

LONG LIVE THE BICYCLE

EVERYTHING I KNOW I LEARNED FROM TWO WHEELS AND A FRAME.

By Saul Griffith

REMEMBER THE VERY FIRST MOMENT

I rode a bicycle. I was at Uncle Dave's place out "in the bush." He wasn't a real uncle, but rather one of those family friends who becomes a default uncle by giving freely of his time and lessons on life. He lived a two- or three-hour drive from Sydney in a small town, on a beautiful rustic property with a shed full of the things that delight a 6-year-old, and one of those things was a bicycle.

There were no luxurious training wheels, just two tireless men — my father and Uncle Dave — who would run behind me holding the underside of the saddle and keeping me upright as I teetered and tottered. It took an afternoon, a beautiful afternoon of giggling and grazed knees, but I was anointed a bicycle rider, and was then allowed to ride to the edge of the property and back. It was probably only a hundred yards, but the world suddenly seemed larger. The love affair would never end.

Soon after, I received a purple chopper, with a banana seat replete with metallic flake. (My sister's banana seat had flowers on it, something I derided at the time, but now appreciate and even search for in old bicycle shops. To my mind, a chopper isn't complete without one.) At age 7 or so, inspired by the sublime acting of Nicole Kidman — I kid you not — in *BMX Bandits*, I convinced my parents to upgrade it and fulfill my dream of owning a black and yellow Speedwell. (It had to be black and yellow.) Not long after that, *E.T.* came out at the movies, and my fantasies of flying bicycles powered by my own little alien were frequent.

What really came with bike ownership, though, was bicycle maintenance, my first taste of hands-on engineering. When I got my first mountain bike,

a coral pink Apollo brand, I would tear it down and build it back up just for kicks. The bearings and their hardened steel balls fascinated and perplexed me as I cleaned, greased, and serviced them.

I learnt the difference between left- and right-handed threaded screws by cross-threading them. I learnt about galvanic corrosion by riding on the beach with steel pedals and aluminum cranks. I learnt about gears, chains, derailleurs, and broken teeth. (The broken teeth — the gears' and my own — were the result of not correctly tensioning the chains. Fortunately, mine were baby teeth and my engineering prowess improved in time for the onset of adult teeth.)

For many of us, bicycles are the first taste of responsibility. As soon as you start modifying or repairing your own bike, you learn very tangibly the results of your work. If you do sloppy work, or make mistakes, the result is typically a bicycle crash — blood, broken bones, and all.

But bicycles taught me more than just basic building principles and simple mechanics; they even introduced me to the magic of materials science. After I tired of my bike's pink color (the only one available), I decided that chrome would be far more "manly." I saved enough money to strip the bike down and take it to a chrome plater.

I clearly remember going to the factory with my tolerant father and being fascinated with the electroplating baths, although the whim turned out to be disastrous. The process effectively annealed and weakened the frame, and the fork gave out soon after, bending slowly upward until it was unrideable. The experience was probably influential in my eventual university study of metallurgy — the fatigue and



This plastic bicycle was a whimsical design exercise in making a complex 3D object from flat 2D sheets of polycarbonate. It's heavy and cumbersome, and rides like a wet noodle, but Wonder Woman wouldn't be caught riding anything else.

properties of metals were very obviously important to the practice of engineering.

Riding my bike taught me about the physical universe. For a period, my friends and I irrationally thought it uncool to have brakes (not that brakes were very good in those days anyway), so we would remove the brakes and use the soles of our shoes rubbed directly on the rear wheel as the slowing mechanism. From this, I quickly learnt about friction, heat, and energy dissipation. I remember multiple trips to the shoe store with a disgruntled mother intrigued as to how I could wear out my shoes in only a month with such an unusual wear pattern.

My friends and I worshipped the older boys in the neighborhood who had fancier bicycles and could make them do the impossible, like doing a “wheelie” — riding on the rear wheel only — from one end of the street to the other. Then came the fantasy of the “bunny hop” — jumping the bicycle without a ramp or gutter. Only years later would I learn that this is a non-trivial trick of physics and requires timing the movement of the center of mass carefully.

In high school, my favorite class was technical drawing. We did the high school equivalent of basic structural analysis, and learned drafting skills with pencil, paper, drawing board, and a bevy of protractors, compasses, and guides. Naturally, at the first open project we had, I labored for weeks with the design of a bicycle. Learning geometric principles with passion, I drew complete technical specifications and what would be my first industrial design rendering. (I like to fancy that the work of my imagi-

nation was a precursor to the carbon fiber monocoque frames that soon after became the fashion in Olympic track cycling.) I would ride endlessly around the velodrome in our neighborhood, and along with my friends, I would fantasize of sporting glory while learning the principles of centripetal forces on the sloped oval track.

I may not have gone to the Olympics, but to this day I still build my own bicycles, whether from the cherry components I've always dreamed of, or by starting from scratch. I've made bicycles entirely out of plastic, built wooden bicycles, and even designed a bicycle “Lego” kit of basic frame components that can be reconfigured into all sorts of different geometries. Bikes haven't stopped teaching me new things: I first welded on a bike frame, and I learnt much about energy efficiency by analyzing bicycles as a transportation alternative. (If you can do only one thing for the environment this year, let it be giving up your car for the bike, or at least picking up your bike helmet instead of your keys a few times a week.)

What more can I say? I love bicycles. I love the feeling of speeding silently under my own power. Maybe what I'd like to say is that, more than love, I owe the bicycle. I owe it a debt of gratitude. As a growing engineer, it encompassed nearly every principle of science and engineering that fascinated me. Long live the bicycle! Long live those who tinker with them, even when they make mistakes.

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