

# Technology and the Unique You: The New Medical Partnership

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Have you ever thought about how each of us is a unique, complex biological structure? We are a composite of so many factors, such as our genetic makeup, our ethnicity (and all that implies), our environment, the people with whom we associate, our habits (or possibly addictions), our diet, exposure to heat and cold. I could go on, but I think you get the idea.

## **But do our doctors?**

At the end of this presentation, I will enumerate many of the known factors that could contribute to this uniqueness.

Modern science has produced medical “miracles” that are prescribed with the general understanding that one pill fits all. Well, sorry to be the bearer of such bad news, it doesn’t.

What works for the unique Barry, might not for the equally unique Ernie (**and he is unique with a capital U**).

So no matter how many times you hear an ad sponsored by a pharmaceutical company, “Ask your doctor if Blabady Bla Bla is right for you,” it’s **far** from a guarantee that it will be.

Why, you may well ask?

Because until very recently, no physician could possibly have enough information about **Unique You** to prescribe medicines or procedures that take your uniqueness into consideration. Thousands may have benefited from taking that drug, but our planet has about 7.5 billion people that are also unique. **What works for one group may actually be deleterious to another, or even a single individual.**

Medical science is on the verge of a true breakthrough. There are now machines capable of remembering every significant detail about **Unique You** (and I’m not just talking about the National Security Agency).

One of my favorite things in life (next to getting stung by a swarm of bees, or being stuck in a room with an insurance salesman,) is answering the questionnaire at the doctor’s office. My favorite is **D.O.B\_\_?**, followed by “**Age\_\_.**” I can’t tell if it’s a question to

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determine your basic arithmetic skills, or that they don't have a program sophisticated enough to derive how many years you have lived, by subtracting your birth year from the current one.

The new databases will remember every detail about your medical history that you have probably forgotten. Do you know the cause of every death in your immediately family? Or what diseases afflict those of your relatives still around? I sure as hell don't

But **Watson**, the I.B.M. computer that beat champion, Ken Jennings at the television game-show, *Jeopardy*, will, and a lot more. The company calls it, "**The New Era of Cognitive Healthcare.**"

<https://www.ibm.com/watson/health/>

Back in 1978, when I first started playing around with computers, my device had a mind-blowing random access memory (RAM) of 4k. That's kilobytes, and not megabytes, or terabytes. That could be expanded to the monumental size of 48k. I could write a program in **Beginner's All-purpose Symbolic Instruction Code, AKA, Basic**, that converted Fahrenheit to Centigrade, and if memory serves (mine, not the random access kind,) that program would use about 48k. Each character of code took up one single byte of memory.

The tasks awaiting the new generation of computing power will require significantly more capacity than that. **Watson** has a memory of **16 terabytes!** That 's  $2^{40}$  or 1,024 gigabytes. My *smart phone* has more than 1 million times the capacity of **NASA's** 1960s space missions, but not all that "smart" as compared with **Watson** and some of its computer cousins.

Arthur Conan and Doyle was not a multi-ethnic law firm, but a famous writer during the late 19th century.

Some people think of these machines as ultimate replacements for human doctors. But Arthur Conan Doyle had the right idea in calling his Watson, "Doctor." The 21st century Watson can be a partner to your doctor, and not necessarily her replacement.

There are far more benefits from that kind of partnership than just obsolescing that annoying questionnaire. **And that, my dear Watson, should be elementary.**

Some people are worried - for good reason - that computers are coming for their jobs. But IBM's Watson, powered with **A.I.** will serve the fields of medicine more as an assistant than a replacement. While

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this comes as no relief to those threatened with job loss, for the afflicted, this is welcome news, indeed

A recent story in *Time Magazine* refers to the Watson approach to diagnosing and treating cancer. It discusses the many problems cancer poses as it finds ways to resist drugs. Researchers at the *Broad Institute of Harvard and MIT* are hoping to solve that problem by teaming up with *IBM Watson Health* to find answers that only reams of data can provide.

Wired Magazine, as far back as 2013, had some interesting information about Watson, that wasn't so elementary. I will quote the following from the article that was entitled, "IBM's Watson is Better at Diagnosing Cancer than Human Doctors." Remember, I'm quoting, so please don't blame me for the long, run-on sentence.

"The first stages of a planned wider deployment, IBM's business agreement with the *Memorial Sloan-Kettering Cancer Center* in New York and American private healthcare company *Wellpoint*, will see Watson available for rent to any hospital or clinic that wants to get its opinion on matters relating to oncology. (**Whew!**) Not only that, but it'll suggest the most affordable way of paying for it in America's excessively-complex healthcare market. The hope is it will improve diagnoses while reducing their costs at the same time.

"Two years ago, IBM announced that Watson had "learned" the same amount of knowledge as the average second-year medical student. For the last year, IBM, *Sloan-Kettering* and *Wellpoint* have been working to teach Watson how to understand and accumulate complicated peer-reviewed medical knowledge relating to oncology. That's just lung, prostate and breast cancers to begin with, but with others to come in the next few years). Watson's ingestion of more than 600,000 pieces of medical evidence, more than two million pages from medical journals, and the further ability to search through up to 1.5 million patient records for further information, gives it a breadth of knowledge no human doctor can match.

"According to *Sloan-Kettering*, only around 20 percent of the knowledge that human doctors use when diagnosing patients and deciding on treatments relies on trial-based evidence. It would take at least 160 hours of reading a week just to keep up with new medical knowledge as it's published, let alone consider its relevance or apply it

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practically. Watson's ability to absorb this information faster than any human should, in theory, fix a flaw in the current healthcare model. *Wellpoint's* Samuel Nessbaum has claimed that, in tests, Watson's successful diagnosis rate for lung cancer is 90 percent, compared to 50 percent for human doctors."

(<http://www.wired.co.uk/article/ibm-watson-medical-doctor>)

IBM's website contains a reference to oncology, and how Watson can provide oncologists with the assistance they need to make more informed treatment decisions. *Watson for Oncology* analyzes a patient's medical information against a vast array of data and expertise to provide evidence-based treatment options.

<http://www.ibm.com/watson/health/oncology/>

An article published this August by the *International Business Times* reported: "A female patient, suffering from leukaemia, baffled Japanese medical professionals after treatment. All previous treatment that had been prescribed for the condition was proving ineffective. It was a mystery for doctors. The team with no other ideas on what to do decided to call in IBM's Watson for help, and it proved to be a life-saving move.

"The mighty machine spent just ten minutes studying the patient's medical information and was able to cross-reference her condition against 20 million oncological records, which had been uploaded to its system by doctors from the *University of Tokyo's Institute of Medical Science*."

It discovered the patient actually had a varying form of the disease than first diagnosed, and told doctors it required different treatment. According to a report by *Silicon Angle* the new treatment proved far more effective than original methods.

<http://time.com/4565526/ibm-watson-cancer-drug-resistance/>

A similar article appeared in the *Wall Street Journal* in October of this year.

There was a piece in the *Huffington Post* accusing **WEBMD** of being less accurate than doctors in diagnosing symptoms. But if **WEBMD** and similar symptom checkers would avail themselves of Watson's technological advances, I believe the odds would improve dramatically.

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An article following that one was entitled, “**Your Flu Risk May Depend On When You Were Born,**” yet another reason why all of your data must be known for diagnoses to be accurate.

Congratulations, Dr. **Baidu**, on your doctorate degree. Well, not actually. While no medical shingle hangs outside of **Baidu**’s Beijing headquarters, China’s answer to **Google** has launched a chatbot they call “Melody,” which was designed to work with doctors to answer vital medical questions from the vast data it stores. **Baidu**, incidentally, also has a research facility in Silicon Valley.

In an article in the *Verge* (<http://www.theverge.com/>), an online science and technology magazine, this statement appeared:

“Melody is not a replacement for doctors — it's merely intended to inform the advice that they offer.

"By gathering more information for the doctor. We believe it will help them make better diagnoses."

<http://research.baidu.com/baidus-melody-ai-powered-conversational-bot-doctors-patients/>

The doctor sticks that tongue depressor in your mouth. With enough pressure he doesn’t have to ask you to say, “ahhh.” Your receptors will almost automatically do that. What is gleaned from that sound emanating from your throat? Actually, it’s not the sound that gives a clue to what may ail you, but saying “ahh” allows for a look at your throat that is typically blocked by your tongue.

The procedure that follows may or may not accurately diagnose a problem you could have. If the throat is sore, why is it sore? After a series of other probes, such as listening to your chest though a stethoscope; a blood-pressure reading; taking your temperature, a diagnosis usually follows.

The doctor will then go on to prescribe a medicine that has worked for many of his patients to fix what that tiny bit of information determined is the problem. He is treating the symptoms, but not necessarily the cause.

But what if some of the myriad of factors that make **Unique You** could indicate that you suffer from a disorder that resulted from something your mother ingested and then delivered to you via her breast milk? Or possibly those dozen bottles of Coca-Cola per week that

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you've guzzled for years might have actually rotted your insides. By having this trove of information about **Unique You**, those factors, inherited or otherwise, will be available to your doctor and/or hospital so that treatment will be far more accurate than current medical techniques permit.

Earlier in this presentation, I suggested that we probably don't know the cause of the deaths of most of our relatives or ancestors. But large computers could store information from records that were originally recorded, by the doctor pronouncing that person dead, or by the coroner. This information could be woven into your personal medical history database.

We're getting much more information on the future of medicine. A new TV show on CBS called "Pure Genius" is about a Silicon Valley billionaire who builds a hospital with the most advanced diagnostic procedures, designed to treat the rarest of diseases. While the show is science fiction-based now, the methods described will soon become science fact.

Are robot doctors next? Actually, they are now being used to assist doctors performing delicate surgeries. And there is no risk that a shaking human hand might place that scalpel in a wrong, vulnerable place.

With enough genetic data and the right algorithms, tools like Watson could be used for everything from diagnosing rare illnesses to prescribing perfectly correct dosages of medicine based on each patient's personal genetic makeup.

While it was once prohibitively expensive to gather your genetic data, companies can now provide it for you at bargain prices. Some of our members have taken advantage of services such as **23 & Me** ([23andme.com](http://23andme.com)). Other DNA gatherers are out there, offering lower and lower prices to provide similar services.

Creating the massive DNA repository that is required for this kind of analysis comes with a number of problems, especially when it comes to privacy. While the data could offer a number of medical benefits, it would have intimate knowledge of every person in the database, from their physical features to their ethnic background – and more.

Another issue is the fact that Watson can only look at existing information on disease, meaning that rarer ailments with few clinical

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studies would be harder to detect, simply because there is not enough data currently available.

The technology is certainly there for the eventual creation of an **A.I.** version of the medical T.V. show, *House*, but there are still plenty of hurdles that will need to be overcome before that day arrives, both in public perception and in governmental regulation.

Not happy with your genome? [There's an app for that](#), and it's called **Crispr genome editing**. An article appearing in *Nature*, the weekly science journal, discusses the process. The piece describes how scientists can become familiar with the genomic process for better insights of what may be ailing you.

(<http://www.nature.com/news/crispr-gene-editing-is-just-the-beginning-1.19510>)

I have not even touched upon your microbiome (I may have to buy you dinner, first). The **NIH** maintains a program called the *Human Microbiome Project*, or **HMP**.

(<http://commonfund.nih.gov/hmp/index>).

Just what is the microbiome? I'm so glad you asked. It's the full array of microorganisms (the microbiota) that live on (and in) humans and, more specifically, the collection of microbial genomes that contribute to the broader genetic portrait, or metagenome, of a human. The genomes that constitute the human microbiome represent a remarkably diverse array of microorganisms that includes bacteria, primitive single-celled organisms, fungi, and even some protozoans and nonliving viruses. Bacteria are by far the most numerous members of the human microbiome: the bacterial population alone is estimated at between 75 trillion and 200 trillion individual organisms, while the entire human body consists of about 50 trillion to 100 trillion somatic (or body) cells. The sheer microbial abundance suggests that the human body is in fact a "supra-organism," a collection of human and microbial cells and genes and thus a blend of human and microbial traits.

Although science has known about the microbiome phenomena since the 1880's, it wasn't until the beginning of the 21st century that the field was fully explored.

Then there's the old placebo effect. There was a case reported about a man in his mid-forties, appearing to suffer from early-onset Parkinson's. He displayed many of the symptoms. He allowed himself to be treated

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by a radical procedure, which included drilling two holes in his skull, and injecting an experimental medicine. Within hours after the conclusion of the “surgery,” the symptoms appeared to have vanished.

His first lucid thoughts were to attribute the medicine to his cure.

He was later told that the procedure had been a placebo, where no actual medicine was pumped into his cranium. The marks that felt like holes done by a surgical drill were simply two plugs, made to resemble an actual surgery. He was grateful for the outcome, and didn’t really complain that his treatment started as nothing more than an experiment. The mind appeared to have produced the pharmaceutical agents needed to treat the disease.

The *Ontario Brain Institute(OBI)* and *University Health Networks (UHN)* in Toronto have adopted *Watson for Drug Discovery* to analyze existing data with natural language processing and machine learning tools.

Dr. Lorraine Kaila, a neurologist at UHN, explains: “The platform gives us the ability to look at connections that researchers might not have found without dedicating weeks or months of time. This includes identifying compounds that we have not previously considered investigating for the treatment of Parkinson’s disease.” (Read more at: [http:// techportfolio.net/2016/10/watson-takes-on-parkinsons-disease/ -ixzz4RimjNPve](http://techportfolio.net/2016/10/watson-takes-on-parkinsons-disease/-ixzz4RimjNPve) )

If surgeons could know in advance about the patient’s ability to fight a deadly disease, much safer procedures could be developed to fight this, and possibly many other life-threatening ailments.

The **Unique You** has also mystified the psychiatric profession. Was that dose of Fluoxetine (AKA ,Prozac) correct for your actual condition, and not necessarily the one for which the diagnosis was based?



## **Technology and the Unique You: The New Medical Partnership**

I'll conclude with a short list of factors that may contribute to your uniqueness. There are undoubtedly many more, but this is a start:

### **Some of the Factors Contributing to the Unique You**

1	Heritage	15	Racial Makeup
2	Place of Birth	16	Condition of Birth Mother
3	Birth Sanitary Conditions	17	Mother's Dietary Habits
4	Religious Dietary Regimen	18	Parents' Smoking Habits
5	Your Smoking History	19	Indulgences/Habits
6	Outdoor Environment History	20	Associates Conditions
7	Your Earlier/Current Diet	21	Sugar Consumption
8	Sleep Quality/Quantity	22	Exercise Regimen
9	Home/Office Environment	23	Exposure to Toxins
10	Your Line of Work	24	Work Conditions
11	Exposure to Diseases	25	Personal Cleanliness
12	Your Micro biome	26	Anti-biotic Resistance
13	Immune System	27	Relationship to Indigenous
14	Placebo Susceptibility	28	Gluten Tolerance

This material is available on the HUSBAY website, if you wish to ponder it further, and look at some of the articles referenced.

Thank you.