VARIABLE LIMITS

by

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Chapters

Chapter 1: Science and Trackers

Genesis

The infinite lives in the finite. One has to cancel the other as night overtakes day the same way today closed into yesterday. Potential for actions resting as creation can happen an infinite number of times the big bang occurred in the universe.

In the movie "The Altered States" (1980 American science fiction-horror film) the main character explores the possibility of tapping into a primordial nature of humanity.

As a scientist, he's interested to explore the limits of humanity to understand the human potential to construct a consistent world view of reality. We live in a dynamic reality surrounded by tools that allow us to explore our potential to work more efficiently. Tools that enable us to both, augment or destroy us, in many cases they allow us to overcome our limitations and expand our abilities.

The advances of science and computation has spent considerable contributions to better understand our nature in the world. One of the many significant events in reconstruction of the body knowledge was Darwin's theory of evolution. Charles Darwin's contribution in the world of biology was a stepping stone that challenged the preconceptions of our myth and self-construction of the world at large.

The biological work of Darwin came to morph and shift past its application in biology and to other areas of human knowledge. Research shed new evidence that genetic expression along with the biological body are continuously reacting to its environment. Epigenetics, the study of changes in organisms has been the study of how the environment affects a person based on their interactions with environment, nutrition, habits, diet.

In a specific case, a genetic code remains unchanged but chemical tags expressed in a lifetime become attached to a person's genes that is eventually passed down. From here we can make an inference that context has affect on our biological states thereby how can we design technologies in accordance with context?

Improvements in technology in the late 20th and early 21st century allow automating the monitoring and recording of fitness activities and integrating them into more easily worn equipment. Early examples include wristwatch sized bicycle computers that monitored speed, duration, distance, etc., available at least by the early 1990s. Wearables heart monitors for athletes were available in 1981. Wearable fitness tracking devices, including wireless heart rate monitoring integrated with commercial grade fitness equipment found in gyms, were available in consumer grade electronics by at least the early 2000s.

Fitness Trackers are inventions that are a new outlook on how we regard personal management of health and lifestyle choices. The technology currently relies on the user's motivation which has been designed on surface level.

To elaborate, trackers are generally termed as "Activity Trackers" in that they provide users a summary outline of the user's behavioral and physical profile with data visualization. This information allows the user to gain an understanding for how these health practices reflect their physical health.

An identified factor of why a wearable device has not been able to sustain long term interest is attributed to a lack of good feedback in the design of a tracker. The paper "*Wearable Devices as Facilitators, Not Drivers, of Health Behavior Change*" puts forward that if feedback loops could be designed around behavioral economics, then individuals can be motivated by experiences of past and future rewards. Further elaboration observed that feedback could be designed to use concepts of informing individual what they would win if they were adherent to the new behavior.

A concept of feedback winning in the literature alludes to gamification mechanism, a staple industry practice in placing reward mechanism which motivates users with points and rewards. This form of gamified feedback would not be long term and offers little in terms of a user's expansive goal if channeled into designed feedback where a user's motivation increases as the user taps into their own individual biological abilities.

Trackers should be designed to aid users to know how to train their individual abilities to deepen their practices of learning about their bodies and potential for growth over a variety of context for biological states.

The incentive of creating trackers that account for every user's bioprofile catering towards an individual health and growth experience would be the best form of feedback loop.
The paper mentions that feedback should be designed as a combination of individual encouragement, social competition and collaboration as effective feedback.

Could trackers be designed in ways that accommodate the adaptive complexity of biological states to address a need similar to how some users regard their music devices as an extension and expression of themselves.

Conventional medicine gave us penicillin, chemotherapy, radiation therapy, and surgery. It is a model of evidence based diagnosis and treating disease born out of the reductionist approach. Evidence-Based Medicine (EBM) is a medical practice that uses best available information to inform best decision making in medical practice.

Integrative medicine takes a counter approach of the sum is the whole of the parts in that physicians view patients as whole individuals composed of various dimensions to create the holistic medical treatment. Integrative medicine is a recent modern development in medicine although its philosophical roots are derived from traditional medical systems.

Conventional and Alternative Medicine (CAM) is the best of both that combines alternative medicine with conventional medicine for holistic treatment. Healthy living is a complex occurrence rooted in a not so often perfect equilibrium. Health determinants include income, social status, education, physical environment, working conditions, culture, gender, genetics, personal behavior and accessibility to health care.

Work outsourcing and companies starting with scale and speed require a busy work culture can prevent work and life balance. This can instigate the accumulation of micro damages towards one's health that eventually develop in the life of the individual. This onset of sickness or disease can be attributed to genetic inheritances or encouraged by the context and habits of the individual.

The individual although empowered to shape their reality and lived circumstances are still subject to the deterministic conditions of socioeconomic and accessibility towards resources that would extend towards their quality of living.

Public perception towards any kind of fitness trackers or other wearable devices has been at best a detached response with early adopters who have been invested in utilizing this new technological invention.

It's been estimated that 1% to 2% individuals in United States have used wearable device while in a general survey 75% of users have described themselves early adopters of the technology. A slice of the demographics shows that 48% were younger than 35 years and 29% earned more than US$ 100'000 annually.

There is the element that users of this product outgrow the usage of a tracker and are not motivated to integrate this into their long-term lifestyle. Some of these losses of interest has been attributed to a lack of a reward system being designed around trackers. A Paper entitled "*Wearable devices as Facilitators, not drivers, of health behavior change***" described the use of wearable devices as a multistep process. A survey quoted in this paper mentioned that more than half of individuals who purchased wearable devices stopped using them, one third did so before 6 months.**

Fitness trackers of the future should be designed to allow users to shape their biological bodies based on their context of diet, health practices, repetitions and biological makeup which can create natural motivation in feedback as they develop their ideal biometrical definition specific to their unique physiological and genetic capacity for management of personal health.

Fitness as a concept can be a discussion in philosophy, sciences, or even cognitive studies. First, we ought to ask ourselves what is fitness or strength, is it multivariable or just a value that can be defined as a physical construct. Is our construction of fitness more in relation to the physical or is it something more abstract that we try so hard to understand?

On a physical level, simultaneously training for strength and endurance produces adaptive qualities compared with training for either exercise mode on its own. On the lens of something intangible like the construction of self or consciousness, does the same apply?

The concept of resilience has been difficult to study as it has been known to encapsulate wide divergence of behavioral patterns. Developmental and psychological studies demonstrate that resilience in both children and adults is a common occurrence following successful navigation of adversity. Children however are better able to exhibit resilience across a wide variety of negative environmental stressors.

Are we able to design personal trackers that guide everyone in constructing digital sculptures of themselves with interactions and motivation that develop in parallel with their biological state adapted for resilience?

How much control do we have over our physical well being? How much does the outside context influence our sense of well being and life quality?

A tracker may let us answer some parts of this perennial question on mortality exploring the thin line of deterministic and indeterministic conditions.

Model Framework for Fitness Trackers

In application, a person informed by a summary of their data analytics will adjust their routine, performance, and habits across various settings. This shift influences their energy exertion, purposeful behavior, and personal motivation forming an active process of self-renewal driven by continuous decision-making informed by analytic feedback.

Developments in the medical field have seen a gradual move away from purely conventional approaches, with growing integration of systems theory into patient treatment. Integrative medicine views the patient as a whole composed of interconnected dimensions as a basis of holistic treatment.

Clinicians and researchers use the term integrative medicine to describe the combination of complementary and alternative medicine (CAM) with conventional practice, with the goal of fostering an effective patient-physician relationship.

Evidence Based Medicine (EBM) is an empirical approach that compiles continuous information and knowledge about a patient to provide clarity in physician decision-making, functioning most effectively when supported by technology.

The EBM methodology operates within a cybernetic framework: for the physician to make accurate assessments, patient information must be continuously verified through ongoing interaction and corrective feedback. In this way, medical systems rely on a continuous feedback loop between patient and physician to support effective treatment outcomes.

Can fitness trackers be used to examine or create a feedback model rooted in cybernetics, CAM and EBM applied in the design of personal trackers? The model intended for the design of personal trackers can consider utilizing components of EBM, CAM and cybernetics.

Data visualization

Personal trackers should be designed on an adaptive model progressive of the digital constructs of the individual that relies on feedback that accommodates for gradual biological resilience.

The circle segment visualization technique in Paper “Circle Segments’: A Technique for Visually Exploring Large Multidimensional Data Sets” applied in visualization exploratory data analysis for multidimensional data is used as a reference for constructing personal visualization for this work.

The technique was utilized for a stock exchange database and noted to be suitable to view of fluctuations of stock price for detecting analogical tendencies between dimensions which were not detectable in ‘line graph’ visualization. High degree of overlaps between data are not suitable for ‘line graphs’. The circle segment technique for representation of data is better perceivable for potential dependencies and correlation between dimensions.

The aim of this work is to explore the mind, body and experience in order to understand where does will meet the mind and to what extent do the gradients of indeterminism and determinism meet.

Sciences studying the context of biology

The preferable feature would be the user's possibility to define and manage their bio profile in the trackers would allow medical institutions to focus efforts in analysis and genetic growth of the individual. Users take ownership of biology as much as value on how their interest and choices create their lives, transferring ownership towards their biology.

Trackers that are designed with this goal enable users to move away from patient-directed-self monitoring to personal biological definition of self-determination. With personal trackers, users would be able to define their totem version of themselves and have biological data diaries communicated by intuitive aesthetic visualization rather than something more cognitive like charts which could be used as studied analysis. This would be streamlined to medical institutions who could better chart out the habits and context of the users to make connections on how their use of the trackers are dynamically changing their contextual biological systems.

The medical institution takes on a more accurate predictive approach in identifying contextual anomalies that indicate an emerging health issue. This approach differs from the current system that combines patient's history, physical examination, laboratory, and imaging studies for a comprehensive approach to lifestyle management for chronic diseases or obesity.

The paper entitled "Integrating Mobile Fitness Trackers into the Practice of Medicine" admits that obesity and metabolic syndrome are a result of daily lifestyle choices and the management of obesity. Diabetes or metabolic syndrome are done by discrete office visits that rely on patient's anecdotal recollections.

Let us consider some contemporary cases of adaptation and evolution at work in our lifetime as variable beings influenced by our context. A research conducted by neuroscientist at the Federal University of Rio de Janeiro observed that the addition of neurons to primate brains require a fixed cost of 6 calories per billion of neurons.

To reframe the significance of this number; the findings show that the human brain evolved with meat eating diet as opposed to current thought that a vegan diet was sufficient for the vitality of our being. This implies that meat is an integral component to human evolution and not just sponge based diet.