

# SENTENCE STRUCTURE

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**TASK 1A: Compare Paragraphs A, B and C below. What are the main differences between them? Which is the best? Why?**

## Paragraph A

1869 was a landmark year in genetic research. Few people realise this. Swiss physiological chemist Friedrich Miescher first identified what he called "nuclein" inside the nuclei of human white blood cells. The term "nuclein" was later changed to "nucleic acid" and eventually to "deoxyribonucleic acid," or "DNA." Miescher's plan was to isolate and characterize not the nuclein but the protein components of leukocytes (white blood cells). Nobody at that time realized that Nuclein existed. Miescher made arrangements for a local surgical clinic to send him used, pus-coated patient bandages. He received the bandages. He planned to wash them, filter out the leukocytes, and extract and identify the various proteins within the white blood cells. He came across a substance from the cell nuclei. It had chemical properties unlike any protein. These included a much higher phosphorous content and resistance to proteolysis (protein digestion). He sensed the importance of his findings. He wrote, "It seems probable to me that a whole family of such slightly varying phosphorous-containing substances will appear, as a group of nucleins, equivalent to proteins"

## Paragraph B

Although few people realize it, 1869 was a landmark year in genetic research, because it was the year in which Swiss physiological chemist Friedrich Miescher first identified what he called "nuclein" inside the nuclei of human white blood cells (The term "nuclein" was later changed to "nucleic acid" and eventually to "deoxyribonucleic acid," or "DNA"). Miescher's plan was to isolate and characterize not the nuclein, (which nobody at that time realized existed) but instead the protein components of leukocytes (white blood cells), so he made arrangements for a local surgical clinic to send him used, pus-coated patient bandages, and once he received the bandages, he planned to wash them, filter out the leukocytes, and extract and identify the various proteins within the white blood cells, but when he came across a substance from the cell nuclei that had chemical properties unlike any protein, including a much higher phosphorous content and resistance to proteolysis (protein digestion), Miescher realized that he had discovered a new substance (Dahm, 2008). Sensing the importance of his findings, Miescher wrote, "It seems probable to me that a whole family of such slightly varying phosphorous-containing substances will appear, as a group of nucleins, equivalent to proteins."

## Paragraph C

Although few people realize it, 1869 was a landmark year in genetic research, because it was the year in which Swiss physiological chemist Friedrich Miescher first identified what he called "nuclein" inside the nuclei of human white blood cells. (The term "nuclein" was later changed to "nucleic acid" and eventually to "deoxyribonucleic acid," or "DNA.") Miescher's plan was to isolate and characterize not the nuclein, (which nobody at that time realized existed) but instead the protein components of leukocytes (white blood cells). Miescher thus made arrangements for a local surgical clinic to send him used, pus-coated patient bandages; once he received the bandages, he planned to wash them, filter out the leukocytes, and extract and identify the various proteins within the white blood cells. But when he came across a substance from the cell nuclei that had chemical properties unlike any protein, including a much higher phosphorous content and resistance to proteolysis (protein digestion), Miescher realized that he had discovered a new substance (Dahm, 2008). Sensing the importance of his findings, Miescher wrote, "It seems probable to me that a whole family of such slightly varying phosphorous-containing substances will appear, as a group of nucleins, equivalent to proteins."

➤ **POWERPOINT: Clauses: Building Blocks for Sentences<sup>1</sup>**

**FOR REFERENCE ...**

**Basic sentence parts and patterns**

- ✓ [http://grammar.ccc.commnet.edu/grammar/diagrams2/one\\_pager1.htm](http://grammar.ccc.commnet.edu/grammar/diagrams2/one_pager1.htm)
- ✓ <http://grammar.ccc.commnet.edu/grammar/quizzes/bodyparts.htm>

**Phrases**

- ✓ <http://grammar.ccc.commnet.edu/grammar/phrases.htm>

**Sentence fragments and run-on sentences**

- ✓ <http://grammar.ccc.commnet.edu/grammar/fragments.htm>
- ✓ <http://grammar.ccc.commnet.edu/grammar/runons.htm>

Below are more examples of simple, compound, complex and compound-complex sentences. Which of these types do you use most frequently in your writing?

**SIMPLE (one independent clause)**

- Scientific writers sometimes needlessly inflate their writing in complexity and length in an effort to “sound scientific” or convey intelligence.
- The best scientists can communicate complicated results to intelligent readers outside their field.
- Long, complex writing doesn't imply good science.

**COMPOUND (two or more independent clauses)**

- A man may die, and nations may rise and fall, but an idea lives on. (John F. Kennedy)
- Any jackass can kick down a barn, but it takes a good carpenter to build one. (Lyndon B. Johnson)
- I have often wanted to drown my troubles, but I can't get my wife to go swimming. (Jimmy Carter)
- Trust, but verify. (Ronald Reagan)
- I have opinions of my own, strong opinions, but I don't always agree with them. (George H. W. Bush)
- You can put wings on a pig, but you don't make it an eagle. (Bill Clinton)

In all of the above examples the independent clauses are linked by a comma + coordinating conjunction (but/and). Alternative mechanisms for joining independent clauses in compound sentences are:

1. A man may die, and nations may rise and fall; an idea lives on. (just a semi-colon)
2. I have opinions of my own, strong opinions; however, I don't always agree with them. (semi-colon + conjunctive adverb + comma)

**NOTE** that the position of conjunctive adverbs can often be varied:

I have opinions of my own, strong opinions; I don't always agree with them, however.

I have opinions of my own, strong opinions; I don't, however, always agree with them.

**COMPLEX (one independent clause and one or more dependent clauses)**

- Computers have come a long way since they first came on the market.

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<sup>1</sup> Powerpoint presentation by Dr. Charles Darling from *Guide to Grammar and Writing* at <http://grammar.ccc.commnet.edu/grammar/>

- Although she was unsure of the answer, she tried to make an intelligent guess.
- Scientists don't know what causes multiple sclerosis.
- The government is saying that more people are in work than ever before.
- He was like a cock who thought the sun had risen to hear him crow.
- The only other known virus that was of similar size and shape was Marburg virus.
- A 3D printer is a machine which can make three dimensional solid objects from a digital file.

### **COMPOUND-COMPLEX (two or more independent clauses and one or more dependent clauses)**

- Because the grammar was easy, I learned the language quickly, but it took me several years to master writing.
- After I stopped paying my bills, the bank repossessed my car, and the phone company cut off my service.
- Similarities between languages have led some researchers to speculate that something inherent in the human brain is biologically responsible for language; consequently, their research focuses on the language acquisition of children for clues.
- Since insects are exothermic, they must rely on the environment as their body's heat source, and without this external heat source, they would not be able to move, forage, mate, or function properly.
- Mistrust of aid workers, particularly those from the Red Cross and Doctors Without Borders, is facilitating the spread of Ebola; in addition, since this is the first outbreak of Ebola in West Africa, many inhabitants are not familiar with how Ebola spreads.
- All too often arguments for organic and against GM foods are not based on scientific evidence; they merely preach consumption of 'natural' products, as though this gives them some special power or desirability.

**TASK 2: In the above complex and compound-complex sentences underline the dependent clauses, wavy underline the independent clauses, and circle the coordinators, subordinators and conjunctive adverbs.**

**TASK 3: Examine the following paragraph and identify the different sentence types (simple, compound, complex and compound-complex). Circle the coordinators, subordinators and conjunctive adverbs.**

#### **Alternative Energy<sup>2</sup>**

Nearly every country in the world today concedes that the age of sourcing energy from fossil fuels — chiefly crude oil and coal — is waning. Not only is there a finite amount of fossil fuel reserves in the Earth, but the environmental (and even political) cost of using these reserves is higher than most countries are willing to bear. As a result, the search for energy derived from alternative sources — including geothermal, nuclear, solar, wind, and hydroelectric technologies — has taken on enormous importance in political and scientific circles. Some countries have made significant strides toward converting their energy bases from fossil fuels to renewable energies; for example, Denmark, which supplied more than 95% of its national energy from fossil fuels in the early 1970s, now supplies more than 30% from wind and other renewable sources. Many other nations, including the United States and China, are still largely fossil-fuel based, but are awakening to the need to make national-level investments in alternative energy innovations that could transform their economies in the near future. The next twenty years may well bring a massive reinvention of the world's approach to energy.

<sup>2</sup> Paragraph from <http://www.nature.com/scitable/spotlight/alternative-energy-8047050>

**TASK 4: Analyse the article ‘Why do mosquitos bite humans?’ for distribution of simple, compound, complex and compound-complex sentences. Which of the four sentence types is most frequent? Which is least frequent?**

**Why Do Mosquitoes Bite Humans?<sup>3</sup>**

**By Sedeer el-Showk, 8 December 2014**

The mosquito *Aedes aegypti*, which preys on humans in tropical and subtropical regions, is the main vector for dengue and yellow fever. In a recent *Nature* paper, a team of researchers have uncovered a gene that enables these mosquitoes to target humans.

To track down the gene, the researchers took advantage of the fact that not all *Ae. aegypti* prefer to bite humans. The species originated in the forests of sub-Saharan Africa, where it fed on non-human animals. In East Africa, the black-coloured subspecies *Ae. aegypti formosus* avoids coming into homes, preferring to stay in the forests, where it lays its eggs in rock pools and preys on non-human animals. The brown-coloured *Ae. aegypti aegypti*, on the other hand, readily comes into homes and bites humans, and has adapted to starvation in its larval stage, since the eggs are laid in water found in indoor containers, which is often nutrient-poor. By comparing the behaviour and genetics of the two subspecies, forest and domestic, the researchers hoped to figure out why one prefers humans.



They started by testing how the two subspecies responded to nylon sleeves which had been worn by humans or guinea-pigs. The experiment confirmed the difference in taste; the domestic subspecies showed a preference for the human-scented sleeve, while the forest subspecies was indifferent. Mosquitoes smell with their antennae, so the team reasoned that there might be an important difference in gene expression in the antennae. They could use RNA sequencing to get a snapshot of gene expression in the antennae, but comparing the two subspecies generated a list of nearly 1,000 genes, including many involved in other process — after all, the forest and domestic forms differ in more than just their prey preference. To tighten their search, the team crossed the two subspecies to make a hybrid pool and then picked out the hybrids that had a strong preference for humans or guinea-pigs. Hybridizing the subspecies smoothed out the genetic differences between them, so the human and guinea-pig preferring hybrids were separated by differential expression of just 46 genes. The two lists — 1,000 genes and 46 genes — had an overlap of only 14 genes, two of which encoded odorant receptors. The team focused their efforts on one of the two, called *OR4*.

The next step was to figure out if and how *OR4* responds to human odors. By cloning the gene into a *Drosophila* neuron, the researchers could test its response to different chemical cues in a controlled manner. *OR4* didn't respond to the different components that make up a guinea-pig's smell, but it did respond when exposed to sulcatone, a chemical which is emitted at higher levels by humans than other animals. The malaria mosquito, *Anopheles gambiae*, also has several odorant receptor genes that respond strongly to sulcatone, but none of them is closely related to the *Ae. aegypti* *OR4*. The two mosquito species, separated by 300 million years of evolution, have independently evolved a taste for this human marker.

The team identified several alleles of *OR4* in *Ae. aegypti* populations. A preference for biting humans depends on having an allele that is strongly expressed and is sensitive to sulcatone. However, it seems that sulcatone alone may not be enough — guinea-pig odor with added sulcatone was no more attractive to human-biting mosquitos than guinea-pig odor alone. In addition, despite being an attractant at low levels, sulcatone acts as a mosquito repellent at sufficiently high concentrations. Sulcatone and *OR4* are clearly just part of a complex ecological and evolutionary interaction between mosquitos and their meals.

**Ref**

McBride, Carolyn S. et al. [Evolution of mosquito preference for humans linked to an odorant receptor](https://doi.org/10.1038/nature13964). *Nature* **515**(7526):222. (2014) doi:10.1038/nature13964

*Image credits*

*The Aedes aegypti image is by James Gathany and is in the public domain as a work of the CDC.*

<sup>3</sup> Article from [http://www.nature.com/scitable/blog/accumulating-glitches/why\\_do\\_mosquitoes\\_bite\\_humans](http://www.nature.com/scitable/blog/accumulating-glitches/why_do_mosquitoes_bite_humans)

## HOMEWORK

1. **SENTENCE COMBINING:** improve your writing fluency by studying the notes and trying the interactive exercises at [http://grammar.ccc.commnet.edu/grammar/combining\\_skills.htm#quizzes](http://grammar.ccc.commnet.edu/grammar/combining_skills.htm#quizzes)
2. **WRITING TASK:** Write a paragraph describing a landmark year, discovery or event in your field, or in your career as a researcher. Try to include a range of sentence types (simple sentence, compound sentence, complex sentence, compound-complex sentence).

### The SEVEN STAGES of the WRITING PROCESS

<u>PLANNING</u>	<u>DRAFTING</u>	<u>REVISING</u>
1. Choose a topic 2. Generate ideas 3. Create an outline	4. Write the first draft	5. Edit and revise 6. Proofread 7. Submit

