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**Technical categories and ethical justifications: why Cwik’s approach is the wrong way around for categorizing germ-line gene editing**

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Significant ethical differences imputed to the existing somatic/germline distinction indicate that technical categories play an important role in debates on gene editing. Yet, as Cwik rightly points out, the germline “is not a stable category” and grouping germline interventions together can hide ethically relevant distinctions.[[1]](#footnote-1) He proposes that we need “a more precise categorization” to “get an accurate map of the ethical terrain”; one that “captures the relevant idiosyncrasies of different germline interventions” (Cwik 2020).

Although we agree that not all germline interventions are necessarily the same and that it is entirely feasible to make finer-grained categorizations, Cwik’s approach fails to identify genuine ethical distinctions. In driving to a “more precise categorization” to capture “relevant idiosyncrasies”, Cwik actually illustrates the perils of taking such an approach. It leads to arbitrary, dynamic and technically demanding categories that will not suffice for denoting ethical distinctions. It is, in short, a ‘back-to-front’ approach to ethical analysis. We should instead draw lines of categorization on the basis of the intervention’s ethical goal.

**Problems with Cwik’s approach**

Cwik’s more precise categorization of germline gene editing has four dimensions: target, goal, outcome, and mechanics. This grouping, for Cwik, then facilitates a “natural sorting” into three broad categories: revising, correcting, and transferring genes. Differences in these categorial dimensions informs consideration of the ethical issues that a particular intervention raises.

It is not Cwik’s attempt to engage in such a finer-grained analysis that concerns us.[[2]](#footnote-2) Rather, it is how he gives technical divisions priority in mapping “the ethical terrain”, that is at issue. Ethically relevant differences between genetic interventions should not be rooted in the technical specificities of the relevant method but in conceptual distinctions derived from ethical goals. At least four problems stem from Cwik’s approach in this regard.

First, this approach is arbitrary. There is nothing that fundamentally determines why we should sort the categories as Cwik has. These are also problematic to apply, as they inevitably overlap. His four dimensions are also problematic. Taking targets as an example, he claims that some targets may be ethically preferable to others. But he fails to specify criteria to use when assessing a particular target. Facilitating interrogation of the overarching rationale for any given genetic intervention is required.

Second, Cwik’s dimensions and categories will have dynamic membership. This will change over time as knowledge of gene functions, techniques and their application changes. Changes to pleiotropic genes can be simultaneously acceptable and unacceptable. Assessing the ethical permissibility of a genetic intervention using Cwik’s dimensions and categories will be unstable because we will not know whether the attendant knowledge is complete or comprehensive for ethical assessment. Without a more substantive, ethically grounded approach, a ‘framework’ for assessment based on dimensions and categories will be at the mercy of technical developments. Ethical acceptability would then become inherently revisable.

Third, applying Cwik’s categories accurately will be technically demanding, requiring in-depth scientific knowledge. Many bioethics scholars may (reasonably) not be able to meet this demand, yet errors will have a pejorative effect on ethical analysis. Cwik makes such errors himself. For example, in comparing gene editing for Spinal Muscular Atrophy (SMA) and Tay Sachs disease, he only compares the ethical acceptability of gene editing for these two conditions. He overlooks the broader clinical context, including the fact that there are already proven preventive interventions for both of these conditions. An ethical framework needs to account for existing options too. Additionally, when querying the ethical superiority of mitochondrial replacement therapy (MRT) over editing nuclear DNA, he erroneously categorizes MRT as a form of gene editing involving the transfer of novel genetic material. MRT does not involve making changes to DNA, nor does it involve editing genes.

Drawing together these three problems, we arrive at the fourth: this approach is back to front when it comes to how we should conceptualize genetic modifications like gene editing. Instead, we should be considering the ethical goals first before attempting to make any categorial distinction of any gene editing intervention. This is because it is not the scientific purpose or technique, but the justification for its use that generates much of its ethical relevance.

This may, initially, appear counter intuitive. However, to create finer and finer degrees of distinction between technical categories does not axiomatically identify ethical distinctions. As there is no objective and systematic means of selecting where to draw the lines of those categories to begin with, we might potentially draw dividing lines between categories where we please and fit some form of technical explanation as to why we have done so. The science under-determines where we make our category divisions.

Cwik’s approach is that we can discern substantial ethical differences between potential applications of different techniques by assessing their dimensions and categories. Yet this is really a manifestation of already having divided up the way in which we classify gene editing through appeal to ethical aims and goals. Cwik is effectively retro-fitting a finely-grained categorization schema to this. Thus, the selection of how he identifies and draws the lines of these categories is actually established not by technical differences but by already existing ethical issues. While it looks convincing that Cwik has captured some scientific division that helps us to explain our attitudes towards the ethical permissibility of those various nuanced categories, this is little more than a sleight of hand - the nuanced categories ‘fit’ the ethics because the ethics determined the categories in the first place.

**Implications of Cwik’s approach**

Pursuing Cwik’s approach would result in a state of considerable ethical confusion and inconsistency. A technique that may otherwise be seen to be ethically problematic might suddenly be seen to be unproblematic, as technical fine-grained divisions are employed to maneuver that technique under a particular label, which would still then require substantive ethical analysis. This process may go on to the level of individual uses of gene editing, rendering any overarching ethical appraisal virtually useless.

Cwik uses his categorization framework to reject the view that crossing the germline will lead us down a slippery slope to permit further, more ethically concerning uses of the technology. However, from Cwik’s back to front approach, we do not arrive at the same point. While we are similarly keen to avoid homogenizing germline interventions and avoiding slippery slopes, disambiguation should come from ethical issues raised by any technique, not the technique itself. Unless there is an intrinsic wrongness to the technique, its technicalities will be largely irrelevant. Further, the techniques do not necessarily capture all the ethical concerns at play and therefore underdetermine ethical debate.

**MRTs**

Recent work on Mitochondrial Replacement Techniques (MRTs) illustrates why conceptual and category classification should proceed the other way around to Cwik. Here, the difficulty of specifying how MRTs fitted into existing classificatory concepts, together with the concern (shared by Cwik) that anything classed as a germline intervention should be prohibited, has already led to work exploring the links between classification and ethical status (Newson and Wrigley 2017).

When undertaking classification, the areas of particular ethical concern are the target and intended goal of the treatment (such as whether it was, indeed, a treatment) and a consideration of who the subject of the intervention is (such as whether there was an identifiable individual who could be said to be the intended recipient of the mitochondrial replacement). Furthermore, through application of the non-identity problem to determine whether any individual is an identifiable recipient, a clear distinction between MRT as therapy (using pronuclear transfer) and MRT as reproductive selective choice (using maternal spindle transfer) has been made (Wrigley et al. 2015).

**Conclusion**

There is no doubt Cwik offers a complex matrix, involving dimensions and categories, to consider possible ethical distinctions in germline editing. Yet as an approach, it is not only the wrong way around but also hard to use. While Cwik spends some time delineating the parameters, he provides little guidance (other than illustrative examples, the ethical acceptability of which may not translate or persist) on how to use it and what normative questions come from it. To this end, it is unlikely to be able to be used objectively or consistently.

**References**

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Wrigley, A., S. Wilkinson, and J. B. Appleby. 2015. Mitochondrial replacement: ethics and identity. *Bioethics* 29(9): 631-638.

1. That ethical distinctions exist between types of germline modification is not a new idea, having been explicitly suggested by, for example, Frankel and Hagen (2011, 6). [↑](#footnote-ref-1)
2. Although we recognize this may form a separate substantive problem of his whole approach concerning the possibilities of errors when categories are based on fine-grained technical aspects of technologies. [↑](#footnote-ref-2)