

Denis Alexander

reviews recent trends at the interface of science and faith

GENES, DETERMINISM & GOD



key points

- Even if the bad old days of genetic determinism are behind us, it still exists in public discourse and the sequencing of the human genome is accompanied by much 'genohype'.
- Likewise, the pendulum has swung from genetic determinism to socio-biology, with the 'blueprint' metaphor for the genome becoming popular.
- It all cries out for new language for integrated personhood; the Bible provides many of the needed footnotes.

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There is a general perception that the bad old days of genetic determinism belonged to the earlier decades of the twentieth century. For more than half a century (roughly 1880–1940) it was widely believed that heredity determined race, class, mental health, and intelligence. Eugenic legislation ensured the compulsory sterilisation of hundreds of thousands of 'physical and mental defectives' in the USA, Denmark, Sweden and Germany.

Following the Second World War, as the horrendous revelations of the use of eugenics in Nazi Germany became well documented, a reaction set in that swung the pendulum away from genetics, shifting towards a greater focus on the environment. But then came the advent of molecular biology from the 1960s onwards and the beginnings of socio-biology from the 1970s onwards, together with the rise of behavioural genetics and the idea of the 'selfish gene'.¹ The sequencing of the human genome² was greeted with considerable 'genohype'. The 'blueprint' metaphor for the genome became very popular, replacing older, less deterministic terminology such as 'genetic lottery'.³

The new genetic determinism, unlike the old, is more subtle, absorbed more by a process of cultural osmosis than by bold assertions. Geneticists reporting their results tend to be cautious, highlighting the role of the environment. Yet at the same time the language of genetic determinism has come into daily discourse. 'It's in her DNA' or 'in this or that institution's DNA' highlight characteristics that are supposedly permanent.

The media reports the discovery of a 'gene for' violence, or happiness, or monogamy. A recent news report from *Nature* proclaims that: 'An increasing number of studies suggest that biology can exert a significant influence on political beliefs and behaviours...genes could exert a pull on attitudes concerning topics such as abortion, immigration, the death penalty and pacifism.'⁴ Genes are seen as

something different from 'us' and they seem to be exerting a 'pull'.

Integrated Personhood

Part of the problem in this discussion is the dichotomous nature of the language used. 'Nature–nurture' remains a common trope in media outputs, 'genes–environment' in more academic discourse. Either way the language tends to portray a somewhat fragmented view of human personhood in which the reified forces of 'genes' and 'environment' are competing for hegemony over the final product.

In my book on this subject⁵ I introduce a new acronym, DIC1, which focuses on a more unitary concept of personhood. This stands for Developmental Integrated Complementary Interactionism, four words which do much to subvert the dichotomous language of 'nature and nurture'. DIC1 focuses on the way in which genetic contributions are thoroughly integrated during human development with the microenvironments of the cellular machinery as well as the macroenvironment provided by the mother during pregnancy and the wider world post-partum. Interactionism continues all the way from the zygote to adult death, with epigenetic inputs from the environment continually modulating genomic functionality. Many levels of complementary description, using a range of disciplines, are essential to do justice to the complexities of the interactions.

What is inherited from the parents is not naked DNA, which by itself can do nothing, but a complex system of DNA, RNA, proteins and nutrients that together operate to regulate cell growth and division. The human egg just prior to fertilisation contains at least 3,000 different proteins, 7,500 different mRNA molecules, and many thousands more small, non-coding RNA molecules involved in regulating gene expression. By itself DNA would be as useless as a piece of software without any computer to run it on. Biologically, human life begins as an integrated

complex system and carries on that way to the end.

Our human identities and unique personalities are 100 per cent genetic and 100 per cent environmental, millions of factors integrated together during foetal development and in the postnatal years to generate the unique person, the unique 'I'. The Psalmist said that he was 'knit together' in his mother's womb⁶ and we are all the products of this great knitting exercise.

Definitions of genetic determinism

Hard determinism we can define as the belief that 'given our particular genomes our lives are not really up to us and are constrained to follow one particular future', whereas soft determinism states that 'given our particular genomes our lives are more likely to follow one particular future', which arguably is not really determinism at all. In reality, the various human states of being are located somewhere on a spectrum lying between the two poles provided by these two definitions. The more deterministic pole of the spectrum is exemplified by medical genetics where often there are genetic conditions that constrain one to a particular future. But for the vast majority of the population, genetic variance may predispose people to do certain things, but in a probabilistic rather than deterministic way.

Determinism in medical genetics is a moving target. The phenylketonuria which once resulted in thousands of children worldwide ending up in care homes due to severe mental disability is now thankfully a thing of the past. Whilst I was working at the American University Hospital in Beirut during the 1980s, a baby was brought to A&E several times with failure to thrive and lactic acidosis. Each time we obtained a small blood sample for enzyme analysis. On the third visit, we identified the 39th case in the world of fructose-1,6-diphosphatase deficiency.⁷ It turned out that the parents had been feeding the baby honey. A fructose-free diet thereafter promised a good prognosis. The genetically determined outcome of the week before was now no longer. Sadly, such is not the case for many thousands of other Mendelian genetic disorders, but in many cases prognoses are gradually improving with new therapeutic interventions.

Behavioural genetics

It is within the fields of behavioural and psychiatric genetics that discussion of genetic determinism becomes most relevant. 'Heritability' within this context refers not to inheritance but to the proportion of the variance of a trait that can be ascribed to genetic variation in a given population.⁸ Heritability values are measured via twin and adoption studies. Genome Wide Association Studies (GWAS) seek to identify genetic variants that correlate with particular traits, such as intelligence or aggression. But even with a straightforward non-behavioural trait like height, which is 80 per cent heritable, the 697 independent, albeit common, gene variants that associate with height variation explain only 20 per cent of the heritability, with rare variants contributing some of the 'missing' heritability.⁹ Unsurprisingly, therefore, inves-

tigation of complex behavioural traits by GWAS has revealed hundreds of gene variants that each make minute contributions – less than 0.1 per cent – to the overall variation in a population.¹⁰ This is what one expects when thousands of genetic variants integrate with thousands of environmental inputs during development to generate complex human individuals.

Genes do not determine behaviour, but they are certainly 'difference makers'.¹¹ The possession of the Sry gene on the Y chromosome may help to explain why an average of 93 per cent of the prisoners worldwide are male,¹² but males are not determined to commit crimes by possessing the Sry gene (thankfully).

Humankind made in the Image of God

The fact that humankind is made in the Image of God, 'male and female he created them'¹³ provides a key starting point for a conversation between genetics and theology. In its Ancient Near Eastern context, 'Image of God' language was used to refer only to kings and occasionally priests. In Genesis 1 we find a totally new idea about the value and status of humankind: the kingly and priestly roles previously allocated to the privileged few by a pantheon of gods were now being delegated instead by the one creator God to the whole of humanity.¹⁴ Psalm 8 expounds this new status. The value of each human individual is bestowed by God's gracious decree, not 'earned' by possessing a certain list of qualities. There are two key entailments.

First, the fact of humankind being made in God's image subverts any move to make distinctions between people based on their genetic endowment. When human personhood is viewed in a purely utilitarian way, without any grounding in a wider worldview that undergirds human value and equality, then it is remarkable how quickly people can be treated as disposable. See Giubilini and Minerva for a frightening example.¹⁵

Second, the moral responsibilities and duties bestowed upon humankind made in the image of God imply genuine choice. The command given in Genesis 2 not to eat of the tree of the knowledge of good and evil is disobeyed; human autonomy seems much more alluring. There are terrible consequences: separation from the tree of life. The assumption of genuine human responsibility is inescapable. Free will brings heavy duties and obligations in its wake.

There is nothing in contemporary genetics, barring some rare but tragic cases of medical genetic pathologies, that in any way subverts personal moral responsibility. Genes do not influence us, and certainly do not control us, as if our genomes were somehow operating in a separate space isolated from the rest of personhood. We cannot escape our responsibilities to God, to each other and to our delegated task of caring for the earth, including our use of genetics. We will be called to account.

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references

1. Dawkins R. *The Selfish Gene*. Oxford: OUP, 1976
2. Consortium. Finishing the Euchromatic Sequence of the Human Genome. *Nature* 2004;431: 931-945
3. Condit CM. How the Public Understands Genetics: Non-Deterministic and Non-Discriminatory Interpretations of the 'Blueprint' Metaphor. *Public Understanding of Science* 1999;8:169-180
4. Buchen L. Biology and Ideology: The Anatomy of Politics. *Nature* 2012;490:466-468
5. Alexander DR. *Genes, Determinism and God*. Cambridge: CUP, 2017
6. Psalm 139:13
7. Alexander D, Assaf M, Khudr A et al. Fructose-1,6-Diphosphatase Deficiency: Diagnosis Using Leukocytes and Detection of Heterozygotes with Radiochemical and Spectrophotometric Methods. *J Inherit Metab Dis* 1985;8: 174-7
8. Plomin R, DeFries J, Knopik VS et al. *Behavioral Genetics: A Primer*, 6th ed. New York, Duffield: Worth Publishers, 2013
9. Marouli E, Graff M, Medina-Gomez C et al. Rare and Low-Frequency Coding Variants Alter Human Adult Height. *Nature* 2017;542:186-190
10. Turkheimer E. Still Missing. *Research in Human Development* 2011;8:227-241
11. Woodward J. *Making Things Happen: A Theory of Causal Explanation*. Oxford: OUP, 2003
12. World Prison Brief, www.prisonstudies.org
13. Genesis 1: 26-27
14. Middleton JR. *The Liberating Image: The Imago Dei in Genesis 1*. Grand Rapids: Brazos Press, 2005
15. Giubilini A, Minerva F. After-Birth Abortion: Why Should the Baby Live? *J Med Ethics* 2013; 39(5):261-3. doi: 10.1136/medethics-2011-100411. Epub 2012