

Gradualism, Moral Status, and Embryonic Ethics

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Reproductive technologies have fundamentally altered our relationship to gametes and embryos. These *reproductive items* are no longer subject only to nature. They are subject to *us*—our attitudes, choices, and actions. Not only can we isolate and store reproductive items, but we can also screen, select, and alter them according to our preferences, morals, and beliefs. This raises fundamental questions about the ethics of our complex relationship to the metaphysically unique things that can create life.

Embryos specifically raise significant questions about the moral boundaries of scientific and technological power, the use of technology to make kinds of reproduction possible that otherwise wouldn't be, the hazard of sliding into eugenic attitudes, the dynamics of personhood and moral status, and the risks of causing undue harm. Neither the moral status of embryos nor what we should or shouldn't do with or to them using reproductive and other technologies is settled.

If we *can* edit embryonic genes or select embryos based on their properties, *ought* we? Is there a coherent ethical rationality that can underlie and guide decisions that

determine and alter life? Some philosophers think there are morally weighty person-affecting and impersonal reasons to edit rather than select embryos since gene editing can make a life better off than it would have been otherwise.¹ Others think this reasoning is flawed because of concerns about the morality of gene editing itself, or disagreements about embryonic metaphysics and personhood.² Discussions about embryonic ethics trace to Parfit's concerns about non-identity and well-being³, however, non-identity leads to logical loops when trying to reason about action in a procreative context. Person-affecting and impersonal reasons for action are scrambled by the fact that our actions determine *who* exists, and the courses of action they would ethically permit may conflict depending on that fact plus the metaphysics of persons, concepts of harm, and theories of moral status one holds. Embryonic ethics demands a moral picture that hangs all these variables together.

In this paper, I resist John McMahan and Julian Savulescu's assertion that we are morally obligated to genetically edit rather than select embryos by sketching a philosophical picture of the moral significance of what I call *reproductive items*, then cast

¹ McMahan and Savulescu 2024 argue along this this line. For them, embryos generate strong moral obligations.

² Quinn and Caplan 2024 deny that embryos generate any strong moral obligations.

³ Parfit 1984 and 1973 develops the non-identity problem, which precipitated tension between person-affecting accounts of harm and the determination of identity by procreative choice. The short story, by my lights, is that if our choices to procreate determine identity, then we cannot object to any pre-conception actions on person-affecting grounds. Anything goes morally because any action will determine *who* exists, rather than affect existing welfare.

embryonic ethics as resting on a problem of vagueness, and argue for *gradualism*⁴ about human development, personhood, and moral status. I then consider some objections and respond by showing how gradualism about embryonic development and personhood can guide coherent ethical reasoning in complex reproductive situations.

Reproductive Items and Moral Significance

Embryos are *extraordinary objects*. They are a collection of cells unlike any other. While somatic cells can propagate action potentials or constitute immunological memory, gametes and embryonic cells have capacities of a different kind entirely. Once joined, gametes produce a *wave*⁵ of complex chemical and biological reactions that generate the conditions for human life to develop, and, with the right biological signals, cause a person to come into existence.

It would be odd to refer to embryos as mere or ordinary objects. Unlike ordinary objects, they are not inert.⁶ Neither are they people with preferences, beliefs, and

⁴ My gradualist view is inspired by ideas in Quinn 1984 having to do with *process*, as opposed to *stage* theories about human development. The former sees personhood as emergent while the latter sees it as either present or absent.

⁵ In fact, quite literally. Tan 2020 observes “topological turbulence” on the surface of the fertilized egg that mimic those seen in quantum systems. For a video, see <https://news.mit.edu/2020/growth-organism-waves-0323>.

⁶ Embryos occupy a still different category from biological entities like viruses, which have biological activity but aren’t “alive.” They are more alive than viruses at least, but perhaps comparative language misfires here.

desires. Some might say embryos harbor the *potential for life*, but that doesn't imply that the embryo itself *is* a human life. When placed in the right biological context, an embryo starts developing into a human being, who, at a future point, will be a full-fledged, conscious living agent with all the capacities, experiences, and moral status we have.

Since embryos have unique properties that aren't quite object- nor person-like, and harbor the potential to develop into persons with the right signals, embryos have a peculiar metaphysics. Their *liminal*⁷ existence, I think, warrants a distinct ontological category. I offer the sortal *reproductive item*. Embryos are "reproductive" for obvious reasons, and I suggest "item" to avoid congruence with ordinary things like tables.

A further qualification about reproductive items is that they have *moral significance* in ways that sentient, animate, or inanimate things do. Moral significance is *relational*, and can be conferred by the nature of things themselves or by the attitudes one has toward things that draw them into the moral drama. Some things have *extrinsic moral significance* that we impose, like a country flag or a family heirloom. Other things have *intrinsic moral significance* like people and sentient beings^{8,9}. Our *conduct* toward

⁷ Wee 2025 develops the concept of liminality in bioethics to refer to cell lines, organoids, cell lines, and other entities that do not sort cleanly into human, non-human ontological categories. It's not abundantly clear to me whether a frozen embryo counts as one of these liminal entities, but its existence is liminal in some sense.

⁸ My usage of *sentient being* follows Birch 2024: 'A sentient being...is a system with the capacity to have valenced experiences, such as experiences of pain and pleasure.'

⁹ Cf. Zimmerman 2025.

things with moral significance is different than our conduct toward things without it and is *regulated* by moral significance. Therefore, moral significance plays a role in shaping our relations to things in the world, thoughts and beliefs, ethics, decisions, and actions.

Whether an embryo has moral significance is not an easy question to answer. Depending on one's beliefs about personhood, human potentiality, biology, spirituality and religion, nature, human development, and morality, an embryo may or may not have moral significance at all, or it may have one kind and not the other, or both. The moral significance of embryos, and so our moral judgements about them, also depend on context in which we are considering them¹⁰, e.g. during *in vitro* fertilization. Nevertheless, the fact *that* persons develop from reproductive items regulates our conduct toward them, *whatever it might be*, in ways that ordinary objects don't.

¹⁰ Unger 1996 develops context-sensitive semantics for moral terms that expands the role of context in ethics by arguing that meaning of "right", "wrong", "good", "bad", "better", or "worse" etc. depends on the context in which a judgement is asserted. Unger contends that when we set the context to morality, it can be further specified e.g. to intentions or consequences, and that centering will govern the semantics of moral terms. So, when we judge conduct as "ethical" we assert that an action is morally acceptable with respect to some specific moral axis, and so we can judge the same action, e.g. lying, as permissible in some contexts but not others. Unger calls this *liberationist* thinking.

Reasons and Embryos

Reproductive technologies raise questions about the morality of our conduct toward reproductive items. We can store and select embryos, and the science of embryo editing and selection are both rapidly advancing. These scientific techniques and our choices to use them have moral and practical dimensions. Fertility companies' communications solicit would-be parents to "Have your best baby."¹¹ [*sic.*] by screening embryos for eye color, hair color, height, IQ, and risk for autism and Alzheimer's disease, or purport to be "Building a future without genetic disease"¹² [*sic.*]. Not only do we decide *to* procreate as humans always have, but we also can decide *how* and *whom* to procreate with the advent of reproductive technologies like embryonic gene editing and selection.

First, some terminology. By *embryo editing*, I mean to refer to the action of choosing to excise, insert, modify, or manipulate embryonic DNA using *gene editing* technologies, e.g. CRISPR-Cas9, that enable the repair and replacement of disease

¹¹ Nucleus Genomics (<https://mynucleus.com>) makes this claim for their embryo selection technology, plus other questionable claims, e.g. "IQ is 50% genetic." [*sic.*], "Have a healthier baby" [*sic.*].

¹² Manhattan Genomics purports to "alleviate suffering...before illness begins" with "transparent science" that "will prevent thousands of diseases", including Alzheimer's, cystic fibrosis, sickle cell anemia, and Huntington's.

causing or other trait-determining DNA sequences.¹³ By *embryo selection*, I mean to refer to the action of choosing which embryos to implant during in vitro fertilization based on genetic screening with methods such as preimplantation genetic diagnosis or polygenic risk scoring¹⁴. Both techniques uncover information and present choices that, combined with gene editing or embryo selection, open the possibilities of “editing in”, “editing out”, and “selecting for” trait-determining genes.

Jeff McMahan and Julian Savulescu assert we have a moral obligation to edit embryos rather than select them for reasons of beneficence¹⁵. They argue for an ethical view of that accommodates both comparative and impersonal reasons action as result of their grievances against both.¹⁶ On the *Comparative View*, harm is person-affecting, and provides reasons to benefit or make a person better off, and against harming or making a person worse off. In comparative contexts, the non-identity problem looms with unpalatable implications: Since harm is person-affecting, actions before conception will determine *who* exists and therefore cannot harm anyone, so anything goes, morally

¹³ National Human Genome Research Institute 2025. Liang 2023 and Alanis-Lobato 2021 report embryo editing can cause loss of heterozygosity and “allelic dropout”. Royal Society 2023 recommends continued research, stipulating that safety and efficacy of heritable human genome editing has not been established.

¹⁴ Khumar 2022 reports accurate prediction of genetic risk for 12 common conditions by prediction of genetic variation in embryo genomes for genes like *BRCA* variants (breast cancer), but qualifies, in line with consensus of the American College of Medical Genetics (Grebe 2024), that clinical utility of this method remains unproven.

¹⁵ McMahan and Savulescu 2024.

¹⁶ McMahan and Savulescu 2024, p. 10.

speaking. On the *Impersonal View*, reasons against harm are generated from a dictum to maximize welfare, either in total or by distribution.¹⁷ The unpalatable implication here is a blindness to naturalness of the person-affecting concept of harm. For McMahan and Savulescu, neither view produces the right moral results, so they construct the *Two-Tier View*, which jettisons parts of each and synthesizes the remainder.

On the Two-Tier View, there are person affecting *and* impersonal moral reasons for action that constitute *moral pressure*¹⁸ to benefit and not harm, and to create good lives and not create bad ones, respectively. A further stipulation of the Two-Tier View is that person-affecting, comparative moral reasons for action are *weightier* than impersonal ones. McMahan and Savulescu also argue that reasons are not additive. Stronger reasons can displace weaker ones, but comparative reasons always trump.

McMahan and Savulescu apply the two-tier view to choices between embryo editing and selection to reach the conclusion that we have weightier reasons to edit embryos rather than select them. They consider the case of editing in or selecting for deafness, and the case of editing out the disease-causing gene for cystic fibrosis. We can lay out the different ways the Comparative, Impersonal, and Two-Tier interpretations of

¹⁷ Nebel 2025 questions what sums of well-being might be. I suspect that well-being aggregates don't exist despite playing a critical role in consequentialist and utilitarian moral ethical theory, as well as in population ethics.

¹⁸ This is my own term for the constraint that moral reasons place on decision and action.

these cases would go in terms of moral judgements and moral reasons, respectively, as follows:

Deafness:

| | Editing In | Selecting For |
|-------------------------|-------------------|----------------------|
| Comparative View | Wrong | Not Wrong |
| Impersonal View | Wrong | Wrong |
| Two-Tier View | Stronger Wrong | Weaker Wrong |

Cystic Fibrosis:

| | Editing Out | Selecting Against |
|-------------------------|---------------------|--------------------------|
| Comparative View | Strong reason for | None |
| Impersonal View | Strong reason for | Strong reason for |
| Two-Tier View | Stronger reason for | Weaker reason for |

In both cases, the Two-Tier View provides stronger person-affecting reasons *against* “editing in” certain traits like deafness that are construable as disadvantageous, and strong person-affecting reasons *for* “editing out” disadvantageous traits than the comparable impersonal reasons because the view take comparative reasons as weightiest. This avoids the pitfalls of the Comparative View, which can’t deliver a

verdict on selection because of non-identity, and of the Impersonal View, which is blind to the moral difference between genetic editing and selection. By giving person-affecting reasons more moral weight, McMahan and Savulescu's two-tier view draws them into the conclusion that there is a significant moral difference between editing and selection that obligates us to choose the former over the latter.

By my lights, this conclusion is counterintuitive. There are significant medical risks associated with embryonic gene editing, including unpredictable efficacy and off-target effects, e.g. large DNA deletions and rearrangements that can lead to embryo inviability.¹⁹ These medical risks also imply moral risks. We cannot ignore the moral risk²⁰ of doing something terribly wrong by deciding to edit, e.g. causing serious medical problems, for the person who will develop from the embryo. Although there are moral risks associated with embryo selection, including the potential to affect the chance of pregnancy and the ethics of discarding screened but unselected embryos²¹, embryo selection is *morally safer* because it does not carry the kinds of risks that embryo editing does for the person that will develop from the embryo—the moral patient with whom we ought to be concerned in reproductive technological contexts. When the

¹⁹ Mattar 2024.

²⁰ Moller 2011, p. 436-438.

²¹ Polyakov 2023.

moral context is further set by specifying to *risk*, I contend we are morally obligated to select embryos rather than genetically edit them.

Another critique of the Two-Tier view concerns personhood ascription. Quinn and Caplan argue²² that the Two-Tier View gets embryonic ethics wrong because it tacitly assumes embryonic personhood. How else would a person-affecting reason to edit embryos be generated? If the person who exists after development also exists *qua* an embryo, that would imply analyzing any conduct toward an embryo as if it were conduct toward a person, i.e. comparatively. We would therefore have strong person-affecting reasons to improve the life of the embryo because, on the Two-Tier View, embryo editing is morally equivalent to saving a life or treatment, while the discarding required by embryo selection could be construed as morally equivalent to killing like killing. If we hold, with Quinn and Caplan, that “in a petri dish, or test tube, all embryos are morally equal”²³ plus any singleton or conjunction of the propositions that there are no lost futures in embryo editing or selection, that embryos have no moral standing, or that since they are not sentient, embryos they cannot be affected for the better or worse, then person-affecting logic fails in the context of embryonic ethics. If a person doesn’t exist as an embryo or an embryo is not a person, then *embryonic intervention* is morally neutral.

²² Quinn and Caplan 2024.

²³ *Ibid.*, p. 46.

I am unsure how McMahan and Savulescu might respond to the charge of assuming embryonic personhood. One possibility might be that this charge rests on a misunderstanding of the Two-Tier View. Another way to interpret the view is that while it takes comparative reasons to be weightier than impersonal ones, they are not intended to imply ontological commitments. That is, McMahan and Savulescu could reply that although there is a strong comparative reason to edit rather than select, that deciding and acting in response to that reason is merely cognitive, and does not commit one to any ontology of personhood. One might rebuke that this ties them in a Parfitian knot of sorts, but a non-committal ontology interpretation of the Two-Tier View at least offers a logical response.

A further critique of the Two-Tier View is metaphysical. The ethics of embryonic gene editing and selection turns on when or if an embryo is identical to the human organism it will become. If an embryo is *the same thing* as the organism it develops into, we have a different kind of moral situation. Warren Quinn²⁴ distinguishes between two ways to see the metaphysics of human development. The *stage theory* takes a binary view about human being—there is a “pop” during human development, before which there is *no* human being and after which there is a human being *qua* person with full

²⁴ Quinn 1984, p. 27-37.

moral status²⁵. Given facts about human embryonic development²⁶, the stage theory is oversimplified, so Quinn argues for the *process theory* of human development, which supposes that a human being comes into existence and enters the world *gradually* by degrees through a special kind of ‘noninstantaneous change’²⁷. Quinn makes these distinctions to discuss the nature of fetal development, however I think they are apt to expand and calibrate to the present discussion of embryonic ethics.

Vagueness, Moral Status, and Gradualist Ethics

The process of human development is gradual. Over its course an embryo *becomes* a person, but we cannot pinpoint exactly when. Our inability to mark a transition from biological matter to human organism to human being and to person constitutes a vagueness in developmental phenomena,²⁸ and in embryonic ethical reasoning. The continuous features of embryonic metaphysics and biological

²⁵ Ibid., p. 34.

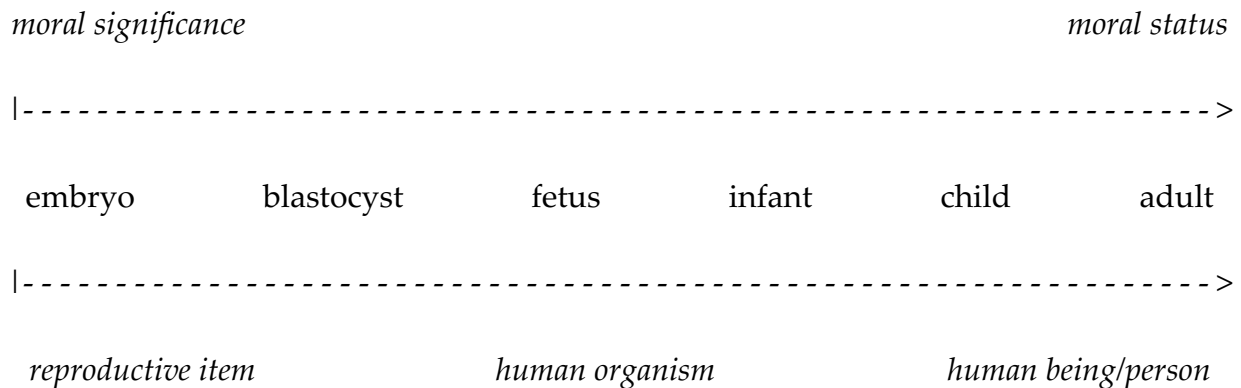
²⁶ Original work on human embryology started in the 1940s with work by Streeter and colleagues on ‘Developmental Horizons of Human Embryos’ under the auspices of the Carnegie Institute of Washington. O’Rahilly and Miller 1987 is a modern summation of that work and https://hdbatlas.org/carnegie_stages.html visualizes the stages.

²⁷ Quinn 1984, p. 36.

²⁸ I do not mean to imply that there is a vagueness in reality itself, but there is at least an epistemic vagueness pertaining to the development of human persons and so a logical one in the philosophical analysis of it.

development mean there is no sharp threshold at which personhood, and so moral status, “comes online”. Rather, it *emerges gradually*. If personhood emerges gradually, then we cannot base the ethics of our conduct toward embryos on a classical “yes/no” or “on/off” conception of personhood and moral status. Where does that leave us in determining the morality of embryonic gene editing and selection?

The admission that moral status develops gradually changes the way we might think about its nature. On a gradualist conception, the embryo does not have the same *degree* of moral status enjoyed by persons or even some animals. We can construct a gradualist moral framework that overlays moral and metaphysical status over the progression of human development as follows:



The embryo influences our conduct because of its nature as a reproductive item. We might say that an embryo has *moral significance* insofar as it matters morally in a way

that may derive from how it affects beings with moral status²⁹. At that point in the gradual emergence of personhood, we might also say a human being is present in the weakest sense possible, if at all, which implies the assignment of, in my view, moral significance rather than moral status. As time and embryonic development progress, personhood continues to emerge, as do the structures of the nervous system and other biological grounds for moral status. Moral significance therefore *evolves* into moral status as embryonic development progresses.

An implication of gradualist ethics is that our conduct is progressively and differentially regulated as the embryo develops into a human organism and eventually a person. The gradual emergence places different moral pressures on our decisions and actions at different times during the development process. A gradualist ethical framework therefore implies a *dynamic* embryonic ethics when it comes to embryo editing and selection. In the embryonic stage, there are very weak person-affecting moral pressures, so the reasons to edit are weak compared to the stronger, impersonal moral reasons to select *at that point in the developmental process*. When embryos are in a state of *suspended animation*, say, during the pre-implantation, *ex vivo* phase of the in vitro fertilization (IVF), impersonal reasons are weightiest, therefore selection is permissible while editing is not due to the entailed level of moral-medical risk. As time

²⁹ This is a modified version of Smithies 2025's concept of moral significance as restated by Chalmers 2025.

passes, person-affecting moral reasons acquire more weight and impersonal reasons become less weighty. When an embryo is implanted in the *in vivo* phase of IVF and biological development begins, the weights of reasons begin to shift. There will still be gray areas in some cases, but the ethical gradualist can always respond that the weightiness of reasons, contra McMahan and Savulescu, depends on fact about the process of human development.

Let's add the gradualist option to one of the aforementioned cases:

Cystic Fibrosis

| | Editing Out | Selecting Against |
|-------------------------|---------------------|--------------------------|
| Comparative View | Strong reason for | None |
| Impersonal View | Strong reason for | Strong reason for |
| Two-Tier View | Stronger reason for | Weaker reason for |
| Gradualist View | <i>ex vivo:</i> | |
| | Weaker reason for | Stronger reason for |
| | <i>in vivo:</i> | |
| | Stronger reason for | Weaker reason for |

The gradualist view developed here admits of *moral flexibility* in a different way than the Two-Tier View that not only aligns with natural intuitions regarding risks associated with genetic technologies, but also are calibrated to the biological process of human development and facts from embryology. It allows for impersonal moral reasons to prevail when a reproductive item with moral significance is the direct object of choice and action, and comparative ones to prevail once development begins. It also permits a context-sensitive moral semantics, and therefore tolerates changing attitudes toward what the right choices might be throughout the development process.

Objections

An objection to the gradualist view might assert that moral status is not the kind of thing that admits of degrees—either something either has moral status or doesn't. I reply that this binary conception of moral status runs against more fine-grained theories of moral value that do admit of degrees to capture the different ways we relate to the things we value. Not all valuing is equal, and it is surely a different phenomenon to value a person than it is to value an animal or a precious object.³⁰ We can at least admit

³⁰ Steinbock 2009.

that things might have full or partial moral status as a function of a thing's level of sentience³¹ or other capacities.

Moreover, consider that these things to which we might pin the assignment of moral significance, value, and status in the context of talking about conduct toward living things are capacities grounded by the biological development of bodily structures, particularly the nervous system. The nervous system develops gradually, with the earliest neurons appearing at as early as three weeks into development.³² If the biological grounds for the capacities to which we pin moral status develop gradually, then we therefore, I think, must admit that moral status itself develops gradually starting from moral significance, and so also admits of degrees.

Another objection to the gradualist view could be that it only holds in a context where the science of gene editing isn't yet proven. There might be some future world where gene editing technology is perfected, and, in that world, the moral risk of gene editing isn't a significant factor because the medical risks are low. I reply that even in a world with perfected gene editing technology, it isn't certain that dangerous off-target effects like the ones described above will not happen. Biological systems can be irregular and unpredictable, so it would not be certain that gene editing, or any other biotechnology for that matter, would carry with it a certainty of success.

³¹ Chalmers 2025, p. 1-2.

³² Stiles 2010.

Embryonic Ethics and Reproductive Rationality

Further, I would be willing to bite the bullet that in the context of perfected genetic technologies, gradualism is a conservative view about biological intervention. These kinds of views are philosophical fair game. The fact that we can manipulate genes of embryos at will doesn't mean we ought to. If we were to take up a Kantian perspective, as K. Lindsey Chambers³³ does, we could assert to the perfected technology objector that manipulating the bodily form of an individual in such a way is a violation of their autonomy despite their yet-existence, and is therefore impermissible.

Responsible Reproductive Rationality

On the gradualist view of embryonic ethics developed here, there are weightier reasons to select embryos rather than genetically edit them because human development is gradual and, concurrently, so is the emergence moral status. Gradualist ethics about embryo selection and editing leaves open the possibility that the permissibility of editing and selection change as the development process unfolds. It also suggests an optimistic caution about the decision to use these kinds of reproductive biotechnologies. We ought to always ensure the birth of a healthy child in any way we can, whatever that may mean in a given reproductive context. Further, we ought to

³³ Chambers 2025.

balance openness to biotechnological interventions against the real risk of over-engineering our offspring and falling victim to the seductive pull of designing people.

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