The Nonindividuation Argument Against Zygotic Personhood

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A widely circulated objection to the use of human embryos solely as means—as in embryonic stem cell research—consists in the thesis of zygotic personhood, the thesis that every activated human oocyte and any developmental successor is a person for purposes of the duty not to kill. Some philosophers stand opposed to zygotic personhood because they demand some cerebral attribute (e.g., reason or self-awareness) for personhood. Others have replied to zygotic personhood by arguing that an embryo less than two weeks old is not even a human individual, and therefore could not be a person. For many scientists and others, the latter argument's attack on individuality has clinched the case for embryo use. In this paper, I study this argument, its shortcomings, the prospects for rehabilitation, and where things stand in its aftermath.

1. The Nonindividuation Argument

I shall use *embryo* for a human organism at any prefoetal stage of development.[1] During early embryogenesis, it sometimes happens that an embryo splits into monozygotic twins. It also sometimes happens that monozygotic or fraternal twins fuse. Monozygotic twinning will occur, and twins will fuse, if at all, prior to formation of the primitive streak. The primitive streak, a longitudinal axis of organization, forms in the embryo at about day 14, at which time begins gastrulation. In gastrulation, cells migrate and orient according to their future roles. Some cells are destined for what will become the neonate, others for the placenta.

I shall use *early embryo* for an embryo in which the primitive streak has not formed. My references to embryos and persons will all be to humans. I define a *human individual* as an individual of

[1] This accords with popular and scientific usage. It differs from the traditional medical dictionary definition that confines the term to an organism that has developed for more than two but less than nine weeks (after which 'foetus' applies).

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humankind, understood as a natural kind identical to or corresponding to the species *homo sapiens*. Human individuals could exist at developmental stages from activated oocyte to adult. This is an ontological observation, not a moral claim.

The argument with which I am concerned in this paper, which I shall call *the nonindividuation argument against zygotic personhood* ('NA'), is the following:

(i) A necessary condition for a being to be a person is that the being be a human individual.
(ii) An early embryo is not a human individual.
(iii) Therefore an early embryo is not a person.

In support of (ii), three arguments have been offered that I sketch here and state more fully hereafter.

[1] An individual is not divisible into surviving individuals of the same kind as itself. It can happen that an early embryo divides into twins and it can happen that twins fuse. Therefore in respect of any early embryo, it cannot be the case that a human individual exists.
[2] If an early embryo is a human individual, the outcome of monozygotic twinning may be given three characterizations: the embryo that splits survives as one twin but not as the other, the embryo survives as both twins, and the embryo dies without leaving a corpse. Since each of these characterizations is untenable, it is false that the embryo that split, or any embryo capable of twinning, is a human individual.
[3] For such time as an early embryo is constituted of totipotent blastomeres,[2] each blastomere has the potential to become a human individual. Whereupon it is concluded that not until there vanishes the opportunity for totipotent blastomeres to separate may it be said how many human individuals exist.

In the foregoing presentation of NA and in fuller statements below of the arguments for (ii), I combine, for maximal persuasive effect, contentions adduced by various proponents.[3] Rarely does one hear

[2] A cell is totipotent if and only if it is capable of developing into an entire organism as well as the placenta.

[3] I have omitted a claim that so quickly fails that we would distort NA by associating the claim with it. The claim is that, because conjoint twins or an engulfed twin can form even *after* the primitive streak forms, a human individual could not exist prior to the time at which ends the possibility of those eventualities. This claim is farfetched inasmuch as, for

any one proponent advance all those contentions together. From scientists offering the argument, one will usually hear a lucid explanation of twinning, then the assertion that divisibility is inconsistent with individuality, and there the matter will be left.

I mention in passing the following notion: what we call '*an* early embryo' is sometimes, unbeknowst to us, more than one embryo. This notion does not hold water. When oocyte activation occurs, it will be obvious that there exists one embryo, not some other number. The embryo possesses a boundary and structure such that under the microscope it is easily distinguished from others of its kind and from its nutritive environment. So in this discussion, I do not introduce the seemingly self-contradictory premise 'an early embryo is not an individual embryo.' Instead I express NA by referring to 'a human individual.' NA calls into doubt the number, if any, of human individuals.

Attractive to scientists and nonscientists alike, NA's biological sophistication has fostered the belief that on scientific grounds alone, NA deals a decisive blow to zygotic personhood. One hears NA's conclusion reiterated, and some of its implications drawn out, by remarks such as the following: 'Whatever else has varied in our confused moral tradition, it has been consistent in affirming that, without discrete individuality, there can be no moral or legal personality ... In the period of cellular cleavage, before the embryo is formed, individuality is not yet.'[4] Day 14 is 'the onset of human individual development.' 'The "embryo" as a continuous entity could be traced back from birth only as far as the primitive streak stage ...'[5] It makes no more sense to say that there exists a person if

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every implanted embryo, the claim would deny individuality by reason of the chance (which happens to be very small) of a usually fatal event. The claim reduces to denying individuality because of the chance of death. We want to say that a human individual is no less so for there obtaining a chance of death.

[4] G. R. Dunstan, 'The Human Embryo in the Western Moral Tradition', in G. R. Dunstan and Mary J. Seller, eds., *The Status of the Human Embryo* (London: King Edward's Hospital Fund, 1988), 55. This remark presupposes that the term 'embryo' does not apply until the third week.

[5] Anne McLaren, 'Prelude to Embryogenesis', in The Ciba Foundation, *Human Embryo Research, Yes or No?* (London: Tavistock, 1986), 14. For the case in point, G. E. M. Anscombe answers the question posed by the title of her paper 'Were You a Zygote?', in A. Phillips Griffiths, ed., *Philosophy and Practice*, supp. 19 to *Philosophy* 59 (Cambridge University

one cannot say how many than to say that there exists an individual if one cannot say how many. A supposed embryonic person that has not reached day 14 is not yet one; it might be two.

Even some Catholic theologians have concluded that personhood or ensoulment does not obtain until the possibility of nonconjoint twinning ceases.[6] The Warnock committee took on board a brief statement of NA,[7] and then Parliament, on the committee's recommendation, enacted the rule that no embryo may be kept or used beyond the earlier of the appearance of the primitive streak and day 14 of development.[8] Bernard Williams endorsed this rule on the ground that although it 'is not ... uniquely reasonable, it is nevertheless reasonable to draw a line there ...' [9]

I have myself invoked NA.[10] I no longer believe the argument sound. Despite their scientific patina, premises (i) and (ii) are not purely scientific, but metaphysical. I shall not be challenging, but rather assuming, (i). Premise (ii), that an early embryo is not a human individual, is ripe for dispute. I shall review the three arguments offered for (ii), then another argument for (iii) that does not invoke (ii). I shall contend that each of these arguments fails. To inquire whether other plausible support obtains for (ii), I shall canvass ontological accounts, recent work on biological individuality, and other moves in search of any requisite of individuality that

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Press, 1985), 111–115, with 'No, I was an identical twin,' though she allows that identical twins 'jointly were once a zygote.'

[6] Norman M. Ford, *When Did I Begin?* (Cambridge: Cambridge University Press, 1988); Carol A. Tauer, 'Embryo Research and Public Policy: A Philosopher's Appraisal', *Journal of Medicine and Philosophy* 22 (1997), 423–439; Thomas A. Shannon, 'Fetal Status: Sources and Implications', *Journal of Medicine and Philosophy* 22 (1997), 415: 'until the cells become committed to becoming a particular part of the body and that part only, the preimplantation embryo is divisible into parts, each of which can become a whole'; the embryo is not a human individual 'until the process of restriction is complete.' See also Shannon's 'Remaking Ourselves?', *Commonweal*, 125 (1998), 9–10.

[7] Mary Warnock, *A Question of Life* (Oxford: Basil Blackwell, 1985), 65–66.

[8] Human Fertilisation and Embryology Act 1990, ch. 37, §3(3)(a).

[9] Bernard Williams, 'Types of Moral Argument Against Embryo Research', in The Ciba Foundation, *Human Embryo Research, Yes or No?* (London: Tavistock, 1986), 190.

[10] Louis M. Guenin, 'Morals and Primordials,' *Science* 292 (2001), 1659–1660.

an embryo lacks. Finding none, I shall close by clarifying that after the collapse of NA, zygotic personhood remains under siege by the same opposition that preceded NA's attack.

2. Individuation and Individuality

I begin by defining some metaphysical concepts as to which our inquiry will require clarity.

The *identity relation* on a set A is the set $I = \{<x, x> | x \in A\}$. A thing is identical to itself and to nothing else. This led Wittgenstein to remark that identity statements are either trivial or false.[11] But Quine located the significance of identity statements in the circumstance that more than one name sometimes pertains to 'only one thing' (to use Kant's phrase for expressing *numerica identitas*).[12] Or, as we sometimes say, more than one name names 'one and the same' object. ('Identity' is a contraction of *idem et idem*). 'The utility of language,' said Quine, 'lies partly in its very failure to copy reality in any one-thing-one-name fashion. The notion of identity is then needed to take up the slack.'[13]

When philosophers call I a relation of 'numerical identity,' at first 'numerical' seems peculiar. We do not ordinarily think of any number by reference to which identity obtains—unless, that is, in using 'one and the same,' we prosaically lay stress on 'one.' Therein lies precisely why 'numerical' is apt. Numerical identity bears upon counting. As we count a given universe, if we encounter 'x' and 'y' and discover that the object named by 'x' is identical to the object named by 'y,' we increment by one, not two. When we count expressions in $\{4^3, 8^2, \pi\}$, the total is three; when we count real numbers, the total is two. 'Numerical identity' signifies identity properly so called, and hence I shall speak of it simply as 'identity.' What authors have sometimes called 'qualitative identity' consists in exact similarity, as if by virtue of copying. That, as Quine remarked, is 'better called resemblance.'[14]

Two relata are *distinct* if and only if they are not identical.

[11] *Tractatus Logico Philosophicus* 5.5303.

[12] *Critique of Pure Reason* A263/B319. The expression was introduced by Leibniz.

[13] *Methods of Logic*, rev. ed. (New York: Holt, Rinehart, and Winston, 1959), 209.

[14] *Word and Object* (Cambridge: MIT Press, 1960), 53. An instance in biology is the concept of homology.

For some sets A, there obtains an *identity criterion*, an explicit membership criterion for I. For example, the axiom of extensionality—two sets are identical if and only they have the same members—constitutes an identity criterion for sets. On the other hand, many an identity relation is well-defined although no identity criterion is apparent.

Some ontological theories conceive a *particular*, in contradistinction from a universal, as an instance—of a kind, type, general term, or in general, of an instantiable. Other theories conceive a particular as something other than an instance—as simply a particular, or as an existent explained by thisness, impredicable subject of predication, trope bundle, existent having attributes that are tropes, mereological sum, or, according to Platonic or immanent realism, an appearance partaking of, or whose content consists of, universals. In all cases a necessary condition of being a particular is noninstantiability.[15]

As the name makes plain, the target of NA is *individuation*. This single term has been used for many distinct concepts. I review these so as to clarify how to understand NA.

(1) *Relation of universals to particulars*. For those who hold that universals exist, individuation may be understood as the origination of particulars, or of what appear as particulars, from universals. Individuation is 'what it takes for a universal to become'

[15] An exception to this requirement of noninstantiability is a peculiar classification devolving within Nelson Goodman's mereological nominalism (*The Structure of Appearance*, 3rd. ed. [Dordrecht: Reidel, 1977], 159, 162, 177–179, 206). Goodman is concerned to treat every existent as an individual. He so defines terms that the predicate 'universal' applies to what he calls an 'individual' (what I call a 'particular') just in case the individual contains no complex that is unrepeatable. (For Goodman, an individual, understood as a mereological sum of one or more atomic qualia, is a complex if and only if every two discrete parts of it are together [as 'together' is rigorously defined]. A complex is repeatable if and only if it or some other complex of its category [kind] has instances.) This 'universal particular' is an individual with instances. By contrast, other nominalists dispose of universals by denying their existence, by reducing them to similarities to paradigm individuals, or by countenancing them while holding that existence is a category inapplicable to universals—all without saying that any particular (or individual) is an instantiable. As we shall later see, this classification by Goodman does not suggest that an early embryo is not a human individual.

particular.[16] Various mechanisms of origination have been imagined. These include partaking in transcendent Forms (in Plato's account), bundling of universals (in Russell's account), possession of features by imitating or sharing in universals, and instantiation as a directly apprehended primitive (in Armstrong's account).

(2) *Achievement of particularity*. Individuation has also been understood to consist in *particularization*, the satisfaction of necessary and sufficient conditions for being a particular.[17] This again is a concern in views that acknowledge universals. One proffered condition for being a particular is 'having a locus in spacetime.' Another is 'thisness.' The specified conditions depend on how particularity is understood. As noted, noninstantiability is invariably among them.

NA raises no doubt whether particularization has occurred. It is no part of the brief of an NA proponent to suggest that an early embryo is a universal.

Neither the concept of particular nor accounts of its realization (whether in terms of instances or other) alone specify in a given case *how many* particulars of a given kind exist, or their distinctness. In theory, E. J. Lowe points out, there could exist a homogeneous material *M* that is infinitely divisible in the sense that any bit of *M* is divisible into two or more bits of *M* (this contrary to physical theory supposing that divisibility ends at fundamental particles). Without more, particularization of the kind 'bit of *M*' achieved in some lump of *M* will not settle how many particulars of the kind 'bit of *M*' that lump comprises, even though distinctness of any two bits may be well-defined, this because there is no smallest bit of *M*. For this reason Lowe calls a bit of an infinitely

[16] Jorge J. E. Gracia, *Individuality, An Essay on the Foundations of Metaphysics* (Albany, N.Y.: State University of New York Press, 1988), 18, 84.

[17] Gracia refers to individuation not only as the satisfaction of conditions of individuality but as the *process of becoming* an individual (4, 18, 84, 141). (In his lexicon, 'individuality' and 'particularity' are synonymous [53].) But in his comprehensive taxonomy of views about what individuates (143–178), as well as in that of E. J. Lowe ('Individuation' in Michael J. Loux and Dean W. Zimmerman, *The Oxford Companion to Metaphysics* [Oxford: Oxford University Press, 2003], 75–93), all candidate individuators are attributes or conditions.

divisible homogeneous material a 'dividual' or 'quasi-individual.' What it is to be one of something is a precondition for counting.[18]

(3) *Discrete particularization*. The sense of individuation at work in NA is *discrete particularization*, the condition of, or the effectuation of the condition of, being one particular—a discrete *unit* particular—of a given kind. Here particularization is understood as in (2).

'Discrete' implies that distinctness is defined by virtue of an identity relation. In mathematics, identity relations sometimes tell us, as in the case of 4^3 and 8^2, that two relata that are identical qua members of one set are distinct qua members of another set (it already being evident that the relata are unit particulars of one set or another). So too will an identity relation report when we are using two names for the same physical object. The human synchronic identity relation contains pairs of names and definite descriptions (e.g., <Ethelred the Unready, the penultimate Anglo-Saxon king>), legal names and nicknames (e.g., <Charles, Charlie>), maiden names and married names, and so on. (The more intriguing case of a human diachronic identity relation depends on the answer to the problem of personal identity.[19]) In general, according to accounts treating particulars as instances, an identity relation's domain consists of a set of instances. According to accounts that do not understand the particularity of a particular as

[18] A dividual, he adds, is 'matter without form' (E. J. Lowe, *The Possibility of Metaphysics* [Oxford: Clarendon Press, 1998], 72–74, 77, 161, 201, and 'Identity, Individuality, and Unity', *Philosophy* 78 [2003], 321–336).

[19] Lowe holds that while an identity relation may exist in respect of it, 'person' denotes a primitive substance because no identity criterion can be stated (*The Possibility of Metaphysics*, 45, 60, 77, 169–173, 203, 209). Here he supposes that a person includes a mental or spiritual component. An expedient would be to assume a bijection from the set of persons onto a subset of the set of human organisms, whereupon we could rely upon our identity criterion for organisms in general. See also Lowe's *Kinds of Being* (Oxford: Blackwell, 1989), 136. This way of distinguishing persons would resemble a common method of mathematical proof in which one establishes some hypothesized property of a set (e.g., countability) by showing that there exists a bijection from that set onto a subset of some other set known to possess that property. Of itself, the recognition of a person as a primitive substance does not suggest that a twinnable embryo could only be one person. Nor does it suggest that it could not be a person.

instantiation, which accounts may hold particularity unanalyzable,[20] the particular may still fall within a kind—belong to a set—whose identity relation satisfies a necessary condition of individuation. A particular can instantiate more than one instantiable or belong to more than one kind. A bird in flight is both an animal and a flying object.

A distinguishing characteristic of discrete units is that one may count them. We often think that of a given kind of physical object, we have observed units whose discreteness is apparent from separation in Euclidean space, if nothing else (e.g., units of 'orange' in the grocery store). In other cases it may be more difficult to discern how many units of a given kind exist. Suppose one Nindy who is a proponent of NA. About unclarity on number of units, Nindy takes an early embryo to be a case in point. As Nindy would have it, an early embryo is, in respect of humankind, a blob. It is not infinitely divisible, hence not a dividual, and it may be a particular, even a discrete particular, of the kind 'blob,' but it is not a discrete particular of humankind. As to the last, it is unindividuated matter.

Discrete particularization is the sense of individuation supposed when Quine writes, 'We have an acceptable notion of class, or physical object, or attribute, or any other sort of object, only insofar as we have an acceptable principle of individuation for that sort of object. There is no entity without identity.'[21] For x to be an entity of kind K, there must be a fact of the matter whether x is the same instance or element of K as y. For as Quine elsewhere observes, 'The statements of identity ... consist of unlike singular terms that refer to the same thing.'[22] That *singular* terms are the relata of the identity relation reveals that for individuation, Quine demands not only an identity relation, but discrete particularization. Without discrete particularization, he holds, we do not have an acceptable notion of 'horse' or 'star.'

[20] See Lowe, *Kinds of Being*, 11–12.

[21] 'On the Individuation of Attributes', in *Theories and Things* (Cambridge, Mass.: Harvard University Press, 1981), 102. Quine refers to an identity criterion as a 'principle of individuation,' noting that attributes lack one (p. 100). See also his *Ontological Relativity and Other Essays* (New York: Columbia University Press, 1969), 23, and *From Stimulus to Science* (Cambridge, Mass.: Harvard University Press, 1995), 75. For reasons that will become clear in the discussion that follows, I was mistaken on a prior occasion ('Morals and Primordials', 1660) to think that 'No entity without identity' lends support to NA.

[22] Quine, *Word and Object*, 117.

When individuation is discrete particularization, as I shall take it to be, we may say that an *individual* is a discrete unit of a particular kind. An individual is a unit particular. Individuality is unit particularity. Or again, an individual is a member of the set of all and only those existents that are individuated. A human individual is a discrete unit particular of humankind.

Other authors sometimes take 'individual' and 'particular' to be synonymous, but as I have defined terms, the set of individuals is a proper subset of the set of particulars.[23]

NA, by alleging failure of discrete particularization, lays siege to human individuation but does not challenge particularization. Before returning to NA, I describe three other senses of individuation that we must distinguish from discrete particularization.

(4) *Achievement of unit status sans distinctness*. Individuation might be rendered as a particular's being or becoming a unit of a given kind for which no identity relation obtains. Lowe poses another unusual case, one that might evoke this sense of individuation. Lowe supposes that when in a "superposed" state of "quantum entanglement," the two electrons of a helium atom are countable even though there is no fact of the matter whether two singular terms used for the electrons name the same thing. He holds that countability and identity are independent so that in this case countability obtains even though distinctness is indeterminate.[24] Does this, contrarily to 'No entity without identity,' imply individuation without distinctness?

Leaving aside whether Lowe's construal of the quantum mechanical situation is accurate, and considering what is logically possible, there arises a dispute, between Lowe and critics, as to whether the truth value of any '*x* is identical to *y*' could be indeterminate. In any case, if we are given a list but it is indeterminate whether one or more of the list's entries denote the

[23] For other examples of nonsynonymous use of these terms, see Lowe, *The Possibility of Metaphysics*, 160–161, and Goodman, *The Structure of Appearance*, 178–179.

[24] Lowe, *The Possibility of Metaphysics*, pp. 33, 61ff., 74–75, 78, 160–161, 200. In mathematics, a set is said to be countable if and only if the set is finite or denumerable (denumerability obtaining if and only if there exists a bijection from the set into the natural numbers). When metaphysicians ponder countability, often they are concerned not with how large is the set, but with whether it is clear what to count (e.g., dividuals?) or whether the circumstances (e.g., of electrons) will permit the exercise.

same thing, we cannot count the entries. If we are able to count the number of electrons in a helium atom as two, it would seem that we have relied on an identity relation specifying identity and diversity. We may be inferring distinctness and number in the same observation, for example, upon ionizing. But the notion of countability independently of distinctness may not be coherent.

Lowe elsewhere says that an individual is "a countably distinct instance of its kind." Reading 'countably distinct' to impose the requirement of countability in the mathematical sense would untenably exclude from recognition as individuals the real numbers, the points in the plane, or anything else the cardinality of whose kind exceeds that of the natural numbers, but if 'countably distinct' is understood as 'discrete,' this concept of an individual is, within ontologies in which a particular is an instance, extensionally equivalent to the concept of a discrete unit of a particular kind. Supposing individuality thus understood, if attainment of countability were to suffice for individuation, and sometimes to obtain without distinctness,[25] not everything individuated would be an individual. Lowe's account will avert this anomaly only insofar as, in distinguishing attainment of countability from individuation, it requires distinctness for individuation. In all events, unit status independently of distinctness would seem to have no prospect of application to ordinary bodies such as life forms.

(5) *Differentiation*. In another sense, individuation of x consists in specifying what about x makes it different from others of some relevant kind. This sense travels with the view that individuality consists in being different from others.[26] This view seemingly presupposes discrete particularization of x—if x were not a unit distinct from others, how could x be said to differ from others?—but this view understands more by individuation. As Lowe puts it, 'What 'individuates' is whatever it is that makes it the single object that it is—what it is that makes it *one* object, distinct from others, and the very object that it is as opposed to any other thing.'[27] On this understanding (which in Lowe's phrasing ascribes

[25] Lowe calls the superposed electrons 'quasi-objects.' He does not say that they are individuals.

[26] Gracia observes that 'Apart from contemporary figures, most modern and many medieval authors either explicitly interpret individuality as difference or fail to distinguish between the two' (33 and 247, n. 13). See, e.g., P. F. Strawson, *Individuals* (London: Methuen, 1959), ch. 3, §4.

[27] Lowe, 'Individuation.'

an individual essence), individuation effects differences in attributes, differences wherein no doubt the explanation of distinctness may be said to lie.

What differentiates? In scholastic philosophy, this was the question of what is the *principium individuationis* when 'individuation' is taken to be differentiation. Authors have nominated categories of what differentiates—matter and form (two of Aristotle's four causes of change), dimensions, a bundle of features, and spacetime coordinates. Of physical objects, Quine remarks, 'They all have their impeccable principle of individuation: physical objects are identical if and only if coextensive ... Physical objects are well individuated, whatever else they are not. We know what it takes to distinguish them, even where we cannot detect it.'[28] It has been said that physical objects self-differentiate.[29] Some of the foregoing categories reduce to spacetime coordinates (assuming a reference frame). But it seems that no one category differentiates.[30] It can take all the attributes of a physical object to differentiate it from all others of its kind. That is, it can take the object itself.

The indiscernibility of identicals entails that two differing entities are distinct.[31] If we assume the converse, the identity of indiscernibles,[32] we would deduce from its contrapositive, the dissimilarity of the diverse, that distinct relata must differ. Why not therefore understand individuation as differentiation? The answer for present purposes must be that which version or versions of the

[28] *Theories and Things*, 101. Here by reference to both individuation and distinguishing of physical objects, Quine effectively says that physical objects meet both the stronger condition of being differentiated and the weaker condition of discrete particularization.

[29] Lowe's term is 'self-individuate.' But in the account in which he uses that term ('Individuation'), he takes individuation to be differentiation. The notion of self-differentiation does not effect a vicious circle of things said to come into being by acting on themselves; differentiation is explanatory, and this explanation merely invokes all the features of an existent in explaining why it is what it is.

[30] One confusing thread in the history of metaphysics consists in talk about whether or how the aforementioned categories effect particularity (or individuality). It seems clear that they do not. To mention one reason, attributes of these categories do not account for noninstantiability.

[31] $\forall x \forall y([x = y] \rightarrow \forall F\,[Fx \Leftrightarrow Fy])$. Here we apply the contrapositive.

[32] $\forall x \forall y(\forall F[Fx \Leftrightarrow Fy] \rightarrow [x = y])$. Versions differ as to whether F ranges over all attributes, over only nonrelational attributes, or over only qualitative attributes.

identity of indiscernibles (some versions being limited to nonrelational or qualitative attributes) is true is a matter of controversy. In order to be fair to NA, we should not assume any version, but instead assume it possible to satisfy discrete particularization without satisfying differentiation. (Imagine watching ball bearings come off a production line.) Differentiation is a stronger condition than what NA must deny.[33] NA succeeds if it negates discrete particularization. The NA proponent need not show a lack of differentiating features.

(6) *Epistemic process*. 'Individuation' has also been used to describe what we do when, as observers of reality and speakers of a language, we distinguish individuals. Quine also writes, 'When we do propound identity conditions for bodies or persons or classes, we are using the prior concept of identity in the special task of clarifying the term "body" or "person" or "class"; for an essential part of the clarification of a term is clarification of the standard by which we individuate its denotata.'[34] This sense will not figure in our discussion. NA purports to speak of what is.

3. Three Arguments Against Early Embryonic Individuality

3.1 Demanding Indivisibility

The general question posed by NA's appeal to twinning is whether discrete particularity may be contingent on what may occur to a particular or by means of a particular in the future. At first blush, it seems straightforward to answer this in the negative. Whether a being now constitutes a discrete unit of a given kind seems to admit of an answer regardless of the possibilities of what in the future befalls the being, how the being develops, or what the being does.

[33] In their leading statement of NA, Helga Kuhse and Peter Singer challenge the existence of 'a particular, identifiable individual' and of 'distinct individuals' ('Individuals, Humans, and Persons: The Issue of Moral Status', in their *Embryo Experimentation* [Cambridge: Cambridge University Press, 1990], 66, 68). As addressed to a Platonic realist, NA challenges the discreteness of an apparent individual.

[34] Review of M. O. Munitz, ed., *Identity and Individuation*, in *Journal of Philosophy* 69 (1972), 488–497. Quine similarly describes the individuation of propositions (*Philosophy of Logic* [Englewood Cliffs, N. J.: Prentice Hall, 1970], 8).

But to assess in its most favorable light the first argument for NA's premise (ii), I review the association of indivisibility with individuality.

3.1(a) The Possibility of Divisibility

In the ontology of Parmenides, reality was One rather than many. To this Parmenides added the thesis that what is is indivisible. After opponents ridiculed Parmenides, his student Zeno paid them back in their own coin. Zeno presented the following argument against divisibility of individual objects of finite volume. Assume that individual objects of finite volume are divisible. We take an object of finite volume and split it in half. We retain one half and put the other in a bin. According to assumption, any part of the individual object, being itself an individual object of finite volume, is divisible. And any part of a part of this object is divisible. And so on. The object is infinitely divisible. So we take the retained half and divide it, retaining one of its halves and putting the other in the bin. We repeat this process of splitting, retaining, and putting a part into a bin *ad infinitum*. The size of the retained parts gets ever smaller as we go. Now each of the parts in the bin must be of nonzero volume, since otherwise they would be nothing. As the process of splitting continues without end, the volume of the parts in the bin will be the sum of infinitely many nonzero volumes. Therefore the original object's volume must be infinite. But that contradicts the opening premise that the object's volume is finite. Since the object in question was arbitrarily chosen, this result follows for any other individual object of finite volume. Hence it is false, as initially assumed, that individual objects of finite volume are divisible.

The Parmenidean must offer some further argument to move from this result to the conclusion that reality is One. If granted the premise that the volume of the One is finite (although concededly huge), the Parmenidean could apply to the One the foregoing argument against divisibility of an object. It would then follow that the One is not divisible, or in other words, that reality is not many.

But our concern is not whether reality is One or many. It suffices for our purposes to observe that Zeno's argument fails because, as Zeno did not know, some infinite series converge. Let v be the volume of the finite object with which we began. The volume of the parts in the bin is

$$v(\tfrac{1}{2} + \tfrac{1}{4} + \ldots) = v \sum_{n=1}^{\infty} \tfrac{1}{2}^n = v$$

Divisibility does not lead to any contradiction of the assumed finite volume. While it could be true that matter is not infinitely divisible—that there exist indivisible elementary particles, and that spacetime is granular—Zeno did not show infinite divisibility impossible.

'Indivisible' and 'individual' both derive from the Latin *dividere*. Using 'divide' in a way that seems inapt to the modern ear, some medieval philosophers held that a distinctive characteristic of a universal is that it is 'divided' into individuals. A realist would nowadays instead say that a universal is multiply instantiated. If an individual is noninstantiable (as we would nowadays say), an individual is, in the medieval parlance, 'indivisible.' But as that does not cast doubt on a noninstantiable's divisibility in the material sense, we may leave this view aside.

Other medieval philosophers returned to a notion of individuality as indivisibility into parts. For Duns Scotus, the question is whether a candidate something was 'of its very nature numerically one, incapable of division into several individuals.' He answered that an individual is 'a this, to which any sort of division is abhorrent.'[35] 'An individual is incompossible with being divided into subjective parts.' Aquinas held that 'an individual is that which is undivided in itself and distinct from others.'[36] Suarez also understood individuality as a kind of indivisibility.

These scholastic formulations seem untenable unless one understands their use of 'indivisibility' as shorthand for some more nuanced concept. For if, contra Zeno, infinite divisibility is possible, so too must be divisibility once. Most of the garden variety things that we recognize as individuals—desks, rocks, and even, we are reminded by Procrustes, adult humans—are divisible. They are no less distinct individuals for that susceptibility. After we have split a desk or rock, the object does not seem to have been any less an individual before division by virtue of the fact that it was later divided.[37] Indivisibility *simpliciter* fails as a condition of individuality because at least some individuals are divisible.

[35] Quoted in Woosuk Park, 'The Problem of Individuation for Scotus: A Principle of Indivisibility or a Principle of Distinction', *Franciscan Studies* 48 (1988), 105–123, 112.

[36] Aquinas, *Summa Theologiae* I, Q. xxix, a. 4.

[37] Here I follow Gracia, 30–32.

To put a sympathetic interpretation on the notion that individuality demands indivisibility, we might read Scotus and Aquinas to say that indivisibility is the quality of being one—of not being two or more distinct beings—for counting purposes. Two things of the same kind stuck together and separable by pulling apart would not satisfy indivisibility as being one thing for counting purposes. In urging NA, Nindy wants to say more than that being two things stuck together is inconsistent with individuality. Nindy wants to insist that divisibility for any purpose is inconsistent with individuality.

So Nindy advances a more nuanced claim, a claim that becomes the opening premise of the argument to which we now turn.

3.1(b) The Divisibility Argument

Argument [1] for NA premise (ii), the premise that an early embryo is not a human individual, runs as follows.

(a) An individual is not divisible into surviving individuals of the same kind as itself.
(b) A human individual is not divisible into surviving individuals of the same kind as itself.
(c) An early embryo is divisible into surviving early embryos.
(d) Therefore an early embryo is not a human individual.

In respect of (a), Nindy points out that if we split a table, we shall not have two things of the same kind as the original table. We shall have but two remnants of a table. If (a) is true, (b) follows as a special case. Nindy then says in support of (c) that an early embryo consists in a collection of cells that could split to form multiple early embryos.

My response to this argument will proceed as follows. I shall argue that (a) is false. This leaves (b) unsustained, and hence the argument fails. I shall then pose attempts to rehabilitate the argument by replacing (a) and (b) with other indivisibility premises.

Mitosis is the routine process, in our bodies and in virtually all organisms whose cells have nuclei, in which new somatic cells originate by division of extant cells. Suppose at time t_0 a cell c

undergoing mitosis.[38] As of a later time t_1, c has completed the process of division, c no longer exists as such, and there now exist c's separated daughter cells, d_1 and d_2. As we look back on history from t_0 to t_1, we have no doubt that at all times prior to its division, c was an individual cell. Plainly c had the capability of dividing, and in fact, c did divide, but it is not incoherent to say, and we unhesitatingly do say, that for so long as c existed, c was an individual. Note also amoebae and bacteria, which divide into individuals of the same kind. In fact they reproduce by division. Neither the possibility nor actuality of dividing and separating impugns individuality. These biological counterexamples show (a) false. Whereupon without more, (b) is unsustained. Just as it is the case that the possibility or actuality of c undergoing mitosis and its daughters separating does not impugn c's cellular individuality, neither the possibility nor actuality of an embryo's twinning impugns an embryo's human individuality. Twinning is itself a case in which mitotically produced daughters separate. Hence there is no anomaly in saying that an early embryo capable of dividing is a human individual. Or that an early embryo that did divide was a human individual before it divided. With (b) unsustained, argument [1] does not go through.

Suppose then in hopes of rescuing argument [1], Nindy responds by weakening (a), replacing it with

(a′) An individual is not divisible without change in itself into surviving beings of the same kind and quantitative extent as itself.

This premise does not fall to the counterexamples of dividing cells, amoebae, and bacteria. Each of their daughters possesses less cytoplasm than that of its progenitor (although because the progenitor expands before division to approximately double its previous size, each daughter receives roughly the volume of cytoplasm of the preexpansion progenitor). The phrase 'without change in itself' blocks what would otherwise be the counterexample of infinitely extended beings, including sets of infinite cardinality, which happen to be divisible into individuals of the same kind and infinite extent.[39] For example, even if 'natural number' is a universal, the set ω of natural numbers is an

[38] The case of mitosis is posed by David Oderberg in 'Modal Properties, Moral Status, and Identity', *Philosophy and Public Affairs* 26 (1997), 259–298, 268, in reply to argument [2] for NA premise (ii).

[39] A counterexample adduced by Gracia, 31.

individual. ω may be partitioned into *X,* the set of even natural numbers, and *Y*, the set of odd natural numbers. It is proven in set theory that, where 'card' is the cardinality (size) of a set, card *X* = card *Y* = card ω = $\aleph_0$. But despite the fact that *X* and *Y* are each 'of the same kind and quantitative extent' as ω, ω could be said to change when partitioned.

Upon substituting (a′), Nindy modifies (b) and (c) *mutatis mutandis* to

(b′) A human individual is not divisible without change in itself into surviving beings of the same kind and quantitative extent as itself.

(c′) An early embryo is divisible without change in itself into surviving early embryos of the same quantitative extent as itself.

We now observe that a monozygotic twin possesses less mass than the early embryo from which it comes. Hence it appears that an early embryo is not divisible into surviving beings of the same kind and quantitative extent as itself. Twinning also changes the dividing early embryo. Consequently (c′) is false. Inserting (a′)–(c′) has not saved the argument, it has scuttled it.

3.2 A Conundrum About Identity

Argument [2] is intended to show that if one assumes that every early embryo is a human individual, one will be caught up short by the question of what happens to such an individual when monozygotic twinning occurs. The argument, in two versions, turns on identity.

The first version of [2] begins by assuming that every early embryo is a human individual. Suppose then an occurrence of monozygotic twinning in which an early embryo splits into twins. We now try to characterize what occurs. Consider

(p) The embryo survives as and is identical to one but not both of the twins.

This is implausible. Monozygotic twinning is symmetrical. It produces twins possessing a common genome. The twins exactly resemble each other and are often called 'identical twins.' We have no apparent explanation why an embryo that splits would survive as one of the twins but not as the other. Consider then

(q) The embryo survives as and is identical to each of the twins.

This is impossible. An identity relation is transitive and symmetric.[40] The twins cannot both be identical to some third thing (the original embryo) unless they are identical to each other. Instead the visibly separate twins are distinct. Thus we are left with

(r) The embryo does not survive.

This is to say that the embryo has died without leaving earthly remains. Dying without leaving a corpse seems to be a feat of which no human individual is capable.

In default of a coherent life history of the putative human individual—assuming none of (p), (q), and (r) plausible—it is concluded that the initial premise that every early embryo is a human individual must be false. No mention has been made of early embryos that do not split, but this *reductio* argument has been taken to show that, in respect of any embryo for which the possibility of twinning remains open, human individuality has not been established.

In the second version of [2], Kuhse and Singer begin not merely with the assumption that an early embryo is a human individual, but with a stronger assumption called by them 'the identity thesis.'[41] To state that thesis, let us say that a *developmental successor* of an entity *i* is an entity, whether in a prenatal or postnatal stage, into which *i* has developed, and that a *developmental predecessor* of *i* is an entity of which *i* is a developmental successor.[42] The identity thesis asserts that an activated human oocyte and its developmental successors are identical, that they are one and the same individual. Put the other way round, the identity thesis entails that any developed human individual is identical to its developmental predecessors—as far back as an activated oocyte. Thus I am identical to the fertilized oocyte from which I developed. To an identity theorist, 'zygote,' 'embryo,' 'foetus,'

[40] Identity is an equivalence relation (i.e., a transitive, symmetric, and reflexive relation). There exist equivalence relations other than the identity relation. For example, <5,3> and <9,7> are equivalent elements of the equivalence class of differences in natural numbers that is the integer 2, but <5,3> and <9,7> are nonidentical ordered pairs.

[41] Kuhse and Singer, 65–68; see also 107–108, n. 7.

[42] We may understand the reference to a 'developmental successor' in the thesis of zygotic personhood as stated at the outset according to the concept here defined.

'neonate,' and other terms for developmental stages are phase sortals. That is, an individual may cease to fall under any such term without ceasing to exist.

Kuhse and Singer argue that since, according to the same reasoning given in the first version, neither (p) nor (q) is true, the identity thesis must be false as to embryos that split, and that, since the remaining possibility (r) entails the absurd consequence of death without a corpse, it is false that every early embryo is a human individual. They go on to argue in the same vein that when fraternal twins (twins developed from distinct oocytes) fuse, it cannot be that one twin but not the other is identical to the emergent embryo, for the emergent embryo will contain a genomic contribution from each twin, nor can the twins both be identical to the emergent embryo, because the twins were distinct, and hence that there remains only the absurd result that one or both twins has died without leaving a corpse. So it must not have been the case that the twins were human individuals. This version says nothing about embryos that neither split nor fuse with others, but Kuhse and Singer suggest that we could best make sense of the failure of the identity thesis for monozygotic and fused twins by concluding that no early embryo is a human individual.

While portraying the identity thesis as a linchpin in the debate about embryo use, neither Kuhse and Singer nor Oderberg ascribe the identity thesis to anyone in particular. A proponent of zygotic personhood could disavow the identity thesis, assert only that a zygote is a person, and claim nothing more. But since the identity thesis could avail a proponent of zygotic personhood, we cannot regard it as a straw man. The thesis would enable the claim that if, as most of us think, an adult human individual is a person, then its zygotic predecessor, because it is one and the same individual, is a person. This offers a proponent of zygotic personhood a response to the contention that a developing human only gradually becomes a person. Absent the identity thesis, the proponent of zygotic personhood seems committed to an ontology of at least two persons per adult. For if we assume zygotic personhood but deny the identity thesis, then the zygote that became me was a person, but a different person than I, whereas if the identity thesis holds, a typical human life story is that of only one person. Still we should bear in mind that, notwithstanding this affinity between zygotic personhood and the identity thesis, the first version of [2] attacks the human individuality of an early embryo without regard to the identity thesis.

One might first think of challenging the dismissal of (p). Contrary to popular misconception, monozygotic twins are not qualitatively identical. Sometimes a monozygote inherits a genetic disposition to a disease while its twin does not; occasionally monozygotes even differ in sex. The causation of monozygotic twinning may involve genetic dissimilarities between cells. And the process of twinning is not perfectly symmetrical: it may distribute protoplasm unequally. Hence one might entertain (p). Instead we must recognize that there occur many cases in which NA's analysis of (p) stands. These are cases in which, even though monozygotes do not exactly resemble each other, they are so similar that one cannot plausibly purport to show why one twin would be identical to its predecessor and the other not.

Where argument [2] goes wrong is in dismissing (r). Death is not the only means by which a life form may cease to exist as such. Dividing is another means. After division, there is no corpse. The embryo that split was one human individual before it split, upon splitting that individual ceased to exist without dying, and now there exist two human individuals originated from the first. In speaking of division and death, Parfit remarks, 'To regard these as the same is to confuse two with zero.'[43] Two individuals have succeeded one that no longer exists. We could have inferred this from the biologist's aphorism 'All cells come from cells.' In monozygotic twinning, (r) is the result.

It follows that not every naturally conceived human individual begins by fertilization or begins as a zygote. Twins begin at twinning. So too not every plant begins as a seed; some begin as shoots taken from other plants. McLaren is correct to say, of embryos that have split, 'the "embryo" that develops from fertilization onwards is a different entity, which includes and gives rise to the "embryo" that grows into a foetus and neonate but is in no way coextensive with it.' She is incorrect to say this of embryos that have not split.

Oderberg would secure the point that twins begin at twinning by defining 'conception' as 'a change in the intrinsic nature of a cell or group of cells, where that change confers on the cell (or its descendants in the case of division) the intrinsic potential to develop, given the right extrinsic factors, into a mature human being.'[44] (By 'division' he refers to monozygotic twinning.)

[43] Derek Parfit, *Reasons and Persons* (Oxford: Clarendon Press, 1984), 262.

[44] Oderberg, 293.

Products of fertilization, clones, and parthenotes all originate by conception in this sense; monozygotic twins are conceived upon embryo splitting. This definition is consistent with the view that when monozygotic twinning occurs, which is not frequently, twins come into existence upon that event, not before (although we can 'trace' them to a zygote).

To Kuhse and Singer's version of the argument, the response earlier given to the first version applies. We may similarly explain fusion of fraternal twins as an event in which two human individuals cease to exist without dying. Each twin's contribution to their successor's genome makes untenable the notion that one but not the other is identical to the successor, while their distinctness precludes their both being identical to the successor. The successor is a new human individual.

As for the identity thesis, in the general case, we can trace an adult to a zygote, and so the thesis could be true. In the special case of an embryo that has split, we have said that the original human individual ceased to exist upon splitting, and two new human individuals succeeded it. Each twin's existence begins at twinning, though its origin can be traced to an activated oocyte. One might try to say that the identity thesis holds, that each twin is identical to its predecessors, by recognizing as each twin's first predecessor the dividing embryo. But since the dividing embryo has a zygote as predecessor, that zygote is a predecessor of each twin. It is more plausible to abandon the identity thesis in the case of monozygotic twins, to acknowledge that a twin is not identical to its predecessor zygote whose successor ceased.[45] This may sacrifice the economy of associating only one human individual with a life history, but the biological fact that monozygotic twinning occurs warrants the sacrifice.

Thus not only the possibility but the actuality of twinning is consistent with human individuality of the split embryo and its twin successors. If the case of an embryo that does split resolves in this way, no impediment arises to human individuality of an embryo that does not split.

[45] Oderberg classifies 'zygote' in this instance as a substance sortal, not a nonsubstance phase sortal (264).

3.3 Totipotency of Constituent Blastomeres

It might seem that Nindy would be tempted to confound opponents by suggesting the following. Because a single totipotent blastomere is fully capable of developing into an infant, any two-cell embryo is two individuals, any four-cell embryo is four individuals, and so on. But to say that would concede unit particularity, that which Nindy seeks to deny. Worse, it would commit Nindy to a count of individuals that, in the routine case in which the embryo never splits and there develops one baby, could not easily be explained by one who finds absurdity in cessation of existence without leaving a corpse.

Argument [3] for NA premise (ii) instead begins from the observation that, for so long as an embryo consists of totipotent blastomeres, the embryo is spontaneously divisible into surviving embryos. (I say 'spontaneously' to distinguish natural twinning from blastomere separation by external intervention, the latter a method of cloning in animal husbandry.) The next premise is that so long as an embryo remains divisible by blastomere separation into surviving individuals, the embryo is not a human individual. It is further asserted that the potential to become multiple individuals precludes the present individuality of any. Not until it is no longer possible for a separated cell to survive can one say that individuals exist, or how many. 'An early human embryo,' Kuhse and Singer conclude, 'is not one particular individual, but rather has the potential to become one or more different individuals.'

The first thing to say about this argument is that totipotency ends around day 4. So if the argument were sound, it would only disprove human individuation prior to day 4; it would not raise doubt whether a five-day-old blastocyst, from which embryonic stem cells may be derived, is a human individual. Secondly, as Oderberg writes, 'The potential of each cell in an embryo, early in its development, to become a distinct human individual is not the same as each cell's *being* a distinct human individual while it subserves the embryo of which it is a part.'[46] The potential to become multiple individuals does not preclude the individuality of the extant embryo. It makes sense to say that an embryo is a human individual; it does not fail to be such because each of its blastomeres is an individual blastomere or has the potential to become a human individual. It is no more anomalous to recognize

[46] Oderberg, 280. Where I use 'person,' Oderberg uses 'human being.'

the human individuality of a divisible embryo than to recognize the individuality of a plant each of whose shoots can develop into a plant. As Oderberg puts it, 'an organism is an individual with identity conditions ... even though it consists of parts which can themselves give rise to new individuals of the same kind.'[47]

Another decisive consideration against argument [3] is that spontaneous separation of totipotent blastomeres constitutes the mechanism of monozygotic twinning.[48] Argument [3] asserts that an embryo is not an individual so long as it remains divisible by blastomere separation into surviving individuals. That implies that an embryo is not a human individual so long as the possibility of twinning by blastomere separation obtains. To say that is merely to repeat argument [1] for the special case of embryos that have not reached the blastocyst stage.

4. Divisibility and Personhood

Suppose that Nindy, still determined to find a place for indivisibility in our thought, proposes that indivisibility is intrinsic to the notion of person, even if not to individuality.[49] So Nindy argues as follows:

(e) A being divisible into surviving beings of the same kind as itself cannot be or correspond to a person.
(f) An early embryo is divisible into surviving early embryos.
(g) Therefore an early embryo is not a person.

The phrase 'or correspond to' in (e) pertains to any nomologically possible person associated (e.g., by Hare) with an embryo.

What ground might there be for (e)? For Aristotle, individual objects like tables, Socrates, and embryos are primary substances. Universals are secondary substances. A person is a primary substance.[50] Following in this vein, Boethius held that a person is 'an individual substance of a rational nature.' Aristotle might be interpreted to assume that a primary substance is indivisible and is

[47] Oderberg, 282.

[48] It has been estimated that roughly one-third of monozygotic twinnings occur by blastomere separation at the two-cell stage. See Ann A. Kiessling and Scott Anderson, *Human Embryonic Stem Cells* (Sudbury: Jones and Bartlett, 2003), 70.

[49] I am grateful to George Daley for urging this claim.

[50] *Categories*, ch. 5, 2a10.

neither predicable of nor part of any other being. In such case a divisible being could not be a person. Thomas Reid wrote that 'a person is something indivisible, and is what Leibnitz calls a *monad*.'[51] The notion of a part of a person 'is a manifest absurdity.' No one would lose part of their personhood, Reid remarked, if they lost a limb or other body part. 'We find it so difficult to comprehend,' observes Lowe, 'how a *person* could split or divide, since only what has parts seems capable of division.'[52]

Why cannot a finite being divisible into surviving finite beings of the same kind be or correspond to a person? Nindy first says that it is in the nature of a cell, including a unicellular organism such as an amoeba or bacterium, to divide into individuals of the same kind and quantitative extent, but that it is not in the nature of a multicellular organism so to divide. To this we might respond by pointing to a plant any of whose shoots, when broken off and planted in the ground, will grow into a distinct plant. Perhaps then, Nindy rejoins, it is animals whose nature it is not to divide. Whereupon, with apologies for the comparison, we advert to worms. A flatworm of the genus *planaria* can be divided and, after a regeneration process (drawing on a reservoir of stem cells) at both termini, the result will be two surviving flatworms (and no corpse). We do not doubt that the predivision worm was an individual worm.

There occur some instances of division (as in mitosis and reproduction of amoebae and bacteria) in which the dividing life form ceases to exist as such, and other instances (as in plants) in which the dividing life form survives.

So next Nindy ventures that, setting aside the disputed case of embryonic division, surely we do not think that a developed human person can divide, or be divided, into a surviving human person. As an observation about the human body and the present suite of medical procedures, so much may be true. Yet if as has seemed to many philosophers, personhood is constituted by or correlates with cerebral activity, continuity, or connectedness, then divisibility seems logically possible. The experiences of patients who have undergone commissurotomies have been said to demonstrate divisibility of consciousness.[53] In this procedure, performed in cases of intractable epilepsy, a surgeon severs the *corpus callosum*, the thick bundle of nerves connecting the hemispheres of the brain.

[51] *Essays on the Intellectual Powers of Man* (1785), Essay III, ch. 4.
[52] *Kinds of Being*, 130.
[53] See, e.g., Parfit, *Reasons and Persons,* 245–246, 255.

The result is dual consciousness—as if there were two brains. The left and right sides do not, as it were, know what each other is doing, and two independent streams of consciousness occur. But the characterization of this as split consciousness, and perhaps thereby split personhood, is debatable. Michael Tye has suggested that the patient might instead have 'a phenomenally disunified consciousness in certain special situations while retaining a unified consciousness elsewhere.'[54] For anyone who holds that a person is an embodied mind, it may also be held that dual consciousness, if it occurs, does not imply the existence of more than one mind.[55] There is also of course the view that consciousness does not alone account for personhood. The example of commissurotomy is not decisive against Nindy's claim that a developed person is not divisible into a surviving person.

We can imagine another operation whose result does refute that claim. Suppose that our friend Oliver—a talking, walking, lively fellow—undergoes a brain split and transplant operation. The surgeon splits Oliver's brain and transfers the halves each to a new body. The surgeon does this so dexterously that, although Oliver's body does not survive the operation, each transplant recipient retains Oliver's memories and otherwise displays such psychological continuity with Oliver that we are inclined to think that Oliver lives on in one or both transferees. (After all, as Peter King has whimsically observed, it is possible to survive with only half a brain, though in such case one is confined to a career in politics.) Whether either transferee *is* Oliver is a matter that I leave aside.[56] For the present context, we want to know whether there obtains any reason to deny that, before the operation, Oliver was a person. Or to deny that Oliver was a human individual. It seems to me that we

[54] Michael Tye, *Consciousness and Persons* (Cambridge: MIT Press, 2003), 135. See also Thomas Nagel, 'Brain Bisection and the Unity of Consciousness', in John Perry, *Personal Identity* (Berkeley: University of California Press, 1975), 227–245.

[55] Jeff McMahan makes this point in *The Ethics of Killing* (Oxford: Oxford University Press, 2002), 87.

[56] One view is that in the general case of associating me at some past time with me today, one should leave aside the question of personal identity. Parfit infers from his case of My Division (a brain split and transplant operation like Oliver's) that 'personal identity is not what matters,' and that what does matter is psychological and physical continuity and connectedness. To which he adds that 'we have conclusive evidence that the carrier of psychological continuity is *not* indivisible' (255, 259).

have no more reason to deny that the preoperative Oliver was a person, or a human individual, than to deny that a worm that splits was an individual worm before it split. A person could be divisible. All the foregoing follows without appealing, as would some views, to a belief that a person is wholly or partly a mind or spirit. Within those views, personal divisibility is yet more easily imagined.

As premise (e) is unestablished, the argument relying upon it fails. When an embryo is capable of dividing or does divide—in this case we do not have to imagine surgery—that attribute is not inconsistent with its being a person before dividing.

5. Attempting Rehabilitation of the Nonindividuation Argument

I have argued that no notion of indivisibility states a necessary condition of individuality or personhood, that nonidentity of an embryo with successor twins does not impugn the status of an early embryo as a human individual, and that totipotency of constituent blastomeres does not impugn that status either. But Nindy may remain unconvinced. 'Perhaps,' says Nindy, 'I have not put my finger on precisely the right failing, but I suspect that an early embryo fails to satisfy some important condition of being a human individual.' So let us inquire whether, apart from the premises already ventured, there circulates some metaphysical view according to which human individuality demands some attribute that an early embryo lacks. If so, and if that view happens to be an otherwise plausible metaphysical view, NA might be saved.

5.1 Metaphysical Accounts and Individuality

When recognized as such, individuals are said to populate classes and to admit of characterizations according to what have variously been described as properties, attributes, and features. Some philosophers conceive properties, attributes, and features as universals, which they understand as multiply instantiable. Nonsortal general terms such as 'red,' often said to name 'characterizing universals,' do not incorporate any precise criterion about what qualifies as an instance. A sortal, on the other hand, travels with both a membership criterion, a defining condition for being an instance, and an identity criterion, a defining condition for

determining when two expressions designate the same instance.[57] A sortal is a 'count noun.' Examples are 'horse,' 'airplane,' and 'man.' Someone might claim that because 'early embryo' is a sortal, any early embryo is a unit particular, since otherwise it could not be counted. But that claim would beg a question at issue. Nindy contends that the biological characteristics of an early embryo are such that discrete particularization has not occurred, and that in consequence, 'early embryo' is not a sortal.

The report from the battlefield tells us that in past skirmishes, each of competing answers to the problem of universals, the conflict in which individuality is caught up, has been shown vulnerable on some flank. Each fails to accord with common sense, commits to an unparsimonious ontology, implies some regress, or exhibits some other weakness. But in an effort to see whether support for NA lies within any plausible metaphysical theory, I interrogate the leading ontological accounts in the following vein.[58] Do individuality or individuation demand the satisfaction of some condition, over and above unit particularity, that an early embryo fails? Does individuation come about through some individuator that an early embryo lacks?

Platonic realism denies the existence of particulars as such (which is why the view has few modern adherents). The Platonic account is concerned in the main with depicting the Forms, the existents whose imitation is said to present us with the appearance of particulars. Appearing as a particular ('individuation' in sense [1] earlier listed) obtains in virtue of partaking in the Forms at some spacetime locus different from the loci of other apparent particulars. An alternative account will say that what appears as a particular is a cluster of the universals of apparent features, a

[57] 'Sortal' sounds like a neologism of contemporary philosophy, but in fact originated with Locke. He formed it from 'sort,' likening this coinage to that of 'general' from 'genus' (*Essay Concerning Human Understanding,* III, iii, 15). The concept harkens to Aristotle's observation that a species or genus 'does not signify simply a certain qualification, as *white* does. *White* signifies nothing but a qualification, whereas species and genus mark off the kind of substance—they signify what sort of substance' (*Categories* 3b17–21 and chs. 1–20).

[58] I am indebted for what I have been able to see of this landscape to the above cited works of Gracia and Lowe, to Michael Loux, *Substance and Attribute* (Dordrecht: Reidel, 1978), and to D. M. Armstrong, *Universals and Scientific Realism* (Cambridge: Cambridge University Press, 1978) and *Universals*, *An Opinionated Introduction* (London: Westview, 1989).

cluster distinct from other clusters (as vectors of an *n*-dimensional vector space are distinct). These accounts are notorious for not fleshing out these notions of partaking and clustering. These accounts do not embellish the notions of particular or individual beyond discrete particularity. Hence they do not suggest that an early embryo would not be a particular or apparent particular of the universal humankind.

The nominalist is concerned to show how we may dispense with talk of universals. Versions of nominalism (including conceptualism, class nominalism, resemblance nominalism, predicate nominalism, and Bambrough's interpretation of Wittgenstein, which accounts for the reach of general terms by family resemblance) vary in how they explain seeming universals. For the nominalist, the question 'what makes something a particular?' is trivial. Since every existent is particular, the answer is existence. Since the nominalist wants to deny the existence of anything but particulars, the nominalist is not motivated to demand more for individuality than discrete particularization as demanded by my definition. The same is true for the characterized particular view, which holds that substances are essentially particular.

An ontological account that pays close attention to individuality, Gracia's version of nominalism, adopts a view with a long pedigree, the view that a particular is a noninstantiable instance of an instantiable.[59] This account is distinguished by taking the stance that mention of instantiables does not imply existence of instantiables. Gracia holds that instantiables, which is to say universals, 'are neutral' with respect to existence. 'Existence is a category that does not apply to them.'[60] It seems straightforward that humankind is an instantiable. Nothing in this account suggests that an early embryo would not be an instance of humankind, nor that an embryo is itself instantiable.

[59] For accord, see Lowe, *The Possibility of Metaphysics*, 155. Gracia classifies his own account as 'strong derivative nominalism.' Other versions of 'derivative nominalism' add notions of relations between individuals and such abstractions as natures (Gracia, 83, 118). But these do not seem to bear upon embryos in any important way.

[60] Gracia, 235. To like effect is a view, embraced by Armstrong, that universals are ways that things are (properties) and ways that things stand to each other (relations). But Armstrong also holds that "Universals are constituents of states of affairs. Space-time is a conjunction of states of affairs. In that sense universals are 'in' space-time" (*Universals, An Opinionated Introduction*, p. 99).

Two other nominalist accounts take a different stance on particulars and thereby on individuals. Mereology (after μεροσ for 'part') attempts to account for the logic of parts and wholes. The project has been carried out, using the primitive term 'overlap,' by Goodman.[61] In Goodman's mereological nominalism, what he calls an 'individual' (or what I call a 'particular') is a sum of its parts, and in respect of a property, is a part of the aggregate of all things possessed of that property. Goodman's individuals are such that no two of them break down into the same atoms,[62] where an atom is something that has no part other than itself. A point that bears on NA is that in Goodman's account, 'an individual may be divisible into any number of parts; for individuality does not depend on indivisibility.' In two cases, Goodman even demands divisibility: 'An individual is "concrete" if and only if it is exhaustively divisible into concreta'; 'An individual is "particular" if and only if it is exhaustively divisible into unrepeatable complexes.'[63] No support for NA appears here.

[61] *The Structure of Appearance*, ch. 2, and Goodman's paper with W. V. Quine, 'Steps Toward a Constructive Nominalism', *Journal of Symbolic Logic*, 12 (1947), 105–122, reprinted in Goodman's *Problems and Projects* (Indianapolis: Bobbs-Merrill, 1972), 173–198. Another thorough account is Rolf A. Eberle, *Nominalistic Systems* (Dordrecht: Reidel, 1970). I am indebted to Israel Scheffler for insights into mereology.

[62] Goodman, 'A World of Individuals', in *Problems and Projects*, 159–163.

[63] Goodman, *The Structure of Appearance*, 33, 150, 178–179. A concretum is defined as any complex that is together with no individual.

When the nominalist J. H. Woodger undertakes to show that a scientific theory can be stated using only logical operators, primitives, and relations such as 'part of' and 'precedes in time' ('The Technique of Theory Construction' in Otto Neurath, Rudolph Carnap, and Charles Morris, eds., *Foundations of the Unity of Science*, vol. 2 [Chicago: University of Chicago Press, 1970], 499–531), he sets forth a theory built on the concept of a cell. As the theory takes shape, it accounts for both reproduction by division and for fusion (pp. 512–514). Whereupon Woodger surmises that if it happens that his exemplified theory applies only to organisms and their parts, he has come close to defining biology. He sets forth a yet more detailed account of biological constructs in *The Axiomatic Method in Biology* (Cambridge: Cambridge University Press, 1937), 58 ff. There he uses the concept of a time slice. The time slices of a creature, he takes pains to say, include prenatal time slices. In the case of a dog, for example, 'One state develops from preceding ones, but they are *all* dog-states' (132–133).

For Goodman, a person, table, or river is a mereological sum of time slices. (One can step into the same river twice, observed Quine, but not

Nominalist trope theory renders a particular as either possessed of attributes that are tropes (in the 'substance-attribute' version), or consisting of a bundle of compresent collocated tropes (in the 'bundle' version). Tropes are properties and relations conceived as particulars rather than as instances of instantiables. Tropes may also be thought of as ways that things are (properties) and ways that things stand to each other (relations). Two particulars cannot share a trope, but exact resemblance among tropes gives rise to an equivalence class of tropes. Resemblances among representative elements of trope equivalence classes will account for what realists see as resemblances among universals.[64] The equivalence classes serve as erzatz universals. It is natural to say that tropes differentiate the particulars to which they belong. But it has been pointed out that to say that tropes differentiate their particulars is circular insofar as particulars differentiate their tropes.[65] None of this entails an account of individuality other than discrete particularity. One may still speak of kinds of entities possessing tropes, and of sorts of trope bundles, including humankind, of which an early embryo may be a unit.

Among views that find a role for both particulars and universals, we find several for which particulars are unanalyzable. These views commit to particularity without purporting to explain it. A particular is such in virtue of a primitive 'thisness' (*haecceitas*) or property of being that very particular, said Scotus, or in virtue of a substratum, something 'I know not what,' said Locke. Ineffability does not show to the advantage of these theories in competition with rivals. We need not enter into that competition here. The 'bare particular' view also holds that particularity obtains *tout court*. A bare particular is imagined as some sort of substratum lacking properties, odd as that may seem. In Armstrong's ontology, particulars are simply instances, instantiation being taken as primitive. These accounts do not purport to inventory the particulars of the world. But it is clear that they regard the objects of our physical world as among them, and that they do not conceive individuality as other than discrete particularity. If anyone says that a given object is an individual by virtue of thisness or a substratum,

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into the same river stage twice ['Identity, Ostension, and Hypostasis' in *From a Logical Point of View*, 2nd ed. (New York: Harper and Row, 1961), 65]). An embryo at a given time could be a time slice of a person.

64 Armstrong, *Universals*, 121–125.

65 See Lowe, 'Individuation.'

or qua bare particular, it will be hard not to say the same of all other objects. Humans, whatever their stage of development, are objects.

Our tranche of philosophical thinking about universals and particulars admits of a convenient summary. Within leading ontological accounts, there does not appear any condition of human individuality or individuation that an early embryo does not satisfy.

5.2 Human Units of Biological Kinds

Earlier we distinguished particularization, differentiation, and discrete particularization. But we did not explore the question of what constitutes a unit particular (or for a realist, apparent particular) of a given kind. There seems no categorical answer. The conditions, even the sorts of conditions, that qualify something as a unit particular vary with the kind of particular. We define a unit of 'tennis ball' by different sorts of conditions than those by which we define a unit of 'snowstorm.'

In our everyday observations of nonliving objects, we do not find discrete particularization remarkable. Objects belong to multiple kinds, but usually in respect to our field of view, we think of some kind or other of which a given object clearly seems a unit. Thus do we think that we observe discrete pencils, horses, and tennis racquets. We might even suppose that all particularization is discrete. An example of a dividual, if any, would show that it is not. Life forms pose cases that can confound us. We have seen that none of indivisibility into survivors of the same kind, identity with successors by twinning, and nontotipotency of constituents is a necessary condition for being a discrete unit particular of humankind. We have not said what constitutes a unit particular of our species. We might try this answer: a human unit particular is a primate with a trunk, a head, two legs, two arms, various specified organs, a 46-chromosome diploid genome with various specified sequences—all subject to variation within some range (including coupling with another, or conjoint twinning). But this could describe only developed humans. For a prefoetal stage, 'unit' must have some other markers.

I turn to the philosophy of biology for a line of reasoning about biological units. There exist many kinds of biological particulars. 'Any entity,' it has been remarked in a study by Jack Wilson entitled *Biological Individuality*, 'at any level of biological organization from an organic molecule to a taxon is going to be a particular.' The

particulars include 'single cells, organisms, populations of organisms, symbiotic associations or organisms, species, and higher taxa. These things have very little in common.'[66]

In Michigan's Upper Peninsula there exists an underground fungus—at least we may provisionally call it 'a' fungus—spanning over 35 acres, thought to be about 1500 years old, and estimated to weigh about 100 tons.[67] It seems clear that what is growing underground is not an instantiable, not a universal, and hence particular. But how many instances of 'fungus' exist there is unclear. Extensive genetic sampling indicates the same genome throughout the expanse. The discoverers therefore have hypothesized that there exists an individual fungus. Critics have replied that the mass is disconnected, hence not a fungus unit but multiple individuals. This poses a variation of the Parmenidean problem of one or many.

Many other life forms similarly perplex. A colonial siphonophore such as the Portuguese man-of-war consists of zooids each of which could be recognized as an organism, yet as a colony, they constitute a functioning whole nearly indistinguishable from a jellyfish. A lichen too is recognizable as an individual but consists of independently recognizable algae and fungi in symbiosis. There are many other such examples.

There does not appear to be, for a given species, a single biological kind of which every species member is an individual. We may recognize the following multiple kinds associable with a species.[68]

> A *single-genome life form* is a living being whose parts share a genome, i.e., share a chromosome complement characteristic of that being's species (with allowance for polysomy and monosomy) and which they have obtained by descent from a common ancestor. A unit of this kind is a *genomic unit*.

[66] Jack Wilson, *Biological Individuality* (Cambridge: Cambridge University Press, 1999), 57, 62, to which I owe each of the biological examples that follow.

[67] Myron Smith, Johann Bruhn, and James Anderson, 'The Fungus *Armillaria bulbosa* Is Among the Largest and Oldest Living Organisms', *Nature* 356 (1992), 428–431.

[68] Here I draw on Wilson's account while departing from his formulation in various respects. Where Wilson introduces 'kinds of biological individuals,' suggesting that individuality is not univocal, I recognize multiple kinds, each kind having individuals as members, but I continue to use 'individual' for a single ontological mode.

> A *develope* is a genetically homogeneous product of a single developmental process beginning with a cell or group of undifferentiated cells. A unit of this kind is a *developmental unit*.
>
> An *historical life form* is a biological continuant or sequence of time slices beginning at a discrete time and ending at a discrete time. A unit of this kind is an *historical subject*. A species may be an historical subject.
>
> A *functional life form* consists of a living integrated structure of heterogeneous causally integrated parts functioning as a behavioral whole. Integration involves interaction between the entity's parts such that the parts cohere and matter to each other. The greater the extent of integration, the greater the impairment if a part is severed from the whole. An individual of this kind is a *functional unit*.
>
> A *connected entity* is an entity connected in Euclidean space save only for such microscopic gaps as occur in all matter. A unit of this kind is a *connected unit*. A scattered deck of cards is a unit of 'deck of cards,' but not a connected unit.
>
> An *evolutionary target* is a life form on which evolution acts. A unit of this kind is a *unit of selection*.

With each species may be associated the foregoing (and other) kinds. Thus we may have a human genomic unit, human functional unit, and so on.

One way to explain Michigan's 'humongous fungus' is to say that there exists one genomic unit and that there exist multiple functional units, developmental units, and connected units. In general, asexually-reproducing plants issue in clones that are separate functional units but together form a single genomic unit. Whereas a caterpillar metamorphosizing into a butterfly also exemplifies how two developmental units can be one genomic unit. In the colonial siphonophore, a zooid is the largest developmental unit; the colony is a functional unit. A blackberry plant, connected by runners, some of them severed, may constitute a developmental unit consisting of multiple genomic units and connected units. So too for species of fern and bamboo. Some cellular slime molds contain a grex, a functional unit that moves around as such, but consists of multiple genomic units. A sexually-produced dandelion and its genetically identical asexually-produced clones constitute a genomic unit and unit of selection while consisting of many functional units and scattered connected units.

But what we observe in the foregoing examples is not common among metazoans (higher animals). A metazoan will typically constitute a genomic unit, developmental unit, functional unit, historical subject, connected unit, and unit of selection—at least for postnatal stages of development—even though those kinds of units differ in modal properties, as in the conditions that cause them to cease.

What is the situation for human prenatal stages? In a zygote, even as maternal and paternal chromosomes reside in separate pronuclei until day 2, they have been paired inside a zona pellucida and are undergoing a process leading to their union. By the two-cell stage, the two genomes have combined. Hence by the two-cell stage at the latest, the early embryo is a new genomic unit. The zona pellucida is this individual's recognizable boundary. The early embryo is also a developmental unit. It is a genetically homogeneous product of oocyte activation undergoing embryogenesis, a single developmental process that began from one cell to which another contributed. Because the germ line is terminally differentiated and access to the germ line is foreclosed, which entails that the universe of heritable allelic variations is already determined, the early embryo is also a unit of selection existing at an early developmental stage. The zygote is also a functional unit insofar as any cell is a functional unit by virtue of its sophisticated integration.

But Wilson suggests that after a zygote divides, the early multicellular embryo is not a functional unit. Each of the blastomeres is a functional unit (and in the first few days a totipotent one) but the collection of blastomeres is not causally integrated. 'Removing a cell,' Wilson writes, 'does not have a significant effect on other cells.' The cells are merely 'stuck together.' Later he remarks that a human individual is a functional unit.[69] Taken together, these remarks suggest an argument. They suggest that for however long an early embryo's blastomeres are merely 'stuck together,' the early embryo is not a human individual.

I reply to this argument as follows. Fertility clinicians operate on the assumption that at the eight-cell stage and thereabouts, many embryos can survive meticulous removal of a whole blastomere. This assumption is the basis for the practice of preimplantation genetic diagnosis. The clinician removes a blastomere while effecting only minimal damage to the zona pellucida and without puncturing the other blastomeres. But it is another thing to say that blastomere removal has no significant effect on embryo function.

[69] Wilson, 90, 106, 111.

To say that a worm survives being cut in half is not to say that the event had no effect on it. Following blastomere removal, some embryos die. For those that survive, we may not know the full effect of blastomere removal. Whether an embryo's survival after losing a blastomere shows that the embryo was never integrated depends on what integration is. Suppose that we understand integration in either of two strong senses according to which a being is integrated only if its parts are codependent,[70] or is integrated only if each of its parts is requisite for development of the whole. On either understanding, an embryo that survives blastomere removal is not integrated. On the other hand, we might understand integration in a weaker sense according to which a being is integrated if it consists of parts contained within a boundary and the parts affect each other. An early embryo may satisfy this weaker definition. We have evidence that by about the eight-cell stage, there form structures involved in intercellular communication. 'Tight junctions' and 'desmosome-like structures' have been observed at the six-cell stage.[71] Through such connections, developmental information passes between cells. It may be that through these connections, blastomeres influence gene expression and eventual differentiation in each other.[72]

Wilson proposes as a test for integration whether the entity in question loses functionality upon being severed. An early embryo passes that test. If a clinician, in performing preimplantation genetic diagnosis, were to cut indiscriminately across an embryo, the embryo would be destroyed.[73] (It will not rebut this to mention

[70] I am grateful to George Daley for explaining to me the evidence about how this concept comes to bear here.

[71] B. Dale et al., 'Intercellular Communication in the Early Embryo', *Molecular Reproduction and Development* 29 (1991), 22–28. 'Desmosome' describes a site of adhesion.

[72] The time at which expression of the embryonic (as opposed to the maternal) genome begins has been observed. See Peter Braude et al., 'Human Gene Expression First Occurs Between the Four- and Eight-Cell Stages of Preimplantation Development', *Nature* 332 (1988), 459–461.

[73] There is also evidence that disturbance of the zona pellucida renders monozygotic twinning more likely (M. Alikani, N. Noyes, J. Cohen, and Z. Rosenwaks, 'Monozygotic Twinning in the Human Is Associated with the Zona Pellucida Architecture', *Human Reproduction* 9 [1994], 1318–1321), though on the basis of what is presently known, this could be explained by mechanical forces pushing a blastomere through a breach in the zona.

mitosis and twinning. They are not instances of severing. Rather they involve systematic replication preceding orderly division.)

So if we apply either the foregoing weaker sense of integration or Wilson's test, the claim that a preblastocyst embryo is not integrated exceeds if not defies our present knowledge.It may be that 'integrated' is vague.[74] There may be no bivalent concept such that whether an early embryo is integrated can be given a 'yes' or 'no' answer. It appears that the extent of integration increases over time—rapidly enough, in fact, that a blastocyst is integrated in the strong sense. By that stage, totipotency is no more, pluripotency obtains, and specialization has begun. Some cells have committed to the inner cell mass, others to the trophoblast. 'Gap junctions' have been observed connecting trophectoderm cells and the inner cell mass.[75] The cells of the blastocyst are codependent. They matter to each other. Thus the argument against individuality that Wilson's remarks adumbrate does not gain traction as to embryonic stem cell research insofar as that research uses blastocysts.

Insofar as a given line of research uses preblastocyst embryos, even if the adumbrated argument showed that they were not functional units, it would remain the case that each *contains* functional units. Moral concern will attach to totipotent constituents of an early embryo. Each is capable of developing into a neonate.

The final and perhaps most important reply to the adumbrated argument applies to all early embryos. We have no reason to conclude that a human individual is only a functional unit. We have reason to think that a human individual is a genomic unit, a developmental unit, and a unit of other kinds—and as earlier indicated, to think this of prenatal stages. Why should we suppose that I, for example, am an individual of *only* one kind? As has been remarked in reply to Wilson, 'Each human functional individual, on his view, shares its matter with a genetic and a developmental individual ... [H]ow could anyone *know* which thing one is?'[76]

A human individual of any kind may place moral demands upon us. A human genomic unit is a particular object of concern. That a new human genomic unit exists has sometimes been said to establish that a new person exists. (As I shall note in closing, that is precisely the position taken in the official Catholic teaching.) With a genomic unit, people associate uniqueness. They sometimes also

[74] I owe this insight to McMahan, *The Ethics of Killing*, 28–29.
[75] Dale et al.
[76] Eric Olson, *Philosophical Quarterly* 51 (2001), 264–266.

associate with a genomic unit the notion of a command center programming development and functionality.

If the question is whether one may sacrifice a unit of any human biological kind, it must be shown why an individual of that kind is not an object of moral concern.

We have not encountered any reason to think that twinnability jeopardizes an embryo's being a unit of a human biological kind. So far as the characterization of monozygotic twins is concerned, there exist, immediately after twinning, one genomic unit and two units of other kinds. By virtue of mutations, monozygotic twins eventually become distinct genomic units.

5.3 Other Moves

Another objection to zygotic personhood might consist in the claim that because at first cells that will become the placenta intermingle with cells that will become the embryo, individuation qua human cannot precede the assignment of cells to their embryonic and placental fates. That assignment is recognizable as of the blastocyst stage, when the inner cell mass and trophoblast are separately visible under the microscope. But the presence at any earlier stage of cells that could become placental does not give us reason to doubt whether there then exists a human individual. We only have reason to observe that the developing organism will develop a part through which it will obtain nutrition during its gestational life.

David Wiggins characterizes the brain as the 'individuating nucleus' of a person, this while considering the hypothetical case in which Brown's brain is transplanted into Robinson's body.[77] After the procedure, it appears that the surviving human, Brownson, is—so far as one can tell by personality, memory, and all other behavioral traits—Brown. With the brain goes the person. Here Wiggins understands 'individuating' as 'differentiating.' That a brain suffices for individuation as differentiation does not imply that a brain is necessary for individuation as discrete particularization.

Religious traditions might bring an entirely different case against NA. Within a view holding that ensoulment occurs at fertilization, twinning may be understood as effecting soul fission. When an embryo splits, an ensouled person ceases and two others come into

[77] David Wiggins, *Identity and Spatio-Temporal Continuity* (Oxford: Basil Blackwell, 1967), 51.

being. A fusion of embryos is a fusion of ensouled persons. Neither the possibility nor occurrence of twinning or fusion undermines individuality. A religious proponent of zygotic personhood does not yield ground by acknowledging that persons cease when embryos split or fuse. The proponent only acknowledges instances in which lives end. The proponent may subsume these endings within a belief already in place, the belief that, after life, the souls of young innocents, thus far understood to include embryos that do not implant, foetuses that die before birth, and children who die before the age of reason, enter a state of eternal rest. In the alternative, one might hear it said that inasmuch as God knows in advance, or decides, the course of an embryo's development, He creates two souls when twinning will occur, one when it will not. It might also be held that any early embryo contains at least one individual, and even that in an embryo that divides, two persons were cohabiting before the division.[78] For an analogous case, a Christian proponent of this view might cite the belief that there exist three persons in one God. Far from licensing experimentation, this line of thinking would pose the question whether an experimenter has killed two persons or one. According to what I have above argued, NA is refutable without taking on board the metaphysical commitments of these theological and multiple occupancy views.

6. In the Aftermath

Had NA succeeded, it would have prevented zygotic personhood from leaving the starting gate. But in its premise that no early embryo is an individual, NA has been tested and found wanting. Our analysis reveals that neither does divisibility preclude an embryo from being a person nor does there obtain any reason to deny that an early embryo satisfies any condition of human individuality requisite for personhood. If you and I are human individuals, so too are early embryos.

It might be ventured that adducing the possibility of twinning, even if not successful in sustaining NA, has given pause to anyone who would classify an early embryo as a person. But even to insinuate that twinnability undermines the possibility of personhood is, I think, inappropriate for the following reason. One can offer many empirical observations about early embryos—e.g., the

[78] Eugene Mills, 'Dividing Without Reducing: Bodily Fission and Personal Identity', *Mind* 102 (1993), 376–51.

extent of their development, their lack of sentience, the circumstance that some of them will never enter a womb—that may lead one's listeners to conclude that we ought not regard at least some of them as persons. Even so, one cannot plausibly impugn an early embryo's human individuality. It would seem unfairly to impugn the motives of NA's proponents to say, with Oderberg, that NA is 'a sandstorm raised to obscure the moral debate,'[79] but knowing what we now know about NA, we have to question whether a candid scientist can any longer advert to NA in public discussion.[80] NA may be said to fail the least demanding component of Rawls's injunction that when advocating or voting in the public political forum about constitutional essentials and matters of justice, we should confine our reasoning to public reason. NA departs from public reason as Rawls understands it not by appealing to some part of a comprehensive doctrine lying outside an overlapping consensus, but by deploying unsound reasoning.[81]

If NA slays no dragons, neither does its defeat win the day for zygotic personhood. Proponents of zygotic personhood must yet make their case. They are apt to mention that we must show respect for the sacred divine gift of human life by refraining from killing any developmental stage of a human organism, that we should adopt zygotic personhood because we cannot identify any plausible prenatal personhood-conferring event other than conception, and that because fertilization creates a new genome, fertilization creates

[79] Oderberg, 297.

[80] In 'Intellectual Honesty', *Synthese* 145 (2005), 177–232, I present a dispositional account of a duty of nondeceptiveness, a duty encompassing one's assertions, Gricean implicatures, and arguments.

[81] According to Rawls's 'wide view' of public reason, an adherent may even introduce a religious or secular doctrine illogically so long as the adherent in due course offers support for the doctrine drawn from an overlapping consensus ('The Idea of Public Reason Revisited', *University of Chicago Law Review* 64 [1997], 765–807, reprinted in John Rawls, *Collected Papers*, ed. Samuel Freeman [Cambridge: Harvard University Press, 1999], 592). A doctrine is a comprehensive moral, philosophical, or religious view including an account of value, virtue, and character (*ibid*., 573, n. 2; *Political Liberalism* [New York: Columbia University Press, 1993], 13, 175). NA is not a doctrine. Hence to NA applies the requirement that public reason conform to guidelines of inquiry chosen in the original position, guidelines that include 'principles of reasoning and rules of evidence' (*Political Liberalism*, 223–226, 243–244, n. 32).

a person.[82] Arrayed against zygotic personhood stand accounts that demand one or another cerebral attribute for personhood. My own account contends that upon a woman's and coprogenitor's morally permissible exercise of the discretion to decline intrauterine transfer of an embryo lying outside them, the developmental potential of that embryo is so bounded that it cannot mature, and hence that neither does there correspond to that embryo a nomologically possible person into which the embryo is then capable of developing and that could be harmed, nor could anyone gain anything for any being by treating the embryo itself as a person rather than using it in humanitarian research.[83] We are back to the debate that raged before twinnability entered. Our NA excursion has resembled the journey of Wagner's audience, as whimsically depicted by Anna Russell, as of the moment in *Götterdämmerung* when the ring falls to the bottom of the Rhine—the place where it lay when the story began. 'You could have skipped the first three nights and be as far ahead as you are now after sitting through this ordeal—and at these prices!'[84]

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[82] This last argument, from genome to person, constitutes the Catholic magisterium's principal ground for condemning embryo experimentation (Congregation for the Doctrine of the Faith, *Declarato de Abortu Procurato* [Vatican City, 1974]). Classifying a being as a person in virtue of a genome, or identifying a person with a genome—a version of genetic reductionism—contradicts the magisterium's bedrock belief that a person is a *corpore et anima unus*.

[83] 'Morals and Primordials' and *The Morality of Embryo Use* [forthcoming], where I classify an embryo barred from the womb and donated to research as an 'epidosembryo' (after the Gr. *epidosis* for a beneficence to the common weal).

[84] I am grateful for conversations and comments to Israel Scheffler, Jorge J. E. Gracia, and Brian F. Loar, and to the audience at Brandeis University where I gave a previous version of this paper.