
Quantuition: Exploring the Future of Representing Biometric Data

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ABSTRACT

In a future where we can and do track everything, how will the way we represent data influence how we relate to ourselves and the world around us? Through speculative design, this project explores the relationship between personal biometric data and the meaning we find in it. Based on insights gained from cultural probes I deployed relating to the data collected during physical exercise, I designed a speculative self-tracking system, Quantuition, that collects data from nanosensors. The system renders that data into 3D data sculptures. Presented in the form of an Instagram feed, this speculation highlights how data design influences the process of individual and social sense-making.

KEYWORDS

data visualization; data physicalization; self-tracking; quantified self; biometrics.

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INTRODUCTION

The rise of smart watches outfitted with biometric sensors, like Garmins and Fitbits, has brought the quantified self movement from the fringes to the mainstream. As it becomes easier for us to measure and log personal data – how fast our hearts beat, how deeply we sleep – this conjures a future where

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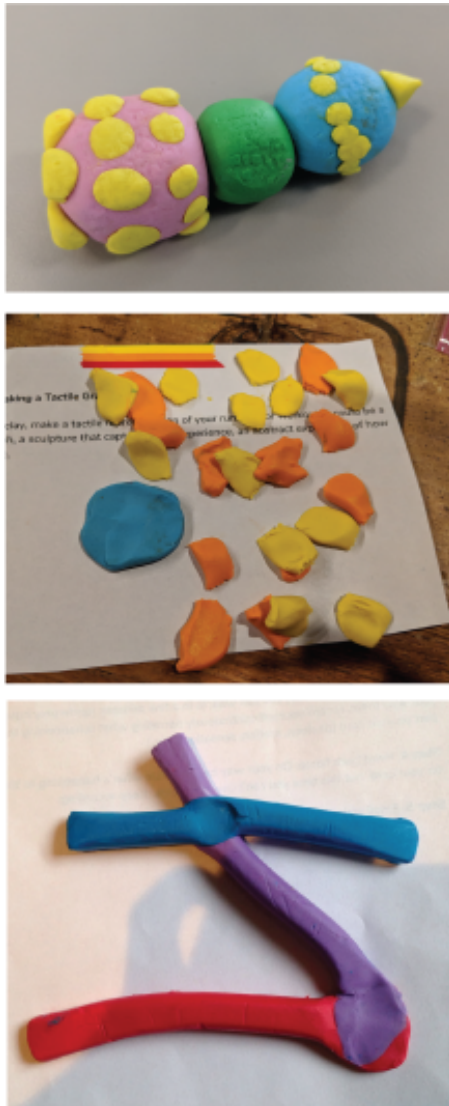


Figure 1: Results of the data sculpture probe. Top: The emotional state of a walk conveyed through relative lumpiness of yellow dots. Middle: A scene with fallen leaves and a pond. Bottom: Representing the flow state of running on a treadmill.

we can, and do, track everything. How will our data representations influence the way we relate to ourselves and the world around us? In a world saturated with information, many people still find it difficult to uncover meaning in data. This project uses cultural probes and speculative design to explore these nascent issues. Cultural probes allowed me to understand what values are inherent in the way we represent personal data. Speculative design allowed me to expose the promises and pitfalls of personal data representation as it collides with smart materials, social networks, and machine intelligence.

CULTURAL PROBES TO EXPLORE PHYSICAL ACTIVITY TRACKING

I crafted cultural probes to interrogate self-tracking and physical exercise. Probe activities included drawing graphs, communicating data through non-verbal sounds, and creating tactile graphics. I deployed these probes to three runners and walkers and interviewed them about their experiences.

The tactile graphic task directly inspired my speculative design process. To uncover emotional representations of physical exercise and to explore unconventional ways of displaying data, participants were given clay and asked to make a sculpture that encapsulated their experience of walking or running. The sculptures were varied in form and meaning (see Figure 1). I anticipated that this activity would be challenging; however, participants enjoyed sculpting and reported that it encouraged them to engage with experiences that don't typically invite them to pause for reflection.

SPECULATIVE DESIGN: QUANTUICTION SELF-MONITORING SYSTEM

Imagine a world where personal sensors can track everything: the content of our conversations, how fast our hair is growing, the amount of dust we inhale, how many tears we cry. As we become aware of these myriad personal data points, they could overwhelm us. How do we draw meaning from this data? How do our interpretations of this data influence our actions, and what are the implications of those new feedback loops? Are we ruled by the data, or do we rule it?

In this speculative design, I've created an imagined product, Quantuition, that consists of spreadable surface and ingestible internal nanosensors. Instead of a digital dashboard, as is standard with today's quantified self systems, data insights are communicated via whimsical data sculptures. Each night, Quantuition's nanosensors beam the massive amounts of data they've collected into the cloud, where software interprets it, synthesizes it, and algorithmically generates shape files for a 3D printer. Each morning, we can check our in-home 3D printers to find a personalized data sculpture representing the previous day. These data sculptures are intentionally opaque – Quantuition's software processes our data, but we are left to interpret the meaning ourselves. This idea is inspired by Gaver's Home Health System projects: The opaque home health horoscopes [5] invited people to inquire and engage, whereas the more explicit health monitor readings [4] did not inspire the same level of engagement.

I've presented this speculative design in the form of an Instagram feed ¹ containing pictures of data

¹<https://www.instagram.com/jordansspeculativdesign/>

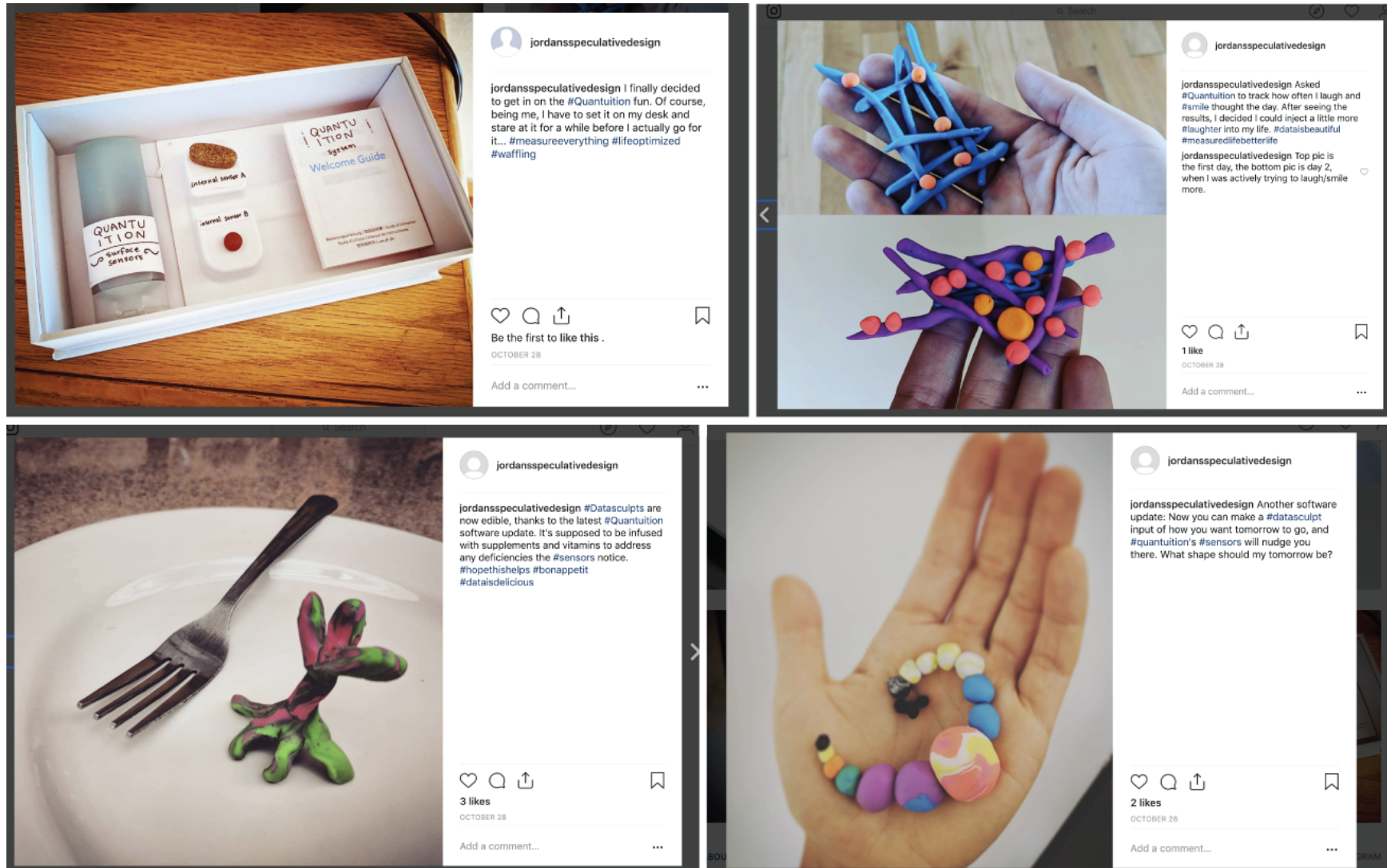


Figure 2: These images show key moments in the Quantuition user's experience. Top left: The spreadable and ingestible sensors arrive. Top right: The user experiments with feedback loops as her sense-making of the data sculptures dictates her behavior. Bottom left: Data becomes even more of a driving force as the Quantuition launches edible data sculptures. Bottom right: Taking feedback loops even further, Quantuition sculptures can also be inputs that direct the nanosensors to control the user's behavior.

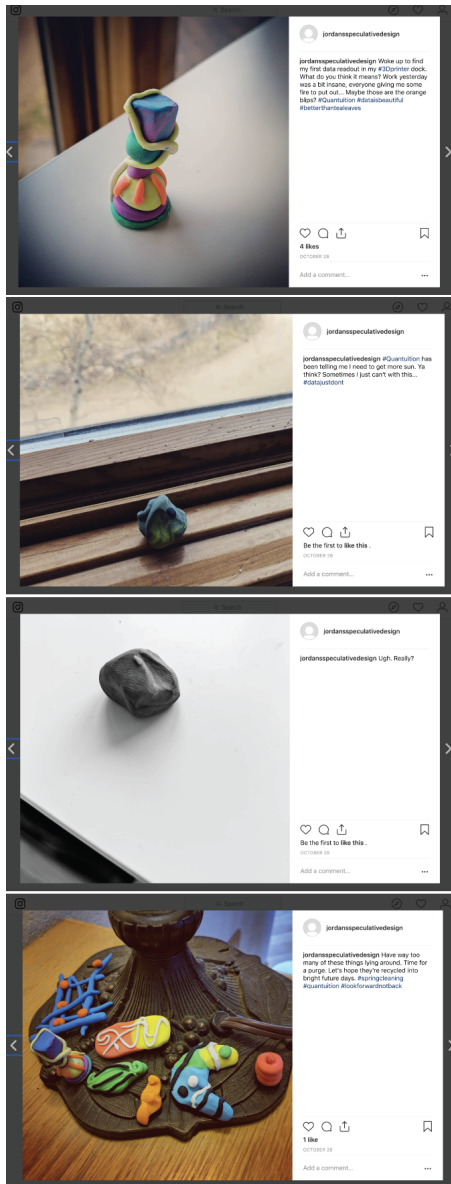


Figure 3: Posts from Quantuition user’s feed showing her first data sculpture (top), a negative feedback loop (middle), and accumulating data detritus (bottom).

sculptures I crafted out of clay. The sculptures are inspired by actual data physicalizations: Marshall Islands stick charts [1], the Melting Memories project [2], a physical Sankey diagram [3], and Worry (Prayer) Beads [6]. The quantified self movement, wellness, and self-improvement are often conflated with the stories we tell ourselves and other people. Thus, an Instagram feed format allowed me to explore the journey a person takes as she integrates Quantuition into her life as well as how she makes sense of the data sculptures and projects their meanings through social media.

In particular, this speculative design exposed new questions about the positive and negative feedback loops inherent in a hyper-quantified future. The Quantuition user experiences the positive influences of examining her life through a data lens by using the sculptures to track – and then increase – her daily laughter (figure 2). But self-tracking can also be demotivating: Lackluster, uninspiring data sculptures drive the Quantuition user deeper into a depressive episode (figure 3).

Going beyond the motivating or demotivating powers of personal data, this speculative future allowed me to interrogate how data might more explicitly drive our actions. Perhaps Quantuition could physically impose behavior changes through edible data sculptures infused with supplements or medications. Who should dictate the specifications of these edible sculptures, the user or the software? With data sculptures, insights can be externalized and even exported. Our user can eat her own data sculpture, but she can also give it to someone else, disrupting the intended functionality of Quantuition and using data sculptures to blur the boundaries between the self and others.

Where does the user’s control – and ultimately free will – begin and end? In the final frame of this user’s Instagram feed (figure 2), Quantuition’s data sculptures can now be used as inputs, directing an aspirational futures. It is unclear whether, in this scenario, the user has more or less power over her future actions than she did before she began using Quantuition.

DISCUSSION

We interact differently with data when it isn’t our own, thus the lessons we can learn from these imagined designs are limited. They invite us to explore the social, rather than introspective, aspects of data representations. Due to the nature of Instagram, simply by using hashtags (some I invented, some already being used), random people engaged with these images unprompted. If I were to continue this project, I would engage this social aspect of data tracking more fully, using commenting features to ask people to react to these speculative posts and creating a community of discussion around them.

CONCLUSION

This project allowed me to ask new questions about how we should be representing and interpreting our personal data. It also led me to interrogate the positive and negative feedback loops produced by biometric monitoring. Ultimately, this speculative future raised questions about data’s relationship to free will, agency and personal control.

ACKNOWLEDGMENTS

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REFERENCES

- [1] 2013. 1862 – Marshall Islands Stick Charts. Retrieved December 7, 2018 from <http://dataphys.org/list/marshall-islands-stick-charts/>
- [2] Refik Anadol. 2018. melting memories: large data sculptures show you the inner workings of the brain. Retrieved December 7, 2018 from <https://www.designboom.com/art/refik-anadol-melting-memories-neuroscience-04-25-2018/>
- [3] Willard Cope Brinton. 2012. 1933 – IBM's Cosmograph. Retrieved December 7, 2018 from <http://dataphys.org/list/ibms-cosmograph/>
- [4] William Gaver, John Bowers, Tobie Kerridge, Andy Boucher, and Nadine Jarvis. 2009. Anatomy of a failure: how we knew when our design went wrong, and what we learned from it. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. ACM, 2213–2222.
- [5] William Gaver, Phoebe Sengers, Tobie Kerridge, Joseph Kaye, and John Bowers. 2007. Enhancing ubiquitous computing with user interpretation: field testing the home health horoscope. In *Proceedings of the SIGCHI conference on Human factors in computing systems*. ACM, 537–546.
- [6] Loren Madsen. 2015. 2004 – Worry (Prayer) Beads. Retrieved December 7, 2018 from <http://dataphys.org/list/worry-prayer-beads/>