Systemed Studies on Message Diffusing: Volume 1

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Overview of Book

This book was originally intended to be one of a set of four themed volumes covering the life's work of Dr. Dodd for publication by an academic publisher around 1970. Unfortunately, the project was cancelled. This is Volume 1 of Dodd's collected papers on Message Diffusing.

Preface to Systemed Studios on Message Diffusing

For a very long time men have struggled for control of their environment. That environment has always included other son. Sometimes mod have moved toward, sometimes away from this goal of environmental control, at over the long time span, man has gained nor* than helms fallen back. The animal world has slowly gives ground to its self-proclaimed master. The systematic application of sun's accumulated knowledge has caused the plant world to yield to and for man. Even seemingly unending and unbending space seems now on the point of crying uncle (be it San or Ivan).

The systematic institutionalization of this search for knowledge, mats-voted by man's desire to control, we call science. But whereas the accomplishments of physical and biological science have been awe-inspiring, those of social science have been much more modest.

In any field, increasing control comes only after vast amounts of time, energy, and material wealth have been spent -- even squandered -- in the preliminaries of perceiving, sorting, describing, ordering and testing of the data. (Sometimes the effort even seems to be spent in the wrong direction, at the wrong time, on the wrong things, and for the wrong reasons!) But out of such investments emerge new tools and new uses for old tools. New ways of thinking about old problems bring ever more combinations of ideas and tools to be tested and selected for the solution of ever more complex problems.

The social scientist, committed to the study of man's interactions with his fellows within the environment, may take that most useful tool, mathematics to help describe, explain and predict man's behavior. S. C. Dodd helps to do this in his Transactional Sociology: explaining and predicting man's behavior in terms of the transact, B = APVTLC. That is, Behavior equals the Acts-of-People-for things-Valued-in-Time-and-Length-of-space-and-residual-Context.

This collection of Dodd's articles in Volume 2 of the series entitled; Systemed Studies on Human Transactions", deals with that portion of his work which bears on the diffusion of items through people, whether small groups, societies, or whole cultures. The articles, as here collected and arranged, provide a type of behavioral system summarized in a mathematical formula that definitely unifies this human behavior-in-context. This unitary theory Dodd calls the "Transaction Theory." It deals with acts-in-context wherein an early transact will predict a later transact insofar as the two are matched, feature for feature.

Besides relating to Dodd's larger theory of human behavior as a transactional system, these articles develop mathematical models for the basic growth curves of interaction and

In addition, however, to providing a systematic frame of reference for research and the interpretation of finds, this volume gives a great deal of experimental evidence on stochastic diffusing processes, in which each state determines the next state in a probabilistic fashion. These experiments are empirical and, increasingly, controlled experiments, but still lack elegance of mathematical expression here. Stochastic theory had not diffused, to sociology or general social science literature, in the period when these articles were being developed.

The articles do, nevertheless, offer experimental and raw empirical material for better trained mathematicians to re-express as predictive models that eyesore rigorously formulated in mathematical and statistical language. If Dodd were doing the experiments now he would doubtless try to express the hypotheses to be tested as stochastic-equations, with their density functions, characteristic equations, generating functions, etc. It is to be hoped that in time others will re-express his work in that way.

This volume on diffusion is the second of a series of volume that are being published by

Gordon and Breach. The first serial volume is entitled Systemed Studies on Human Values. The second in the series is the present Systemed Studies on Message Diffusing. The third volume in this series is entitled Systemed Studies on Opinion Polls. It collects some forty of Dodd's articles with a focus on polling. The fourth volume in the series is proposed under the title Systemed Studies on Interactive Symbolizing. All the articles in the four volumes together account for the 144 of Dodd's research articles in professional journals. Most of these were developed over the 20-year period 1950-1970.

Though unified in part, in retrospect, these represent a lifetime's research process. This flow of incipiently tested thinking aims to help develop laws of human behavior in the elementary field of diffusing item messages through a population and a period. Dimensionally, the Behavior deals with Acts of People in Time. (An APT formula!) Increasing these behaviors can be more rigorously stated as stochastic processes, or laws of changing probabilities. I see scientific laws about events as sequences in time, which, if correlated, spell out effective means to human ends. By this definition, few men, if any, have equaled Dodd's contribution to the development of sociological laws about diffusion.

All of the articles collected here have been presented or published previously. Some represent propositions for test; some are reports of such empirical tests. Although the use of uncut articles introduces a certain amount of redundancy, this could prove to be useful, particularly for those who are unfamiliar with mathematics and who find the material difficult to absorb in a single exposure. The inclusion of Dodd's transact model (article 11), and the reiteration rule (article 12), provides a broad theoretical base, and permits placing the diffusion research studies into a larger framework.

Stuart Dodd chose behavior science as field before the term was invented, and at a time when many scholars still asserted that it was t contradiction in terms. It has been he, and men like him, who have demonstrated that behavioral science is possible. The dimensional frame he developed to help order and guide his thinking has thus had a subtly profound effect upon the development of sociology, even though it has not been widely used in direct quotation by other scientists. Although not only yet living but still prodigiously productive, Stuart Dodd has even so already become part of the folklore of sociology. I doubt if there are any sociologists in the world, beyond the level of the undergraduate student, who has not heard of him. Since I believe this to be the case, a little biographical material of how his thinking grew seems in order.

Throughout his 40 years of scientific productivity, Dr. Dodd has been putting out articles and books at a mean rate of four a year. The main thread through these I see as seeking for systematizing of the situation. He seeks the uniform, the invariances, the generalizations, the laws that are increasingly emerging with greater and greater university. He has the general point of view that scientific methods are any and all methods that enable us to so describe as to explain and predict and increasingly control better than we could otherwise. He sees the pursuit of what most men want, most deeply and durably, to be most hopeful if scientific methods are used increasingly. But there is always something new cropping up, new combinations and permutations of existent patterns, so that one never looks forward to a time when all problems will be solved.

His missionary home in Turkey had a great deal to do with his feeling a high sense of interest and responsibility to contribute to society, to speak up on how to improve the world in the ways he can, which is chiefly through research. Others might choose political activity; his brother, Alexander Dodd, chose life in the Society of Brothers, a Christian group practicing

community of goods, as a way of demonstrating by example how men ought to live together in love. Two other brothers followed their father's business in choosing to become medical missionaries. A fourth brother after fifty, found his best contribution in applying simple Christian faith for rebuilding the inner city around community and spiritual values - becoming Man of the Year in Stanford (Conn.) thereby. His sister pursued the teaching of art and its spiritual messages. But behavioral research as a social scientist is the way Stuart Dodd has chosen to make his contribution, chiefly. He enjoys bringing items that seem most remote abstract or general into more Immediate, concrete, and particular application.

In his sophomore year in high school, he had an excellent mathematics teacher who gave stimulating encouragement. One day the teacher cane into class and said, "Gentlemen, I want to call your attention to something," and he held out Dodd's homework - - "After almost 3,000 years of geometrical thinking by the human race, here is an entirely new proof of a theorem of Euclid's that Stuart Dodd has produced yesterday." Dodd hadn't even supposed it to be unusual! It will be left to future generations to assess the full impact of the material presented in this book. But all must surely even now agree: it is unusual!

This collection is intended for use by several audiences. It will be useful for graduate students in the behavioral sciences, especially in those studies and theories which draw on mathematics for more exact prediction of human behavior. Although students with a firm background in modern mathematics (especially set theory) may find some passages difficult, they will be rewarded for their effort.

Indeed, as the number of students with the requisite mathematical knowledge increases, this collection of articles should find an even wider audience as an undergraduate supplemental text.

Mathematics students may find some interest in simple applications of mathematics to the social sciences. Students from such diverse disciplines as education, political science, and communications may also find implications for their special fields of interest. And all social scientists with an interest in diffusion will want this book in their libraries.

Preface to Article #1: The Transact Model

The first article presents the fundamental concepts and their interrelationships which together form the theoretical superstructure uniting the various articles in this volume on message diffusion. It presents a classification scheme whereby every behavioral transaction can be analyzed in all of its factors – categories (actions, people, time, space, values, and residual circumstances) and its four facets (kinds, degrees, variables and systems). At the core of the model are the propositions that insofar as its factors and facets are known, in just so far can the transaction be predicted. Such a proposition is true by definition; its value is heuristic and methodological. For it permits more exact resynthesis of previous analysis and theory. It helps to test our current analysis of human behavior by its predictivity.

The cross-classification of the factors and facets produces a paradigm for transactional analysis – comparable to, but much more systematic than, Merton's paradigm for functional analysis.

Some of the versatile, alternative interpretations of the four facets of every variable are:

in terms of geometry: points, sects, vectors, spaces
in terms of class-calculus: cases, class-intervals, Classes, classifications
in terms of set theory: elements subsets, sets, settings
in terms of corner scripts: pre-superscripts, ${}^{s}1$, post-superscripts, 1^{s}, pre-subscripts, ${}_{s}1$, post-subscripts, 1_{s}

In general, the four facets specify four levels of thoroughness in any transact analysis. The four facets, or corner scripts, are generated and can best be operationally defined by the four successive rounds of reitering. (See Vol. IV article #20 on "The Reiteration Rule" for more details.)

Preface to Article #2: A Measured Wave of Interracial Tension

Research in a field often proceeds by exploring the field, narrowing it down. The explorations Section II helped Dodd see the dimensional core of the behavioral and social sciences as centrally the all-or-name acts and interacts of people in space and time. This formulation seems to me to derive the simplest, most powerful, most frequent, and most firm modeling on which to build, expand, compute deviations, and generally build up a more law-abiding science.

The first article in this section, "A Measured Wave of Interracial Tension" tests a part of the Interactance hypothesis developed more fully in article #17. Here, the effect of time and distance on the spread of a rumor is measured exactly. It was found that the probability at interacting per capita equaled the reciprocal of the intervening distance. The probability of interactance decreased, likewise, with intervening time.

Preface to Article #3: Can the Social. Scientist Serve Two Masters?

The previous article, "A Measured Wave Racial Tension", tested two factors of the interactance hypothesis, space and time, as predictors of the diffusion of a message. This

article, "Can the Social Scientist Serve Two Masters?" reports the testing of four predictor variables from Project Revere in the diffusion of a message to a population through air-borne leaflets:

1) the ratio of number of leaflets to size of population,
2) the relationship between the message and the value-system of the population,
3) the distance intervening between the inter actors, and
4) time.

'The thrust of the article is two-fold, it is demonstrated, firstly, that research done at the request of a paying sponsor may be so conducted so as both, to meet his special, needs and also to advance the science. It is also demonstrated, however, how fruitful the interactance hypothesis can be in suggesting candidate date predictors of the criterion variable, the spread of a new message through a population.

These experiments on whole communities confirmed the four hypotheses, or candidate social laws that mass human responses or interaction will tend in otherwise unchanged settings, to be proportional:

a)To the size of the stimulation and
b) its importance to the respondents, and inverse to
c) the intervening distance and
d)the intervening time.

Preface to Article #4: Testing Message Diffusion in C-ville

Stopping a rumor is a hard thing to do. Social scientists who have tried it report that starting a rumor is nearly as difficult. In fact, getting people, at the will of the experimenter, to voluntarily spread any message, may take several tries. The problem is one of motivation. In "Testing Message Diffusing in C-ville," part of the motivation was the reward of a pound of coffee. Interestingly, although it is not reported here, an earlier version of the test had used $1.00 as "bait" -- with negative results.

This little article is a model of exact research in a field setting where a large number of potentially causal factors are constant so that the effect of the stimulus can be relatively un-ambiguously observed. It is also a model of how best to present the results of research -- in lucid prose, illustrated by self-explanatory graphs, backed up by full documentation in tabular form.

Diffusion over time was found to closely fit a logistic curve. Growth of the cohort of knowers in the population through removes from the source closely fitted a normal curve.

Preface to Article #5: Testing Message Diffusion in Controlled Experiments

There is some overlap between the last article and the following one. Both report the harmonic waning of interacting as distance increased that was found in the "C-ville" (Carnation, Washington) experiment. In addition however, "Message Diffusion in Controlled Experiments" also substantiates the finding reported in Article 5 that interacting in message diffusion over time fits an S shaped, or logistic, curve. This finding is replicated here on quite

other data.

The article here is also significant, moreover, theoretically as well as substantively. It relates the observed findings to the transact model (Article #1) tightly. Note that as early as 1953 transactional sociology was being used to produce Pearsonian product moment correlations or .999 and .935 between model – predicted and field-observed data – a rarely accomplished nearly twenty years later by researchers using alternative approaches.

Preface to Article #6: Formulas for Spreading Opinions

By 1958, when "Formulas for Spreading Opinions" was written, Dodd and his associates at the Washington Public Opinion Laboratory had learned the forms and characteristics of the logistic diffusion curve dealing with the operational definition of it in the present tense. They had learned a good deal of its causation or the mechanism producing it -- the probabilistic interacting of knower with non-knower in a one-way action that meant the non-knowers would cumulatively decreases while the knower would cumulatively increase up to a maximum of the full diffusion of the population. They had learned that this growth curve when observed at any point in it could be used for predicting the future by taking readings further ahead in time on that curve. The curve is what is now called a stochastic theory and an ergodic process.

An ergodic process goes to the same end or conclusion (namely, diffusion of the entire population) regardless of its starting point. This is coming to be a very important process. It helps so synthesize the teleological points of view from the empirical and mechanistic points of view. In the cast of human beings, language and words can denote future situations. Then we use these words as stimuli from behind to push us into actually achieving that vision of what's ahead. We are able to use the future when recorded in words as a prior mechanistic cause determining present action. And so we get a beautiful synthesis of how nature works by causes earlier in time than their effects. Through language man is able to project ahead and use the future desired situations as present and prior causes of further behavior.

Now here in the ergodic processes we have a purely mathematical and probabilistic concept that a process will go toe fixed conclusion such or diffusion of the entire population or probability of reaching a given level regardless of what point you latch onto the process or equilibrium as soon as the partial interruption is removed. Six families of such ergodic processes, with the conditions productive of each, are presented here.

Preface to Article #7: Testing Message Diffusion from Person to Person

As we saw in Section II, an exciting discovery emerged from Project Revere: the growth in the per cent of the population hearing a massage, when plotted, tended to show regular S-shaped growth curves. The logistic growth curve seemed to account for this as a simple most likely product of knowers (p) interacting with non-knowers (q). So p x q measures the resulting diffusion as a joint probability. These logistic diffusion curves are treated to detail in the five articles of Section III.

You will find that the logistic hypothesis formulates a basic principle of interhuman or group behavior, namely, "If people repeatedly interact to telling and hearing an item message and do so with equal opportunity, i.e., randomly, steadily, and pairs, than the knowers can be predicted to increase according to the S-shaped logistic growth curve that is defined by p_t =

$(pq)^{(t)}$. The exponent (t) in parenthesis means a stochastic or recursive processing. It means that the base is not exactly the same base that is multiplied by itself t times but it is each time the base that emerged from the previous multiplication, whatever it may be and is the taken to be multiplied by its complement for the next change.

This behavioral analysis is tested in articles 7 through [11] in near-imperfect resyntheses by field and laboratory experiments. Here experimenters try to get people communicating in pairs only, to get them communicating randomly and at will, in steady and harmonically waning time rates, in controlled person-to-person ratios with equal opportunity and in cliques of varying size.

These variations of the conditions are highly related to the law of gravity which is also a case of p x q or a joint probability extended out over space. The logistic curve is the law of joint probability of p x q when extended over successive periods. They both deal with the interacting or intersects of sets of elements.Whether the elements in one case are molecules and in the other case are human persons does not matter at all to the form, of the mathematical formula that is graphed in a geometric curve.

Preface to Article #8: The Logistic Law of Interaction When People Pair Off 'At Will"

We just saw the overall research strategy and principle hypotheses of the Washington Public Opinion Laboratory as presented in 1952. As then anticipated, this strategy was to bear fruit in that as time went on, more and more of the candidates for sociological laws to be demonstrated as being in fact invariantly true probabilistic propositions, given the stated requisite conditions. (By "invariantly true" I mean true with a very small margin of error.) "The Logistic Law of Interaction When People Pair Off 'At Will', is a case in point. An average correlation of r = .90 over five experiments is here demonstrated.

Now in the theory of ergodic processes, the mathematicians have worked out two limits. One is the domain within which the process can wobble from its definite course and not break down entirely. (When it gets beyond the limits of the domain, then the whole system goes to pieces.) An organism's metabolism may be lowered by heat or cold, and still recover, whereas if burned up or frozen to death, it will die. The other limitation is the temporal one, the period. The ergodic process holds good within a specified period and if it exceeds that period too greatly, it can again break down and disappear.

One of the unstated conditions for the logistic law of interaction when people pair off at will is that the domain and the period not exceed some as yet unspecified values. We know that these limits are at least greater (under the other conditions of the experiment) than the parameters reported here.

This article started to test Dodd's hypothesis that randomness can be operationally redefined as multiplex causation. So-called random variables and distributions can be analyzed and resynthesized as produced by large numbers of elements of much smaller order, thus a million random tosses of a million pennies produces a highly normal distribution. Each penny's coming up heads or tails seems in turn determined by an is unobserved but large number of minute influences from molecular collisions (as in Brownian movements) up to neural coordinations in the hand of any human tosser. Whenever the causal influences are "multiplex" i.e. many and small with none outstanding so they seeming unobservable we call them "random acts", "chance events", etc. This multiplex causation hypothesis has vast overtones and implications in philosophy, science, and statistics. A simple indication of all this

was sought in this article by asking “Will people behave logistically as random elements do?” When we observe many people each doing a small act or making many small decisions with near equal likelihood, will the aggregate result fit a logistic curve of cumulating 'joint probability, e.g. from random acts? The consistently affirmative answers from diffusion experiments in Project Revere support the multiplex elements hypothesis defining randomness.

This article, then, indicates one way whereby controlled experiments can progressively test the "multiplex-as-random" hypothesis.

Preface to Article #9: Testing Message Diffusion in Harmonic Logistic Curves

The next article takes up two questions:

1. At what speed will a message spread?
2. What will be the form of that spread?

As usual in Dodd’s work, the answers are specific to exactly stated social preconditions. All too often in behavioral science this is not the case, leading to apparently contradictory findings. The article proceeds by mathematically deriving models which match the preconditions; by simulating, if you will, the social situation. Finally, evidence from experimental testing shows that the notions about the "real" system as embedded in the mathematical model are accurate and adequate to a degree seldom equaled in the social science literature. The observed and expected curves match almost exactly with respect to mean, variance, and rank order, the agreement of the three statistical moments that is better summarized by the intraclass correlation than by Pearson’s r.

Here the preconditions included a waning-with-time factor, 1/t, superposed upon the three necessary and sufficient conditions for producing a logistic growth curve, namely random, steady, pairing, of many interactors in mass-communicating; a one-way, all-or-none item message.

The harmonic logistic model answers the questions above by saying: The speed and form of mass diffusing of an item will be predictable by four factors, kpq/t, (insofar as all else is constant). These factors are:

p = the proportion of current knowers retelling the message.
q = the complementary non-knowers becoming scarcer and harder to find.
1/t = waning of diffusing with time whether due to neural decay of synaptic paths (a forgetting factor) or social overlaying the message by other succeeding events or other causes
k = the potency parameter adjusting units and reflecting the average interest of that population in that message under the existing conditions.

Preface to Article #10: A Test of Message Diffusion by Chain Tags

Good theory is important, and good methods are important. Theory and method lie at the heart of any science. But there is more to research than science – there is art. The art of choosing, or developing, techniques. Index construction, a good example of which we saw in the last article, is an example of the artistry of the scientific researcher. Here we see another.

The "chain tag" is a simple, workable, yet very clever device for measuring or, perhaps better, mapping, the flow of diffusion while introducing minimal contamination into the process. It is a contribution to the "nuts and bolts" of diffusion research the kind of thing that makes people ask, "Why didn't somebody think of that before?" Of course the chain-letter device has been long known. But its use to measure and control diffusion rates in controlled experiments is new.

This article is also significant is demonstrating, that at least in the late 1950's, the patriotic appeal to national defense and survival was still a potentially powerful motivator in American culture.

Preface to Article #11: Clique Size as a Factor in Message Diffusion

This final article in the group of articles discovering self- completing processes compares the deviation from the logistic model as the clique size varies above and beneath a clique size of four men.

We have seen that if the system deviates beyond either of its limits in size or duration, the whole equilibrium or system may disappear. This idea of the ergodic process is going to become a useful cybernetic synthesis of cause and effect, purpose and mechanism, the things controlled by feedback loops where verbalized future ends become actual preceding events, and so on. Dodd and his associates learned that the logistic diffusing was a case of the second moment of an attribute in a population that changes probabilistically. The other statistical moments of a distribution are the zeroth moment $(p + q)^0$, which on repeatedly interacting with itself generates the binomial distribution $(p + q)^n$ and the normal curve; the first moment (p, q) gives rise to two exponential curves; the second moment gives rise to the logistic curve; while the third gives rise to the negative binomial; and the fourth gives rise to the negative logistic reflecting the bimodality-to-unity of the distribution. They discovered that these processes can all be interrelated as the family of five statistical moments of any distribution, especially the normal distribution. Is fact, current textbooks on stochastic processes will list these five and about six or seven other processes as great achievements, or laws, of stochastic theory thus far, but they seem not to realize that they are determined and ordered by the statistical moments.

The next five articles on "Momental Diffusion" explore and develop these basic stochastic laws of human mass behavior much further.

Preface to Article #12: A Dimensional Theory of Social Diffusion
with Henry Winthrop

Now we go on to the next set of articles, Section IV, on momental diffusion. These expand and explore the different moments discussed in the preface of the preceding article, #11. Again these articles grew from one to the next in irregular progression. The first one (#12) with Henry Winthrop grew out of Project Revere to the 1950's. It explores different ways of looking at diffusion as a discrete set of elements, and as a continuous curve. Depending on which way diffusion is viewed, slightly different results obtain. The discrete curves fit human data usually better since a dichotomy in population must change in jumps of whole persons.

Preface to Article #13: How Random Interacting "Organizes" a Population

The next article, #13, "How Random Interacting "Organizes" a Population" seems to me to be Dodd's most important insight into this process. It shows that when the two halves of a population, p + q, interact with themselves repeatedly raising themselves to a power, $(p + q)^n$, in the binomial expansion (and the normal distribution as n becomes large), that this is one mechanism that determines the normal distribution curve as observed so often. We begin, thus, to account for one of the many ways in which a normal curve can arise as The Central Limit Theorem in statistical says it must arise when the means of many sorts of distributions are thrown together.

Another outcome of the random interacting in article #13 was that if the normal distribution has its two arms on either side of the mean, plotted vertically as an ordinate on log scales, then each of the arms become converted into the Gompertz curve of positive and negative entropy. This accounts for negative entropy as the communication or information curve by which things become organized and built up from the state of random completed entropy to their present state, whatever it may be at all the different levels. Then the positive entropy measures the physicist's observed entropy of everything running down from its current state to a more disorganized or purely random state eventually. Every cohort of actants thus seems building up with smaller and smaller factions to the midpoint of its cohort life cycle and then probabilistically breaking down back to the bottom of the cycle. This bottom point, or nadir, reflects the state of completed entropy. Here the whole process of organizing a cohort of actants starts over again. But this start of creation, or the organizing of everything, at the nadir is not a new or sudden event, done once for all and requiring an external creator to start it moving. Rather it is the perpetual and continuous random process of forming and unforming all the possible n^n formation in any set of n elements or action or energy-operating-in-time. Because the cohorts are coming on constantly, the binomial expansion tabled in this article may be view as a generalization of it. In short, the last column in Table 1 may go far in explaining continuous evolving and concurrent devolving throughout the cosmos (See Section VI or Vol. IV for fuller development of what this article presages.

Preface to Article #14: Three Momental Models for Predicting Message Diffusion

The statistical moments have been referred to several times earlier, in connection with diffusion theory. They are systematically presented in article #14 as momental laws of predicting message diffusion. Dodd worked them out with William S. Peirce at the Great Barrington Institute for Economic Research while on leave back in 1961. Peirce was an economist and Dodd, of course, a sociologist. They published jointly, again indicating how theses interdisciplinary moment laws cross-cut the content of the different behavioral sciences. They are the pure forms of interacting of sets of elements – here human elements. In this volume, the systemed articles study content highly general to any and all sciences. In the end we achieve increasing generality towards the unity of science which scientists hope eventually to see emerge increasingly.

Preface to Article #15: The Reactance Model

The next article, #15, deals with the Reactants Models as a summary of the ten years or so of Project Revere's researches. This project on message diffusing from airborne leaflets used up something like a third of a million dollars from the Air Force and produced sixty articles and a dozen Ph. D. dissertations and M. A. Theses. Its summarizing volume was never published. Various difficulties developed. Before the Project's output described in the volume could be fully checked, the group dissolved, so the volume is still in manuscript form. But this article is the core of the chief findings. It deals chiefly with the stochastic growth processes that emerged from that experimenting on the diffusing of messages from airborne leaflets in communities. Project Revere, I think, contributed a large number of methodological and theoretical insights and suggestions to the field. At the beginning the investigators mapped out a thirty-page prospectus that had something like 100 Ph.D. theses titled. All of them were projects which could have been carried through with the data collected; only seven or eight of them were actually executed. The data thus are still a gold mine for Ph.D. topics and diffusing or one-way forms of human interaction with respect to an item of knowledge.

Most of the articles in this volume on Message Diffusion report testings or follow up testing from Project Revere. For another summary, of this project and of its exploration of the dimensions of acts of people in time $B = [A/P]^{(t)}$ is given in #6, Formulas for Spreading Opinions.

Preface to Article #16: The Tetramatrix for Modeling Macrosociology

The Tetramatrix tor Macrosociology is the most recent (1970) of all the articles in this volume. It presents a vista for future behavioral scientists to develop. Here Dodd sees the various national Five and Ten year plans gradually developing through matrices of data. These data are to be recorded ahead in plans and behind in fulfillments into matrices of systemed data. The resulting matrices ought to increasingly express stochastic laws of a probabilistic self-governing system changing in time. Such stochastic systems include the case, of course, of a stable equilibrium or symmetric positive and negative changes. Tautalogously such stable systems are likely to prevail because by definition they are most durable and frequently occurring.

Preface to Article #17: The Interactance Hypothesis

From the foregoing explorations of the logistic models and the moments models, the following Section V on Laws of Diffusion clinches the argument that dimensional analysis of human behavior can prove fruitful. It does this by showing that real laws have grown out of it.

In the first article here, called "The Interactance Hypothesis" (Written in 1950), Dodd realized that the interacting of people across space could be predicted by formulas of the same form as that of Newton's law of gravity. This interactance formula is simply a product of the relative shares of the two interacting populations (whether of men. molecules or anything else) divided by the resistance produced by the intervening distance. As the action of each population wanes linearly with distance from its starting point, their joint action must be their product, which is the inverse square of the intervening distance. That law has become a definite part of the social sciences now. All town planning and traffic planning and things of that kind just take that law as a basic premise to forecast what the traffic will be between two areas if channeled along a single highway or over one bridge, etc.