

## Genome editing and human equality

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### Outline...

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- §3. Why the argument about risk is a red herring...
- §4. A compelling intuition?
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## From gene editing to genome editing....

CRISPR/Cas9 allows *precisely targeted* genetic modification....

Multiple applications, including



Fundamental research in biology and medicine ✓

Agricultural biotechnology ?



“Gene drives” for disease vector control ???

Somatic cell treatments/cancer therapies ✓✓



Germline genetic modification (“genome editing”) ?

## Why edit human genomes?

**Health?**

(“curing” genetic diseases)?



**Genetic relatedness?**

**Human enhancement!**



## The “therapeutic” case for genome editing is very weak....



Preimplantation genetic diagnosis (PGD) already allows couples at risk of transmitting a genetic disease to their offspring to give birth to healthy children



Only when a couple is unable to produce viable embryos that do not carry genes for a disorder using their own gametes would there be any grounds for attempting to cure affected embryos by editing their genomes.



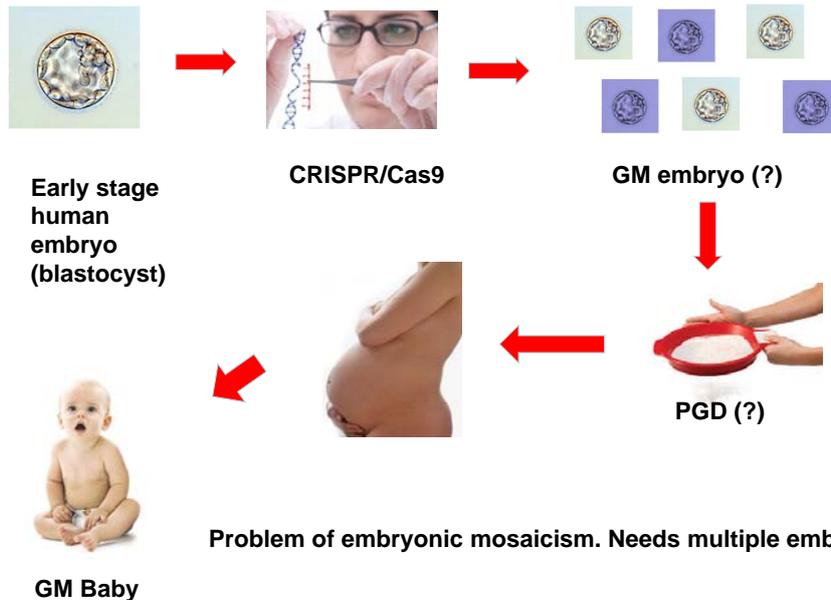
Even in such cases, couples could always have children using donor sperm and/or donor ova.

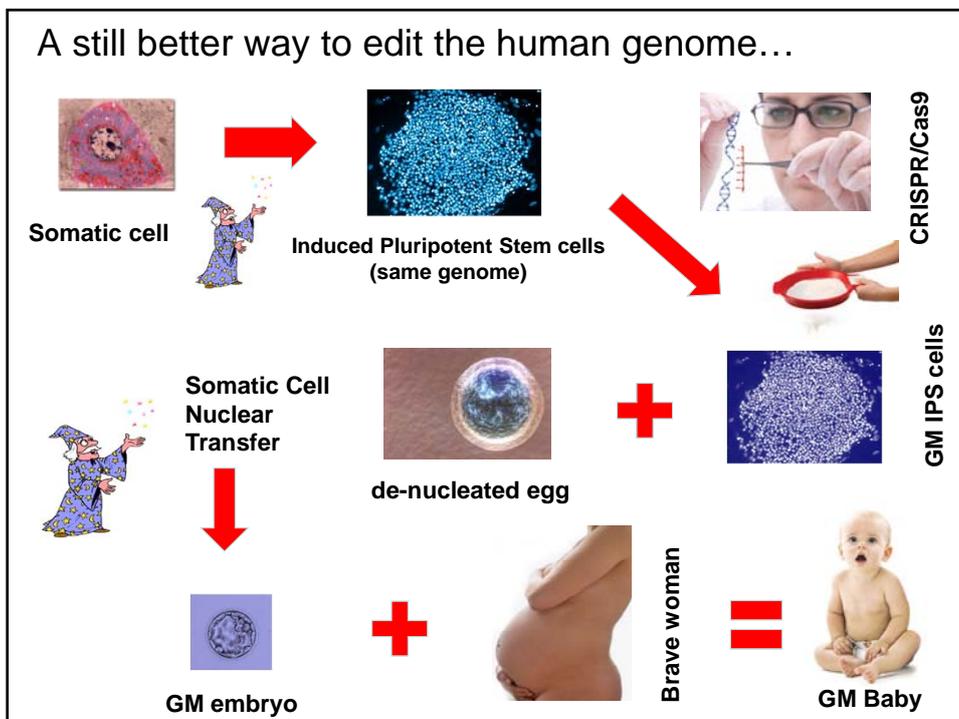
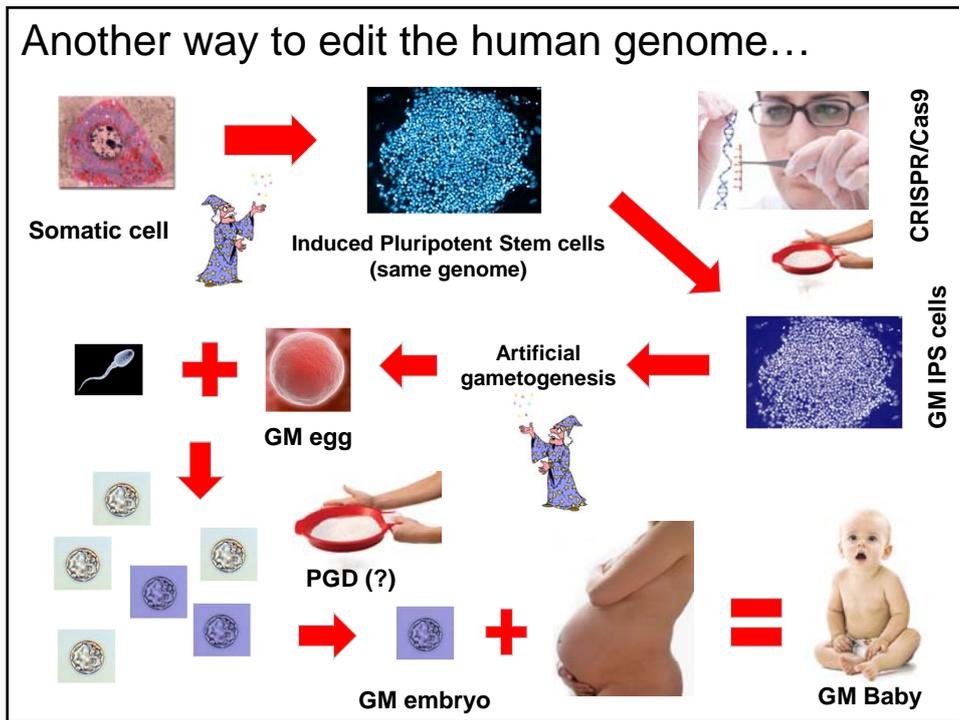
Rather than a cure for a disease, then, genome editing would function solely as a means to satisfy the preferences of couples to raise children who were their genetic offspring.



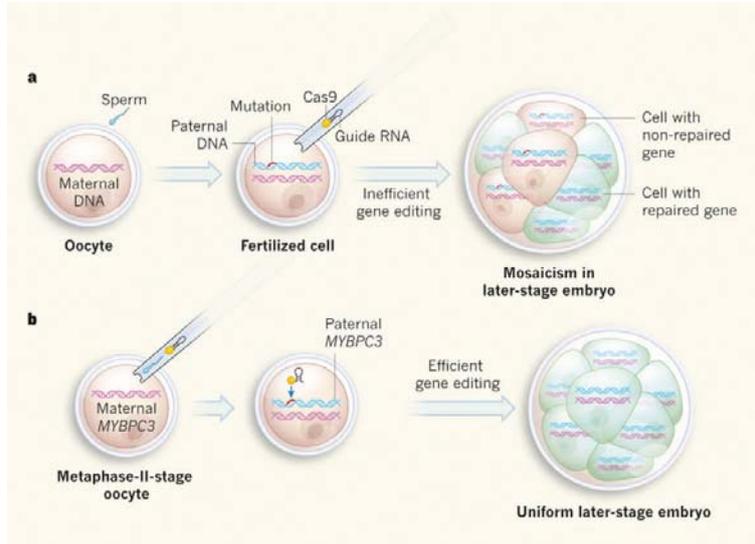
**“Therapeutic” genome editing is a Trojan horse for human enhancement....**

## One way to edit the human genome...



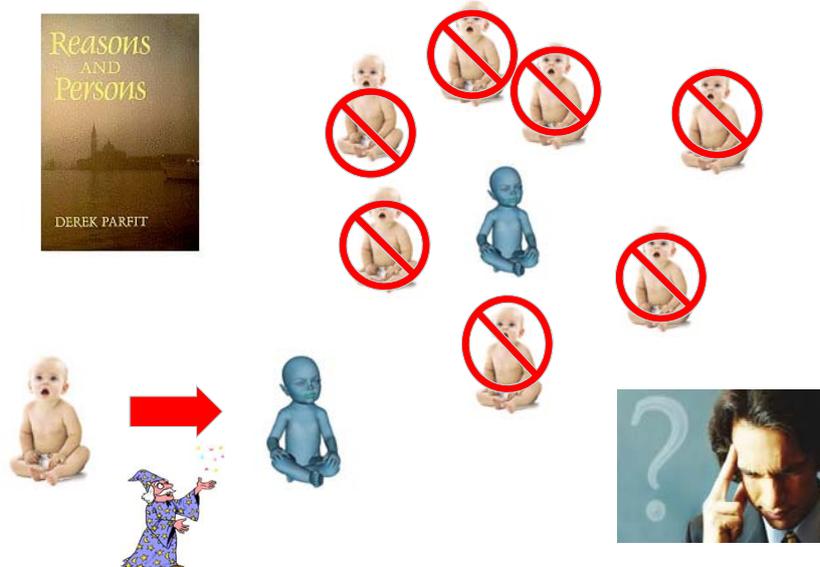


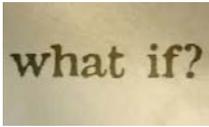
### An even better way to edit the human genome...



doi:10.1038/nature23533

### Genome editing may be “person affecting”





We normally decide whether something harms or benefits someone by asking what their welfare would have been like (A “counter-factual”) had that thing not occurred ...

But some reproductive technologies, like PGD, determine WHICH individual comes into existence



In such cases asking what the life of the person born as a result of the technology would have been like had another choice been made involves a comparison with what their welfare would have been like if they did not exist!

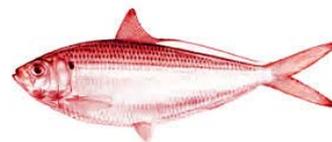
“Identity affecting” choices don’t harm or benefit anyone!



If we edit an embryo’s genome it seems as though we WILL be able to ask what that individual’s welfare would have been like had we not done so

**If human enhancement via genome editing becomes possible it is likely to be morally obligatory....**

### Why the argument about risk is a red herring...



- First use will inevitably be experimental
  - Risk of children being born with disabilities
- But this risk is endemic to reproductive technologies
  - We still don’t know if IVF is safe
  - “Natural” pregnancy involves significant risks
- Coming into existence is risky!



The collage consists of three distinct images. On the left is a newspaper clipping from 'The Independent' with the headline 'The three-parent baby trap: is new IVF technique safe?'. In the top right is a screenshot of a 'nature' journal article titled 'Scientists cheer vote to allow three-person embryos'. On the right side of the collage is a diagram titled 'THE SCIENCE...' which illustrates the process of mitochondrial replacement therapy. The diagram shows a mother's egg with faulty mitochondrial DNA being fertilized with a father's sperm in a laboratory. Simultaneously, a donor's egg with healthy mitochondrial DNA is fertilized with a donor's sperm. The donor's mitochondrial DNA is removed, and the healthy donor mitochondrial DNA is transplanted into the mother's egg. The resulting 'reconstructed' embryo is then implanted into the mother, resulting in a baby with three genetic parents.

### A compelling intuition?



Human enhancement is a threat to human equality

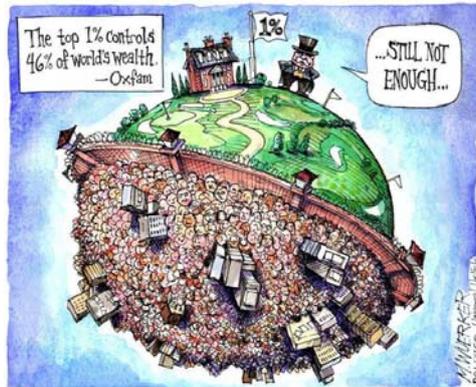
Inequality within societies ... and between generations



## Two challenges...



**Parents already shape children by shaping their environment**

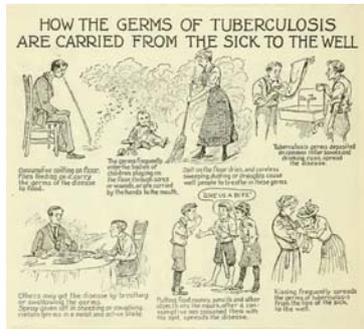


**The species is already "split"**

## Sandel and human solidarity

**Our shared vulnerabilities play an important role in supporting the idea of human equality.**

**Enhanced human beings may no longer face many of the risks faced by normal individuals and so have little basis for solidarity**



## Design, designers, and human freedom?



The power of the designers over the designed?



An empirical threat to freedom?



A political relationship?



Technics vs dialogue...



## Enhancement and obsolescence...



Sparrow, R. 2015. Enhancement and Obsolescence: Avoiding an "Enhanced Rat Race". *The Kennedy Institute of Ethics Journal* 25(3): 231–260, September.



In order for there to be any realistic prospect of human enhancement via genome editing our knowledge of human genetics must progress rapidly ...

But rapid technological progress generates obsolescence!



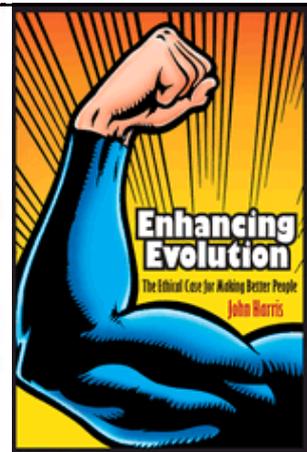
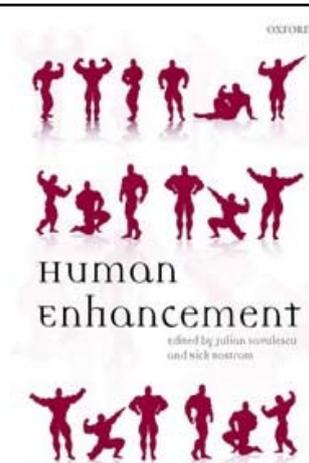
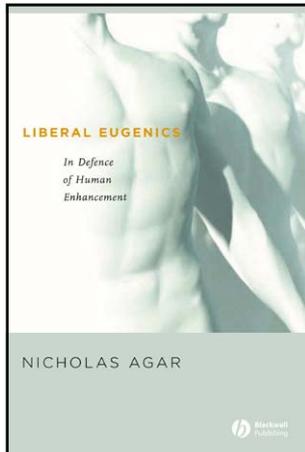
The genetic enhancements available to parents conceiving children in any given year will rapidly be superseded by better enhancements

Every child will be born with enhancements that will be obsolete by the time they are five.



And will only be able to participate fully in social and economic life for a very brief period as an adult before other more enhanced individuals become adults.....

**The social impacts are likely to be dramatic....**



**Perhaps not a coincidence!**

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