

Question 1-11 are based on the following passage.

This passage is adapted from David Z. Hambrick, "What Makes a Prodigy?" ©2015 by Scientific American.

Line
5
10
15
20
25
30
35
40
45
50

What explains prodigies? How can a person accomplish so much so fast? Psychologists have long debated this question. According to one account, it is possible that most anyone could be a prodigy, with the right environment. As the late psychologist Michael Howe argued, "With sufficient energy and dedication on the parents' part, it is possible that it may not be all that difficult to produce a child prodigy." Extraordinary opportunity is indeed a theme that runs through the biographies of many prodigies.

10 However, recent research indicates that basic cognitive abilities known to be influenced by genetic factors also play a role in prodigious achievement. In the most extensive study of prodigies to date, the psychologist Joanne Ruthsatz and her colleagues administered the Stanford Binet intelligence
15 test to 18 prodigies—five in art, eight in music, and five in math. There was a wide range of IQs in the sample, from 100—the average for the general population—to 147—well above the usual cutoff for "intellectually gifted." However, with an average score of 140 (above the 99th percentile),
20 nearly all of the prodigies did extraordinarily well on the tests of working memory. Analogous to the central processing unit of a computer, working memory is a cognitive system responsible for carrying out the mental operations involved in complex tasks such as problem
25 solving and language comprehension. It is what you use when you compute a tip for a dinner check in your head, or when you hold in mind the steps of a complex skill you are trying to learn.

Working memory is measured with tests that involve both
30 remembering information for a short period of time and manipulating that information in some way. For example, in backward digit span, the test-taker is read a sequence of random digits, such as 8 3 2 9 5 1 3 7 5 0. The goal is then to recall the digits back in the reverse order—0 5 7 3 1 5 9 2 3 8
35 for the preceding sequence. As measured by tests like these, people differ substantially in the capacity of their working memory system—some people have a "bigger" working memory than other people. Moreover, this variation is substantially influenced by genetic factors, with estimates of
40 heritability typically around 50%.

With an average score of 148, the music prodigies in the Ruthsatz study were especially high in working memory (the average for the math prodigies was 135 and for art prodigies was 132). In fact, all eight of the music prodigies were at or
45 above the 99th percentile, and four were at or above the 99.9th percentile. The odds of eight randomly selected people scoring this high on a test are essentially zero. Ruthsatz and colleagues concluded that a superior working memory is one characteristic that prodigies in art, music, and
50 math have in common.

Prodigies also exhibit an unusual commitment to their domain, which the developmental psychologist Ellen Winner calls a "rage to master." Winner describes children who possess this quality in the following terms: "Often one cannot
55 tear these children away from activities in their area of giftedness, whether they involve an instrument, a computer, a sketch pad, or a math book. These children have a powerful interest in the domain in which they have high ability, and they can focus so intently on work in this domain that they
60 lose sense of the outside world." Winner argues that this single-mindedness is a part of innate talent rather than a cause of it—a convergence of genetically-influenced aptitude, interest, and drive that predisposes a person to obsessively engage in some activity.

65 Consistent with Winner's thesis, results of a recent study of more than 10,000 twins by Miriam Mosing, Fredrik Ullén, and their colleagues at Sweden's Karolinska Institute revealed that a common set of genes influence both music aptitude and the propensity to practice—an example of a
70 phenomenon known as genetic pleiotropy, which occurs when one gene (or set of genes) influences multiple traits. Taken together, these findings add to a growing body of evidence indicating that exceptional performance in music, the arts, sports, science, and other complex domains is, at its
75 core, determined multiply—the product of both environmental factors and of genetically-influenced traits. More generally, psychologists who study expertise are moving beyond the question of whether experts are "born" or
80 "made." As the psychologist Jonathan Wai put it, it is increasingly clear that "Experts are born, then made."

Prodigies' Mean Scores on the Stanford-Binet Intelligence Test by Domain

	Full Scale IQ Standard Score	Working Memory Standard Score
Art	108.4	132
Music	129.14	148.38
Math	139.8	134.8
Mean Total Score	126.18	140.06

Adapted from Joanne Ruthsatz et al. "The Cognitive Bases of Exceptional Abilities in Child Prodigies by Domain: Similarities and Differences." ©2014 by Elsevier Inc.

1

The main purpose of the first paragraph is to

- A) present the belief that the surroundings in which a child is raised could cause a child to become a prodigy.
- B) characterize a debate among psychologists as to why prodigies possess certain talents that the general population lacks.
- C) examine the advanced cognitive abilities and privileges that many prodigies share.
- D) detail the astonishing speed with which prodigies can complete a task.

2

In the passage, the author mentions calculating a tip and learning the steps of a complex skill primarily in order to

- A) provide examples of tasks that involve the use of working memory.
- B) indicate two practices at which prodigies generally excel.
- C) reinforce the idea that any person can be a prodigy.
- D) identify two tasks that prodigies completed on the intelligence test.

3

As used in line 36, “capacity” most nearly means

- A) qualification.
- B) number.
- C) duty
- D) extent.

4

Which choice provides the best evidence that the scores received by the prodigies in the Ruthsatz study cannot be attributed entirely to chance?

- A) lines 38–40 (“Moreover . . . 50%”)
- B) lines 41–44 (“With . . . 132”)
- C) lines 44–46 (“In fact . . . percentile”)
- D) lines 46–47 (“The odds . . . zero”)

5

In the context of the quotations by Ellen Winner, the main effect of the word “rage” in line 53 is to

- A) acknowledge the resentment that prodigies may feel as a result of their gifts.
- B) suggest that the lives of prodigies are frequently characterized by conflict.
- C) emphasize the extreme nature of an aspect of prodigies' behavior.
- D) indicate that prodigies have intensely active imaginations.

6

In line 62, “convergence” most nearly means a

- A) movement.
- B) approach.
- C) union
- D) succession.

7

Based on the passage, it can most reasonably be inferred that genetics help to determine prodigies' skills and the

- A) likelihood that the prodigy will be motivated to improve their skills.
- B) decision to dissociate from their peers who lack similar skills.
- C) environments that parents create to help their children who are prodigies to advance.
- D) attitude that prodigies have toward the areas of their giftedness as they grow into adults.

8

Which choice provides the best evidence for the answer to the previous question?

- A) lines 53–57 (“Winner . . . book”)
- B) lines 57–60 (“These . . . world”)
- C) lines 65–71 (“Consistent . . . multiple traits”)
- D) lines 72–76 (“Taken . . . genetically-influenced traits”)

9

According to the table, the highest mean Full Scale IQ standard score attained by a group of prodigies in a single domain was

- A) 134.8.
- B) 139.8.
- C) 140.06.
- D) 148.38.

10

Which comparison of the prodigies' scores is best supported by information in the table?

- A) While the math prodigies earned a higher mean Full Scale IQ standard score than the art prodigies, the art prodigies earned a higher mean Working Memory standard score.
- B) While the music prodigies earned the highest mean Working Memory standard score of prodigies in any domain, they earned a lower Full Scale IQ standard score than their math counterparts.
- C) While the art prodigies earned a mean Working Memory standard score higher than that of the average for the general population, their mean Full Scale IQ standard score was slightly lower than the average score of the general population.
- D) While prodigies in all three domains earned high Working Memory standard scores, their mean Full Scale IQ standard scores were all lower than researchers had expected.

11

The data in the table best support a finding that is summarized in which lines of the passage?

- A) lines 12–16 (“In the . . . math”)
- B) lines 29–31 (“Working . . . way”)
- C) lines 35–38 (“As measured . . . people”)
- D) lines 48–50 (“Ruthsatz . . . common”)