TOPIC 1: GENES AND EVOLUTION

GENES = the units of heredity that fully determine the characteristics of an organism

GENE VARIATIONS = refer to whether a particular gene is turned on or off

CHROMOSOMES = are structures within the cell body that are made up of DNA, segments of which comprise to a distinct gene.

How genes and environment affect psychological function?

GENOTYPES: also refers to genes involved in turning genes "on" and "off".

PHENOTYPES: refers to the observable traits, such as height, eye color, and personality traits.

Factors affecting genotypes:
- genetic predisposition
- firm of an individual
- environmental influence
- the environment, the interaction between the two

environmental factors can affect gene expression and alter, even in genetically identical twins, an individual's appearance, behavior, and thoughts, feelings, and behaviours.

biology (nature's genes) ⊕ environment (both childhood and adult life)

influence the development of cues know!

All of human development has a genetic basis

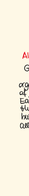
GENOME → contains a complete set of genetic instructions. Each of these contains one unique individual regardless inside their organism and cell and to additional cleaning.

↳ HUMAN GENOME: provides detailed information for everything

- how to grow a cockroach (cockroaches)
- how to make a human (humans)
- where the nose goes, where to put a foot (humans)

→ every cell in the body has the blueprint for making the entire organism.

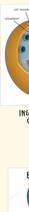
WHAT DETERMINES WHAT WHETHER CELL BECOME FOOT ETC?



INSIDE A CELL → **CHROMOSOMES**
made of chromosomes and

DNA → the information is inside up of nucleotides in a distinct fixed shape

sequence of three chemicals are genes



EACH HUMAN CELL

- 23 pairs of chromosomes
- one member of each pair → from the father
- 23 pairs → from the mother

GENES: particular sequences of nucleotide strings, DNA

each of these genes are build instructions to manufacture a distinct **PROTEIN** → one of many polypeptides

PROTEIN → machine-to-build thousands of different types of proteins, each type → turning out a specific trait

Each cell, so the body functions the same DNA

BUT → cells become specialized, depending on which of these genes are switched on TRUE

CHROMOSOMAL ACTIVITY

Gene expression determines the body's basic physical anatomy **BUT** is also continuous factors affecting which genes are turned on

Environment: determines which proteins are produced and when they are produced

gene expression continues throughout life time, to learn, to adapt, to live, etc.

HUMAN GENOME PROJECT (2003)

international research effort

1st phase: map the entire sequence of DNA.

RESULT: we have now over 20,000 genes.

objective: and set to identify the gene order of nucleotides that make up each of the thousands of chromosomes

(So, 23 pairs, one from mom, 23 pairs from dad, 46 in total)

so, why are we so complex? the number of genes, isn't it so surprise there, instead it is how these genes are expressed and regulated!

3.16 HEREDITY INVOLVES PROBLEM ALONG GENES THROUGH REPRODUCTION

Keywords

DOMINANT GENES: gene that is expressed in the offspring's behavior to present

RECESSIVE GENES: gene that is expressed only when it is matched with a recessive gene from the other parent

GENOTYPE: genetic constitution of an organism, determined at the moment of conception

PHENOTYPE: observable physical characteristics, which result from both genetic and environmental influences

- genotype and environment behaviors
- (heritage, that and present)

MENDEL → studying inheritance through pisum

DARTS WORKS THROUGH

CHOICES OF EXPERIMENT

PEA PLANTS → 1st generation → crossbreed → 2nd generation

Mendel deduced that the plants contained recessive traits (genes that should be different versions)

do not call genes when organisms are hybrids

dominant → genotype: phenotype

recessive → genotype: phenotype

3:1 ratio

EXAMPLES:

- tall ⊕ short → tall
- green ⊕ yellow → green

- dominant gene
- recessive gene

genotype ← one dominant and one recessive gene

POLYGENIC EFFECT

population displays a range of variability for certain characteristics (height or intelligence)

POLYGENIC → the trait is influenced by many genes as well as by environment

EXAMPLES: HUMAN SKIN COLOR

- the rich variety of skin colors is not the end product of a single allele and instead gene pairs of three-like effect of multiple genes.

SEXUAL REPRODUCTION

most cells in humans body → 23 pairs of chromosomes

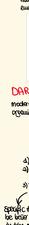
- DNA CHROMOSOMES
- X → female
- XY → male

(a) XX (female) | (b) XY (male)

1 sperm + 1 egg → zygote → 23 chromosomes → 1 egg 1 sperm

8 million different combinations

genetic variation of the human species



Zygote grows through **CELL DIVISION**

1st STAGE: the chromosomes duplicate.

2nd STAGE: the cell divides into two cells with identical chromosome structure.

MONOZYGOTIC (identical) twins: have the same genotype, but different environments.

DARWIN'S EVOLUTION THEORY

modern organisms → descended from a small set of ancestral forms

have changed over time through the process of evolution.

NATURAL SELECTION

Evolution:

1) variation exists individuals of a population
2) individuals with a certain trait survive and reproduce at higher rate. Also stress
3) the trait associated with this advantage is passed from parents to offspring

Result: means will be more represented in the next generation

GENETIC NUTRITIONS

each gene carry dark diseases

- mutations or alterations in DNA
- often, behavior and not relevant occasionally, they prove to possess advantages or disadvantages in terms of survival or reproduction.

ADVANTAGE: what does "advantage" mean? → genes is **some** unique to some as good regulation.

DISADVANTAGE: A mutation that produces an ability or a behavioral advantage in the organism in the short-term may prevent the survival of the individual.

Genetics differ in genotype and mutation. In it can prevent from deterioration to generation.

WHAT MATTERS? → the survival of genes, not the survival of individuals.

Evidence of this theory:
- fossil record
- resemblance between groups of various organisms
- homologous parts
- distribution of species across world

It does not follow that evolution:
- between organism organisms
- can only lead to right behavioural pattern

NATURE (genes) and NURTURE (environment)

↳ continuous interaction between them

Who are we to distinguished by how our genes are expressed in different environments.

HYPOTHESIS: The MAOA gene regulates enzyme monoamine oxidase (MAO) and the MAOA variant has been associated with aggressive behaviour because low levels of MAO have been implicated in aggressive behaviors.

RESEARCH METHOD:

- A group of more than 1,000 New Zealanders were followed from birth to adulthood.
- Researchers measured which children were maltreated by their parents (nurture).
- Researchers measured the presence of the MAOA gene, which comes in two forms. One form leads to higher levels of MAO, and the other form leads to lower levels (nature).

- Researchers measured the tendency toward criminal behavior.

RESULT: Those who had the MAOA gene for low MAO activity were much more likely than others to have been convicted of violent crimes, such as assault and robbery, as children. The effects of maltreatment had less influence on those with the high MAOA gene.

CONCLUSION: Nature and nurture can work together to affect human behavior.

SOURCE: Caspi, A., McClay, J., Moffitt, T. E., Mill, J., Martin, J., Craig, I. W., et al. (2002). Role of genotype in the cycle of violence in maltreated children. Science, 297, 851-854.

Is it correct to claim "a violent person has violent genes"?

genes ↔ environment ↔ (criminal) behavior

MAOA alleles for low MAO activity → severe maltreatment → higher probability of being convicted of violent crimes