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THE MORAL-PRINCIPLE OBJECTION TO HUMAN EMBRYONIC STEM CELL RESEARCH

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Abstract: Opponents of human embryonic stem cell (hESC) research claim that such research is incompatible with the moral principle that it is always wrong intentionally to end a human life. In this essay, I discuss how that principle might be revised so that it is subject to as few difficulties as possible. I then argue that even the most defensible version of the principle is compatible with the moral permissibility of hESC research.

Keywords: abortion, future-of-value objection, embryo, human embryonic stem cell research, moral-principle argument, moral status, twinning, zygote.

The Value of Human Embryonic Stem Cell Research

Human embryonic stem cell (hESC) research promises greatly to improve the lives of many people with serious diseases. The hESCs used in research are obtained from human embryos. In this essay the term "embryo" will refer to the precursor of an adult human being from the time of fertilization to the time of implantation. (Embryologists would define "embryo" more broadly [Smith and Brogaard 2003, 56].) The stem cells obtained from embryos are useful in medical research because they are undifferentiated or "pluripotent." That means that they are not specialized cells but are capable, in an appropriate environment, of differentiating into any specialized human cell, such as a skin cell, or a neuron, or a heart muscle cell.

In suitable in vitro environments hESCs multiply. In some environments they multiply and remain stem cells. In other environments they can be encouraged to develop into specialized cells found in the human body. The specialized cells could be used to create functional human tissue of various kinds. Some scientists hope that in the future even functional human organs can be grown in the laboratory from stem cells. Such tissues and such organs could be used to replace tissues or organs destroyed by disease or trauma.

Such medical advances seem to be the best hope, at least in the long run, for people afflicted with pathologies that now resist cure or effective

treatment. If a patient's clinical symptoms are due to the destruction or irreversible loss of function of certain cells, or certain tissues, or certain organs in her body, then sometimes medicine now can offer treatments partially to compensate for the absence of those cells. However, treating a patient by replacing the destroyed tissue with normally functioning tissue could be far more efficacious. For example, treating a patient who suffers from type I diabetes by replacing his destroyed insulin-producing cells with normal insulin-producing cells could be better than the blood-sugar monitoring and the insulin injections that are essential parts of the lives of diabetics. Treating patients whose clinical symptoms are due to destruction of some parts of their nervous systems with neurons produced by stem cells may restore function. Perhaps liver cells produced from stem cells can be injected into patients with severely diseased livers so that satisfactory liver function can be restored. Because there are good reasons for trying to cure diseases and because hESC research promises markedly better treatments of disease than are currently available, the case for pursuing hESC research seems overwhelming.

It is worth noting, however, that a hopeful line of research is one thing and a cure for a disease is another. Prospective treatments that seem promising fail in clinical trials more often than not. This is plainly not an argument against pursuing hESC research. It is merely a caution against overstating the argument for it.

The Moral-Principle Objection

The case for pursuing hESC research is, according to some, subject to an overwhelming difficulty. In the past, hESCs have been obtained by destroying human embryos. Opponents of hESC research argue that because intentionally to end an innocent human life is wrong and because intentionally to destroy a human embryo is intentionally to end an innocent human life, intentionally to destroy a human embryo is wrong. Because obtaining hESCs involves intentionally destroying a human embryo, obtaining hESCs for medical research is wrong. The view that it is wrong to end a human life in order to pursue the ends of medical research, no matter how valuable that research, is a moral principle taken for granted in medical research ethics. I shall call this, or variants of this, "the moral-principle objection" to hESC research.

As this is being written, there is some reason to think that hESCs can be obtained without destroying the embryo that is their source (*New York Times* 2006). Some of those who defend the moral-principle objection argue that, even if this is so, the hESC itself is a human life and should not be destroyed. Accordingly, this new development does not, at least without further analysis, show that the moral-principle objection is without force.

Defense of hESC research involves showing that the most defensible variant of this moral-principle objection is flawed. Defenders of hESC research often reject the moral-principle objection on the ground that it reflects merely a religious concern. They go on to argue that because of considerations having to do with the separation of church and state, or because of the epistemic problems with religious claims, such concerns should not interfere with scientific progress or with public policy. This won't do. The claim that it is wrong to take an innocent human life is not a merely religious doctrine. Those who are religious and those decent people who are not agree that some variant of this moral principle is true. Sometimes the moral-principle objection is rejected on the ground that we don't know when life begins and that therefore to hold that life begins so soon after conception is mere dogma. However, hESCs would be useless to researchers unless they were human and unless they were alive. They could not multiply unless they were alive. We know that life has begun by the time of fertilization.

Some will not find this argument convincing. Stem cell lines can be obtained from frozen embryos. Because a frozen embryo does not exhibit signs of life, some will claim that it is hard to believe it is alive. To this skeptical thought there is a response. Even though frozen embryos do not exhibit signs of life, they did exhibit signs of life before they were frozen. Because "death" is defined in terms of the *irreversible* loss of function, one cannot classify frozen embryos as already dead because they have lost life functions. The useful cells in them, under the proper conditions, will again manifest life functions, otherwise they would not be valuable for stem cell research. It follows that frozen embryos are alive. Since the embryos in which we are interested are plainly members of our species, they must be classified as human.

A different reason for thinking that this moral-principle objection will not do as it stands is more plausible. Human cancer cells can be obtained from humans and can be grown in vitro. Because such cells are obtained from humans, they are human. Because they are cancer cells, they will grow vigorously in the right medium. Because they grow, they are alive. Nevertheless, one surely has not *wronged* a human cancer cell culture if one kills all of the cells in the culture. It follows that the premise in the moral-principle objection that says that intentionally ending an innocent human life is always wrong is false. Accordingly, the moral principle objection fails, or so the argument goes.

This is too quick. When we claim that a human life should not be sacrificed for medical research, there surely is something that we have in mind which is true. This suggests that some variant of the moral-principle objection is correct. For all we know so far in the analysis, that reformulated objection is incompatible with the moral permissibility of hESC research. So how can one adjust the moral-principle objection so that it may come closer to capturing what seems correct about it?

A human cancer cell culture is the life of a living human thing. It does not seem unduly to stretch the English language to call anything that is both human and living "a human life." However, it does seem unduly to stretch the English language to call a human cancer cell culture "a human being." It seems safe to consider the class of human beings a subset of the class of human lives. Then we can reformulate the premise of the moral-principle objection so that it says, "It is always wrong intentionally to take the life of an innocent human being." This will take care of the human cancer cell culture objection.

What counts as a human being? It is safe to say that the individuals who are reading this essay or who could read this essay are now human beings. It also seems reasonable to say that an earlier or later phase of what is now indisputably a human being is also a human being. This suggests that someone who defends the moral-principle objection might want to defend what I shall call *a trace-back strategy*. A trace-back strategist would argue that since our histories can be traced back to the time when we were zygotes, embryos are human beings and therefore destroying an embryo is destroying a human being (see Devolder and Harris and also Sagan and Singer in this collection).

The Phase Objection to a Trace-Back Strategy

Many believe that the moral-principle objection can be rebutted even if the trace-back strategy succeeds. This rebuttal starts with analysis of the implications of the claim that if some individual is now a human being, then each and every phase of that same individual is a human being. This claim does not *strictly entail* the claim that every human being is the sort of thing it is seriously presumptively wrong to kill. Perhaps our belief that an individual has the right to life *because* that individual is a human being is false. Perhaps the human beings with whom we are acquainted have the right to life *because* of some *other* property that *those* human beings possess. Perhaps the human beings with whom we are acquainted have the right to life in virtue of some characteristic they came to possess *after they were embryos*. Perhaps, although we can trace our history as human beings back to the time when we were zygotes, we cannot trace our full moral standing, our right to life, back to that phase of our existence. Many philosophers have argued that a human being is the sort of thing it is seriously presumptively wrong to kill only when she has reached the phase when she has become sentient (Sumner 1981), or only when she has reached the phase when she has an interest in living (Steinbock 1992), or only when she has reached the phase when she has a concept of self as a continuing subject of experience (Tooley 1972 and Singer 1979), or only when she becomes a person (Warren 1973), or only when some other phase in her life's history has been reached. There are many versions of such phase strategies in the philosophical literature, for many believe that

such strategies are needed to defend abortion rights. Any of these phase strategies, if sound, will successfully rebut a trace-back strategy and therefore make moral room for hESC research.

Phase views are far less plausible than their defenders suppose. All seem to be subject to one of two kinds of objections. (1) Some phase theorists base the right to life on a natural property that a human organism has only in a later phase of its existence, while, at the same time, criticizing those who base the right to life on the natural property of being a member of our species. For example, those who base the right to life on being able to exist independently or on having developed the capacity to exhibit certain psychological characteristics are apparently inconsistent in this way. (2) Other phase theorists base the right to life on a human's having entered a phase of her existence where she has some kind of pro-attitude to her future. This kind of phase theory avoids the first kind of objection by making the wrongness of killing depend on what we value. However, theories of this kind are unable to account for the wrongness of killing those adult human beings who do not value their existence, such as the severely clinically depressed. A phase view must make it seriously presumptively wrong to kill *all* of those human beings whom all believe it is seriously presumptively wrong to kill, must provide a plausible explanation of that wrongness, must leave very young human beings outside the scope of that wrongness, and must not achieve its results by ad hoc moves. I believe that no such strategy can meet these conditions of adequacy, although I have done little more than to suggest why in this essay. I shall assume that this suggestion can be successfully filled out. The issue of whether, given this assumption, the moral-principle objection succeeds does not lose its interest because this assumption has been made.

The Dualism Objection to a Trace-Back Strategy

Another objection to a trace-back strategy involves rejecting the claim that we are human beings. Jeff McMahan has argued that we are essentially embodied minds (McMahan 2002). We are only those parts of human animals that exhibit mental properties. We are essentially functioning cerebra. Therefore, we did not exist before the animal of which we are a part became sentient and we no longer exist after our cerebra lose irreversibly and entirely the capacity to function, even if our bodies remain alive. If McMahan is correct, then our existence cannot be traced back to the time when our human organism was an embryo, for we are not now, and never were, human organisms. Therefore, the destruction of the embryo that was our precursor could not have harmed an earlier phase of us. It would only have prevented, like contraception, our coming into existence. McMahan's view is incompatible with the moral-principle objection.

Is it correct? McMahan's defense of his view is based on the claim that our continuing identity as individuals is, in the final analysis, a matter of our continuing identity as persons. This identity is based on the continuity of our memories, beliefs, and intentions. Hence, we are essentially mental entities—persons—and as a consequence not biological organisms. His best (and apparently compelling) argument in defense of this view is that if Bertha's brain were transplanted into Clorinda's (brain-empty) body, we would locate Bertha where Clorinda's body is, not where Bertha's (former) body is. So Bertha's identity follows her brain, not the remainder of her body, because her brain is the physical basis of the mental. However, McMahan's view does not easily accommodate a brain transplant thought experiment in which one's cerebral hemispheres are separated and transplanted into different bodies, and cases of multiple personality disorder in which a patient is cured (rather than several patients being killed!) by eliminating all but one of the personalities. Whether these difficulties are, in the final analysis, fatal or can adequately can be dealt with is far beyond the scope of this essay. I shall take for granted the view of most of us that we are human biological organisms. I trust that most readers will not find that assumption difficult to accept. Those who do not may regard the thesis of this essay as conditional.

The Human Being Version of the Moral-Principle Objection

Even if the phase and dualism objections to the trace-back strategy are unsound, the human being version of the moral-principle objection is weaker than its proponents believe. The moral dictum "Intentionally ending the life of an innocent human being is always seriously presumptively wrong" is subject to two major difficulties. The first is that the scope of the dictum seems implausibly broad. The dictum implies (even if we allow exceptions for cases in which one waives one's right to life) that ending the lives of anencephalic newborns and persons in persistent vegetative state is morally wrong. It implies that we have at least a presumptive obligation not to end the lives of those for whom there is no realistic hope of any future mental function. This seems bizarre. Such humans seem, like plants, beyond the possibility of morally significant harm.

The second difficulty is that the moral significance of mere species membership seems difficult to defend. The connection between being a human being (which is a biological category) and having the right to life (which is a moral category) seems merely arbitrary in the absence of additional justification. If the justification is religious, then we are faced again with the church-state problem and the epistemic difficulties of claims to religious knowledge. Given these problems, the proponent of hESC research should argue as follows: "Why should the moral-principle objection be allowed to trump the promise of human embryonic stem cell research when that objection seems to have implausible implications and

the underpinnings of that objection are suspect?" Plainly this argument has force.

The Future-of-Value Objection

The moral-principle objection can be revised again to deal with the above argument. Consider the claim that it is wrong to kill virtually all the human beings with whom we are acquainted because they have futures of value, that is, that killing them deprives them of the good things that they would have experienced had they not been killed. I am, not surprisingly, especially fond of this account of the wrongness of killing (Marquis 1989). It has two advantages over the view that it is wrong to kill us because we are human beings. First, because what is at the center of the future-of-value account of the wrongness of killing is what we do value, or what we would value, it does not base the wrongness of killing on a merely biological property. Second, it does not entail that it is wrong to end the lives of anencephalic newborns and persons in persistent vegetative state, for both lack futures of value. The class of individuals it is wrong to kill according to the future-of-value account is not the same as the class of individuals it is wrong to kill according to the innocent human being account. Not all human beings are individuals whose lives it is wrong to end (e.g., anencephalics); not all individuals whose lives it is wrong to end are human beings, for there could be individuals who are not human beings who have futures like ours. The nonreligious will cite, in this connection, visitors from outer space; the more devout may cite angels. A necessary and sufficient condition of an individual having a future of value is that a later phase of that same individual would have a life that she would value. We all agree that it is presumptively seriously wrong to kill ordinary human adults and children. Therefore, it is wrong to kill anyone who has a future like ours, that is, a future like that of human adults and children. Suppose that we can trace back our existence to the time when we were a zygote. Then the human embryo you once were, reader, had a future (very much!) like *yours* and therefore a future such that it would have victimized you as much to kill you when you were an embryo as it would be to kill you now. Plainly, this argument can be generalized so that we apparently have an objection of moral principle to hESC research. The best version of the moral-principle objection to hESC research is, apparently, the future-of-value objection. However, the future-of-value objection succeeds only if human embryos actually are early phases of the individuals we are now.

Arguments That We Were Once Embryos

The view that we can trace our existence back to the time we were zygotes is supported by an apparently plausible argument. Each of us is the same

human being as the genetically identical and spatiotemporally contiguous human being that existed seconds earlier. Because identity is transitive, we can trace our existence as a human being (the history of our existence as the same human individual) backward in time to the time when we were zygotes.

This spatiotemporal contiguity argument is unsound as it stands. Suppose Bertha and Clorinda are identical twins. Both are spatiotemporally contiguous and genetically identical to Alice, the zygote from which they originated. The spatiotemporal-contiguity argument entails that they are both identical to Alice. Because identity is transitive, it follows that they are identical with each other. Because that is false, the simple spatiotemporal-contiguity argument must be given up.

Nevertheless, considerations concerning identical siblings do not force us to give up much. We have no grounds (yet) for rejecting the view that those of us who never had an identical sibling began to exist at conception. That (apparently) is the vast majority of us. Hence, presumably the vast majority of zygotes have a future of value. Therefore, we do not yet have grounds for rejecting the moral-principle objection to hESC research.

A Simple Twinning Argument

A simple twinning argument is one of the most frequently encountered objections to the view that a human being who never had identical siblings began to exist when she was a zygote. Here is the argument. Since embryos can twin, at the embryo stage no human's unique individuality has yet been achieved. If an embryo's unique individuality has not yet been achieved, then an embryo is not the same unique individual as her adult successor. If an embryo is not the same unique individual as her adult successor, then no embryo was an early phase of the unique individual I am (or you are either, reader).

This argument is fallacious. In the cases of those of us in whom twinning did not take place we have not yet discovered a reason for rejecting and we have some reason for accepting the view that our unique individuality was *actually* established at conception. The *possibility* of twinning does no more to cast doubt on my actual unique individuality from the time of conception than the *possibility* of my being a rich man augments my *actual* bank account.

Smith and Brogaard have claimed that human beings, unlike flatworms and sticks, are essentially indivisible, that it is essential to the nature of a human being that it cannot divide (2003, 66–67). If this is so, then embryos cannot be human beings. However, this line of argument has been challenged. Of course, adult human beings are indivisible. We cannot be cut in half so as to obtain two human beings, as a stick can be broken in half so as to obtain two sticks. It seems reasonable to believe

that human beings after implantation are indivisible. It does not follow that no human being is indivisible (Damschen, Gomez-Lobo, and Schoenecker 2006, 173). A truth about later phases of our existence does not entail a claim about all phases of our existence. Accordingly, we still lack an argument against the view that those of us who never had a genetically identical sibling were once zygotes.

A Trace-Forward Strategy

If the preceding analysis is correct, then the most defensible version of the moral-principle objection to hESC research is as follows. Killing us is wrong because a later phase of us would be deprived of the valuable life we would have experienced had we not been killed. Unless twinning takes place, a zygote and its successor embryo are individuals whose future later phases will (or would) experience a life like ours. Therefore, it is wrong to end the life of a zygote or its successor embryo. It is wrong to destroy an embryo in order to obtain stem cells. Indeed, it is even wrong to extract a cell from an embryo for stem cell research, whether or not the embryo can be saved. That cell would have had, like a zygote, a future like ours. Therefore, hESC research is incompatible with a defensible moral principle.

The preceding argument presupposes that we began to exist when we were only a single cell, because that has been established by the trace-back strategy. Furthermore, it presupposes that the single cell that was the earliest phase of us was a human being. That claim also seems to have been established by an argument that appeals to spatiotemporal contiguity and the transitivity of identity. The argument that supports that claim also is based on an analysis of what it is to have a future like ours. Briefly, to have a future like ours is now to possess a certain potentiality. To possess that potentiality now is, in our world, at any rate, to be a human being. That is because human beings actually have standard life spans that contain the goods of living. The potentiality of human beings to have a future of value is based on their actual nature as human beings in the same way as the potentiality of table salt to dissolve when put in water is based on its actual nature as sodium chloride. Accordingly, if the moral-principle objection is sound, then, apparently, there are single-celled human beings. It may seem strange to call a one-celled organism "a human being," but this oddity is, by itself, not sufficient to reject the view we are considering. Our belief that this view is odd stems from the fact that none of the human beings we know is a one-celled organism. Because we are not acquainted (in the ordinary way) with human zygotes, this counts for little. A trace-back strategy seems to give us a decent reason for this claim.

Now consider tracing our individuality forward from this one-cell stage. This one-celled human being, this zygote, will split into two cells. Each of the two cells does not seem to be different in any important respect from the human being from which each originated. The situation

here is like the fission of one amoeba into two amoebas, with (let us suppose) no space separating the amoebas. Therefore, if the zygote from which the two human cells originated is a human being, then each of these two cells must also be a human being. (For similar views see van Inwagen 1990, 152–53, and Olson 1997, 90–93.)

Is there a plausible alternative to the view that, if a zygote is a human being, then the two-celled successor of a zygote is two human beings? The alternative, I suppose, is that this two-celled entity is itself one human being. If this is the case, then either (1) this two-celled human being contains as parts two one-celled human beings or (2) this two-celled human being contains as parts individuals who are not human beings at all but merely parts of this two-celled human being. Will either of these alternatives survive analysis?

Consider the second. Each of the parts of this supposed human being does not seem to be different in any important respect from the human being from which the parts originated. That was the reason for calling both "human beings." Accordingly, we have a good reason for eliminating the second alternative.

Consider the first. It suggests that at the two-cell stage we now have three human beings somehow: each of the cells in this two-celled thing is a human being, and the sum of the two cells is a third human being. Surely that is one too many human beings in existence at the two-cell stage! Something else is odd about the first alternative. Imagine that one adult human being is in a deep embrace with another adult human being so that there is as much spatial contiguity between them as you like. We are not inclined in the least to think of this (small) pile of human beings as another human being of which the two human beings are part.

This first alternative stretches our conceptual imagination. Are there natural examples of the kind of phenomenon we are considering that will allow us to fix our thoughts? Pregnancy might be analogous. In pregnancy one human being exists inside another. We have all the spatial contiguity one would like if we don't worry excessively about the amniotic fluid separating the fetus from the woman. Can we call the fetal human being part of the maternal human being? I don't believe that our linguistic intuitions are clear with respect to this case. On the one hand, a fetus is a human being, and a human being does not seem to be the sort of thing that can be a part of another human being. It isn't a leg or a heart. On the other hand, the fetus is *spatially within* its mother. This supports the claim that the fetus is part of the woman. If one human being can be part of another human being, then why can't two human beings each be part of another human being? Perhaps this seems unusual, but, after all, it is unusual to think of a single-celled thing as a human being.

Nevertheless, the pregnancy case is different from the two-celled-embryo case in the following respect. An abundance of independent and obvious reasons support the view that pregnant women are human

beings. No such reasons support the view that a two-celled successor to a zygote is one human being. To consider another related case, there is no inclination to call conjoined twins one human being that contains as parts two human beings (but compare Smith and Brogaard 2003, 48).

Thus, when that one-celled human being, whom we shall now call Alice, divides, two human beings emerge, even when the eventual successor to these two human beings is only one adult human being. Could the one adult who is their successor be identical with either of these two organisms? There seems to be no difference between them, so there seems to be no reason for holding that the one adult is identical with one rather than the other. Could we be identical with each of them? Call them Bertha and Clorinda. If the adult who is their successor is identical with Bertha and is also identical with Clorinda, then, by transitivity of identity, Bertha and Clorinda are identical. But this is false. Therefore, the adult who is their successor cannot be identical with both of them. We are forced to the conclusion that there is nothing at all at the two-cell stage to which we are identical. If there is nothing at the two-cell stage to which we are identical, then there is nothing at that stage to have a future of value.

Of course, this line of argument applies to the early successors of this bunch of two cells. It applies to our precursors at the four-cell stage and beyond that as well. So far as I can tell, this line of argument applies to our precursors in the inner cell mass after the blastocyst has formed. It applies until there is cellular differentiation within the inner cell mass and the embryo is implanted in the uterus. When that occurs, it is plausible to maintain that those differentiated cells are not human beings themselves but are parts of a single human being. This is so by the third week after fertilization. At that time, but only by that time, we have a human being who is (or would be) the same individual as an adult, and, therefore, an individual who has a future of value.

This matter can be viewed from another perspective. Our zygote, Alice, does not have a future of value, for Alice's nature is soon to go out of existence. Neither Bertha nor Clorinda has a future of value either, for the same reason. Therefore, ending the lives of Bertha and Clorinda is not wrong, not only because neither is the same individual as her successor human being but also because neither has a future of value. This sort of argument can be applied to the embryo and its components until the time of implantation. This entails that the future-of-value version of the moral-principle objection to hESC research is unsound. Since there is, apparently, no more defensible version of the moral-principle objection to hESC research, the moral-principle objection to HESC research collapses under analysis.

Arguments That a Multicelled Embryo Is a Human Being

How might proponents of the moral-principle objection respond to these difficulties? The literature suggests two kinds of arguments. According to

the first kind of argument, there is some *present property* of an embryo that makes it a human being. According to the second kind of argument, the fact that the *successor* to an embryo would be a unitary human being is sufficient to show that the embryo *currently* is a unitary human being.

According to proponents of the first kind of argument, the zona pellucida, the thin permeable membrane that surrounds the cells of the embryo, makes a multicelled embryo one human being (Damschen, Gomez-Lobo, and Schoenecker 2006, 168–170). This is not plausible. Imagine a number of human beings at a cocktail party held in one room. It is hard to believe that the fact that those human beings are surrounded by the walls of the room shows that the cocktail party itself is some super human being over and above the human beings at that cocktail party. Of course, someone might argue that the party itself is an individual in addition to the individual human beings in the room. Even if this is so, there is no reason for saying that the cocktail party is a human being. This being the case, there is no reason for saying that this individual has a future like ours. Accordingly, even if the zona pellucida makes the embryo an individual, it does not make the embryo the right kind of individual to have a future of value and, therefore, the right kind of individual such that it would be wrong to destroy it.

Proponents of the moral-principle objection might argue that the fact that nutrients flow from outside to inside the zona pellucida and also within different cells inside the zona pellucida makes the multicelled embryo one human being (Damschen, Gomez-Lobo, and Schoeneker 2006, 169–170). However, if the persons at the cocktail party pass the hors d'oeuvres around the room or obtain the hors d'oeuvres from the caterer and then pass them around the room, it is hard to believe that do we now have some super human being in virtue of this communication.

Let us now consider the second kind of argument. Does the fact that the *successor* to the embryo is a unitary human being show that the embryo is *at present* a unitary individual human being? Tollefsen (2001, 72) argues that "viewing this continuing collection as a single individual permits us to avoid a metaphysical puzzle: how is it that a mere aggregate, forced together only by way of an external influence, should become a single organic individual?" Tollefsen is claiming that the fact that the *successor* to the multicelled embryo is a single individual shows that there must be something (call it "the X factor") in the embryo *when the embryo is an embryo* that is the biological basis of this future unity. That X factor makes the embryo itself a unitary human being.

This argument is that there *must* be some property, *a something we know not what*, that is the basis for regarding the embryo as one human being. This argument apparently appeals to the principle of sufficient reason. This seems a very weak reed on which to base the moral-principle objection. The reed seems even weaker when one considers the following. Why *must* there be such a property? One can imagine that there is some

"combinatorial factor" in *each* of the cells of the embryo after so many divisions in virtue of which the cells combine at the beginning of the third week after fertilization.

Another problem with this argument is that if there were some unknown property of a multicelled embryo that is a present sufficient basis for the future unity of the human being that is the successor to the embryo, then identical siblings should not be possible. However, there are identical siblings. This entails that there may be no property in the embryo that is a sufficient basis for the future unity of the successor adult human being.

A still further problem with this X-factor argument concerns what one should say about the pluripotent cell that could be removed from the embryo for hESC research, even if the embryo could be preserved. Proponents of the moral-principle objection argue that such a cell would, in the appropriate environment, function as a zygote. In such a situation it would multiply to become a multicelled embryo that would supposedly be unified by some X factor, from which we could extract a pluripotent cell that will multiply in the appropriate environment so that we obtain a multicelled embryo, from which we could extract another pluripotent cell, and so on. This sort of process does not impress us with the true unity of the original multicelled thing. It is safe to conclude, therefore, that if a zygote is a human being, then its multicelled successor embryo is not a single human being.

A Provisional Conclusion

What can we conclude from this analysis? Proponents of the moral-principle objection to hESC research defend the view that a new individual human being comes into existence at the time of fertilization (George and Gomez-Lobo 2002, 258–66). What are the consequences of this view? First, a zygote and each of its two successor cells have (almost?) all features in common. Therefore, if the former is a human being, then each of its successor cells is a human being also. Second, when tracing the process of division forward, there seems to be no good reason for saying that, in addition to the two, or four, or eight, and so forth, human beings that are a product of zygote division, there is, in addition, a grand summative human being that embraces all of these human beings. What this comes to is that there seems to be no good reason to adopt the view that the embryo, that is, the cells of the embryo taken collectively, is a human being.

Third, if a zygote is a human being, then that human being goes out of existence when it undergoes fission into two cells. It follows that it does not have a future of value, because, given the facts of human development, there could be no later stage of it that has a life it would value. Neither of the cells into which it splits has a future of value either, for

those cells will also undergo fission and therefore only exist for a short time. Thus, the reason why it is wrong to kill human children and adults is not a reason that applies to the cells of an embryo. Each of the cells of an embryo, from a moral point of view, is like an anencephalic child. None of them has a future of value.

Fourth, there is another way of looking at the matter that supports the view that it is not wrong to end the life of any of the cells in the embryo. Could any of these cells be identical to the adult human being who is their successor? Consider the cells of the embryo at, say, the four-cell stage. If the adult human being who is their successor is identical to any one of those cells, then presumably she is identical to each of the other cells, for the relation between each of them and the adult human being is the same. If this is so, then the adult human being is identical to four different things that exist at the four-cell stage. However, if the adult human being were identical to four different things, then, because identity is transitive, the four different things would be identical to each other. But this is false. Therefore, none of the cells of the embryo is identical to the future adult human being. This gives us another reason for affirming that it is not wrong to end the life of any of the cells of the embryo.

A Possible Difficulty

Do these considerations show that no version of the moral-principle objection to hESC research is sound? Perhaps not. The analysis has been either explicitly or implicitly conditional. It has explored the consequences of the assumption that the zygote is a human being.

This assumption does not appear to be unreasonable. It seems to be a consequence of the trace-back strategy. Furthermore, proponents of the moral-principle objection have adopted (so far as I know, universally) that view. However, no doubt one reason they have adopted that view is because they are adherents of the human being version of the moral-principle objection. Even if the moral-principle objection has always been based on the claim that the zygote is a human being, perhaps it *could* plausibly be set out without that claim.

Nevertheless, arguments in favor of considering the moral-principle objection solely in the context of human beings exist. One can, of course, conceive of beings from outer space who have futures like ours but who, because they lack the requisite DNA, are not human beings. Nevertheless, claims about the embryology of such beings can be nothing but sheer speculation. Since concerns about hESC research are concerns about research on something that is clearly human, there is an argument that we can confine our analysis to what is human. Furthermore, since there can be morally permissible research on things that are human, such as human cancer cell cultures, it seems necessary to limit the scope of the moral-principle objection not to what is human but only to human beings.

These arguments are not good enough. The future-of-value account can provide us with a basis for defending the permissibility of research on human cancer cell cultures. An appeal to the fact that such cultures are not human beings is unnecessary. In addition, concern about the embryology of visitors from outer space can be excluded on the grounds such visitors are not human. We don't have to appeal to the fact that such visitors are not human beings.

The correctness of the previous analysis in this essay is compatible with the following defense of the moral-principle objection. The claim that an embryo as a whole is not a human *being* does not rule out the fact that the embryo as a whole is plainly human. Each of the cells of the embryo lacking a future of value is compatible with the collection of embryonic cells, the embryo as a whole, having a future of value. Accordingly, a defender of the moral-principle objection might argue that it is wrong to destroy a human embryo because it has a future of value. Whether it is now a human being or not, a later stage of it will (or would) have a future that it will then value.

Why This Version of the Moral-Principle Objection Should Be Rejected

Two considerations support rejecting this final version of the moral-principle objection. The first is based on the claim that a necessary condition for an individual to have a future of value is that a later stage of *that very same individual* is an individual who will (or would) then value its life. Therefore, embryos have a future of value only if a later phase of the individual that is an embryo is a human being. If this were so, "human being" would be a phase, not a substance, sortal. Being a human being would be phase in the career of a substance the earliest phase of which is an embryo. This is hard to believe. It is hard to believe that so much philosophical water has passed under the bridge without an obvious name for the kind of substance we are. It seems far more reasonable to believe that human beings and human embryos are both substances. They are different individuals that succeed one another. There is another clear case of this sort of thing. Human beings are succeeded by human corpses. A corpse and a human being are not different phases of the same individual. This view of the relation between human embryos and human beings is based upon a famous metaphysical doctrine. Form, as Aristotle thought, is the principle of individuation. What else, after all, could it be? If this analysis is correct, then it is not the case that embryos have futures of value.

The second consideration is based upon the nature of an embryo and the possibility of twinning. Suppose we hold the view that a human embryo as a whole has a future of value. What are we to say of the cell that is detached (by us or naturally) from the embryo and now is a twin of the original embryo? If an embryo has a future of value, then it seems

reasonable to say that this cell has a future of value. The earlier analysis in this essay shows that the cell, before it was detached, did not have future of value. It follows that detachment can produce an enormous change in the moral standing of a cell. Detachment is no more than a change in spatial location. It follows that change in spatial location can create an enormous change in the wrongness of ending the life of an individual. This is hard to believe, for mere spatial location is surely morally irrelevant. Therefore, the view that the embryo has a future of value leads to unacceptable conclusions.

We should conclude that no version of the moral-principle objection to hESC research is compelling.

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