Genomic Enhancement & the Myths of Merit

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Genomics is primarily a tool (not a revolution in medicine)
- Genes mix with environments → body, traits, health, disease, (dis)ability
- Genomics must mix with other bodies of knowledge and actions → value (treatment, prevention, “control”)

Nature vs. & nurture
- Nature & nurture → With knowledge it all becomes social
- What was natural or “given” becomes a matter of choice (choosing to leave something alone is a choice)
- The social realm of justice and responsibility overtakes the realm of the natural

Genetic testing → alter behaviors → alter genes
Gene therapy
Gene editing
Genetic enhancement
How CRISPR Works

Bacteria use a weapon called CRISPR to julienne invading viruses. Scientists can hijack this process to chop up sequences of DNA they would like to modify instead. Unlike previous genome-editing methods, the CRISPR system uses a single, all-purpose enzyme, called Cas9, to do the slicing. All the researcher has to do is create an RNA "guide" to steer it there; RNA is vastly easier to synthesize than enzymes.

1. Construct an RNA guide that includes a part matching the desired DNA sequence.
2. Attach the RNA guide to an all-purpose Cas9 cutting protein, creating the CRISPR tool.
3. Introduce the CRISPR tool into the cell of interest. The guide RNA finds its DNA match in the genome.
4. The Cas9 protein cuts both strands of the DNA in a gene so that the gene will be disabled or, with the insertion of a segment of engineered DNA, modified.
Chinese Scientist Claims to Use Crispr to Make First Genetically Edited Babies

The researcher, He Jiankui, offered no evidence or data to back up his assertions. If true, some fear the feat could open the door to “designer babies.”

Chinese scientist who produced genetically altered babies sentenced to 3 years in jail

By The Associated Press
July 27, 2017

For the first time in the United States, scientists have edited the genes of human embryos.

THE LEGAL LANDSCAPE

A 2016 survey in Science examined existing laws (legislation) and documented policies (regulation) that explicitly govern gene editing or might be applied to such activities. The survey labelled countries as restrictive, permissive or something in between. But specialists disagree over whether rules in some nations might be interpreted to permit gene editing.
Treatment / enhancement distinction

Breaks down practically, conceptually
- Consider silicone breast implants
  - Breast reconstruction following cancer surgery or injury
  - Breast augmentation
- Breast reduction for back pain, posture, self-esteem
- Ritalin for attention deficit disorder, studying
- Beta-blockers for hypertension, angina, heart rhythm disorders, performance anxiety

Breaks down practically, scientifically
- Enhancement at different levels
  - Cellular → physiological → whole organism
Myths of merit

Genetic enhancement threatens merit by undermining the value of exerting effort on a level playing field
- Perhaps we misvalue effort & merit

Assuming responsibility & exercising choice necessarily lead to the hubris of playing God
- Can we act responsibly but not pridefully?
Justice as fair equality of opportunity

Those with the same level of talent and ability, and the same level of motivation to use them, should have the same prospects of success in life, regardless of their initial social situation.

--John Rawls

A just society ensures the conditions of fair equality of opportunity.
If the playing field is level (equal opportunity), then natural ability + effort $\rightarrow$ fair outcomes

Which inequalities require redress?

- Formal and informal discrimination
- Social lottery’s effects resulting from **unjust social structures**
- Social *and natural* lotteries’ effects resulting from what is **beyond the individual’s control** (brute luck)
What happens when the natural lottery is no longer beyond human control?
No longer a matter of luck?
Gene doping

Reoxygen is a new way to artificially enhance an athlete's performance—one that is hard to detect and with potentially permanent effects.

How it works

Reoxygen was developed as a gene therapy treatment for severe anemia. A patient is injected with a harmless virus carrying a modified gene that encodes erythropoietin, a protein that boosts red blood cell production. The host's cells can translate that gene into active proteins as if the foreign gene were the cells' own.

1. Delivery

DNA packaged in a virus is injected into the athlete and flows through the bloodstream into muscle.

Danger: Altered viruses can trigger dangerous reactions from the immune system.

Alternatives: Viruses are not the only way to deliver performance-enhancing genes to cells. Fat molecules or naked DNA can be injected directly into muscle.

2. Change

Viruses bind to muscle cells and deposit the foreign gene inside, where it integrates into the cell's chromosomes. The gene stimulates the production of the protein erythropoietin (EPO).

Danger: Inserting foreign DNA can damage the cell's own genes, risking cancer.

Detection: Presence of a foreign gene in the athlete's DNA.

3. Dispersal

Erythropoietin (EPO), produced by the altered muscle cells, flows through the bloodstream to bone marrow, stimulating production of red blood cells, the body's main transporter of oxygen.

Detection: Changes in the concentration of multiple proteins in the blood or urine.

Other gene doping possibilities

- In 1988, H. Lee Sweeney and colleagues at the University of Pennsylvania School of Medicine injected mice with a virus carrying a gene that boosted production of insulin-growth factor 1 (IGF-1). The injected mice had 15% more muscle mass than untreated mice.

- In 2004, Ronald Evans and colleagues at California's Salk Institute for Biological Studies engineered mice to have extra copies of the gene encoding a protein called peroxisome proliferator-activated receptor delta (PPAR-delta). These mice could run twice as far as unaltered mice.
In sports, what is valued is superior “developed ability” and winning.

Innate Ability
Unearned, unmeritorious, lucky advantages

Individual Effort
The “earning,” the source of the merit

Developed Ability
Merited, not just lucky

Success
Genes related to muscle mass, heart rate recovery, oxygenation, risk of soft tissue injury

Genes related to motivation
But, it’s not just genes

Social Class

Beliefs in self-efficacy, fatalism, luck

Past Experience

Decision Fatigue

Ego Depletion

Stress of racism, sexism, anti-sematism, ... violence, stigma ...
And, it’s not just athletic ability

Stigmatization, differential treatment by others
Self-perception of competence, academic efficacy
Fatalism, self-fulfilling prophesy
Recommendations

- Not to avoid genetic technologies, including judicious gene editing
  - Even genetic enhancement at some levels
- Not to avoid assuming responsibility or the shift from chance to choice
- Not to hide behind fears of “playing God”
  - We already do in myriad social, behavioral ways
    - As parents
    - As policymakers
Instead give up some myths of merit

- That effort is largely/mostly individual & meritorious
- That the result of effort is 100% earned, not at all a matter of fortune or luck
- That the moral universe aligns prosperity/success with merit (desert) & failure with wrongdoing

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<tr>
<th>Protestant</th>
<th>Salvation</th>
<th>Earned and thus deserved, or a gift of grace?</th>
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<td>Secular</td>
<td>Success</td>
<td>Earned and thus deserved, or beyond one’s control?</td>
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“The Protestant work ethic began as a tense dialectic of grace and merit, helplessness and self-help. In the end, merit drove out grace. The ethic of mastery and self-making overwhelmed the ethic of gratitude and humility.”
“The fortunate [person] is seldom satisfied with the fact of being fortunate [but also] needs to know that he has a right to his good fortune ... that he ‘deserves’ it, and above all, that he deserves it in comparison with others. He wishes to be allowed the belief that the less fortunate also merely experience [their] due.”

--Sandel quoting Max Weber
“The notion that we are free human agents, capable of rising and succeeding by our own effort, is only one aspect of meritocracy. Equally important is the conviction that those who succeed deserve their success. This triumphalistic aspect of meritocracy generates hubris among the winners and humiliation among the losers. ... This triumphalistic aspect of meritocracy is a kind of providentialism without God, at least without a God who intervenes in human affairs. The successful make it on their own, but their success attests to their virtue.”

--Sandel
Ethic of fortune “appreciates the dimensions of life that exceed human understanding and control. It sees that the cosmos does not necessarily match merit with reward. It leaves room for mystery, tragedy, and humility.” – Sandel

Ethic of mastery places “human choice at the center of the spiritual order.” -- Sandel quoting Jackson Lears
“A culture less intent on the individual’s responsibility to master destiny might be more capacious, more generous, more gracious. ...

[Recognition of the unpredictable character of fortune and fate might lead people] to imagine their own misfortune and transcend the arrogance of the meritocratic myth—to acknowledge how fitfully and unpredictably people get what they deserve.”

--Lears
Sandel concludes that this “providentialist notion that people get what they deserve ... comes in two versions—one hubristic, the other punitive.” He rejects both.

He also rejects the use of genetics to enhance people as hubristic.

He distinguishes between genetic means and effortful means to improve or enhance oneself and one’s offspring.

He most strongly rejects seeking “perfection” by any means—effort or genetic enhancement.
But can we truly maintain there is an ethical distinction between employing genetic or social enhancement?

Once genetic enhancement is possible, can we avoid the responsibility of using/not-using it?

**Shift the focus from genetic enhancement to enhancing discourse & behavior.**

Avoid the hubris, heartache, & harms of seeking *perfection*, while embracing the benefits of both exerting effort and using genomic tools to enhance capabilities and outcomes.

Be more gracious, generous, empathetic, and cooperative.

Reduce comparison, competition, and adherence to caste and hierarchy.