Science for the model flyer: training

Believe in play. Learning is a human speciality. Other animals do it but we are the masters and play is key to learning.

The world is full of false statistics that we start to accept due to repetition. For example we are told that we need to walk 10000 steps each day, a factoid invented by a Japanese marketeer. Then there is the idea that a new skill takes 10000 hours to master. Of course exercise and practise is good but arbitrary numbers are not and can be off-putting. The UK comedian Vic Reeves says 82.6% of all statistics are made up on the spot.

I was fortunate at uni to follow an early modular course designed to train scientists and engineers for the modern age. As a result we were also trained in the science of the brain and motivation. It was a four year course only made possible by the fact that in the UK university courses were free and students got an adequate maintenance grant. We had a series of psychology lectures by experts from the three schools of psychology, namely psychoanalysis, behavioural training and psychometry. Now I will be controversial. I was persuaded by the last two as they were clearly based on science and could be measured but not the first. This seemed to me like a car technician waving his arms over a failed engine, reciting some made up words and telling the driver to wait, as ‘It will get better with further talk’. And now of course new scanning techniques are gradually beginning to show us how the brain works and what we can do to fix it when it goes wrong. One day, perhaps the Diagnostic and Statistical Manual of Mental Disorders will stop growing annually and eventually be replaced by a Haynes Manual.

I have spent quite a lot of my life in education and training of all levels and types. One of the most rewarding was retraining adults, and more recently some time doing model flight training.

There are two types of training: physical and mental. Both are relevant to model flying.

Physical

Let’s get physical out of the way first. We cannot fly if our muscles are too poor either to stand up or to operate the kit from a chair. If standing, we need to balance stably which is all about leg and core muscle strength not our brains. We don’t have to be immensely strong, just adequate. It is best if we have decent reaction times, defined as being at or below 0.2 s but for gentle models more than that should be fine. It depends what you fly. One thing is for sure. No-one must ever say at the field, ‘At Our Age’, or worse, ‘At your age.’

Experiment one

Measure your reaction time using this simple test.

- Get someone to hold a 30 cm ruler vertically at the 30cm mark. Hold your thumb and forefinger on each side of the 0 cm mark. Your fingers should be about 1 cm away from the ruler.
- The other lets the ruler go without warning.
- Snap your finger and thumb together to stop the ruler.
- Read off the value from the table.
- The original list was for each cm of the ruler. I removed many of the entries.
- Take the value for the nearer one.
- Take the best of three.

cm	seconds
1	0.045
4	0.090
8	0.128
12	0.156
16	0.181
20	0.202
24	0.221
28	0.239
30	0.247

Mental

Humans learn by play. I have every respect for formalised training schemes but my own is more open and playful. The key to autonomy is instant correct reactions. By correct I mean appropriate. This means flying. Lots of it. And laughing. And confidence.

Let's look at another field for guidance. A well designed bike is like Newton's 1st Law. Once set in motion it will continue upright until it slows down, even without a rider. See the site listed at the end. So a rider only has to learn what to do to get started and stopped, to change direction and to respond to events that disturb stability. Oh, and to use the arm and hand signal that I call 'The Sign of Onan' when threatened by a maniac motorist. Onan? Well, Dorothy Parker had a pet parrot that she called Onan. Why? 'He spills his seed upon the ground.' (Genesis 38:9).

A learning cyclist has to acquire a wide range of reactive skills such as turning the front wheel, moving the body and centre of gravity and so on. And these reactive skills have to be internalised so they are automatic and instant. When a rider is really skilled he or she can do all of these to stay upright even when stationary at traffic lights or when jostling on the track at the start of a short sprint race. In this situation the alleged importance of the gyro effect of the wheels no longer applies.

You could go through the previous two paragraphs and apply the ideas to model planes and not be far from model flight training.

Then there is the phrase 'muscle memory'. Hmmm. I have never been convinced by that. Where in the muscles are memories stored? Though our nervous systems are part of our brain system, we are not octopuses that have their brains distributed around their bodies and legs. I think it is more like Zen training. After a while it no longer needs to be thought about.

For initial training using buddy boxes I use an electric glider model with a pusher motor. I use a Bixler 1.1 but there are plenty similar. It is simple and is clean so has fair penetration. It is light and stable but with power on it has a good turn of speed and can do many aerobatics. It is also quick and easy to repair at the field as damage is usually limited to the fuselage. No need for premature ends to a training session. The nose resembles a boxer's hooter after a while but it doesn't seem to change its flight.

At the start I avoid training days where the wind is stronger than about 16 kph (10 mph) as otherwise I am constantly taking over control when the model gets too far downwind. Then it’s up to ceiling at about 120 m and hand over. Three mistakes high and power off. Stable flight first then gentle turns left and right. Except in the very first sessions I don’t take over when the trainee makes a mistake. Let him or her try things to fix it with suggestions from me. Only when the ground approaches do I release the trainer switch and take over. And we have fun. Get the trainee doing loops and attempting powered rolls early on and having a good laugh at the results. Laughter is relaxing. As long as there is plenty of height there is no danger. I gradually introduce power flying after the basic skills are there.

Of course the second biggest skill to learn is control reversal with an approaching model. For that you need to get in lots of hours. The biggest skill? Approach and landing of course. At my club we have an informal but rigorous test before a pilot is allowed to fly solo. Many UK clubs insist on gaining a BMFA A certificate before that. It isn’t what the award was intended for and holds back, or even puts off, learners. Once they are safe, they need lots of hours and that is difficult if they have to be supervised. The choice of a Bixler type model with a soft nose and no prop on the front means that such models are inherently safe to person and property.

Dutch bicycle lab. http://bicycle.tudelft.nl/stablebicycle/

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