Tracking Every Facet of Life, from Sleep to Mood to Pain, 24/7/365

I got up at 6:20 this morning, after going to bed at 12:40 am. I woke up twice during the night. My heart rate was 61 beats per minute, and my blood pressure, averaged over three measurements, was 127/ 74. My mood was a 4 on a scale of 5. My exercise time in the last 24 hours was 0 minutes, and my maximum heart rate during exercise was not calculated. I consumed 400 milligrams of caffeine and 0 ounces of alcohol. And in case you were wondering, my narcissism score is 0.31 (more on that in a moment).

Numbers are making their way into the smallest crevices of our lives. We have pedometers in the soles of our shoes and phones that can post our location as we move around town. We can tweet what we eat into a database and subscribe to Web services that track our finances. There are sites and programs for monitoring mood, pain, blood sugar, blood pressure, heart rate, cognitive alacrity, menstruation, and prayers. Even sleep—a challenge to self-track, obviously, since you're unconscious—is yielding to the skill of the widget maker. With an accelerometer and some decent algorithms, you will soon be able to record your sleep patterns with technology that costs less than $100.

All this might once have seemed like a nightmare, the kind of thing that would be proposed by Thomas Gradgrind, the schoolmaster in Charles Dickens' *Hard Times,* who barks at his students by number—"Girl number twenty!"—and blasts every person he meets with unsolicited facts and statistics. Quantitative analysis by its very nature seems remorseless and inhuman. Numbers may be useful for epidemiologists and insurance companies, school systems, the military, and sociology professors, but what have they to do with the fabric of our personal lives? To be turned from warm flesh into cold arithmetic—what a terrible thing. As the hero of the cult TV series *The Prisoner* cried, "I am not a number! I am a free man!"

But two years ago, my fellow *Wired* writer Kevin Kelly and I noticed that many of our acquaintances were beginning to do this terrible thing to themselves, finding clever ways to extract streams of numbers from ordinary human activities. A new culture of personal data was taking shape. The immediate cause of this trend was obvious: New tools had made self-tracking easier. In the past, the methods of quantitative assessment were laborious and arcane. You had to take measurements manually and record them in a log; you had to enter data into spreadsheets and perform operations using unfriendly software; you had to build graphs to tease understanding out of the numbers. Now much of the data-gathering can be automated, and the record-keeping and analysis can be delegated to a host of simple Web apps. With new tracking systems popping up almost daily, we decided to create a Web site to track them. We called our project *the Quantified Self*. We don't have a slogan, but if we did it would probably be "Self-knowledge through numbers."

We're aware of how absurd this sounds. *Self-knowledge through numbers*. What could that possibly mean? Of course you can learn things about yourself through numbers—weight is probably the most common personal metric—but self-knowledge has connotations that go beyond quotidian facts. "Know Thyself" was inscribed at the temple of Apollo at Delphi, held up as an ideal in Latin and Christian philosophy, and recycled by generations of advice mongers. Self-knowledge was obtained through introspection and reflection; that is, through words.

But there has long been a parallel method of understanding ourselves. Athletes are among the pioneers: With their increasingly precise and scientific training regimens, serious competitors now commonly load databases not only with their practice results but also with stats on the biological precursors of optimum performance: heart rate, diet, metabolism, and dozens of other factors. Anywhere the goal is explicit—run

faster, weigh less—the ability to plot progress is too powerful to ignore.

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But the newest tools open possibilities for personal tracking in areas of life that had always seemed inaccessible to quantitative methods. Diarists often chronicle their moods, creating a paper trail that provides a sense of mastery over fleeting emotions. There is a problem, however, with this sort of old-fashioned journal-keeping: You record your mood only when you're in the mood to do so, which introduces a bias. If you impose a regular schedule, noting your feelings at the same time every day, you face the issue that mood varies predictably with time of day and regular cycles of activity. It might seem that we're simply incapable of reliably tracking our own subjective states, but social scientists solved this problem years ago: Just randomize the time of inquiry. Mihaly Csikszentmihalyi and Reed Larson reported early results using such methods back in 1983, launching a productive line of research in psychology. At the time, of course, this was work for professionals with programmed watches. It wasn't clear how you would direct a random inquiry to yourself.

With today's technology, such things are now trivial. There is open source software for random experience sampling. This feature is already embedded in tools like Happy Factor, a Facebook app that randomly pings you with a text message, to which you respond with a number indicating your happiness level. There are protocols for measuring mental fitness that take less than five minutes to complete and provide a baseline for experiments on your brain's agility. The Web site CureTogether lets users log an enormous range of conditions, symptoms, and feelings. Modern self-tracking systems can measure our bodies, our minds, and our movements.

But can they measure our narcissism? The question comes up often enough to require an answer. My original impulse, after I'd heard it three or four times, was to investigate it in the spirit of the self-tracking movement—that is, with a number. There is a well-validated psychological test for measuring narcissism that takes only a few minutes to fill out. I administered it to three dozen self-trackers, and the mean score was 0.38, which is within the normal range. But of course, that's not a real answer, because when people ask whether self-tracking is narcissistic, they're not wondering about *clinical* narcissism. They're wondering

about selfishness, narrowness, a retreat from social engagement and social generosity into an egotistical world of self.

Oddly, though, self-tracking culture is not particularly individualistic. In fact, there is a strong tendency among self-trackers to share data and collaborate on new ways of using it. People monitoring their diet using Tweet What You Eat! can take advantage of crowdsourced calorie counters; people following their baby's sleep pattern with Trixie Tracker can graph it against those of other children; women watching their menstrual cycle at MyMonthlyCycles can use online tools to match their chart with others'. The most ambitious sites are aggregating personal data for patient-driven drug trials and medical research.

Self-trackers seem eager to contribute to our knowledge about human life. The world is full of potential experiments: people experiencing some change in their lives, going on or off a diet, kicking an old habit, making a vow or a promise, going on vacation, switching from incandescent to fluorescent lighting, getting into a fight. These are *potential* experiments, not *real* experiments, because typically no data is collected and no hypotheses are formed. But with the abundance of self-tracking tools now on offer, everyday changes can become the material of careful study.

When magnifying lenses were invented, they were aimed at the cosmos. But almost immediately we turned them around and aimed them at ourselves. The telescope became a microscope. We discovered blood cells. We discovered spermatozoa. We discovered the universe of microorganisms inside ourselves. The accessible tools of self-tracking and numerical analysis offer a new kind of microscope with which to find patterns in the smallest unit of sociological analysis, the individual human. But the notion of a personal microscope isn't quite right, because insight will come not just from our own numbers but from combining them with the findings of others. Really, what we're building is what climate scientist Jesse Ausubel calls a macroscope.

The basic idea of a macroscope is to link myriad bits of natural data into a larger, readable pattern. This means computers on one side and distributed data-gathering on the other. If you want to see the climate, you gather your data with hyperlocal weather stations maintained by amateurs. If you want to see traffic, you collect info from automatic sensors placed on roadways and cars. If you want new insights into yourself, you harness the power of countless observations of small incidents of change—incidents that used to vanish without a trace. And if you want to test an idea about human nature in general, you aggregate those sets of individual observations into a population study.

The macroscope will be to our era of science what the telescope and the microscope were to earlier ones. Its power will be felt even more from the new questions it provokes than from the answers it delivers. The excitement in the self-tracking movement right now comes not just from the lure of learning things from one's own numbers but also from the promise of contributing to a new type of knowledge, using this tool we all build.

Contributing editor Gary Wolf (gary@aether.com)*blogs about self-tracking at quantifiedself.com. He wrote about the barcode of life in issue 16.10.*

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