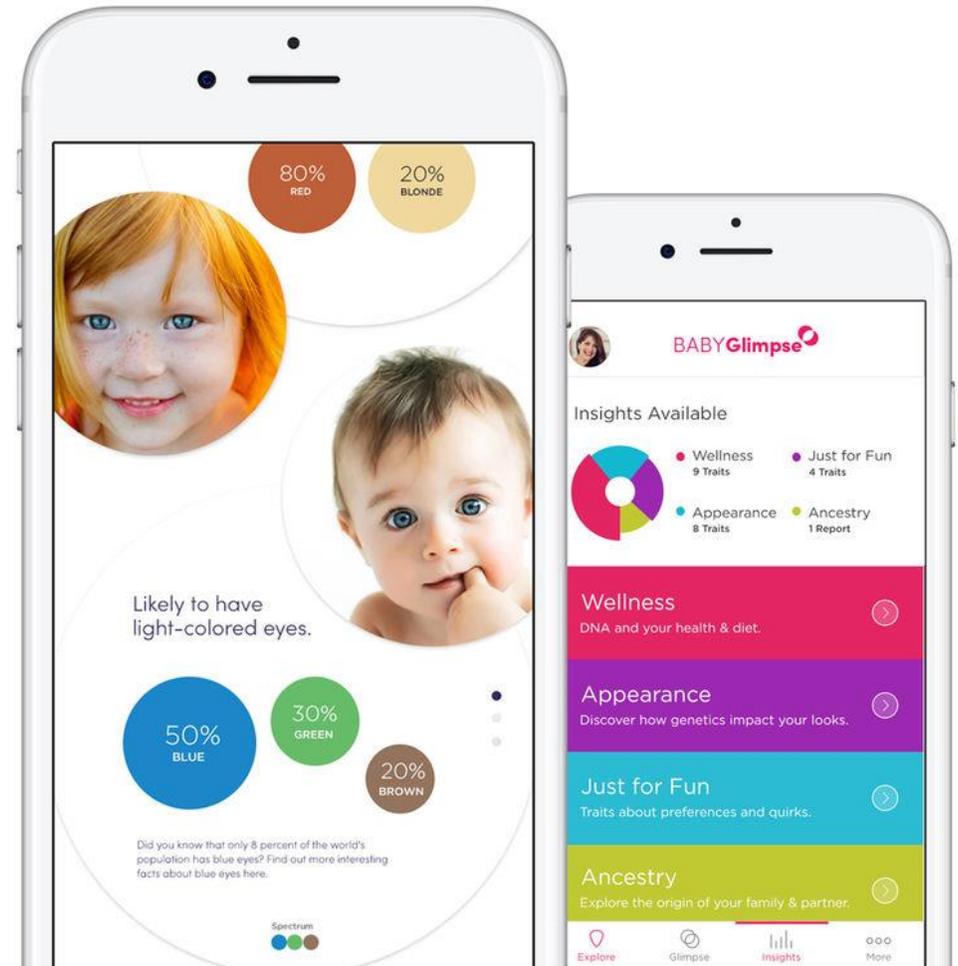
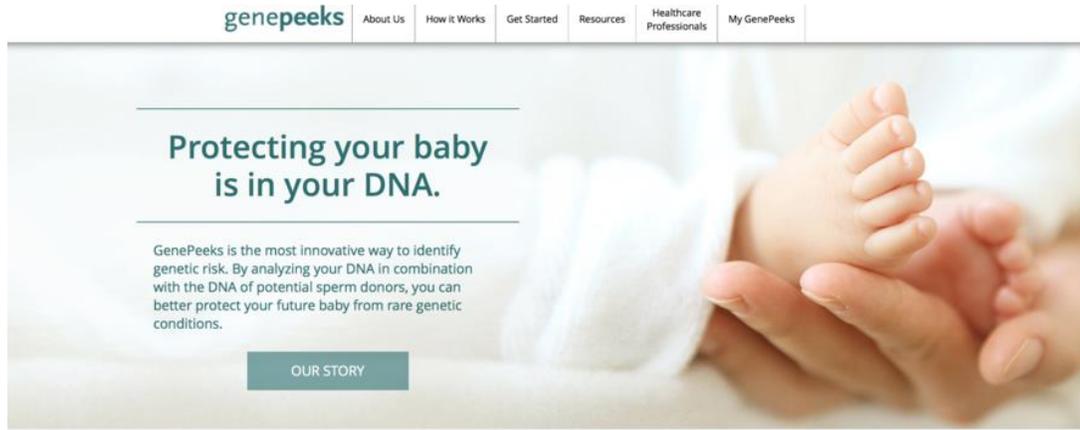


From *medically* assisted to *algorithmically* assisted human reproduction

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Law



Complex decision-making in the global genetic supermarket



Perfect Match 360°: Artificial intelligence to find the perfect donor match



Algorithms and human reproduction

Algorithms can be used to optimise, automate, standardise or routinise human reproduction on several levels:

- 1) Finding a romantically compatible partner (e.g. OKCupid, Tinderbabies)
- 2) Finding a genetically compatible partner or gamete donor (e.g. 23andMe and GenePeeks designer baby patent)
- 3) Selecting a viable embryo for IVF (e.g. algorithms developed to facilitate 'embryo scoring' and 'unbiased automated embryo assessment')
- 4) Creating, selecting and modifying 'personalised embryos' through new technologies (e.g. IVG and CRISPR)

Genetic reproductive matchmaking

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Technology

23andMe's 'build-a-baby' patent criticised

3 October 2013

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How ethical is it to build a perfect baby?

A US patent for a database that uses DNA testing to tell prospective parents which traits their future offspring may inherit has been criticised by experts.

The Observer
Genetics

Startup offering DNA screening of 'hypothetical babies' raises fears over designer children

Six years after Anne Morriss gave birth to a boy with a rare disease, she and a US scientist are giving would-be parents the chance to screen potential children for genetic conditions

Catherine de Lange

Mon 7 Apr 2014 08.00 BST

f t e 301 20



▲ Anne Morriss and her son Alec, six, who is now as healthy as any child, pictured at their home in Cambridge, Massachusetts. Photograph: Steve Schofield for the Observer

Two days after Anne Morriss took her newborn son home from hospital, she received a bone-chilling phone call. The stranger on the end of the line asked her whether she was sure her baby was still alive. Rushing to the next room, she was relieved to find the baby was fine, but the call was from a Massachusetts state physician who told her that a routine scan had revealed her baby had been born with a rare

Algorithmically assisted selection of embryos

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MEGAN HOLTMAN SCIENCE 04.04.2019 05:00 AM

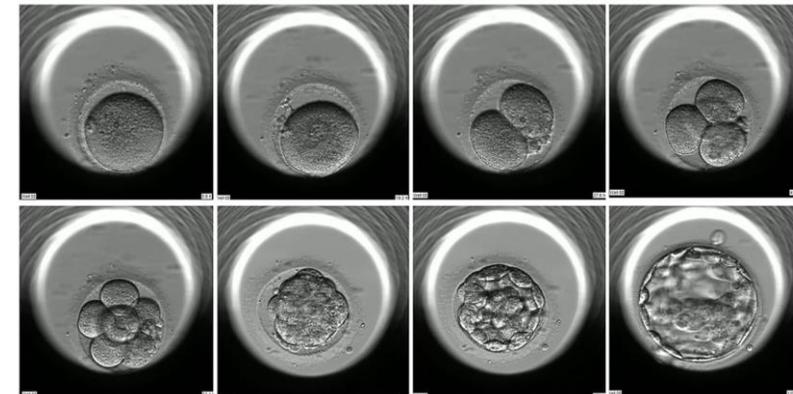
AI Could Scan IVF Embryos to Help Make Babies More Quickly

An algorithm that rates the quality of embryos better than specialists do is a first step toward making IVF easier for women.



Vitrolife Why Vitrolife IVF journey Products Academy Support Investors Blog Log in CONTACT US

GROWING AND SELECTING THE BEST EMBRYO WITH EMBRYOSCOPE



Toward algorithmically assisted personalisation of embryos?



The end of sex and the future of reproduction: in vitro gametogenesis

The New York Times

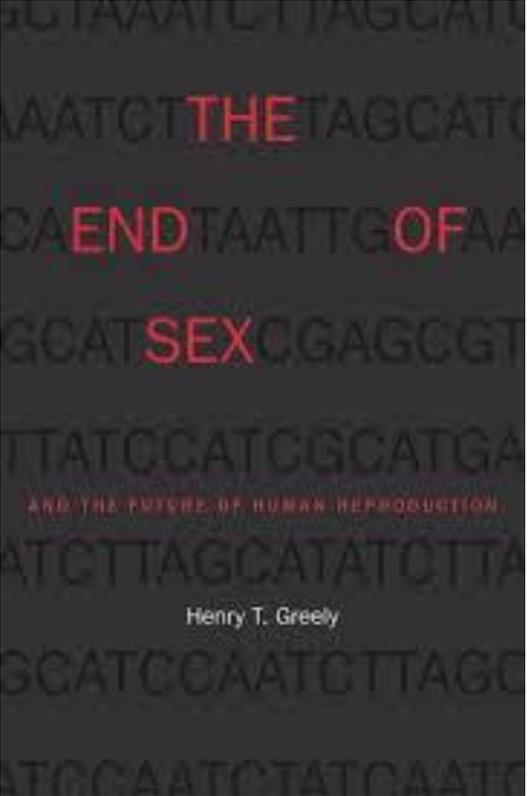
Babies From Skin Cells? Prospect Is Unsettling to Some Experts



Mice that were created from tail cells. Researchers in Japan made viable eggs from the skin cells of adult female mice, and produced embryos that were implanted into female mice, who then gave birth to healthy babies. Katsuhiko Hayashi

By Tamar Lewin

May 16, 2017



CRISPR-babies: germline genetic modification



He Jiankui defends 'world's first gene-edited babies'

© 28 November 2018

f t e Share



A Chinese scientist who claims to have created the world's first genetically edited babies has defended his work.

Speaking at a genome summit in Hong Kong, He Jiankui said he was "proud" of altering the genes of twin girls so they could not contract HIV.

His work, which he announced earlier this week, has not been verified.

Legal-ethical concerns about algorithmically assisted reproduction

Mittelstadt et al., 'The ethics of algorithms; mapping the debate', 2016:

- 1) Epistemic concerns and evidentiary shortcomings
- 2) Unfair outcomes
- 3) Transformative effects
- 4) Traceability

Epistemic concerns and evidentiary shortcomings

Evidence produced by algorithms may be:

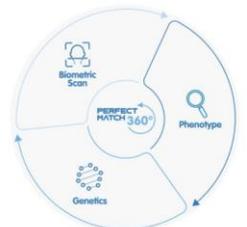
- 1) Inconclusive: genetic risk
- 2) Inscrutable: deep learning
- 3) Misguided: often commercial setting

Perfect Match 360°: Artificial intelligence to find the perfect donor match



Perfect Match 360°

IVI's patients have at their disposal **Perfect Match 360°**, an innovative system that guarantees choosing the most suitable donor, taking into consideration the **phenotypic criteria** (physical characteristics, such as ethnicity, eye colour, hair colour, height and physique, blood type,...), **biometrics** (facial resemblance study) and a comprehensive **genetic analysis** (detecting more than 600 genetic diseases).



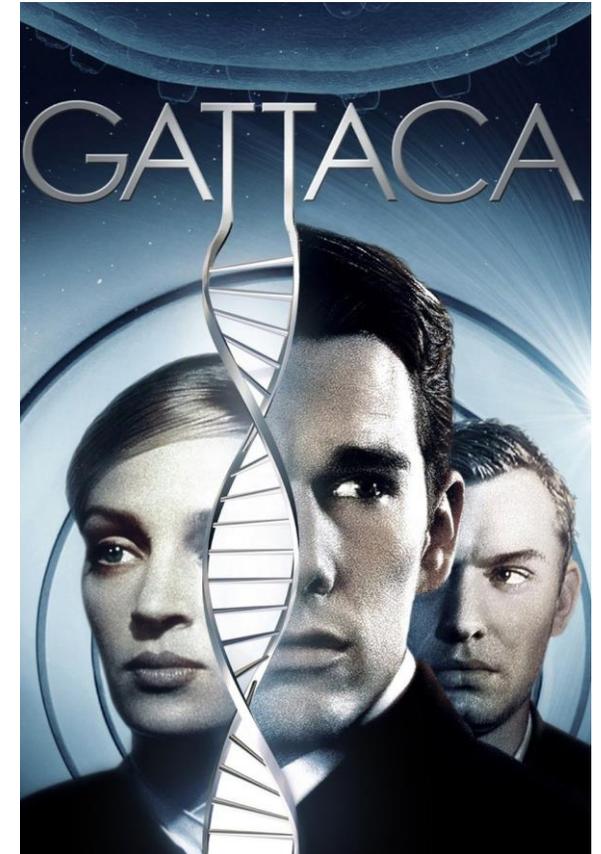
More information

Unfair outcomes: the risk of eugenic feedback loops

Sonia Suter on algorithmically assisted reproduction:

“the algorithmic selection could potentially be misperceived as scientific, objective and even medically optimal, rather than a mathematical expression of values and expression. Indeed, the appeal of these algorithms might be precisely their apparent objectivity[...]

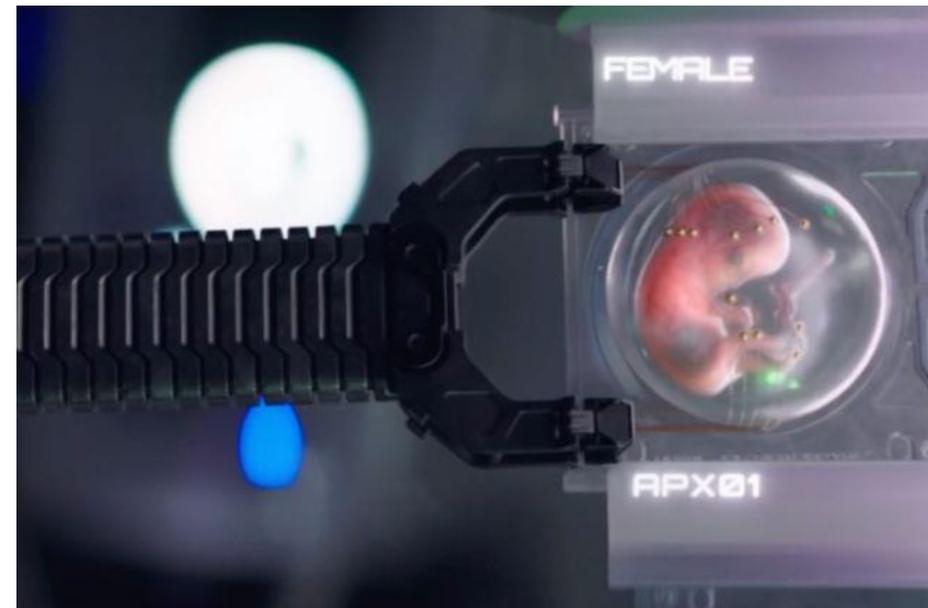
These cultural shifts would routinize selection against not just disabilities, but also disfavored non-medical traits, ultimately leading to a vicious cycle: reproductive choices would reinforce prejudice by reducing the number of children born with the disfavored disabilities or traits, which would increase selection against those traits, thereby further reinforcing prejudice, etc.’



Transformative effects

Meseguer et al. 2012:

‘We think that there is a need for an automatization or robotization of the ART lab. [...] What do we need to transform our way of handling fertilization of human gametes and embryo development from a manual art into an automated process where a sperm and an oocyte come in at one end of the machine and out of the other comes the best-quality embryo? Are we able to transform our way of working in the ART lab as we did in **car manufacturing**, moving from handmade prototypes into **fantastic production lines** that today provide better and safer cars? Perhaps it is a dream, but we believe we are allowed to dream.’



Traceability: product liability/wrongful birth

UK news

This article is more than 1 year old

Woman awarded £9m damages for care of son who 'should not have been born'

High court rules in favour of Omodele Meadows, who says she would have terminated her pregnancy if she had known child would have haemophilia

Press Association

Sat 25 Nov 2017 13:34 GMT



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▲ The high court said that Omodele Meadows' primary motive was 'a better life for her son'. Photograph: Andrew Matthews/PA

A mother has been awarded £9m in high court damages to raise the son who would not have been born if she had known of his haemophilia.

Shortly after Omodele Meadows gave birth to Adejuwon in September 2011, she discovered he had the rare condition that affects the blood's ability to clot.

THE IRISH TIMES

Thu, Nov 14, 2019

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Mother gets €1.8m in first ever 'wrongful birth' case

Woman with rare genetic condition had child who needs 24-hour care after incorrect test result

© Wed, Jun 20, 2018, 14:42

Mary Carolan



▲ A mother who is a carrier of a rare genetic condition, and who claimed she was deprived of her right to travel for an abortion, has settled the first ever 'wrongful birth' case here for an interim payment of €1.8m.



The woman's child was born with the same disabling condition after a test on the foetus for that condition came back with a normal result.

Conclusion

From medically assisted to
algorithmically assisted reproduction



From human reproduction to the
production of humans?

