

G. DONALD ALLEN

48. EASY PROBLEMS

I am reading Daniel Kahneman's remarkable book, *Thinking, Fast and Slow* (Farrar, Straus, & Giroux, 2011). The broad theme of this book is that people are intuitive thinkers, but in many cases the intuition is both wrong and biased. He takes the brain and divides it into two systems, called System 1 – the intuitive and fast part of your brain, and System 2 – the more deliberate and analytical part. He gives numerous examples of how the one system overrides the other, when System 1 seems to rule and when System 2 does. I recommend this book to you, with enthusiasm.

What I want to highlight is an example from the book, a sample math problem that is totally simple and most all would get it right, if not for the impetuous System 1. Here's the problem. Let your intuition figure it out. Be quick!

A bat and ball cost \$1.10.

The bat costs one dollar more than the ball.

How much does the ball cost?

A number came into your mind; it was 10 as in 10 cents. The answer seems correct, and not needing further analysis by that drudge upstairs, System 2, you report it in. But you are wrong. Your intuition jumped in there quickly and you agreed with it. In fact, the answer is 5, as in 5 cents. Check it out. (The solution is shown below.)

$$x + y = 1.10$$

$$x = y + 1$$

Use substitution.

$$y + 1 + y = 1.10$$

$$2y = 1.10 - 1$$

$$2y = 0.10$$

$$y = 0.05$$

The upshot about this really simple problem is that if you give such problems to your students, their System 1 will ferret out a reasonable response quickly, and then applying the *principle of least effort*, neglect to call on System 2, for confirmation. Make it too simple, and you may find too many wrong answers on the quiz.

G. D. ALLEN

This question is not new. Many thousands have taken it. The shocking result is that more than 50% of Harvard, MIT, and Princeton students gave the intuitive but incorrect answer, 10. At less selective institutions, the percentage incorrect jumped to the 80% range.

As Kahneman notes, “Many people are overconfident, prone to place too much faith in their intuitions. They apparently find cognitive effort at least mildly unpleasant and avoid it as much as possible.”

AN EQUATION FOR LIFE

An important equation. Let A = (your) attitude, P = (your) persistence, and I = (your) intelligence. In terms of your quantified versions of these

$$A_q + P_q \geq I_q$$

Your attitude quotient plus your persistence quotient exceeds your intelligence quotient. This simple inequality demonstrates your attitude and persistence applied to your life can have more effect than your native intelligence. Indeed, look around you. Note how some people, perhaps less intelligent, in your mind, have achieved what you desire. Now look at their attitude and persistence. That’s how they did it. Indeed, I believe in many cases

$$P_q \geq A_q$$

The lesson here is not to give up because you think you don’t have the smarts. Keep at it with a strong and positive attitude, with a relentless spirit for achievement.