Observation is an underrated skill, and one that is in great demand for those in pursuit of wicked problems.

By Matthew E. May

OBSERVE FIRST, DESIGN SECOND:
TAMING THE TRAPS
OF TRADITIONAL THINKING

THE IMPOVERISHED ECONOMY in rural northern Nigeria is based on subsistence farming. The large population inhabiting the many isolated communities survives by growing, consuming and selling fruits and vegetables nourished by the many streams and rivers that flow into Lake Chad. However, the arid heat of the semi-desert geography presents a significant problem: rapid food decay. Perishables last no more than a few days before spoiling.

The solution would seem easy enough: refrigeration. But the problem is far more complex than simply being too poor to afford a refrigerator. For starters, there is no electricity. Mohammed Bah Abba, a Nigerian-born adviser to the United Nations Development Program in Jigawa, knew that this problem was even more far-reaching. The women of this predominantly polygamous society are segregated from the men and confined to their homes—a cultural practice called purdah. As a result, the young girls of the family are forced to travel long distances to large markets each day to sell the food as soon as it is harvested, leaving little, if any, time for school. Furthermore, much of what is produced is either sold cheap or wasted, resulting in losses to an already meager income, or sold in a partly spoiled state, resulting in health hazards.

The very health, welfare and education of Abba’s people was tied to the ability to keep produce fresh. Although he is neither an inventor nor an entrepreneur, he set out to find a way to address the situation, knowing that whatever he came up with would have to cost nearly nothing to construct and maintain, work without electricity, use readily-available materials and skills, and be acceptable in a conservative Muslim community.

Faced with daunting constraints, Abba thought long and hard. Then he remembered, from his youth, clay pots that had been central to the lives of northern Nigerians. Once used for
everything from cooking to coffins, the pots had since been replaced by more modern aluminum and plastic containers. But they hadn’t disappeared entirely, and neither had the indigenous skills used to shape them; Abba remembered the basics of traditional claywork that his grandmother had taught him. He also remembered enough of his secondary-school Science to hit upon an idea: cooling by evaporation – nature’s way of dropping the temperature a few degrees.

Abba’s idea for storing vegetables? Clay pots. Or rather, double clay pots. The solution couldn’t be simpler: place one pot inside another; fill the gap with something moist enough to keep both pots damp – like wet river sand; and cover the inner pot with a wet cloth. As the moisture in the gap evaporates from the outer pot toward the dry outside air, the inner pot cools, with the wet sand playing the dual role of insulating the inner pot. The drop in temperature of several degrees chills the contents of the inner pot, killing potentially-harmful microorganisms that flourish only at higher temperatures. The end result: Abba’s pot-within-a-pot desert cooler kept contents a dozen degrees cooler than the surrounding air. Instead of lasting for three days, eggplants stayed fresh for nearly a month; peppers and tomatoes stayed ripe for three weeks, and spinach lasted twelve days instead of one.

Today, farmers and traders use these desert coolers to store their produce at home and sell it – fresh – at a good price to the 100,000 customers of the Dutse Market. Now that they’re able to sell on demand, their income levels have noticeably risen. The invention has also freed young girls to attend school, because they no longer have to worry about traveling far and wide every day. Furthermore, married women can now contribute to household income by making soft drinks – called zobo – and selling them from the coolers. This extra income is often used to buy soap and other essentials.

Abba’s solution captured the attention of the world and received numerous awards and accolades. By 2006, well over 100,000 desert coolers had been sold and distributed throughout Nigeria, and an adapted version is now being used to preserve insulin vials for diabetic patients in remote rural areas. This is a prime example of how to solve a wicked problem with an elegant solution. But let’s see how fiendishly difficult it can be to apply similar thinking to a far simpler challenge.

**Please Be Kind, Rewind**

Imagine it’s 1991, and you are the manager of the local video store, a branch of a large chain. Back then, VCR machines didn’t have the automatic rewind feature on them, and DVDs hadn’t yet been invented. Your store has a problem: despite the fact that the rental contract clearly states that all videos must be rewound by the customer, 30 per cent of your customers don’t bother re-winding the tape. According to comment cards, this situation is a great source of customer dissatisfaction amongst ‘conscientious reinders’.

You’ve tried a number of things to solve the problem: incentives, penalties, ‘be kind, rewind’ reminders – you’ve even installed a row of rewinding machines in the store. Nothing has improved the situation. You decide to ask your employees to help solve the problem, and give them four non-negotiable conditions:

1. The solution must achieve a level of 100 per cent customer rewind accountability—it’s the customer’s responsibility, not the store’s;
2. There can be no additional burden on the customer;
3. Any solution must be of extremely low, and preferably no, cost—pennies per tape, at most; and
4. The solution must be easy to implement, without disrupting the normal operation of the store.

You tell your employees that they are free to be as innovative as they wish, as long as all conditions are met.

Why not try your own hand at solving this problem? If you’re up for it, put this magazine down for 10 minutes and let your mind play with the possibilities. What you’re looking for is a simple solution that fits within the limitations imposed by the four conditions and solves the problem with finality. Hint: Enlist the help of someone nearby if you like—sometimes it’s easier to brainstorm together. Oh, and don’t frustrate yourself trying to invent auto-rewind VCRs and DVDs—not only will you violate the conditions of the challenge, but they aren’t necessary to solve the problem.

Jot down all your ideas, select the best one, and then we’ll continue.

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This problem is based on the true story of **Star Video**, which solved the issue many years ago. I have given this thought exercise to over 50,000 people in seminars and workshops, and the results are always the same, regardless of the makeup of the group. The solutions people come up with are remarkably similar, but the simplest solution is discovered less than 10 per cent of the time.

Moreover, the conditions of the challenge – which are similar to the kinds of constraints under which Mohammed Bah Abba labored – are generally ignored. I have observed that it appears to be easier, or at least more common, for people to think ‘outside the box’ than inside it; and that is not necessarily a good thing.
Following are the top ten solutions people provide, in no particular order:

1. A loyalty program that gives you a free rental if your rewind record is clean for a length of time;
2. A small monetary fine;
3. More rewinders in the store with good signage;
4. Splicing reminders into the tape itself;
5. A video case that doesn’t allow the tape to be put back in if it hasn’t been rewound, or modifying the cassette itself so that it won’t fit back in the case if it hasn’t been rewound;
6. Putting the movie on both sides of the tape;
7. Cutting the tape to put the ending at the front;
8. Eliminating the after-hours drop box, monitoring every customer return, and reminding them their tape needs rewinding;
9. Enlisting volunteers to rewind tapes in exchange for free rentals;
10. The all-time favorite: a drop box that rewinds the tape when it is inserted.

Each of these solutions violates one or more of the limitations I imposed, and furthermore, none solves the problem. The reason I like this exercise is that, while it is clearly less complex than the typical business problem today, it nevertheless catches people doing all the things that get in the way of good problem solving in any scenario.

Over and over again I see what I call the ‘sins of solutions’ being committed, and my bet is that they appeared in some form during your own attempt to solve the problem. The first thing I regularly observe is an almost immediate leap to the solution itself. Unfortunately, leaping to solutions in an instinctive way almost never leads to an elegant solution to a complex problem, because deeper, hidden causes don’t get addressed.

The primary reason we tend to jump right into ideating is that most of the problems we face are routine, and don’t require much more than a quick work-around. Former CIA analyst Morgan Jones uses the example below to demonstrate how our predilection for ‘leaping’ can interfere with our efforts. Read the description below, and then name the individual described here:

A new chief executive, one of the youngest in his nation’s history, is being sworn into office on a bleak, cold, cloudy day in January. He was raised as a Catholic. He rose to his new position in part because of his vibrant charisma. He is revered by the people and will play a crucial role in a military crisis that will face his nation. His name will become legendary.

The vast majority of people conclude that it is John F. Kennedy, and they arrive at their answer before the third sentence. But given this description, an alternative answer could be Adolf Hitler. In rather non-scientific terms, as soon as our brain recognizes a piece of information as being part of a pre-existing pattern, we leap, subconsciously jumping ahead to a plausible conclusion, instinctively abbreviating our thinking. The unfortunate result is that very often, we fail to consider a broader range of possibilities.

How much time did you spend thinking about why people don’t rewind their videos – i.e. the root cause of the problem? My guess is that you probably spent nearly all of your 10 minutes focusing solely on solutions, devoting little time to why the problem exists in the first place. You are not alone: after years of observing people trying to solve this problem, I can assure you that very few ever consider the ‘why’. Most settle on a solution first, and then try to manipulate it to fit the conditions. When that doesn’t work, the conditions quickly get downplayed or downright ignored. This is natural, because it is easier and requires less mental effort than labouring under limits – but it also prevents tough problems from getting solved.

The Perils of Pattern Recognition

Our habit of leaping to solutions is related to the ‘blind spots’ in the human brain—an umbrella term for the assumptions, biases, mindsets and reflexive processing that our brains automatically manufacture and utilize. Simply put, your brain is constantly filling in gaps for you.

For example, you understand this sentence with little difficulty. That’s because the brain is a pattern-making, pattern-recognizing machine. All day long, unbeknownst to us—and for the most part uncontrolled by us—our brains record every single experience, sending sensory information in the form of electrical impulses to our cerebral cortex, the ‘grey matter’ that houses the brain’s higher functions. Each new experience is automatically stored as data in our brain. The process is additive and cumulative, and generally goes unedited. Even though the electrical impulses themselves disappear in milliseconds, their passage to the nerve cells triggers a grouping mechanism, filing new information with other like data as it comes in, which in turn creates specific and unique patterns.

Different patterns combine to make memories and perceptions, and those connections are reinforced over time, becoming mental models—mindsets, biases and paradigms. For the most part, these mental models allow us to function much more efficiently by helping us rapidly sift data and sort information into useful knowledge, according to whether it confirms or contradicts the strong patterns already embedded in our minds. There is no sophisticated term for this phenomenon; it’s basically guesswork by the brain.

Neuroscientists love to demonstrate just how smart this guesswork is by demonstrating the effect of the ‘physiological
blind spot of the eye’, which is called the *punctum caecum* in medical literature. Here’s how it works.

Hold this image up a few inches from your face. Close your right eye and focus your left eye on the X. Now slowly, really slowly, move the book away from you. At some point the O will disappear and in its place is not a hole, but a uniform grey background, courtesy of the ‘filling in’ power of your brain. The O disappears the moment the image falls on a small patch of retina called the *optic disk*, an area with no receptors. This is where the optic nerve pierces the retina as it exits the eyeball and heads back toward your brain. Using what’s called a ‘surface interpolation’ process, your brain fills in the spot with information taken from the immediate area – in this case, the grey background. Such filling-in actions pervade our problem solving, and we cannot get to deeper problem solving until we tame them.

Back to our videotape challenge: the filling-in that your brain did likely resulted in your making an assumption—that the videotape must come back to the store rewound. However, the problem simply required the tape to be rewound; the issue of *when* the tape was to be rewound was never stipulated.

By spending more time thinking about the *cause* of a problem, we are often better able to frame the issue without making unwarranted assumptions. The true root cause of the problem of un-rewound tapes is that one-third of customers are simply lazy and willing to pass their responsibility on to others. Once you understand that, you can see why previous solutions didn’t work: nothing at such a low transaction level is going to change a basically lazy person into an accountable one. But you don’t

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**DOCUMENTING WICKED PROBLEMS**

*Interview by Pym Buitenhuis*

Master observer and renowned photographer Edward Burtynsky, whose work graces our cover for the second time, talks about his work during the Gulf Oil Spill disaster.

**The Gulf Oil spill was a classic example of a wicked problem: big, difficult, multiple variables, etc. What made you want to go there?**

In my work I don’t usually chase disasters. I focus on intentional landscapes, like mines or quarries – landscapes designed by people, not by accident. I am interested in how we incrementally create these things of vast scale as we remove the materials we need to build our urban cities. That’s mainly what my work is about. When the Gulf spill happened, I’d spent 12 years photographing the subject of oil, and in that whole time, I rarely ever actually saw oil, except around abandoned rigs. Oil, I always thought, was like blood: it runs through our veins and keeps everything going; but if you can see it, it’s a problem. I had already been working on a project about water for a couple of years, and then this disaster happened. So these two big concerns in my work – oil and water – suddenly came together. I had already published the oil book, but I thought it might somehow work into the water book as a kind of a bridge piece.

**In your work you have this interplay between beauty and devastation. Is that how you would you characterize it?**

I’m always careful with the word *beauty*. The problem with it, I find, is that it is culturally specific, so the label ‘beautiful’ isn’t accurate. What I look for are visually-compelling images that are more archetypal, that cross over cultural boundaries and enter a kind of global collective space. I look for the tension between attraction and repulsion; that is when the image becomes unstable. If you buy a piece and live with it, one day you might just be taken by the content of what it is, and the next you might enjoy it just for its structure. My work tries to tell a story while at the same time not being photojournalistic.

**From what you understand, how did this accident happen?**

It all came down to this half-million dollar mechanical device that was battery powered, and the battery was low. Once it stopped functioning, not one thing went wrong, but four or five – and all of a sudden they lost control.

**How were you able to see the spill?**

Because of the spill, the whole fishing season was cancelled, so all the pilots and guides swapped sport fisherman for journalists. We used those same Cessna’s to fly us out. With the Cessna, you’ve got a small window from which you can shoot. You have to shoot backwards and out, because there’s a strut that holds the wing; so it’s a tricky thing to shoot. You also can’t hover over something you want to shoot or back up as you would with a helicopter, so you have to go around in a big loop again, and inevitably you never get back to exactly where you were.
need to: the real issue revolves around making it impossible not to rewind the tape, and to do so with little or no cost and without placing additional burden on the customer. Star Video’s solution: let the tapes be rented out un-rewound. They simply put a small sticker on the video case, stating that the tape may have to be rewound before watching. The solution placed no additional burden on the customer – one rewind was all that was ever required—and that didn’t change. What changed is where and when the rewind occurred. If you got a tape that hadn’t been rewound, you rewound it before watching. The stickers were very inexpensive, and there was no ongoing burden on the store. Problem solved. If you think about it, the solution is the same one most of us employ when doing laundry: we clean the lint screen before our next dryer load, not after the last one.

The ‘sins of solutions’ I have described are interconnected, and they lead to three related thinking traps:

Not invented here. With the video challenge, many of the top ten solutions are really just a version of what hasn’t worked in the past: incentives, penalties, reminders and rewinders. The impulse to do something—anything—leads us to focus on execution, and as a result we ignore the facts. This causes tunnel vision that goes something like this: “Hey, if I (we) didn’t come up with the solution, it won’t work. They probably didn’t do it right.” We adopt this mindset unknowingly, shutting out another person’s or group’s idea immediately and without due consideration merely because they came up with it. The next time you’re in the lobby waiting for the elevator to go up to your office or hotel room, count how many people hit the up button even though they can see that you’ve already pushed it. By nature, we don’t trust other people’s solutions.

Satisficing. In 1957, economics Nobel Laureate Herbert Simon published a book called Models of Man, in which he examined
the default decision-making process by which we tend to go with
the first option that offers an acceptable payoff. Simon said that
by nature we ‘satisfice’—his term, combining satisfy and suffice.
In other words, we have a tendency to settle for ‘good enough’,
opting for whatever seems to expeditiously meet the minimum
requirement needed to move us closer to achieving a given goal.
We then stop looking for other ways, including the best way, to
solve the problem. We rationalize that the optimal solution is too
difficult, not worth the effort involved, or simply unnecessary.

Allow me to demonstrate. Take a look at the incorrect Ro-
man-numeral equation below. Imagine that the numbers are
movable sticks. Leaving the plus and equals signs where they
are, what is the least number of sticks you need to move to turn
the equation into a correct one?

\[ XI + I = X \]

Most people get to the answer of ‘one’ almost immediately. They jump in and start moving things around right away, seeing \( X + I = XI \) or \( IX + I = X \) as good answers, and stop at that point. But these are satisficing answers, and they are only ‘good enough’. If you stop and think for a moment about the optimal answer, you realize that the answer ideally would be ‘zero’. Is that possible? Yes. Turn the image upside down for a moment or reflect it in a mirror: you don’t need to move a single stick. The elegant solution is achievable if you stop for a moment, think about the question a bit more deeply, look at the problem from another perspective, and aim for the ideal. This, though, is the opposite of satisficing.

When we satisfice, we ignore the constraints that carry the
paradoxical power to open up new and different ways of looking
at things. We mistakenly pose the question “What should we
do?” before asking “What is possible?” We want a solution, but
we don’t have the patience to wait for the optimal one, favoring
implementation over incubation. We throw some resources at
the problem and move on, or tweak a previous solution and fit
it to the current situation. In short, we fail to look more holisti-
cally at the challenge, and the result is that we never get to the
best solution.

**Complicating.** In looking at the list of most common video-re-
wind solutions, notice that many require the addition of tech-
ology not in existence, which not only violates the conditions
of the challenge, but is completely unrealistic. In the interest of
acting and doing, we often inadvertently leave out the most criti-
cal facts, which blocks the discovery of a simpler and more ro-
bust solution. This is the mirror opposite of the filling-in effect.

Closely related to this is the tendency to simply downgrade the
requirement of ‘100 per cent customer rewind’, claiming it is im-
possible. Naturally, we then offer up a reduced objective—getting
more or most people to rewind—and declare victory. But as any-
one familiar with football will tell you, the goal is not to reach the
97-yard line.

**In closing**

The video challenge demonstrates that we face two major ob-
stacles in trying to solve seemingly-intractable problems: acting
and adding. Each of the top ten solutions to the video challenge
can be attributed to one or both of these. How can we tame
these thinking traps? The answer is surprisingly simple: become
a better observer.

Mohammed Bah Abba was not an expert problem-solver,
but he was an expert observer. It was his intimate knowledge
and deep understanding of a multi-dimensional problem that
helped him devise the desert cooler. His insight sprang from
being able to immerse himself in the problem, observe it up close,
and gain an intimate and empathic view of it. This is exactly
what the best scientific investigators, detectives, and designers
do. As UK urban designer Ben Hamilton-Baillie says, “Most
of what we accept as ‘the proper order of things’ is based on as-
sumptions, not observations. If we observed first and designed
second, we wouldn’t need most of the things we build.”

Regardless of the work we do, we must constantly fight
the urge to ‘fill in the blanks’ immediately and instead, observe
first and design second. In today’s world, this will become in-
creasingly important, for the simple reason that the vast major-
ity of the challenges we face are far more complex than getting
someone to rewind a videotape. R