POLYPRESCRIPTION AND PROOF OF ITS VALIDITY BY DYNAMIC OPERATOR ALGEBRA

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ABSTRACT: In this paper a polyprescription has been defined and arguments in favour and against it in homoeopathic treatment of diseases have been presented with appropriate references. Mathematical formulations of some sections of the *Organon of Medicine* (fifth edition) have been offered on the basis of set algebra. The vital force has been expressed as a real dynamical variable and represented as a living state function ψ. The living state function of the system (organism) has been expressed as a summation of the state functions of the different subsystems (organs) of the patient. An analogy has been drawn between a real dynamical variable and living state function, either in health or under diseased condition; and it has been shown that the state functions have all the properties to be called an 'observable'. Operator algebraic methods as applied to a quantum mechanical observable have been applied to the state functions of the subsystems (organs) and to that of the whole system (the patient). Symptoms have been supposed to form a set, and it has been shown that symptoms also behave as observables and become subject to operator algebraic treatment. Medicines and morbific agents inimical to life have been expressed as dynamic operators m′ and pathogenic operators p′. Operation of m′ or p′ on ψ results in the change of state of ψ in association with the medicinal symptoms S(m) or disease symptoms S(p). Pathogenic and therapeutic equations have been developed on the basis of operator algebra. Therapeutic equation has been solved by use of mathematical formulations of sections 24, 26, 29 and 157 of the *Organon of Medicine*. The solution of the equation (therapeutic) shows that the remedy $R = m'_1+m'_2+ \ldots +m'_n$ is the general solution of the equation, i.e. for cure of a pathogenic condition more than one medicine is required. This is also true for the case in which homoeopathic aggravation takes place after the administration of the remedy. The single remedy cure is only a particular solution of the therapeutic equation. Creator and annihilator operators have been defined. The case of homoeopathic aggravations has been mathematically represented with the help of creator operator. A few of Dr. Kent's[1] observations have been mathematically expressed with the help of the annihilator operator.

FIRST SECTION

Introduction: The polyprescription is defined as a prescription which contains more than one homoeopathically selected remedy for the cure of a patient. Some homoeopathic physicians believe that it is unhomoeopathic and grossly against Dr. Hahnemann's teachings. Section 272 of the *Organon of Medicine* (5th ed.) says: "In no case is it requisite to administer more than one *single, simple* medicinal substance at one time". Section 273 of sixth edition of the same book says: "In no case under treatment is it necessary and *therefore not permissible* to administer to a patient more than *one single, simple medicinal* substance at one time. It is inconceivable how the slightest doubt could exist as to whether it was more consistent with nature and more rational to prescribe a *single, simple* medicine at one time in a disease or mixture of several differently acting drugs. It is absolutely not allowed in Homoeopathy, the one true, simple and natural art of healing, to give the patient *at one time*

two different medicinal substances". These surely lead to the conclusion that Dr. Hahnemann was against administration of more than one remedy at a time in the treatment of diseases homoeopathically.

A footnote appended to section 272 in the fifth edition of the *Organon of Medicine* is relevant here. The footnote says:" Some homoeopathists have made the experiment, in cases where they deemed one remedy homoeopathically suitable for one portion of the symptoms of a case of disease, and a second for another portion, of administering both remedies at the same or almost at the same time; but I earnestly deprecate such a hazardous experiment, which can never be necessary, though it may sometimes to be of use." Dr. Dudgeon's note in appendix of the fifth edition in this connection is very important. It states: "At the suggestion of Dr. Aegidi, Hahnemann was induced to try the effect in diseases, specially chronic ones of mixing highly diluted medicines and giving them in one dose. He was at first greatly pleased with the results obtained, and intended to recommend this plan in the fifth edition of the *Organon*, but was dissuaded from this by some of the most influential of his disciples; instead of doing so he merely alludes to the proposal, mildly denouncing it in the note to section 272."

In his book *Curability of Tumours by Medicines* Dr. J. C. Burnett emphatically expressed his opinion that in the cure of complex chronic diseases "*More than one Remedy is often needful*" and produced a large number of case-histories of different types of tumours in support of it. In case of a cure of a tumour by a number of remedies Dr. Burnett's critics asked him the question, "Which cured the case?" To his critics he answered, "Will you get a long ladder and place it up against the side wall of your house, and mount it so as to get into your house, by the top window; when you have safely performed the feat, write and tell me which rung of that ladder enabled you to do it." After many experiments and successes in cure of complicated chronic diseases with the help of a number of remedies he came to the conclusion, "In difficult, chronic, complicated cases of disease you require not a remedy but a ladder (series) of remedies, not one of which can of itself effect the cure, but each of which works cure-wards, their cumulative action eventuating in a cure. That is how I cure cataract, and many other chronic diseases that are currently held to be incurable by most men of all shades of therapeutic opinion. *I Regard this power of utilising A Long Series of Remedies for the cure of Difficult cases as only Second in Importance to the Law of cure itself.*"

The part "completion of the action of the previous remedy" of section 171 in the sixth edition of the *Organon of Medicine* holds the key in favour of polyprescription. Dr. Hahnemann recommended in sections 165 and 171 that a second remedy may be administered after the completion of the action of the first remedy. Here the time factor is important. In a footnote appended to section 287 in the fifth edition of the *Organon of Medicine* he expressed his opinion, "when it (potency) is carried up to XX, L, C and higher . . . then the action always appears to last a shorter time." On the basis of this observation of

Dr. Hahnemann, we may infer that higher and higher the potency of the remedy, shorter and shorter is the duration of completion of its action. If remedies are administered in high potencies such as 10M, 50M, CM or millesimal scale, it is quite reasonable to assume that the remedies act only for a couple of hours, or even for a couple of minutes. Thus linking the footnote of section 287 with the contents of section 168 and 171 there is nothing against the principle of administration of remedies in a polyprescription one after another within intervals of couples of hours, or even minutes.

Objection may be raised bere what is the gurantee that the action of the first remedy will be completed by the time the second remedy is administered? The prescriber violates provisions of section 168 and 171 when he administers to the patient the second and the subsequent remedies before the completion of action of the first remedy. How is this action of the prescriber going to affect the body and mind of the patient? May not it harm the state of health of the patient?

From the experiences of one of the authors during the last six years in treatment of chronic and aeute diseases by the method of polyprescription it may be most emphatically said that even violating sections 168 and 171, no harm is done to the patient hy this mode of treatment. Validity of this claim may be proved by linking togcther the provisions of sections 155, 281, 283 and footnote of section 141.

Besidcs the provisions of the *Organon of Medicine*, it is also possible to derive mathematically that treatment of diseases homoeopathically by method of polyprescription is a more general one than treatment by a single remedy, and treatment by a single remedy is only a specialised case of treatment by polyprescription.

SECOND SECTION

The human body may bc considered as a hierarchical multicomponent system consisting of respiratory, cardiovascular, alimentary, urogenital and other functional units, at a particular level of organisation considered. A system may be defined as a collection of interacting parts which in some sense constitute a whole. Everything cxcluded from this collection may be considered as the environment. It is assumed by definition that the internal interactions are always greatcr than external interactions. In this way the description of the living hcing can he based on the representation of a finite number of subsystems of tlie human body. Each of the subsystems may be considered as a system in itself when considered individually. But, for our purpose, they are the components (subsystcms) of the human body, which is the system in our case. In an attempt to prove mathematically the validity of polyprescription in the treatment of diseases homoeopathically we start with section 9 of the *Organon of Medicine*, which states," In the healthy condition of man, the spiritual vital force (autocracy), the dynamis that animates the material hody (organism), rulcs with unhounded sway and retains all the parts of the

organism in admirable, harmonious, vital operation, as regards both sensations and functions, so that our indwelling, reason-gifted mind can freely employ this living, healthy instrument for higher purpose of our existence."

We represent the state of the dynamical system (i.e. human body under external influences) mathematically by a state funetion ϕ (q_1, $q_2 \ldots q_n$), being a function of a finite number of variables, where q_1, q_2 ete. represent the possible states of the different subsystems of the body. The state q_i, (i = 1 to n) of a system changes by interaction with the environment, and also by abnormal interaction of the different systems of the body. A state of a system may be in the normal healthy state, i.e. when section 9 is valid. When all the systems of organism are performing normal physiological and biochemical functions, the state function of the living being takes the form ϕ (q°_1, $q^\circ_2 \ldots q^\circ_n$). Such a state we shall call the ground state of health of the living being. A state may be a diseased state, which in the words of Dr. Hahnemann corresponds to the deranged state of the vital force. Dr. Hahnemann's opinion about the deranged state of the vital force corresponds to the pathological state, i.e. a state of abnormal physiological and biochemical functions of the system. The dynamic influence upon it of a morbific agent inimical to life in section 11 corresponds to interaction of the environment with the systems of the organism and abnormal internal interactions of systems amongst themselves. In the living state the systems of the living human being are always subjected to interactions with the envirnnment and also internal interactions of the subsystems amongst themselves. We claim that mathematically the susceptible and immune states of an individual depend upon the response of the systems to the interactions external or internal. Higher the response of the systems to the external or internal influences, more susceptible is the individual; smaller the response, more immune is he to the influences.

We introduce a new variable:

$$x_1 = q_1 - q^\circ_1 \qquad \ldots \quad (1)$$

In this equation ($q_1 - q^\circ_1$) corresponds to the deviation of the living state from the ground state of health. Taking into account the susceptibility and immunity of an individual, and ground state of health ϕ (q°_1, $q^\circ_2 \ldots q^\circ_n$), as an ideal state. We express the living state functions of subsystems of an individual as

$$\left.\begin{aligned} \phi_1 &= \phi_1 (x_1, x_2, x_3, \ldots x_n), \\ \phi_2 &= \phi_2 (x_1, x_2, x_3, \ldots x_n), \\ \ldots \quad & \quad \ldots \quad \quad \ldots \\ \ldots \quad & \quad \ldots \quad \quad \ldots \\ \phi_g &= \phi_g (x_1, x_2, x_3, \ldots x_n) \end{aligned}\right\} \qquad \ldots \quad (2)$$

Since, the individual consists of 'g' different systems, his living state function may be written as

$$\psi = \sum a_i \phi_i, \; i = 1, 2, \ldots g \qquad \ldots \quad (3)$$

where the summation includes both summation and integration depending on whether we are using a discrete or a set of continuous states. The discrete states in the living state functions of an individual may be supposed to appear when the individual is under the influence of an acute affection. The magnitude of the discrete changes in the living state function will depend on the response of the systems to the interactions external or internal, i.e. upon the immunity of the individual, in other words on the nature of ψ. The state ψ of a healthy individual, i.e. when the individual has a complete sense of well being, and provisions of section 9 of the *Organon of Medicine* are fully satisfied, may be supposed to be a set of continuous states. When the individual suffers from any chronic affeetion involving structural change of any organ or organs, then also ψ is regarded as a set of continuous states.

We claim that a pathogenic operator p′ (dynamic influence upon vital force of morbifie agent inimical to life (section 11 of the *Organon of Medicine*) operating on the living state funetion of the i'th subsystem gives rise to a set of symptoms

$$S_i^j(p) = \{S_i^1(p), S_i^2(p), S_i^3(p) \ldots\} \qquad \ldots \quad (4)$$

The value of j ranges over the number of symptoms produced as a result of operation of p′ on ψ_i. The value of i will range from 1 to 'g' the total number of subsystems composing the whole system of the individual. Hence one may write

$$\left.\begin{aligned} S_1(P) &= \{S_1^1(P), S_1^2(P), S_1^3(P) \ldots\} \\ S_2(P) &= \{S_2^1(P), S_2^2(P), S_2^3(P) \ldots\} \\ \ldots \quad & \quad \ldots \quad \quad \ldots \\ \ldots \quad & \quad \ldots \quad \quad \ldots \\ S_g(P) &= \{S_g^1(P), S_g^2(P), S_g^3(P) \ldots\} \end{aligned}\right\} \qquad \ldots \quad (5)$$

Now, $S_1(P), S_2(P) \ldots S_g(P)$ are supposed to be elements of whole set of symptoms

$$S(P) = \{S_1(P), S_2(P), \ldots S_g(P)\} \qquad \ldots \quad (6)$$

This set represents all the symptoms which may arise in the whole individual as a result of operation of the pathogenic operator p′ on the whole living state function ψ. We write the pathogenic operator equation for a particular subsystem

$$\text{as } p'\psi_i = S_i^j(P)\,\phi_i. \qquad \ldots \quad (7)$$

We call this equation the pathogenic equation of the i'th subsystem. In this equation ϕ_i, the living state function of the i'th subsystem is supposed to be the mathematical representation of the vital force which Hahnemann described as a dynamic entity. In section 11, Hahnemann stated that "vital force" is present "everywhere in his organism". The mathematical representation of this statement will he found in equation (3) above.

We introduce the idea that the living state functions are dynamical vari-

ables.[a] Of the different properties of a dynamical variable as stated in the reference above we are interested in the following involved in our case.

(a) Any dynamical variable that we can measure must be a real dynamical variable[a]. Let us see if ϕ_I's satisfy this condition to be a dynamical variable. E.E.G., E.C.G., results of different physiological and biochemical tests, etc. give definite results indicating the physiological and pathogenic conditions of the different subsystem living state functions ϕ_I's. The results are obtained after tests or some measurements done on ϕ_I's. Hence ϕ_I's are measurable quantities and hence real dynamical variables.

(b) A real dynamical variable may change its state. In quantum mechanical dynamical variables the change of state is caused by a measurement carried on it. In our dynamical variables the change of state takes place as a result of interaction of the pathogenic operator p' on ϕ_I's. This interaction is expressed mathematically by $p'\phi_I$ and should be read as "the dynamic operator p' operates on the dynamical variable (state function of the i'th subsystem) ϕ_I $p\phi_I$ of (7) expresses mathematically the statement of Hahnemann, "the dynamic influence upon it (the vital force) of a morbific agent inimical to life" in section 11 of the *Organon of Medicine*. p' then corresponds mathematically to "morbific agent inimical to life". The effect of operation of p' on ϕ_I's is an altered state of ϕ_I's. This is a mathematical statement and its physical interpretation corresponds to the statement of Hahnemann, "that is (the vital force) primarily deranged by the dynamic influence upon it (vital force) of a morbific agent inimical to life; it is only the vital force, deranged to such an abnormal state, that can furnish the organism with disagreeable sensations, and incline it to the irregular processes which we call disease", in section 11. A diseased part of the organism (patient), according to Hahnemann is recognised by the association of morbid symptoms of abnormal and disagreeable functions and sensations connected to the part. So we represent the diseased state function by associating the state function ϕ_I's with the set of symptoms $S_I^J(P)$'s by $S_I^J(P)$ ϕ_I's which is the right hand side of the pathogenic equation (7). ϕ_I's without association of any set of symptoms will represent the normal state living functions of the subsystems. From the discussions above we can conclude that the test of changeability of dynamical variable has been fully satisfied by our subsystemic living state functions ϕ_I's.

(c) In quantum mechanics the state of a dynamical variable on which measurement is done is the eigenstate, and the result of the measurement is the eigenvalue belonging to that eigenstate. In our case of the dynamic variable we assume ϕ_i's as the eigenstates of ψ, and the set of symptoms $S_I^J(p)$'s as the eigenvalues. In quantum mechanics eigenvalues are obtained as a result of measurement on the dynamical variable and in our case eigenvalues are created as a result of operation of p' on ϕ_I's. We assume that the eigenvalues $S_I^J(p)$'s belong to the diseased eigenstates represented by $S_I^J(p)$ ϕ_I's.

(d) In quantum mechanics the set of eigenvalues of a real dynamical variable are just the possible results of measurements of that dynamical vari-

able[2]. In our case the set of symptoms $S_l^J(p)$'s, i.e. the eigenvalues of $S_l^J(p)\phi_l$'s are the results of operation of p' on ϕ_l's.

(e) In quantum mechanics the eigenstates of a dynamical variable forms a complete set. We define a complete set of states to be a set sueh that any state is dependent on them[2]. In our case, when p operates on ψ, the living state function of the whole organism, i.e. the patient, the diseased eigenstates are represented by S(p) ψ where S(p) as shown in (7), is a set of symptoms (eigenvalues), whose elements include all the set of symptoms of the different ϕ_l's. As the symptoms are supposed to form a set, and diseased eigenstates have been supposed to be associated with symptoms, we may conclude that the diseased eigenstate S(p) ψ form a set. That the diseased eigenstates are interdependent will be understood from the following illustration. Suppose a patient having a malignant growth in the brain. He may develop symptoms like headache, blindness, loss of hearing, loss of taste, paralysis of the limbs, etc. The different symptoms will represent the diseased states of the different subsystems of the patient. Since the diseased state of the different subsystems is the consequence of the diseased state of the brain, we may reasonably conclude that the different diseased eigenstates are interdependent. Thus we sec that $S_l^J(p)$ ϕ_l's form a set and they are interdependent. Hence $S_l^J(p)$ ϕ_l's form a complete set.

(f) We call a real dynamical variable whose eigenstates form a complete set an "observable".[2] It is obvious from what has been stated in (e) that the dynamical variable of the diseased state of an organism is an observable.

The pathogenic equation (7) which has heen written for a subsystem can now be generalised for the whole organism and can be expressed as

$$p' \psi = S(p) \psi \qquad \ldots \qquad (8)$$

where S(p) is represented by (6).

The set of symptoms S(p) consists of k number of general symptoms and l number of particular symptoms in the diseased state of the individual. To consider the general and particular symptoms separately we now introduce new notations for the elements of the set S(p).
These are,

$$\sum_{1}^{K} G\mu(P); \text{ and } \sum_{1}^{l} P\nu(P).$$

The subscript μ in G(p) range from 1 to k to include the k number of general symptom elements, and ν in Pν(p) range from 1 to l to include the l number of particular symptom elements of S(p), so that

$$S(p) = \left\{ \sum_{1}^{K} G\mu(p) + \sum_{1}^{l} P\nu(p) \right\}. \qquad \ldots \qquad (9)$$

The operator equation thus is transformed into

$$p' \psi = \left\{ \sum_{1}^{K} G\mu(p) + \sum_{1}^{l} P\nu(p) \right\} \psi. \qquad \ldots \qquad (10)$$

Again medicines have been defined as artificial morbific agents (section 70 of the *Organon of Medicine*) and medicines also dynamically derange the vital force to produce symptoms of the medicines, as are observed in drug provings (sections 121 to 145). Drug proved symptoms are recorded in homoeopathic materia medica. We regard the symptoms described in materia medica as the eigenvalues of the medicinal operator m' when it operates in the living state ψ of the drug prover.

We write the medicinal operator equation, defining the pathogenic action of the medicine as

$$m'_1\psi = \left\{ \sum_1^{b_1} G\alpha(m_1) + \sum_1^{c_1} P\beta(m_1) \right\} \psi, \qquad \ldots \quad (11)$$

where α range from 1 to b_1 and β range from 1 to c_1. Physically this equation indicates that the medicine m_1 operating on ψ gives rise to b_1 number of generals and C_1 number of particulars, some of which might be characteristic symptoms of the medicine as recorded in materia medica in bold type. Similarly for a second medicinal operator we write

$$m'_2\psi = \left\{ \sum_1^{b_2} G\alpha(m_2) + \sum_1^{c_2} P\beta(m_2) \right\} \psi. \qquad \ldots \quad (12)$$

We suppose that if the two medicines are superimposed in an individual, the eigenvalues of the superimposed medicinal operators become a set formed by the union of the set of symptoms formed by the eigenvalues of the individual operator m'_1 and m'_2. The operator equation then takes the form

$$(m'_1 + m_2)\,\psi = [S(m_1) \cup S(m_2)]\,\psi, \qquad \ldots \quad (13)$$

(See *Groups* by D. A. R. Wallace, London: Gorge Allen & Unwin Ltd.) One may also write

$$(m'_1 + m'_2)\,\psi = S(m_1 + m_2)\,\psi. \qquad \ldots \quad (13A)$$

where $S(m_1 + m_2)$ represent the set of symptoms developed during drug proving in drug prover when the medicines m_1 and m_2 are administered simultaneously. Then a question arises, should

$$S(m_1 + m_2) = S(m_1) \cup S(m_2)\ ? \qquad \ldots \quad (14)$$

Answer to this question cannot be given here, because, the set of symptoms as recorded in materia medica has been obtained by proving the drugs singly on drug provers. Homoeopaths may experiment by proving the drugs in combinations and find the answer to this question.

Under the diseased condition when, when S(p) is given by relation (9), the homoeopathic physician's job is to match the generals and particulars of the medicines with the generals and particulars of the pathogenic symptoms. The matching is done by recognising the similar elements of S(p) and $S(m_1)$, $S(m_2)$ etc. (section 29 of the *Organon of Medicine*). Totality of symptoms will be achieved when all the elements of S(p) are similarly recognised in the ele-

ments of $S(m_1)$, $S(m_2)$, ... ete. The totality of symptoms is mathematically represented by $S(p) \cap S(m_1) \cup S(m_2) \cup S(m_3)$ ... ete. We may say that the totality of symptoms corresponds to a condition of one to one correspondence of the elements of $S(p)$ with the elements of $S(m_1) \cup S(m_2) \cup S(m_3) \ldots \cup S(m_n)$.

It should be noted here that for the totality of symptoms one must have

$$\sum_{1}^{b_1} G_\alpha(m_1) \cup \sum_{1}^{b_2} G_\alpha(m_2) \ldots \cup \sum_{1}^{b_n} G_\alpha(m_n) = \sum_{1}^{K} G_\alpha(p); \text{ and}$$

$$\sum_{1}^{b_1} P_\beta(m_1) \cup \sum_{1}^{b_2} P_\beta(m_1) \ldots \cup \sum_{1}^{b_n} P_\beta(m_n) = \sum_{1}^{I} P_\nu(p). \quad \ldots (15)$$

These equations mean that unions of generals of $S(m_1)$, $S(m_2) \ldots S(m_n)$ must be equal to a set of the generals of the pathogenic symptoms and similarly for the set of particulars.

The sign $\cap$ used above is read as intersection in the language of set algebra. By intersection of two sets a new set is formed by the common elements present in the two sets. $S(p) \cap S(m_1)$ will represent a set of elements common to $S(p)$ and $s(m_1)$ which are most similar. This condition corresponds to the totality of symptoms and may be taken as the mathematical representation of section 24. If there be no common symptoms in $S(p)$ and $S(m_1)$, then the result of intersection of $S(p)$ and $S(m_1)$ will be a null set, and the condition of accurate similarity of disease and medicinal symptoms will not be achieved, and the selected medicine will not cure the patient when administered. The selected medicine will then be unhomoeopathic to the disease condition. If $S(m_1)$ has some symptom elements common and similar to $S(p)$ then in the language of set theory it is expressed as $S(p) \subseteq S(m_1)$. If the rest of elements of $S(p)$ are contained in a set of symptoms of $S(m_2)$ then $S(p) \subseteq S(m_2)$. In the language of set of theory $S(p) \subseteq S(m_1)$ is read as $S(p)$ is a subsetsof $S(m_1)$. The totality of symptoms of section 29 is expressed by set theoric expression as $S(p) \cap \{S(m_1) \cup S(m_2) \ldots\}$. Now by property of set algebra one can write

$$S(p) \cap \{S(m_1) \cup S(m_2)\} = S(p) \cap S(m_2) \cup S(p) \cup S(m_2). \quad \ldots (16)$$

This equation is the basis for writing polyprescription. It can be generalised for achieving totality of symptoms as $S(p) \cap S(m_1) \cup S(m_2) \ldots\ldots \cup S(m_n)$ ... (16A)

The degree of interaction of p''s and m''s on ψ has been described by Hahnemann in sections 31 and 32. What Hahnemann has said in these two sections can be mathematically stated as (i) the interaction of the pathogenic

operator (morbific noxious agents—section 31) is a function of the state of immunity of the living state function ψ and also time; (ii) the action of m''s on ψ is independent of the state of ψ and also time. In section 33 one finds, "the morbific noxious agents possess a power of morbidly deranging man's health that is subordinate and conditional, and often very conditional; whilst medicinal agents have an absolute unconditional power, greatly superior to the former." This indicates that the probability of interaction of m''s on ψ is always 1, but in case of p's it may be either 1 or zero. When the immunity of the subject is large, and p' cannot change ψ to S(p) ψ, then the probability of interaction is zero, but when equation (8) is satisfied the probability of interaction is 1.

We define a medicine m'_1, a remedy for a pathogenic condition, when $S(m_1)$ created by the operation of m'_1 on ψ has an one to one correspondence with S(p) created by operations of p' on ψ. For a medicine to be a remedy, i.e. to cure a pathogenic condition we must have $S(p) \subseteq S(m_1)$; and $S(m_1) \subseteq S(p)$; i.e. $S(p) = S(m_1)$. This is the case of a single remedy cure. But, in case of a polyprescription, the remedy

$$R' = m'_1 + m'_2 + \ldots + m_n \qquad \ldots \quad (17)$$

and for totality of symptoms one must have

$$S(p) = S(p) \cap S(m_1) \cup S(m_2) \ldots \cup S(m_n) \qquad \ldots \quad (18)$$

An illustration will explain the meaning of this equation. Let S(p) = A, B, C, D, E, F where A, B, C . . . etc. are symptom elements of the diseased state of a patient. Again let

$$\left.\begin{aligned} S(m_1) &= \{A, B, C, X, Y, Z.\} \\ S(m_2) &= \{B, C, D, P, Q, R.\} \\ S(m_3) &= \{E, F, U, V, W.\} \end{aligned}\right\} \qquad \ldots \quad (19)$$

where A is a peculiar, uncommon striking, characteristic symptom of m'_1; B, C, D are particular characteristic symptoms of m'_2; and E, F are the general characteristic symptoms of m'_3. Now

$$\left.\begin{aligned} S(p) \cap S(m_1) &= \{A\} \\ S(p) \cap S(m_2) &= \{B, C, D\} \\ S(p) \cap S(m_3) &= \{E, F\} \end{aligned}\right\} \qquad \ldots \quad (20)$$

Taking the union of the three sets in the left hand side of (20) one gets

$$S(p) \cap S(m_1) \cup S(p) \cap S(m_2) \cup S(p) \cap S(m_3) = \{A, B, C, D, E, F\} = S(p) \qquad \ldots \quad (20A)$$

which corresponds to (18). Thus we see that the set represeuted by (18) is equal to S(p); the similarity of the diseased and medicinal symptoms (section

24) being represented by the equality of the elements of the set S(p) and that of (18). This proves that for cure, i.e. to get the patient rid of the symptoms A, B . . . F, etc., all the three medicines m_1, m_2 and m_3 must be administered and the remedy in this case is

$$R' = m'_1 + m'_2 + m_3. \quad \ldots \quad (21)$$

This remedy operator will cure the patient, i.e. annihilate the disease symptoms and bring the patient to a state to satisfy the provisions of section 9. Some homoeopaths will raise objection against this equation, and say that this is against the principle of Homoeopathy. Reference (i) to the footnote of section 272; (ii) Dr. Dudgeon's note in the Appendix (page 264, 5th edition of the *Organon*); (iii) Dr. Burnett's opinion, as described in Ist section of this paper; (iv) and finally Hahnemann's opinion expressed in the 2nd and 3rd editions which is: "Only in complicated disease, e.g. when in addition to the veneral chancre disease, the condylomatous or mayhap the psoric diseases dwells in the body, it is impossible to complete the cure with a single medicine. Here each appropriate homoeopathic (specific) remedy for one and the other disease must be employed alternately for the first mentioned complication the best mercurial preparation in alternation with the best preparation of sulphur until both are cured (page 249, Appendix, 5th edition)", will definitely prove the validity of this equation. Prof. Traube's[3] observation from colloid chemistry standpoint seems relevant here. He observed, "I have arrived, on the basis of my colloidal experience, at the result that there is a healthy kernel within homoeopathic observations. The increased results claimed repeatedly from combination of two medicines is wholly intelligible from the standpoint of colloidal teaching."

The curative power of medicines depends on their symptoms similar to the disease, but superior to its strength (section 27). A disease is annihilated and removed only by a medicine capable of producing in the human system in the most similar and complete manner to the totality of its symptoms, which are stronger than the disease (section 27). The process of annihilation of the disease has been explained by Hahnemann in section 29. What has been said in this section, may be mathematically stated as, that after the administration of the remedy operator $R' = m'_1 + m'_2 + m'_3 + m_n$, the patient is under the action of operator $(p' - R')$, which changes the living state function of the organism into a state $S(R)\ \psi$, where S(R) may be either,

$$S(R) = S(p) \cap \{S(m_1) \cup S(m_2) \ldots \cup S(m_n)\} \quad \ldots \quad (23)$$

or,

$$S(R) \subseteq S(p) \cap \{S(m_1) \cup S(m_2) \ldots \cup S(m_n)\} \quad \ldots \quad (24)$$

(24) will be discussed later in relation to accessory symptoms. Under the action of the similar medicine, the weaker disease symptoms are overpowered and replaced by the stronger similar medicinal symptoms and the organism is medicinally diseased (section 29). This medicinally diseased state is represented

by S(R) ψ, and the elements of S(R) are the result of the superposition of the medicinal symptoms on the similar disease symptoms. Hence we write the equation

$$(p' - R')\,\psi = S(R)\,\psi \qquad \ldots \quad (25)$$

This equation may be called the therapeutic equation of the living state function. Since R' opposes p' by virtue of similarity of symptoms (section 26) produced by them, we use the negative sign. The medicinal disease, though stronger than the natural disease caused by the pathogenic operator p', acts for shorter duration, vanishes, taking with it the symptoms of the natural disease resulting in a cure (section 29). This can be mathematically expressed by assuming the elements of S(R) as a rapidly decreasing function of time. When S(R) satisfies (23), the right hand side of (25) becomes zero, and then we can write

$$(p' - R')\,\psi = 0 \qquad \ldots \quad (26)$$

$$\text{Since } \psi \text{ cannot be zero, we must have } (p - R) = 0 \qquad \ldots \quad (27)$$

$$\text{i.e. } p' = R' = m'_1 + m'_2 + \ldots + m'_n \qquad \ldots \quad (28)$$

The components of R, i.e. m_1, m_2, m_3, etc., may be allowed to operate simultaneously (section 72) footnote and Prof. Traube's[3] observation); in alternations (page 249, Appendix of the *Organon of Medicine*, 5th edition,); or one after another, (sections 168 to 171).

The elements of the set of medicinal or disease symptoms are time-dependent (section 32). It is a common experience of physicians that in untreated chronic and acute diseases the symptoms grow worse with time and in such cases the symptom elements are assumed to be an increasing function of time.

To a homoeopathic physician all the subjective and objective symptoms are real, because both types of symptoms of the patient are curable by properly selected remedy. As stated before, objective symptoms are measurable entities. The degree of deviation from the normal behaviour pattern of the patient offers the measurability of his mental symptoms. So one could conclude that symptoms are real, time-dependent, and measurable quantities. Again being time-dependent, symptoms change their states either during the progress of cure of the disease. Thus they are changeable quantities. Symptoms have been assumed to be mathematically associated with a diseased state, and since the diseased state form a complete set as shown before, one can infer that the set of symptoms form a complete set. Hence symptoms may mathematically be regarded as real dynamical variable and 'observable', as discussed before. This analysis makes it imperative that the diseased state represented by S(p) ψ or S(R) ψ are such eigenstates that their eigenvalues (symptoms) are real dynamical variables and 'observables'.

The subsystems which are involved in the production of the symptoms under the action (influence) of the pathogenic operator are highly susceptible, i.e. highly responsive to the environment. Now under the environment of

the remedy operator R', their response is further enhanced and this is what is called homoeopathic aggravation of the symptoms under homoeopathic medicines. In section 157, Hahnemann has described the nature of homoeopathic aggravation: "... that a homoeopathically selected remedy does, by reason of its appropriateness and minuteness of the dose, gently remove and annihilate the acute disease analogous to it, without manifesting its other unhomoeopathic symptoms, that is to say, without production of new serious disturbances..." as stated by Hahnemann in section 157, has been mathematically represented by (23) and (26).

We assume a set of creator operator C^+ to become operative when $(p' - R')$ operates on ψ. It is assumed to operate on the elements of the observable S(R), the eigenvalues belonging to the eigenstates S(R) ψ, created by the operation of $(p' - R')$ on ψ. The elements of the set C^+ are real positive numbers equal or greater than 1. The element 1 of C^+ will not aggravate any of the symptom elements of S(R), when C^+ operates on it. If there is no aggravation of any symptom elements of S(R) during the process of cure, then there will be only one element of C^+ and that element will be equal to 1. This corresponds mathematically to the fourth observation of Kent.[1] It is to be noted here that other observations of Kent may also be mathematically formulated by application of operator algebra which will be done later.

The number of elements of C^+ will depend on the number of aggravated symptom elements of S(R), (23). If all the elements of S(R) are aggravated by different degrees, and there are $(k + l)$ number of elements of S(R), then C^+ will have as many elements and in that case,

$$C^+ = \left\{ \sum_{i=1}^{K+l} C_i^+ \right\} \qquad \ldots \quad (29)$$

If all the elements of S(R) are equally aggravated, then C^+ will have only one element. Again if K number of elements are equally aggravated and l number of them are differently aggravated then number of elements of C^+ will he $(l + 1)$, i.e.

$$C^+ = \left\{ \sum_{l=1}^{l+1} C_l^+ \right\} \qquad \ldots \quad (29A)$$

The operator equation of C^+, operating on elements of S(R), assuming that all the elements are differently aggravated is given by,

$$\sum_{i-1}^{K+1} \{C_i^+ S_i(R)\} = \sum_{i=1}^{K+1} \{N_i(t) S_i(R)\}. \qquad \ldots \quad (30)$$

Hence we can write the therapeutic equation (26) during the state of aggravation as,

$$(p' - R') \psi = \left\{ \sum_{i=1}^{K+1} N_i(t) S_i(R) \right\} \psi. \qquad \ldots \quad (31)$$

This equation physically interprets the changes in the living state function during the state of aggravation brought in by the creator operator C^+, assuming that all the symptom elements are homoeopathically aggravated. When all $N_i(t)$'s reach their peak values, (30) takes the form

$$(p' - R')\,\psi = \left\{ \sum_{i=1}^{K+1} N_i\, S_i(R) \right\} \psi. \qquad \ldots (32)$$

where N(t)'s are eigenvalues of C_i^+s.$N_i(t)$'s form a set of real positive numbers, integral or fractional. Since $N_i(t)$'s are associated with $S_i(R)$'s which are time dependent, it is evident that $N_i(t)$'s become implicitly dependent on time. Let us suppose $N_i(t)$ reaches a steady state value N_i at time t_1 hours after the administration of the remedy. This physically means that a symptom $S_i(R)$ reaches its highest aggravated state at time t_1 hours after the application of the remedy. This is mathematically expressed as

$$N_i(t) = N_i, \text{ at time } t = t_1 \qquad \ldots (33)$$

It is assumed that when a symptom aggravates to its peak value, then C_i^+ ceases to operate on $S_i(R)$ element. Cessation of the interaction of C_i^+'s on $S_i(R)$'s physically corresponds to the stoppage of change of state of $S_i(R)$'s. Thus C_i's are implicitly dependent on time.

Homoeopathic physicians find that after the administration of the remedy/ remedies (in polyprescription), different symptoms aggravate at different times by different degrees. Kent's[1] third observation may be mathematically expressed by assuming that for the case $dN_i(t)/dt$ large, i.e. the steady state value N_i is reached within a short time. When it is small the case may be said to correspond to the second observation of Kent. The first observation corresponds to low $dN_i(t)/dt$ and high value of N_i.

After the state of aggravation the amelioration, i.e. reduction in the intensity (magnitude) and elimination of the symptoms start and finally varying with time all the symptoms are removed and the patient is cured. To express this process mathematically we introduce an annihilator operator A, which is like C^+ is implicitly dependent on time and operates on the state generated by C^+, i.e. on the state $\sum N_i S_i(R)$, so that all the symptoms of S(R) becomes equal to zero. Like the creator operator the annihilator operator is also assumed to form a set such that

$$A = \left\{ \sum_{i=1}^{K+1} Ai \right\}. \qquad \ldots (34)$$

The number of elements of A will be same as those in C^+. A_i's become operative when C_i's cease to bring any further change in the states of $S_i(R)$'s.

The eigenvalues $\sum_{i+1}^{K+1} N_i S_i(R)$'s of the state represented by the right hand side of (31) come under the action of A, given by (32).

By combining the provisions of sections 29 and 157, one can obviously write

$$\sum_{i=1}^{K+1} A_i(N_i S_i(R)) = 0 \qquad \ldots \quad (35)$$

under this condition (31) reduces to (26). Thus we see that even when there is aggravation of the disease symptoms after the administration of

$$R' = m'_1 + m'_2 + \ldots + m'_n$$

the cure state is also reached.

Question obviously arises what should be the basis of selection of the components of the remedy operator? When a symptom element of disease corresponds distinctively with a peculiar, uncommon, singular striking symptom of a medicine, then such correspondence makes the medicine qualified to be adopted as a component of the remedy operator. Again when two or more general or particular characteristic symptom of a medicine correspond to some symptoms of the disease, then that medicine should be selected as a component of the remedy operator. In case of a one sided disease or a local malady, components may be selected from the family history, i.e. if there is a history of T.B., cancer, diabetes; from the past history of the patient such as sycotic or luetic diseases, and from particular symptom of the one sided disease or local malady by matching the location, sensation, modality and concomitant of disease symptom with the medicinal symptom. An illustration: A patient (male) middle aged, has thirst + + +; salivation + +, foetid breath, imprint of the teeth on flabby tongue, cough < during night, > by sitting up and passing flatus, with circumscribed red cheeks and night sweat.

This is case in which

$$R' = m'_1 + m'_2,$$

Merc. viv + Blood root.

Here $S(m_1) = \{$Thirst + + +, Salivation + +, foetid breath, imprint of teeth on tongue$\}$

and $S(m_2) = \{$circumbscribed red cheek; cough > by passing flatus; night sweat;$\}$

So $S(m_1) \subseteq S(p)$,

and $S(m_2) \subseteq S(p)$.

The set $S(p) \cap \{S(m_1) \cup S(m_2)\}$ will have 1 to 1 correspondence with the elements of the set S(p). Hence when these two medicines are given simultaneously or one after the another or in alternation, will cure the case. Mukherji, since 1978, has been writing polyprescription for his patients, putting more stress on the simultaneous administration of the components of remedy operator, giving him highly satisfactory results of cure. Illustrations are described here.

Gridharilal, male, age 18 years, and his younger brother Dularilal, age 10, were suffering from a type intermittent fever. Symptoms were high pyrexia, preceded by chill and violent shivering; fever appearing on alternate days in the afternoon (1 p.m.). The chill state continued for about an hour, severe shivering and whole bodyache were the most prominent symptoms, had no desire to drink water in this state. Heat stage continued for 3 to 4 hours, and even in the month of August preferred to cover the body in woolen shawl. Remission of fever was preceded by profuse sweating, and complete remission took place within 7 to 8 hours. The brothers consulted Mukherji on their fifth attack of fever.

Clinical observations: Gridharilal—Armpit temperature 104.5°F, Pulse rate 122/min, tongue clear, dry, thirst not prominent, bodyache less than that during chill.

Dularilal had temperature 103.5°F, Pulse rate 110/min tongue dry, clear, thirst not marked, slight chilly, also a slight bodyache. Bowel movement normal of both. Nothing striking could have been discernible.

Same prescription was made for both the brothers.

(i) Pyrogenium 6, 4 gls. (20 size) = 1 dose

(ii) Urtica urens 6, 4 gls. (20 size) = 1 dose

(iii) Dissolve 4 gls of each in 250 ml of water and take 4 teaspoonful every 2 hrs. Rpt. 3 days. Succuss before use.

The brothers have had no more attacks after the medication till now.

Pyrogenium has a characteristic symptom: pulse abnormally rapid out of all proportion to temperature. It appears from this clinical observation that Pyrogenium could also be indicated in pyrexial conditions where there is relative bradycardia.

One might question which of the medicines cured the cases? Mukherji's answer to such question will be similar to Dr. Burnett's.

Advantages and Disadvantages of Polyprescription: If the selection of the components of the remedy operator could be made successfully, cure could be hastened at a much rapid rate by judicious repetition of the dose according to Hahnemann's instruction in section 247, footnote. By being successful to bring in rapid amelioration of the symptoms, the physician earns the patients' gratitude and goodwill. Mukherji uses Ferr. phos and Kali. mur in combination and administers in divided doses in early cases bronchitis. Mode of repetition is every 10 to 30 min. for 4 to 6 times, then delaying every 1 to 2 hours. His experience is that the combination works curewards at astonishingly rapid rate, bringing in complete remission within 24 hours, followed by amelioration of chest pain and expectoration, clearing the lung field within 3 to 4 days.

Disadvantages: If the selection of components of the remedy operator be not homoeopathic to the case, (though the probability of this happening in much less than that of a single remedy), then there are two possibilities which might take place in the patients (i) no > of the disease-symptoms without any new symptoms being developed; (ii) no > of the symptoms with appear-

ance of new symptoms belonging to the components. In the first case new components are to be tried. The second case may be looked upon as that the patient is proving the medicines of the components of the remedy operator in presence of the symptoms of the pathogenic operator. If the components are administered in high potencies, their effect will be minimum (sections 282 and 283).

For cure, the physician has again to select the appropriate components. As a result of inappropriate selection by the physician, the patient might suffer initially, but in the long run he is benefited (footnote of section 141).

Polyprescription has, indeed, a definite disadvantage; it pinches the doctor's purse. A polyprescription writer selects 3 components for the remedy operator and his seleetion is such that

$$S(p) \cap \{S(m_1) \cup S(m_2) \cup S(m_3)\}$$

is absolutely homoeopathic, then that single prescription will cure the patient, and the physician would have to be satisfied with one fee. If he had written three preseriptions for the three components, then he would have received three fees. Net loss suffered by the physician is the amount of two visits, but the net gain is the patient's appreciation and goodwill.

CONCLUSION

Hahnemann visualised (*Organan of Medicine* 5th ed. footnote of section 145), "The healing art will then come near the mathematical science in certainty." In this paper the authors have made a modest attempt to make his vision come true. We are very much aware that there are a number of weak links in the mathematical formulation vis-à-vis the corresponding problems of the diseased state given above. However, this may be considered as a preliminary report on our attempt to understand the problem under certain simplificd assumptions which can definitely be made more rigorous by further studies.

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