

# Ottawa Citizen

Beware: children at play; Not that long ago, it was normal for kids to grab a saw and plywood, or matches and methylated spirits and figure things out for themselves. Tom Spears wonders what happened to the idea of letting children follow their instincts

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Illustrations: Joe Mabe, Wikimedia Commons / The Gilbert chemistry set, which was popular with children in the 1940s: 'You learn by tinkering,' psychologist Mary Lou Vernon says.; / A.C. Horth's instructional illustrations for making a hot-air balloon. 'Hold it until the inside air is quite hot,' he told his young readers.;

The dream machine of my childhood is a tiny working steam engine with a gleaming boiler, a bright red wheel that really, really turns, and chrome and copper finish.

So why is it marketed (\$129 at Lee Valley Tools, assembly required) for ages 16 and up? This is an instrument to thrill a child somewhere.

Let's step back in time for a moment. In the late 1960s or early '70s, I had a stationary steam engine that would be considered highly improper today. It sat in the den of my parents' house in Toronto when I was about eight.

I filled a little metal box of absorbent material with rubbing alcohol, put a few ounces of water in the boiler, and lit a match. Whoosh! My mother supervised from the next room, which meant that if I yelled she would come and see what was wrong, sooner or later.

I never yelled. Spilled alcohol on the table once or twice and accidentally lit it, a pale blue flame flickering over the table until the fuel was exhausted. But I never called for help. The table finish may have suffered, but it was Formica. Today's

model uses safer wood pellet fuel.

I also owned a book called 101 Things For a Boy to Make, by Arthur C. Horth. Well into the 1950s it was a bestseller, showing children the basics of carpentry from tables to boats with working propellers driven by elastic bands. A later edition removed "Boys" from the title. Sequels listed 101 things for girls, for housewives and, in 1940, for wartime.

This book summed up the attitude of generations that believed children should be taught to experiment with their hands and minds, to use the world around them as an open source of materials for tinkering, building, creating, learning.

Thanks to this attitude it was nor-mal for a kid to grab a saw and some plywood, or fiddle with a chemistry set, or head off to the woods with no parents and no ready lesson on environmentally sustainable use of forest ecosystems.

Horth's master work is out of print, but I recently found a copy at Bundock Books in Nepean, the third edition, from 1938. It was an instant reconnection.

Some of the projects are pretty dreary. There probably wasn't much call for A Useful Fireside Stool at any point.

But Horth had his dark side. How about a spring-operated machine gun that fires homemade bullets?

My favourite is the hot air balloon.

Horth tells boys to cut out curving sections of tissue paper so that they overlap slightly and fit into a shape that's nearly a sphere, but elongated and left open at the bottom. You glue the paper sections together.

Then comes the good part. His design uses a ring of wire that holds a cotton ball near the opening. "When the balloon is ready, as shown at Fig. 8, swing it round in the air to fill it out, then pour a little methylated spirits (alcohol) on the cotton wool, light it, and hold it until the inside air is quite hot."

This is a big balloon - he suggests a diameter of three feet - so the prospect of a large amount of paper going up in flames is very real.

The prospect of burning your-self is also pretty good as you try to swing the balloon, keep it full of air, pour flammable liquid and light it before the balloon deflates.

You can just imagine one kid lighting it while a friend says: "The book says you keep holding it until it gets hot."

There's also a good chance that a breeze could lift some flaming paper over the fence. You hope your neighbour has a sense of humour.

Horth wasn't the only writer sending children into the path of danger. The

American Boys' Workshop, by Clarence Budington Kelland, tells how to make your own bow and arrow and shoot things. Kelland was a colourful character with a bad temper and frustrated political ambitions. He wrote short children's fiction in the 1920s and '30s, and one of his stories, called Opera Hat, inspired the film Mr. Deeds Goes to Town.

Chemistry sets of the 1960s were different from today's. They had strips of magnesium that burned, even underwater, and iron filings, which burned, too. Some came with alcohol burners, a weaker version of the Bunsen burner. They used rubbing alcohol.

The Royal Society of Chemistry in Britain recently traced the history of chemistry sets for children and teen-agers, and concludes the heyday occurred from about 1940 to 1960. The society says these were wonderful toys, and remain a terrific way to inspire children and teach them the pleasure of scientific inquiry.

But it adds, perhaps a bit sadly: "In these safety-conscious and litigious times, this is far from easy."

The society quotes Harold Kroto, who won the Nobel Prize in chemistry in 1996: "I really got a kick out of growing crystals. That did seem quite magical. However, my main memory is of distilling formaldehyde with a school friend. The pungent aroma got in our eyes and had us running out into the back yard."

Formaldehyde has been classified as a known human carcinogen by the International Agency for Research on Cancer and a probable human carcinogen by the U.S. Environmental Protection

Agency.

Bob Burk, who heads the chemistry department at Carleton University, laments the disappearance of old-time chemistry sets for children. Today's sets, he says, are a pale imitation.

"I teach the first-year class. There are about 600 students coming into this every year," he says, "and what we've found is that probably half of them have never been in a chemistry lab of any description, which is amazing because the Ontario curriculum demands it.

"And most of them, whether they've been in a lab or not, have never experienced anything outside a lab of this nature. So they can't connect what we're doing in the lab-oratory to their everyday life."

Fiddling with a chemistry set is one way to build a sense of what chemical reactions are, he says. But Burk is like a hockey coach teaching kids who have never played road hockey.

The child of past generations learned to use serious tools. *Electricity for Boys*, published in 1914, gives a list of things your child should be working with, and it's a long way from today's typical craft store items with their safe paper and rounded scissors:

"If a gas stove is not available, a brazing torch is an essential tool," the book says. "Numerous small torches are being made, which are cheap and easily operated. A small soldering iron, with pointed end, should be provided; also metal shears and a small square; an awl and several sizes of gimlets; a screwdriver; pair of pliers and wire cutters."

It also advises "a variety of small drills; two wood chisels, say of one-half-inch and three-quarters-inch widths; 14 small cold chisels; hacksaw, 10-inch blade; small iron square; pair of dividers; tin shears; wire cutters; 2 pairs of pliers, one flat and the other round-nosed; 2 awls, centring punch, (and) wire cutters."

Through all these pursuits that would be judged too dangerous to-day, children learned a lot about how things worked. They made book-shelves, toy propellers, tents, camp fire pits, radios, electromagnets, even small boats. They learned to sharpen saws and chisels.

"These are the people who got the Apollos going to the moon!" says Claire Samson, an engineer, geologist and head of Carleton's earth sciences department.

She traces her career to the day when she was about five years old and an uncle gave her a geologist's hammer. Not the plastic kind you'd see in a story today, but a real one. The head has one blunt face and one sharp edge.

"I cannot describe to you the joy of using a geological hammer to split little pebbles apart," she says. "To this day, it (the hammer) is in front of my eyes in my office. With a little magnifying glass and the sunlight I wrote 'Samson' on the wood handle. It's my most cherished object.

She continues: "When we were at the cottage on the St. Lawrence River I was pretty happy on my own, collecting pebbles and splitting them apart. Nowadays not a single parent would do that. Even our undergrads cannot use the hammer without the proper eye safety because chips can go

in your eyes."

The experiments of childhood are a common theme among many people who create things. The recent biography of Steve Jobs describes how his father would take young Steve to the garage to take apart radios and see what made them run. Steve MacLean, president of the Canadian Space Agency and a veteran astronaut, sometimes tells inter-viewers about working on every-thing from bicycles to wiring in the workshop of his parents' home in Ottawa.

Mary Lou Vernon is a psychologist who runs the preschool lab at Western University, where children from the community (London, Ont.) provide a base for research into early childhood. She firmly believes that the opportunities to work with tools and to explore their surroundings help children to develop far beyond learning the immediate skills of hammering nails or sewing.

"You learn by tinkering," she says. Going back to psychologist Jean Piaget in the 1940s, it's been shown over and over that children learn best when they can work with concrete objects first, and approach the abstract theories and calculations later.

"We've lost so much of that," Vernon says.

Partly it's our awareness of safety, but also it's the result of busy parents who don't have time to sit down with children and show them how the tools work.

"I think children need to tinker, but they also need to do this with someone in the family," she believes. "Projects like those in 101 Things for a Boy to Make are best suited for a child and an adult to do together, yet for much of their time at home

"our children are growing up alone."

Some feel a generation is reaching adulthood without the instinct to take chances.

As a meteorite researcher, Samson mixes with space scientists. Both in the United States and Canada she feels that "things are over-studied. (They) reduce risk to totally zero. Do extensive studies, and after a few years we have nothing to show. Some kind of risk-taking has gone out of the equation, with the result that everything does not get done."

On the day I spoke to Burk, the Duchess of Cambridge was visiting London children who were camping. It was the first time they had ever travelled outside the city. Finally, at age eight or nine, they were get-ting mud on their clothes.