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How to Fly a Horse: The Secret History of Creation, Invention, and Discovery

by Kevin Ashton

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25 Highlights

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Creating is not extraordinary, even if its results sometimes are. Creation is human. It is all of us. It is everybody.

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Work is the soul of creation. Work is getting up early and going home late, turning down dates and giving up weekends, writing and rewriting, reviewing and revising, rote and routine, staring down the doubt of the blank page, beginning when we do not know where to start, and not stopping when we cannot go on. It is not fun, romantic, or, most of the time, even interesting. If we want to create, we must, in the words of Paul Gallico, open our veins and bleed.

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Thinking is finding a way to achieve a goal that cannot be attained by an obvious action.

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Creating is taking steps, not making leaps: find a problem, solve it, and repeat. Most steps wins. The best artists, scientists, engineers, inventors, entrepreneurs, and other creators are the ones who keep taking steps by finding new problems, new solutions, and then new problems again. The root of innovation is exactly the same as it was when our species was born: looking at something and thinking, "I can make this better."

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Follow-up research tested whether larger groups performed any better. In one study, 168 people were either divided into teams of five, seven, or nine or asked to work individually. The research confirmed that working individually is more productive than working in groups. It also showed that productivity decreases as group size increases. The conclusion: "Group brainstorming, over a wide range of group sizes, inhibits rather than facilitates creative thinking." The groups produced fewer and worse results because they were more likely to get fixated on one idea and because, despite all exhortations to the contrary, some members felt inhibited and refrained from full participation.

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Research into brainstorming has a clear conclusion. The best way to create is to work alone and evaluate solutions as they occur. The worst way to create is to work in large groups and defer criticism. Steve Wozniak, Steve Jobs's cofounder at Apple and the inventor of its first computer, offers the same advice: "Work alone. You're going to be best able to design revolutionary products and features if you're working on your own. Not on a committee. Not on a team."

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When political scientists William Ogburn and Dorothy Thomas studied this phenomenon, they found 148 cases of big ideas coming to many people at the same time and concluded that their list would grow longer with more research. Having ideas is not the same thing as being creative. Creation is execution, not inspiration. Many people have ideas; few take the steps to make the thing they imagine. One of the best examples is the airplane. The brothers Orville and Wilbur Wright were not the first people to have the idea of building a flying machine, nor were they the first people to begin building one, but they were the first people to fly.

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These were the Wrights' first mental steps. Problem: Balance a bucking aircraft. Solution: Imitate gliding birds.

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And so it continued. The Wright brothers' great inventive leap was not a great mental leap. Despite its extraordinary outcome, their story is a litany of little steps.

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Never have a failure in public that you could have in private. Private failures are faster, cheaper, and less painful.

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Great creators know that the best step forward is often a step back—to scrutinize, analyze, and assess, to find faults and flaws, to challenge and to change. You cannot escape a maze if you only move forward. Sometimes the path ahead is behind.

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Experts do not think less. They think more efficiently. The practiced brain eliminates poor solutions so quickly that they barely reach the attention of the conscious mind.

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Beginner's mind and expertise sound like opposites, but they are not. Western philosophy has conditioned us to see things in opposing pairs—black and white, left and right, good and evil, yin and yang (as opposed to the

original Chinese idea of yin-yang), beginner and expert—a paradigm called “dualism.” We do not have to see things this way. We can see them as connected, not opposed. Beginner’s mind is connected to, not opposite to, expertise because the greatest experts understand that they are working within the constraints of a paradigm and they know how those constraints arose. In science, for example, some constraints are the result of available tools and techniques. Robin Warren had developed enough expertise as a pathologist to know that the dogma of the sterile stomach predated the invention of the flexible endoscope and might be a wrong assumption caused by a lack of technology.

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There are no true beginners. We start building paradigms as soon as we are born. We inherit some, we are taught some, and we infer some. When we first create, we are already David Foster Wallace’s fish, swimming in a sea of assumptions we have not yet noticed. The final step of expertise is the first step to beginner’s mind: knowing what you assume, why, and when to suspend your assumptions.

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Confidence is a cycle, not a steady state, a muscle that must be strengthened daily, a feeling we renew and increase by enduring the adversity of creation. Certainty is constant. Confidence comes and goes.

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Make an enemy of certainty and befriend doubt. When you can change your mind, you can change anything.

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The best source of pure water is the spring—nature’s equivalent of a well, where groundwater flows up from an aquifer. This water, clean and rich in minerals, has been revered for thousands of years; natural springs are often considered sacred sites of healing. Some spring water is naturally effervescent.

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When Harlow introduced a reward—food—into the process, the monkeys’ puzzle solving got worse. In his own words: it “tended to disrupt, not facilitate the performances of the experimental subjects.” This was a surprising finding. It was one of the first times anybody noticed that external rewards could demotivate rather than invigorate. But these were monkeys.

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Theresa Amabile asked professional artists to select twenty pieces of their work, ten of which had been commissioned and ten of which had been created without a commission. A panel of independent judges assessed the merits of each piece. They consistently rated the commissioned art less creative than the self-motivated work.

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Creative professional Tom Wujec confirmed this: he conducted marshmallow challenge workshops more than seventy times between 2006 and 2010 and recorded the results. Kindergartners' towers average twenty-seven inches high. CEOs can only manage twenty-one-inch towers, lawyers build fifteen-inch towers, and the worst scores come from business school students: their towers are typically ten inches high, about one-third the height of the towers built by kindergartners. CEOs, lawyers, and business school students waste minutes on power struggles and planning, leave themselves only enough time to build one tower, and do not uncover the hidden assumption that makes the challenge so challenging: marshmallows are heavier than they look. When they finally figure this out, they have no time left to do anything about it. Wujec recounts those last moments: "Several teams will have the powerful desire to hold on to their structure at the end, usually because the marshmallow, which they just placed onto their structure moments before, is causing the structure to buckle." Young children win because they collaborate spontaneously. They build towers early and often rather than wasting time fighting for leadership and dominance, they do not sit around talking—or "planning"—before they act, and they discover the problem of the marshmallow's weight quickly, when they have lots of time left to solve it. Why do children do this? That question is answered by the work of Lev Vygotsky, a psychologist from Belarus. In the 1920s, Vygotsky discovered that the development of language and creative ability are so connected they may even be the same thing.

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Even worse, by the time children become adults, they have learned that talking is an alternative to doing. At school, most work is done individually and quietly—especially most of the work that gets graded. One of the most common classroom rules is "No talking." The message is clear: you cannot do and talk at the same time. This division between words and actions persists into the workplace, where groups solve problems by talking—or "planning"—until they agree on what they think is the one best answer, then take action. Children do not hold meetings at school; they discover them as adults, at work. Children see the marshmallow challenge as a chance to collaborate; adults treat it like a meeting.

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"Meeting" is a euphemism for "talking"; therefore, meetings are an alternative to work. Despite this, the average office worker attends six hour-long meetings a week, almost a full working day. If an organization uses Microsoft's Outlook software to automatically schedule meetings, their employees attend even more meetings—nine hour-long meetings a week. There is no creating in meetings. Creation is action, not conversation.

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Lockheed did to win its wartime contracts to make planes—but the more creative an organization is,

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Much of what happens in internal meetings is called "planning," but planning is of limited value, because nothing ever goes according to plan.

There is a false intellectual tradition of complaint that paints wonder as blunder, mistakes snorts for thoughts, and points at human beings as if they were mainly shameful. “But famine,” “but war,” “but Hitler,” “but climate change”: it is easier to look for flies in the soup than to work in the kitchen. But we are all connected, and we are creative. No one does anything alone. Even the greatest inventors build on the work of thousands. Creation is contribution. We cannot know the weight of our contribution in advance. We must create for creation’s sake, trust that our creations may have impacts we cannot foresee, and know that often the greatest contributions are the ones with the most unimaginable consequences.
