Coherent Interaction as Constant Reflection

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Abstract

My creative practice began by finding novel interaction methods for reading, writing, and listening. I placed sensors on objects or in locations so they could trigger the playback of text or audio related to the activity I was performing. This could affectively enhance the experience of everyday activities by subliminally priming my subconscious with hypnotic scripts related to the experience. Then I expanded to typing out affirmations or goal statements related to the activity as I was performing it. This added an element of intentionality and deliberate focus to activities normally performed mindlessly. Recently, my practice has shifted inward. Instead of using sensors on external objects, I use physiological signals produced by my body like my heartbeat, breath, and blinks to control my interaction with information. This has made interoceptive awareness a continuous focus throughout the day as I move between different activities. My experiments with bringing beats, breaths, and blinks into coherence for interaction has led me to speculate on the design of future thought tracking technologies for reflection, self-control, and self-knowledge.

Keywords

Embodied Interaction, Ubiquitous Computing, Tangible Computing, Wearables, Text-input, Slow Technology

Introduction

We perform the same actions thousands of times throughout our lives. We walk to the refrigerator, towel off after a shower, wash our hands in the sink, and countless other things. Many of these actions are performed automatically while we are daydreaming and thinking about other things. My arts practice began by harnessing these times for self-improvement and learning. I converted the activities we perform on autopilot into opportunities for self-programming. This leads to living more efficiently and having more control over the content I absorb, from the subliminal periphery to the center of my attention. It provides the opportunity to reshape reality.

Early Practice

My practice began by placing sensors on objects I use regularly to play back audio to enhance the experience of the activity. I made the Mantra Mouthguard where I used computer keystrokes to play the Hare Krishna mantra syllable by syllable through computer speech on an audio transducer placed on the tongue (see Figure 1). [1] This allowed me to type long papers while slowly feeling the Hare Krishna mantra on my tongue as if I was chanting it as many times as a monk would. As a slow typer, it worked perfectly for my text input speed and provided a flow-like state when the perfect rhythm of chant to keystroke was found.

Figure 1. Mantra Mouthguard (2018). Audio transducer (bone conductor) in an LED mouthpiece with LED removed.

I expanded the use of audio accompanying activities with my performance “Do You Like Butter?”. [2] In this piece I mounted a computer keyboard to the top of a pull-up bar enveloped in fake buttercup flowers and had the computer ask the question “Do You Like Butter?” syllable by syllable when my chin pressed the space bar on the top of the pull-up bar. If I could perform the five pull-ups required to complete the question, then the computer would say I didn’t like butter. If I couldn’t make the five pull-ups, then the computer would say I did like butter. Again, I was using audio paired with an activity to enhance my experience of it, this time motivating me to eat less butter so I could lift myself more easily.

Next, I created a chin interface which was a computer mouse mounted on a neck posture corrector that captured the up-and-down movements of my jaw while chewing to play back music from a midi score. [3] I would eat food and listen to a related musical score to affectively enhance my eating experience. I made connections like eating beef jerky while hearing cowboy music to boost masculinity, chewing a Take Five bar and playing back the jazz standard of the same name while holding a saxophone to feel cooler, and eating carrots while playing back the Looney Tunes theme song to make the carrots more appetizing. I even mounted

the mouse on a violin that had a mini embedded hibachi grill so I could roast a marshmallow with a bow-sized skewer and eat it while playing back the Kumbaya song as if I was seated around a campfire. [4]

Figure 2. One-button Chin Interface (2024). Microswitch mounted in a 3D printed frame, neck cord, quarter inch output.

One Man Trance

During my MFA thesis research I became a certified hypnotist, specializing in inventing my own active-alert self-hypnosis techniques. Active-alert hypnosis uses physical movement instead of relaxation to get your mind to a suggestible state, and my thesis paired these movements with computer interaction. I extended my practice to more activities from my daily routine like choosing an item from the kitchen pantry, washing hands in front of the bathroom mirror, lying in bed watching TV, exercising, and practicing at my one-man band drum pedal station to trigger playback of text, images, and audio to program my subconscious. [5] The triggers I used were accessibility switches and adapted electronic drum equipment that sent next slide or mouse movement messages to the computer through MIDI translation programs and MAX MSP. For example, I used knee triggers on the front of a bathroom vanity to control the playback of prerecorded audio of a hypnotic script empowering my immune system while I was washing my hands and reviewing/ "cleaning up" recently brainstormed ideas in a smart mirror. [6] This sparked my interest in pairing particular computer interaction opportunities with reading, writing, or learning specific information related to the interaction.

Placebo and Suggestion

One of the major findings of my thesis research was the COMT gene. Catechol-O-methyltransferase (COMT) is the mechanism our brains use to sweep up the extra dopamine that is floating around without a purpose. COMT works better at cleaning up dopamine for some people and worse for others. [7] The key to determining how well your COMT enzyme works is to look at the combination of valine (val) or methionine (met) on a certain rung of your DNA, rs4680. 25% of people are met/met, meaning they have a lot of extra dopamine left in their brains. All the extra dopamine in the brain of a met/met means they rate experiences as more pleasurable than val/vals or val/mets. But most interesting of all – met/mets are much more prone to respond to placebos and suggestion. [8]

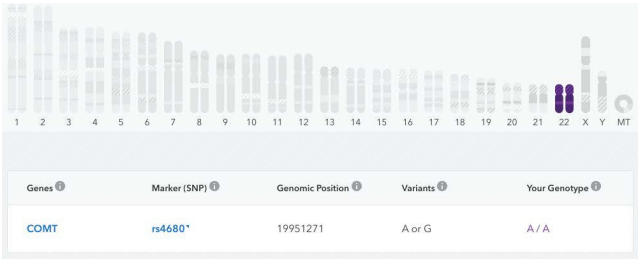

Figure 3. Screenshot of my raw DNA data for marker rs4680 (COMT) from "Your Raw Data," 23andme.

My DNA results show that I am met/met, part of the 25% of the population that responds strongly to placebos and suggestion (see Figure 3). This became the key to shifting my practice to favor text-input over reading or listening because typing, especially in novel ways, forces me to hold words and ideas in my head for longer periods of time. This boosts the overall effectiveness of the affirmation, goal statement, intentionality statement, or prayer because I am so prone to suggestion and placebo. The question driving my practice became "how can I be writing (something positive) all the time?"

A piece I created for this constant writing research was the Constant Notetaker, a way to write on the Apple Watch while not wearing it on your wrist. Instead, the Apple Watch is mounted on a 3D printed stand (see Figure 4) that is held in place against the palm of your writing hand with your writing pinky and ring fingers. This allows you to handwrite using a stylus without having to lay your wrist or forearm on a flat surface. You can instead gesture freely as you are writing allowing for more expressive thinking and communicating by incorporating gestures.

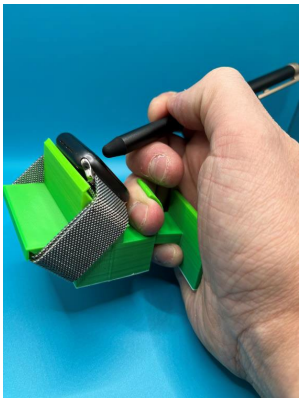

Figure 4. Constant Notetaker (2022). Apple watch, stylus, 3D printed frame.

Typing Variations

To input text while engaging in activities I utilized the built-in on-screen keyboard accessibility option available on Mac and Windows computers. I placed sensors on objects or on my body to retrieve motion data to power choreographed mouse movement over the onscreen keyboard to make key selections. The cursor would start at the left-most tab key and toggle through the P key, then move to the A-L key row up to and including the Enter key, then move to the Z-M key row up to and including the ?/ key. Once the cursor reached the end of the final row it would restart from the Q-P row again.

I began researching metaphor-based embodied interaction, a design approach that maps abstract concepts to physical gestures and interactions. I wanted to potentiate the power of the statements I was typing by having an activity represent the concept. An example of this is my Schedule Juggler (see Figure 5) where I placed a piezo microphone in a 3D printed frame that covers a portion of the palm of each hand to capture the moment each ball is caught in each hand. When a ball hits the trigger bar in each hand, a message is sent to a laptop to move the mouse cursor from left to right across the keys on an onscreen keyboard. The Schedule Juggler was designed as an interface specifically for typing and editing your schedule for the week. Making every scheduling activity use juggling lends psychological weight to the task, feeling how hard it is to do multiple things and how much attention it requires. Switches on the floor in front of the juggler control select, delete, and space functions.

Figure 5. Schedule Juggler (2022). Piezo microphone, 3.5mm wire audio terminal, 3.5mm to .25" audio converter, 3D printed frame.

Another example of metaphor-based embodied interaction is my piece Twist and Type Out. I reversed the top half of a Nordic Track so I could stand on the floor and pull the arm resistance cables in the "the twist" dance motion. I mounted a magnetic reed switch to the frame of the arm resistance cable reel and placed a magnet on the reel itself to send a signal to the computer each time an arm pulled back in the twisting motion. This piece had an audio element as well playing back the midi score of Chubby Checker's "The Twist" one beat at a time. To complete the embodied action and typing metaphor pairing I would type a twist metaphor such as "life is full of twists and turns" while playing and dancing to the music.

Interoceptive Investigations

Recently my practice has shifted inward, aiming to maintain a focus on my inner signals rather than focusing on the activity creating the signals. While typing through tangible objects rather than computer keyboards slowed text-input, using physiological signals to type slows text-input even more. According to Hallnäs and Redström, slow technology can aid in reflection because we interact with it at a pace that encourages memory and experience. [9]

My first interoceptive piece incorporated blinking as one channel of text-input in my Carry-on for Consciousness (see Figure 6). The Carry-on for Consciousness is a hard shell wheeled carry-on luggage bag with embedded electronics to allow for embodied travel writing during the most mundane aspects of a flying vacation. A traveler can wheel the carry-on around the airport and look down at the luggage to see eight motorized faders moving left and right toggling through each letter of the alphabet. The faders' movements are powered by sensors mounted on the glasses, chin, wrist, and ankle of the traveler. As the traveler blinks, chews gum, swings their arm by their belt in a natural motion, or walks and moves their ankle past their opposite ankle the accompanying faders will move. The traveler can type an up to eight letter word as an intentionality or goal statement to help them remain centered at the airport and reflect on their journey once they return from their destination.

Figure 6. Carry-on for Consciousness (2024). 20" hardshell carryon luggage bag with a 5" x 9" rectangular section cut from the front, a Behringer X-Touch Compact, an Arduino micro, ten microswitches in a 3D printed frame attached to the carryon handle, a Windows laptop running Max for Live, Ableton Live 12, Bome Midi Translator Pro, and two Roland TM-1s to receive the signals from the sensors.

Coherent Interaction

Currently, I am developing a new system of embodied text-input using interoceptive awareness techniques. I have shifted from toggling through an onscreen keyboard to using morse code. This drastically reduces the amount of time spent typing out my thoughts. To type out the morse code I must bring my breath, blinks, and heartrate into coherence. I am experimenting with blinking between heartbeats to be a "dot" and blinking on heartbeats to be a "dash" while inhaling. While exhaling, blinking between heartbeats is a space and blinking on heartbeats is a backslash, two keys I need to separate morse characters and words for the translation software I am using.

The challenge is finding the right sensors to use to harness all these bodily signals without interfering with everyday activities. I have experimented with snorkel masks and a midi breath sensor to capture inhales and exhales (see Figure 7). I am experimenting with different blink sensors, recently finding gel electrodes attached to the face to be the best option for operating through different lighting conditions throughout the day. Finding a way to get a steady live heartrate signal while moving has been the most challenging, but currently electronic stethoscopes that allow me to both listen and send a signal to the computer seem the most promising.

Figure 7. Breath-based Morse Interface (2024). Nose snorkel, 3D printed mount, Jamboxx midi harmonica (in/out breath sensor).

Future Work

I hope to develop my coherent interaction techniques where I can constantly be typing throughout any activity I am doing. Imagine typing out positive self-talk to yourself throughout the day. Instead of rehashing old issues and anxieties, you could be leading your thoughts in a more positive direction. Not only that, the interoceptive awareness benefits are like those experienced from mindfulness exercises. A user of coherent interaction could constantly reflect on how they are feeling, naming emotions and experiences to help manage them, a proven process for lowering anxiety. [10] All this reflection could be done without anyone else being aware of it as no journals, smartphones, or laptops would be required for logging. The self-discipline coherent interaction encourages along with the self-knowledge developed from tracking and typing thoughts throughout each day may lead to a more reflective human experience.

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