

PASSAGE 2

THE MYSTERY OF YAWNING

According to conventional theory, yawning takes place when people are bored or sleepy and serves the function of increasing alertness by reversing, through deeper breathing, the drop in blood oxygen levels that are caused by the shallow breathing that accompanies lack of sleep or boredom. Unfortunately, the few scientific investigations of yawning have failed to find any connection between how often someone yawns and how much sleep they have had or how tired they are. About the closest any research has come to supporting the tiredness theory is to confirm that adults yawn more often on weekdays than at weekends, and that school children yawn more frequently in their first year at primary school than they do in kindergarten.

Another **flaw** of the tiredness theory is that yawning does not raise alertness or physiological activity, as the theory would predict. When researchers measured the heart rate, muscle tension, and skin conductance of people before, during, and after yawning, they did detect some changes in skin conductance following yawning, indicating a slight increase in physiological activity. However, similar changes occurred when the subjects were asked simply to open their mouths or to breathe deeply. Yawning did nothing special to their state of physiological activity. Experiments have also cast serious doubt on the belief that yawning is triggered by a drop in blood oxygen or a rise in blood carbon dioxide. Volunteers were told to think about yawning while they breathed either normal air, pure oxygen, or an air mixture with an above-normal level of carbon dioxide. If the theory was correct, breathing air with extra carbon dioxide should have **triggered** yawning, while breathing pure oxygen should have suppressed yawning. In fact, neither condition made any difference to the frequency of yawning, which remained constant at about 24 yawns per hour. Another experiment demonstrated that physical exercise, which was sufficiently vigorous to double the rate of breathing, had no effect on the frequency of yawning. Again, the implication is that yawning has little or nothing to do with oxygen.

A completely different theory holds that yawning assists in the physical development of the lungs early in life, but has no remaining biological function in adults. It has been suggested that yawning and hiccupping might serve to clear out the fetus's airways. The lungs of a fetus secrete a liquid that then mixes with its mother's amniotic fluid. Babies with congenital blockages that prevent this fluid from escaping from their lungs are sometimes born with deformed lungs. It might be that yawning helps to clear out the lungs by **periodically** lowering the pressure in them. According to this theory, yawning in adults is just a developmental fossil with no biological function. But, while accepting that not everything in life can be explained by Darwinian evolution, there are sound reasons for being skeptical of theories like this one, which avoid the issue of what yawning does for adults. Yawning is distracting, consumes energy, and takes time. It is almost certainly doing something significant in adults as well as in fetuses. What could it be?

The **empirical** evidence, such as it is, suggests an altogether different function for yawning—namely, that yawning prepares us for a change in activity level. Support for this theory came from a study of yawning behavior in everyday life. Volunteers wore wrist-mounted devices that automatically recorded their physical activity for up to two weeks; the volunteers also recorded their yawns by pressing a button on the device each time they yawned. The data showed that yawning tended to occur about 15 minutes before a period of increased behavioral activity. Yawning bore no relationship to sleep patterns, however. This accords with anecdotal evidence that people often yawn in situations where they are neither tired nor bored, but are preparing for impending mental and physical activity. Such yawning is often referred to as "incongruous" because it seems out of place, at least in the tiredness view: **soldiers yawning before combat, musicians yawning before performing, and athletes yawning before competing**. Their yawning seems to have nothing to do with sleepiness or boredom—quite the reverse—but it does precede a change in activity level.

Which of the sentences below best expresses the essential information in the highlighted sentence in the passage? Incorrect choices change the meaning in important ways or leave out essential information.

- ☐ It is the conventional theory that when people are bored or sleepy, they often experience a drop in blood oxygen levels due to their shallow breathing.
- ☐ The conventional theory is that people yawn when bored or sleepy because yawning raises blood oxygen levels, which in turn raises alertness.
- ☐ According to conventional theory, yawning is more likely to occur when people are bored or sleepy than when they are alert and breathing deeply.
- ☐ Yawning, according to the conventional theory, is caused by boredom or lack of sleep and can be avoided through deeper breathing.

In paragraph 1, what point does the author make about the evidence for the tiredness theory of yawning?

- ☐ There is no scientific evidence linking yawning with tiredness.
- ☐ The evidence is wide-ranging because it covers multiple age-groups.
- ☐ The evidence is reliable because it was collected over a long period of time.
- ☐ The evidence is questionable because the yawning patterns of children and adults should be different.

The word "flaw" in the passage is closest in meaning to

- ☐ fault
- ☐ aspect
- ☐ confusion
- ☐ mystery

In paragraph 2, why does the author compare the physiological changes that occur when subjects simply opened their mouths or breathed deeply with those that occur when people yawned?

- ☐ To present an argument in support of the tiredness theory
- ☐ To cast doubt on the reliability of the tests that measured heart rate, muscle tension, and skin conductance
- ☐ To argue against the hypothesis that yawning provides a special way to improve alertness or raise physiological activity
- ☐ To support the idea that opening the mouth or breathing deeply can affect blood oxygen levels

The word "triggered" in the passage is closest in meaning to

- ☐ removed
- ☐ hollowed
- ☐ increased
- ☐ caused

[Paragraph 2](#) answers all of the following questions about yawning EXCEPT:

- ☐ Does yawning increase alertness or physiological activity?
- ☐ Does thinking about yawning increase yawning over not thinking about yawning?
- ☐ Does the amount of carbon dioxide and oxygen in the air affect the rate at which people yawn?
- ☐ Does the rate of breathing affect the rate at which people yawn?

The word "periodically" in the passage is closest in meaning to

- ☐ continuously
- ☐ quickly
- ☐ regularly
- ☐ carefully

According to the development theory of yawning presented in [paragraph 3](#), what is the role of yawning?

- ☐ It causes hiccups, which aid in the development of the lungs.
- ☐ It controls the amount of pressure the lungs place on other developing organs.
- ☐ It prevents amniotic fluid from entering the lungs.
- ☐ It removes a potentially harmful fluid from the lungs.

[Paragraph 3](#) supports which of the following statements about the development theory of yawning?

- ☐ The theory is attractive because it explains yawning from the perspective of Darwinian evolution.
- ☐ The theory is unsatisfactory because it cannot explain the lung deformities of infants.
- ☐ The theory is questionable because it does not explain why people continue to have a behavior after the behavior becomes useless and inconvenient.
- ☐ The theory is incomplete because it does not explain all the evolutionary stages in the development of yawning.

The word "empirical" in the passage is closest in meaning to

- ☐ reliable
- ☐ based on common sense
- ☐ relevant
- ☐ based on observation

The study of yawning behavior discussed in [paragraph 4](#) supports which of the following conclusions?

- ☐ Yawning is associated with an expectation of increased physical activity.
- ☐ Yawning occurs more frequently when people are asked to record their yawning.
- ☐ People tend to yawn about fifteen minutes before they become tired or bored.
- ☐ Mental or physical stress tends to make people yawn.

Why does the author mention "soldiers yawning before combat, musicians yawning before performing, and athletes yawning before competing"?

- ☐ To argue that just the expectation of physical activity can make some people feel tired
- ☐ To explain how the view that people yawn because they are tired accounts for yawning before stressful situations
- ☐ To support the view that yawning helps prepare a person for mental or physical activity
- ☐ To provide anecdotal evidence that conflicts with the experience of the volunteers in the study

Look at the four numbers, ① ② ③ ④, that indicate where the following sentence could be added into the passage.

This, however, was not the case.

Where would the sentence best fit?

-  ①
-  ②
-  ③
-  ④

Another flaw of the tiredness theory is that yawning does not raise alertness or physiological activity, as the theory would predict. When researchers measured the heart rate, muscle tension, and skin conductance of people before, during, and after yawning, they did detect some changes in skin conductance following yawning, indicating a slight increase in physiological activity. However, similar changes occurred when the subjects were asked simply to open their mouths or to breathe deeply. Yawning did nothing special to their state of physiological activity. Experiments have also cast serious doubt on the belief that yawning is triggered by a drop in blood oxygen or a rise in blood carbon dioxide. ① Volunteers were told to think about yawning while they breathed either normal air, pure oxygen, or an air mixture with an above-normal level of carbon dioxide. ② If the theory was correct, breathing air with extra carbon dioxide should have triggered yawning, while breathing pure oxygen should have suppressed yawning. ③ In fact, neither condition made any difference to the frequency of yawning, which remained constant at about 24 yawns per hour. ④ Another experiment demonstrated that physical exercise, which was sufficiently vigorous to double the rate of breathing, had no effect on the frequency of yawning. Again, the implication is that yawning has little or nothing to do with oxygen.

An introductory sentence for a brief summary of the passage is provided in the column to the right. Complete the summary by selecting the **THREE** answer choices that express the most important ideas in the passage. Some sentences do not belong in the summary because they express ideas that are not presented in the passage or are minor ideas in the passage. **This question is worth 2 points.**

- ☐ Although earlier scientific studies strongly supported the tiredness theory, new evidence has cast doubt on these findings.
- ☐ Evidence has shown that yawning is almost completely unrelated to the amount of oxygen in the blood and is unrelated to sleep behavior.
- ☐ Some have proposed that yawning plays a role in the development of the lungs before birth, but it seems unlikely that yawning serves no purpose in adults.
- ☐ Fluids in the lungs of the fetus prevent yawning from occurring, which disproves the development theory of yawning.
- ☐ New studies, along with anecdotal evidence, have shown that the frequency of yawning increases during extended periods of inactivity.
- ☐ There is some evidence that suggests that yawning prepares the body and mind for a change in activity level.

The tiredness theory of yawning does not seem to explain why yawning occurs.