

Dominant & Recessive Genes

by Sophia Tutorial



WHAT'S COVERED

In this lesson, we'll discuss genetics, or the biological factors that influence human development.

The specific areas of focus include:

1. Review of Heredity and DNA
2. Chromosomes and Genes
3. Dominant and Recessive Genes
4. Effect of Genetics on Psychology

1. Review of Heredity and DNA

As you learned in a previous lesson, there are two important aspects of biology and genetics:

- Heredity
- DNA

Heredity, which is also referred to as inheritance, is the transmission of physical and psychological characteristics from a parent to an offspring.

DNA, which stands for deoxyribonucleic acid, is the mechanism that allows for that information to be passed on from parent to offspring.

Now that we've reviewed those aspects, we can take a look at some of the other factors that influence heredity and DNA.

2. Chromosomes and Genes

The DNA inside of every person is organized into x-shaped structures called chromosomes.

Each cell has 46 of these chromosomes, which are bundles of DNA that organize all of a person's genetic information. Out of the 46 chromosomes, half, or 23, come from one parent, and half of them come from the other.

These chromosomes are a bit like big tangles of DNA, and the DNA themselves are long strands. Thus, it can be difficult to understand exactly what's occurring.

To make this easier, DNA are grouped into useful units called **genes**. A gene is a specific area on the DNA that carries certain hereditary information.

Genes code for specific processes or characteristics within the human body, such as eye color. Because each person has two of each of these genes, it's hard to tell which of them is going to be expressed. Therefore, genes are further labeled as being either dominant or recessive.



TERM TO KNOW

Genes

Sections of a chromosome that code for specific traits (physical and psychological)

3. Dominant and Recessive Genes

A **dominant gene** is a gene that will express itself each time it is present. While it can at times be considered the more powerful of the two types of genes, that's not necessarily the case.

A **recessive gene** is a gene that will only be expressed when it's paired with another recessive gene. In other words, it will be expressed when it doesn't have a dominant gene paired with it.

This is a little bit tricky to understand, so a lot of geneticists use a system called a Punnett square. A Punnett Square organizes the information to show when certain characteristics are going to be expressed, and when they are not.



EXAMPLE Say the chart below represents two parents and four children, and both parents have brown eyes. More specifically, they each have a dominant gene for brown eyes, which is the big X, and a recessive gene for blue eyes, which is the small x. Any time there's a large X, then the offspring will have brown eyes.

	X	x
X	XX	Xx
x	Xx	xx

In the first box, there are two big X's, so that child will have brown eyes. In the second and third boxes, there is one big X and one small x. Since the big X is dominant, those children will also have brown eyes. However, the fourth child has two recessive genes, or two small x's. This child will have blue eyes because he or she doesn't have a dominant gene to express for brown eyes.

While this type of chart can be a helpful way to make sense of all of this genetic information, the way that our genes work is generally not as simple as the Punnett square makes it look.

Most characteristics in genetics are polygenetic, meaning that there are lots of genes working together to

express that characteristic.



TERMS TO KNOW

Dominant Gene

This gene's feature will be expressed each time it is present, only a single gene is needed to be expressed

Recessive Gene

Gene must have a second similar gene paired with it to be expressed

4. Effect of Genetics on Psychology

It's important to remember that genes express not only physical characteristics like eye color, but psychological characteristics as well. Thus, genetics can help us understand why certain psychological occurrences--or even psychological mental disorders--occur.

➦ **EXAMPLE** Some mental disorders, like bipolar disorder, schizophrenia, and autism, have a strong genetic basis. This means that it's much more likely for people to inherit those diseases from their parents. If a person's parent has schizophrenia, that person is 80% more likely to have schizophrenia than somebody whose parent doesn't have it.

An understanding of genetics helps psychologists to understand how some of these psychological characteristics get passed on. In fact, in 2003, the Human Genome Project was able to sequence all of the three billion different DNA and gene types that exist within the human body.

Now that we understand what the code looks like, we're a lot closer to understanding the biologic basis for the characteristics, behaviors, and mental states that exist within human beings.



SUMMARY

In this lesson, you explored a **review of heredity and DNA** as two important aspects in the biological dimension of developmental psychology. You then learned that **chromosomes** are tiny bundles of DNA; half a person's chromosomes come from one parent, and half from the other. **Genes** are specific areas on DNA that contain particular hereditary information. Genes are further classified as being either **dominant** or **recessive**.

You now understand the **effect of genetics on psychology**. Understanding the expression of certain traits over others as a result of genetics can help us understand how psychological characteristics and disorders are passed on.

Good luck!

Source: This work is adapted from Sophia author Erick Taggart.



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Genes

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Recessive Gene

Gene must have a second similar gene paired with it to be expressed.