

## §2 Deductions

old to  
§1

In this section we restrict ourselves to precise, rather than approximate, observations. This has the consequence that the final observer states  $\Psi$  are orthogonal (for each  $i$ )  $(\Psi^0_{[i, \alpha_i]} \Psi^0_{[i, \beta_i]}) = 0$  for it is  $\Psi$ .

Since the measurements are perfect, the representation

$L.O. \Psi$  is canonical. The treatment we give here will, of course, approximate the case of nearly precise observation, since in the latter case nearly canonical and the system states rel to the observer states are nearly eigenstates (or conversely, in case of expansion in system eigenstates the apparatus observer states nearly orthogonal).

Block 5] At this point the English language becomes

slightly clumsy. Whereas before we had a single state for the observer, afterwards we had a number of different states, all occurring in a superposition. Each of these separate states is a state of an observer, so we can speak of the different observers described by these diff. states. On the other hand, the same physical system is involved, and the same observer is thus in different states for different elements of the superposition.

*In this actuality it is best to think of an observer tree*  
*we shall use the singular, when referring to the whole tree (system) and plural when we wish to emphasize differences in the states,*

6) we mean, of course, transfer which does not destroy (erases) the original information.

This definition corresponds to the negative of the entropy of a probability distribution as defined by Shannon [7].

The fact that the information is non-positive is no liability, since we shall primarily be interested in the differences of information when we compare two distributions. We are actually seldom interested in the absolute information of a distribution, only in differences.

add:

[1] §2 pg 5 addendum that a good discussion of information theory is to be found in Shannon [7] or Woodward [1]. Note, however, that in the theory of communication one defines information of a state  $x_i$ , which has a priori probability  ~~$P_i$~~ , to be  $\ln P_i$ . We prefer, however, to regard information as referring to the information of the distribution itself. Our information is then simply the expectation of the information contained in the states ---.

add to pg 10, ~~Th~~ ~~that~~  $P$  is an operator, in fact the operator

$$P = \sum w_m [\psi_m]$$

since, in [6.3] we have  ~~$\langle \psi_j | \phi_i \rangle = \delta_{ij}$~~

$$P = (\phi_i) \sum_m w_m [\psi_m] \phi_i = \sum_m w_m (\phi_i, [\psi_m] \phi_i)$$

$$= \sum_m w_m (\phi_i, \psi_m) \phi_i$$

$$= \sum_m w_m (\psi_m, \phi_i) (\psi_m, \phi_i)^* \text{ going}$$

✓ need footnote about invariance of  $\text{Tr}(\rho \phi)$  i.e. that under unitary transform  $f(UAU^{-1}) = Uf(A)U^{-1}$  see von Neumann pg 388