**Paragraph Structure, Topic Sentences and Transitions**

**Pre-Class Activities**

**Paragraphs**

Paragraphs are extremely important components of an effectively structured piece of writing because they organize material in a way that makes it easier to follow for your readers. Without them, even the most fascinating piece of work will fail to attract the attention it deserves. Structuring your writing into clear, effective paragraphs that address individual ideas will help you organize your work, which in turn gives your readers the best possible chance of understanding the points you are trying to make.

Scientists and researchers often find themselves communicating the results of important studies in an attempt to convince others that they have discovered a new piece of knowledge that will have implications for future research and/or immediate real-world applications. As such, it is even more crucial that they are able to tell a story effectively because they have to convince their audience that their arguments are valid.

The three golden rules below will help you to write clear paragraphs, although you should note that these are just the main ones that you will need to focus on; there are plenty of others that will improve your writing as well. To begin with, try to make sure that you:

**1.** Make one main point per paragraph. It is good practice to tell your reader in one clear, concise sentence (called a topic sentence) at the beginning of each paragraph what you will be expanding upon in that particular paragraph.

**2.** Funnel information from general to specific. Treat each paragraph as a mini-essay, each with its own topic sentence. It is a good idea to start by providing general information before making the information that follows more specific.

**3.** Provide evidence to fully support each paragraph. Although it is a good idea to make most paragraphs roughly similar in terms of word count, it is more important to make each paragraph similar in terms of content completeness. You must provide evidence to back up the general statement(s) made early in each paragraph.

**Question 1 (5 marks)**

Imagine that you have been working on a research project that was designed to investigate why the North American Bullfrog (*Rana catesbeiana*) is proving to be such an invasive species. After working with numerous conservation charities and having looked at lots of sets of data, your colleague has drafted a short piece of writing to advertise your work ahead of an upcoming conference.

**Read this draft below and use the three golden rules to restructure the writing into effective paragraphs**. *Hint: You should split the text into three different paragraphs and will need to move two sentences into one of these. You can copy and paste the text to save time.*

The North American Bullfrog (*Rana catesbeiana*) is one of the most invasive species on the planet, and is famous for eating just about anything it can fit inside its mouth. Although being non-fussy eaters is part of the reason that bullfrogs are so successful at invading other habitats, the first major advantage they have over other frogs is that they produce relatively high numbers of offspring. While the females of many native frog species produce 2-3,000 eggs at a time, bullfrogs can produce ten times as many, which gives the resultant young a much greater chance of surviving into adulthood. The second major advantage bullfrogs have over other species of frog is that they are more mobile and more willing to travel relatively long distances between ponds; native frogs tend to stay very near to the pond in which they are born, whereas bullfrogs can travel over two kilometers between habitats as they search for more favorable environments. Studies looking at the contents of bullfrog intestines have confirmed that they eat birds, snakes, rats, turtles, fish, and each other. Due to their willingness to eat a variety of prey species, local wildlife populations can be severely affected when they become common.

**Question 2 (3 marks)**

To give you some more practice in following the three golden rules of paragraph formation, read the following information drafted by your colleague ahead of the invasive species conference and condense it into *fewer* paragraphs. This exercise should help show you that it is just as possible to split information into too many paragraphs as it is to use too few, but that by following the golden rules, you should be able to improve any piece of writing.

**Read the draft below and use the three golden rules to restructure the writing into effective paragraphs**. *Hint: You should condense the text into three different paragraphs. You can copy and paste the text to save time.*

Controlling the spread of bullfrogs is of such importance that scientists are considering implementing a biological control program.

Such programs involve the deliberate release of predatory species into an environment in the hope that they will ultimately control the numbers of the unwanted species.

In this best-case scenario, the other species in the food web will recover and neither the introduced predator nor the unwanted species will exert a large effect on community processes.

Many scientists are wary of implementing biological control methods, however, as there are large risks associated; the major ones include the expense involved and the limited likelihood of success, as well as the released predator being too effective and simply replacing the unwanted species as a dominant one that negatively affects all other species in the environment.

When this last-case scenario becomes a reality, scientists are then faced with the problem of reducing numbers of the new dominant species.

In the case of the bullfrogs, the likeliest choice of a predatory control species would be the large-mouthed bass.

This fish is popular among fishermen and would seem a good choice to keep bullfrog numbers in check because it has a big appetite and is known to eat tadpoles and small frogs.

**Topic Sentences**

Remember from the previous section that an effective topic sentence must inform your reader what the paragraph is about, and it should also link the flow of your argument from the previous paragraph to the current one. It is usually a good idea to make the first sentence of your paragraph the topic sentence.

As a rough indicator of whether you have written clear topic sentences, a reader in a real hurry should be able to read these, and these only (i.e. avoid the detailed information in all the paragraphs), and still be able to understand the backbone of the argument you are making.

**Some example errors and improvements**

A1 (topic sentence missing):

“When cornered by a pack of wolves, even the most terrified hare will run within the closing circle, desperately seeking an escape route. Fish caught in a trawler net will swim round and round, looking for a way out. Even primitive micro-organisms will move as far away as possible from a negative stimulus, somehow conditioned to flee from impending death.”

**B1 (with effective topic sentence):**

**“There is a huge diversity of life on earth, but all organisms display a common desire to survive.** When cornered by a pack of wolves, even the most terrified hare will run within the closing circle, desperately seeking an escape route. Fish caught in a trawler net will swim round and round, looking for a way out. Even primitive micro-organisms will move as far away as possible from a negative stimulus, somehow conditioned to flee from impending death.”

**A2 (topic sentence does not relate closely enough to paragraph):**

“There is a huge diversity of life on earth, but all organisms display a common desire to survive. When cornered by a pack of wolves, even the most terrified hare will run within the closing circle, desperately seeking an escape route. Wolves co-ordinate their hunting efforts so as to increase their chances of catching prey, but those with higher social ranks earn the right to eat before their inferiors. Hares, on the other hand, typically forage for food on their own. Although they do not benefit from the increased awareness of where food might be, which would come from searching with others, they never have to share their food when they find it.”

**B2 (topic sentence relates directly to paragraph):**

**“Wolves and hares use different foraging strategies, and there are positives and negatives associated with each.** Wolves co-ordinate their hunting efforts so as to increase their chances of catching prey, but food must be shared and wolves with higher social ranks earn the right to eat before their inferiors. Hares, on the other hand, typically forage for food on their own. Although they do not benefit from the increased awareness of where food might be, which would come from searching with others, they never have to share their food when they find it.”

**Questions 3, 4 and 5 (1 mark each, 3 marks total)**

Study the following paragraphs and the three different options for a topic sentence. Choose the most suitable one for each.

**Question 3 (1 mark):** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.The blue whale can grow to lengths of 100ft and weigh as much as 180 tons, whereas the dwarf sperm whale does not grow to be longer than 9ft and weighs as little as 250kg.

1: There is huge variation in the size of different whale species.

2: The blue whale is much more powerful than the dwarf sperm whale.

3: Despite living in the sea, whales are mammals and are unable to breathe underwater.

**Question 4 (1 mark):**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.Viruses are made up of genetic material surrounded by a coat of protein. They must ‘hi-jack’ a host cell and use its physiological machinery to reproduce. Conversely, bacteria are much larger than viruses and are capable of independent reproduction. 

1: Viruses and bacteria differ in their method of reproduction.

2: Viruses and bacteria both cause serious illness in people but reproduce differently.

3: Viruses and bacteria are very different organisms.

**Question 5 (1 mark):**

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.For example, many parents have refused to give their children the triple vaccine of measles, mumps and rubella because of the suggestion that it increases the risk of developing autism. This is despite independent research finding no evidence to support a link between the two. Further independent research shows that there has been an alarming increase in the number of measles cases in children that did not receive the vaccine in recent years. Despite this fact, a high proportion of parents are still reluctant to administer the triple vaccine to their kids.

1: Some inoculations are still poorly trusted despite tests confirming their safety.

2: Measles has affected a high proportion of children that have not been vaccinated against it.

3: Parents often rely on rumours to make poor health decisions on behalf of their kids.

**Questions 6 and 7 (1 mark each, 2 marks total)**

Now try to apply the rules of structuring your writing with effective topic sentences from the other perspective; try to select the most appropriate sentences to follow the topic sentences below.

**Question 6 (1 mark)**

In the natural world, sexual attraction is often based on male individuals displaying colourful features. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1: For example, male peacocks, male perch, male grouse, and some male spiders all follow this pattern. In these same examples, the females in each species are typically less colorful.

2: For example, male peacocks with the biggest and brightest tails tend to attract more females than those with duller appendages. Similarly, male perch with the brightest orange bellies and striking dorsal fins win more mates than their less colorful peers.

3: For example, specific genes in male peacocks and male perch code for certain proteins that, when expressed at high levels, cause the animals to develop extreme colors and win mates. This phenomenon is true for some bird and fish species.

**Question 7 (1 mark)**

Drugs and medicines can save lives, but also destroy them. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1: The word ‘drug’ has a negative association for many people but ‘medicine’ has a much more positive one. For example, Penicillin is lauded as one of the greatest discoveries in human history as its use saved millions of people from diseases like diphtheria and scarlet fever. On the other hand, recreational drugs do not save people from such diseases.

2: Because medicines can be so important in saving lives, the pharmaceutical industry is worth trillions of dollars. Non-medicinal drugs, sold illegally, are also extremely valuable. Medicines have traditionally saved millions of people from diseases such as syphilis, diphtheria, typhoid and malaria but drugs often have negative associations because people know how damaging they can be to people that become addicted.

3: Many life-threatening diseases, such as diphtheria and malaria, can be successfully treated with the correct antibiotics and antiviral drugs. For people afflicted by these diseases, drugs are wonderful commodities. However, people that take recreational drugs can often develop serious addictions to them; because these drugs are often extremely damaging to the body, addicts are in serious danger of developing major health issues that can ultimately lead to death.

**Questions 8 and 9 (1 mark each, 2 marks total)**

For the following two questions, read the **bolded** topic sentence (and paragraph that follows it) before deciding which **one** of the following problems makes each one a **poor** topic sentence:

A) It is **too broad**, and it is therefore hard to cover in sufficient detail in one paragraph

B) It is **too narrow**, and there is therefore too little to expand on in the paragraph

C) It **lacks focus**, and is therefore hard to link it to the support of one idea

D) The language is **too specialist**, and therefore might not make sense to everyone

**Question 8 (1 mark)**

**Many students prefer one distinct scientific discipline to others**. Although many people categorize students as 'science students' from an early stage of their academic careers, there are many biologists that do not involve themselves in learning chemistry or physics, and vice versa.

**Question 9 (1 mark)**

**Parametric statistical methods are preferable to their non-parametric equivalents because they increase power in hypothesis-testing analyses**. This is important because statistical analysis of data essentially provides support for the existence (or non-existence) of a significant effect. As such, a parametric method might highlight an important pattern that could be missed by a non-parametric test, which has great relevance in the field of research.

**Making Smooth Transitions**

We have already seen that a piece of writing containing interesting, important information will fail to get the message across if it is not structured into clear paragraphs. In the same way, such information will not make an impact on a reader if the flow of ideas does not transition seamlessly from sentence to sentence, or from paragraph to paragraph.

When reading over your work, ask yourself whether the flow of information is smooth. Although it is often difficult to remember everything that you have just read, it is a bad sign if you find yourself having to jump backwards again and again to fully understand something.

Before you get used to making smooth transitions, it is a good idea to ask a friend or classmate to read your work and tell you whether they followed your thought process from the first sentence to the last. If they found it difficult, you probably need to work on your transitions.

An effective transition should do at least two of three things. It should:

**1.** Act as a preparatory signpost for what is coming up next

**2.** Explain to the reader how each idea is connected

**3.** Signal the point at which you are shifting to another idea

**Two examples**

**A1 (Poor transitions):**“Global warming will have negative consequences for polar bears. As temperatures rise they will have a smaller habitat in which to live. Also, there will be less food available for them because there will be smaller populations of krill. Polar bear populations are thus affected by the amount of ice available.”

**B1 (Good transitions):**“Global warming will have negative consequences for polar bears for two main reasons. Firstly, because increased temperatures cause increased melting of ice on which the bears live, there will be a reduced area in which they can live. Secondly, many species that polar bears rely on for food will be less numerous than in the past because their main food source, krill, can only breed successfully underneath ice. Therefore, the reduction of ice is the key factor in limiting polar bear populations.”

B1 is better than A1 because:

**1.** **Each sentence begins with a ‘signpost’ that links it to the next one**

**2.** **Each transition connects the points made in the whole text with one another**

**3.** **Each transition informs the reader that a new idea is about to be elaborated on**

**Question 10 (5 marks)**

Imagine that you conducted a detailed experiment to see whether certain plant species were more effective than others at suppressing the spread of an invasive plant species that has negative consequences for British Columbia grasslands. In less than 250 words you had to describe (1) why your research was important, (2) what your main results were, and (3) why they might have important implications.

Read the ‘original’ draft below. Now, use the three transition pointers above to improve the transitions by filling in the gaps in the same body of text.

The spread of *Bromus tectorum*(cheatgrass) throughout grasslands in British Columbia (BC) has many negative effects on these habitats. For [?????], cheatgrass reduces biodiversity, leads to more frequent wildfires, and causes health problems for cattle that eat it. [?????], negative effects on ecosystems are also financially costly; it costs a lot of money to restore a habitat after fire and it is expensive to buy food for lots of cattle.

I grew cheatgrass plants in different treatment groups each featuring one other plant species that was common in BC grasslands, [??????] I wanted to see which species had the greatest negative effect on cheatgrass growth rate. [?????] this method, I tested three other species and found that crested wheatgrass significantly reduced the growth rate of cheatgrass; it reduced growth rate by approximately 65%. Bluebunch wheatgrass did not significantly affect cheatgrass growth rate, whereas Idaho fescue significantly increased the growth rate of cheatgrass by approximately 39%. As a [?????], I recommend grassland managers promote the growth of crested wheatgrass and discourage the growth of Idaho fescue.

**Choosing Effective Transition Words and Phrases**

Good transitions link ideas from sentence to sentence to build a compelling argument, and for this reason it is vital that an effective transition word or phrase is used in each scenario to achieve this. For example, the transition ‘for example’ will only work when you have just made a statement and are about to back it up with some specific evidence.

The following list is by no means extensive, but it provides some excellent transition words and phrases that will help you link sentences and develop, logical, flowing arguments:

* But/however
* Nevertheless
* For example
* Firstly/secondly/finally etc.
* Therefore/thus
* As a result
* In contrast
* And/also
* Furthermore/moreover

**Some examples**

* Rabbits regulate their own body temperature. **In contrast,** snakes rely on the external environment to warm them.
* The vast majority of fertilized eggs released by salmon are eaten by other animals or drift away to unsuitable habitats. **However,** a small number hatch into young fish each year and these fish eventually go on to produce eggs of their own.
* Prey species are at their most vulnerable when they are temporarily distracted when drinking. **As a result**, predators have learned to lurk around water sources and wait for their prey to come to them.

The following list includes some words that you should pay extra attention to when using as transitions. These words can be very effective when used correctly, but they can also confuse readers in certain situations:

* Since
* It
* For
* They
* Naturally
* Clearly/obviously

**Some examples**

* A major medical breakthrough was made approximately 80 years ago when Alexander Fleming discovered Penicillin. **Since** it has helped to greatly reduce the number of people dying from diseases such as syphilis and diphtheria.

**In the above example, it is not clear whether the writer is suggesting that fewer people have died from these diseases in the years that have passed since the breakthrough was made, or whether he/she is using ‘since’ to mean that it was a major breakthrough ‘because’ fewer people died from the diseases after its discovery.**

* As rabbit populations grow to something approaching carrying capacity, the chance that any one individual will die increases. **They** are more at risk from the effects of competition and disease in these circumstances.

**In the above example, it is not clear whether the individuals are more at risk, or if the rabbit population as a whole is more at risk.**

* **Clearly**, the results show that as temperature increases, mouse heart rate does likewise.

**In the above example, the writer assumes his/her reader will come to the same conclusion. Not everyone interprets things the same way and it can come across as rude to suggest a pattern or conclusion is obvious.**

**Question 11 (5 marks)**

There are five major mistakes in terms of the use of transition words and/or phrases in the paragraph below. First of all, try to highlight all five. Do this by **bolding** the five words/phrases that are problematic.

There are many different factors involved in regulating the size of a population of animals. Clearly, density independent factors, such as natural disasters and changeable weather patterns, work in tandem with density dependent factors, such as competition and predation, to ultimately determine how many individuals will exist from one point in time to another. A natural disaster, such as a flash flood, can wipe out a population regardless of its size; it will kill field mice whether they exist as a solitary breeding pair or are part of a 1000-strong local population. In contrast, density dependent factors will have less of an effect when the population is small.  Therefore, the availability of resources, such as food and nesting sites, also dictate how many individuals can survive in a given environment. In contrast, when there is lots of food available, a population will grow because there are sufficient resources to support more individuals than currently exist. Thus, as time progresses, it is probable that food will no longer be as plentiful and fewer individuals will be supported. Finally, predation is likely to be more common when populations grow because there are more individuals available for predators to eat. Also, diseases are likely to have more effect when a population is large because there are more individuals in close contact and this makes it easier for the disease to spread between hosts.

**Question 12 (5 marks)**

Now study the paragraph again (the one above, from question 11) and replace the poor transitions you **bolded** with a suitable transition word or phrase.

**Question 13: Bringing it all together (10 marks)**

Choose a complicated subject or topic that you are very interested in (it can be anything, but try to choose something that most people will know little about). **In 150-200 words, write a total of five sentences that are split into two paragraphs.** **Try to explain two separate aspects of this subject and ensure that:**

1. **Each topic sentence is clear and suitable**
2. **Your paragraphs are organized appropriately and information flows logically from sentence to sentence**
3. **Each sentence transitions smoothly to the next**

Once you have written your sentences/paragraphs, try to ask a friend with no background knowledge about the subject whether they have understood how each element (sentence) relates to the next one, and to the argument as a whole. Their input will likely help you write a strong, cohesive piece of writing.

**\*\*\* Make sure you make a copy of your answer (copy and paste into a file on your computer). You will return to this piece of writing in the post-class activities. \*\*\***