Article

Where in This World is the Human Soul?[1]

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Abstract | Where is the soul in this world? I could go to the Sages for an answer from my religious tradition, but for a person like me — a scientist for fifty years and at seventy three already in Biblical terms 13 years an elder — it is easier instead to let the Sages come to me; that is, to turn to the *Siddur,* the Jewish book of daily prayers, codified in Hebrew for the most part a few hundred years ago but including some passages from the Hebrew bible's Torah, Prophets and Writings that are millennia old.

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> ...
> All I have is a voice
> To undo the folded lie,
> The romantic lie in the brain
> Of the sensual man-in-the-street
> And the lie of Authority
> Whose buildings grope the sky:
> There is no such thing as the State
> And no one exists alone;
> Hunger allows no choice
> To the citizen or the police;
> We must love one another or die.
> ....
> W. H. Auden, *September 1, 1939 [Auden, 1940, 98]*

I am a scientist who wishes to address a purely religious subject. This is a slightly stressful situation, but one familiar to many Jews. My teacher Rabbi Adin Steinsaltz put it this way:

> In our time most Jews live an amphibian kind of existence, like frogs. The same people live consciously in two different realms, or worlds, that of the Western world, and that of Torah.…The problem is the reality of being a member of two contradictory cultures having contradictory claims and assumptions. The real problem is not a function of the truth of these claims, but rather the fact that people accept both of them. Frogs do very well with their amphibian life. But human beings are much less adapted to living in two worlds and belonging to both of them simultaneously. (Steinsaltz, 1995, 156)

Where is the soul in this world? I could go to the Sages for an answer from my religious tradition, but for a person like me — a scientist for fifty years and at seventy three already in Biblical terms 13 years an elder — it is easier instead to let the Sages come to me; that is, to turn to the *Siddur,* the Jewish book of daily prayers, codified in Hebrew for the most part a few hundred years ago but including some passages from the Hebrew bible's Torah, Prophets and Writings that are millennia old.

The *Siddur* opens with a set of blessings of Talmud-

[1] *This paper draws upon my book The Faith of Biology and the Biology of Faith: Order, Meaning, and Free Will in Modern Science, New York: Columbia University Press (2000), but it is novel in its arguments and conclusions. I have presented earlier versions of these arguments most recently to the Columbia University Seminar on Knowledge, Technology and Social Systems and the Columbia University Seminar on Religion, October 9, 2013, and to Union Theological Seminary in July 2013.*

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ic origin, meant to be said every morning as soon as one is awake, before the beginning of more formal and communal prayer. In the formative ancestral Vilna Siddur of 1615, these two blessings follow each other without interruption. Together they give us as good a Jewish notion of the soul as we need:

> "Blessed are you, LORD our God, King of the universe,
> who formed man in wisdom,
> and created in him many orifices and cavities.
> It is revealed and known before the throne of Your glory
> That were one of them to be ruptured or blocked,
> It would be impossible to survive
> And stand before you.
> Blessed are You, LORD,
> Healer of all flesh who does wondrous deeds."
> [Sacks, 2009, 4]
> …
> "My God,
> the soul you placed within me is pure.
> You created it, You formed it, You breathed it into me,
> And you guard it while it is within me.
> One day You will take it from me,
> And restore it to me in the time to come.
> As long as the soul is within me,
> LORD my God and God of my ancestors,
> Master of all works, God of all souls.
> Blessed are you, LORD,
> Who restores souls to lifeless bodies."
> [Sacks, 2009, 6]

It seems to me both modest and perfectly reasonable to begin each day with thanks for body, life and soul. But a closer look at the two blessings shows that the soul is not mentioned at all in the first blessing, which is so clear and specific about the body's anatomical vulnerability. This invites an interpretation of both blessings that makes the "soul" of the second blessing into something altogether non-anatomical, and therefore wholly mysterious because as Polkinghorne puts it, "whatever the human soul may be, it is surely what expresses and carries the continuity of living personhood" (Polkinghorne, 2002, 14). Is there nevertheless something to say about the soul in this world without making eschatological guesses about the next world? I think so.

Olam Haba, The World to come, in which the soul once again somehow rejoins some form of the body, must certainly be a World as free of any dependence on a vulnerable wet chemical like DNA, as it is free of death. But then what can one mean to say "You preserve it within me?" Is there a way in which to understand the soul's presence here and now, in this corporeal, mortal world? How can the soul of a living person, the soul I mean when I say these two blessings together, be localized?

2013 marked the 60th anniversary of the discovery of the structure of DNA, the genetic material (Watson and Crick, 1953, 737). There is something wonderfully mysterious about all DNA, but especially the DNA that sits inside the sperm and egg cells in each of our bodies. It may live on after we die. We must die, but in our children, a version of that DNA will live on. What is so for each of us, is so for our species, all seven billion humans alive on this planet today. Our species will live only so long as the DNA in some of the egg and sperm cells of some of us combine to make the next generation of people. Beyond that promise, nature offers us no further hope of life, beyond the mortal span each of us has.

What is so for our species, is also so for all other tens of millions of different species alive on the planet today. In each case individuals within a species must die, but the DNA that begins a new individual by the combination of egg with pollen or sperm, will live on. The DNA that succeeds in traveling from the egg and sperm of one generation to the egg and sperm of the next is called the germ line of the species.

So if one wanted to seek souls in physical materials, then the germ line of our species — all the particular versions of DNA containing the instructions for the initial forms and behaviors of each of us and each of our children — would certainly be an interesting starting place. Not surprising that some people treat human DNA this way. But there is a problem from nature that resists this notion of human DNA being somehow privileged and special; it is the problem of the origin of all these tens of millions of species' germlines.

Darwin's explanation of evolution by natural selection

answers the question of how we emerged in and from nature. It begins with the observation from nature that germ lines do not live forever. Unexpectedly, species are as mortal as the individuals that make them up. Both fossils and DNA analyses confirm that the germ lines of today's species come from the germ lines of previous, ancestral species, now dead. More, they also agree that any ancestral species emerged from accumulated changes in the DNA of the germ line of even older ancestral species.

The process is called biological speciation — Darwin (1859) presented his ideas about speciation in the book whose long title begins "*On The Origin of Species by Means of Natural Selection*" — and he said it works in the following way. When inherited changes — we now know that these must be changes in germline DNA — leave some members of a species able to produce fertile offspring amongst themselves, but unable to produce fertile offspring with other members of the same species, then the germ-line DNAs of the smaller and larger subpopulations will begin to diverge from each other by random mutation. Once that happens, each subpopulation's germ-line is free to follow its own future of subsequent natural selection, and so we may say each has become the germline of a new species.

The subsequent survival, change, or death of one new species' germ-line need have no further effect for better or worse, on the survival, change, or death of the other new species. Because of their common ancestry, the DNAs of the germ-lines of any two living species will share some stretches of DNA that were present in their last common ancestor species. The planet today is covered by individuals of species that may look as different as a person and a rose, yet the DNA of the germ line of a person and the germ line of a rose have an amazing amount of sequence similarity due to their ancient common ancestry.

Thus of all parts of the natural world, DNA itself, though invisible, is unsurpassed in its capacity for expressing novelty over time. Common ancestry means that DNA itself, the molecule, has persisted since the beginning of life some four billion years ago. The sprouting of new germ-lines from old from then until now, means that at the deepest chemical level of analysis, all life from its beginnings until now, has been DNA's way of making more DNA.

So then the question becomes: does the capacity of DNA to express novelty through natural selection extend to encoding our souls, or is DNA perhaps nothing more than the Golden Calf of the day, an object worshipped precisely by those too impatient to consider their souls? My answer has only a little to do with today's DNA, and a lot to do with the ancient history of love.

Consider the germ-line DNA of our species and its most immediate ancestors. The first hallmarks of a future that would include us, were in ancestral mammals that lived at least two hundred million years ago. From that stock, mammals diversified — sometimes slowly, sometimes quickly, especially after the cataclysmic death of the dinosaurs sixty-five million years ago — into a set of about four thousand living species, different enough from each other to be placed in no fewer than fifteen different orders, including our own, the primates.

The traits all primate species share define what we can be sure were traits of the first ancestral primate species. Do these traits include a soul? Here the beginning of an answer, from the distinguished evolutionary biologist Monroe Strickberger:
Primates, the mammalian order that includes humans, are species that have a number of adaptations indicating an arboreal (tree-living) ancestry. …These adaptations include:

> • Ability to move the four limbs in various directions.
> • Grasping power of hands and feet.
> • Slip-resistant cutaneous ridges in the ventral pads of these extremities [fingerprints].
> • Retention of the collar bone to support the pectoral girdle in positioning the forelimb.
> • Flexibility of the spine to allow twisting and turning. [Strickberger, 2005, 463]

This is the first, oldest, DNA-based primate context for our own species. A tree-living ancestral primate's DNA survives in our germ line through these traits, which we share with all the other primate species that shared this ancestor: gibbons, orangutans, gorillas, and chimps. There is not much in this common ancestry so far, on which to hang an ancestral origin of the Soul.

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Anatomically modern *Homo sapiens* first appeared in eastern Africa about a hundred thousand years ago and began migrating soon thereafter. Europe, Asia, and Africa saw many millennia of joint habitation by archaic and modern humans, but the Neanderthal people of Europe died off about forty thousand years ago, and we have been the lone Homo species ever since. Alone, but not rootless. Each of us carries within, a deep history of specifically hominoid behaviors as well. Strickberger continues:

> In addition to having their highly developed brain, anthropoid primates (monkeys, apes and humans) also undergo a relatively long postnatal growth period accompanied by considerable parental care for a relatively small number of offspring. The selective value of this trait probably arises from the limited number of offspring that can be successfully born and carried by highly mobile primates, *along with the long-dependent learning period* [my emphasis] needed to cope with many environmental and social variables.

This is more useful to the argument that our Souls may be part of our biology. The more recent ancestral germ line of last ancestor common to chimps, gorillas and humans disappeared only tens of millions of years ago. Since these three species are alive today and share a strategy of intensive nurturing of a small number of children, we may safely conclude that this trait in each of the three species, including our own, is the result of a very large set of DNA stretches within each species' germ line that have persisted from this ancestral anthropoid germ line. Put simply, our ancestral anthropoid DNA has given us our capacity for love.

This ancestral nurturing behavior, so critical for the strategy of survival used by all hominoid primates from then to now, is also prerequisite to our specifically human capacity for religious expression of that love. Our germ-line builds individuals capable of family, love, speech, language, abstraction, revelation, ritual and only then, finally, the specific expression of those capacities in a religion.

These and all other capabilities for expression of a religious life are all built upon this humbler but central, ancestral germ-line obligation that each generation must teach the next, for the species itself to survive. In this sense, the soul — wherever it may be localized — must be dependent for its existence in part on our DNA-based capacity for teaching and learning; that is, for love and for hope.

Scientists sometimes speak of inherited diseases as "experiments of nature." Not a nice thought, but an accurate one. We can ask nature to help us take the next step in localizing the soul, carrying out our own "thought experiment," of a sort. Consider five different kinds of person. In all five cases we will stipulate that the DNA of the person is an equally valid example of the human germ-line.

First, the person who is healthy enough to say the two blessings I presented earlier (whether or not they choose to do so). The brain is OK, the mind is OK, and the body is OK.

Second, the person who is in a late stage of ALS, Lou Gehrig's Disease. Portions of the brain have ceased to function properly and as a result there is no communication of brain with body. The mind, though, remains undiminished in its capacity for thought, though totally hampered in all its attempts to communicate through the body.

Recent work has given such minds a way to communicate, by presenting patients — whose eyes may be kept open without discomfort — with a real-time video representation of their own electro-encephalogram waves. In this situation, some ALS patients learn to modulate their EEG patterns, using a disembodied feedback loop that goes from screen to eye to brain to EEG machine to screen. In time they learn how to think in such a way as to make the waves rise above a line, or fall below it. And that control over a simple digital code of up-or-down is sufficient to enable them, slowly but surely, to remain in communication with any of the rest of us.

So we have to say that in such a case, the brain is partially there, the mind is OK, but the body is gone.

Third, the person who is in a late stage of Alzheimer's Disease. Other portions of the brain have ceased to function properly, and as a result there is no memory, no recognition, no communication. My father lived in this state for years. First, I did not recognize him in a "home" when he still knew me, which was bad enough; but then he did not know me when I did

know him, and that was much worse. Today there are no tools to penetrate this loss of mind. We have to say that in such a case, the brain is partially gone, the body is OK, but the mind is gone.

Fourth, the newborn infant who emerges breathing, but with such severe brain damage that there is no cortical function, that is, no chance for thought or action later in life. Jewish law is quite clear that a person who is breathing on his or her own is alive. In this case we can be sure that though the body is there — as it is in Alzheimer's Disease — there is neither mind, nor much brain either.

Fifth, the person who has just suffered a massive cerebral stroke, or a severe accident to the head. Lacking signals from the brain to the diaphragm such a person would be dead, but because of the technology of artificial-breathing, he or she may be maintained for some time in a state which can only be described as well as one in which the body is OK, but both the mind and the brain are gone.

Now the thought-experiment: is there a part of the anatomy of these or any other DNA-based person in which the soul of a living person may be said to reside, based on these five situations? Not really.

In the first case, of a healthy person, it could be in the brain, the body or the mind, or in all three. In the second case, of ALS, it could be in the mind, or in the remaining functional brain, or both. In the third case, of Alzheimer's Disease, it could be in the body or the remaining functional brain, or both.

In the fourth case, of the newborn baby who lacks a cortical brain, the soul can be only in the body. In the fifth case, of the person with a flat EEG maintained on an artificial breathing machine, though the machine is on, only the body is functional. The soul is in question in the fifth case, with some Rabbinic authorities agreeing that it has already been taken, and others seeing no difference between the fourth and fifth examples.

Adding up these five cases, there is no single place left for the soul to reside. A slightly modified conclusion would be, that there is no anatomical localization of a person's soul within that person that meets the test of all five of these cases. But consider what we find when we go back to the lessons of evolution, and look again. In our species a rich interaction with a loving adult is as important to an infant as food or water. This need is very old, much older than the hominoid ancestors of our species, older even than the ancestor of the mammals, as many hundreds of millions of years old as the time when the last common ancestor of mammals and birds walked the earth. As Ursula Goodenough puts it:

> We nurture our children selflessly. But we also recognize them as our most tangible sources of renewal — for a child, the world is always new. … The instinct to engage a mate to help with child-rearing is accompanied by the instinct in children (and in all young mammals and birds) to form strong relationships with their all-important parents.… [I]t seems probable that our affection for our parents flows through emotional networks that establish parent-offspring bonds in other mammals. (Goodenough, 2000, 134)
>
> …
>
> Our sorrow at the death of others is a universal human emotion that transcends cultures. Indeed ape mothers have been observed carrying their dead babies around for several days, suggesting that this form of grieving far antedates our humanness. (Goodenough, 2000, 150)

This is to say that the germ line of our species carries, and gives to each of us, an inherited, wholly naturalistic, DNA-encoded set of behaviors that include an absolute dependence on other members of our species for emotional and physical support at the beginning and end of life. That dependence must persist as well throughout one's life, and therefore we are a species of intrinsically loving, and beloved, individuals.

Let us suppose that every one of us does have a soul, and that while we are alive it has a natural location somewhere in this mortal world. We've already established that the soul of any of us is hard to find in any part of our DNA- encoded, experience-modulated minds, bodies or brains. If we simply connect these ideas an unexpected answer emerges, one based on the history of our species. The location of the soul of any one of us need not necessarily be entirely in our minds or bodies or brains. Instead, it could be — in part, or altogether — in the minds, bodies and brains of

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each of the people whom we have nurtured, and the minds, bodies and brains of those who have nurtured and loved us.

The argument here is not about Heaven. Those two morning prayers are recited by and to those of us alive today, and the souls "within" us now. And I am arguing, simply, that these souls within us need not be individually ours alone. I hold in me a set of emotional and narrative memories of a number of people. Some people have impressed themselves deeply on me, and I know I will never forget them. Others once made me laugh or cry, but I can hardly remember why. Above and beyond any other people, my wife, my daughter and her family live inside of me with sharpness and intensity unrivalled by the memories of anyone else.

From what I have said about our natural origins, it should be clear that the special intensity of these memories is not an accident, but rather that it is the predictable outcome of a strategy for the survival of our species, that has worked for it and for its ancestors as well, for millions of years. All that I am saying that might be new, is that this special set of memories and feelings I hold for these people represents an aspect — maybe no more than a reflection, but maybe no less than a portion of the entirety — of each of their souls.

Now let me make that symmetric. I will assume — it is no great immodesty — that a sense and a memory of me is as strong in each of them. In that sense they hold an aspect, or a portion, of my soul. And in each case, with full symmetry, it is that portion or aspect of our souls that can, without mystery or miracle, and while restricted entirely to this mortal world, survive death.

In terms of the five persons we've already discussed, this notion clears away all awkward anatomical paradoxes, and restates the problem in a simple and telling way. Each of these people has a soul, but we cannot tell much about that soul until we know more about the people closest to each of them. If they are loved and cared for, then of course their soul is well no matter how ragged their mind, or brain, or body. And if they are abandoned, mocked, written off as if already dead, then their soul must be in the Other World already, even though their body, or their brain, or their mind may still be present.

At one level this begs an important question: localization itself is a dead end. If our soul is distributed among other people, then where is it in them? The notion of a distributed soul restates the question so as to avoid localization in any one part of even any one person, and to substitute for that expectation, it offers a fuller recognition of the essentially distributed nature of one's humanity.

For persons lucky enough to share the fate of my first example, the symmetry of relationships assures that the distributed soul is not only in others, but in oneself. But surely for the infant born without a cerebral cortex, the soul has little apparent place to be, except in those who love it. In terms of eschatology, *Olam Haba* is then the time out of time and the place that is no place we can experience in this world, that will return to us both our embodied individualities, and our collective relationships.

What about the souls of those people who are the victims of false memories or bad experiences? These must suffer, but by this argument their souls may be rescued by kindly and loving people, even despite their victimhood. Nor is the distributed nature of necessary love restricted to any other aspect of DNA-based behavioral biology, except the impulses to love and to care. Parents should love and care for their children, and children for their parents, but the soul of a child neglected by living parents is far more at risk than the soul of an orphan adopted by loving strangers. Similarly, to be known by others as a cynic or to think of others with a cynical regard for self- advantage, are strategies that must risk one's distributed soul.

Without the capacity to both give and take love, no aspect of your soul can find a proper home in someone else. I have promised to avoid the World to Come in this paper, but I can turn to King Solomon for a brief elaboration of the eschatological implications of the idea of a distributed Soul:

> "For love is fierce as death,
> Passion as mighty as Sheol; It's darts are darts of fire,
> A blazing flame.
> Vast floods cannot quench love, Nor rivers drown it. …"
> (JPS Tanach 1999, 1743)

I am a scientist; no poet, and surely no King. This is how I now understand these lines from *Song of Songs:* When the fact of love is elevated to the status of a religious obligation, it becomes a statement about the World to Come. Even then, it need not, nor should not, lose any of its biological, evolutionary, DNA-based specificity.

Without the capacity to give love, you cannot leave with anyone the best aspect of your own soul and so it is likely to wither within you; and without the capacity to receive love, you cannot properly remember anyone else's soul either, and so you deprive them of some hope for the future, as well.

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