A Quantum Theory of Mind
Appendix A:

by John E. Range

0	1	0	0	0

This array represents the state of a ***classical*** particle that is located in the **2nd** of **N = 5** possible locations.

Here in this empty **5** by **5** ***"square array,"*** "***matrix***" or "***operator"*** the shaded boxes represent what-are-called its "***diagonal***" elements.

0	0	0	0	0
0	1	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

This array represents the state of a ***quantum*** particle located in the second of **N = 5** possible positions. More generally the particular ***diagonal element*** (or ***number***) located in horizontal row ***n*** and vertical column ***n*** of the matrix **S** represents the *relative* probability that the quantum particle lies in possible location ***n***. Because all of the off diagonal entries of this matrix are zero, this array is also an example of a "***diagonal matrix***"

1	0	1	2	-1
2	-1	3	1	0
0	-2	0	1	1
4	0	1	2	0
1	0	0	1	-3

Here is a sample matrix (call it **matrix A**), the boxes are for simplicity filled with small integers, but they could also be filled with complex numbers.

6	-2	0	1	-1
-2	4	-2	0	2
0	-2	8	-1	1
1	0	-1	6	0
-1	2	1	0	7

Here is a another matrix (call it **matrix B**).

5	0	5	10	-5
10	-5	15	5	0
0	-10	0	5	5
20	0	5	10	0
5	0	0	5	-15

Here is **matrix A** multiplied by the scalar number **5**

7	-2	1	3	-2
0	3	1	1	2
0	-4	8	0	2
5	0	0	8	0
0	2	1	1	4

Here is the matrix representing **A+B** (**matrix A** added to **matrix B**). Note that **A+B = B + A.**

9	-6	5	12	-7
15	-16	25	5	-1
4	-6	4	6	11
26	-10	6	15	-3
10	-5	2	7	-22

Here is the matrix representing **AB** (the left multiplication of **matrix B** by **matrix A**).

5	2	1	13	-3
8	0	10	0	-6
7	-14	-7	5	5
25	2	7	13	-2
10	-4	5	8	-21

Here is the matrix representing **BA** (the left multiplication of **matrix A** by **matrix B**). Note that **AB** does not equal **BA**.

A projection operator **"P"** is an ***operator*** (or ***matrix***) that satisfies the relation **PP = P.**

1/2	-1/2	0	0	0
-1/2	1/2	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

Here is one possible projection operator.

1	0	0	0	0
0	1	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

Here is matrix **P** (another projection operator).

0	0	0	0	0
0	0	0	0	0
0	0	1	0	0
0	0	0	1	0
0	0	0	0	1

Here is matrix **1-P (** another projection operator).

Let the above mentioned **matrix B** represent the state vector **S**.

6	-2	0	0	0
-2	4	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

Here is the matrix representing **PSP**

0	0	0	0	0
0	0	0	0	0
0	0	8	-1	1
0	0	-1	6	0
0	0	1	0	7

Here is the matrix representing **(1-P)S(1-P)**