受　験　番　号					

氏　　名

2016 (平成28) 年度放送大学
大学院博士後期課程
文化科学研究科 文化科学専攻

自然科学プログラム

筆記試験問題（英語読解試験）

試 験 日：２０１５（平成２７）年１０月４日（日）
試験時間：９時３０分～１１時３０分

注意事項

１．試験開始の合図があるまで、この問題冊子は開かないでください。
２．解答には、ＨＢ又はＢの黒鉛筆かシャープペンシルを使用してください。
３．配付されるものは、問題冊子１冊及び解答用紙２枚です。追加配付はしません。
４．試験開始の合図の後、問題冊子を確認してください。問題冊子は、表紙、白紙、問題（４頁）、下書き用紙（２枚）の順に綴じられており、合わせて８枚です。冊子を綴じているホッチキス針をはずしたり、中身を破り取ったりしてはいけません。
問題冊子または解答用紙に落丁・過不足のある場合、あるいは印刷が不鮮明な場合には、手を挙げて試験監督員の指示に従ってください。
５．問題冊子の所定欄に、受験番号及び氏名を記入してください。
６．解答用紙の所定欄に、所属を希望するプログラム名、氏名、受験番号及び解答用紙の何枚目であるかを、解答用紙別に必ず記入してください。
７．問題冊子及び解答用紙を持ち帰ってはいけません。
８．問題冊子は試験終了後に回収します。
問題冊子に解答を記入しても採点の対象にはなりませんので、必ず解答用紙に解答を記入してください。
９．試験時間は２時間です。試験開始後４０分を経過した後は、問題冊子及び解答用紙を試験監督員に提出した上で、退室してもかまいません。ただし、試験終了５分前以降は退室できません。

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以下の英文を読み、筆者の主張を 600 字程度の日本語で要約しなさい。

In 1908, Edward Thorndike, who would become known as the father of modern educational psychology, came up with a way to test whether nature or nurture dominated an individual's ability at a task. Thorndike was a leading proponent of the then-controversial idea that older adult—meaning, at the time, those over thirty-five—can continue to learn new skills. He figured that the way to distinguish nature from nurture was to give people the same amount of practice at a certain task and to see whether they became more or less alike. If their skill levels converged, Thorndike reasoned, then the impact of practice was overwhelming any innate individual differences. If they diverged, then nature was overpowering nurture.

In one experiment, Thorndike had adults practice multiplying three-digit numbers by three-digit numbers in their heads as quickly as they could. He was astounded by their improvement. "The fact that these mature and competent minds improved in the course of so short a training so much," Thorndike wrote, "is worthy of attention." After one hundred practice trials, many of the subjects cut their mental computation time in half. And every single subject improved. Just as in chess, language, music, and baseball, as practitioners improve at mental multiplication, they internalize patterns and systems of breaking problems into pieces that allow for increasingly rapid calculation.

But while Thorndike saw across-the-board improvement, he also noted what sociologists call a "Matthew effect." The term derives from a passage in the biblical Gospel of Matthew:

> *For to all those who have more will be given, and they will have an abundance; but from those who have nothing, even what they have will be taken away.*

Thorndike saw that the subjects who did well at the start of the training also improved faster as the training progressed compared with the subjects who began slowly. "As a matter of fact," Thorndike wrote, "in this experiment the larger individual differences

increase with equal training, showing a positive correlation with high initial ability with ability to profit by training." The passage from the Bible doesn't quite capture Thorndike's results accurately because every subject improved, but the rich got relatively richer. Everyone learned, but the learning rates were consistently different.

When World War I erupted, Thorndike became member of the Committee on Classification of Personnel, a group of psychologists commissioned by the U. S. Army to evaluate recruits. It was there that Thorndike rubbed off on a young man named David Wechsler, who had just become a famous psychologist, developed a lifelong fascination with tracing the boundaries of humanity, from lower to upper limits.

In 1935, Wechsler compiled essentially all of the credible data in the world he could find on human measurements. He scoured measures of everything from vertical jump to the duration of pregnancies to the weight of the human liver and the speeds at which card punchers at a factory could punch their cards. He organized it all in the first edition of a book with the aptly momentous title *The Range of Human Capacities*.

Wechsler found that the ratio of the smallest to biggest, or best to worst, in just about any measure of humanity, from high jumping to hosiery looping, was between two to one and three to one. To Wechsler, the ratio appeared so consistent that he suggested it as a kind of universal rule of thumb.

Phillip Ackerman, a Georgia Tech psychologist and skill acquisition expert, is a sort of modern-day Wechsler, having combed the world's skill-acquisition studies in an effort to determine whether practice makes equal, and his conclusion is that it depends on the task. In simple tasks, practice brings people closer together, but in complex ones, it often pulls them apart. Ackerman has designed computer simulations used to test air traffic controllers, and he says that people converge on a similar skill level with practice on the easy tasks—like clicking buttons to get planes to take off in order—but for the more complex simulations that are used for real-life controllers, "the individual differences go up," he says, not down, with practice. In other words, there's a Matthew effect on skill acquisition.

Even among simple motor skills, where practice decreases individual differences, it never drowns them entirely. "It's true that doing more practice helps," Ackerman says, "but there's not a single study where variability between subjects disappears entirely."

"If you go to the grocery store," he continues, "you can look at the checkout clerk, who is using mostly perceptual motor skill. On average, the people who've been doing it for

ten years will get through ten customers in the time the new people get across one. But the fastest person with ten years' experience will still be about three times faster than the slowest person with ten years' experience."

Scientists who study skill performance attempt to account for "variance" between people. Variance is a statistical measure of how much individuals deviate from the average. In a sample of two runners, if one athlete completes the mile in four minutes and the other runs it in five minutes, the average is four and a half minutes and the variance is half a minute. The question for scientist is: What accounts for that variance, practice, genes, or something else?

It is a critical inquiry. It is not enough for scientists to say that practice *matters*. That point is entirely uncontroversial. As Joe Baker, a sports psychologist at York University in Toronto, says, "There isn't a single geneticist or physiologist who says hard work isn't important. Nobody thinks Olympians are just jumping off the couch."

Scientists must go beyond saying that practice matters and attempt the difficult task of determining exactly *how much* practice matters. By the strictest 10,000-hours thinking, accumulated practice should explain most or all of the variance in skill. But that never, ever happens. From swimmers and triathletes to piano players, studies report that the amount of variance accounted for by practice is generally between low and moderate.

In a study that K. Anders Ericsson himself coauthored of darts players, for example, only 28 percent of the variance in performance between players was accounted for after fifteen years of practice. At the rate of skill convergence documented in that study, a 10,000-years rule might be more likely than a 10,000 hours rule—if, that is, the players would ever reach the same level at all.

The data quite clearly support a view of skill—from chess and music to baseball and tennis—that is based on a paradigm not of "hardware *not* software," but of both innate hardware *and* learned software.

David Epstein, *The Sports Gene: Inside the Science of Extraordinary Athletic Performance* (London: Current, 2013), pp. 34-37.

<注>

Gospel of Matthew: 新約聖書の『マタイによる福音書』

rub off on〜: (〜と多くの時間を共に過ごした結果) 〜に影響を与える

air traffic controller: 航空管制官

K. Anders Ericsson: スウェーデン出身の心理学者で、現在フロリダ州立大学心理学教授。特定の技能・技術に秀でるには、生まれつきの才能よりも1万時間の修練が必要であると結論付けた論文で有名。