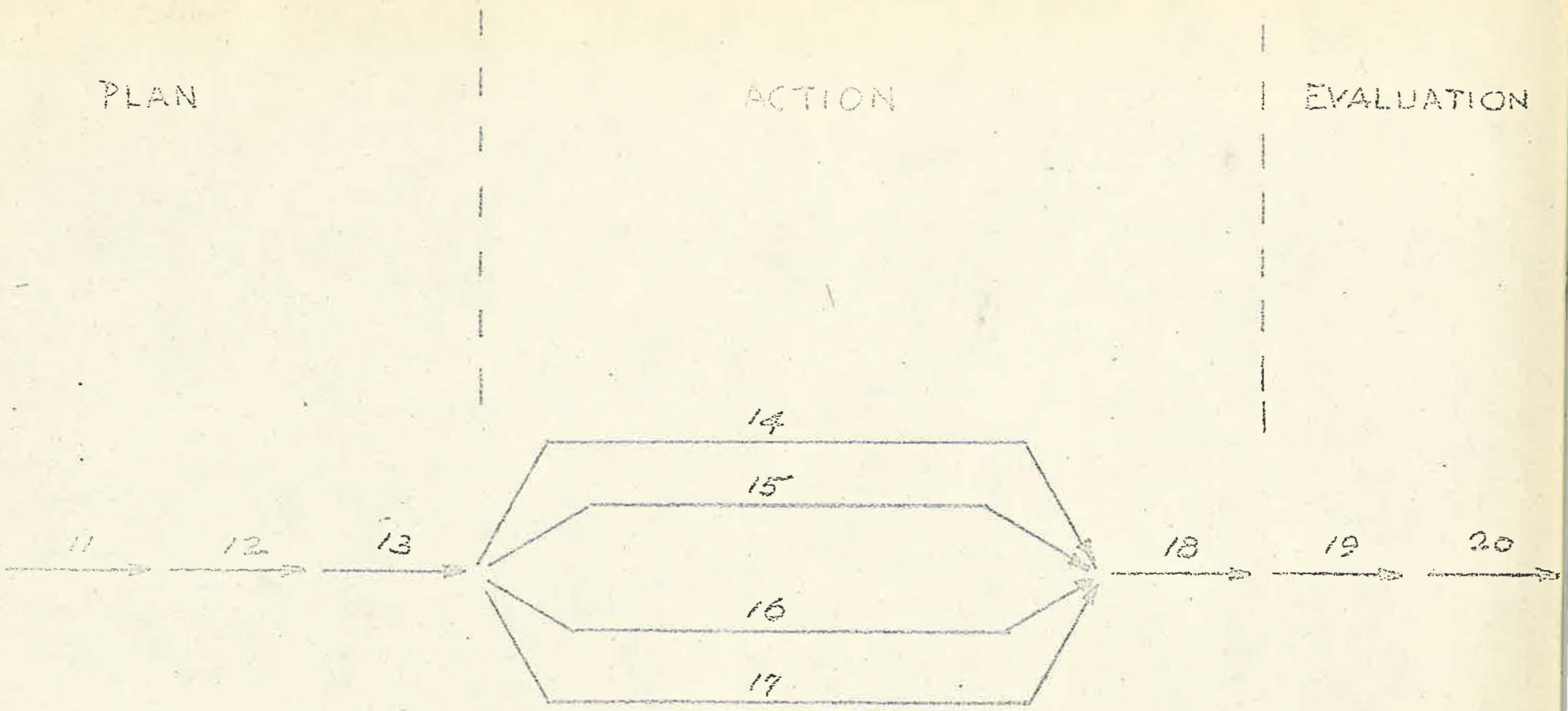
"Mr. Louchy-can we count on your organization to cooperate with ours on a project to....."


1.
Institute agrees to serve as consultant to Action Group
2.
Interview members of Action Group on their image of needed projects
3.
Study available surveys & reports on the community
4.
Summarize relevant demographic facts & projections of the community
5.
Discuss with selected representatives of the community reactions to the Action Group's proposed project
6.
Asses Action Group's limitations of time & resources for undertaking the project
7.
Assess Action Groups' motives for undertaking the project
8.
Survey the major political, economic, social & other relevant organizations of the community
9.
Study the informal and formal communication structure of the community's influentials
10.
Identify several action targets


11.
For each action target:
..study what has already been done in community
..estimate probable community support & opposition
..estimate community resources that can be mobilised
12.
Select one action target from among alternatives examined
13.
Plan the first action step & map out division of responsibilities
14.
Assign responsibilities to members
15.
Prepare Action Group for first step. Train them if necessary
16.
Hire outside specialists if necessary
17.
Prepare announcements & publicity to reach relevant publics
18.
Take Action
19.
Evaluate action in process
20.
Re-define or adjust an action, if necessary

IMAGE




PLAN
ACTION
EVALUATION
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