

October 28, 2014

Interesting item in the [NY Times Magazine](#) asking if age is nothing but a mind set. Of course, you can take it too far, but some of these studies are good food for thought. *One day in the fall of 1981, eight men in their 70s stepped out of a van in front of a converted monastery in New Hampshire. They shuffled forward, a few of them arthritically stooped, a couple with canes. Then they passed through the door and entered a time warp. Perry Como crooned on a vintage radio. Ed Sullivan welcomed guests on a black-and-white TV. Everything inside — including the books on the shelves and the magazines lying around — were designed to conjure 1959. This was to be the men's home for five days as they participated in a radical experiment, cooked up by a young psychologist named Ellen Langer.*

The subjects were in good health, but aging had left its mark. "This was before 75 was the new 55," says Langer, who is 67 and the longest-serving professor of psychology at Harvard. Before arriving, the men were assessed on such measures as dexterity, grip strength, flexibility, hearing and vision, memory and cognition — probably the closest things the gerontologists of the time could come to the testable biomarkers of age. Langer predicted the numbers would be quite different after five days, when the subjects emerged from what was to be a fairly intense psychological intervention.

Langer had already undertaken a couple of studies involving elderly patients. In one, she found that nursing-home residents who had exhibited early stages of memory loss were able to do better on memory tests when they were given incentives to remember — showing that in many cases, indifference was being mistaken for brain deterioration. In another, now considered a classic of social psychology, Langer gave houseplants to two groups of nursing-home residents. She told one group that they were responsible for keeping the plant alive and that they could also make choices about their schedules during the day. She told the other group that the staff would care for the plants, and they were not given any choice in their schedules. Eighteen months later, twice as many subjects in the plant-caring, decision-making group were still alive than in the control group.

To Langer, this was evidence that the biomedical model of the day — that the mind and the body are on separate tracks — was wrongheaded. The belief was that "the only way to get sick is through the introduction of a pathogen, and the only way to get well is to get rid of it," she said, when we met at her office in Cambridge in December. She came to think that what people needed to heal themselves was a psychological "prime" — something that triggered the body to take curative measures all by itself. Gathering the older men together in New Hampshire, for what she would later refer to as a counterclockwise study, would be a way to test this premise. ...

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The stars were squired via period cars to a country house meticulously retrofitted to 1975, right down to the kitschy wall art. They emerged after a week as apparently rejuvenated as Langer's septuagenarians in New Hampshire, showing marked improvement on the test measures. One, who had rolled up in a wheelchair, walked out with a cane. Another, who couldn't even put his socks on unassisted at the start, hosted the final evening's dinner party, gliding around with purpose and vim. The others walked taller and indeed seemed to look younger. They had been

pulled out of mothballs and made to feel important again, and perhaps, Langer later mused, that rekindling of their egos was central to the reclamation of their bodies.

The program, which was shown in four parts and nominated for a Bafta Award (a British Emmy), brought new attention to Langer's work. Jeffrey Rediger, a psychiatrist and the medical and clinical director of Harvard's McLean Hospital, was invited by a friend of Langer's to watch it with some colleagues last year. Rediger was aware of Langer's original New Hampshire study, but the made-for-TV version brought its tantalizing implications to life.

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Scientific American says we might see more propeller driven aircraft.

The debut of propeller-driven aircraft kicked off a global aerospace technology boom that continues to this day. But since the emergence of the jet aircraft engine during World War II, research into propeller-powered flight has often taken a backseat to the turbofan technology that carries jetliners faster and farther. Speed and range come at a cost, however, and both rising fuel prices and increased demand for regional air travel have changed the economics of flight over the past 10 years. Now airlines are once again looking to smaller, more efficient turboprop planes to handle shorter routes, driving the development of a new generation of prop-driven aircraft technologies poised to take wing by the end of the decade. ...

... Among those paving the way for a new generation of turboprops, General Electric Aviation's Dowty Propellers is exploring anew the interactive effects among the propeller, engine nacelle and aircraft wing. Using computational fluid dynamics tools that were not available even a few years ago, engineers at the Gloucester, England-based firm are not only designing blades with new efficiency-enhancing shapes but rethinking the layout of the propeller as a whole.

"The computational power that's available now has really made the difference," says Dowty's Jonathan Chestney, noting that researchers can analyze data on an individual-blade basis. "It's an exciting time for us," he remarks. "We're able to see much more detail, like a scientist who just got a microscope for the first time." ...

We have had items on China's aircraft carrier. **War is Boring** says things are not going well with the craft.

There's no more of a conspicuous and potent symbol of China's growing naval power than the aircraft carrier Liaoning.

But the 53,000-ton, 999-foot-long carrier could be dangerous to her crew and prone to engine failures. If so, that makes the vessel as much of a liability as an asset to Beijing.

The ex-Soviet carrier once went by the name Varyag until a cash-strapped Ukraine sold the ship to Beijing in 1998. The Chinese navy has since invested considerable resources into modernizing the warship and testing her at sea.

But on at least one occasion during recent sea trials, Liaoning appeared to suffer a steam explosion which temporarily knocked out the carrier's electrical power system. ...

... Engine failures are not an unknown phenomenon aboard ex-Soviet carriers. The 40,000-ton displacement Indian carrier Vikramaditya—first a Soviet Kiev-class carrier commissioned in 1987 and sold in 2004—temporarily shut down at sea after a boiler overheated two years ago.

The 50,000-ton Russian carrier Admiral Kuznetsov also [goes nowhere](#) without a tug escort in case her engines break down while underway. ...

NY Times

[What if Age Is Nothing but a Mind-Set?](#)

by Bruce Grierson

One day in the fall of 1981, eight men in their 70s stepped out of a van in front of a converted monastery in New Hampshire. They shuffled forward, a few of them arthritically stooped, a couple with canes. Then they passed through the door and entered a time warp. Perry Como crooned on a vintage radio. Ed Sullivan welcomed guests on a black-and-white TV. Everything inside — including the books on the shelves and the magazines lying around — were designed to conjure 1959. This was to be the men's home for five days as they participated in a radical experiment, cooked up by a young psychologist named Ellen Langer.

The subjects were in good health, but aging had left its mark. "This was before 75 was the new 55," says Langer, who is 67 and the longest-serving professor of psychology at Harvard. Before arriving, the men were assessed on such measures as dexterity, grip strength, flexibility, hearing and vision, memory and cognition — probably the closest things the gerontologists of the time could come to the testable biomarkers of age. Langer predicted the numbers would be quite different after five days, when the subjects emerged from what was to be a fairly intense psychological intervention.

Langer had already undertaken a couple of studies involving elderly patients. In one, she found that nursing-home residents who had exhibited early stages of memory loss were able to do better on memory tests when they were given incentives to remember — showing that in many cases, indifference was being mistaken for brain deterioration. In another, now considered a classic of social psychology, Langer gave houseplants to two groups of nursing-home residents. She told one group that they were responsible for keeping the plant alive and that they could also make choices about their schedules during the day. She told the other group that the staff would care for the plants, and they were not given any choice in their schedules. Eighteen months later, twice as many subjects in the plant-caring, decision-making group were still alive than in the control group.

To Langer, this was evidence that the biomedical model of the day — that the mind and the body are on separate tracks — was wrongheaded. The belief was that "the only way to get sick is through the introduction of a pathogen, and the only way to get well is to get rid of it," she said, when we met at her office in Cambridge in December. She came to think that what people needed to heal themselves was a psychological "prime" — something that triggered the body to take

curative measures all by itself. Gathering the older men together in New Hampshire, for what she would later refer to as a counterclockwise study, would be a way to test this premise.

The men in the experimental group were told not merely to reminisce about this earlier era, but to inhabit it — to “make a psychological attempt to *be* the person they were 22 years ago,” she told me. “We have good reason to believe that if you are successful at this,” Langer told the men, “you will feel as you did in 1959.” From the time they walked through the doors, they were treated as if they were younger. The men were told that they would have to take their belongings upstairs themselves, even if they had to do it one shirt at a time.

Each day, as they discussed sports (Johnny Unitas and Wilt Chamberlain) or “current” events (the first U.S. satellite launch) or dissected the movie they just watched (“Anatomy of a Murder,” with Jimmy Stewart), they spoke about these late-'50s artifacts and events in the present tense — one of Langer’s chief priming strategies. Nothing — no mirrors, no modern-day clothing, no photos except portraits of their much younger selves — spoiled the illusion that they had shaken off 22 years.

At the end of their stay, the men were tested again. On several measures, they outperformed a control group that came earlier to the monastery but didn’t imagine themselves back into the skin of their younger selves, though they were encouraged to reminisce. They were suppler, showed greater manual dexterity and sat taller — just as Langer had guessed. Perhaps most improbable, their sight improved. Independent judges said they looked younger. The experimental subjects, Langer told me, had “put their mind in an earlier time,” and their bodies went along for the ride.

The results were almost too good. They begged belief. “It sounded like Lourdes,” Langer said. Though she and her students would write up the experiment for a chapter in a book for Oxford University Press called “Higher Stages of Human Development,” they left out a lot of the tantalizing color — like the spontaneous touch-football game that erupted between heretofore creaky seniors as they waited for the bus back to Cambridge. And Langer never sent it out to the journals. She suspected it would be rejected.

After all, it was a small-sample study, conducted over a mere five days, with plenty of potentially confounding variables in the design. (Perhaps the stimulating novelty of the whole setup or wanting to try extra hard to please the testers explained some of the great improvement.) But more fundamental, the unconventionality of the study made Langer self-conscious about showing it around. “It was just too different from anything that was being done in the field as I understood it,” she said. “You have to appreciate, people weren’t talking about mind-body medicine,” she said.

Langer did not try to replicate the study — mostly because it was so complicated and expensive; every time she thought about trying it again, she talked herself out of it. Then in 2010, the BBC broadcast a recreation, which Langer consulted on, called “The Young Ones,” with six aging former celebrities as guinea pigs.

The stars were squired via period cars to a country house meticulously retrofitted to 1975, right down to the kitschy wall art. They emerged after a week as apparently rejuvenated as Langer’s septuagenarians in New Hampshire, showing marked improvement on the test measures. One, who had rolled up in a wheelchair, walked out with a cane. Another, who couldn’t even put his socks on unassisted at the start, hosted the final evening’s dinner party, gliding around with purpose and vim. The others walked taller and indeed seemed to look younger. They had been pulled out of mothballs and made to feel important again, and perhaps, Langer later mused, that rekindling of their egos was central to the reclamation of their bodies.

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Langer's house in Cambridge was as chilly as a meat locker when we arrived together, having walked from campus, last winter. The back door had been left open all day so that her aging, coddled Westie, Gus, could relieve himself in the yard. (Langer's partner, Nancy Hemenway, who normally would be at home, was away.) Gus has a brain tumor. "He was supposed to be dead over a year ago," Langer said. "But I think he might outlive us all."

In the kitchen, Langer began laying out wide noodles for a lasagna she was making for an end-of-term party. It was the last time she would meet with her students for a while; they were about to scatter for the winter break, and she was leaving for a sabbatical in Puerto Vallarta, Mexico, where she and Nancy have another home. (Langer planned to Skype into weekly lab meetings.)

"Family recipe?" I asked of the dinner.

"I don't follow recipes — you should know that," she said. She piled on an immoderate amount of cheese. "Besides, if I blow it, what's going to be the cost?" Langer said. "Is it anyone's last meal?" She added, "My students aren't going to love me if my lasagna's no good?"

Langer was born in the Bronx and went to N.Y.U., becoming a chemistry major with her eye on med school. That all changed after she took Psych 101. Her professor was Philip Zimbardo, who would later go to Stanford and investigate the effects of authority and obedience in his well-known prison experiment. Human behavior, as Zimbardo presented it, was more interesting than what she'd been studying, and Langer soon switched tracks.

She went on to graduate work at Yale, where a poker game led to her doctoral dissertation on the magical thinking of otherwise logical people. Even smart people fall prey to an "illusion of control" over chance events, Langer concluded. We aren't really very rational creatures. Our cognitive biases routinely steer us wrong. Langer's notion that people are trained not to think and are thus extremely vulnerable to right-sounding but actually wrong notions prefigured many of the tenets of "behavioral economics" and the work of people like Daniel Kahneman, who won a Nobel Prize in economic sciences. But unlike many researchers who systematically work out one concept until they own it, Langer's peripatetic mind quickly moved on to other areas of inquiry. "I was never — and maybe this is a character flaw — the type of person who is going to take one idea and beat it to death," she said. "Part of that is that I have so many ideas. If whatever it is I'm excited about now doesn't happen, it doesn't matter, because there's always the next possibility."

By the 1970s, Langer had become convinced that not only are most people led astray by their biases, but they are also spectacularly inattentive to what's going on around them. "They're just not there," as she puts it. When you're not there, Langer reasoned, you're very likely to end up where you're led. She set up a number of studies to show how people's thinking and behavior can easily be manipulated with subtle primes.

In one, she and her colleagues found that office workers were far more likely to comply with a ridiculous interdepartmental memo if it looked like other official memos. In another, created with her Yale mentor, Robert Abelson, they asked behavioral and traditional therapists to watch a video of a person being interviewed, who was labeled either “patient” or “job applicant,” and then evaluate the person. The behavioral therapists regarded the interviewee as well adjusted regardless of whether they were told the person was a patient or an applicant. But the traditional therapists found the interviewee labeled “patient” significantly more disturbed. Even trained observers “were mindlessly led by the label,” Langer says.

If people could learn to be mindful and always perceive the choices available to them, Langer says, they would fulfill their potential and improve their health. Langer’s technique of achieving a state of mindfulness is different from the one often utilized in Eastern “mindfulness meditation” — nonjudgmental awareness of the thoughts and feelings drifting through your mind — that is everywhere today. Her emphasis is on noticing moment-to-moment changes around you, from the differences in the face of your spouse across the breakfast table to the variability of your asthma symptoms. When we are “actively making new distinctions, rather than relying on habitual” categorizations, we’re alive; and when we’re alive, we can improve. Indeed, “well-being and enhanced performance” were Langer’s goals from the beginning of her career.

Martin Seligman in the past two decades has come to be recognized as the father of positive psychology. Tal Ben-Shahar, who taught a popular undergraduate course at Harvard on the subject until 2008, calls Langer “the mother of positive psychology,” by virtue of her early work that anticipated the field.

Langer came to believe that one way to enhance well-being was to use all sorts of placebos. Placebos aren’t just sugar pills disguised as medicine, though that’s the literal definition; they are any intervention, benign but believed by the recipient to be potent, that produces measurable physiological changes. Placebo effects are a striking phenomenon and still not all that well understood. Entire fields like psychoneuroimmunology and psychoendocrinology have emerged to investigate the relationship between psychological and physiological processes. Neuroscientists are charting what’s going on in the brain when expectations alone reduce pain or relieve Parkinson’s symptoms. More traditionally minded health researchers acknowledge the role of placebo effects and account for them in their experiments. But Langer goes well beyond that. She thinks they’re huge — so huge that in many cases they may actually be the main factor producing the results.

As an example, she points to a study she conducted in a hair salon in 2009. She got the idea from a study undertaken nearly a decade earlier by three scientists who looked at more than 4,000 subjects over two decades and found that men who were bald when they joined the study were more likely to develop prostate cancer than men who kept their hair. The researchers couldn’t be sure what explained the link, though they suspected that androgens (male hormones including testosterone) could be affecting both scalp and prostate. Langer had another theory: “Baldness is a cue for old age,” she says. “Therefore, men who go bald early in life may perceive themselves as older and may consequently be expected to age more quickly.” And those expectations may actually lead them to experience the effects of aging. To explore this relationship between expectations of aging and physiological signs of health, Langer and her colleagues designed the hair-salon study. They had research assistants approach 47 women, ranging in age from 27 to 83, who were about to have their hair cut, colored or both. They took blood-pressure readings. After the subjects’ hair was done, they filled out a questionnaire about how they felt they looked, and their blood pressure was taken again. In a paper published in 2010 in the journal *Perspectives on Psychological Science*, they reported that the subjects who perceived themselves as looking younger after the makeover experienced a drop in blood pressure.

A few years earlier, Langer and one of her students, Alia Crum, conducted a study, published in the journal *Psychological Science*, involving 84 hotel chambermaids. The maids had mostly reported that they didn't get much exercise in a typical week. The researchers primed the experimental group to think differently about their work by informing them that cleaning rooms was fairly serious exercise — as much if not more than the surgeon general recommends. Once their expectations were shifted, those maids lost weight, relative to a control group (and also improved on other measures like body mass index and hip-to-waist ratio). All other factors were held constant. The only difference was the change in mind-set.

Critics hunted for other explanations — statistical errors or subtle behavior changes in the weight-loss group that Langer hadn't accounted for. Otherwise the outcome seemed to defy physics. “To which I would say, ‘There's no discipline that is complete,’ ” Langer responds. “If current-day physics can't explain these things, maybe there are changes that need to be made in physics.”

In the course of her career, Langer says, she has written or co-written more than 200 studies, and she continues to churn out research at a striking pace. Just before winter break, in her final meeting with two dozen or so students and postdocs, Langer went around the table checking the progress of nearly 30 experiments, all of which manipulated subjects' perceptions. Some used a special clock that could be set to run at half-speed or double-speed. In one study, sleeping subjects were fooled, upon awakening, into thinking they had more or less sleep than they actually did. She posits that the scores on measures of short-term memory and reaction time will vary accordingly, regardless of how long the subjects actually slept. In a yet-to-be-published diabetes study, Langer wondered whether the biochemistry of Type 2 diabetics could be manipulated by the same psychological intervention — the subjects' perception of how much time had passed. Her theory was that the diabetics' blood-glucose levels would follow perceived time rather than actual time; in other words, they would spike and dip when the subjects expected them to. And that's what her data revealed. When a student emailed her with the results this fall, she could barely contain her excitement. “This is the beginning of a psychological cure for diabetes!” she told me.

Some of the new experiments rely on variables that change self-perception. In a study using avatars, scheduled to take place at the popular gaming facility Second Life, subjects will watch a digital version of themselves playing tennis and gradually getting thinner from the exertion. Langer is exploring whether watching an avatar will have a physiological effect on the real person. “You see yourself, you're playing tennis,” Langer said. “The question is: Will people lose weight? We'll see.”

Some of Langer's colleagues in the academy see her as a valuable force in psychology, praising her eccentric intelligence and ingenious study designs. Steven Pinker, the writer and Harvard professor, told me that she filled an important niche within the school's department, which has often harbored “mavericks with nontraditional projects,” including “B. F. Skinner's utopian novels and manifestoes and Herb Kelman's encounter groups between Arab and Israeli activists — not to mention Timothy Leary and Richard Alpert,” who would become Ram Dass.

But Langer's sensibility can feel at odds with the rigors of contemporary academia. Sometimes she will give equal weight to casually hatched ideas and peer-reviewed studies. She spoke loosely to me of her New Hampshire counterclockwise study as having been “replicated” three times — in Britain, the Netherlands and South Korea. But none of these were lab experiments. They were events made for television. The study that arguably made Langer's name — the plant study with nursing-home patients — wouldn't have “much credibility today, nor would it meet the tightened standards of rigor,” says James Coyne, professor emeritus of psychology at the University of Pennsylvania medical school and a widely published bird dog of pseudoscience. (Though, as Coyne also acknowledges, “that is true of much of the work of the '70s, including my own

concerning depressed persons depressing others.”) Langer’s long-term contributions, Coyne says, “will be seen in terms of the thinking and experimenting they encouraged.”

Four years ago, Langer and her colleagues published in *Psychological Science* a study that came closest in spirit to the original counterclockwise study in New Hampshire. Here, too, the placebo was a health prime, a situational nudge. They had two groups of subjects go into a flight simulator. One group was told to think of themselves as Air Force pilots and given flight suits to wear while guiding a simulated flight. The other group was told that the simulator was broken and that they should just pretend to fly a plane. Afterward, they gave each group an eyesight test. The group that piloted the flight performed 40 percent better than the other group. Clearly “mind-set manipulation can counteract presumed physiological limits,” Langer said. If a certain kind of prompt could change vision, Langer thought, there was no reason, that you couldn’t try almost anything. The endgame, she has said many times since, is to “return the control of our health back to ourselves.”

Last spring, Langer and a postdoctoral researcher, Deborah Phillips, were chatting when the subject of the counterclockwise study came up. Over the more than 30 intervening years, Langer had explored many dimensions of health psychology and tested the power of the mind to ease various afflictions. Perhaps it was finally time to run the counterclockwise study again. But if they did, she wanted to raise the stakes: Could they shrink the tumors of cancer patients? Langer often says she has no clue where her ideas come from — but in this case it was crystal clear: Metastatic breast cancer killed her mother at 56, when Langer was 29.

Phillips suggested that perhaps they should start with early-stage cancers, ones perceived as more curable, but Langer was firm: It had to be a big, common killer that traditional Western medicine had no answer for. She settled on Stage 4 metastatic breast cancer. Treatment of such cases is usually framed in terms of so-called comfort care. “The medical world has given up on these people,” Langer says.

The study, which is planned for the spring, is designed to include three groups of 24 women with Stage 4 breast cancer who are in stable condition and undergoing hormonal therapy. Two groups will gather at resorts in San Miguel de Allende, Mexico, under the supervision of Langer and her staff. The experimental group will live for a week in surroundings that evoke 2003, a date when all the women were healthy and hopeful, living without a mortal threat hanging over them. They will be told to try to inhabit their former selves. Few clues of the present day will be visible inside the resorts or, for that matter, outside them. In the living areas, turn-of-the-millennium magazines will be lying around, as will DVDs of films like “Titanic” and “The Big Lebowski.” San Miguel de Allende, which has historically been a place known for its nearby healing mineral springs, is a Unesco World Heritage Site, and many of its buildings look as they did a few hundred years ago. “The whole town is a time capsule,” Langer says. (The other group at San Miguel will have the support of fellow cancer patients but will not live in the past; a third group will not experience any research intervention.)

As with the original counterclockwise experiment, subjects will be tested before and after on relevant measures — in this case the size of their tumors and the levels of circulating proteins in their blood known to be made by cancer cells — in addition to variables like mood and energy and pain levels. The experimental group will bring with them the same kinds of primes that the New Hampshire men did, like photographs of their younger selves. “We won’t make them haul their bags up the stairs,” Langer says. But otherwise they will be nudged to do all they can for themselves.

The staff will encourage the women to think anew about their circumstances in an attempt to purge any negative messages they have absorbed during their passage through in the medical system.

This is crucial, Langer says, because just as the mind can make things better, it can also make things worse. The nocebo effect is the flip side of the more positive placebo effect, and she says that one of the most pernicious nocebo effects can occur when a patient is informed by her doctor that she is ill. The diagnosis itself, Langer says, primes the symptoms the patient expects to feel. “You change a word here or there, and you get vastly different results,” Langer says. She told me about a yet-to-be-published study she did in 2010 that found that breast-cancer survivors who described themselves as “in remission” were less functional and showed poorer general health and more pain than subjects who considered themselves “cured.”

So there will be no talk of cancer “victims,” nor anyone “fighting” a “chronic” disease. “When you’re saying ‘fighting,’ you’re already acknowledging the adversary is very powerful,” Langer says. “ ‘Chronic’ is understood as ‘uncontrollable’ — and that’s not something anyone can know.”

Of course, the subjects hope to get better, and everything about the setup is nudging them in that direction. So the study becomes a kind of open placebo experiment. Langer has long believed it’s possible to get people to gin up positive effects in their own body — in effect, to decide to get well. Last fall, she tested that proposition, but in reverse: She recruited a number of healthy test subjects and gave them the mission to make themselves unwell. The subjects watched videos of people coughing and sneezing. There were tissues around and those in the experimental group were encouraged to act as if they had a cold. No deception was involved: The subjects weren’t misled, for example, into thinking they were being put into a germ chamber or anything like that. This was explicitly a test to see if they could voluntarily change their immune systems in measurable ways.

In the study, which is ongoing, 40 percent of the experimental group reported cold symptoms following the experiment, while 10 percent of those in control group did. Buoyed, Langer ordered further analysis, looking for more concrete proof that they actually caught colds by testing their saliva for the IgA antibody, a sign of elevated immune-system response. In February, the results came in. All of the experimental subjects who had reported cold symptoms showed high levels of the IgA antibody.

Placebo effects have already been proven to work on the immune system. But this study could show for the first time that they work in a different way — that is, through an act of will. “As far as we know today, the placebo responses in the immune system are attributable to unconscious classical conditioning,” says the Italian neuroscientist Fabrizio Benedetti, a leading expert in placebo effects. In Benedetti’s experiments, a suggestion planted in the minds of test subjects produced physiological changes directly, the way a dinner bell might goose the salivary glands of a dog. (In one study, healthy volunteers given a placebo — a suggestion that any pain they experienced was actually beneficial to their bodies — were found to produce higher levels of natural painkillers.) “There’s no evidence that expectations play a role as well,” Benedetti says. Langer plans to further analyze the subjects’ saliva to see whether they actually have the rhinovirus and not just elevated IgA.

The implications of the open placebo — that is, we know the sugar pill is just a sugar pill, but it still works as medicine — are tantalizing. If placebo effects can be harnessed without deception, it would remove many of the ethical issues that surround placebo work. In a study published in the journal *Plos One* in 2010, Ted Kaptchuk, a professor of medicine at Harvard Medical School, and his colleagues administered a placebo labeled “placebo” to a test group of patients suffering from irritable bowel syndrome. Their symptoms declined significantly as compared with a no-treatment control group. “At some level everybody realizes they themselves are the placebo,” Langer says.

Langer's cancer study has had to clear the hurdles of three human-subjects ethics boards — one from Mexico, one from Harvard's psychology department and, for a time, one from the University of Southern California's medical school, where until recently Debu Tripathy, an oncologist who is recruiting subjects for Langer's study, was a professor of medicine. In June, progress stalled when the board at U.S.C. asked that the language be tweaked. "There's so much stuff that's totally outrageous in this world," Langer told me at the time. "They want me to add a consent form for the people to sign saying there's no known benefit to them. But that just introduces a nocebo effect!" (The study now has to clear the ethics board at the University of Texas M.D. Anderson Cancer Center in Houston, where Tripathy presently works.)

Like the men in New Hampshire, Langer's cancer patients in San Miguel will pass a richly diverting week. In this case, art classes, cooking classes and writing classes will help distract them from the brute dread of their circumstances and re-engage them in life. The terror of late-stage cancer can be as debilitating as the physical reality, Tripathy says. Some sufferers, he says, show symptoms akin to PTSD. There's strong evidence that the support of other people boosts the quality of life for cancer patients. There's less evidence that it improves their health prospects.

I asked Tripathy whether there's any precedent for what Langer is trying to do. "Well, there are many examples in medicine where improvement in the emotional state seems also to bring about some improvement in the disease state," he said. "We know, for example, that Tibetan monks can meditate and lower their blood pressure. People with hypertension, they embark on behavioral changes, and you can see the improvement in the medical indexes, like fewer heart attacks. But cancer? That's a harder thing to fathom."

Positive psychology doesn't have a great track record as a way to fight cancer. Indeed, when James Coyne and colleagues followed 1,093 people with advanced head-and-neck cancer over nine years, they found even the most optimistic subjects lived no longer than the most pessimistic ones.

Some cancer patients respond to interventions better than others, Tripathy notes. "But even with high-dose chemotherapy, you rarely see 'complete response,' which is total disappearance" of advanced breast cancer. "So if we saw anything like that, boy, that would hit the medical journals in a hurry."

One day in Puerto Vallarta in February, Langer sat on the patio of her hillside home. An iguana the length of a celery rib scooted across a high railing, and the dogs went bananas. "That's Ada," Langer said. "Or is it Ida? There are two — it's hard to tell them apart." When the iguanas first appeared and began devouring the hibiscus, Langer was startled. Now she and Nancy feed them petals for lunch. "That's the way it is," she said. "You can be scared. You give it a name, and then it's a pet."

Langer peered out over the deep blue sea, in the direction of a lagoon, where early in her career she conducted experiments on whether dolphins were more likely to want to swim with mindful people. In the last few days, she had been exchanging emails with a writer who wanted to come stay with her for a couple of weeks, taking notes for a screenplay for a Hollywood biopic.

Langer told me that she chose San Miguel for her new counterclockwise study primarily because the town had made "an offer I couldn't refuse." A group of local businesspeople, convinced of the value of having Langer's name attached to San Miguel, arranged for lodging to be made available free to Langer. They also encouraged her to build a Langer Mindfulness Institute, which will take part in research and run retreats. (A local developer donated a beautiful *casa*, next to his Nick Faldo-designed golf course, to serve as staff quarters for the institute.) Starting sometime next

year, adults will be able to sign up for a paid, weeklong counterclockwise experience, presumably with a chance at some of the same rejuvenative benefits the New Hampshire test subjects enjoyed.

Langer says she is in conversation with health and business organizations in Australia about establishing another research facility that would also accept paying customers, who will learn to become more mindful through a variety of cognitive-behavioral techniques and exercises. She has already opened a mindfulness institute in Bangalore, India, where researchers are undertaking a study to look at whether mindfulness can stem the spread of prostate cancer.

Langer makes no apologies for the paid retreats, nor for what will be their steep price. (This, too, is calculated: In the absence of other cues, people tend to place disproportionate value on things that cost more. Dan Ariely, a psychologist at Duke, and his colleagues found that pricier placebos were more effective than cheap ones.) To my question of whether such a nakedly commercial venture will undermine her academic credibility, Langer rolled her eyes a bit. “Look, I’m not 40 years old. I’ve paid my dues, and there’s nothing wrong with making this more widely available to people, since I deeply believe it.”

Medical colleagues have asked Langer if she is setting herself up to fail with the cancer study — and perhaps underappreciating the potential setbacks to her work. It’s also possible that subjects who don’t improve could feel more demoralized by the experience. In her memoir, “Bright-sided,” the journalist Barbara Ehrenreich wrote scorchingly about the sunshine brigade that bombarded her with “positive thinking” as she suffered through breast cancer. Under those conditions, patients who don’t get better might feel as if they themselves were somehow to blame.

After a lecture in 2010, in which she’d discussed how when we talk about “fighting” cancer we actually give the disease power, a man buttonholed Langer and laid into her. His wife had died of breast cancer. “He said she had fought it, and I made it seem that it was her fault,” Langer told me.

Langer apologized to the man. “Those are good points, and I’m sorry I didn’t address them,” she said. “But let me explain to you that it’s the culture that teaches us that we have no control. I’m not blaming your wife; I’m blaming the culture.” Langer imagines a day when blame isn’t the first thing people reach for when things go awry. Instead, we will simply bring to bear the power of our own minds — which she believes will turn out to be far greater than we imagined.

Scientific American

The Return of the Propeller

The demand for shorter, cheaper flights is driving new research into turboprops

by Clay Dillow



At Dowty Propellers, engineers use braiding machines to build advanced composite blades.

The debut of propeller-driven aircraft kicked off a global aerospace technology boom that continues to this day. But since the emergence of the jet aircraft engine during World War II, research into propeller-powered flight has often taken a backseat to the turbofan technology that carries jetliners faster and farther. Speed and range come at a cost, however, and both [rising fuel prices](#) and increased demand for regional air travel have changed the economics of flight over the past 10 years. Now airlines are once again [looking to smaller, more efficient turboprop planes](#) to handle shorter routes, driving the development of a new generation of prop-driven aircraft technologies poised to take wing by the end of the decade.

Turboprop planes accounted for roughly half of the 20- to 99-seat passenger aircraft delivered to airlines in 2013, according to [market research](#) conducted by Canadian plane maker Bombardier—parity that has not existed since the 1990s. Demand has risen because on flights less than about 500 nautical miles, turboprops are far more fuel-efficient than turbofans, which fly most efficiently only after they have made the long climb to their much higher cruising altitudes. But in exchange for their efficiency, traditional turboprops sacrifice airspeed and generate noise and vibrations that compromise passenger comfort. For airlines competing over customer experience as much as price (and acutely aware of passengers' perceptions of propeller-driven aircraft as passé), the propeller technology of the last century will not do.

Among those paving the way for a new generation of turboprops, General Electric Aviation's Dowty Propellers is exploring anew the interactive effects among the propeller, engine nacelle and aircraft wing. Using computational fluid dynamics tools that were not available even a few years ago, engineers at the Gloucester, England-based firm are not only designing blades with new efficiency-enhancing shapes but rethinking the layout of the propeller as a whole.

“The computational power that’s available now has really made the difference,” says Dowty’s Jonathan Chestney, noting that researchers can analyze data on an individual-blade basis. “It’s an exciting time for us,” he remarks. “We’re able to see much more detail, like a scientist who just got a microscope for the first time.”

Dowty engineers are currently exploring two novel spacing ideas for eight-blade propellers. One positions the blades unequally around the circumference of the propeller hub; the other staggers the blades axially, with four blades mounted farther forward on the hub than the others. These spacing schemes break up and change the audible frequencies created in flight. Dowty is in the midst of testing the corresponding cabin sounds on volunteers to see which ones they prefer.

Dowty’s research is not taking place in a vacuum. Advanced propellers will appear in the next-generation helicopters that the U.S. Department of Defense wants and in upcoming unmanned aerial vehicles, says aerospace engineer Lakshmi Sankar of the Georgia Institute of Technology. As such, research is taking place across the industry and even across disciplines. Computational fluid dynamics research on propellers conducted at places like the NASA Glenn Research Center and [Georgia Tech](#) are feeding into designs coming out of suppliers including Dowty and Charlotte-based [UTC Aerospace Systems](#).

Novel designs are not far from the tarmac. Says Dowty’s Chestney, “We expect to see some key players going public with new aircraft designs in the next couple of years.”

War is Boring

[China's Aircraft Carrier Trouble: Spewing Steam and Losing Power](#)

'Liaoning' shut down during recent sea trials

By Robert Beckhusen



There’s no more of a conspicuous and potent symbol of China’s growing naval power than the aircraft carrier *Liaoning*.

But the 53,000-ton, 999-foot-long carrier could be dangerous to her crew and prone to engine failures. If so, that makes the vessel as much of a liability as an asset to Beijing.

The ex-Soviet carrier once went by the name *Varyag* until a cash-strapped Ukraine sold the ship to Beijing in 1998. The Chinese navy has since invested considerable resources into modernizing the warship and [testing her at sea](#).

But on at least one occasion during recent sea trials, *Liaoning* appeared to suffer a steam explosion which temporarily knocked out the carrier's electrical power system. The failure, reported by Chinese media site Sina.com, resulting from a leak in "the machine oven compartment [to the water pipes](#)."

We're only able to glimpse at the carrier's engine problems, as we know very little about what's inside the ship. This includes even what *kind* of [engines](#) *Liaoning* has.

The Chinese government also doesn't like to admit to problems with its military hardware. When it does—and that's never guaranteed—the admissions often come months or years after problems come up.



The Liaoning battle group during sea trials (China Defense Blog)

During the accident, hot water and steam began "spewing" out of the engine's oven compartment, Sina.com reported. One cabin became "instantly submerged in water vapor," the report added.

The crew immediately evacuated the cabin, with one officer apparently pulling a sailor out by his collar to save him from the extremely hot steam. The carrier then lost power, but the crew "eventually restored power to ensure the smooth operation of the ship."

Fortunately, this doesn't appear to have been a catastrophic boiler failure of the kind that would unleash almost instantaneously lethal, high-pressure steam. It's possible *Liaoning* instead suffered a low-pressure steam release involving a faulty heat exchanger. Vessels commonly use heat exchangers to control water temperature necessary for regulating internal power and heating.

The Chinese navy began modernizing the ex-*Varyag* in 2005—essentially rebuilding the carrier from the inside. New electronics, self-defense anti-aircraft guns and new engines were just some of the upgrades. The warship in her unimproved condition was a "basket case," an unnamed officer told the Website.

Engine failures are not an unknown phenomenon aboard ex-Soviet carriers. The 40,000-ton displacement Indian carrier *Vikramaditya*—first a Soviet *Kiev*-class carrier commissioned in 1987 and sold in 2004—temporarily shut down at sea after a boiler overheated two years ago.

The 50,000-ton Russian carrier *Admiral Kuznetsov* also [goes nowhere](#) without a tug escort in case her engines break down while underway.

The Chinese navy isn't going to get rid of *Liaoning* any time soon. She's Beijing's first serviceable carrier and the ship is a valuable resource for naval flight operations. Even if China never sends her into battle, she's useful for training and learning *how* carriers work.

But powerplant problems can also make it so China can do little else. Failures can add costly repairs, shorten the vessel's lifespan and force her to crawl along the water at slow speeds. Beijing also lacks large overseas naval bases—a necessity if trouble arises while *Liaoning* sails far from China's shores.

If she ever does. *Liaoning* is more alike to its ex-Soviet cousins than different—confined to home ports and restricted from challenging rivals like India.

“Since China began to send navy convoys on anti-piracy missions to the Gulf of Aden and the Somali coast in 2008,” military analyst Liu Zhongmin wrote in *Global Times* in 2010. “The lack of overseas bases has emerged as a major impediment to the Chinese navy's cruising efficiency.”

Now add the possibility of engine problems.





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