

Appendices: citations on a theme from works of colleagues-predecessors.

The Prospect of Immortality.

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Chapter 8. The Problem of Identity. [\[1\]](#)

In considering the chances of reviving, curing, rejuvenating, and improving a frozen man, we have to envisage the possibility of some very extensive repairs and alteration. This leads to a number of very perplexing puzzles.

As an extreme case, imagine an elderly cancer victim who is not frozen until several hours after death, and then only by crude methods. Almost all the cells of his body have suffered severe damage and are thoroughly dead by present criteria, although some would grow in culture and we assume a small percentage of them have degenerated relatively little. But after enough centuries pass medical art at last is ready to deal with him, and for the sake of emphasis let us assume a grotesque mixture of techniques is used.

When our resuscitee emerges from the hospital he may be a crazy quilt of patchwork. His internal organs - heart, lungs, liver, kidneys, stomach, and all the rest - may be grafts, implanted after being grown in the laboratory from someone else's donor cells. His arms and legs may be bloodless artifacts of fabric, metal and plastic, directed by his own will and complete with sense of touch but extended and flexed by tiny motors. His brain cells may be mostly new, regenerated from the few which could be saved, and some of his memories and personality traits may have had to be imprinted on or into

the new cells by microtechniques of chemistry and physics, after being ascertained from the written records.

Striding eagerly into the new world, he feels like a new man. Is he?

Who is this resuscitee? For that matter, who am I and who are you?

Although most resuscitees will not represent such extreme cases – we hope most of us will be frozen by non-damaging methods – nevertheless we cannot sidestep the issue. We are now face to face with one of the principal unsolved problems of philosophy and/or biology, which now becomes one of prime importance in an exceedingly practical way, namely that concerning the nature of «self».

What characterizes an individual? What is the soul, or essence, or ego? This seemingly abstruse question will shortly be seen to have ramifications in almost every area of practical affairs; it will be the subject of countless newspaper editorials and Congressional investigations, and will reach the Supreme Court of the United States.

We can bring the problem into better focus by putting it in the form of two questions. First, how can we distinguish one man from another? Second, how can we distinguish life from death?

Later I shall offer some tentative partial answers. First we can illuminate the question, and perceive some of its difficulties and subtleties, by considering a series of experiments. Some of these experiments are imaginary, but perhaps not impossible in principle, while others have actually been

performed.

Experiment 1. We allow a man to grow older. Legally, he retains his identity; and also subjectively, and also in the minds of his acquaintances (usually). Yet most of the material of his body is replaced and changed; his memories change, and some are lost; his outlook and personality change.

It is even possible that an old acquaintance, seeing him again after many years, might refuse to believe he is the same person. On first considering this experiment, we are apt to feel slightly disturbed, but to retain a vague conviction that "basically" the man is unchanged. We may feel that the physical and psychological continuity has some bearing on the question.

Experiment 2. We watch a sudden, drastic change in a man's personality and physique, brought about by physical damage, or disease, or emotional shock, or some combination of these. Such has often occurred.

Afterwards, there may be little resemblance to the previous man, mentally or physically. There may be "total" amnesia, although he may recover capability of speech. Of course he retains, e.g., the same fingerprints, and the same genes. But it would be absurd to say the main part of a man is his skin; and identical twins have the same genes, yet are separate individuals.

Although the physical material of his body is the same stuff, he seems – and feels – like a different person. Now we are more seriously disturbed, because the main continuity is merely physical; there is a fairly sharp discontinuity in personality. One might say with some plausibility that a man was destroyed, and another man was created, inheriting the tissues of his predecessor's body.

Experiment 3. We observe an extreme case of «split personality».

It is commonly believed that sometimes two (or even more) disparate personalities seem to occupy the same body, sometimes one exercising control and sometimes the other. Partly separate sets of memories may be involved. The two «persons» in the same body may dislike each other; they may be able to communicate only by writing notes when dominant, for the other to read when his turn comes.

We may be inclined to dismiss this phenomenon by talking about psychosis or pathology. This tendency is reinforced by the fact that apparently one of the personalities is usually eventually submerged, or the two are integrated, leaving us with the impression that "really" there was only one person all along. Nevertheless, the personalities may for a time seem completely distinct by behavioral tests, and subjectively the difference is obviously real.

This may leave us with a disturbing impression that possibly the essence of individuality lies after all in the personality, in the pattern of the brain's activity, and in its memory.

Experiment 4. Applying biochemical or microsurgical techniques to a newly fertilized human ovum, we force it to divide and separate, thereby producing identical twins where the undisturbed cell would have developed as a single individual. (Similar experiments have been performed, with animals.)

An ordinary individual should probably be said to originate at the moment of conception. At any rate, there does not seem to be any other suitable time – certainly not the time of birth, because a Caesarean operation would have produced a living individual as well; and choice of any other stage of development of the fetus would be quite arbitrary.

Our brief, coarse, physical interference has resulted in two lives, two individuals, where before there was one. In a sense, we have created one life.

Or perhaps we have destroyed one life, and created two, since neither individual is quite the same as the original one would have been.

Although it does not by any means constitute proof, the fact that a mere, crude, mechanical or chemical manipulation can "create a soul" suggests that

such portentous terms as "soul" and "individuality" may represent nothing

more than clumsy attempts to abstract from, or even inject into, a system certain «qualities» which have only a limited relation to physical reality.

Experiment 5. By super-surgical techniques (which may not be far in the future) we lift the brains from the skulls of two men, and interchange them. This experiment might seem trivial to some. Most of us, after thinking it over, will agree it is the brain which is important, and not the arms, nor the legs, nor even the face. If Joe puts on a mask resembling Jim, he is still Joe; and even if the «mask» is of living flesh and extends to the whole body, our conclusion will probably be the same. The assemblage of Joe's brain in Jim's body will probably be identified as Joe. But at least two factors make this experiment non-trivial.

First, if the experiment were actually performed and not merely discussed, the emotional impact on the parties concerned would be powerful. The wives would be severely shaken, as would the subjects. Furthermore, Joe-in-Jim's-body would rapidly change, since personality depends heavily on environment, and the body is an important part of the brain's environment.

Also, we may be willing to admit that Joe's arms, legs, face, and intestines are not essential attributes of Joe – but what about his testicles? If Joe-in-Jim's-body lies with one of their wives, he can only beget Jim's child, since he is using Jim's gonads. The psychiatric and legal problems involved here are formidable indeed.

Some people might be tempted to give up on Joe and Jim altogether, and start afresh with Harry and Henry. In one sense, this is an impractical evasion, since the memories, family rights and property rights cannot be dismissed. From another view, it may be a sensible admission that characterization of an individual is to some extent arbitrary.

Once again, the suggestion is that physical systems (i.e., real systems) must in the end be described by physical parameters (operationally) and that attempts to pin profound or abstract labels on them, or to categorize them in subjective terms, cannot be completely successful.

Experiment 6. By super-surgical techniques (not yet available) we divide a man's brain in two, separating the left and right halves, and transplant one half into another skull (whose owner has been evicted).

Similar, but less drastic, experiments have been performed. Working with split-brain monkeys, Dr. C. B. Trevarthen has reported that «. . . the surgically separated brain halves may learn side by side at the normal rate, as if they were quite independent.» [121]. This is most intriguing, even though the brains were not split all the way down to the brain stem, and even though monkeys are not men.

There is also other evidence in the literature which we can summarize, with certain simplifications and exaggerations, as follows. Either half of a brain can take over an individual's functions independently. Normally, one half dominates, and loss of the other half is not too serious. But even if the dominant half is removed, or killed, the other half will take over, learning the needed skills.

There is presently no conclusive evidence that so drastic an experiment as ours would necessarily succeed; but in principle, as far as I know, it might, and we are not at the moment concerned with technical difficulties.

If it did succeed, we would have created a new individual. If the left half was dominant, we might label the original individual LR; the same skull containing the left half alone after surgery we might call L, and the right half alone, in a different skull after the operation, is R. L thinks of himself as being the same as LR. R may also think of himself as LR, recuperated after a sickness, but to the outside world he may seem to be a new and different, although similar, person.

In any case, R is now an individual in his own right, and regards his life to be as precious as anyone else's. He will cling to life with the usual tenacity, and if he sees death approaching will probably not be consoled by the knowledge that L lives on.

Even more interesting is the attitude of L, the formerly dominant half, now alone in the skull. Suppose that, before the operation, we had told LR that the dominant half of his brain was diseased, and would have to be removed, but that the other half would take over, albeit with some personality changes and possibly some loss of memory. He would be worried and disturbed, certainly -- but he would probably not regard this as a death sentence. In other words, LR would be consoled well enough by the assurance that R would live on. Yet after the splitting, and transplanting operation, L would regard his own destruction as death, and it would not satisfy him that R lived on, in another body.

This experiment seems to suggest again that, psychologically if not logically, the physical continuity is an important consideration.

Experiment 7. A man is resuscitated after a short period of clinical death, with some loss of memory and some change in personality.

This experiment has actually been performed many times [97]. Death was real by the usual clinical tests (no respiration, no heartbeat) but of course most of the cells remained alive, and most people would say that he had not «really» died, and that he was certainly the same person afterward. This experiment is important only as background for the following ones.

Experiment 8. A man dies, and lies unattended for a couple of days, passing through biological death and cellular death. But now a marvel occurs; a space ship arrives from a planet of the star Arcturus, carrying a supersurgeon of an elder race, who applies his arts and cures the man of death and decay, as well as his lesser ailments.

(It is not, of course, suggested that any such elder race exists; the experiment is purely hypothetical, but as far as we know today it is not impossible in principle.)

The implications are apt to shake us. If decay is to be regarded as just another disease, with a possibility of cure, then when may the body be considered truly dead? If "truly" dead be taken to mean «permanently» dead, then we may never know when we are in the presence of death, since the criterion is not what has already happened to the man, but what is going to happen to him in the (endless?) future.

Experiment 9. A man dies, and decays, and his components are scattered. But after a long time a super-being somehow collects his atoms and reassembles them, and the man is recreated.

Once more, the difficulty or even impossibility of the experiment is not important. We also disregard the question of the possibility of identifying individual elementary particles. Is it the "same" man, in spite of the sharp physical discontinuity in time? If memory, personality, and physical substance are all the same, perhaps most of us would think so, even though we are disturbed by the black gulf of death intervening. But if we so admit, we must open the door even wider.

Experiment 10. We repeat the previous experiment, but with a less faithful reproduction, involving perhaps only some of the original atoms and only a moderately good copy. Is it still the same man?

Again, perhaps, we wonder if there is really any such thing as an individual in any clear-cut and fundamental sense.

Experiment 11. We repeat experiment 10, making a moderately good reconstruction of a man, but this time without trying to use salvaged material.

Now, according to the generally accepted interpretation of quantum theory, there is in principle as well as in practice no way to «tag» individual particles, e.g. the atoms or molecules of a man's brain; equivalent particles are completely indistinguishable, and in general it does not even make sense to ask whether the atoms of the reconstructed body are the «same» atoms that were in the original body. Those unfamiliar with the theory, who find this notion hard to stomach, may consult any of the standard texts.

If we accept this view, then a test of individuality becomes still more difficult, because the criteria of identity of material substance and continuity of material substance become difficult or impossible to apply.

Experiment 12. We discover how to grow or to construct functional replicas of the parts of the brain - possibly biological in nature, possibly mechanical, but at any rate distinguishable from natural units by special tests, although not distinguishable in function. The units might be cells, or they might be larger or smaller components. Now we operate on our subject from time to time, in each operation substituting some artificial brain parts for the natural ones. The subject

notices no change in himself, yet when the experiment is finally over, we have in effect a «robot»!

Does the "robot" have the same identity as the original man?

Experiment 13. We perform the same experiment as 12, but more quickly.

In a single, long operation, we keep replacing natural brain components with artificial ones (and the rest of the body likewise) until all the original bodily material is in the garbage disposal, and a "robot" lies on the operating table, an artificial man whose memories and personality closely duplicate those of

the original.

Perhaps some would feel the «robot» was indeed the man, basing the identity in the continuity, on the fact that there was never a sharp dividing line in time where one could say man ended and robot began. Others, well steeped in democracy and willing to apply political principles to biology, might think the robot was not the man, and ceased to be the man when half the material was artificial.

The subject himself, before the operation, would probably regard it as a death sentence. And yet this seems odd, since there is so little real difference between experiments 13 and 12; 13 merely speeds things up. Perhaps sufficient persuasion could convince the subject that the operation did not represent death; he might even be made to prefer a single operation to the nuisance of a series of operations.

Experiment 14. We assume, as in the previous two experiments, that we can make synthetic body and brain components. We also assume that somehow we can make sufficiently accurate nondestructive analyses of individuals.

We proceed to analyze a subject, and then build a replica or twin of him, complete with memories.

Does the identity of our subject now belong equally to the «robot» twin? It might seem absurd to say so, but compare the previous experiment. There is scarcely any difference, especially since in experiment 13 the subject was under anesthesia during the operation; experiment 13 was virtually equivalent to destroying the subject, then building a robot twin. The only real difference between experiments 13 and 14 is that in experiment 14 both the original and the duplicate survive.

Experiments 15, 16, and 17. We repeat experiments 12, 13, and 14 respectively, but instead of using artificial parts we use ordinary biological material, perhaps obtained by culturing the subject's own cells and conditioning the resultant units appropriately. Does this make any difference?

In logic, one would think perhaps not, but blood is thicker than water. Some people might make a different decision on 15 and 16 than on 12 and 13.

Experiment 18. We assume the truth of an assertion sometimes heard, viz., that in certain types of surgery a patient under certain types of anesthesia suffers pain, although he does not awaken and afterwards does not remember the pain. The experiment consists in performing such an operation.

Most of us do not fear such operations, because we remember no pain in previous experiences, and because authoritative persons assure us we need not worry. Even a warning that the pain under anesthesia is real is unlikely to disturb us much, if we are not of very nervous temperament. Still less do we fear ordinary deep anesthesia, in which there seems to be no pain on any level, even though for the conscious mind this gulf is like that of death. Yet a child, or a person of morbid imagination, might be intensely frightened by these prospects.

Thus again we note a possible discrepancy between the logical and the psychological.

Experiment 19. A Moslem warrior is persuaded to give his life joyfully in a «holy war», convinced that the moment his throat is cut he will awaken in Paradise to be entertained by houris.

We draw the obvious but useful conclusion that, from the standpoint of present serenity, it is merely the prospect of immortality that is important.

Experiment 20. We pull out all the stops, and assume we can make a synthetic chemical electronic mechanical brain which can, among other things, duplicate all the functions of a particular human brain, and possesses the same personality and memory as the human brain. We also assume that there is complete but controlled interconnection between the human brain and the machine brain: that is, we can, at will, remove any segments or functions of the human brain from the joint circuit and replace them by machine components, or vice versa.

In a schematic sense, then, we envisage each of the two brains, the biological one and the mechanical one, as an electronic circuit spread out on a huge "bread board" with complete accessibility. From the two sets of components, by plugging in suitable leads, we can patch

together a single functioning unit, the bypassed elements simply lying dormant.

To make the picture simpler and more dramatic, let us also assume the connections require only something like radio communication, and not a physically cumbersome coupling.

We might begin the experiment with the man fully conscious and independent, and the machine brain disconnected and fully dormant. But now we gradually begin disconnecting nerve cells or larger units in the man's brain, simultaneously switching in the corresponding units of the machine. The subject notices no change – yet when the process is completed, we "really" have a machine brain controlling a «zombie» human body!

The machine also has its own sensory organs and effectors. If we now cut off the man's sensory nerves and motor leads and simultaneously activate those of the machine, the first subjective change will occur, namely, an eerie transportation of the senses from one body to another, from the man's to the

machine's. This might be enjoyable: perhaps the machine's sense organs are more versatile than the man's, with vision in the infra-red and other improvements, and the common personality might feel wonderful and even prefer to «live» in the machine.

At this stage, remember, the man is entirely dormant, brain and body, and the outside observer may be inclined to think he is looking at an unconscious man and a conscious machine, the machine suffering from the curious delusion that it is a man controlling a machine.

Next, we reactivate the components of the man's brain, either gradually or suddenly, simultaneously cutting off those of the machine, but leaving the machine's sensors plugged in and the sensors of the human body disconnected. The subject notices no change, but we now have a human brain using mechanical senses, by remote control. (We disregard such details as the ability of the human optical center to cope with infra-red vision, and the duplication of the new memories.)

Finally, we switch the human effectors and sensors back in, leaving the man once more in his

natural state and the machine quiescent.

If we perform this sort of exchange many times, the subject may become accustomed to it, and may even prefer to «inhabit» the machine. He may even view with equanimity the prospect of remaining permanently «in» the machine and having his original body destroyed. This may not prove anything, but it suggests once more that individuality is an illusion.

Discussion and Conclusion. In discussing these hypothetical experiments we have touched on various possible criteria of individuality – identity of material substance, continuity of material substance, identity of personality and memory, continuity of personality and memory – and seen that none of these is wholly satisfactory. At any rate, none of these, nor any combination, is both necessary and sufficient to prove identity.

One cannot absolutely rule out the possibility that we have missed the nub of the matter, which may lie in some so far intangible essence or soul.

However, such a notion seems inconsistent with the ease with which man can instigate, modify, and perhaps actually create life, and with several of our experiments.

The simplest conclusion is that there is really no such thing as individuality in any profound sense. The difficulty arises from our efforts first to abstract generalities from the physical world, and then to regard the abstractions, rather than the world, as the basic reality. A rough analogy will help drive home the point:

The classification «man» is useful, but not sharply definable. Is a freak a man? Is an aborted fetus a man? Is a pre-Neanderthal or other «missing link» a man? Is a corpse a man if some of the cells are still alive? And so on. A label is handy, but objects may be tagged arbitrarily. In the physical world there is no definite collection of objects which can be called «men», but only shifting assemblages of atoms organized in various ways, some of which we may choose to lump together for convenience. Let us then cut the Gordian knot by recognizing that identity, like morality, is man-made and relative, rather than natural and absolute. Identity, like beauty, is partly in the eye of the beholder. It is only partly existent, and partly invented. Instead of having identity, we have degrees of identity, measured by some criteria suitable to the purpose.

The result is wonderful: we have lost our souls, but gained heaven, in a certain sense. Perhaps few of us, even if intellectually convinced that identity is an illusion and death therefore unimportant, may be able to translate this into emotional acceptance, or will want to. But we can now persuade ourselves that death need never be regarded as absolutely final – since it is always possible, at some distance in space, time, and matter, for reasonably close duplication or resuscitation to occur – that is, for physical

reincarnation, with memory or without. This possibility can dull the edge of desperation for those unable to obtain first-class freezer accommodations for themselves or their families.

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