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The Thoughtful Distinction Between Embryo and Human

CENTRAL to many of the bioethical issues of our time is the question, When should society confer moral status on an embryo? When should we call an embryo or a fetus one of us? The fertilized egg represents the starting point for the soon-to-be dividing entity that will grow into a fetus and finally into a baby. It is a given that a fertilized egg is the beginning of the life of an individual. It is also a given that it is not the beginning of life, since both the egg and the sperm, prior to uniting, represent life just as any living plant or creature represents life.

Yet is it right to attribute the same moral status to that human embryo that one attributes to a newborn baby or, for that matter, to any living human? Bioethicists continue to wrestle with the question. The implications of determining the beginning of moral status are far-reaching, affecting abortion, in vitro fertilization, biomedical cloning, and stem-cell research. The rational world is waiting for resolution of this debate.

This issue shows us how the field of neuroethics goes beyond that of classic bioethics. When ethical dilemmas involve the nervous system, either directly or indirectly, those trained in the field of neuroscience have something to say. They can peek under the lid, as it were, and help all of us to understand what the actual biological state is and is not. Is a brain present? Is it functioning in any meaningful way?

Neuroscientists study the organ that makes us uniquely human--the brain, that which enables a conscious life. They are constantly seeking knowledge about what areas of the brain sustain mental thought, parts of mental thought, or no thought. So at first glance, it might seem that neuroethicists could determine the moral status of an embryo or fetus based on the presence of the sort of biological material that can support mental life and the sort that cannot--in other words, whether the embryo has a brain that functions at a level that supports mental activity. Modern brain science is prepared to answer this question, but while the neurobiology may be clear, neuroethics runs into problems when it tries to impose rational, scientific facts on moral and ethical issues.

The fertilized egg is a clump of cells with no brain; the processes that begin to generate a nervous system do not begin until after the 14th day. No sustainable or complex nervous system is in place until approximately six months of gestation.

The fact that it is clear that a human brain isn't viable until Week 23, and only then with the aid of modern medical support, seems to have no impact on the debate. This is where neuro "logic" loses out. Moral arguments get mixed in with biology, and the result is a stew of passions, beliefs, and stubborn, illogical opinion.

Based on the specific question being asked, I myself have different answers about when moral status should be conferred on a fetus. For instance, regarding the use of embryos for biomedical research, I find the 14-day cutoff employed by researchers to be a completely acceptable practice. However, in judging a fetus "one of us," and granting it the moral and legal rights of a human being, I put the age much later, at 23 weeks, when life is sustainable and the fetus could, with a little help from a neonatal unit, survive and develop into a thinking human being with a normal brain. This is the same age at which the U.S. Supreme Court has ruled that the fetus becomes protected from abortion.

Obviously there is a point of view that life begins at conception. The continuity argument is that a fertilized egg will go on to become a person and therefore deserves the rights of an individual because it is unquestionably where a particular individual's life begins. If one is not willing to parse the subsequent events of development, then this becomes one of those arguments you can't argue with. Either you believe it or you don't.

While those who argue this point try to suggest that anyone who values the sanctity of human life must see things this way, the fact is that this just isn't so. This view comes, to a large extent, from the Roman Catholic Church, the American religious right, and even many atheists and agnostics. On the other side, Jews, Muslims, Hindus, many Christians, and other atheists and agnostics do not believe it. Certain Jews and Muslims believe that the embryo deserves to be assigned the

moral status of a "human" after 40 days of development. Many Catholics believe the same, and many have written to me expressing those views based on their own reading of church history.

WHEN we examine the issue of brain death--that is, when life ends--it also begins to become clear that something else is at work here: our own brain's need to form beliefs. If we examine how a common set of accepted rational, scientific facts can lead to different moral judgments, we see the need to consider what factors influence these varying conclusions, and we can begin to extricate certain neuroethical issues from the arbitrary contexts in which they may initially have been considered.

Different cultures view brain death differently. Brain death is declared medically when a patient is in an irreversible coma as a result of brain injury--from a stroke, for example--and has no brain-stem response, leading to a flat EEG (that is, no sign of brain activity on an electroencephalography recording), and no ability to breathe independently.

A survey published in the journal Neurology in 2000 compared worldwide standards and regulations for declaring brain death. The concept of brain death is accepted worldwide: Even in the most religious societies, no one argues that human life continues to exist when the brain is irreversibly unable to function. What differs is the procedure for determining brain death. And these societal differences reveal how bioethical practices and laws can vary so wildly, for reasons that have nothing to do with science but instead are based on politics, religion, or, in most cases, the differing personal beliefs of a task force.

For instance, China has no standards, while Hong Kong has well-defined criteria--left over, no doubt, from its having been under British rule. The Republic of Georgia requires that a doctor with five years of neuroscience practice determine brain death; this is not so in Russia. Iran requires the greatest number of observations--at 12, 24, and 36 hours--with three physicians; and in the United States, several states have adapted the Uniform Definition of Death Act, including New York and New Jersey, both of which have a religious-objections loophole.

THE EXAMPLE of brain death illustrates how rules and regulations on bioethical issues can be formed and influenced by beliefs that have nothing to do with the accepted scientific facts. No one debates that a line has been crossed when the loss of brain function is such that life ceases. What we differ on isn't even where that line should be drawn--most countries have similar definitions of brain death. What differs is largely who makes the call and what tests are used--differences, basically, in how you know when you get there, not where "there" is.

So, too, we all seem to be in agreement that there must be a point at which moral status should be conferred on an embryo or fetus. However, we seem to have a harder time defining that point, regardless of the facts.

Why? As Sir Bertrand Russell said, "In an instant of time, nothing exists." In other words, everything is the product of the interaction of atoms and molecules, so by definition, everything is a dynamic process. This raises the potentiality argument, the view that since an embryo or fetus could become an adult, it must always be granted equivalent moral status to a postnatal human being.

During a discussion of stem-cell research that took place while I was serving on President Bush's bioethics council, I made an analogy comparing embryos created for stem-cell research to a Home Depot. You don't walk into a Home Depot and see 30 houses. You see materials that need architects, carpenters, electricians, and plumbers to create a house. An egg and a sperm are not a human. A fertilized embryo is not a human--it needs a uterus, and at least six months of gestation and development, growth and neuron formation, and cell duplication to become a human. To give an embryo created for biomedical research the same status even as one created for in vitro fertilization, let alone one created naturally, is patently absurd. When a Home Depot burns down, the headline in the paper is not "30 Houses Burn Down." It is "Home Depot Burned Down."

Many other compelling arguments about the course of the natural reproductive process should cause one to doubt that something magical happens at conception. It turns out that twinning commonly occurs in the first 14 days. One person becomes two persons. Even more bizarre, chimeras are formed. This happens when an egg that has split to form twins fuses back into one egg again. In such circumstances, it is hard to ascribe the sense of what is happening to the uniqueness of the "individual" or "soul" that is supposedly being formed at the instant of conception.

THE DEBATE over the ethics of stem-cell research involves arguments that weigh the relative importance of relieving human suffering, freely conducting research, and protecting human embryos. The logic and thinking are complicated and often confused. For example, from my point of view, there is no conflict or weighing of goods between the embryo and stem-cell research. I assign no moral status to the 14-day-old embryo. If I did, the weighing of goods would begin, and moral judgments would follow. One is quickly placed in the middle of well-known dilemmas posed by philosophers and ethicists alike. It comes down to the question, Is it a moral good to sacrifice one life if more lives will thereby be spared? Does the mother of five hiding from the Gestapo have the moral duty or right to smother the crying baby so the whole family will not be caught and shot?

Current policy on stem-cell research is based on the attempt to weigh the value of a potential human life (in the case of biomedical cloning, an embryo created for biological research) against the value of the potential of research to save lives. This is a wrongheaded equation. For research on spare IVF embryos, as well as for embryos made for biomedical cloning, the need to harvest stem cells at 14 days raises the question of the moral status of the embryo. Both these cases raise another ethical factor to weigh, that of intention.

Two kinds of embryos are used for human biomedical research: spare embryos from IVF procedures, and embryos created by "somatic cell nuclear transfer." In SCNT an egg is removed from a female, the DNA is removed from it, and a cell from another individual is placed into the egg and allowed to grow. The South Koreans have shown that this can work in humans. They let such an entity develop to 14 days and then harvested stem cells from it. If the entity had been reimplanted in a woman's uterus, it is possible a fully formed baby might have developed. This process was used to produce the cloned sheep Dolly.

In biomedical research using SCNT, a cloned embryo is created in a petri dish for the purpose of harvesting stem cells for studies and, ultimately--if research that has recently been thwarted is successful--for use in the treatment of such diseases as Parkinson's. There is never an intention to create a human being. Does this clump of cells deserve the protections of a human being? Stem-cell researchers adhere to a cutoff of 14 days, before which they do not consider life to have begun. The embryo has not begun to develop a nervous system, the biological structure that sustains and interprets the world in order to generate, maintain, and modify the very concept of human dignity.

An intention argument can also be made for spare embryos created from IVF. Parents undergoing fertility treatment may create many embryos, so as to ensure that

one viable embryo takes hold when implanted. It is not the intention of the parents that every embryo created be a child. After natural sexual intercourse, an estimated 60 to 80 percent of all embryos generated through the union of egg and sperm spontaneously abort--many without our knowledge. So if we use IVF to create embryos and then implant only a select few, aren't we doing what nature does? We have simply replaced nature's techniques with modern scientific techniques for selecting the strongest embryos.

Do extrauterine embryos deserve the moral status of a human being? Do they even deserve to be considered the same as implanted embryos? I say not. It seems to me that the intentions of parents or donors to either create a human baby or not create a human baby must have some role in the potentiality argument. In other words, if we create cells for research purposes, and never intend to create a human, or if a parent creates embryos so that one can "take," do we have a moral responsibility to grow those other embryos into human beings? Of course not.

INTENTION is an interesting ethical concept that we seem to understand intrinsically. We see it everywhere; save for cases of recklessness and negligence, intention is a clear marker of guilt in our legal system. Crimes are weighed, guilt is determined, and punishment is meted out based on intention: Charges of manslaughter and murder in the third, second, and first degrees are all determined by the level of intention of the killer. The same goes for determining whether crimes are misdemeanors or felonies.

Is intention, which appears to be a guiding principle of ethics, hard-wired into our brains? Research on the "theory of mind" suggests that it is. In fact, intention may be one of the defining characteristics of the human species. A crucial part of being human is to have a theory about the intentions of others in relation to oneself. If I have a theory about how I relate to you and you to me, a huge part of it is based on what I view our intentions toward each other to be.

Knowing this--that our brains are wired to form intentions--should become the context, then, for looking at any intention argument. While I happen to agree with the logic of the intention argument vis-à-vis stem-cell research, intention arguments are inherently nonsensical. When you think about the neuroscience, it is important to understand we are wired to form these personal beliefs--these "theories of mind."

When one has an intention about another person, or thing, or animal, it is a state of personal belief. The person or thing or animal sits separate and apart from that belief. Does a clump of cells take on a different character if I have no intention ever to let it develop? Does it take on a different character if I do intend to have it develop, say by reimplanting it into a woman's uterus? I think not. It is the same clump of cells no matter what my personal intentions are for it. The cells are what they are and should be evaluated on their own terms, not mine. This, ultimately, is why we should set aside our personal beliefs and accept that a clump of cells is decidedly not a human being. Your parents may have intended for you to become a doctor. Should you feel lessened by the fact that you became a professor instead?

Clearly, I believe that a fertilized egg, a clump of cells with no brain, is hardly deserving of the same moral status we confer on the newborn child or the functioning adult. Mere possession of the genetic material for a future human being does not make a human being. The developing embryo that becomes a fetus that becomes a baby is the product of a dynamic interaction with its environment in the womb, its postnatal experiences, and a host of other factors. A purely genetic description of the human species does not describe a human being. A human being represents a whole other level of organization, as distinct from a simple embryo as an embryo is distinct from an egg and sperm. It is the dynamics between genes and environment that make a human being. Indeed, most of us are willing to grant this special status to a developing entity long before it is born, but surely not before the entity even has a brain.

Fixing the beginning of life is a tricky issue that, like most, if not all, neuroethical issues, should depend on the context. There is not a single answer. My life and your life began at conception. But when my life began and when life begins are different questions. A 14-day-old embryo created for research is not, and should not be granted the moral status of, a human being. Embryos are not individuals. As a father, I may react to a sonogram image of a nine-week-old embryo and see a future child; as a neuroscientist, I know that that creature cannot survive outside the womb for another 14 weeks. In neuroethics, context is everything. And it is our brains that allow us to analyze, reason, form theories, and adapt to all contexts.

PHOTO (COLOR): Human embryos at eight days and six weeks, and a fetus at 12 weeks

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By Michael S. Gazzaniga

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