Application of the Conservation of Information

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Abstract

In this paper, we posit information as a fundamental, conserved quantity in the universe. Via the no-cloning theorem, this leads to the interesting consequence that quantum systems will always tend to decohere. It stems from a mathematical approach to consciousness taken by the present author. The theory would be falsified [1] if quantum information can be extracted without decoherence ensuing. The paper consists entirely of eight examples where we apply our yet-undisclosed full theoretical system.

Example 1: Purely quantum system.

Suppose a quantum system A yields quantum information Q qubits to a quantum computer C. Regard the system $[A + C]$ as an information-theoretically closed system. Since information is conserved, A loses Q qubits and C gains Q qubits.

Example 2: Classical-quantum interaction.

Suppose a quantum system A yields quantum information Q qubits to a quantum computer C which is used by a classical human being H. Regard the system $[A+C+H]$ as information-theoretically closed. Since information is conserved, A's loss is the gain of $[C+H]$. $[C+H]$ thus gains Q qubits. Since H is classical, those Q qubits will start to decohere from the perspective of H. Suppose they take a time t_d to lose all quantum-ness and yield F classical bits to H. From the perspective of H, t_d is a function f_H of the information gained by him/her. Thus $t_d = f_H(F)$. Since we know t_d and we know F, we can compute f_H, by looking at various (t_d, F) pairs. Once we have f_H, we represent H by it. Let us now replace H by G who is any other human. By a similar procedure we will obtain f_G. Proceeding in this way, we will obtain $f_{X_i^j}$ where $i = 1, ..., \infty$ are indices of various LCIs, or local consciousness instruments and j is an index that enumerates the various levels or states of consciousness possessed by an LCI. Note that all of these $f_{X_i^j}$ are only for the universe of the shape $[A + C + H]$. A different universe (i.e. closed system) would not necessarily have f - it might be replaced by g, say.

Example 3: Purely classical system.

Communication between f's and g's. We form a metasystem $[f + g]$. Since f and g are both classical, they can exchange classical information *ad lib* without violating the law of conservation of information.

Example 4: Convergence of f's and g's separately to a nonlocal consciousness NC.

Since NC is eternal (spatiotemporally), the spatial part meaning that it is eternal from every spatial location, f as well as g must necessarily (and separately) converge to NC as their individual spatiotemporal extent is scaled up. However, in this process, no element of the f sequence is identical with any element of the g sequence and vice versa. Suppose this did happen, then let f_l and g_m be the said elements which are identical. Form a closed system $[f_l + g_m]$. In this closed system, f_l cannot exchange any information with g_m. Suppose it gave g_m 3 classical bits. Then g_m would gain 3 bits due to which it would compute an elapsed time $t_g = g(3)$. f_l will not however lose any or gain any bits since it is classical and the bits are classical. So it would compute an elapsed time $t_f = f(0)$. No matter how many bits f_l gave to g_m, t_f will always be $f(0)$ and therefore distinct in many cases from t_g. So in a single closed system, we would then have two different proper times. Unless we think this is possible (it might be, take the twin paradox for example), this is a contradiction and therefore the assumption was invalid and f_l cannot exchange any information. So, we have a closed system in which the subsystems cannot exchange any information, even classical. Unless we allow this inability to communicate (it might be, for example in two impaired individuals), this is a contradiction and therefore the supposition was invalid and no element of the f sequence is identical with any element of the g sequence. Thus, even as they are scaled up, the consciousnesses of f and g cannot ever be identical. How then can the limit be the same for both? This is not a mathematical impossibility. For example, consider the decreasing numbers from positive infinity to zero and the increasing numbers from negative infinity to 0. Both converge to the same point, but they never have any identical numbers, one from each set, because the sets are disjoint.

Example 5: Distance between systems.

Under the assumption of a single (monism) nonlocal consciousness NC, the 'distance' between one of the f's and one of the g's, and its use in defining the distance between the corresponding, different closed systems. We can take the NC to be a separating hyperplane between the two systems containing, individually, f and g, respectively. We can define the mean f of the first set and the mean g of the second set and take the distance between the two systems as the distance between these these two means. This distance is a distance betwen "coalesced" local consciousness instruments (LCIs).

Example 6: Minimal number of LCIs.

In the space which contains the "coalesced" LCIs, there must be at least two members since a single member alone cannot be used to conceive a coalesced LCI. The coalescion is in the context of the prescence of another LCI. Thus there are always at least two LCI-trajectories towards the NC. Denote them again by f and g.

Example 7: Undefinability of phenomena.

Given that there are always at least two "humans" f and g (though our development can be repeated without specifically using the term 'human'), consider the closed system $[A + H_1 + H_2]$. This is the minimal non-trivial universe consisting of these two humans and a quantum system. There are thus always at least two *potential* or *possible* measurement results about A. This is the crux of the difficulty in potentially 'knowing' a quantum system - which would be the 'right' measurement outcome? And so, if there is no correct measurement outcome of quantum systems, there is no correct measurement outcome of anything to do with the classical senses and classical-mental apparatus of a human being. Thus the phenomenal world is undefinable because there are always at least two definitions and this is a contradiction of sorts.

Example 8: Information being everywhere.

In the quantum sense however, that is, if H_1 and H_2 are themselves treated as quantum systems, the situation might differ. For then A can lose 3 qubits, giving 1 to H_1 and 2 to H_2, without violating the conservation of information. And following this, H_1, itself a quantum system can give its A-qubit to H_2. In this free-flow sense, all humans and physical systems can freely and, in an unhindered manner, exchange information. There is no question of defining A here because definition-giving is a classical world process. Specifically, in this case H_2 can finally give all the 3 qubits back to H_1 and so establish an "equality" or "egality", which is not possible in the case that H_1 and H_2 are classical (since quantum information cannot be cloned (a classical intervention requiring process)). Thus if there are no classical systems, the no cloning theorem is irrelevant and there only exists information, that is, "information is everywhere."

References

[1] Karl Popper. *The logic of scientific discovery.* New York: Taylor & Francis, 2005.