The Unconscious Mind according to Henri Poincaré

Where do ideas come from? How did Thomas Edison and Nikola Tesla come up with a continuous stream of inventions over decades? An often repeated tale about Edison says that when facing a tough problem he would sit down in a comfortable chair with a metal ball in his hand. As he drifted off to sleep the ball would fall to the ground waking him, and the solution to the problem would be there — clear in his mind.

I don't know whether this story is true. But many mathematicians have solved difficult problems while dreaming, or while not consciously working on them. The famous Indian mathematician Srinivasa Ramanujan claimed that his family goddess would present him with complex mathematical equations in his dreams. In another example, a mathematician included a dead friend as a co-author on a manuscript that was a culmination of years of work. The deceased friend was not a mathematician. However, he appeared to him in a dream and provided a crucial insight that allowed him to complete his efforts.

The famous French mathematician Henri Poincaré was very interested in mathematical creativity. He describes a period of hard and seemingly fruitless effort to solve a problem, from which he took a break to join a geological expedition. As he was stepping on a bus, he made one of the most important breakthroughs of his life. The solution came to him out of nowhere, and was accompanied by a perfect certainty as to its correctness. Poincaré did not claim that this was a miraculous incident. Indeed, he believed that we can solve problems when we are not consciously thinking about them.

At any moment we are aware of only a fraction of what goes on in our brain. Poincaré was quite aware that creativity requires a period of conscious effort followed by a period of rest. Our unconscious mind keeps working on the problem behind the curtain. As a consequence sometimes a solution, or at least a good idea, will emerge apparently out of nowhere. A period of concerted effort to check the idea and put it in a form that is understandable to others is then necessary. Poincaré's contemporary Albert Einstein may have expressed this most succintly when he said that "Creativity is the residue of time wasted".

Poincaré then goes on to analyze this raw evidence. He draws the following conclusions:
1. The creations involve a period of conscious work, followed by a period of unconscious work.
2. Conscious work is also necessary after the unconscious work, to put the unconscious results on a firm footing.
3. Earlier in this piece, Poincaré drew the conclusion that mathematical creation cannot be mechanical. Many of the choices are based on grounds of symmetry, mathematical elegance, consistency with other areas of mathematics, and even esthetics. Therefore the unconscious is not simply a mechanical processor; (quoting again from Poincaré) "it is not purely automatic;

it is capable of discernment; it has tact, delicacy; it knows how to choose, to divine. What do I say? It knows better how to divine than the conscious self, since it succeeds where that has failed. In a word, is not the subliminal self superior to the conscious self? ... Does it follow that the subliminal self, having divined by a delicate intuition that [certain] combinations would be useful, has formed only these, or has it rather formed many others which were lacking in interest and have remained unconscious?"
4. The unconscious can present the conscious mind with something that is not fruitful, but which is nevertheless elegant or beautiful.
5. What the unconscious presents to the conscious mind is not a full and complete argument or proof, but rather "point of departure" from which the conscious mind can work out the argument in detail. The conscious mind is capable of the strict discipline and logical thinking, of which the unconscious is incapable.

Yet, there seems to be an effort in many disciplines to increase productivity by increasing the number of hours spent at work. At some level this effort may be counterproductive. That may be one of the reasons that Henry Ford reduced the work week to 40 hours.

In today's economy, creativity is essential in many jobs. And it seems that our mind needs freedom, rest and — yes — distraction to be creative. So do take some time off to enjoy with your friends and family. And write down all those ideas that come unbidden to your mind.

Sources:

http://www.uh.edu/engines/epi2817.htm
http://www.is.wayne.edu/drbowen/crtvyw99/poincare.htm

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