A Mathematical Journey Through Alcoholics Anonymous

By
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Abstract

The paper concentrates on three members of AA, a normal person, an intellectual introvert, and an intellectual extrovert. Two of them use AA treatment throughout; one ignores it after a while. We use a four dimensional vector for every person in our population which represents his desired time spent in the P(physical), I(intellectual), E(emotional), and S(spiritual) aspects on any given day. The values that we get will represent an eigenvector from the largest eigenvalue of a special matrix with nonnegative entries that we call his ID(identity) matrix..

This ID matrix applied to his present state determines his progression through life by taking repeated applications. It tends to the eigenvector of the matrix from any present state as well as determines how quickly he is able to change as he progresses. Along with this distribution, there is an ordered collection of 10 measurable activities that make up a typical day.; M(morning), W(work), Ex(exercise), Sl(sleep), L(leisure), Re(religious activity), Se(sex), Ax(anxiety),Ar(artistic), C(conversation) Each measurable activity gives a distribution that represents the percent of time given in each of our four dimensions. By specifying how much time per day is spent in each measurable activity, we can get a distribution that matches within 1 minute per day of the matrix distribution.This collection given in the above order is called "a measurable activity sequence" or Mas for short.The number of applications of the matrix on his initial state gives us a time measure of how long it has been sInce he started, and his Mas at that time gives us a much clearer picture of just how he has changed and what his daily life looks like..

Key Words

Alcoholics Anonymous

matrices

eigenvectors

probability distributions

measurable activities

Introduction and Definition of Activity Matrices

In this paper we will analyze mathematically the results of three individuals participating in the program of Alcoholics Anonymous(AA), its meetings, steps, traditions, etc. But it will be clear that such a method can be used with all kinds of treatments for addicts and other mental diseases.

We begin by looking at our society to determine how the average person utilizes his time. Since there are only 24 hours in a day, there are limits as to how one distributes his time each day. We will use four dimensions which represent the physical(P), intellectual(I), emotional(E), and spiritual(S) dimensions respectively and seek the time distribution of these four dimensions for the average person. The values that we get will represent an eigenvector corresponding to the largest eigenvalue of a special matrix with nonnegative entries that we call an "activity matrix". We start with the following axiom:

Axiom 1. Every person in our population can be associated with an activity matrix which represents the instinctive drives(ID) of that person.

What this means is for that each of us there is an ideal distribution of our time among the dimensions. It is where we want ultimately to be. It represents who we are.

We have defined an activity matrix in the paper "A Matrix Method for Decision Making and Forecasting". But this paper applies to business problems and its values represent "amounts of money". Even though, in our present paper, the numbers represent "time", we can still use the same definition for an activity matrix:

Definition:Given two positive vectors W(w1w2...wn), B(b1b2...bn) where B<W, and given a number u,0<u≤1, then for si=bi/((n-1)wi) and u1u2...un is any set of numbers, 0<ui≤1 I=1,2,...n, such that the geometric mean of the uis is u, then an activity matrix is defined by

$$
A(u1u2...un)=
\begin{bmatrix}
1-u1 & (w1/w2)s1u1 & (w1/w3)s1u1... & (w1/wn)s1u1 \\
(w2/w1s2u2 & 1-u2 & (w2/w3)s2u2... & (w2/wns2u2 \\
\multicolumn{4}{c}{\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots} \\
\multicolumn{4}{c}{\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots} \\
(wn/w1)snun & (wn/w2)snun... & & 1-un
\end{bmatrix}
$$

The totality of all such activity matrices will be denoted by Pop(u), the population with respect to u.

The Measurable Activities

Every activity matrix has a largest real eigenvalue between 0 and 1 and a corresponding eigenvector with positive entries. Dividing the vector by the sum of its dimensions gives us a distribution in the statistical sense. This eigenvector represents on average the percent of time spent per day on each dimension. In order to obtain these amounts and qualify their mean ing, it is necessary to list a number of "measurable actives" that encompass a typical day. These activities must be capable of being measured by an in depth analysis of his past history as well as his future aspirations.

The first one that we will consider is labeled Ax(anxiety). It specifies the time spent with a number of negative emotions, eg, anger, hatred, fear, disgust, self loathing, etc. We can obtain an approximate amount by finding out how often one fights with his wife or partner, how long they last, how much he likes or dislikes his boss, how fearful he is that someone will break into his home, or how worried he is about his health, or how afraid he is that his wife or husband is having an affair, etc. We can question how many arguments he gets into, how long he thinks about getting back at someone who he feels has wronged him. All the other activities come into play in assessing the amount of time given to Ax.One may well ask,"Where are the positive emotions such as love, contentment, joy, pride, admiration, etc.?" The answer is that they are not necessary to quantify since, as the person moves toward his ID goal, Ax will decrease as his positive emotions increase, so that his well being can be measured by Ax alone.

We now go through the other measurable activities, keeping in mind for each one, how much time we can extract from it and put that amount into Ax.

The first activity is labeled M(morning). It represents the time spent getting up, dressed, bathroom, and breakfast.How long a person needs to get ready to meet the day tells us how fastidious or sloppy he is.Some people shower every day, Others shower once a week or less.Some love to take showers, others hate it.Some want a quick breakfast, others want a more substantial meal. The next activity is W(work). The one after that is Ex(exercise).What distinguishes the two is that W is necessary but Ex is chosen.They are both highly physical but whereas it is necessary to work for a living as well as do chores around the house, Ex involves walking running ,climbing, hiking etc, things that one wants to do.

It often overlaps with L(leisure time) which although it can involve physical activities(singing songs, playing an instrument for fun) mostly involves watching TV, game playing, movies, daydreaming, etc.

Then there is SL(sleeping).The average time for a good nights sleep is between 7 and 8 hours. But for people who are anxious or have insomnia, the amount of time is less, and the residual time usually, but not always, put into Ax(they are anxious they are not getting enough sleep).

Two other activities, Re(religious activities) and Se(sex) more or less speak for themselves.Re is not only time spent in a religious setting, daily prayers, meditation, church, etc., but also includes contemplating life's wonders,, mysticism, magic, as well as dreams.

Se is not only time spent in sexual activity, but also includes thinking about sex, fantasizing about an imagined sexual partner, etc.There is also quite a lot of emotion involved.

The last two activities, Ar(artistic) and C(conversation), are the most intellectual, where Ar represents above all, clear logical thinking, obtained by studying, reading, listening, etc., and using the acquired knowledge in some creative way.

Conversation also requires a good amount of intellect but not as much as Ar. One argues one's case, whether one is highly intelligent or mentally challenged, conversation is a very necessary ingredient. There is also an emotional impact to conversation.Thus we have ten measurable activities:
M,W,Ex,Sl,L,Re,Se,Ax,Ar.C

Measurable Activity Distribution

	P	I.	E.	S
M	.4	.25	.2.	.15
W	.6	.2	.15	.05
Ex	.5	.2	.25	.05
Sl	.55	.14	.065	.245
L	.085	..315	.2	.4
Re	.1	.25	.15	.5
Se	.12	.15	.45	.28
Ax	.02	.25	.63	.1
Ar	.02	.7	.18	.1
C	.02	.6	.32	.06

Table 1

Each measurable activity is divided into a portion of time spent in each aspect. That division depends not only on our common sense, but also must allow the breakup of the aspects, to be able to come within one minute per day to what the matrix shows, for any particular period of time for all activity matrices in Pop(u). We use the 1 minute limit in our calculations because, from a practical point of view, when the amount of time is under a minute, it is unnecessary in this paper to get a more accurate reading. We do allow differences of .0007 or (.0007)(24)(60)=1.008 minutes to be within the 1 minute range but nothing larger. We shall adhere to these restrictions throughout the rest of this paper.

From the measurable activities, we list the partition of time that governs the normal person in our society:

M	W.	Ex.	Sl.	L.	Re.	Se.	Ax.	Ar.	C
1.	6.7	.6	7	2.9	.48.	.42	2.1	1.15	1.65

The numbers are given in hours whose sum adds to 24. Everyone is forced to divide their time among the 24 hours that make up a day; and while this division will change day to day, if we take an average of all people, we will get the numbers dividing a day for the average person in our society. Using these numbers, we find the distribution for the normal person to be [.3755 . 2544 .1962 .1739]

These numbers represent the percents of our 24 hour day, which by multiplying each number by 24 gives us the hours spent with P,I,E,S respectively. This vector and all multiples represent the largest eigenvector of some activity matrix which we shall call N(1), whose main diagonal elements are 0. Once we have such a matrix, we replace the diagonal elements by 1's and keep all the others the same.

This matrix represents the "model" by which all activity matrices in the population will be formed. The way the model works for a normal person, once a value of u is given, is for the main diagonal elements to be 1-u and all the other elements in the model to be multiplied by u. This matrix will be denoted N(u). For N(1), our diagonal elements are 0, the rest are the model elements.

For N(0), we get the identity matrix, where N(0)P=P and time literally stands still, nothing changes.

For any u, 0<u≤1 and given any vector P, then N(u)^nP will be expressed as N(u)P n, which will be used in this paper to indicate the vector obtained by applying N(u) n times to P. It approaches N(u)'s eigenvector corresponding to the principal eigenvalue for n large enough. If u<u', then N(u')P approaches it faster in the sense that it takes less applications of N to get there. What is truly surprising is the following theorem:

Theorem 1. For any u,, 0<u≤1 and any positive vector P, N(u)P n approaches the same eigenvector as n ⟶ ∞, the eigenvector of N(1).

Using [.3755 .2544 .1962 .1739], we find the matrix N(1):

$$N(1)= \begin{bmatrix} 0 & .2726 & .4641 & .6177 \\ .1420 & 0 & .3004 & .3998 \\ .1182 & .1469 & 0 & ..3327 \\ .1122 & .1394 & .2373 & 0 \end{bmatrix}$$

Now let P=(336.5 224.2 287.1 152.2), a vector we shall use throughout this paper. Then N(1)P 500=(1.6700 1.1329 .8709 . 7738)(10^−71) whose distribution is [.3754 .2547 .1958 .1740], whereas the normal person's distribution is [.3755 .2544 .1962 . 1739], values within one minute of our time percent.

The model that we then use to form all of our matrices is:

$$M= \begin{bmatrix} 1 & .2726 & .4641 & .6177 \\ .1420 & 1 & .3004 & .3998 \\ .1182 & .1469 & 1. & .3327 \\ .1122 & .1394 & .2373 & 1 \end{bmatrix}$$

In earlier papers, where the activity matrices were used for business projections and where we were interested in the amount of money made rather than the time spent, these models were based on a goal G along with the best and worst projection for our next time period's income.

The M matrix represented the "improvement region" and u was closely associated with the 'rate of improvement".

The normal matrix N(u), 0<u≤,1 is then given, using M:

$$N(u)= \begin{bmatrix} 1-u & .2726u & .4641u & .6177u \\ .1420u & 1-u & .3004u & .3998u \\ .1182u & .1469u & 1-u & .3327u \\ .1122u & .1394u & .2373u & 1-u \end{bmatrix}$$

Once again we know that every such matrix has the same distribution. Now , if we are given M and u, then the population of all activity matrices can be obtained by considering all numbers $u_1 u_2 u_3 u_4$, $0<u_i≤1$ whose geometric mean is u and whose matrix is given by

$$A(u_1 u_2 u_3 u_4)= \begin{bmatrix} 1-u_1. & .2726u_1. & .4641u_1. & .6177u_1 \\ .1420u_2 & 1-u_2 & .3004u_2 & .3998u_2 \\ .1182u_3 & .1469u_3 & 1-u_3 & .3327u_3 \\ .1122u_4 & .1394u_4 & .2373u_4 & 1-u_4 \end{bmatrix}$$

What is also true is the following theorem:

Theorem 2. Given $0<u,u_i≤_i 1$, I=1,2,3,4 and $u'_i=(u'/u)u_i$, then $A(u_1 u_2 u_3 u_4)$ and $A(u'_1 u'_2 u'_3 u'_4)$ have the same eigenvector.

However, if one of the $u'_l>1$, then it is no longer an activity matrix. Consider u=.3 and u_1=.3, u_2=.1, u_3=.3, u_4=.9. Suppose now we want to change to u.' =.4. Then we multiply each u_i by 4/3 to get u'_i. Thus u'_1=.4 u'_2=.4/3=2/15 u'_3=.4 u'_4=1.2>1. This is no longer an activity matrix and will not be considered in this paper.

Time Span for Each Application of N

We begin by assuming our emotions are well out of control and we seek help in bringing those emotions down to a level where we can function in a way we were meant to function. Thus we expect our initial state P to have an emotional time that is much larger than our ID emotions. We seek treatment for that purpose. This in essence is what AA, psychological, or psychiatric treatment is for. It is not for changing who we are, but rather, for bringing our emotions down to a level where we can become who we were meant to be.

A person's ID matrix applied repeatedly to his present state not only determines his path through life but also determines his ability to change. We do that by finding the minimal value we can let u be where N(u)P has a measurable change in at least one of its dimensions. The smaller the u value , the faster we are able to change.

We shall use AA treatment in order to assess the time it takes for one application of N and use the vector P, which represents the state of a working alcoholic(an alcoholic who is employed), and first find the smallest value of u where there is a measurable change with one application of N. That value of u is .01. Thus

$$N(.01)= \begin{bmatrix} .99 & .002726. & .004641. & .006177 \\ .00142. & .99 & .003004 & .003998 \\ .001182 & .001469 & .99 & .003998 \\ .001122 & .001394 & .002373 & .99 \end{bmatrix}$$

Now N(.01)P=(336.0 223.9 285.5 152.1). The sum of the dimensions is 997.5 and the distribution is [.3368 .2245 .2862 .1525] , whereas [P]= [.3365 .2242 .2871 .1522]. All of the differences are less than a minute, except E, where (.287-.2862)(24)(60)=1.296 minutes.

Looking at G(.01)(bottom of page 8), we have G(.01)P=(335.54 224.10 285.46 151.97), the sum of its dimensions is 997.08. and the distribution is [.3365 .2248 .2863 .1524]. Again, all of the differences are less than a minute except E, where (.2871-.2863)(24)(60)=1.152 minutes.

If we try N(.005)P-(336.3 224.2 287.1 152.2) then [N(.005)P]=[.3367 . 2244 .2866 .1523] where all values are less than a minute from P Thus the smallest value of u where the E coordinate is greater than a minute is between .005 and .01. Rounding u to the nearest hundredth which gives us a reasonable estimate, we have u=.01.

We also find that the same is true for G(.005)P. Since N and G are extremes of one another, we will consider that all matrices in Pop(u) have a minimal u=.01.

Next, we have to find the length of time for one application. An AA member who just starts is requested to go to 90 meetings in 90 days. We assume at that time the person begins to feel that the Ax activity has decreased by just about a minute.

	M.	W.	EX.	SL.	L.	RE.	SE.	AX.	AR.	C
P	1	6.25	.5	6	1.65	.3	.4.	7.1	.3	.5
NP 5	1	6.35.	.45	6.05	1.35	.54	.3	7.08	.68	.2

Table 2

The measurable activity values displayed above for NP 5 are shown in Table 4, to be within one minute of the matrix values.

Thus, looking at Table 2, after 5 applications of N(.01), Ax has gone from 7.1 hours to 7.08 h to obtain (7.1-7.08)(60=1.2 minutes or 1.2m. Lower powers have Ax come under 1m. Thus, we can equate N(.01) 5 to 90 days and therefore each application takes 18 days on a 360 day year. This means that the number of applications divided by 20 gives us the number of years. We shall consider all matrices A in Pop(.01) to take 18 days for each power of A giving us a time measurement for arriving at various milestones.

We will investigate an individual whose ID matrix is G(.6 .1 .3 .45), where u=.3 and we will assume his initial state is vector P. Notice first that most time is allotted to the smaller u value which is u2=.1. Thus we have an intellectual person. Notice also that u1=.6 where the physical dimension is least. It is much less than that of a normal person whose u1=.3. Although his ideal is to have u1=.6, it may be impossible in his lifetime to actually approach that time if he is not a wealthy individual. In such cases his ID matrix will have to be modified. Furthermore, since we are assuming that each application take 18 days, we must change .3 to .01 by multiplying each ui by .01/.3 obtaining

$$G(.02\ .003\ .01\ .015)=\begin{bmatrix} .98 & .005452 & .009282 & .01235 \\ .0004733 & .996 & .001001 & .001333 \\ .001182 & .001469 & .99 & .003327 \\ .001683 & .002091 & .003360 & .985 \end{bmatrix}$$

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Different Realizations of G

Once we are given an ID matrix, there may be a variety of ways that the measurable activities can be distributed and still remain within one minute of the matrix values.Each different realization allows us to include the personality of the person which will better specify which particular distribution is most appropriate for that particular person.

In general: introvert-less C, insomniac-less SI, religious-more Re, workaholic-more W, extra clean-more M, scholarly-more Ar, etc. We identify where we are right after we stopped drinking. We do not need a matrix for that but rather a listing of the measurable activities for P. We now list P,N, and a variety of matrices for G.

	P.	G1.	G2.	G3.	G4.	G5.	N
M	1	1	1	.47	1.5.	1.5	1
W	6.25	5.02	5.02	5	4.87	4.87	6.7
Ex	.5	.4	.4	.4	.2	.2	.6
SI	6	6	6	6.4	6	6	7
L	1.65	1.18	1.18	1	1.01	.79.	2.9
Re	.3	.18	.18	.2	.18	.4	.48
Se	.4	.45	.55	.53	.55	.55	.42
Ax	7.1	.97	.77	.956	.77	.82	2.9
Ar	.3	8.3	8	8.13	8.02	8.02.	1.15
C	.5	.5	.9	.905	.9	.895	1.65

```
.3365 .3033 .3037  .3032..3036 .3037 .3755
.2243 .3754 .3752  .3756 .3759 .3757 .2544
.2871 .1739. .1736. .1745 .1735 .1745 .1962
.1522 .1474 .1475  .1467 .1470 .1463 .1739
```

Matrix	G	N
	.3037	.3754
	.3753	.2548
	.1741	.1958
	.1469	.1740

Table 3

The last four numbers in each column under the Gi heading in Table 3 represent the distribution of the measurable activities, and the G matrix distribution is listed under G. Likewise with N. Note that in all cases these alternative activities are all within 1m of the matrix values. Incidentally, we arrived at the matrix distribution by looking at the vector GP 2500.

Now, looking at Table 3, G1 represents an intellectual introvert, G2, an intellectual extrovert,G3 is the person needing more sleep, less work, sloppy, which we can identify as a Bohemian, G4 represents the more fastidious, more concerned with cleanliness and appearance. Finally G5 is the more religious person.

Before we continue, we must consider the normal matrix N and modify our personality types.The personalities of individuals are usually established by comparison with the normal.In variations of G, different personalities were given, but they were constrained by the ID matrix G corresponding to an intellectual. In our comparison with N, we specify how people distributed their time compared to normal. Certain of our measurable activities are singled out in our minds to classify individuals. For example, time spent in Ax for N is 2.1h. If a person spends a good deal more time in Ax, we tend to classify him as anxious, fearful, hot tempered, emotional, etc.; whereas if the person spends much less time, he is classified as cool, happy go lucky, calm even tempered. These classifications assume that Ax time is part of the person's ID, which may not be true, but so long as he displays this behavior over some time, we generally take it for granted that it is part of his overall personality.

Analysis of the 90 day Period

	P.	G1P 5.	NP 5.	G1P 5-P.	NP 5-P
M.	1	1	1	0	0
W	6.25.	6.25	6.35	0	1
Ex	.5	.5	.45	0	-.05
SI	6	6	6.05	0	-.05
L	1.65	1.68	1.35	.03	-.3
Re	.3	.38	.54	.08	.24
Se	.4	.32	.3	-.08	-.1
Ax	7.1	7.01	7.08	-.09	-.02
Ar	.3	.69	.68	.39	.38
C	.5	.17	.2	-.33	-.3

.3365	.3366	.3386
.2242	.2271	.2262
.2871	.2825	.2822
.1523	.1538	.1530

Matrix

.3365	.3384
.2270	.2255
.2832	.2827
.1533	.1534

Time Transfer

G1P 5:C   Ax → Ar.   Se→Re   Ax→L
   .33 .06   .39   .08 .08   .03 .03

NP 5.   C   L→ Ar.   L. Ax →Re.   Se → W   Ex → SI
   .3 .08 .38   .22 .02.   .24   .1   .1   .05 .05

Table 4

Before we go into the details of describing how our person has changed his behavior at the 90 day mark, we must deal with the following problem: At what time after the alcoholic stopped drinking did he go to his first AA meeting? We do not assume he went the day he stopped. In fact, for most of us, it is vital that we go through a detoxification treatment, generally done nowadays in a hospital requiring at least a week for some, but in most cases requiring a much longer stay. During that time, AA members from different nearby groups bring speaker meetings to those who care or are required to attend, giving them a taste of what joining AA would be like.

We now state or second axiom:

Axiom 2 Once our alcohol consumption, which has robbed us of our identity, has stopped, then we will go along the path of getting toward our ultimate goal, which is represented by our ID matrix, regardless of what treatment we are given or give ourselves. The difference will be in the length of time it takes to reach certain milestones and how the transfer of time will be interpreted.

Therefore for the purpose of giving a constant interpretation of these changes, we will assume that our individual goes to AA meetings directly after getting out of detox.

In order to interpret the time transfer diagrams in Table 4, notice that the activities on the left of the arrow are activities that lost time. They are picked up by activities to the right of the arrow. We match up the activity with most time lost to the one with most time gained, filling in portions of other activities that seem reasonable to balance each side.

The transfer of time diagrams give us a much better sense of how the person is changing in that period of time and also what is requested in the treatment that is bringing that change about.

The 90 day period for AA members is considered the time needed in order to decide whether the treatment will be of help.It is far too early for one to be rational in one's decision. It must come from the barest changes in the time distribution toward normalcy and especially in being aware that Ax is decreasing just enough so that one can have some hope that all is not lost.

We now take a more comprehensive look at what happens at the 90 day mark.For this, we use Table 4 again. We know that Ax has decreased by 1.2m. That is barely enough to feel that there is an almost undetectable amount of improvement. Looking at the time transfer diagram for NP 5, we find that 18m loss of conversation and 4.8m less of leisure time has gone into Ar, increasing it by 22.8m per day.The rest of the leisure time decrease of13.2m and the decrease of Ax, has gone into Re adding 14.4m. Sexual activity of 6m goes into 6m more of work, and 3m of Ex goes into 3m more of sleep. We can interpret these changes as follows: for AA members in general, new members are told to keep their mouths shut because they do not know what they are talking about. In fact, one of the common expressions is,"take the cotton out of your ears and put it in your mouth.", meaning, "start listening and stop talking.". They are given a lot of reading material, the big book, the book on steps and traditions, and numerous other publications. The treatment is based on spiritual principles involving a higher power, prayer, and meditation. Also work is requested: making coffee, sweeping, stacking chairs, etc. Looking at these transfers of time, we see that the 90 day period displays a definite tendency toward normalcy which involves obeying the rules of the society they are in, even though Ax decreases almost imperceptibly.

We now examine the time transfer diagram for our G1 individual. Notice that the cutting down of conversation and giving it all to Ar, probably learning about AA by reading the literature and listening to speakers at meetings, has resulted in increasing that time by 23.4m day, Notice also that Ax has decreased by 5.4m totally. That is quite a bit more than the 1.2m decrease of N. It would seem that G's learning new things is sufficient to spark enough interest, even though it would not have been G1's choice of study., it did allow him to lower Ax by a more significant amount. Our normal person also increased Ar by almost the same amount, 22.8m, but his decrease of Ax is only 1.2m indicating that increasing Ar does not have as much of an impact for him.

Cutting time thinking about sex and putting it into a spiritual context is almost certainly AA's influence. But notice how little time that is, 4.8m. That contrasts quite sharply with N's time given to Re,14.4m. In order for N to accomplish that, some leisure time had to be given up. With G, we actually increase leisure time by 1.8m from the extra decrease of Ax time.

The Three Milestones Q1 Q2 Q3

When anyone undergoes treatment of this kind, there must be markers along the way to check where one is at a particular time compared to where one ought to be if the treatment is done correctly.In order to understand the milestones that are going to be used and how they will be interpreted, we need to first have a clear understanding as to what these matrices and their eigenvectors represent.

In classical or quantum physics, basic particles such as molecules, atoms, electrons, etc. are viewed en masse and the measurable results they produce come about not from a single particle but from large quantities of such particles where depending on their type and place in a mechanical system, we derive the results by using some statistical measure such as that of Boltzmann, Fermi Dirac, Bose Einstein to account for the results.

In our situation, the basic particle is a human being and the results that follow come from that single person's behavior.There is however a statistical component by looking at the normal matrix N. It comes from a survey of how, on average, a normal person in our society would distribute his time at the milestones, if he allowed himself to deteriorate to a state represented by P. Not only are there many people whose matrices are close to N, but it also sets the standard of what to expect from an alcoholic, in general, at various milestones.However, once the ID of a particular person is known, we can get a much more accurate picture of what to expect. By contrasting that with the normal, we can see how different our expectations should be. It is only because we can view each person individually , that we can accomplish this without resorting to a statistical measure.. We are able to close in on a person by finding his ID matrix G, his personality using a realization G, his choice of an option at any particular time, which we have yet to cover, and his resistance to change.

Analysis of Vector P

The first thing that needs to be done is to determine the vector P. It represents the time the person stops drinking and does not pick up again. He may stop drinking, not go to AA at all, nor any other treatment facility and never drink. This happens very seldom although much of the AA population believes that they are the rare exception. Others may stop for a while and reluctantly go to an AA meeting.. Since P identifies a working alcoholic in this paper, it implies that our individual has a job, maybe a wife and family, takes part in activities in his community. Unlike the derelict living on the street, oblivious to what people think of him, he is reluctant to admit he is an alcoholic even to himself. To do so would mean exposing him to the disdain and ridicule of the community, since drunks are not looked on kindly.

To walk into a meeting and say, when called upon, that he is an alcoholic would most likely be very difficult for him to admit , especially since much of his reasoning abilities have been taken from him by alcohol. If that is not bad enough, he is told to get a home group, a sponsor, and get active in working the steps.Under these conditions, many members cannot go through the steps properly and eventually go out again.

For those of us that actually succeed in not drinking again, there is a point where we know we need help, are not sure if we are really powerless over alcohol, but decide to join the fellowship and follow the suggestions that AA offers In the right way. The vector P defines the person where he is when he stops drinking(a dry drunk),becomes an AA member when he gets out of detox, and continues to be helped without going out again. Thus we have a winner and want to trace his progress.

We now need more details about our individual.From his case history which we assume we know, we will learn his age, sex, what kind of work he does. We will determine when he started drinking, how long it lasted, what damage he has done to himself and others. We will determine the amount of alcohol he was consuming, how it affected his health. When one is drunk, there is very little time spent in I, P may be significant if it is destroying his body and S may play a role by way of the proverbial "seeing pink elephants".

The upshot of all this is that Ax is out of sight, especially when one drinks against one's will, leading to hopelessness and toward suicide.

Thus we assume that the E coordinate of P is much larger than that of the person's ideal eigenvector, and the purpose of the treatment is to bring down that level so the person can function as he wants to. For these reasons, we are able to select the measurable activities for P.

One more word about P before we continue. One of the common expressions in AA is: "identify but don't compare". This is used when AA members listen to stories of other AA members who share what it was like before they stopped drinking. Mathematically, they are describing a vector P′ when they finally stopped. That vector could represent a person who has done many terrible things, committed many crimes, lived in horrible conditions. To the listener, whose history resulted in vector P, it is easy to say,"Well I was never as bad a person as the one I'm listening to so I do not have to worry as much about my alcoholism"The truth is that both people are alcoholics. They have a potentially fatal disease. That is the only identification that matters, not the comparison. We clarify this now because throughout the remainder of this paper, we will compare how AA treatment of the average person compares to treatment of our other individuals as well as with each other. This is entirely different, where we are comparing the results of AA treatment for different people.

The vector P will be the starting point for all matrices in this paper.Thus we have two vectors associated with each person, the beginning vector P, where we start, and the eigenvector of G or N that our person is attempting to reach.

Let R=[G]-[P]=(r1r2r3r4).This vector is called the directed range. In our circumstance, R=(.3037 .3753 .1741 .1469)-(.3365 .2242 .2871 .1522)=(-.0328 .1511 -.113 -.0053). We now let Q1=1/4R+[P], Q2=1/2R+[P], Q3=3/4R+[P].They represent the quartiles of the range.Each quartile is a distribution. To see this, Q1=1/4R+[P]=1/4([G]-[P]) +[P]=1/4[G]+3/4[P] whose sum adds to 1.

Since it is the emotional marker that we are concentrating on, we find how many applications of the matrix are necessary in order to obtain that level of emotional time that is within 1m of the third coordinate of Q1.In general, the measurable activities of the matrix at each quartile do not have to correspond to some particular occurrence in the treatment. However, for AA treatment, Q1 corresponds in many cases to where the dry drunk attains sobriety(the state where the person becomes rational). Q2 can be linked to where the "promises" of the big book start to take hold, ie. "We begin to see a new freedom and a new happiness....." which seemed so

completely out of reach when we first started. Finally Q3 would approach his desired way of life, which takes over more and more as his emotions get toward their desired level. These results are listed in Table 5. The first thing we need to know is how long it takes for G to reach Q1.The $u=.01$ represented the value, rounded to the nearest hundredth of the first instance when there was a measurable change of NP or GP from P. In general, however, each person changes at his own pace, as is said in the promises,"sometimes quickly, sometimes slowly". We must take into consideration how a person is disposed to change and use that value of u for that particular person.

GP 42 106 225 : 2.1y 5.3y 11.35y

[P] .3365 .2242 .2871 .1522
Q1 .3283 .2620 .2589 .1510 [.3358 .2469 .2589 .1584]
Q2 .3201 .2998 .2306 .1496 [.3314 .2776 .2306 .1604]
Q3. 3119 .3375 .2024 .1483 [.3209 .3200 .2024 .1567]
[G] .3037 .3753 .1741 .1469

NP 29 70. 140 : 1.45y 3.5y 7y

[P] .3365 .2242 .2871 .1522
Q1 .3463 .2318 .2643 .1577 [.3461 .2314 .2643 .1583]
Q2. .3560 .2395 .2415 .1631 .3558 .2387 .2415 .1640]
Q3. .3658 .2471 .2186 .1686 [.3655 .2463 .2189 .1694]
[N] .3755 .2543 .1958 .1744

Table 5

Looking at Table 5, we see that it takes G 2.1y to reach Q1. To analyze the results, we must look at the direction each dimension is going. The P dimension stars at .3365 and ends at .3037, which is moving downward. When E reaches the first quartile level, the first coordinate P is at .3358, higher than the first quartile value of .3283. Likewise I starts at .2242 and ends at .3753 which is moving upward. Its matrix value is .2469 whereas its Q1 second coordinate vale is .2620 showing that it needs more time to get there. The same holds with S, which moves downward from .1522 to .1469 and whose matrix value of .1584 needs more time to get to its quartile

value of .1510. What is also significant about S is that at the first quartile, S is larger at .1584 than where it started, which is at .1522. It is moving in the opposite direction! Notice though that the range of S is .1523-.1469=.0054 yielding only a 7.778 minute difference. It is often the case the when start and finish have times close together, that the dimension will start moving in the opposite direction, sometimes for a considerable length of time until it turns around and begins to approach the goal value.Given that AA is the treatment, it is not surprising that he spend more time in spirituality than he would ultimately want, and the time grows until he finally feels confident enough to have it begin to move in the right direction.

At this point, we can look at how a normal person N divides his time at Q1. We look at Table 5 again.What is rather interesting is that the first quartile in all the other dimensions are very near where their ID matrix is, which means we do not have to choose E. Any other chosen dimension would have ended the same place. This is very different from G, where all the other factors were well behind their way toward the goal and the E factor was the fastest. It showed that these other factors had to be slowed before we can think about getting our emotions to the Q1 level.

Now that we have the skeletal structure at Q1, it is time to put some meat on the bones. The first thing that is necessary is to match GP 42 with measurable activities. Since there are a variety of personalities all represented by G, we will choose G1(the introvert) and G2(the extrovert) as two examples. The results will give us a much more thorough examination of just how our time distribution has changed.

Analysis of G at Q1

	P	G1P 42	G2P 42.	G1-P.	G2-P.	G1.	G2
M	1.	1.	1	0	0	1	1
W	6.35.	6.15	6,25	-1	0	5.02	5.02
Ex	.5	.53	.4	.03	-.1	.4	.4
Sl	6	6	6	0	0	6	6
L	1.65	1.87	2.3	.22	.85.	1.18	1.18
Re	.3	.55	.25	.25	-.05	.18	.18
Se	.4	.3	.3	-.1	-.1	.45	.55
Ax	7.1	5.7	5.55	-1.4	-1.55	.97	.77
Ar	.3	1.65	1.25	1.35	.95	8.3	8
C	.5	.25	.7	-.25	.2	.5	.9

.3357	.3357
.2470	.2473
.2585	.2586
.1588	,1584

Matrix GP 42

.3359
.2469
.2588
.1583

Time Transfer

G1P: Ax → Ar   Se   W   Ax → Re.   C → L.   EX
     1.35   1.35   .1   .1   .05   .25   .25   .22   .03

G2P: AX   RE. → AR.   L.   Se.   Ex → C
     1.55   .05   .95   .65.   .1   .1   .2

Table 6

We now take a look at G1 and G2 and compare them with each other and N.Under the time transfer heading in Table 6 and regarding G1, it shows:

G1P 42:   Ax → Ar.   Se. W. Ax → Re   C. →   L. Ex
             1.35. 1.35   .1 .1   .05   .25   .25   .22. .03

From this we see that Ax has decreased by 1h24m which caused an increase of Ar by almost the same amount. In other words, our intellectual introvert, as soon as his emotions dropped by 1h21m, it was completely taken up by his intellectual pursuits.There seemed almost a desperation to get back to them. His conversation level, which was really the same as his ideal, nevertheless at Q1, dropped by 15m, probably due to AA's suggestion, and that time spent on 13.2m more of leisure and 3m more of some exercise.Finally sexual activity and work were each lowered by 6m and anxiety lowered by 3m increasing religious activity by 15m.

Let us be clear as to our interpretation of this last time transfer. If this person was involved in any kind of treatment which caused his anxiety level to drop, then the drop would be taken up with Ar, and the drop in Se and W would be taken up with Re. If the treatment had nothing to due with religious activity as it does in AA, it would simply mean that the role Re played would come from other sources. The activity Re is part of everyone's life and time is spent there. It must not be confused with time spent in one's religion.

For example, one can imagine that once G1's reasoning was restored, he was able to get back to what had interested him in the past and was studying what he had done. One doesn't need the concept of god or a higher power to conclude that something inside of him , beyond his control, was bringing him back to what he had abandoned when his drinking became excessive and this is certainly an aspect of Re.

We now consider G2.

G2P 42:   Ax.   Re   → Ar.   L.   Se. Ex → C
             1.55 .05   .95 .65   .1   .1   .2

We notice right away that Ax has dropped 1.55h instead of 1.4h as it did for G1. This is a 9m difference in lowering anxiety. It is not surprising that the extrovert who talks more, and is more gregarious, should experience more lessening of his anxieties in the same time period, but what is more interesting is where that new time surpluses have gone..Ax ,which was lowered by 1h57m and Re, lowered by 3m have gone to increasing Ar by 54m and L by 39m. Our extrovert is not so quick to be consumed by Ar as was G1. Also paradoxically, Re has actually decreased from where he was at P, even though AA treatment suggests that one should be more involved with religious activities. The time he spent with Re when he first started as a dry drunk probably reflected his fear that his life was in danger. At Q1 time however, that fear was lessened as his rationality returned. Increasing his leisure time , which contains a spiritual percent of .4 made up for Re whose spiritual percent is .5(see Table 1) and so G2 felt that he did not require any more Re time than 15m a day being that his desired ID time for Re is 10.8m

Notice also that 6m of sexual activity and 6m of exercise goes into conversation, again recognizing that once his thinking had straightened out, he no longer had to keep his mouth shut Furthermore, conversation has a strong intellectual component , where for G1, conversation time lessened and got picked up by leisure and exercise.

What seems to be rather obvious, is that once G2's rationality was restored, he had no intention of following AA treatment. Instead of talking less, he was talking more.and used some of that to increase his intellect. Instead of increasing Re as was suggested, he used more of his leisure time for the increase of spirituality determined from his progression.There is a hint of arrogance that ,at this early stage, he thinks he has things under control.

We see that even though G1 and G2 change their amounts of time only in the last four activities listed: Se, Ax, Ar, and C,(Table 6, columns 7 and 8, and their dimensional percents taken from GP 42 are the same), we have quite a contrast in their overall activities at the Q1 time.

Analysis of N at Q1

	P.	NP 29.	NP 29-P.	N
M.	1	1	0	1
W	6.25	6,6	.35	.67
Ex	.5	.4	-.1	.6
Sl	6	6.1	.1	7
L	1.65	2.035	.385	2.9
Re	.3	.4	.1	.48
Se	.4	.35	-.05	.42
Ax	7.1	5.97	.1,13	2.1
Ar	.3	.695	.395	1.15
C	.5	.45	-.05	1.65

Matrix NP 29

.3463	.3462
.2311	.2314
.2642	.2643
.1584	.1582

Ax	→	Ar	L	W	Ex	→	Sl.	Se.	C	→	Re
1.13		.395	.385	.35	.1		.1	.05	.05		.1

Table 7

We next compare the G1 and G2 time transfers with that of N. First of all, the time it takes N to reach Q1(Table 5) is 1.5y instead of 2.1y. We can readily account for this, since N does not have a passion for the intellect and his interests are evenly distributed over the four dimensions(all having the value u). Therefore the passion that has retarded G from reaching Q1 is nonexistent for N. Notice also that Ax is reduced by 1.13h which is quite quite a bit less than both G! And G2. This is also to be expected since the goal distribution of activities for N puts Ax at 2.1h whereas for G1, it is at .97 and for G2, it is at .77.

Looking at Table 7, we notice that the Ax time decrease is almost evenly distributed among intellectual time, leisure time, and work time.We also notice that we give up 6m of exercise and give it for sleeping. This may not seem like any real time for sleeping., but if we consider that over a week, it represents 42m extra sleep, we might conclude that it was spent in a single

night, say on a night of the weekend.

We see from Table 7 that N is certainly following AA treatment. Conversation was lowered from .5h to .45h even though N's ideal time is 1.65h Then Re is increased by 6m by lowering Se and C each by 3m. When Ax was lowered by 1.13h , the most time went to Ar, indicating that our normal individual was reading AA literature and working on the steps. There is no indication that any of the suggestions were ignored.

The Median Milestone Q2

The second milestone that we look toward is the one where the promises start to take hold. We begin to see"…a new freedom and a new happiness….". Some of us have worked on all 12 steps by this time. Others have only been through the first three or four. Whatever the case, the steps by this time are known and an earnest attempt is made to put them in practice.

Once again, our first concern is "How long does it take G before this happens?". The answer, from Table 5 is that it takes 5.3y before Q2 is attained, assuming u=.01

We see that the matrix value for P is.3201. Since the goal value is.3037, P should be moving toward lower values. Thus .3316 has not gotten to the median level. The same is true for I and S. When E has reached the Q2 level, the other factors still have a way to go to reach their Q2 levels. This means that G will have to slow the other aspects down in order to bring E to its median level. The dimension S is still moving in the wrong direction as it was with Q1.

Analysis of G at Q2

	P.	G1P 106.	G2P 106	G1P-P.	G2P-P	G1.	G2
M.	1	1.036	1	.036	0	1	1
W	6.25	6	6.05	-.25	-.2	5.02	5.02
Ex	.5	.45	.4	-.05	-.1	.4	.4
Sl	6	6	6	0	0	6	6
L	1.65	1.89	2.3	.24	.65	1.18	1.18
Re	.3	.614	.3	.314	0	.18	.18
Se	.4	.3	.38	-.1	-,02	.45	.55
Ax	7.1	4.14	4	-2.96	-3.1	.97	.77
Ar	.3	3.07	2.8	2.77	2.5	8.3	8
C	.5	.5	.77	0	.27	.5	.9

.3313	.3311
.2778	.2774
.2307	.2210
.1802	.1605

GP 106
.3314
.2776
.2306
.1603

G1P 106: Ax.　Ex　→　　Ar.　L.　　W.　Se　→　　Re.　M
　　　　　2.96　.05　　　2.77　.24　　.25　.1　　　.314　1.036

G2P 106: Ax　→　Ar.　L.　　W.　EX.　Se　→　C.　L
　　　　　3.1　　2.5　.6　　.2　.1　　.02　　.27　.05

Table 8

From Table 8 we see that, as G1 recovers from alcoholism(Ax dropping by about 3h), almost all that time is picked up by Ar, showing that G1 is working on his passion. Furthermore Re has increased, showing that G1 is still following AA treatment.

Since so much time still goes into Ar and since Re time is so large, almost 40m compared to about 10m ideally, something extraordinary is happening.We can imagine a scenario where G1, by staring at a problem that he had no idea how to solve just before alcohol had taken over so many years ago, now sees the solution laid out clearly in front of him. It is as if he were working on the problem all those years and now it is finally solved.

There is common expression that holds true for alcoholics:
"If you stop drinking, for many years even, and you then go out, you don't start at the beginning, or even where you were when you stopped. You start where you would have been had you never stopped drinking." This is a remarkable trait of the mind and G1 was witnessing the flip side:

"If you stop drinking and your passion returns, you don't start at the beginning, or even where you were when alcohol took over. You will start where you would have been if your passion had always been there, working on your problems."

G1 is certainly experiencing life saving benefits by being a member of AA.

Note that G2's decrease of Ax has gone mostly into Ar but with a significant amount into L.,with no increase of Re at all. That coupled with the fact that C has increased by 15m and Ax decreased 12m more than G1, shows that not only is G2 ignoring AA treatment, but that he is not nearly as worried as G1 that he has a potentially fatal disease. He has increased Re by 3m to where it was when he first started. His lack of more of an increase of Re implies that he is not attending many AA meetings.

Analysis of N at Q2

	P.	NP 70.	NP 70-P.	N
M	1	1	0	1
W	6.25	6.75	.75	6.7
Ex	.5	.41	-.09	..6
Sl	6	6.3	.3	7
L	1.65	2.37	.72	2.9
Re	.3	.385	.085	.48
Se	.4	.455	.055	.42
Ax	7.1	4.75	-2.35	2.1
Ar	.3	1.1	.8	1.15
C	.5	.48	-.02	1.65

Matrix NP 7

.3359	.3558	
.2384	.2387	
.2419	.2416	
.1638	.1639	

Ax	→	Ar.	L.	W.	Sl.	Re.		Ex.	C	→	Re.	Se
2.35		.8	.72	.5	.3	.03		.09	.02		.055	.055

Table 9

We examine first how time saved from Ax is dispensed to the other activities of NP 70. We see that the most time, 49m goes to Ar, indicating that N is still reading AA literature. We also add 43.2m going to L and 30m toW, the main activities of our day. Re was also increased by 5m while C was still being decreased indicating that N continues to follow AA;s suggestions.Getting more sleep a night indicates that Ax has receded enough to allow a little more peaceful sleep.The increase of sex by 3.3m doesn't seem like much, but that translates to 23.1m per week which could amount for an additional sexual experience per week.

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Analysis of G at Q3

	P.	G!P 225.	G@P 225.	G!P 225-P.	G@P 225-P.	G1	G2
M	1	1	1	0	0	1	1
W	6.25	5.65	5.73	-.6	-.52	5.02	5.02
Ex	.5	.4	.4	-.1	-.1	.4	.4
Sl	6	6	5.9	0	-.1	6	6
L	1.65	1.95	2.156	.3	.506	1.18	1.18
Re.	.3	.3	.18	0	-.12	.18	.18
Se	.4	.4	.44	0	.04	.45	.55
Ax	7.1	2.48	2.37	-4.62	-4.73	.97	.77
Ar	.3	5.16	5.024	4.86	4.724	8.3	8
C.	.5	.66	.8	.16	.3	.5	.9

.3208	.3208
.3200	.3200
.2023	.2022
.1569	.1570

GP 225
.3210
.3200
.2023
.1567

GP 225: AX → Ar.   W. → L. Ar.   EX. W → C
4.62   4.62   .54   .3 .24   .1   .06   .16

GP 225: Ax → Ar.   W → L.   Re. Ex. Sl → C. Se
4.73   4.724   .52 .502   .12 .1 .1   .3 .04

Table 10

We are now at a period in AA where we can feel confident that we are well on our way toward living the good life so to speak. This does not mean that only sunny days are ahead. Life is lived on life's terms and each day, life goes on sometimes with positive consequences and sometimes with negative ones. But with help from the treatment, we are more willing to follow the serenity prayer:

"God, grant me the serenity to accept the things I cannot change, courage to change the things I can, and wisdom to know the difference."

The time it takes G1 and G2 to reach Q3 is 225 applications of G, or 11.25y. Whenever there is so long a period of sobriety, there is always the tendency to feel that one is cured, that treatment is no longer necessary. This can become a fatal mistake. People who have long periods of sobriety go out sometimes over the smallest circumstances: a wedding toast, the obliging of a friend to taste how good a new found wine is., etc.It is usually not fatal for those who have had AA treatment since they know exactly what they have to do and where they have to go to achieve sobriety again.

From Table 5, we again notice that E reaches Q3 before any of the other dimensions. We also see that at Q3, the S dimension is moving in the right direction toward the goal.

For G1, we see that not only does his Ax decrease go completely into Ar but also some of W's decrease is also picked up by Ar. It shows that G1 has been working on his passion daily and producing by this time a large number of results all of which have been stored in his mind for years waiting to come out.

He is quite secure in knowing that he would never want to block his passion again with alcohol or any other substance. He will probably attend less and less AA meetings as the years pass since he has such a powerful censure behind him. But he will remember for the rest of his life what taking a single drink can accomplish.

Regarding G2, we see from Table 10 that just about all of the Ax decrease has gone into Ar, and just about all of W's decrease has gone into L. We also see that C's increase has brought him conversing almost up to his ideal level.

These quartiles come about on the assumption that one has not picked up a drink during that time. It is highly unlikely that G2, without having had any real AA treatment, would have been able to go 11.25y without going out, and if he actually did accomplish not drinking for that amount of time, he would certainly feel that he was cured of the disease making it most

probable that he would succumb to some small request to take a drink without any real knowledge of how to get back to sobriety, putting his life in real danger.

Analysis of N at Q3

	P.	NP 140.	NP 140-P.	N
M	1	1	0	1
W	6.25	6.7	.45	6.7
Ex	.5	.51	.01	.6SI
SI	6	6.65	.65	7
L	1.65	2.76	1.11	2.9
Re	.3	.34	.04	.48
Se	.4	.42	.02	.42
Ax	7.1	3.545	-3.555	2.1
Ar	.3	1.325	1.025	1.15
C	.5	.75	.25	1.65

	Matrix
.3652	.3655
.2460	.2463
.2195	.2189
.1693	.1693

Ax →	L.	Ar.	SI.	W.	C.	Re.	Se.	Ex.	M
3.555	1.11	1.025	.65	.45	.25	.04	.02	.01	0

Table 11

Looking at Table 5, we see again that the matrix values at NP 140 and the Q3 values are essentially the same for each coordinate as it has been all along. The time for reaching Q3 is 7y. Again, this is a very significant difference from G which required 11.25y to decrease E by 3/4of its directed range. On the other hand, the normal person or those people close to normalcy, having no particular passion to hold onto, may also feel after 7y of sobriety, that drinking on a social level might be within their reach, especially since society as a whole condones the use of alcohol as a normal function in so much of their activities. Going out after 6 or 7 years is a common occurrence for many alcoholics. For others, who realize they are

not normal, find social drinking to be a joke, especially watching people leave some of their drink in their glass without ever finishing it, something an alcoholic would never do.

Let us now look at Table 11. Only Ax has decreased by 3.555h. All the other activities have increased their time , except for M which stayed the same. Leisure activity took most of the time decrease from Ax, but , surprisingly, Ar took almost as much. At Q3, it uses 1h20m compared to its ideal time of 1h10m. This excessive use of Ar shows the influence of AA by his continuing to read its literature and go to AA meetings. Another sure sign is that his conversation is 45m a day whereas his ideal amount is about 1h40m.

It would seem to indicate that N is really worried that he may go out at any time and it is only AA that is keeping him sober. He will probably continue with AA for most of his life and will make it an important part of who he is and who his friends are.

We see that the change of behavior of N is so different at Q3 than that of G1 or G2.

Modification of G

We consider now the case where the person's ID cannot be attained, where he needs to work more hours per day in order to make enough money to survive on, or where his health is such that he needs more hours of sleep and is not able to work normally, etc. In such cases, he needs to change his ID matrix to accomplish these restrictions, while trying to keep the time spent on other activities as close to his ID matrix as possible.

We offer here a modification of G which we call Gm, where it is necessary for the person to work more hours than is possible by G.Of course the increase of time for W must be compensated for by a decrease in other measurable activities; but overall, we try to keep the other activities as close to the same time as possible. Since Gm is not the true ID matrix, we would never expect that the anxiety of the person would be less than his ID level anxiety. On the other hand, by decreasing time in the other activities such as morning, leisure time, exercise, etc., it is possible to bring it down to the ID level, but for the most part, the amount of disappointment felt would keep it at the same or at a higher level.

Construction of G1m From G1

	G1	G1m	G1m-G1
M	1	.782	-.268
W	5.02	6.4666	1.4466
EX	.4	.2	-.2
SI	6	6	0
L	1.18	.6379	-.5421
Re	.18	.148	-.032
Se	.45	.45	0
Ax	.97	1.044	.074
Ar	8.3	7.8211	-.4789
C	.5	.45	-.05

.3303	.3293
.3754	.3617
.1739	.1720
.1474	.1369

Matrices

G(.02 .003 .01 .015)   G1m(.0103 .00361 ,01036 .0258591)

.3037	.3293
.3753	.3617
.1741	.1721
.1469	.1368

Table 12

From Table 12, we see the our G1 individual has to work about 1h 30m more per work day but that can be made up by spending about 15m less time in the morning, about 30m less leisure, and 30m less study time. By doing that, his Ax time has increased by only 4.5m more per day.

GmP	37	92	192:	1.85y	4.6y	9.6y			
[P].	.3365	.2242	.2871	.1522					
Q1	.3347	.2586	.2584	.1445	[.3488	.2425	.2584	.1503]	
Q2.	.3329	.2930	.2296	.1445	[.3569	.2666	.2297	.1568]	
Q3	.3311	.3273	.2009	.1407	[.3559	.3008	.2010	.1423]	
[Gm]	.3293	.3617	.1721	.1368					

<center>Table 13</center>

From Table 13 above, we see that the E dimension leads all the others in approaching the goal as it did with G. Furthermore, the P dimension is moving in the wrong direction and continues for a long time. We started at P being at .3365, At Q2 time, it is at .3569. By the time it has gotten to Q3, it is at .3359, suggesting that it turned around toward the goal direction only a short time before. It shows how much more work had to be done, and the length of time that it had to continue before one could comfortably lighten the amount to be able to move toward the goal. Notice that Q1 takes place at 1.85y, between N at 1.25y and G, at 2.1y.

<center>Options</center>

The matrix distribution, give or take a minute, at any particular time determines how disposed a person is to change(which also depends on u). For most of us, we cannot change differently. However, at any particular time, there are a number of ways we can distribute our time and still remain within one minute of our matrix values. Options are possible because we can replace time in one measurable activity with time in another whose corresponding distributions have the highest values close to one another. For P, SI has the P value of .55 and the W value at.6: the more time we work, the less time we sleep. For I, Ar and C, at.7 and .6: the more time we talk to someone, the less time we have for studying on our own. For E, Se and Ax at .45 and ,63: the more we engage in sex, the less time we will be dealing with our fears. Finally for S, Re and L at .5 and .4:the less time we are involved with contemplating life's mysteries, the more time we will be able to relax and watch our favorite TV shows. We shall illustrate this by using two different options for a modified intellectual introvert G1m at the first quartile Q1.

In this example, we will keep conversation down to a level compatible with an introvert.

However for a particular time period, it could still be an option to converse with people, behaving more like an extrovert, if a person feels that in his situation, he can help himself or others by talking more than he would normally do.We all have such choices on a daily basis.

Comparison of G1ma and G1mb

	G1ma	G1mb	G1mb-G1ma
M	.844	.744	-.1
W	6.9007	6.6572	-.2435
Ex	.45	.4	-.05
SI	6	6.41	.41
L	1.4378	1.4003	-.0375
Re	.426	.276	-.15
Se	.45	.45	0
Ax	5.6166	5.7448	.1282
Ar	1.4249	1.6177	.1928
C	.45	.3	-.1
			GmP 37
	.3488	.3488	.3488
	.2425	.2425	.2425
	.2583	.2581	.2584
	.1504	.1506	.1503

Table 15

The most significant difference between G1ma and G1mb is in sleeping, where G1mb sleeps almost 25m more a night. To do this, he must give up 6m of M, 15m of W, and 3m of exercise.On the other hand, 6.62h of work is the same as the normal person's workday at Q1. For G1ma to work an additional 15m would seem to be excessive, but it is needed if he only sleeps 6h per night. Not only do we increase M. W, and Ex, but L increases 2.25m and Re by 9m giving up about 11.5m of Ar time. Finally, C increasing by 9m allows him to decrease Ax by 8m. We can thus consider that by sleeping 6h a night and working 15m more a day than normal, he can decrease his anxiety by 8m more a day and decide whether it is worth it or not.

We can now speculate how that additional work time could come about.. After 1.85y in AA, it might be that our person becomes a sponsor to several members who just stopped drinking a short time ago He may have requested that his sponsees call him every day , which is not an unusual request, and that, as a sponsor, he must listen to the emotional struggles of the person having to get through a day without drinking, even though that day for him, may have been filled with all kinds of troubles. Certainly, listening and advising his sponsees fall under the W activity as a necessary obligation and could easily account for the extra work as well as the extra conversation. In addition, the satisfaction of helping other sick people, even at the expense of losing some Ar time, which is his passion, could account for that 8m drop in anxiety.

Conclusion

In order to analyze where a particular individual should be at any particular time, we first used Axiom 1, which states that every person can be assigned an activity matrix which represents his desired progression through life as well as his ability to change. From Axiom 2, this matrix will drive him toward his ideal distribution as his anxiety lessens regardless of the treatment used to accomplish this. Ultimately along with his ID matrix will be a distribution of his measurable activities that will also be ideal for him, revealing his personality. However, at each marker, he has the option to decide how his measurable activities should be distributed within the confines of his matrix distribution, which may mask his ultimate preference for a particular one. Since lowering his anxiety is crucial for his well being, one would think that the option that reduces Ax the most should be the dominant one, but it is not. Rather, the option that should dominate is the one that allows the person to be treated by AA. Since following AA's suggestions is not part of his natural way of life, one would expect that this option would not minimize Ax. Furthermore, one's personality always makes it's appearance sooner or later, suggesting that some options are not realistic. Consider for example G2 who, once he had recovered enough, couldn't resist being who he was and ignoring AA treatment.

We deliberately chose an intellectual and contrasted him with a normal person to show how different they are from one other, the major mathematical difference being in the pace of the I coordinate. In fact, we first defined the matrix of the individual for u=.3 as G(.6 .1 .3 .45) and N(.3 .3 .3 .3) to make the difference more transparent, ie..1 and .3, before using u=.01 where it is harder to grasp the difference between .0033333 and .01

This difference can be used with each of the other coordinates giving us a very different contrast with the normal. Using .1 on P, we have the soldier, the farmer, the athlete. On E, we have the revolutionary, the patriot, the crusader. On S, we have the priest, the buddhist monk, the clairvoyant. For most of the population, the differences will be somewhere between the extremes.

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