

# Creative Connections

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Many have wondered, "How can birds fly but not man?" Paul MacCready also asked that question. However, he went further than anyone else did. He asked, "Why not?" And with creative insight, perseverance and by connecting several known technologies, he designed and built the first successful human powered aircraft, the Gossamer Albatross. The story of its design conception and successful flight embodies many of the fundamental principles of creative problem solving.

The initial ideas occurred to him while driving with his family on vacation. He was relaxed. And, as he began to shut out his local environment (teenage music, conversation, and the problems of driving) he began to think about several related items.

He was acutely aware of co-signing a relative's note for a \$100,000 business loan. A loan he personally would be responsible for should any misfortune befall his relative. This thought, he observed, "could never really leave my consciousness." MacCready also remembered reading about a \$100,000 award being offered to anyone who designed and built an airplane that could navigate a prescribed course powered solely by a human. It did not take him long to connect these two thoughts.

Paul MacCready was educated as an aeronautical engineer, but he had never worked in air frame design. Therefore, he had no preconceived notions about how one should be created. His professional life was dedicated to meteorology not aircraft design. He was involved in the development of airborne instrumentation via balloons. This required knowledge of lightweight materials. He also had an active interest in model airplane construction and hang gliding.

In addition, in their travels, he and his sons had often studied the flights of large soaring birds. He understood that if you measure the time it takes a soaring bird to complete a circle, and estimate the angle of the bank in the turn, you know enough to calculate many factors about the bird. As an interesting vacation-time exercise, he and his sons had been doing just this for several days. As he drove the family car, he reflected on all these factors. Propelled by the desire for security, he suddenly realized he knew how to design a successful human powered aircraft. Furthermore, he stated, "I was sure it would eventually work."

MacCready had several significant insights. First, he understood clearly that if the wing span was increased and the weight kept constant, the horsepower required to power the aircraft dropped faster than linearly. In other words, there is an engineering advantage for such a large wing span, low weight aircraft. The second realization was that safety precautions could be greatly reduced because the flying speed and altitude of such an aircraft was going to be very low. A third realization, connected to the second, was that the aircraft did not have to be particularly durable because the number of flights would be limited and the weather conditions for flight could be selected.

With these insights he had a new starting point for design. Later, he also used the knowledge gained through his model airplane and hang gliding hobbies, his technical training in aeronautics and the latest information in high strength, light-weight materials to design and build a 55 pound aircraft with a wing span of 96 feet. To put it mildly, he did not use conventional airframe design.

His human powered flying machine, made of lightweight alloy tubing, plastic film and wire, looked more like a poorly designed model airplane that would not survive its first encounter with a bush. Hence it was named the "Gossamer Albatross". Yet it flew! And, it flew the prescribed course to win the \$100,000 prize. Moreover, MacCready started a whole new train of thought on human powered flight.

Later he designed and built another "gossamer" version that became the first human powered aircraft to fly across the English Channel. And then he built a different aircraft, based on the same principles, but powered by solar cells. It became the first solar powered airplane and it flew from Paris to London. Thoroughly caught up in creative connections, Paul MacCready produced a model of a flying dinosaur that actually flew by flapping its wings.

What basic principles of creativity does this story embody?

### **1. Ask the right questions**

It's the question that sets the frame of mind and limits the creative solutions. Asking "why?" is always a good start. There may also be a need to "live in the question" for a period of time before settling on the exact wording. This is an important first step; but don't get stuck here. Don't overlook the importance of asking the right questions early on.

### **2. There must be a need**

The need existed for Paul MacCready to obtain financial security. The prize offered would satisfy that need. MacCready said he thought the most creative act in the whole process was establishing the prize in the first place. Also, surely, the challenge of accomplishing what no one else had done met a need for him.

### **3. Be an expert in several fields**

He was an expert in the fundamentals of the problem he was trying to solve. The basic equations of flight were second nature to him. Moreover, he was well acquainted with lightweight materials and had a good knowledge of birds. Expertise is relative. If you find that you don't know enough, there are many ways to gain information and experience. Don't be shy if you are serious about creatively solving a problem. Teams can play an important role here.

### **4. Don't be tied to existing ways of thought**

The innovation was developed by someone not tied to existing ways of thought. MacCready didn't know it couldn't be done the way that he envisioned. There are numerous blocks to creative thinking based on having too much knowledge of the old way of looking at things. If you are too well versed in an old paradigm, you may have a hard time coming up with a new

one. It's hard to read the label from inside the jar. Perceptual, emotional, cultural, environmental, intellectual and expressive blocks may also limit creative ability. You may have to let go of some things in order to grab on to something else. Again, there are techniques to help you consider a problem in different ways in order to break down some of these blocks and come up with more creative solutions.

### **5. Allow your intuition to be heard**

In many cases the creative idea occurs while performing some mundane act. Literature is filled with examples of incidents where ideas occurred at unexpected moments. Driving a car seems to be one of those acts conducive to creative thinking. Sometimes driving becomes semiautomatic. And while the logical part of the brain is bored by the whole process, the intuitive part of the brain can surface and be heard. Walking, shaving, house cleaning, showering or bathing, daydreaming and sleeping have all been reported as times when creative ideas emerged. There are even exercises to help suppress the logical part of the brain, attributed to its left hemisphere, that allow the right side to become dominant for awhile. The left side, which contains the power of speech, is dominant during most of our lives. MacCready commented, "most creative thinking occurs when you are thinking about what your mind wants to think about, rather than what someone else wants you to think about."

### **6. Meld different technologies together**

Paul MacCready melded several different technologies to create the solution. The greatest advances frequently occur when achievements of one technological field rub up against the achievements of another. Quite often the advancement comes from a totally unexpected direction. When the right knowledge is brought together in one person or in a team against a common need, the connection is made and the creation is born.

### **7. Persevere**

Lastly, when the creative connections are made, you must have the courage of your convictions and pursue the idea to its conclusion. It would have been very easy for MacCready to dismiss the idea as being impractical, too much work, or for some other reason. But, he didn't. Remember that he stated he knew it would eventually work. That implies a lot of effort and possibly some failures. However, he had the insightful knowledge that it would work. A truly creative idea occurs only rarely. When it does, it is a waste to not pursue it. Moreover, it rarely works right the first time. Many things can be learned from failure.

We all are created creative. As we are educated, trained and mature, we tend to forget or ignore some of the creative skills with which we are born. We have not lost the innate ability to create. Rather, it has been suppressed.

Each of us can become more creative than we are now. But you must work at it. Asking "why?" about your work or projects is good beginning.

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